

REPORT NUMBER: R&D-CAL-15-036

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

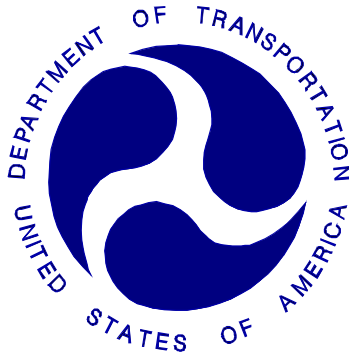
**2016 Toyota Scion iA
Four Door Sedan**

90.1KPH, 15 DEGREE ANGLE, 35% OVERLAP

TEST DATE: 6/17/2016

NHTSA No: R20165146

**CALSPAN CORPORATION
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FINAL REPORT SUBMITTED:

July 15, 2016

PREPARED FOR:

**U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
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FINAL REPORT ACCEPTANCE BY VEHICLE SAFETY RESEARCH, OFFICE OF
STRUCTURAL AND RESTRAINTS RESEARCH DIVISION:

Date: _____

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

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16. Abstract A test was conducted in accordance with Contract DTNH22-14-D-00359, Task Order #001. The Test consisted of an Oblique Moving Deformable Barrier (OMDB) traveling at a target speed of 90.12 kph into a stationary 2016 Toyota Scion iA four door sedan. 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 June 17, 2016. The OMDB impact velocity was 90.24 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 528 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>353.89</td> <td>434.22</td> </tr> <tr> <td>Brain Injury Criteria (BrIC)</td> <td>N/A</td> <td>0.58</td> <td>1.97</td> </tr> <tr> <td>Peak Neck Tension</td> <td>N</td> <td>2327.06</td> <td>2164.76</td> </tr> <tr> <td>Peak Resultant Chest Deflection</td> <td>mm</td> <td>59.81</td> <td>43.23</td> </tr> <tr> <td>Peak Abdomen Deflection</td> <td>mm</td> <td>-64.60</td> <td>-114.34</td> </tr> <tr> <td>Peak Resultant Acetabulum force</td> <td>N</td> <td>3193.99</td> <td>2767.22</td> </tr> <tr> <td>Peak Femur Force</td> <td>N</td> <td>-5989.44</td> <td>-3824.73</td> </tr> <tr> <td>Right Tibia Index</td> <td>N/A</td> <td>1.04</td> <td>1.02</td> </tr> </tbody> </table>					Measurement Description	Units	Driver THOR	Pass. THOR	Head Injury Criteria (HIC ₁₅)	N/A	353.89	434.22	Brain Injury Criteria (BrIC)	N/A	0.58	1.97	Peak Neck Tension	N	2327.06	2164.76	Peak Resultant Chest Deflection	mm	59.81	43.23	Peak Abdomen Deflection	mm	-64.60	-114.34	Peak Resultant Acetabulum force	N	3193.99	2767.22	Peak Femur Force	N	-5989.44	-3824.73	Right Tibia Index	N/A	1.04	1.02
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DISCLAIMER

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

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Date: July 15, 2016

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Edward J. Dutton, Test Engineer Director
Transportation Test Operations

Date: July 15, 2016

TABLE OF CONTENTS

Test Vehicle:	<u>2016 Toyota Scion iA four door sedan</u>	NHTSA No.:	<u>R20165146</u>
Test Program:	<u>R&D 90.1kph, 15° / 35% Left Oblique Offset</u>	Test Date:	<u>6/17/2016</u>

<u>Section</u>		<u>Page No.</u>
1	Purpose of Test	1-1
2	Summary of Test	2-1
	Crash Vehicle Summary	2-3
	Preliminary Injury Summary: Driver	2-5
	Preliminary Injury Summary: Front Right Passenger	2-6
3	Data Sheets	3-1

<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	3-2
2	Seat Adjustment, Fuel System, and Steering Wheel	3-6
3	Dummy Longitudinal Clearance Dimensions	3-8
4	Dummy Lateral Clearance Dimensions	3-10
5	Seat Belt Positioning Data	3-11
6	High-Speed Camera Locations and Data	3-12
7	Vehicle Instrumentation Data	3-15
8	Photographic Reference Target Locations	3-18
9	Test Vehicle Summary of Results	3-25
10	Post-Test Observations	3-26
11	Vehicle Profile Measurements	3-27
12	Accident Investigation Division Data	3-29
13	Vehicle Intrusion Measurements	3-30
14	OMDB Crush Measurements	3-47
15	Summary of FMVSS 212, 219 (Partial), and 301 Data	3-48
	Windshield Periphery Measurements	3-48
	Areas of Protected Zone Failures	3-48
	Fuel System Integrity Post Impact Data	3-49
16	FMVSS 301 Static Rollover Results	3-50
17	Dummy / Vehicle Temperature Stabilization	3-51

<u>Appendix</u>		<u>Page No.</u>
A	Photographs	A-1
B	Vehicle & Dummy Response Data Traces	B-1
C	Part 572 E/O Dummy Calibration and Performance Verification Data Sheets	C-1
D	CMM Measurement Procedures	D-1

SECTION 1
PURPOSE OF TEST

Test Vehicle: 2016 Toyota Scion iA four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
Test Date: 6/17/2016

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 0001. The purpose of this test is to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

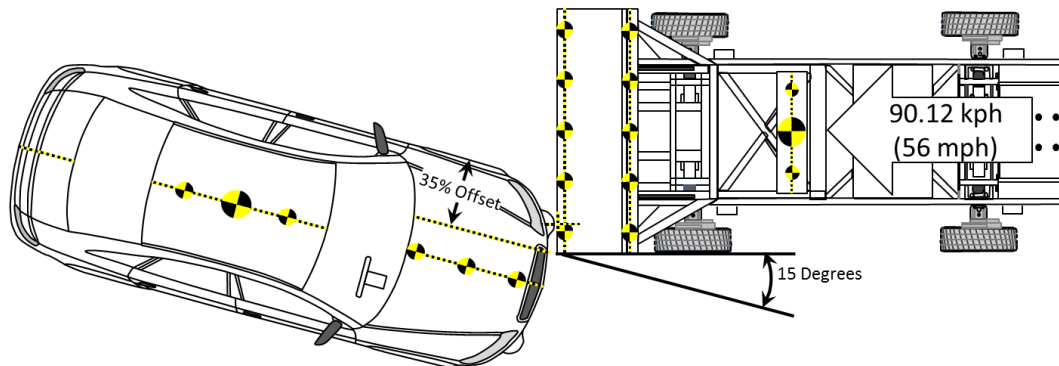
This test was conducted in accordance with the instructions set forth for a 15° angle, 35% offset moving barrier to vehicle impact, outlined in Contract No. DTNH22-14-D-00359, Task Order 0001. Data was obtained indicant of Federal Motor Vehicle Safety Standard FMVSS 208- Occupant Crash Protection, FMVSS 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 0001.

SECTION 2 SUMMARY OF TEST

Test Vehicle: 2016 Toyota Scion iA four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
Test Date: 6/17/2016

A 2016 Toyota Scion iA four door sedan 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 1,377 kg (3,036 lbs), and the OMDB's mass was 2519 kg (5,552 lbs). The test was conducted by Calspan Corporation on June 17, 2016.



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. 016) was seated in the left, front (P1 -Driver's) seating position and one 50% adult male THOR-NT adult male ATD (Serial No. 015) 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 airbag.

SECTION 2 (CONTINUED)

SUMMARY OF TEST

Test Vehicle: 2016 Toyota Scion iA four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
Test Date: 6/17/2016

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 81.4% total windshield retention, with 64.3% and 98.5% 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 528 mm at C2 to the left of the vehicle's centerline. The maximum crush of the structural bumper beam was 526 mm at B2, 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 some separation along the bottom edge.
- The A-Pillar & B-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, side headliner & Headrest
- Torso contacted the frontal airbag
- Side Torso and Arm contacted the Torso/Pelvis Airbag & Driver's 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 & Center instrument panel
- Torso contacted the frontal airbag
- Left shoulder contacted the center instrument panel
- Knees contacted the glove box

SECTION 2 (CONTINUED)
CRASH VEHICLE SUMMARY

Test Vehicle: 2016 Toyota Scion iA four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
Test Date: 6/17/2016

Primary Impact Data

Measured Parameter	Units	Value
OMDB Velocity at Impact	kph	90.24
OMDB Test Weight	kg	2519
OMDB Maximum Static Crush	mm	286
Vehicle Test Weight	kg	1377
Actual Vehicle Angle	degrees	15
Vehicle Maximum Static Crush	mm	528
Vertical Offset from Target Point (+ down / - up)*	mm	-14
Lateral Offset from Target Point (+ left / - right)*	mm	0
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: 016		THOR, S/N: 015	
Head Contact	Frontal & Curtain Airbags, Side Headliner & Headrest	A49-A51	Front Airbag & Center instrument panel	A70-A72
Upper Torso Contact	Frontal Airbag	N/A	Front Airbag Arm contacted center instrument panel	N/A
Lower Torso Contact	None	N/A	None	N/A
Side Torso Contact	Torso Airbag & Door 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 Upper Neck Y Force	Broken Cable – Needs to be replaced
Driver Upper Neck X Moment	Broken Cable – Needs to be replaced
Driver Thorax Upper Left X Displacement	Transducer no longer functions, but cables appear intact.
Driver Abdomen Left DGIR X Displacement	Can't replicate issue
Driver Abdomen Left DGIR Y Rotation	Internal circuit issue – Needs new potentiometer
Driver Abdomen Left DGIR Z Rotation	Internal circuit issue – Needs new potentiometer
Driver T1 Z Acceleration	Cable cut at back of ribs – Needs new Accelerometer
Driver Knee Left X Displacement	Internal transducer issue – Needs new potentiometer
Driver Tibia Lower Left Y Force	Broken Cable – Needs to be replaced
Driver Foot Left X Acceleration	Internal transducer issue – Needs new potentiometer
Driver Ankle Left X Rotation	Potentiometer shaft is broken
Driver Tibia Lower Right X Force	Internal transducer issue – Needs new potentiometer
Passenger Front Neck Spring Tower Load Cell	Internal transducer issue – Needs new potentiometer
Passenger Abdomen Left DGIR X Displacement	Internal transducer issue – Needs new potentiometer
Passenger Abdomen Left DGIR Y Rotation	Internal transducer issue – Needs new potentiometer
Passenger Abdomen Right DGIR X Displacement	Internal transducer issue – Needs new potentiometer
Passenger T1 X Acceleration	Wire cut near spine, needs new accelerometer
Passenger T1 Z Acceleration	Wire cut near spine, needs new accelerometer
Passenger Femur Left Y Force	Broken Cable – Needs repair
Passenger Femur Left X Moment	Broken Cable – Needs repair
Passenger Tibia Left X Acceleration	Broken Cable – Needs repair
Passenger Tibia Left Y Acceleration	Internal circuit issue – Needs new potentiometer
Driver Seat Track X Acceleration	Cable pulled tight – Needs repair
Passenger Shoulder Belt Displacement	Seat belt pulled out of the transducer

PRELIMINARY INJURY SUMMARY: Driver

Test Vehicle: R20165146 - 2016 Toyota Scion iA NHTSA No.: R20165146
 Test Program: R&D Left Oblique Offset 15deg/35% Test Date: 6/17/2016

Driver: THOR Serial No. 016 Injury Summary

Location	Description	Unit	Source	Max	Min
Head	HIC 15ms		Compute	353.89	
	Brain Injury Criteria (BrIC)		Compute	0.58	
	Head Rotational Velocity X	Deg/s	60	875.85	-628.29
	Head Rotational Velocity Y	Deg/s	60	906.09	-1258.14
	Head Rotational Velocity Z	Deg/s	60	908.13	-657.54
Neck	Upper Neck Z-axis Force	N	1000	2327.06	-432.99
	Upper Neck Y-axis Moment	Nm	Thortest	27.01	-18.42
Chest	Upper Left Resultant Chest Deflection	mm	Thortest	21176.92 ⁽¹⁾	
	Upper Right Resultant Chest Deflection	mm	Thortest	59.81	
	Lower Left Resultant Chest Deflection	mm	Thortest	18.70	
	Lower Right Resultant Chest Deflection	mm	Thortest	43.46	
Abdomen	Lower Left X-axis Deflection	mm	Thortest	28.65 ⁽²⁾	-0.04 ⁽²⁾
	Lower Right X-axis Deflection	mm	Thortest	0.14	-64.60
Acetabulum	Left Acetabulum Resultant Force	N	Compute	2743.79	0.07
	Right Acetabulum Resultant Force	N	Compute	3193.99	0.11
Femur	Left Femur Force, FZ	N	600	142.54	-5263.56
	Right Femur Force, FZ	N	600	1846.96	-5989.44
Tibia	Left Upper Tibia, FZ	N	600	114.00	-1232.82
	Left Upper Tibia Index		Compute	0.68	
	Right Upper Tibia, FZ	N	600	569.69	-2211.08
	Right Upper Tibia Index		Compute	0.73	
	Left Lower Tibia, FZ	N	600	249.68	-2154.77
	Left Lower Tibia Index		Compute	0.62	
	Right Lower Tibia, FZ	N	600	3595.09	-3491.85
	Right Lower Tibia Index		Compute	1.04	
Ankle	Left Ankle Rotation, RX	Deg	180	15.05 ⁽³⁾	14.78 ⁽³⁾
	Left Ankle Rotation, RY	Deg	180	31.45	-30.45
	Left Ankle Dorsiflexion Moment, MY	Nm	Compute	56.48	-8.55
	Left Ankle In/Eversion Moment, MX	Nm	Compute	14.17 ⁽⁴⁾	-120.98 ⁽⁴⁾
	Right Ankle Rotation, RX	Deg	180	22.02	-36.05
	Right Ankle Rotation, RY	Deg	180	23.78	-20.81
	Right Ankle Dorsiflexion Moment, MY	Nm	Compute	564.09 ⁽⁵⁾	-1153.26 ⁽⁵⁾
	Right Ankle In/Eversion Moment, MX	Nm	Compute	254.93	-196.26

Anomalies: (1) Thorax Upper Left X Displacement, Questionable data after 163ms
 (2) Questionable spike 35ms
 (3) Questionable data throughout
 (4) Tibia Lower Left Y Force, Questionable data throughout
 (5) Tibia Lower Right X Force, Questionable magnitude throughout

PRELIMINARY INJURY SUMMARY: Right Front Passenger

Test Vehicle: R20165146 - 2016 Toyota Scion iA NHTSA No.: R20165146
 Test Program: R&D Left Oblique Offset 15deg/35% Test Date: 6/17/2016

Right Front Passenger: THOR Serial No. 015 Injury Summary

Location	Description	Unit	Source	Max	Min
Head	HIC 15ms		Compute	434.22	
	Brain Injury Criteria (BrIC)		Compute	1.97	
	Head Rotational Velocity X	Deg/s	60	1304.58	-2002.88
	Head Rotational Velocity Y	Deg/s	60	1066.48	-1778.13
	Head Rotational Velocity Z	Deg/s	60	4459.88	-1537.79
Neck	Upper Neck Z-axis Force	N	1000	2164.76	-441.59
	Upper Neck Y-axis Moment	Nm	Thortest	201.12 ⁽⁶⁾	-21.52 ⁽⁶⁾
Chest	Upper Left Resultant Chest Deflection	mm	Thortest	43.23	
	Upper Right Resultant Chest Deflection	mm	Thortest	26.32	
	Lower Left Resultant Chest Deflection	mm	Thortest	32.53	
	Lower Right Resultant Chest Deflection	mm	Thortest	27.85	
Abdomen	Lower Left X-axis Deflection	mm	Thortest	135.83 ⁽⁷⁾	-0.07 ⁽⁷⁾
	Lower Right X-axis Deflection	mm	Thortest	35372.18 ⁽⁸⁾	-114.34 ⁽⁸⁾
Acetabulum	Left Acetabulum Resultant Force	N	Compute	2201.03	0.22
	Right Acetabulum Resultant Force	N	Compute	2767.22	0.09
Femur	Left Femur Force, FZ	N	600	210.16	-3824.73
	Right Femur Force, FZ	N	600	428.80	-2501.08
Tibia	Left Upper Tibia, FZ	N	600	121.69	-2231.39
	Left Upper Tibia Index		Compute	0.84	
	Right Upper Tibia, FZ	N	600	139.03	-2152.20
	Right Upper Tibia Index		Compute	0.65	
	Left Lower Tibia, FZ	N	600	111.40	-3088.46
	Left Lower Tibia Index		Compute	0.75	
	Right Lower Tibia, FZ	N	600	3398.91 ⁽⁹⁾	-10310.58 ⁽⁹⁾
	Right Lower Tibia Index		Compute	1.02 ⁽⁹⁾	
Ankle	Left Ankle Rotation, RX	Deg	180	23.74	-19.94
	Left Ankle Rotation, RY	Deg	180	13.39	-24.14
	Left Ankle Dorsiflexion Moment, MY	Nm	Compute	118.04 ⁽¹⁰⁾	-6.30 ⁽¹⁰⁾
	Left Ankle In/Eversion Moment, MX	Nm	Compute	707.61 ⁽¹¹⁾	-821.00 ⁽¹¹⁾
	Right Ankle Rotation, RX	Deg	180	25.53	-39.55
	Right Ankle Rotation, RY	Deg	180	-1.75	-19.39
	Right Ankle Dorsiflexion Moment, MY	Nm	Compute	83.60	-10.66
	Right Ankle In/Eversion Moment, MX	Nm	Compute	38.96	-76.52

Anomalies: (6) Front Neck Spring Tower Load Cell, Questionable data 80ms to 100ms
 (7) Questionable data throughout
 (8) Questionable spikes throughout (9) Questionable magnitude throughout
 (10) Tibia Left X Acceleration, Questionable spike 73ms
 (11) Tibia Left Y Acceleration, Questionable data after 22ms

SECTION 3 DATA SHEETS

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
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Data Sheet No.		Page No.
1	General Test and Vehicle Parameter Data	3-2
2	Seat Adjustment, Fuel System, and Steering Wheel	3-6
3	Dummy Longitudinal Clearance Dimensions	3-8
4	Dummy Lateral Clearance Dimensions	3-10
5	Seat Belt Positioning Data	3-11
6	High-Speed Camera Locations and Data	3-12
7	Vehicle Instrumentation Data	3-15
8	Photographic Reference Target Locations	3-18
9	Test Vehicle Summary of Results	3-25
10	Post-Test Observations	3-26
11	Vehicle Profile Measurements	3-27
12	Accident Investigation Division Data	3-29
13	Vehicle Intrusion Measurements	3-30
14	OMDB Crush Measurements	3-47
15	Summary of FMVSS 212, 219 (Partial), and 301 Data	3-48
	Windshield Periphery Measurements	3-48
	Areas of Protected Zone Failures	3-48
	Fuel System Integrity Post Impact Data	3-49
16	FMVSS 301 Static Rollover Results	3-50
17	Dummy / Vehicle Temperature Stabilization	3-51

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

VEHICLE INFORMATION

NHTSA No.	R20165146
Model Year	2016
Make	Toyota
Model	Scion iA
Body Style	Four Door Sedan
VIN	3MYDLBZV0GY123821
Body Color	Silver
Odometer Reading (km/mi)	423.2 km / 263 mi
Engine Displacement. (L)	1.5
Type/No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	Front Wheel Drive
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes
All-Wheel Drive (AWD)	No
Traction Control System (TCS)	Yes

VEHICLE OPTIONS

Auto-Leveling System	No
Automatic Door Locks (ADL)	Yes
Power Window Auto-Reverse	No
Other Optional Feature	-
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	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 Manufacturing de Mexico S.A. DE C.V.
Date of Manufacture	12/15

GVWR (kg)	1539
GAWR Front (kg)	814
GAWR Rear (kg)	738

VEHICLE SEATING AND WEIGHT CAPACITY

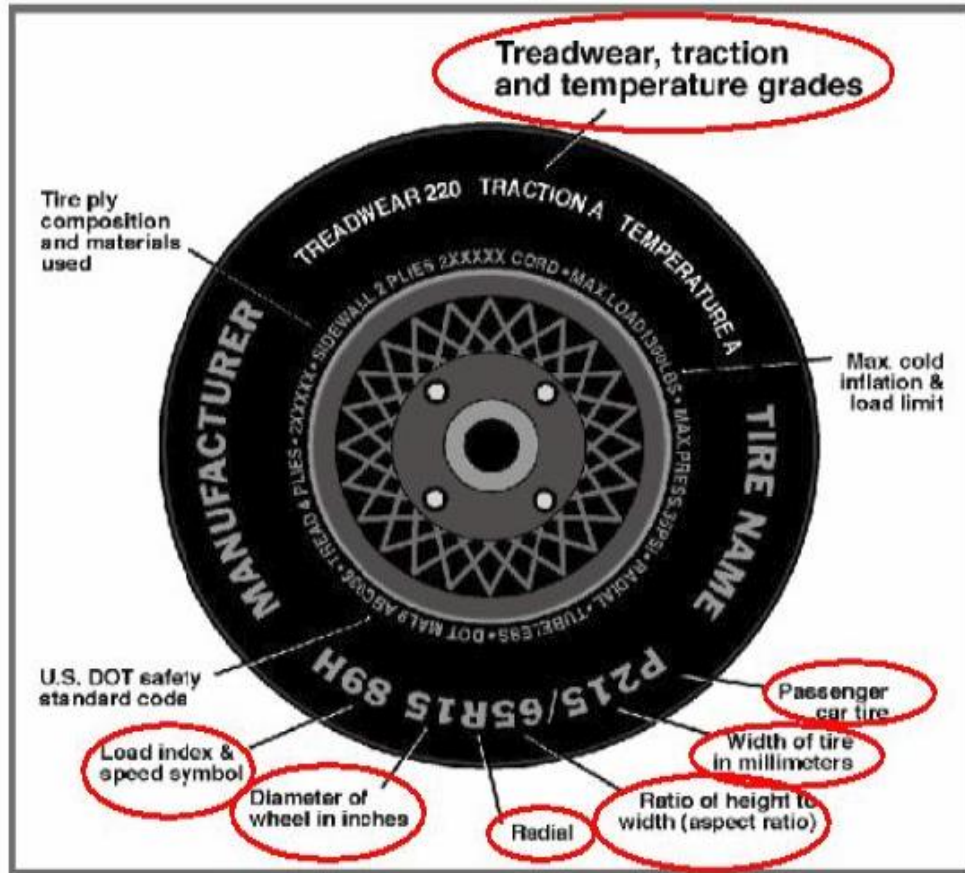
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	-	
Number of Occupants	2	3	-	5
Capacity Wt. (VCW) (kg)				385
Cargo Wt. (RCLW) (kg)				44.8

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

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

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



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	250	230
Recommended Tire Size	P185/60R16	P185/60R16
Tire Size on Vehicle	P185/60R16	P185/60R16
Tire Manufacturer	Toyo	Toyo
Tire Model	Proxes A27	Proxes A27
Treadwear	240	240
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	2 Steel, 1 Polyester, 1 Nylon	2 Steel, 1 Polyester, 1 Nylon
Load Index/Speed Symbol	86H	86H
Tire Material	Rubber	Rubber
DOT Safety Code Right	N3ELV573815	N3ELV573815
DOT Safety Code Left	N3ELV573815	N3ELV573815

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

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	345	216		374	334	
Right	kg	327	211		383	286	
Ratio	%	61	39		55	45	
Totals	kg	672	427	1099	757	620	1377

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1099
Weight of 2 THOR ATDs	kg	190
Rated Cargo/Luggage Weight (RCLW)	kg	44.8
Calculated Vehicle Target Weight (TVTW)	kg	1333.8

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	675	680	683	693	997
As Tested	mm	656	663	643	651	1155
Post Test	mm	685	632	613	702	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2566
Total Vehicle Length at Left Side	mm	4198
Total Vehicle Length at Centerline	mm	4362
Total Vehicle Length at Right Side	mm	4198
Weight of Ballast in Cargo Area	kg	0
Weight of Vehicle Components Removed	kg	15
Amount of Stoddard Solvent in Fuel Tank	L	40.92

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

Muffler, rear bumper beam, rear bumper cover

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

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Units	Pre-Test
1	Total Length	mm	4362
2	Total Width	mm	1692
3*	Bumper Top Height	mm	536
4*	Bumper Bottom Height	mm	423
5*	Longitudinal Member Top Height	mm	569
6	Distance Between Longitudinal Members	mm	1012
7	Longitudinal Member Width	mm	63
8*	Engine Top Height	mm	815
9*	Engine Bottom Height	mm	219
10	Engine and Gearbox Width	mm	482
11	Front Bumper-Engine Distance	mm	603
12*	Front Shock Absorber Fixing Height	mm	864
13*	Bonnet Leading Edge Height	mm	768
14	Front Shock Absorber Fixing Width	mm	1124
15	Front Bumper – Front Axle Distance	mm	854
16	Front Axle – A Pillar Distance	mm	548
17	A-Pillar – B-Pillar Distance	mm	1036
18	B-Pillar – Rear Axle Distance	mm	982
19	B-Pillar – C-Pillar Distance	mm	960
20*	Roof Sill Bottom Height	mm	1369
21*	Roof Sill Top Height	mm	1409
22*	Floor Sill Bottom Height	mm	253
23*	Floor Sill Top Height	mm	374

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

DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

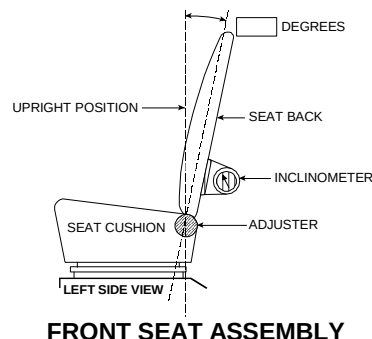
NHTSA No.: R20165146
 Test Date: 6/17/2016

NORMAL DESIGN RIDING POSITION

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

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

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



	UNIT	FORM 1 POSITION	AFTER ATD POSITIONING
Driver Seat Back Angle	deg	4.1	4.5
Passenger Seat Back Angle	deg	3.5	5.4

SEAT FORE/AFT POSITIONS

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

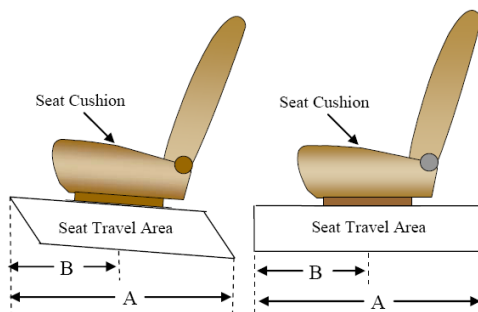
The driver's seat was positioned at its mid seat cushion angle and at the mid-point of fore/aft travel. The passenger's seat was positioned at the mid-point of fore/aft travel.

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

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	3	0 – Uppermost
Passenger Seat	3	0 – Uppermost



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

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

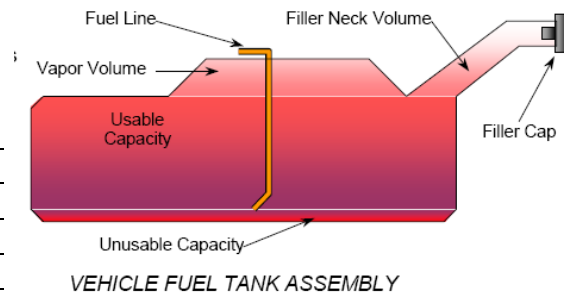
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	44
Usable Capacity of "Optional Tank"	N/A
93% of Usable Capacity	40.92
Actual Amount of Solvent Used	40.92
1/3 of Usable Capacity	14.7

FUEL PUMP

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

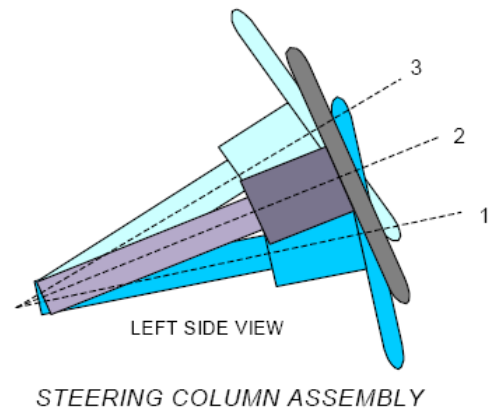
Fuel evacuated according to the specifications provided by the manufacturer in Form 1. Electric fuel pump operates when the ignition is in the 'on' position and the engine is running. The fuel filler neck is located above the left rear wheel.



STEERING COLUMN ADJUSTMENT

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

The steering wheel was adjusted to the midpoint of tilt angle range and the midpoint of the telescoping travel



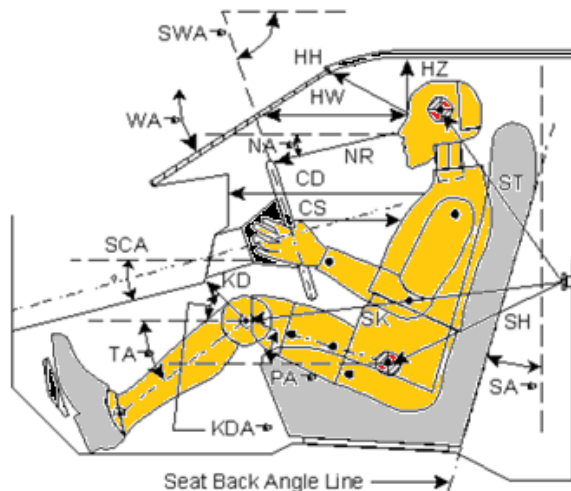
STEERING COLUMN POSITIONS

	Tilt (degrees)	Fore/Aft Position (mm)
Lowermost position No. 1	22.7	
Geometric center position No. 2	24.7	
Uppermost position No. 3	26.7	
Telescoping Steering Wheel Travel		50
Test Position	24.7	25

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

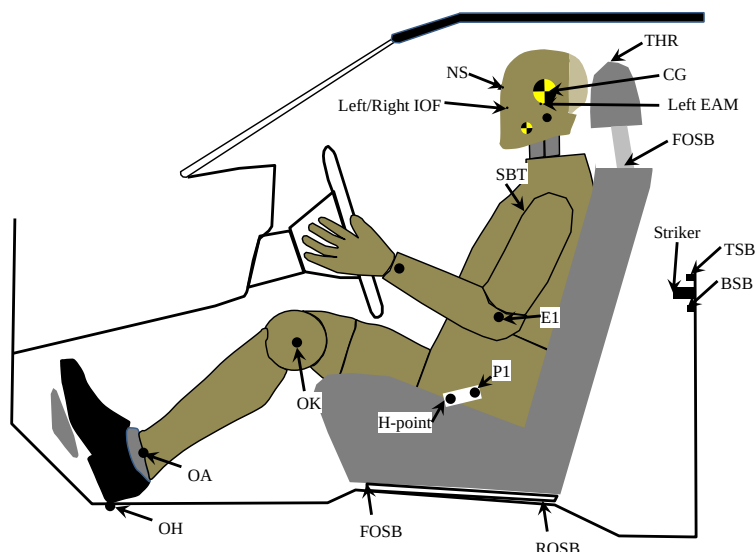


Code	Measurement Description	Driver (Serial#THOR 016)		Passenger (Serial#THOR 015)	
		Length (mm)	Angle(°)	Length (mm)	Angle (°)
WA°	Windshield Angle		28.5		
SWA°	Steering Wheel Angle		24.8		
SCA°	Steering Column Angle		65.2		
SA°	Seat Back Angle (on headrest post)		4.5		5.4
SA°	Seat Back Angle		22.3		21.7
HZ	Head to Roof (Z)	184	90	170	90
HH	Head to Header	412	16	403	17.8
HW	Head to Windshield	693	0	696	0
NR	Nose to Rim	496	15.2	665	37.8
CD	Chest to Dash	575		353	
CS	Chest to Steering Hub	355	2.8		
RA	Rim to Abdomen	185	0		
KDL	Left Knee to Dash	106	32.8	80	40
KDR	Right Knee to Dash	88	49.2	106	35.7
PA°	Pelvic Angle		35.1		34.8
TA°	Tibia Angle		46		45.6
SK	Striker to Knee	585	2.8	610	2.9
ST	Striker to Head	490	86.1	485	86.9
SH	Striker to H-Point	244	39.3	260	38.0
HAX°	Head Angle (X)		0.1		-0.3
HAY°	Head Angle (Y)		-3.5		-2.5
TAX°	T6 Angle (X)		0.2		0.2
TAY°	T6 Angle (Y)		25.2		23.7
TAX°	T1 (X)		1.2		0.5
TAY°	T1 (Y)		3.1		3.3
TAX°	T12 (X)		0.7		-1.3
TAY°	T12 (Y)		32.9		34.6
PAX	Pelvic (X)		0.3		-0.7
PAY	Pelvic (Y)		35.1		34.8

DATA SHEET NO.3 (CONTINUED) DUMMY CMM MEASUREMENTS

Test Vehicle: 2016 Toyota Scion iA four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
Test Date: 6/17/2016



Description	Units	Driver			Passenger		
		X	Y	Z	X	Y	Z
Head CG	mm	1999	-423	-566	2006	419	-561
Nasion	mm	2095	-346	-572	2102	345	-566
Tip of Nose	mm	2095	-346	-534	2102	342	-528
Tip of Chin	mm	2081	-346	-433	2090	343	-428
Left EAM	mm	2005	-419	-539	2016	269	-535
Right EAM	mm	2009	-270	-540	2011	413	-533
Left IOF	mm	2090	-378	-535	2099	312	-529
Right IOF	mm	2092	-313	-535	2097	376	-528
Outboard Elbow	mm	2223	-604	-103	2158	640	-50
H-Point	mm	2221	-547	78	2237	549	83
H-Point Tool	mm	2145	-598	52	2162	602	56
Outboard Knee Bolt	mm	2616	-544	-48	2645	302	-52
Inboard Knee Bolt	mm	2621	-254	-80	2641	525	-46
Outboard Ankle Bolt	mm	2904	-553	256	2948	284	245
Outer Heel Point	mm	2930	-535	390	2926	251	380
Inboard Heel Point	mm	2842	-195	401	2924	474	377
Striker Top Bolt	mm	1,999	-742	-91	2,000	743	-93
Striker Bottom Bolt	mm	2,003	-743	-56	2,003	744	-56
Center Tip of Striker	mm	2032	-744	-77	2032	745	-78
Front Outboard Seat Anchor Bolt	mm	2,466	-549	305	2,468	552	307
Rear Outboard Seat Anchor Bolt	mm	2,022	-547	336	2,024	552	335
Outboard Head Restraint Post	mm	1796	-430	-424	1804	428	-420
Top of Head Restraint	mm	1853	-347	-688	1856	347	-688
Center of Steering Wheel	mm	2480	-346	-284			

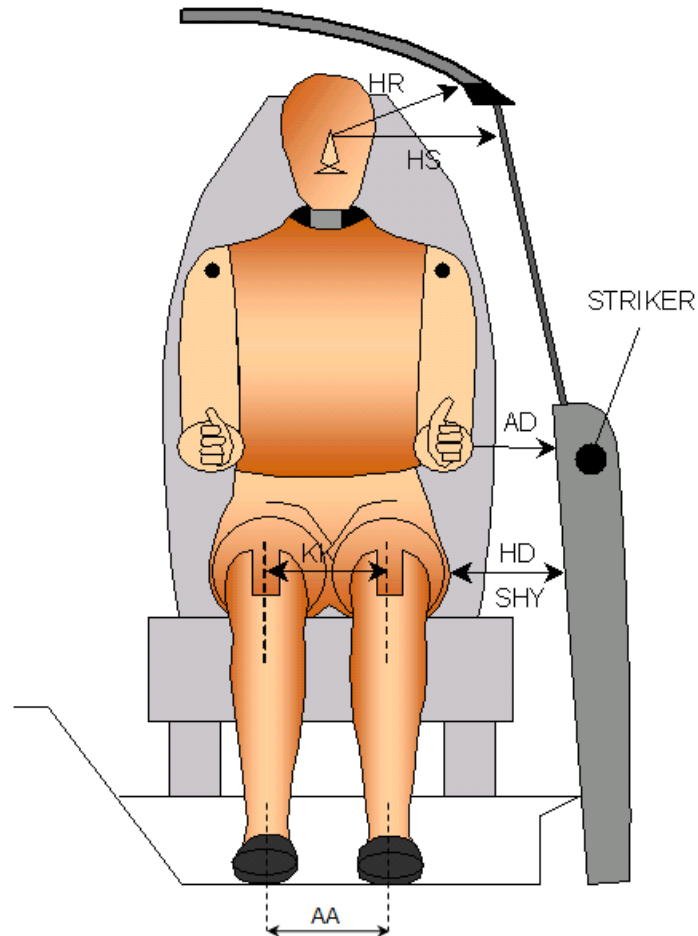
Reference point:

- +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 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

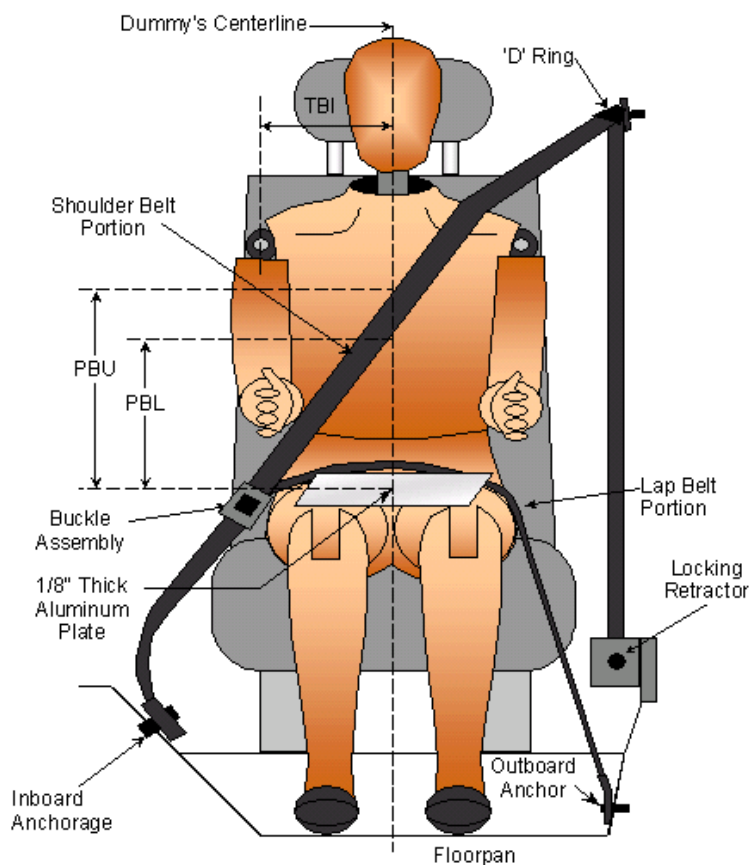


Code	Description	Units	Driver	Passenger
AD	Arm to Door	mm	102	16
HD	H-Point to Door	mm	108	115
HR	Head to Side Header	mm	188	197
HS	Head to Side Window	mm	325	320
KK	Knee to Knee	mm	335	270
SHY	Striker to H-Point (Y Direction)	mm	205	205
AA	Ankle to Ankle	mm	332	227

DATA SHEET NO. 5 SEAT BELT POSITIONING DATA

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU — Top surface of reference to belt upper edge	mm	340	360
PBL — Top surface of reference to belt lower edge	mm	265	285

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	805	860
Lap Belt Length as measured on ATD	mm	780	830
Remainder of belt on reel	mm	815	710
Total belt length for continuous webbing systems	mm	2400	2400

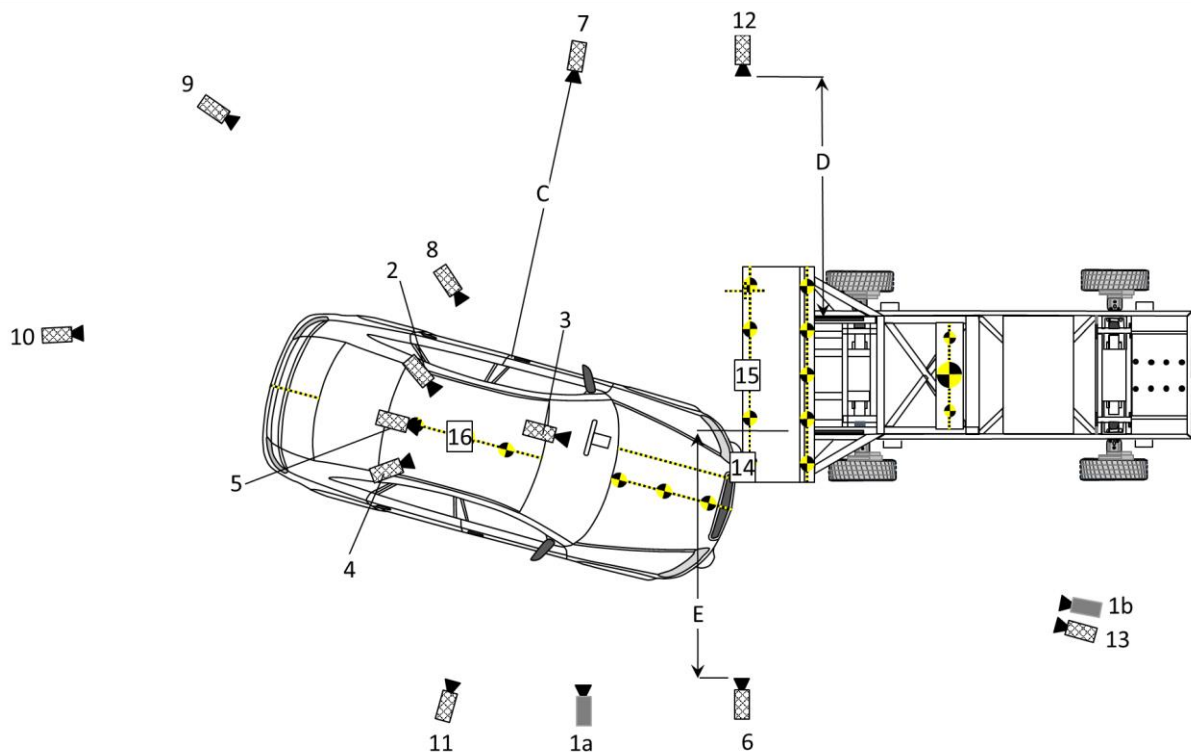
DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

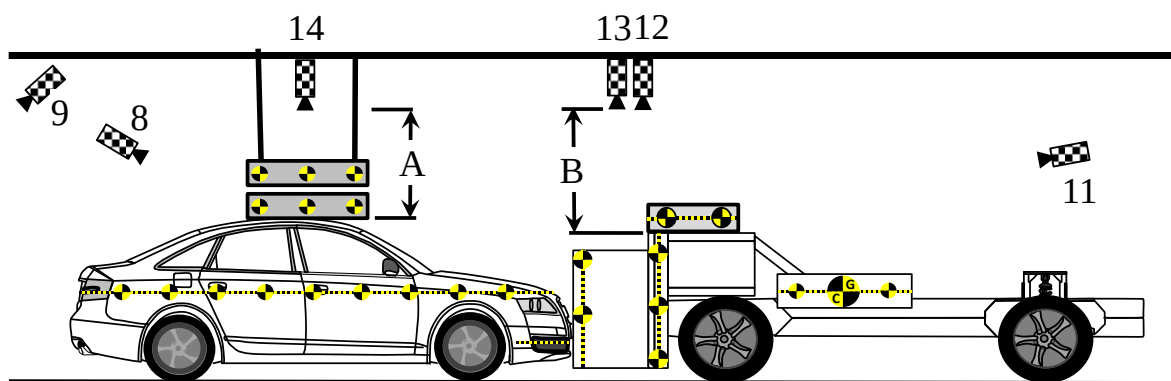
Test Vehicle: 2016 Toyota Scion iA four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
Test Date: 6/17/2016

HORIZONTAL LOCATION



VERTICAL LOCATION



A	mm	3823
B	mm	4140
C	mm	7894
D	mm	8115
E	mm	8363

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

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

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	7391	-394	1199	8	1000
3	Onboard Driver Lower Leg	6571	-547	233	6.5	1000
4	Onboard Driver Movement	7362	-945	1199	8	1000
5	Onboard Centerline	7561	-591	1152	8	1000
6	Right Side of OMDB View	4955	-9216	1172	24	1000
7	Left Side of Test Vehicle	6286	7930	1147	24	1000
8	Target Vehicle Left Side Perpendicular (High)	8240	2240	3710	24	1000
9	Oblique Rear View of Vehicle	13725	6950	2712	28	1000
10	Rear View of Vehicle and OMDB	28750	0	3421	10	1000
11	Right Side Target Vehicle and OMDB	10998	-9970	2584	24	1000
12	Left Side of OMDB View	4989	9449	1188	20	1000
13	Front of Vehicle and OMDB	622	-3998	1501	28	1000
14	Overhead Impact Point View	4929	-1101	4563	28	1000
15	Overhead OMDB View	7369	0	5327	14	1000
16	Overhead Vehicle View	4678	0	5327	15	1000

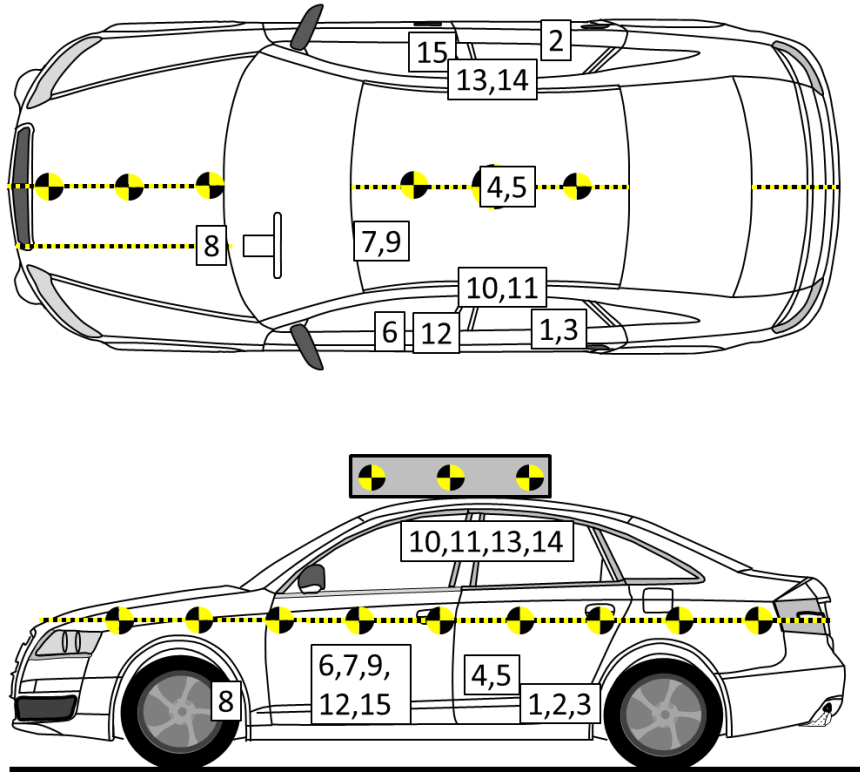
Reference Point:

- +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 Toyota Scion iA four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
Test Date: 6/17/2016



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	1723	-687	312
2	Right Rear Sill	X,Y	mm	1718	696	311
3	Left Rear Sill Redundant	X,Y	mm	1708	-689	312
4	Vehicle CG	X,Y,Z	mm	1771	-1	256
5	Vehicle CG Angular Displacement	X	mm	1782	-1	258
		Y	mm	1770	10	257
		Z	mm	1771	-1	256
6	Left Side Seat Track	X,Y,Z	mm	2152	-520	357
8	Left Side Toe Pan	X,Y,Z	mm	3258	-394	74
7	Left Side String Pot	N/A	mm	3194	-327	259

Reference point:

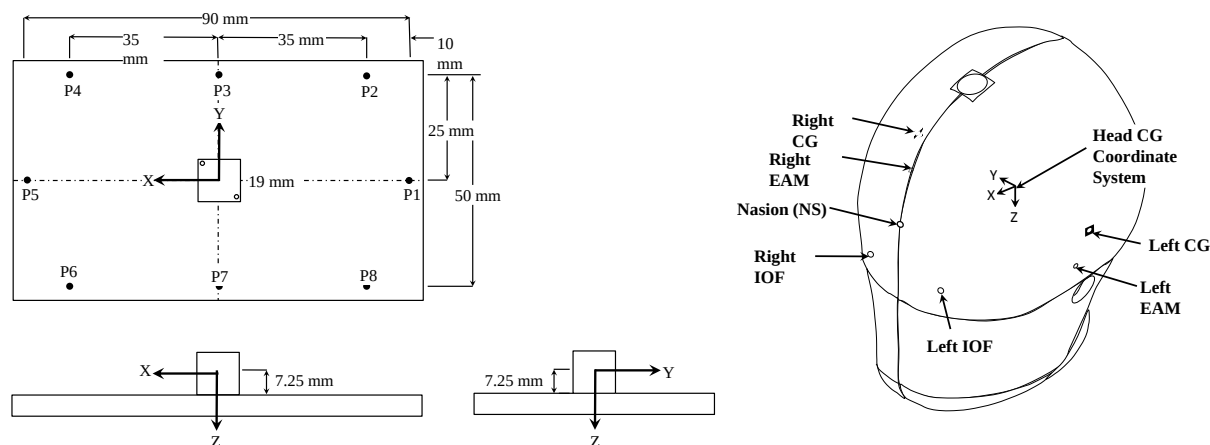
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

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

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

ANGULAR RATE SENSOR MOUNTING PLATE & THOR HEAT POINT DEFINITIONS



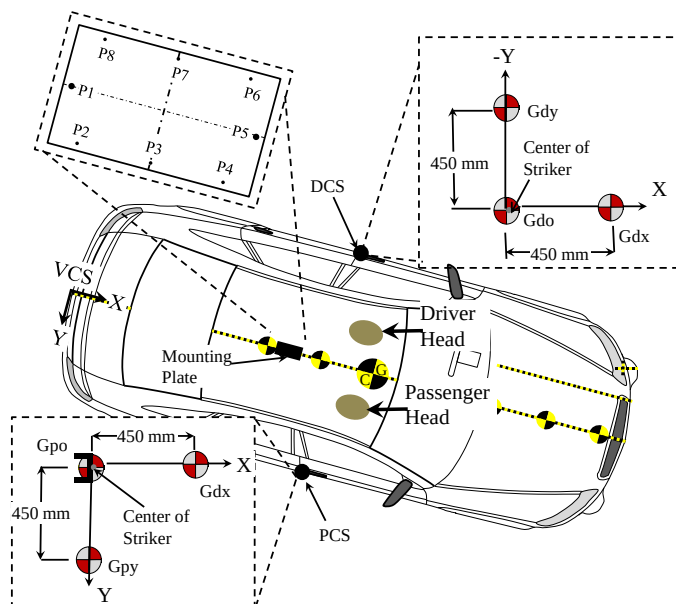
ARS MOUNTING PLATE - VEHICLE COORDINATE SYSTEM					
No.	Description	Units	Measurements (mm)		
			X	Y	Z
P1	Plate Point 1	mm	1726	-1	271
P2	Plate Point 2	mm	1736	24	271
P3	Plate Point 3	mm	1771	24	271
P4	Plate Point 4	mm	1806	24	271
P5	Plate Point 5	mm	1816	-1	271
P6	Plate Point 6	mm	1806	-26	271
P7	Plate Point 7	mm	1771	-26	271
P8	Plate Point 8	mm	1736	-26	271

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 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016



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	450	0	0	452	0	0
G _y	-1	-451	-5	3	450	3
P1	-463	652	-363	-84	-790	-370
P2	-460	678	-363	-81	-763	-371
P3	-426	687	-363	-47	-755	-370
P4	-392	696	-363	-13	-746	-370
P5	-376	675	-362	3	-768	-370
P6	-379	648	-362	0	-795	-370
P7	-413	639	-363	-34	-803	-370
P8	-447	630	-363	-68	-812	-370
Left CG	-89	315	-1199			
Right CG				82	-314	-1202
Left EAM	-84	321	-1172			
Right EAM				89	-318	-1174
Left IOF	-13	382	-1168	199	-395	-1170
Right IOF	-28	445	-1168	181	-332	-1169
Nasion	-16	415	-1206	194	-361	-1207

DATA SHEET NO. 7 (CONTINUED)
VEHICLE INSTRUMENTATION DATA

Test Vehicle: 2016 Toyota Scion iA four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
Test Date: 6/17/2016

No.	Description	Axes	Units	Positive Direction		Negative Direction	
				Max	Time (ms)	Max	Time (ms)
1	Left Rear Sill	X	g	4.39	126.90	-38.38	36.45
		Y	g	24.74	37.55	-4.39	69.20
2	Right Rear Sill	X	g	4.13	122.05	-46.67	46.30
		Y	g	23.49	48.15	-4.49	98.55
3	Impact Side Rear Sill Redundant	X	g	5.06	127.15	-38.72	36.50
		Y	g	23.16	37.60	-5.50	69.40
4	Vehicle CG Acceleration	X	g	5.70	97.65	-49.41	36.20
		Y	g	22.08	48.25	-4.73	69.35
		Z	g	20.63	52.75	-19.87	41.80
5	Impact Side Seat Track	X	g	63.71	84.95	-2039.27	77.50
		Y	g	32.80	47.75	-8.22	72.55
		Z	g	26.95	41.40	-22.19	69.15
6	Impact Side Seat Crossmember	X	g	5.43	130.05	-57.13	38.35
		Z	g	31.69	48.10	-11.87	70.25
7	Impact Side Toe Pan	X	g	59.97	41.10	-156.78	32.95
		Y	g	68.80	36.95	-8.06	72.85
		Z	g	31.28	43.55	-62.50	35.30
8	Angular Rate Sensors	X	Deg/s	354.95	37.55	-311.42	61.00
		Y	Deg/s	86.54	37.75	-197.52	50.85
		Z	Deg/s	127.37	62.65	-23.38	20.15
9	Driver Shoulder Displacement		mm	32.90	44.15	-124.38	93.90
10	Driver Shoulder Belt		N	4795.98	50.35	-14.01	24.30
11	Driver Lap Belt		N	2582.27	61.15	-0.50	0.60
12	Passenger Shoulder Displacement		mm	19.70	33.95	-386.75	88.15
13	Passenger Shoulder Belt		N	3166.66	47.50	-18.95	242.60
14	Passenger Lap Belt		N	8181.47	63.80	-0.21	-14.85
15	Impact Side Floor String Pot		mm	12.01	231.00	-86.39	74.35

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	25.00
2	Driver Air Bag Squib 2	*	A	30.00
3	Driver Curtain Airbag	*	A	27.95
4	Driver Torso Airbag	*	A	27.95
5	Driver Knee Airbag	*	A	N/A
6	Driver Pretensioner	*	A	25.00
7	Passenger Air Bag Squib 1	*	A	25.00
8	Passenger Air Bag Squib 2	*	A	30.00
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	25.00

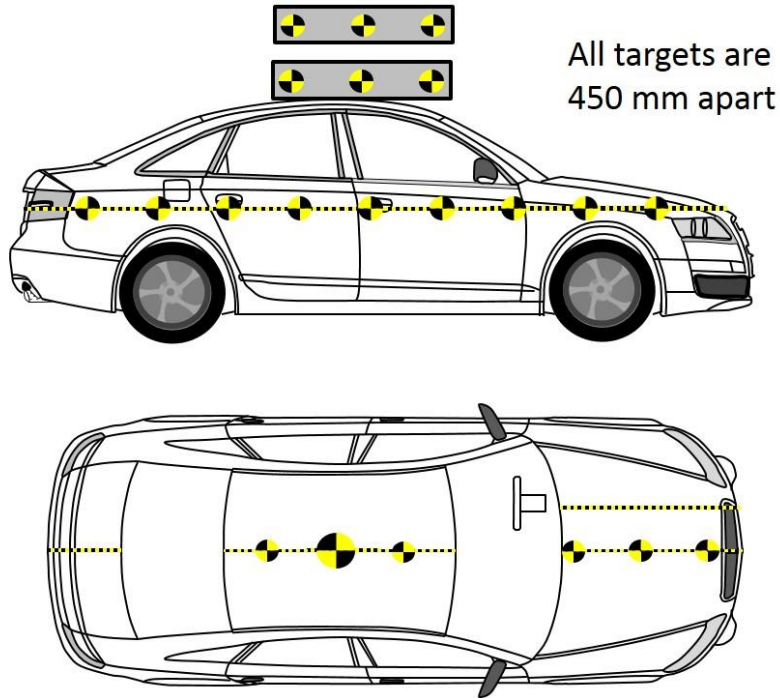
* The measurement indicates the time the voltage changed

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

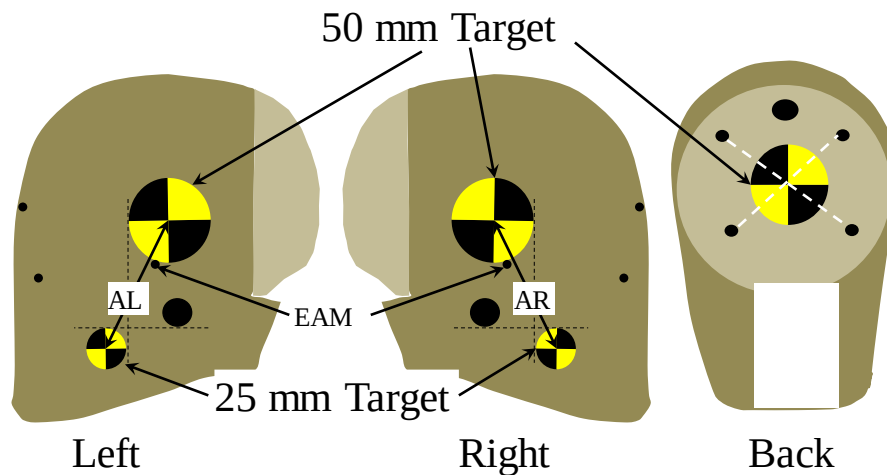
Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

VEHICLE TARGETS



ATD HEAD TARGETS



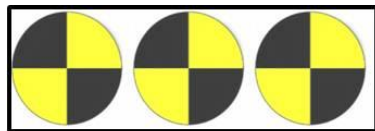
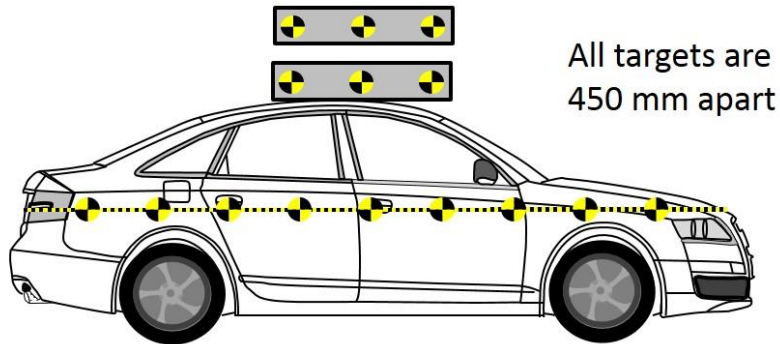
Target	Measurement
AL	91 mm
AR	91 mm

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

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

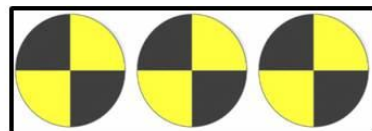
NHTSA No.: R20165146
 Test Date: 6/17/2016

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	2360	-371	-1176
2	mm	1904	-365	-1181
3	mm	1456	-355	-1181
4	mm	2375	360	-1175
5	mm	1924	365	-1174
6	mm	1470	368	-1175

Reference point:

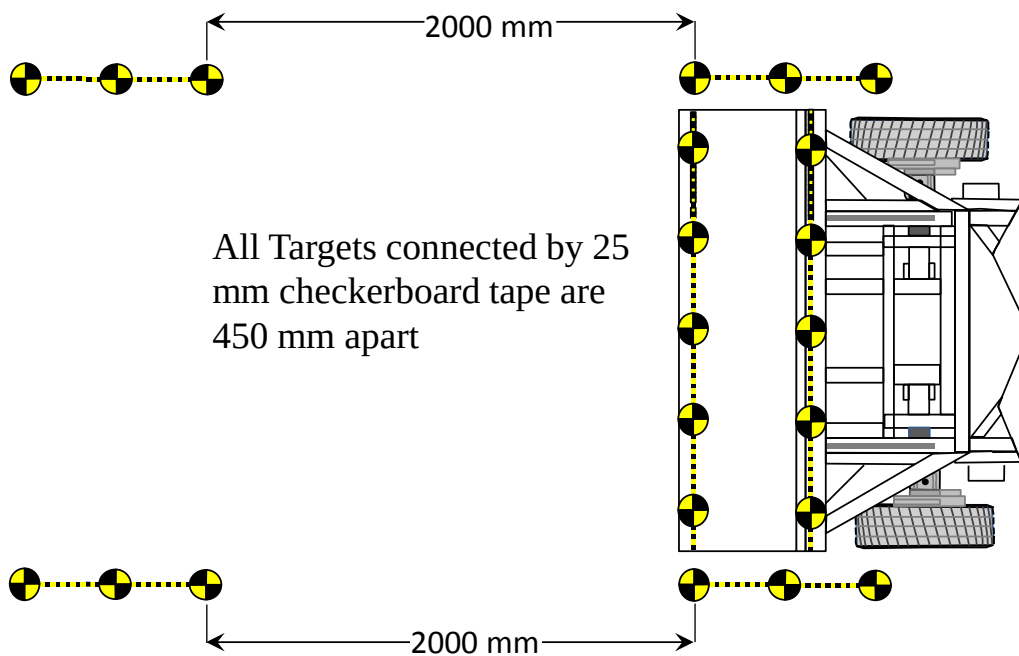
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

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

Test Vehicle: 2016 Toyota Scion iA four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
Test Date: 6/17/2016

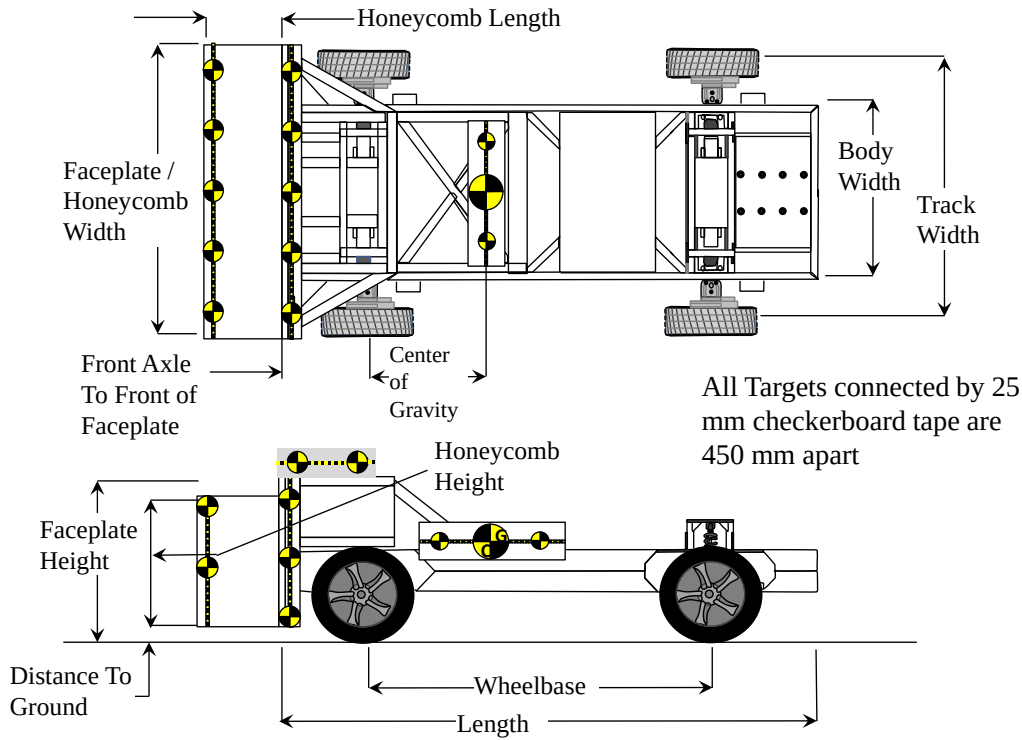
GROUND TARGETS LOCATED IN REFERENCE TO OMDB



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

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016



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 Toyota Scion iA four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
Test Date: 6/17/2016

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 Toyota Scion iA four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
Test Date: 6/17/2016

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Right Front Passenger
Dummy Type/Serial No.	THOR 016	THOR 015
Lower Leg Type	LX	LX
Lower Leg Serial No.	018 / 019	038 / 039
Head Contact	Front & Curtain Airbag, Side Headliner & Headrest	Front Airbag & Center instrument panel & headrest
Upper Torso Contact	Front Airbag Arm & Side torso hit door	Arm hit 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 Buckled	Y
Windshield Damage	Cracks throughout with some 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 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4362	3931	432
2	Rear Surface of Vehicle (RSOV) to Front of Engine	mm	3759	3660	99
3	RSOV to Firewall	mm	3393	3259	134
4	RSOV to Upper Leading Edge of Right Door	mm	2959	2958	2
5	RSOV to Upper Leading Edge of Left Door	mm	2958	2947	11
6	RSOV to Lower Leading Edge of Right Door	mm	2980	2979	1
7	RSOV to Lower Leading Edge of Left Door	mm	2979	2978	1
8	RSOV to Upper Trailing Edge of Right Door	mm	1929	1929	0
9	RSOV to Upper Trailing Edge of Left Door	mm	1928	1918	9
10	RSOV to Lower Trailing Edge of Right Door	mm	2001	1981	20
11	RSOV to Lower Trailing Edge of Left Door	mm	1981	1981	0
12	RSOV to Bottom of "A" Post of Right Side	mm	3060	3057	2
13	RSOV to Bottom of "A" Post of Left Side	mm	3060	3052	8
14	RSOV to Firewall, Right Side	mm	3421	3416	5
15	RSOV to Firewall, Left Side	mm	3422	3147	275
16	RSOV to Steering Column	mm	2489	2473	16
17	Center of Steering Column to "A" Post	mm	245	214	32
18	Center of Steering Column to Headliner	mm	397	382	16
19	RSOV to Right Side of Front Bumper	mm	4272	4221	50
20	RSOV to Left Side of Front Bumper	mm	4270	3709	561
21	Length of Engine Block	mm	288	282	6
RD	RSOV to Right Side of Dash Panel	mm	2686	2689	-3
CD	RSOV to Center of Dash Panel	mm	2656	2638	18
LD	RSOV to Left Side of Dash Panel	mm	2686	2670	16

UR* = Unrecoverable Data Point

DATA SHEET NO. 12
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2016 Toyota Scion iA four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

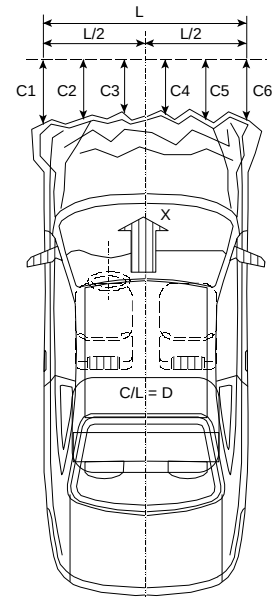
NHTSA No.: R20165146
Test Date: 6/17/2016

VEHICLE INFORMATION

VIN: 3MYDLBZV0GY123821 Wheelbase (mm): 2566
Vehicle Size Category: Passenger Test Weight (kg): 1377

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): 90.24
Velocity Change (kph): 90.24



CRUSH PROFILE

Collision Deformation Classification: 12FYEW3
Midpoint of Damage: C2
Damage Region Length (mm): 1261
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	4127	3668	459
C2	Crush zone 2 at left side	mm	4290	3762	528
C3	Crush zone 3 at left side	mm	4348	3990	358
C4	Crush zone 4 at right side	mm	4349	4154	195
C5	Crush zone 5 at right side	mm	4293	4225	68
C6	Crush zone 6 at right side	mm	4131	4180	-49
L	C1 to C6	mm	1261	1027	234

Crush Measurements: Bumper Cover Removed

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
B1	Bumper Beam 1 at left side	mm	4173	-497	181
B2	Bumper Beam 2 at left side	mm	4205	-376	180
B3	Bumper Beam 3 at left side	mm	4260	-257	180
B4	Bumper Beam 4 at left side	mm	4276	-131	180
B5	Bumper Beam 5 at right side	mm	4245	-4	181
B6	Bumper Beam 6 at right side	mm	4278	125	180
B7	Bumper Beam 7 at right side	mm	4262	250	180
B8	Bumper Beam 8 at right side	mm	4208	367	180
B9	Bumper Beam 9 at right side	mm	4177	491	180
L	B1 to B9	mm	988	807	-181

DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Toyota Scion iA four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

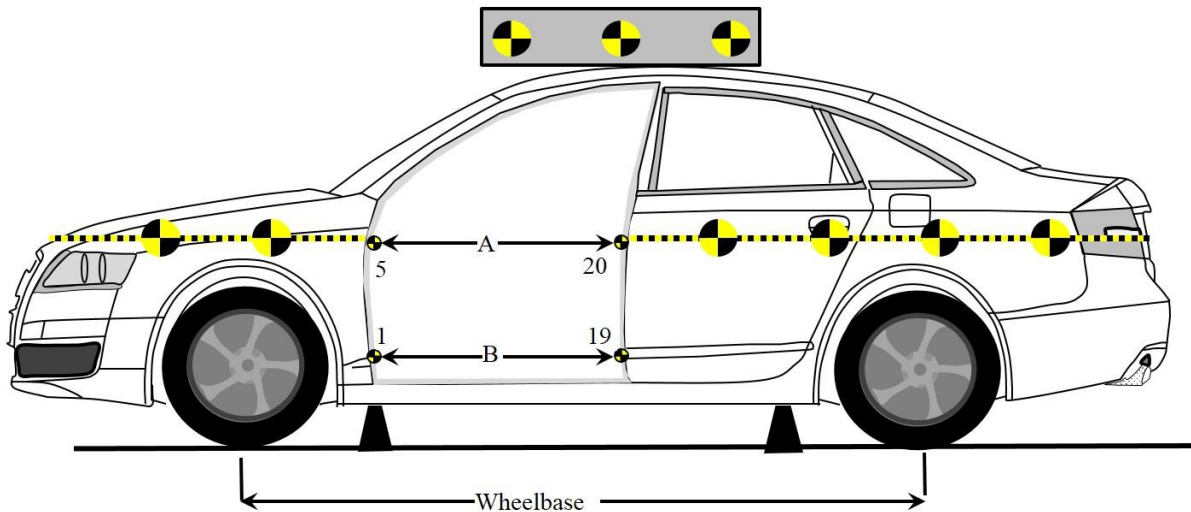
NHTSA No.: R20165146
Test Date: 6/17/2016

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	826	817	-9
B	Left Side Lower	mm	698	692	-6
D	Right Side Upper	mm	826	825	-1
E	Right Side Lower	mm	699	698	1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2566	2395	-171
F	Right Side Wheelbase	mm	2566	2598	32



DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

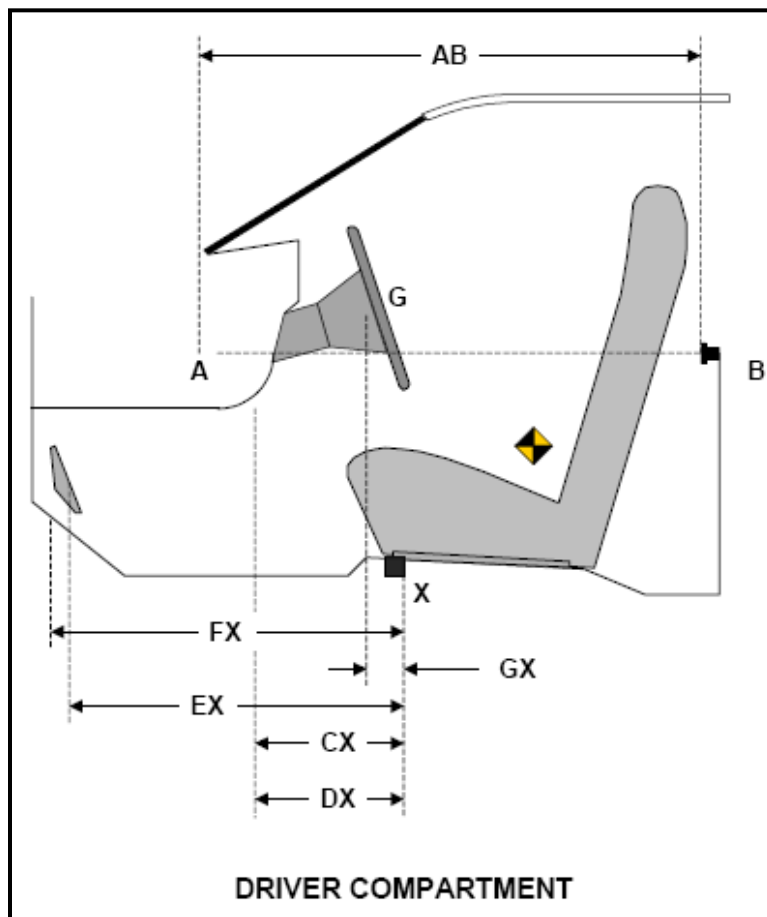
Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	728	728	0
CX	Left Knee Bolster to X	mm	270	261	-9
DX	Right Knee Bolster to X	mm	265	249	-16
EX	Brake Pedal to X	mm	532	561	29
FX	Foot Rest to X	mm	674	626	-48
GX	Center of Steering Column Wheel Hub to X	mm	14	1	-13

X = Front of Seat Track (Stationary)

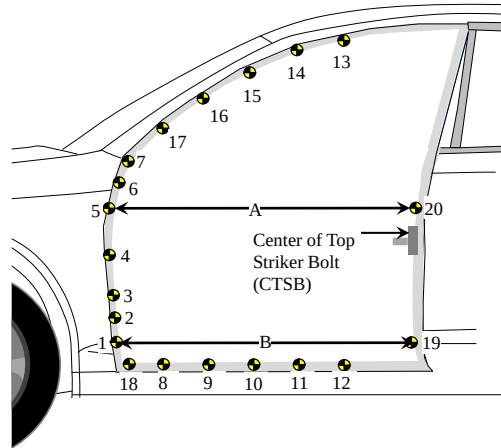


DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

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

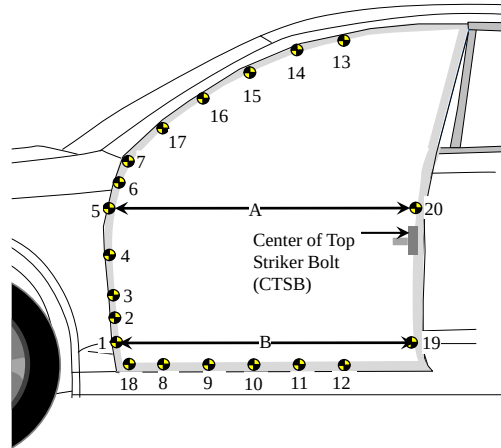
Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
1	2882	-695	213	2878	-687	196	-4	8	-17
2	2898	-685	137	2888	-676	121	-10	9	-16
3	2887	-680	62	2876	-673	43	-11	7	-19
4	2870	-675	-87	2856	-678	-106	-14	-3	-19
5	2854	-673	-237	2844	-681	-257	-10	-8	-20
6	2845	-672	-312	2839	-682	-332	-6	-10	-20
7	2822	-661	-387	2818	-672	-410	-4	-11	-23
17	2723	-642	-466	2723	-652	-490	0	-10	-24
16	2619	-622	-525	2623	-630	-549	4	-8	-24
15	2511	-602	-577	2514	-610	-598	3	-8	-21
14	2398	-585	-623	2400	-590	-638	2	-5	-15
13	2282	-570	-653	2283	-575	-667	1	-5	-14
20	2028	-686	-238	2026	-688	-242	-2	-2	-4
19	2186	-708	213	2184	-707	211	-2	1	-2
12	2132	-708	125	2131	-706	123	-1	2	-2
11	2282	-711	287	2281	-713	285	-1	-2	-2
10	2431	-711	288	2428	-709	282	-3	2	-6
9	2581	-710	289	2578	-705	277	-3	5	-12
8	2731	-709	288	2729	-704	275	-2	5	-13
18	2807	-708	280	2801	-702	266	-6	6	-14

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

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

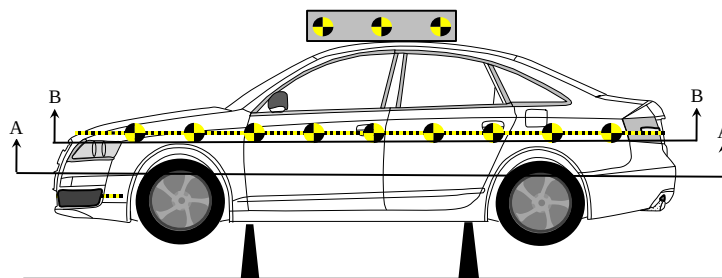
Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
1	2882	698	213	2881	706	215	-1	8	2
2	2896	686	137	2896	696	139	0	10	2
3	2886	684	62	2886	693	64	0	9	2
4	2870	679	-87	2869	686	-86	-1	7	1
5	2853	678	-238	2852	684	-236	-1	6	2
6	2845	676	-313	2844	684	-311	-1	8	2
7	2821	664	-388	2820	671	-385	-1	7	3
17	2721	645	-465	2720	649	-462	-1	4	3
16	2617	624	-525	2615	626	-520	-2	2	5
15	2509	606	-578	2508	605	-574	-1	-1	4
14	2398	586	-620	2397	586	-618	-1	0	2
13	2281	572	-653	2280	568	-648	-1	-4	5
20	2028	689	-237	2027	687	-234	-1	-2	3
19	2184	712	213	2183	713	218	-1	1	5
12	2132	710	125	2131	710	129	-1	0	4
11	2282	712	287	2281	714	290	-1	2	3
10	2431	712	288	2431	716	292	0	4	4
9	2581	713	288	2580	717	291	-1	4	3
8	2731	713	288	2730	717	291	-1	4	3
18	2807	711	280	2806	716	283	-1	5	3

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

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

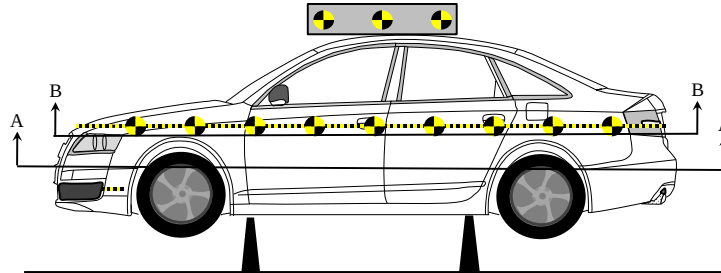
Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
1	1977	-833	182	1	1976	-831	182
2	2279	-834	180	2	2214	-835	181
3	2539	-835	181	3	2460	-840	181
4	2866	-837	180	4	2790	-846	182
5	3163	-845	181	5	2940	-846	182
6	3838	-827	181	6	2962	-892	182
7	4041	-743	182	7	3061	-878	182
8	4168	-578	181	8	3127	-929	181
9	4283	-440	180	9	3298	-776	182
10	4337	-238	180	10	3567	-632	181
11	4349	-2	181	11	3716	-528	181
12	4348	106	180	12	3691	-378	182
13	4329	305	180	13	3729	-252	181
14	4274	463	181	14	3850	-13	181
15	4170	579	182	15	3989	209	182
16	3991	773	181	16	4045	275	182
17	3832	827	181	17	4067	344	181
18	3168	846	181	18	4041	534	181
19	2862	838	181	19	3994	692	182
20	2539	835	182	20	3840	758	182
21	2354	834	182	21	3786	889	181
22	1980	831	181	22	3648	873	181
				23	3370	837	182
				24	3161	858	181
				25	3013	849	181

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

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

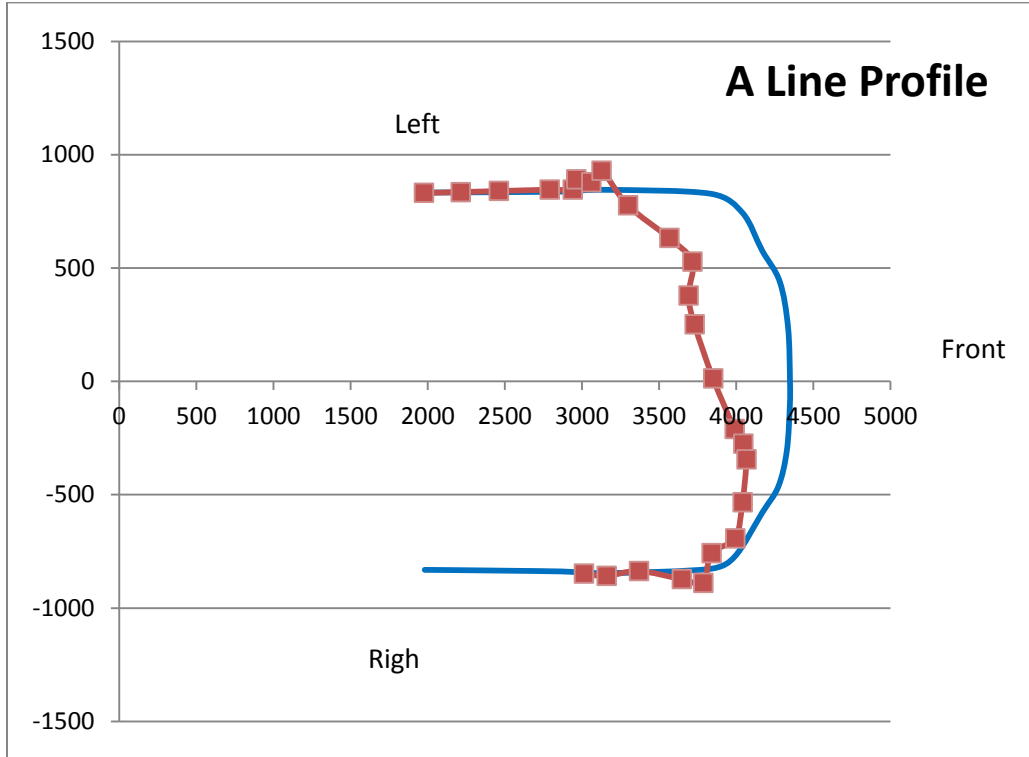
Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
1	1960	-841	-68	1	1956	-845	-68
2	2131	-844	-68	2	2253	-855	-68
3	2359	-847	-67	3	2511	-861	-69
4	2720	-845	-68	4	2882	-862	-68
5	3012	-837	-68	5	2889	-888	-69
6	3349	-846	-69	6	3010	-901	-69
7	3696	-831	-67	7	3045	-819	-68
8	3973	-735	-68	8	3141	-793	-68
9	4120	-548	-67	9	3262	-659	-68
10	4246	-287	-69	10	3326	-544	-69
11	4296	3	-68	11	3430	-455	-68
12	4270	162	-67	12	3657	-310	-68
13	4215	400	-67	13	3661	-200	-68
14	4085	598	-69	14	3763	-41	-68
15	3938	764	-68	15	3902	127	-69
16	3642	843	-68	16	3994	301	-69
17	3347	849	-68	17	4086	374	-69
18	3100	837	-67	18	3720	653	-68
19	2686	847	-68	19	3796	762	-69
20	2290	847	-67	20	3625	845	-68
21	2092	844	-67	21	3314	851	-68
22	1961	841	-68	22	3025	841	-68

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

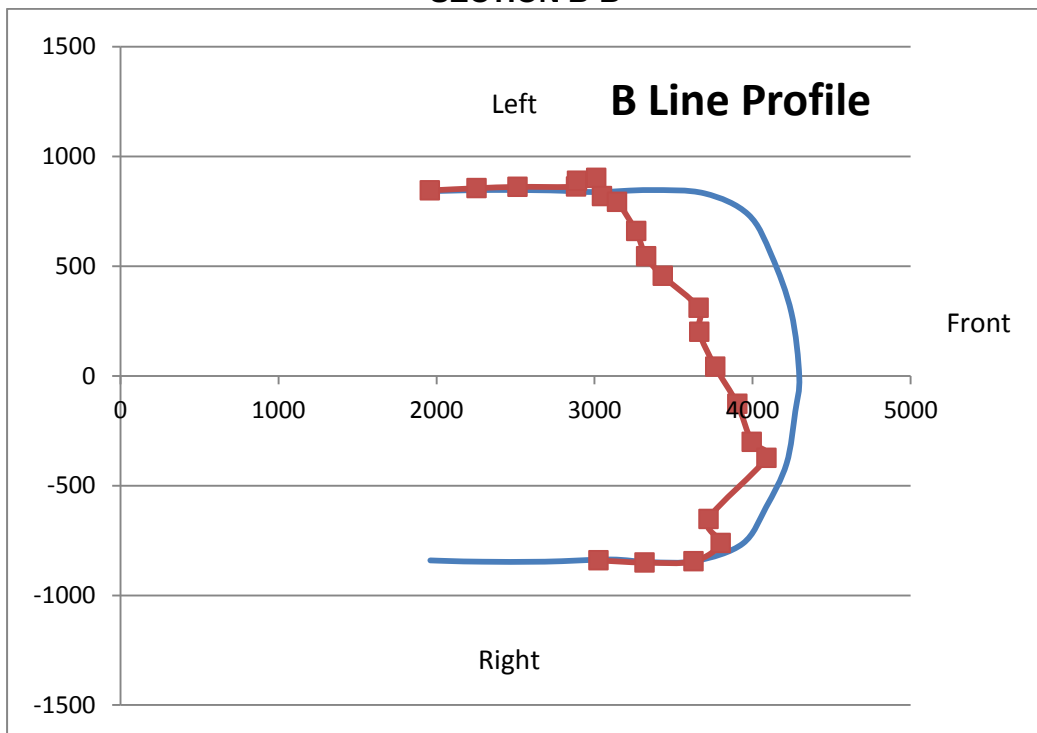
Test Vehicle: 2016 Toyota Scion iA four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
Test Date: 6/17/2016

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A



SECTION B-B



DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

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	4173	-497	181	3664	-391	2	-509	106	-179
	B2	4205	-376	180	3678	-268	22	-527	108	-158
	B3	4260	-257	180	3750	-195	13	-510	62	-167
	B4	4276	-131	180	3849	-115	16	-427	16	-164
	B5	4245	-4	181	3910	-2	34	-335	2	-147
	B6	4278	125	180	4018	77	26	-260	-48	-154
	B7	4262	250	180	4087	181	37	-175	-69	-143
	B8	4208	367	180	4123	305	63	-85	-62	-117
	B9	4177	491	180	4181	416	80	4	-75	-100

Reference point:

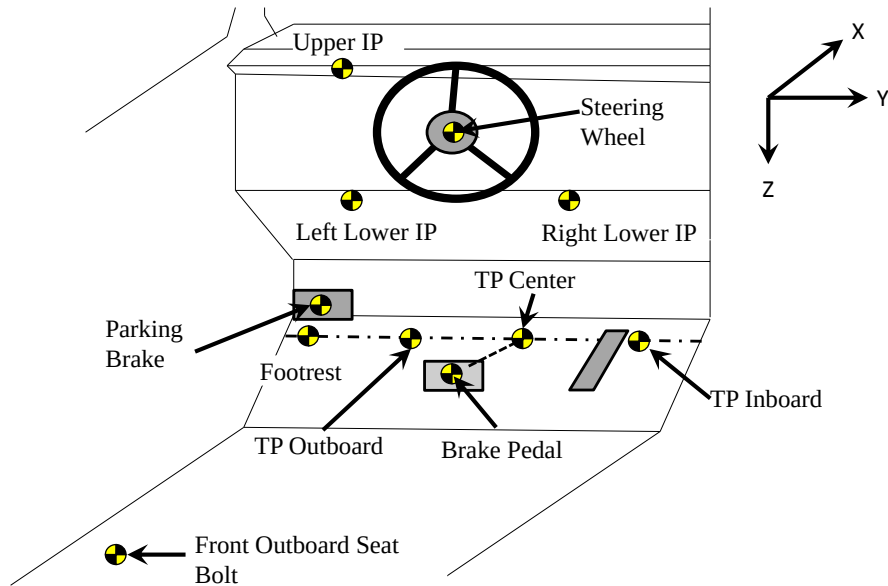
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

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

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

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	3243	-162	214	3158	-150	174	-85	12	-40
TP Center	3245	-315	215	3103	-277	177	-142	38	-38
TP Outboard	3221	-463	212	3104	-401	167	-117	62	-45
TP Footrest	3141	-563	213	3091	-529	180	-50	34	-33
Brake Pedal	2999	-313	213	3026	-341	216	27	-28	3
Left Lower IP	2736	-496	-60	2726	-510	-94	-10	-14	-34
Right Lower IP	2732	-196	-60	2714	-207	-85	-18	-11	-25
Upper IP	2678	-586	-255	2659	-606	-289	-19	-20	-34
Steering Column	2480	-346	-284	2466	-384	-308	-14	-38	-24
Front Outboard Bolt	2466	-549	305	2465	-546	297	-1	3	-8
Emergency Brake									

Reference point:

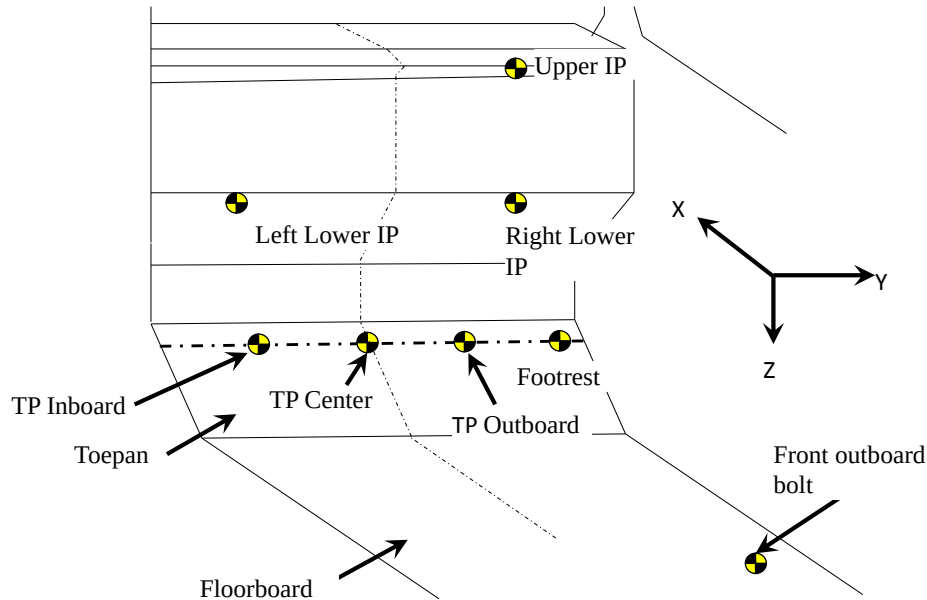
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

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

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

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	3240	197	213	3189	229	171	-51	32	-42
TP Center	3248	349	213	3246	366	212	-2	17	-1
TP Outboard	3188	498	213	3188	516	212	0	18	-1
TP Footrest	3115	598	213	3118	617	215	3	19	2
Left Lower IP	2740	198	-53	2744	188	-72	4	-10	-19
Right Lower IP	2771	499	-53	2766	489	-64	-5	-10	-11
Upper IP	2678	591	-253	2679	559	-266	1	-32	-13
Front Outboard Bolt	2468	552	307	2469	552	310	1	0	3

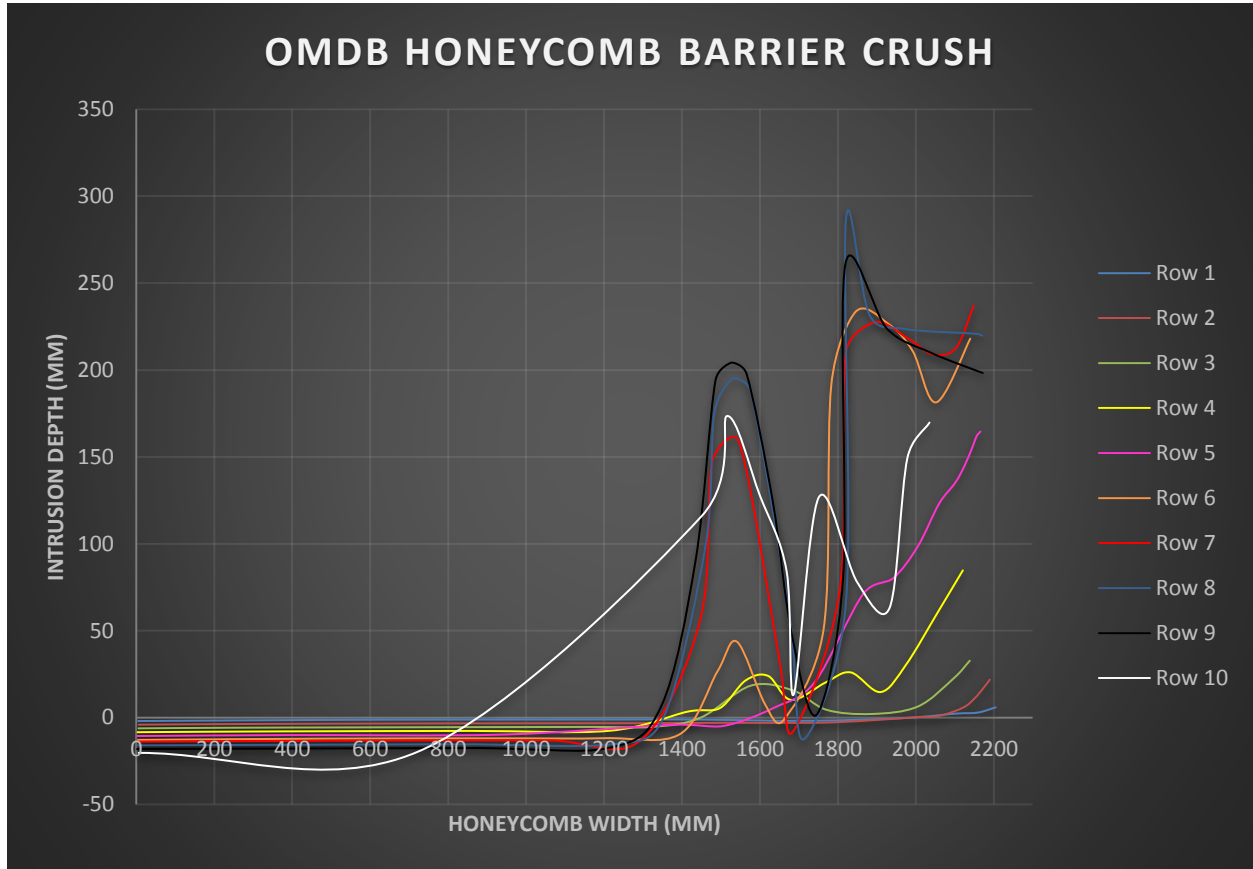
Reference point:

- +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 Toyota Scion iA four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
Test Date: 6/17/2016



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

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016

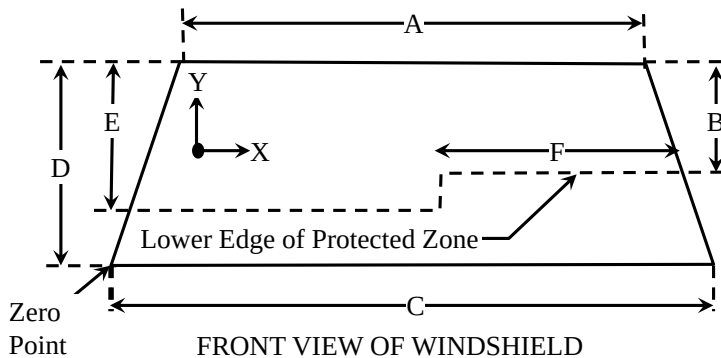
Please provide windshield mounting details. A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

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

Temperature of windshield molding during test: 21°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2042	1312	61.3
Right Side	2042	2012	98.5
Total	4084	3324	81.4



Item	Units	Value
A	mm	1116
B	mm	527
C	mm	1460
D	mm	754
E	mm	517
F	mm	490

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 Toyota Scion iA four door sedan</u>	NHTSA No.:	<u>R20165146</u>
Test Program:	<u>R&D 90.1kph, 15° / 35% Left Oblique Offset</u>	Test Date:	<u>6/17/2016</u>

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

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

Test Time: 11:15 AM

Stoddard Solvent Spillage Measurements

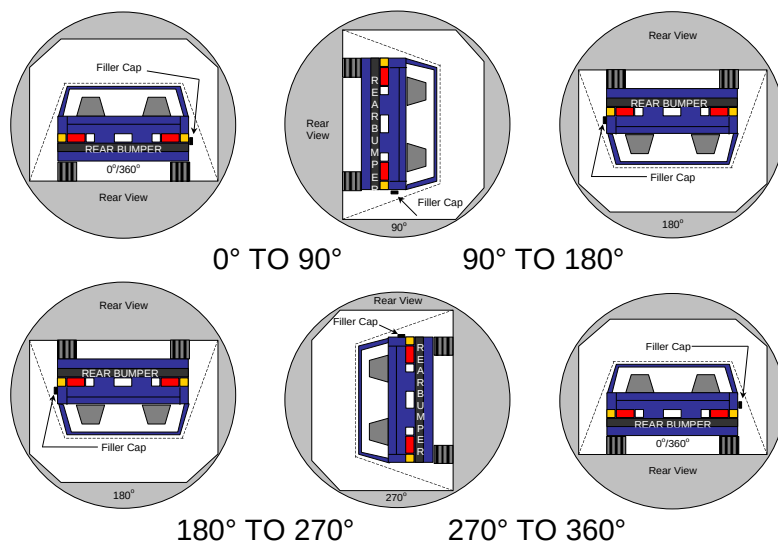
A.	From impact until vehicle motion ceases: (Maximum allowable = 1 oz.)	<u>0</u>	oz
B.	For the 5-minute period after motion ceases: (Maximum allowable = 5 oz.)	<u>0</u>	oz
C.	For the following 25 minutes: (Maximum allowable = 1 oz./minute)	<u>0</u>	oz
D.	Spillage	<u>0</u>	oz

DATA SHEET NO. 16

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016



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

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

3. Details of Stoddard Solvent spillage: None

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	75	300	375
90° to 180°	63	300	363
180° to 270°	60	300	360
270° to 360°	65	300	365

FMVSS 301 SPILLAGE TABLE

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

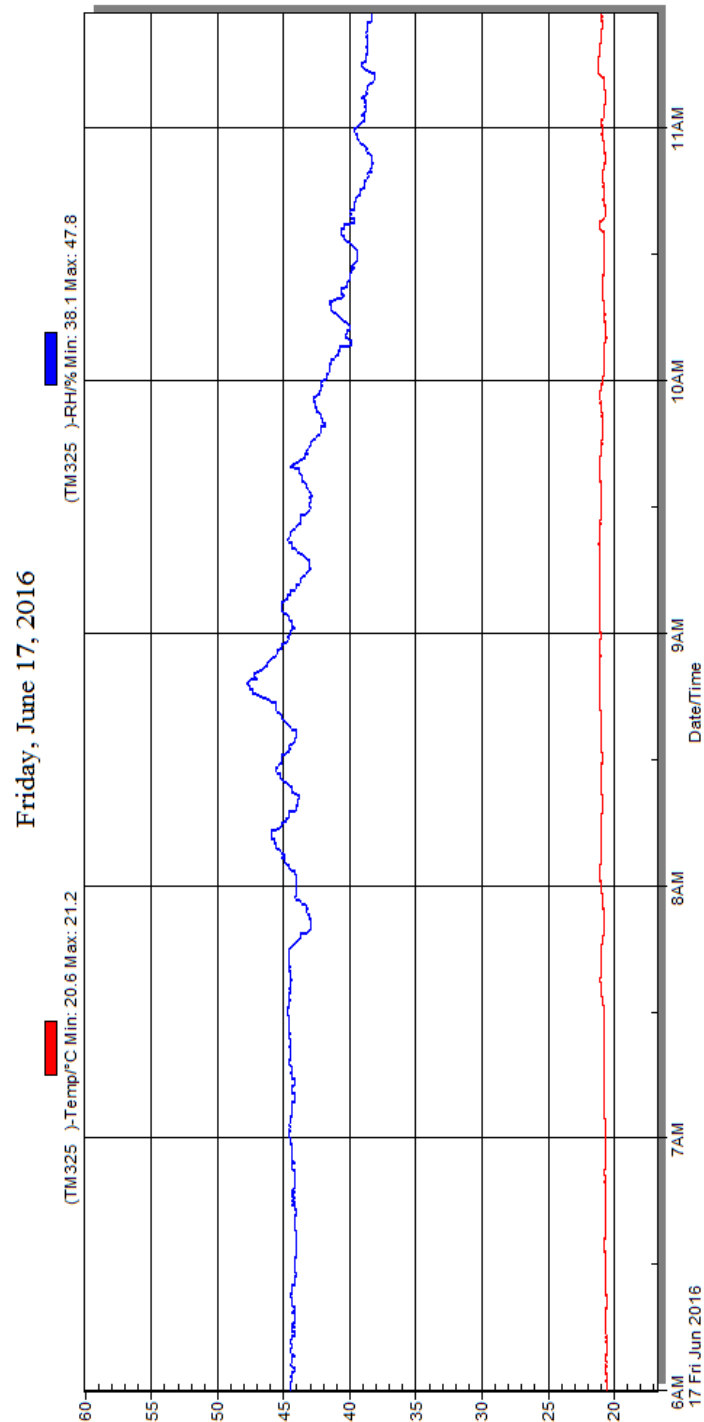
SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle: 2016 Toyota Scion iA four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20165146
 Test Date: 6/17/2016



Temperature Stabilization Chart/Data

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS		
No.	Description	Page
1	As Delivered Right Front 3-4 View of Test Vehicle	A-9
2	As Delivered Left Rear 3-4 View of Test Vehicle	A-9
3	Test Vehicle Certification Label	A-10
4	Test Vehicle Tire Placard	A-10
5	Pre-Test Front View of Test Vehicle	A-11
6	Post-Test Front View of Test Vehicle	A-11
7	Pre-Test Left Front 3-4 View of Test Vehicle	A-12
8	Post-Test Left Front 3-4 View of Test Vehicle	A-12
9	Pre-Test Left Side View of Test Vehicle	A-13
10	Post-Test Left Side View of Test Vehicle	A-13
11	Pre-Test Left Rear 3-4 View of Test Vehicle	A-14
12	Post-Test Left Rear 3-4 View of Test Vehicle	A-14
13	Pre-Test Rear View of Test Vehicle	A-15
14	Post-Test Rear View of Test Vehicle	A-15
15	Pre-Test Right Rear 3-4 View of Test Vehicle	A-16
16	Post-Test Right Rear 3-4 View of Test Vehicle	A-16
17	Pre-Test Right Side View of Test Vehicle	A-17
18	Post-Test Right Side View of Test Vehicle	A-17
19	Pre-Test Right Front 3-4 View of Test Vehicle	A-18
20	Post-Test Right Front 3-4 View of Test Vehicle	A-18
21	Monroney Label Photograph	A-19
22	Pre-Test Overhead View of OMDB against target vehicle at ideal Impact Point	A-19
23	Pre-Test Left Side View of OMDB against target vehicle at ideal Impact Point	A-20
24	Pre-Test Right Side View of OMDB against target vehicle at ideal Impact Point	A-20
25	Pre-Test Close-up View of Impact Point	A-21
26	Post-Test Close-up View of Impact Point	A-21
27	Post-Test Vehicle Overhead View	A-22
28	Pre-Test Close-up View of Driver Door Latch	A-23
29	Post-Test Close-up View of Driver Door Latch	A-23
30	Pre-Test Close-up View of Passenger Door Latch	A-24

TABLE OF PHOTOGRAPHS (Continued)		
No.	Description	Page
31	Post-Test Close-up View of Passenger Door Latch	A-24
32	Pre-Test Windshield View	A-25
33	Post-Test Windshield View	A-25
34	Pre-Test View of Driver Inner Door Panel	A-26
35	Post-Test View of Driver Inner Door Panel	A-26
36	Pre-Test View of Passenger Inner Door Panel	A-27
37	Post-Test View of Passenger Inner Door Panel	A-27
38	Pre-Test Overall View of Driver Knee Bolsters	A-28
39	Post-Test Overall View of Driver Knee Bolsters	A-28
40	Pre-Test Left Side View of Driver Knee Bolsters	A-29
41	Post-Test Left Side View of Driver Knee Bolsters	A-29
42	Pre-Test Right Side View of Driver Knee Bolsters	A-30
43	Post-Test Right Side View of Driver Knee Bolsters	A-30
44	Pre-Test View of Driver Floor pan at Left sill level, w/carpet	A-31
45	Post-Test View of Driver Floor pan at Left sill level, w/carpet	A-31
46	Pre-Test View of Driver Floor pan at Mid seat level, w/carpet	A-32
47	Post-Test view of Driver Floor pan at Mid seat level, w/carpet	A-32
48	Pre-Test View of Driver Floor pan at Right sill level, w/carpet	A-33
49	Post-Test View of Driver Floor pan at Right sill level, w/carpet	A-33
50	Pre-Test Driver Front Windshield View	A-34
51	Post-Test Driver Front Windshield View	A-34
52	Pre-Test Left Side View of Driver and Interior	A-35
53	Post-Test Left Side View of Driver and Interior	A-35
54	Pre-Test Left Side Driver Window View	A-36
55	Post-Test Left Side Driver Window View	A-36
56	Pre-Test Right Side View of Driver and Interior	A-37
57	Post-Test Right Side View of Driver and Interior	A-37
58	Pre-Test View of Driver Door Clearance	A-38
59	Post-Test View of Driver Door Clearance	A-38

TABLE OF PHOTOGRAPHS (Continued)		
No.	Description	Page
60	Pre-Test View of Parking Brake	A-39
61	Pre-Test Driver Seat Fore Aft Markings	A-40
62	Post-Test Driver Seat Fore Aft Markings	A-40
63	Pre-Test Driver Seat Back Markings	A-41
64	Pre-Test Overhead View of Driver Thighs on Seat	A-41
65	Pre-Test Driver Adjustable D-ring	A-42
66	Post-Test Driver Adjustable D-ring	A-42
67	Pre-Test Driver Feet	A-43
68	Post-Test Driver Feet	A-43
69	Pre-Test View of Driver Right Knee and Bolster	A-44
70	Post-Test View of Driver Right Knee and Bolster	A-44
71	Pre-Test View of Driver Left Knee and Bolster	A-45
72	Post-Test View of Driver Left Knee and Bolster	A-45
73	Pre-Test View of Driver Abdomen	A-46
74	Post-Test View of Driver Abdomen	A-46
75	Pre-Test Left Side View of Steering Wheel set position	A-47
76	Post-Test Left Side View of Steering Wheel set position	A-47
77	Post-Test View of Driver Head Contact with Airbag – Front	A-48
78	Post-Test View of Driver Head Contact with Airbag – Curtain	A-48
79	Post-Test View of Driver Head Contact with Vehicle Interior – A	A-49
80	Post-Test View of Driver Head Contact with Vehicle Interior – B	A-49
81	Post-Test View of Driver Head Contact with Vehicle Interior – C	A-50
82	Pre-Test Overall View of Passenger Knee Bolsters	A-51
83	Post-Test Overall View of Passenger Knee Bolsters	A-51
84	Pre-Test Left Side View of Passenger Knee Bolsters	A-52
85	Post-Test Left Side View of Passenger Knee Bolsters	A-52
86	Pre-Test Right Side View of Passenger Knee Bolsters	A-53
87	Post-Test Right Side View of Passenger Knee Bolsters	A-53
88	Pre-Test View of Passenger Floor pan at Right sill level, w/carpet	A-54
89	Post-Test View of Passenger Floor pan at Right sill level, w/carpet	A-54

TABLE OF PHOTOGRAPHS (Continued)		
No.	Description	Page
90	Pre-Test View of Passenger Floor pan at Mid seat level, w/carpet	A-55
91	Post-Test view of Passenger Floor pan at Mid seat level, w/carpet	A-55
92	Pre-Test View of Passenger Floor pan at Left View, w/carpet	A-56
93	Post-Test View of Passenger Floor pan at Left View, w/carpet	A-56
94	Pre-Test Passenger Front Close-up View, Windshield	A-57
95	Post-Test Passenger Front Close-up View, Windshield	A-57
96	Pre-Test Left Side Passenger and Interior View	A-58
97	Post-Test Left Side Passenger and Interior View	A-58
98	Pre-Test Right Side Passenger Window View	A-59
99	Post-Test Right Side Passenger Window View	A-59
100	Pre-Test Right Side Passenger and Interior View	A-60
101	Post-Test Right Side Passenger and Interior View	A-60
102	Pre-Test View of Passenger Door Clearance	A-61
103	Post-Test View of Passenger Door Clearance	A-61
104	Pre-Test Passenger Seat Fore-Aft Markings	A-62
105	Post-Test Passenger Seat Fore-Aft Markings	A-62
106	Pre-Test Passenger Seat Back Markings	A-63
107	Pre-Test Overhead View of Passenger Thighs on seat	A-63
108	Pre-Test Passenger Adjustable D-ring	A-64
109	Post-Test Passenger Adjustable D-ring	A-64
110	Pre-Test View of Passenger Feet	A-65
111	Post-Test View of Passenger Feet	A-65
112	Pre-Test View of Passenger Right Knee and Bolster	A-66
113	Post-Test View of Passenger Right Knee and Bolster	A-66
114	Pre-Test View of Passenger Left Knee and Bolster	A-67
115	Post-Test View of Passenger Left Knee and Bolster	A-67
116	Pre-Test View of Passenger Abdomen	A-68
117	Post-Test View of Passenger Abdomen	A-68
118	Post-Test View of Passenger Head contact with Airbag – Front	A-69
119	Post-Test View of Passenger Head contact with Airbag – Curtain	A-69

TABLE OF PHOTOGRAPHS (Continued)		
No.	Description	Page
120	Post-Test View of Passenger Head contact with Interior	A-70
121	Post-Test View of Passenger Body contact with Interior	A-70
122	Post-Test View of Passenger Head contact with Interior	A-71
123	Post-Test Passenger Contact With Glovebox	A-71
124	Pre-Test Ballast Locations	A-72
125	Post-Test Speed Trap Readout	A-72
126	Pre-Test View of Fuel Filler Cap	A-73
127	Post-Test View of Fuel Filler Cap	A-73
128	Pre-Test Engine Compartment View	A-74
129	Post-Test Engine Compartment View	A-74
130	Pre-Test Right Side Engine Compartment View	A-75
131	Post-Test Right Side Engine Compartment View	A-75
132	Pre-Test Left Side Engine Compartment View	A-76
133	Post-Test Left Side Engine Compartment View	A-76
134	Pre-Test View of Front Underbody (perpendicular to vehicle)	A-77
135	Post-Test View of Front Underbody (perpendicular to vehicle)	A-77
136	Pre-Test View of Mid Underbody (perpendicular to vehicle)	A-78
137	Post-Test View of Mid Underbody (perpendicular to vehicle)	A-78
138	Pre-Test View of Rear Underbody (perpendicular to vehicle)	A-79
139	Post-Test View of Rear Underbody (perpendicular to vehicle)	A-79
140	Pre-Test View of Steering rack and or sway bar	A-80
141	Post-Test View of Steering rack and or sway bar	A-80
142	Pre-Test Bumper to Rail Attachments and Crush Initiators	A-81
143	Post-Test Bumper to Rail Attachments and Crush Initiators	A-81
144	Post-Test View of Front Sub-Frame Deformation	A-82
145	Pre-Test Frame Rail with tire removed	A-83
146	Post-Test Frame Rail with tire removed	A-83
147	Pre-Test View of Front Driver Wheel Well with tire removed	A-84
148	Post-Test ¾ View of Front Driver Wheel Well w/ tire removed	A-84
149	Post-Test Side View of Front Driver Wheel Well w/ tire removed	A-85

TABLE OF PHOTOGRAPHS (Continued)		
No.	Description	Page
150	Post-Test Right Side 3/4 Rear View of the Front Driver Wheel Well w/ tire removed	A-85
151	Post-Test Looking Down at the Front Driver Shotgun	A-86
152	Post-Test Right Side ¾ View of Front Driver Shotgun	A-86
153	Post-Test Front Driver Close up View of Suspension w/ tire removed	A-87
154	Post-Test ¾ View of Front Passenger Wheel Well w/ tire removed	A-87
155	Post-Test Side View of Front Passenger Wheel Well w/ tire removed	A-88
156	Post-Test Right Side 3/4 Rear View of the Front Passenger Wheel Well w/ tire removed	A-88
157	Post-Test Looking Down at the Front Passenger Shotgun	A-89
158	Post-Test Right Side ¾ View of Front Passenger Shotgun	A-89
159	Post-Test Front Passenger Close up View of Suspension w/ tire removed	A-90
160	Post-Test View of Door Sill with door open-Struck Side	A-90
161	Post-Test View of Deformation of A pillar-Struck Side	A-91
162	Post-Test View of Deformation of B pillar-Struck Side	A-91
163	Post-Test View of Deformation of C pillar-Struck Side	A-92
164	Post-Test View of Wheel and/or Tire Deformation-Struck Side	A-92
165	Post-Test View of Deformation of Rocker or Post-Struck Side	A-93
166	Post-Test View of Windshield Separation	A-93
167	Pre-Test Left Side View of OMDB	A-94
168	Post-Test Left Side View of OMDB	A-94
169	Pre-Test Right Side View of OMDB	A-95
170	Post-Test Right Side View of OMDB	A-95
171	Pre-Test Top View of OMDB	A-96
172	Post-Test Top View of OMDB	A-96
173	Pre-Test Front View of OMDB	A-97
174	Post-Test Front View of OMDB	A-97
175	Pre-Test Left Front ¾ View of OMDB	A-98
176	Post-Test Left Front ¾ View of OMDB	A-98
177	Pre-Test Right Front ¾ View of OMDB	A-99
178	Post-Test Right Front ¾ View of OMDB	A-99
179	Pre-Test Right Side View of OMDB	A-100

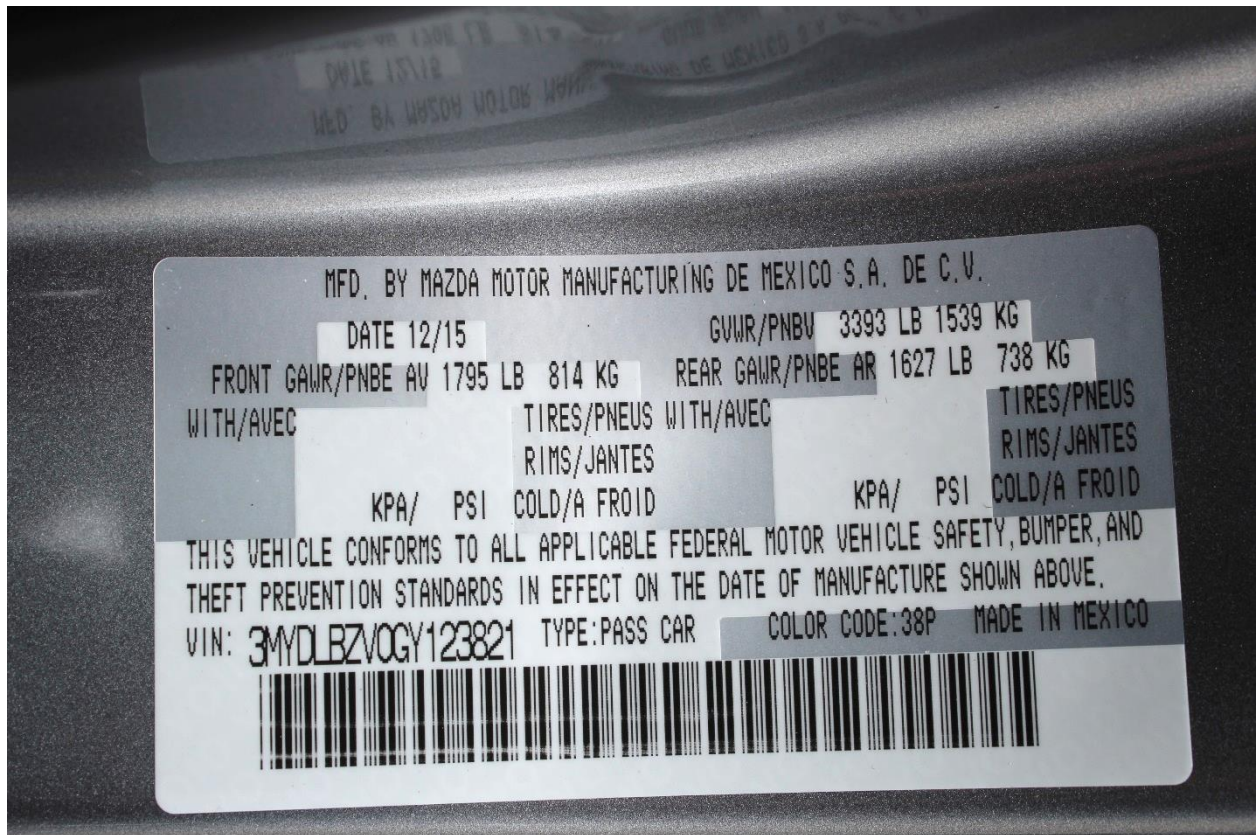
TABLE OF PHOTOGRAPHS (Continued)		
No.	Description	Page
180	Post-Test Right Side View of OMDB	A-100
181	Pre-Test Left Side View of OMDB	A-101
182	Post-Test Left Side View of OMDB	A-101
183	Pre-Test OMDB & Vehicle, Right Side	A-102
184	Post-Test OMDB & Vehicle, Right Side	A-102
185	Pre-Test OMDB & Vehicle, Left Side	A-103
186	Post-Test OMDB & Vehicle, Left Side	A-103
187	Pre-Test OMDB & Vehicle, Top View	A-104
188	Post-Test OMDB & Vehicle, Top View	A-104
189	Pre-Test OMDB & Vehicle, Rear View	A-105
190	Post-Test OMDB & Vehicle, Rear View	A-105
191	Pre-Test OMDB & Vehicle, Front View	A-106
192	Post-Test OMDB & Vehicle, Front View	A-106
193	Pre-Test OMDB & Vehicle Alignment View	A-107
194	Vehicle at 0 Degrees on Static Rollover Device	A-107
195	Vehicle at 90 Degrees on Static Rollover Device	A-108
196	Vehicle at 180 Degrees on Static Rollover Device	A-108
197	Vehicle at 270 Degrees on Static Rollover Device	A-109
198	Vehicle at 360 Degrees on Static Rollover Device	A-109
199	Impact Photo	A-110
200	Pre-Test Vehicle Bumper Left Side View	A-111
201	Post-Test Vehicle Bumper Left Side View	A-111
202	Pre-Test Vehicle Bumper Left Front View	A-112
203	Post-Test Vehicle Bumper Left Front View	A-112
204	Pre-Test Vehicle Bumper Front View	A-113
205	Post-Test Vehicle Bumper Front View	A-113
206	Pre-Test Vehicle Bumper Right Side View	A-114
207	Post-Test Vehicle Bumper Right Side View	A-114
208	Pre-Test Vehicle Bumper Right Front View	A-115
209	Post-Test Vehicle Bumper Right Front View	A-115



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



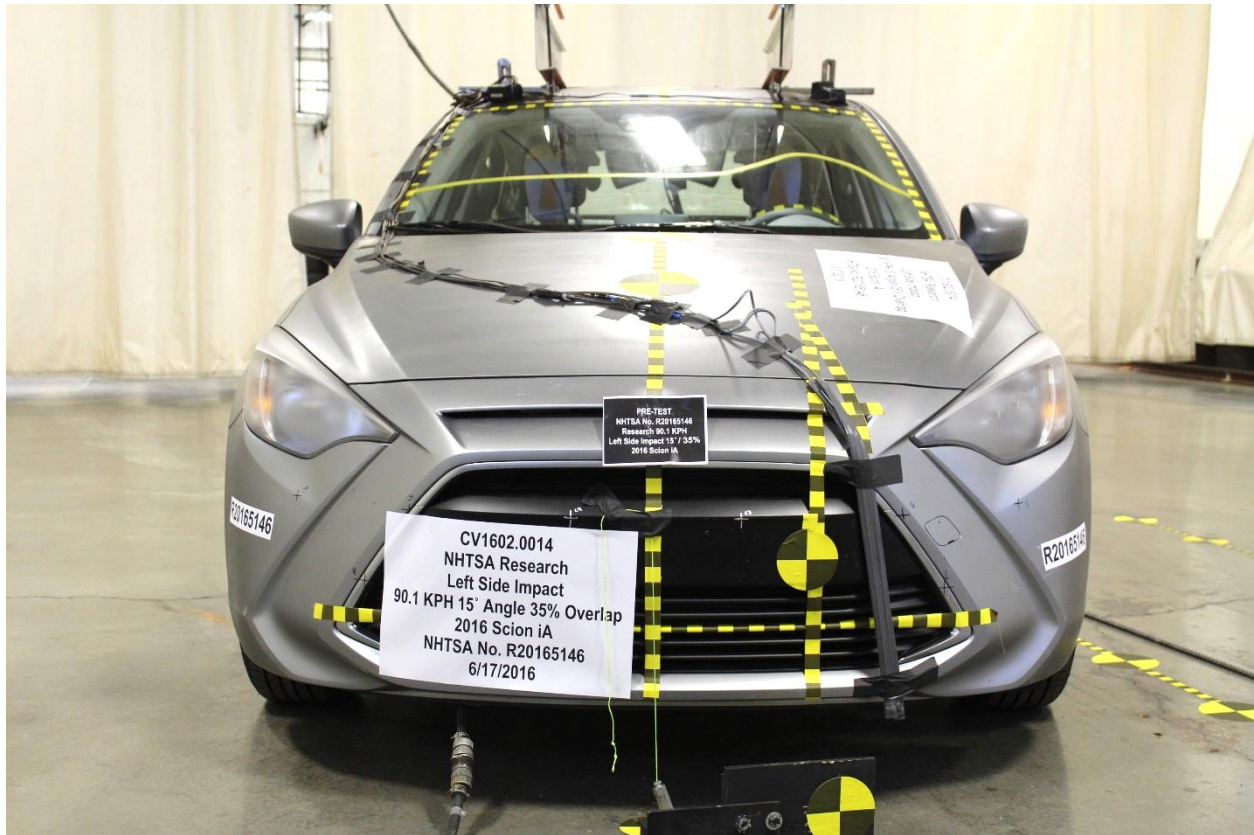
No. 002 As Delivered Left Rear 3-4 View of Test Vehicle



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

what moves you

DESC: **SCION iA** 4-DOOR SEDAN

VIN: **3MYDLBZV0GY123821**

VRU/DL: 2016/625A

CLR: STERLING/AZ70 (038P/79)

FINAL ASSEMBLY POINT: SALAMANCA, MEXICO

STANDARD EQUIPMENT

MECHANICAL AND PERFORMANCE

- 1.5L 4-Cyl DOHC 16-Valve 108HP
- 6-Speed Automatic Trans w/ Sport Mode
- Front WH Drive, Electric Power Assisted Steering, Direct Injection System
- Ventilated Fr Disc & Rr Drum Brakes
- Inc MacPherson Strut Front Suspension
- Torsion Beam Rear Suspension
- 16" Alloy Wheels w/ 165R6016 Tires

SAFETY AND CONVENIENCE

- Low Speed Pre-Collision System, Dynamic Stability Ctrl (DSC), Trac Ctrl Sys (TCS)
- Anti-Lock Brake Syst (ABS), Electronic Brake Force Dist (EBD), Brake Assist (BA)
- Dr and Fr Pgr Standard Airbag System
- Dr and Fr Pgr Seat Mounted Side Airbags
- Fr and Rr Side Curtain Airbags
- LATCH-Lower Anchor & Tether for Children
- Integrated Rear-View Backup Camera Syst
- Tire Pressure Monitor Syst / 1st Aid Kit

EXTERIOR

- Halogen Headlamps, Daytime Running Lights
- Var Intermittent Front Windshield Wipers
- Color-Keyed Power Outside Mirrors w/ LED Turn Signal Ind, Chrome-Tipped Exhaust

INTERIOR

- 7" Color Touch-Screen Display Audio, Multi-Function Command Control, AM/FM/HD Radio, 8 Speakers, AUX / 2 USB Ports w/ iPod Connectivity, Hands-Free Phone Capability & Music Streaming via Bluetooth Wireless Tech, Voice Recog Technology, Connected Service Suite w/ Pandora, Aha & Stitcher Audio
- Remote Keyless Entry w/ Engine Immobilizer
- Push Button Engine Start System
- Power Door Locks, Power Windows w/ Dr Side One-Touch Auto Up/Down w/ Lam Protection
- Tilt/Telescope Steer WH w/ Audio Controls
- Speedometer & Digital Tach, Cruise Ctrl
- Air Cond w/ Window Defogger, 60/40 Split Fold Flat Rear Seats, Trip Meter
- Manual Height Adj Dr Cr, Carpeted Fl Mats
- ***Full Tank of Gas***

MANUFACTURER'S SUGGESTED RETAIL PRICE **\$16,800.00**

OPTIONAL EQUIPMENT

FE 50 State Emissions

GOVERNMENT 5-STAR SAFETY RATINGS

This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash or rollover risk.

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

EPA DOT Fuel Economy and Environment

Fuel Economy

37 MPG combined city/hwy

33 city 42 highway

2.7 gallons per 100 miles

You Save \$3,000 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$1,200

Fuel Economy & Greenhouse Gas Rating (better = left)

Smog Rating (better = right)

8 10 1 5

Best

The vehicle emits 263 grams CO₂ per mile. The best emits 139 grams CO₂ per mile. (EPA est.)

QR Code

fuel economy.gov

Calculate personalized estimates and compare vehicles

DELIVERY PROCESSING AND HANDLING FEE 795.00

TOTAL **\$17,595.00**

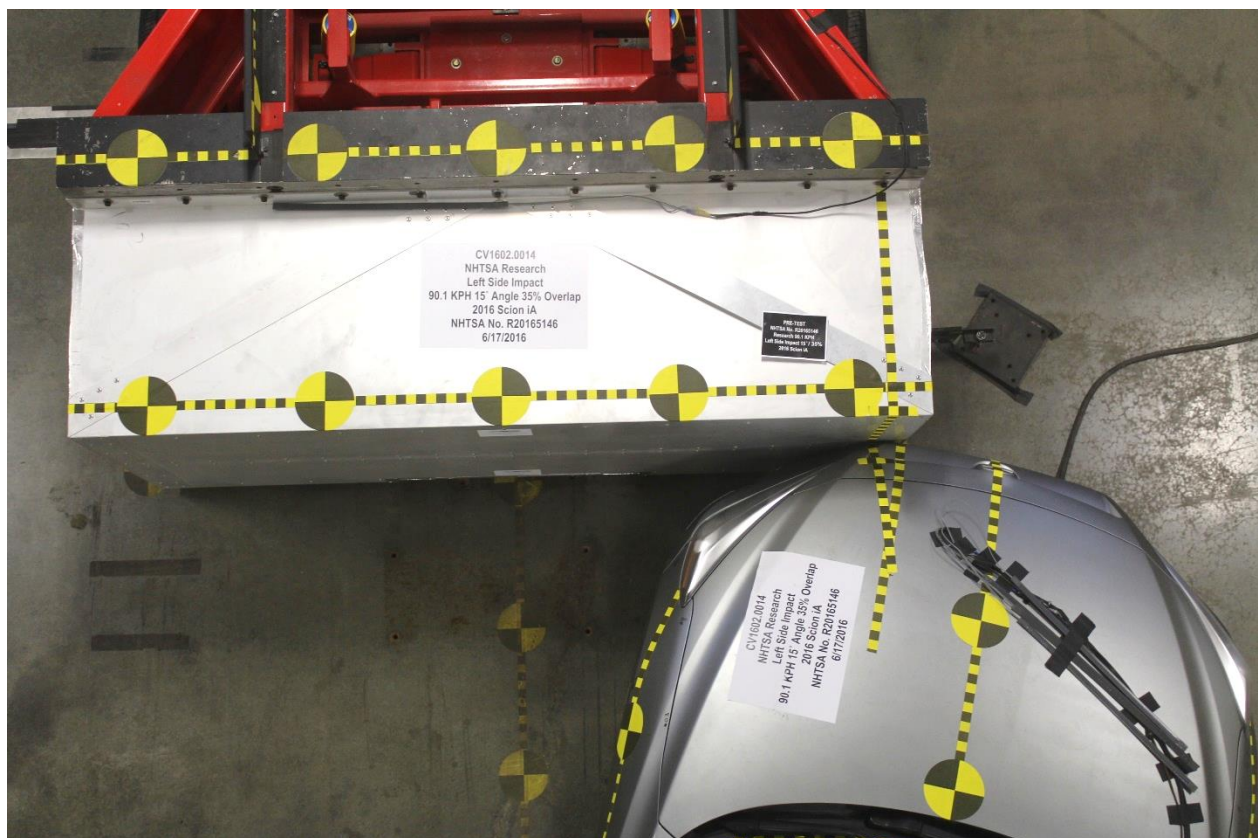
The New Vehicle Limited Warranty provides 3-year/50,000-mile basic coverage, 5-year/100,000-mile powertrain coverage, and 3-year/50,000-mile corrosion perforation coverage. See Warranty and Maintenance Guide for details. An extended service contract may be available for the vehicle.

The dealer's suggested retail price includes manufacturer's recommended pre-delivery service. Gasoline, license and title fees, applicable federal, state and local taxes and dealer and distributor installed options and accessories are not included in the manufacturer's suggested retail price.

Scion Service Shop, which covers normal factory scheduled maintenance for two years or 25,000 miles, whichever occurs first, is included as part of the sales price of the vehicle for cash/retail buyers. See participating dealer for eligibility and coverage details.

Delivered by Truck to: 31177
MAGUIRE TOYOTA
375 ELMIRA ROAD
ITHACA NY 14850

No. 021 Monroney Label Photograph



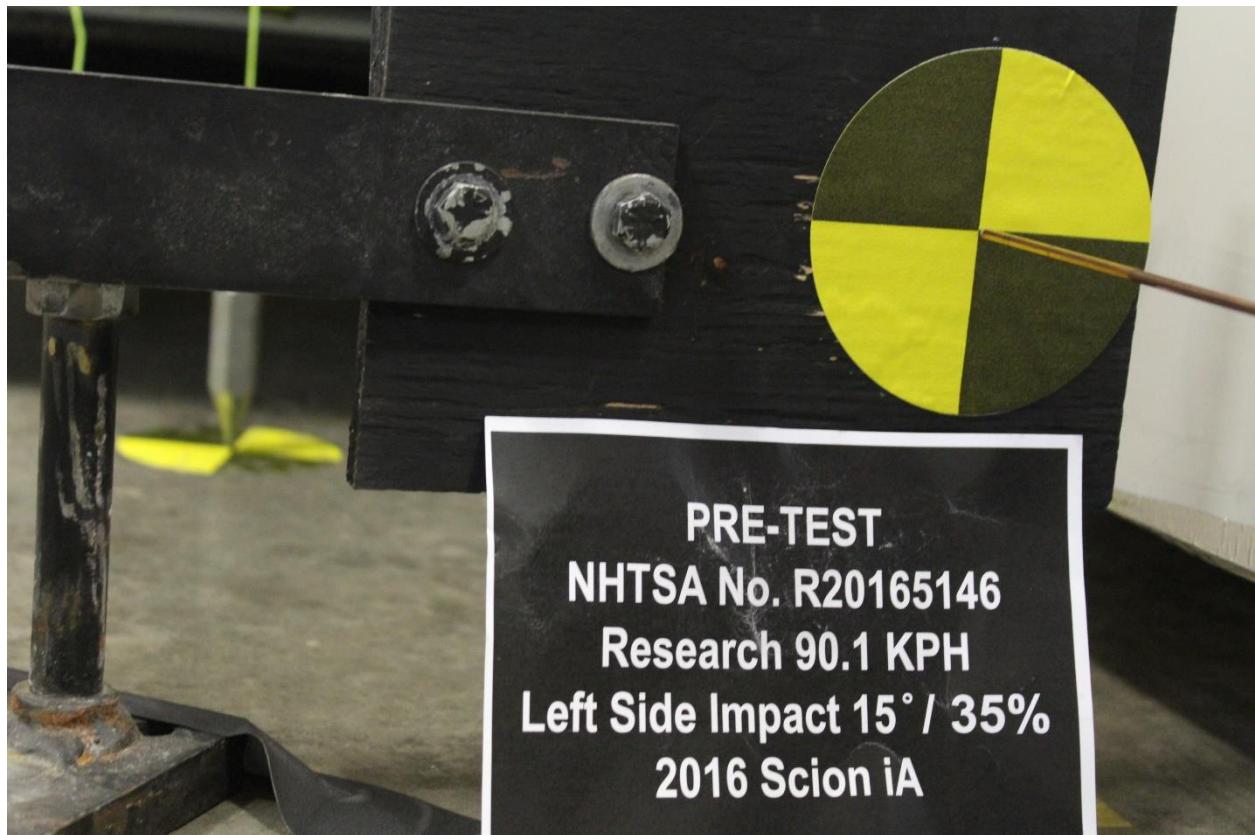
No. 022 Pre-Test Overhead View of OMDB against target vehicle at ideal Impact Point



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

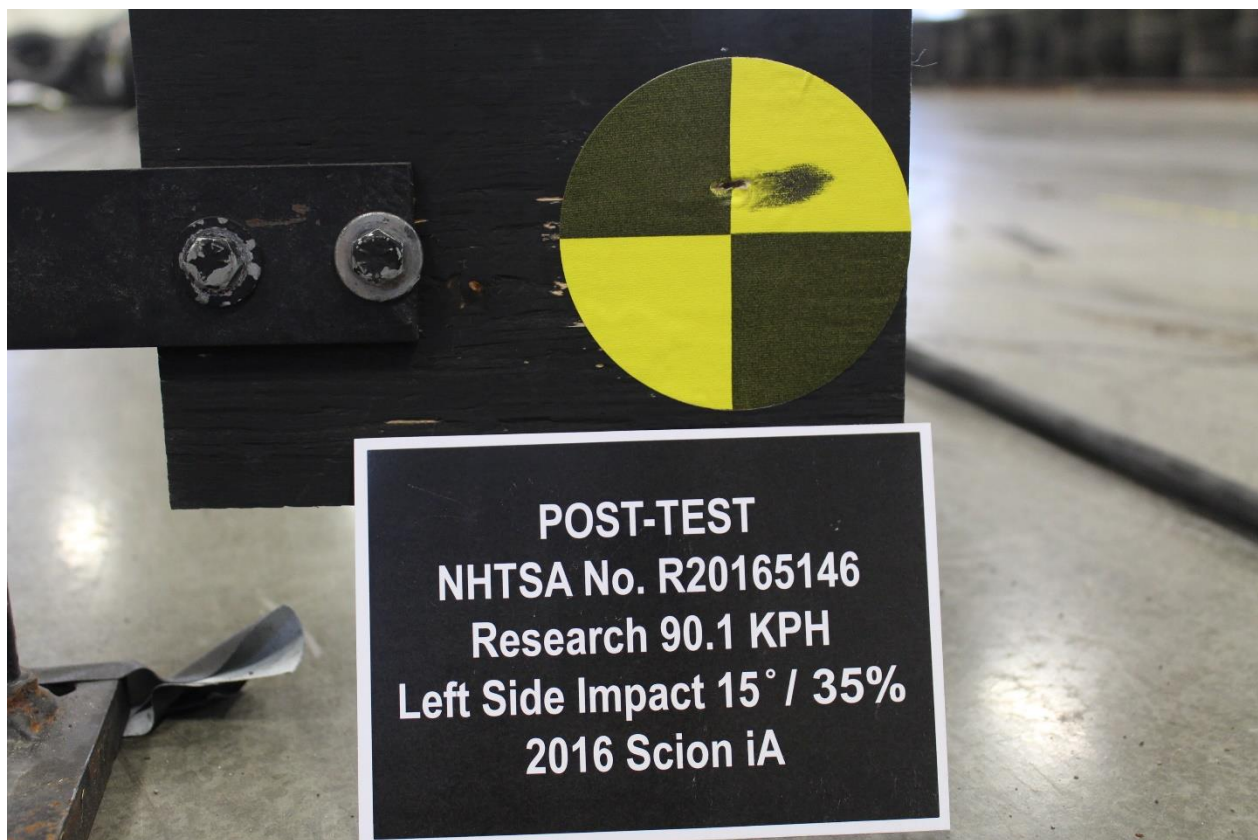


No. 024 Pre-Test Right Side View of OMDB against target vehicle at ideal Impact Point



PRE-TEST
NHTSA No. R20165146
Research 90.1 KPH
Left Side Impact 15° / 35%
2016 Scion iA

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



POST-TEST
NHTSA No. R20165146
Research 90.1 KPH
Left Side Impact 15° / 35%
2016 Scion iA

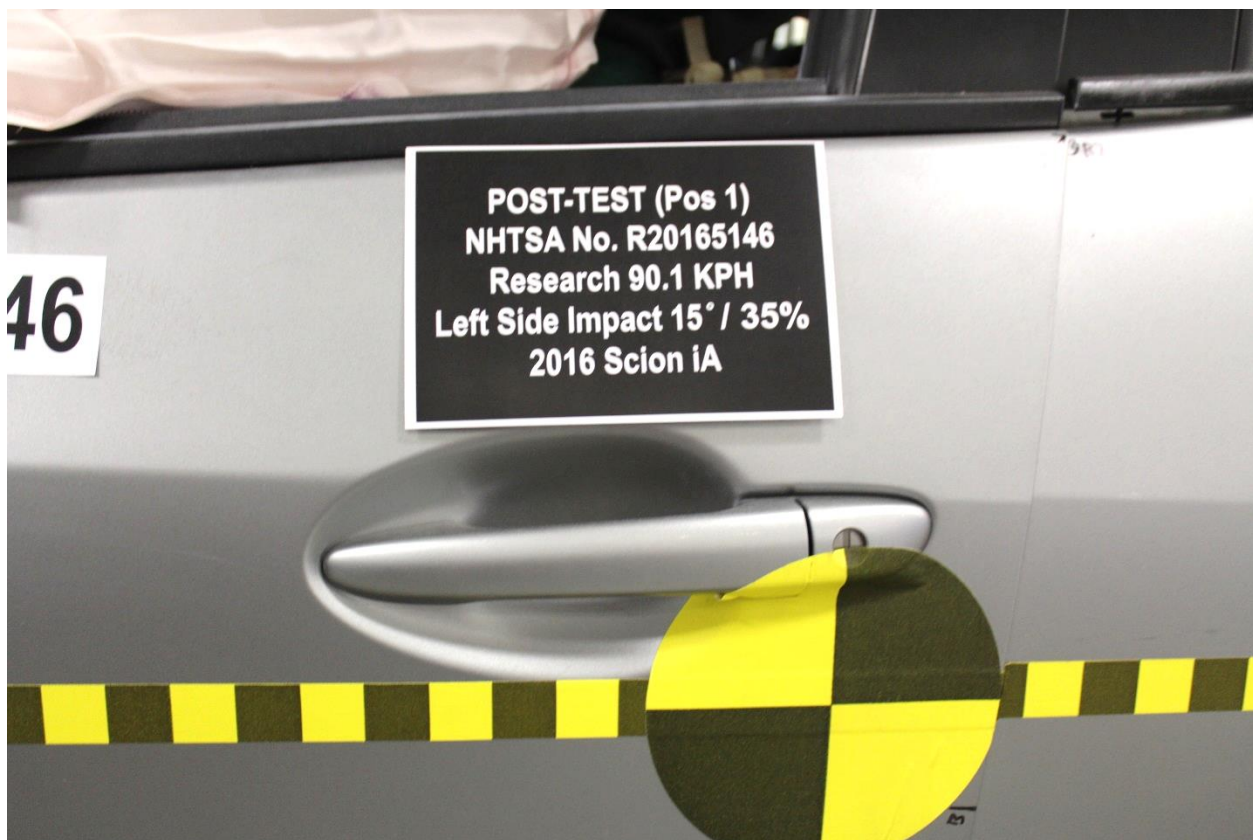
No. 026 Post-Test Close-up View of Impact Point



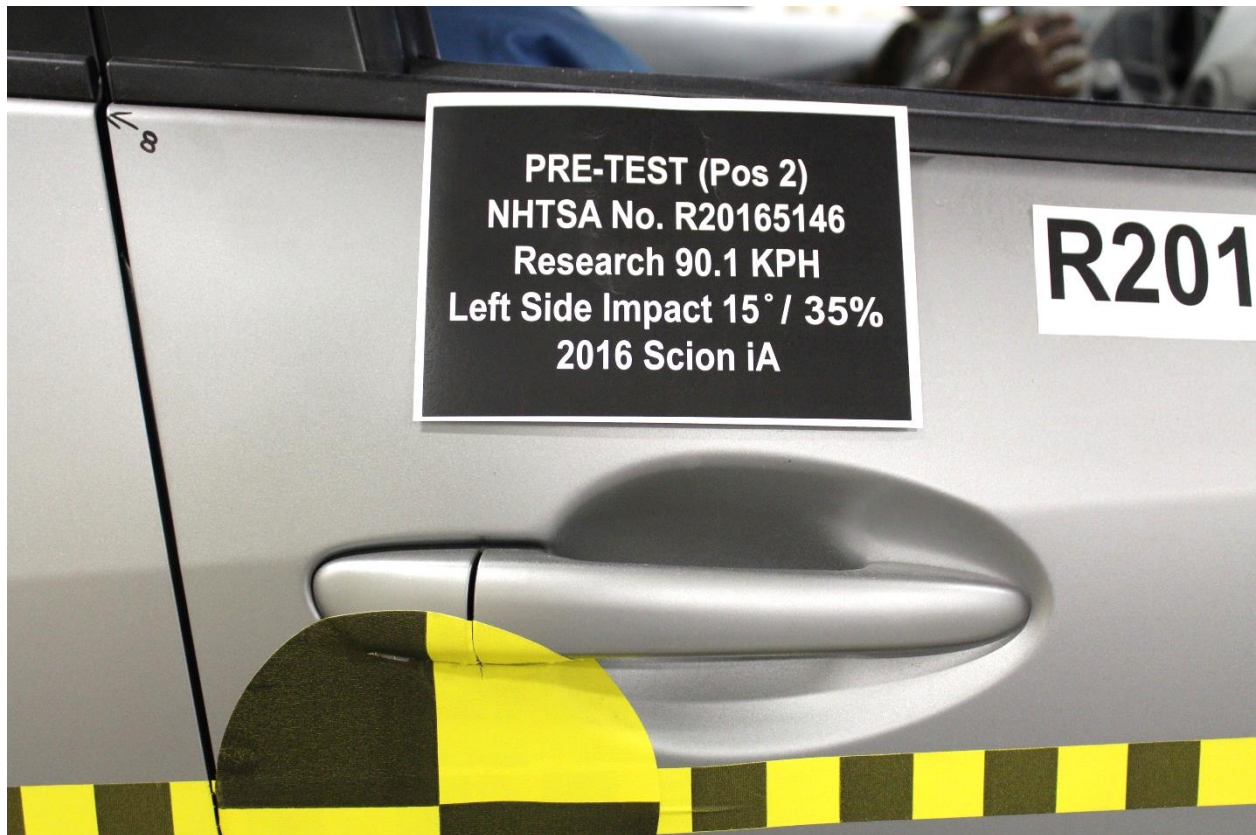
No. 027 Post-Test Vehicle Overhead View



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



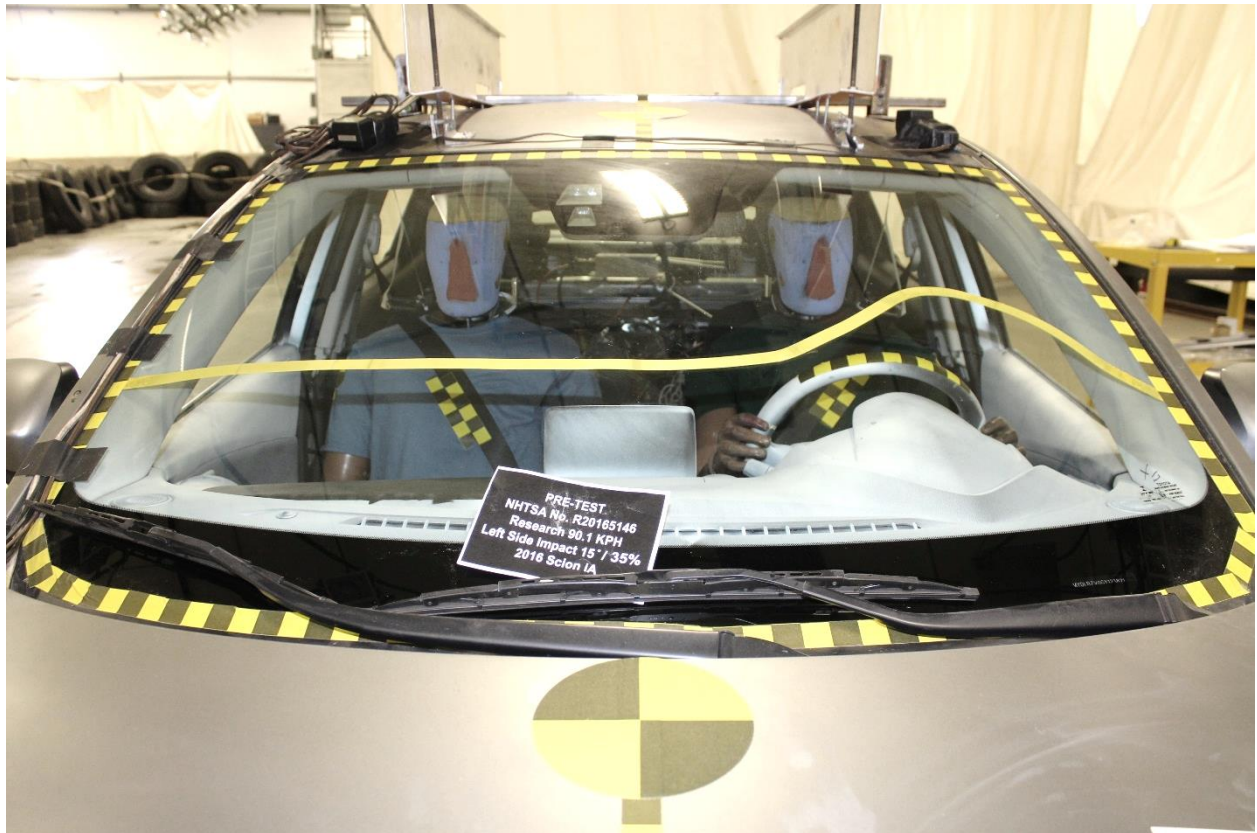
No. 029 Post-Test Close-up View of Driver Door Latch



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



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



No. 032 Pre-Test Windshield View



No. 033 Post-Test Windshield View



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



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



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



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



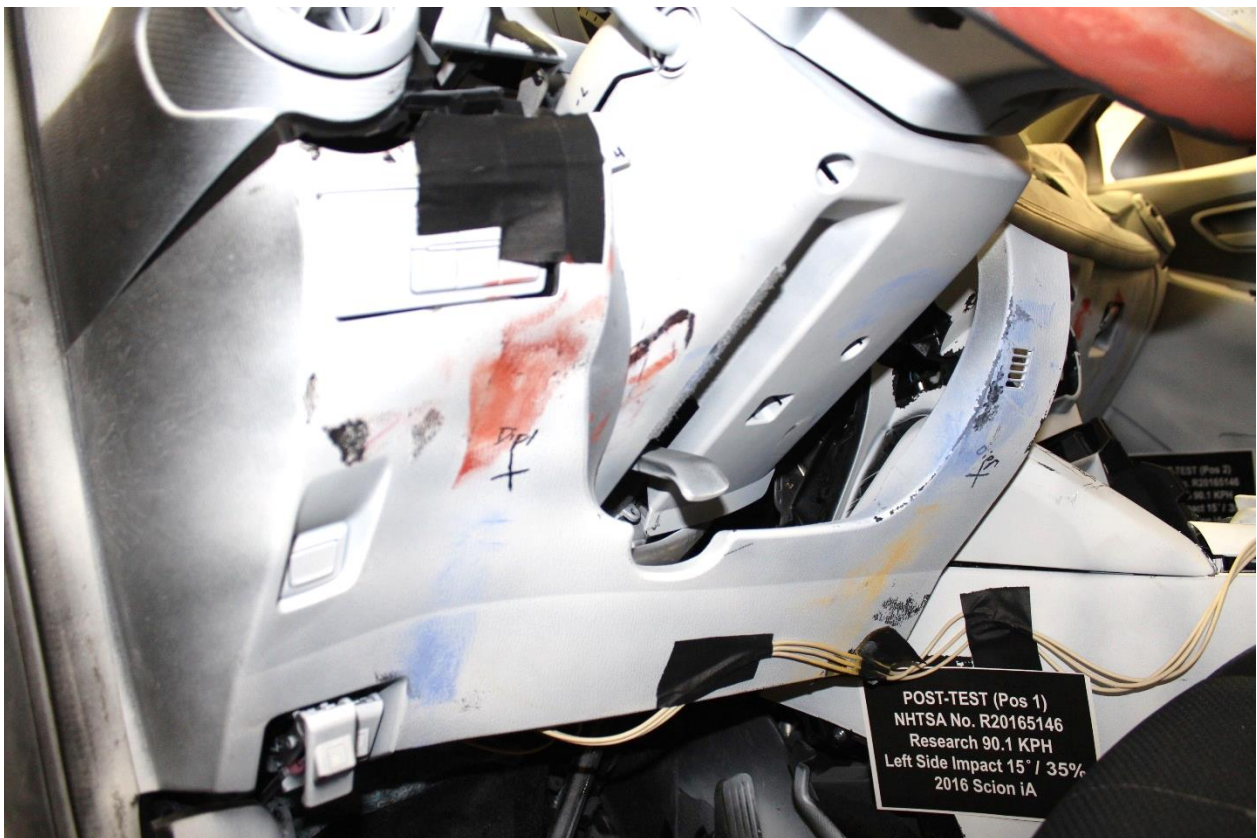
No. 038 Pre-Test Overall View of Driver Knee Bolsters



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



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



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



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



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



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



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



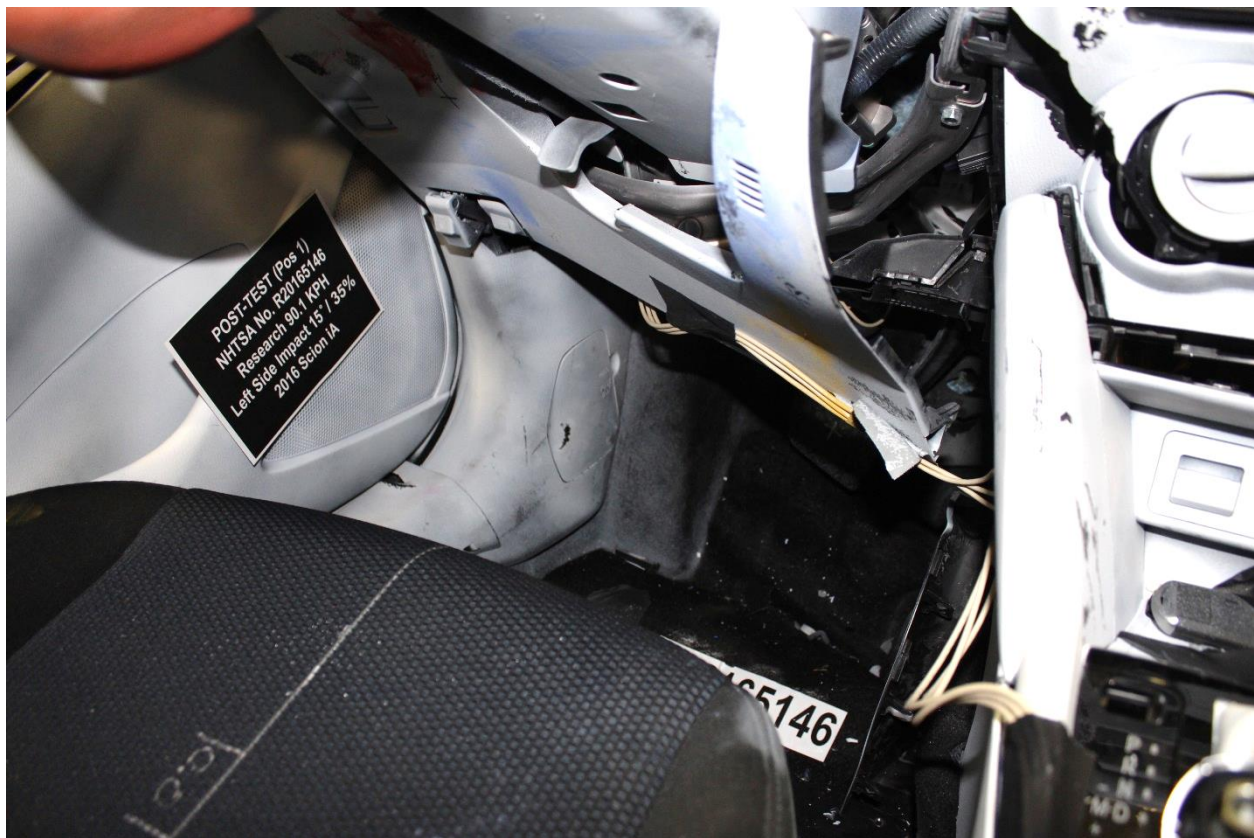
No. 046 Pre-Test View of Driver Floor pan at Mid seat level, w/carpet



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



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



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



No. 050 Pre-Test Driver Front Windshield View



No. 051 Post-Test Driver Front Windshield View



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



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



No. 054 Pre-Test Left Side Driver Window View



No. 055 Post-Test Left Side Driver Window View



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



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



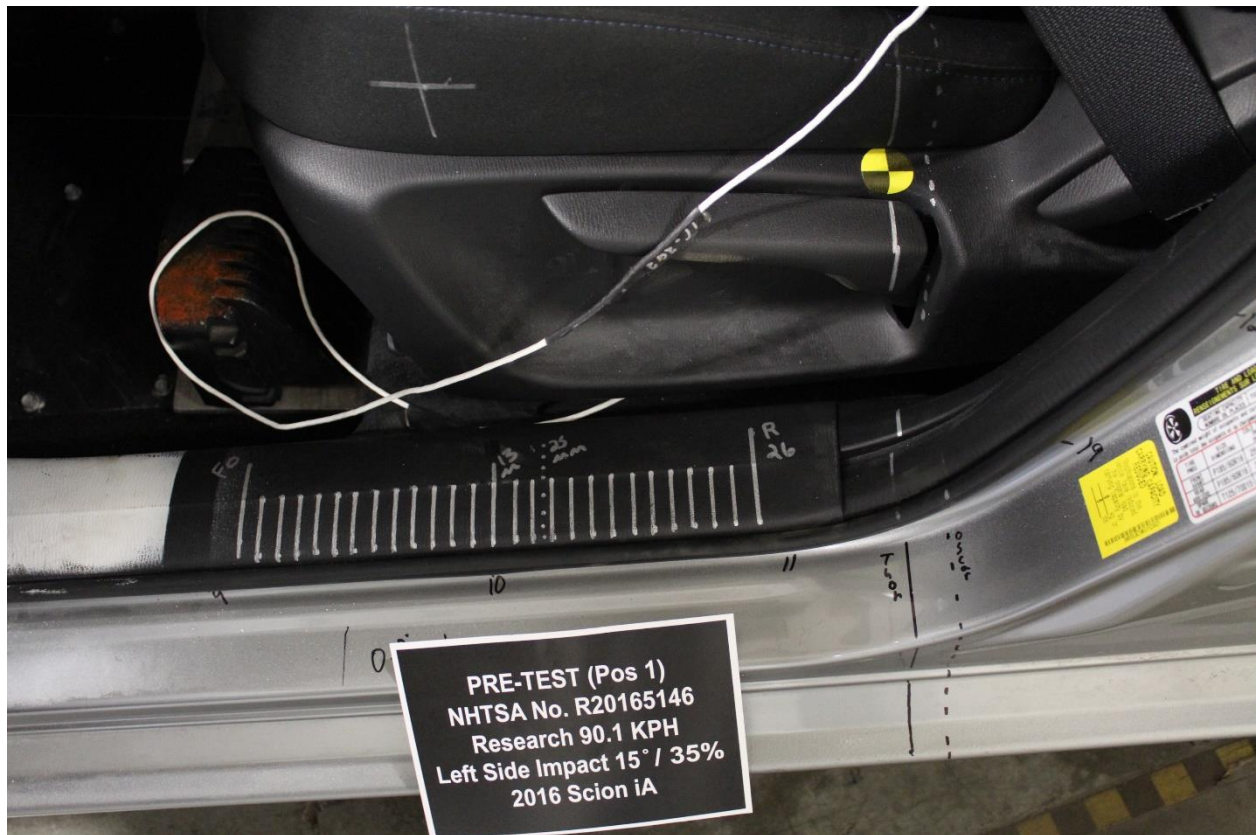
No. 058 Pre-Test View of Driver Door Clearance



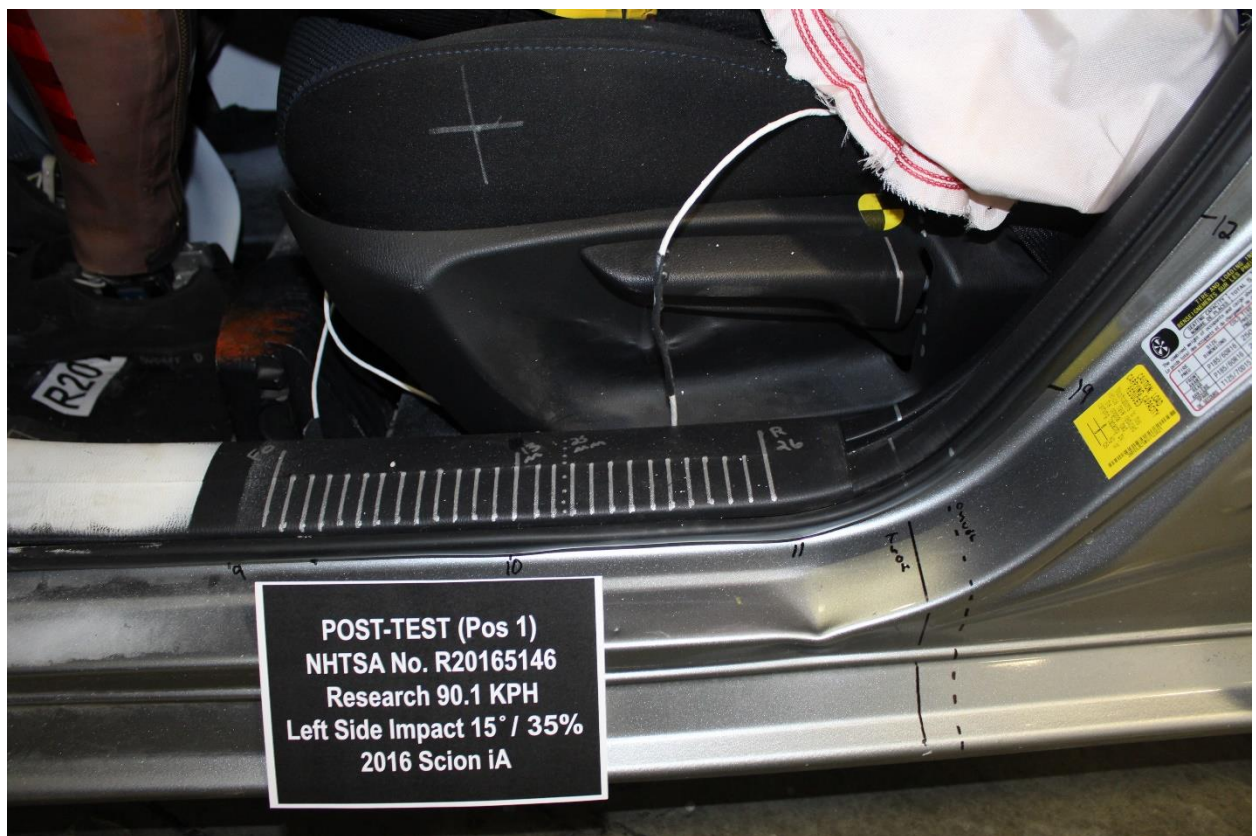
No. 059 Post-Test View of Driver Door Clearance



No. 060 Pre-Test View of Parking Brake



No. 061 Pre-Test Driver Seat Fore Aft Markings



No. 062 Post-Test Driver Seat Fore Aft Markings



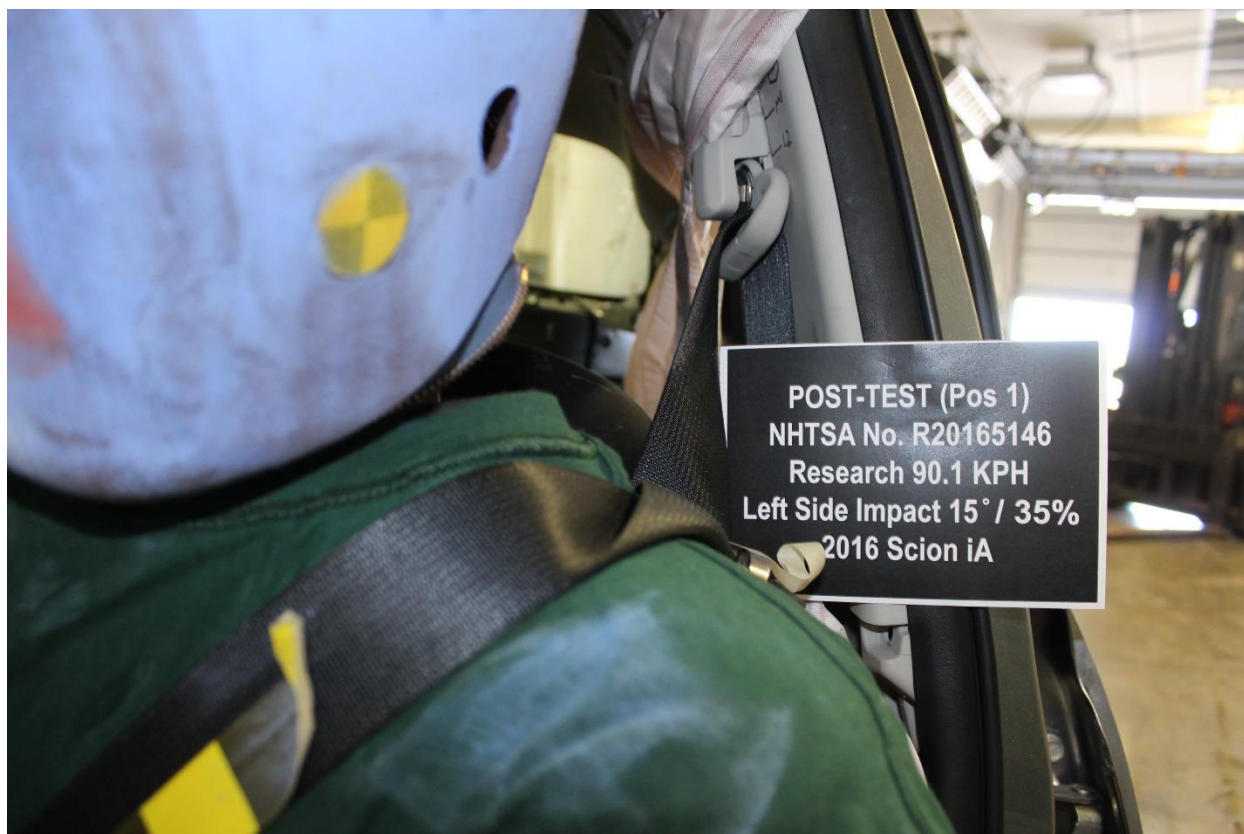
No. 063 Pre-Test Driver Seat Back Markings



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



No. 065 Pre-Test Driver Adjustable D-Ring



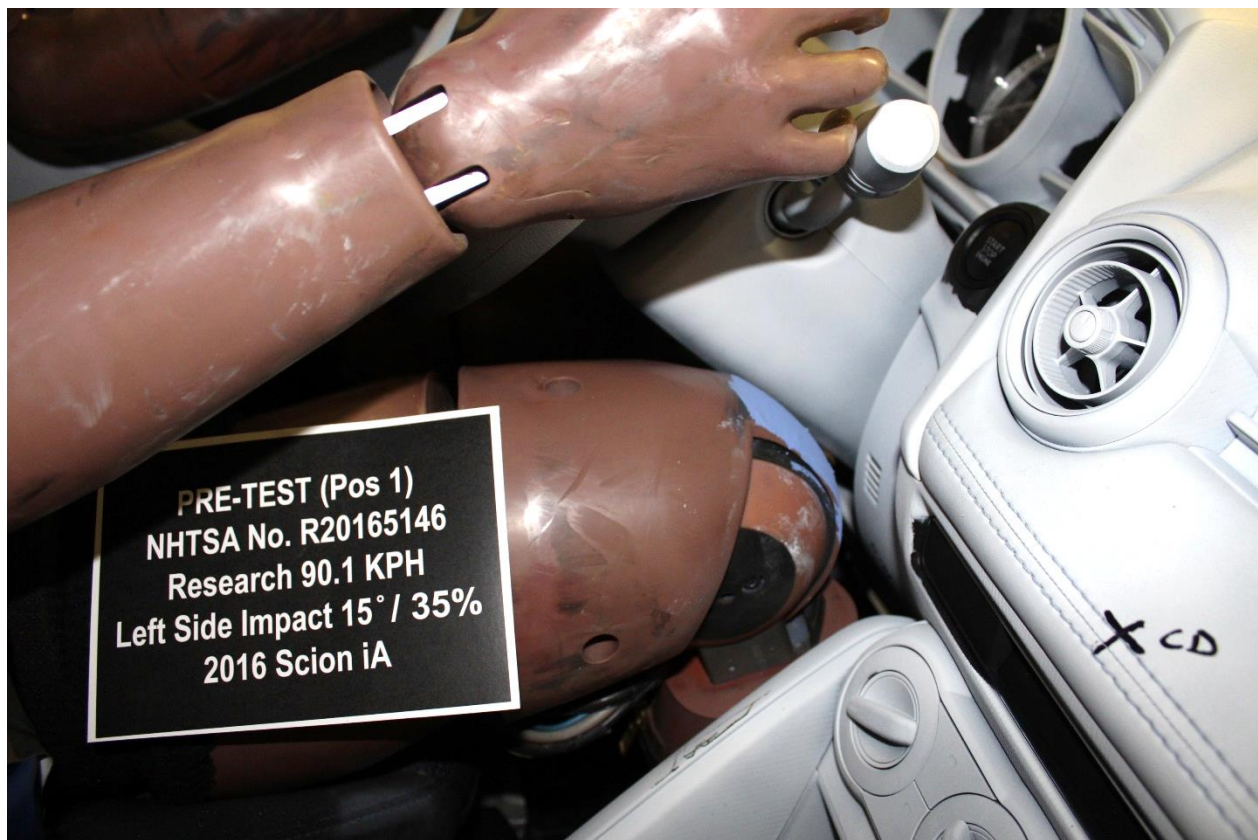
No. 066 Post-Test Driver Adjustable D-Ring



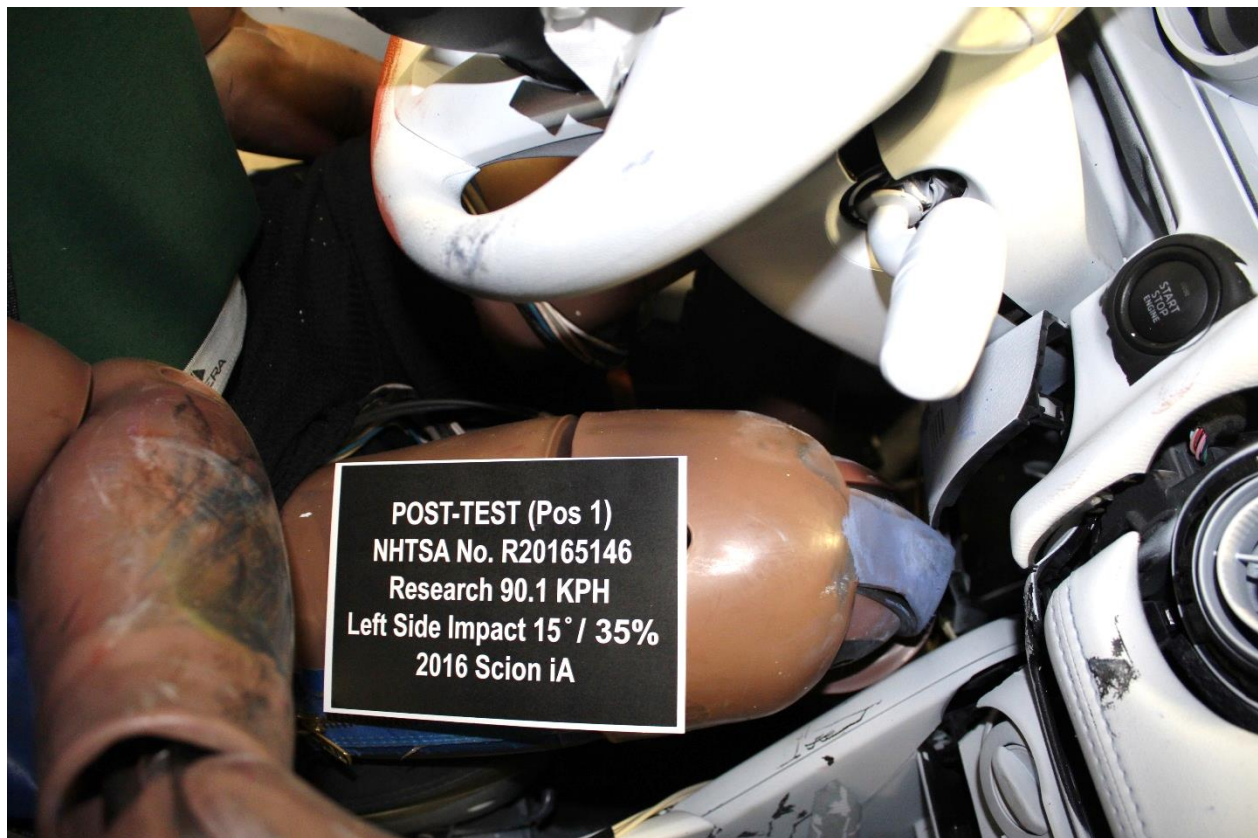
No. 067 Pre-Test Driver Feet



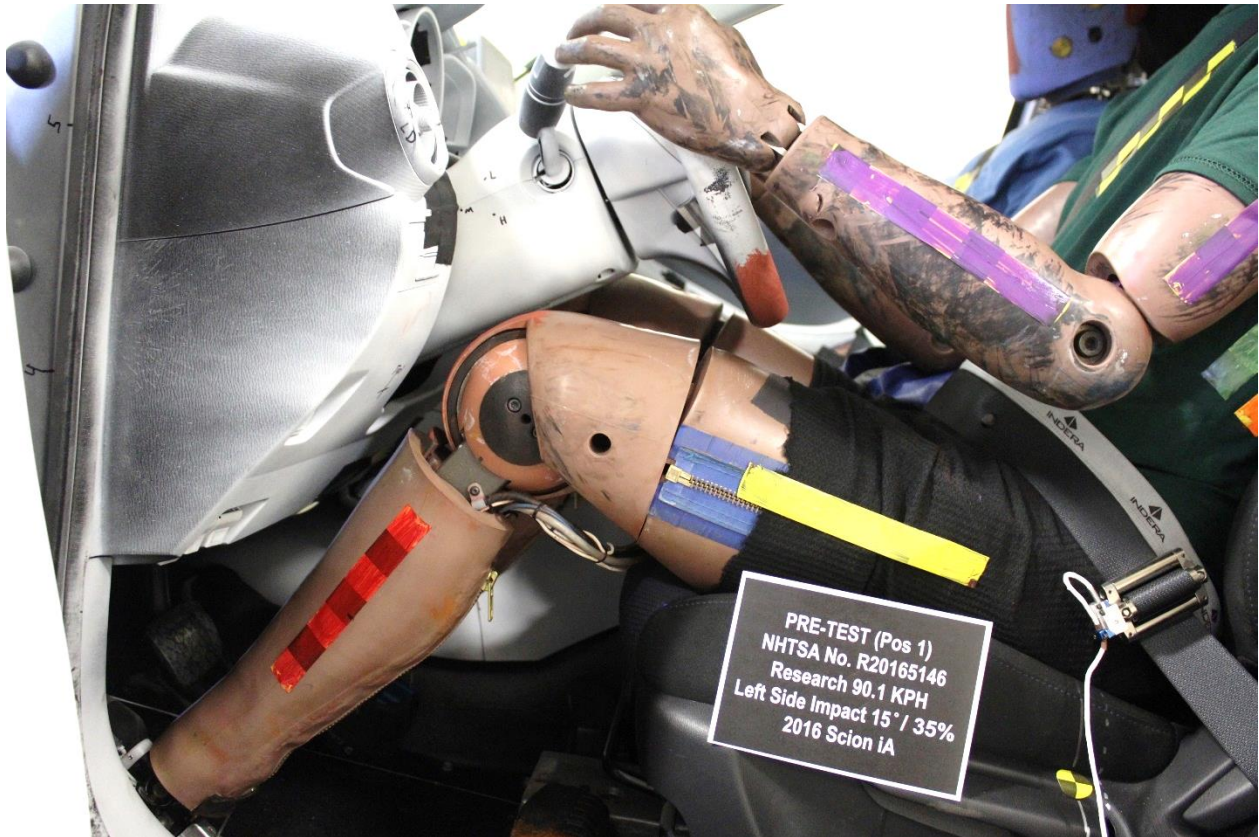
No. 068 Post-Test Driver Feet



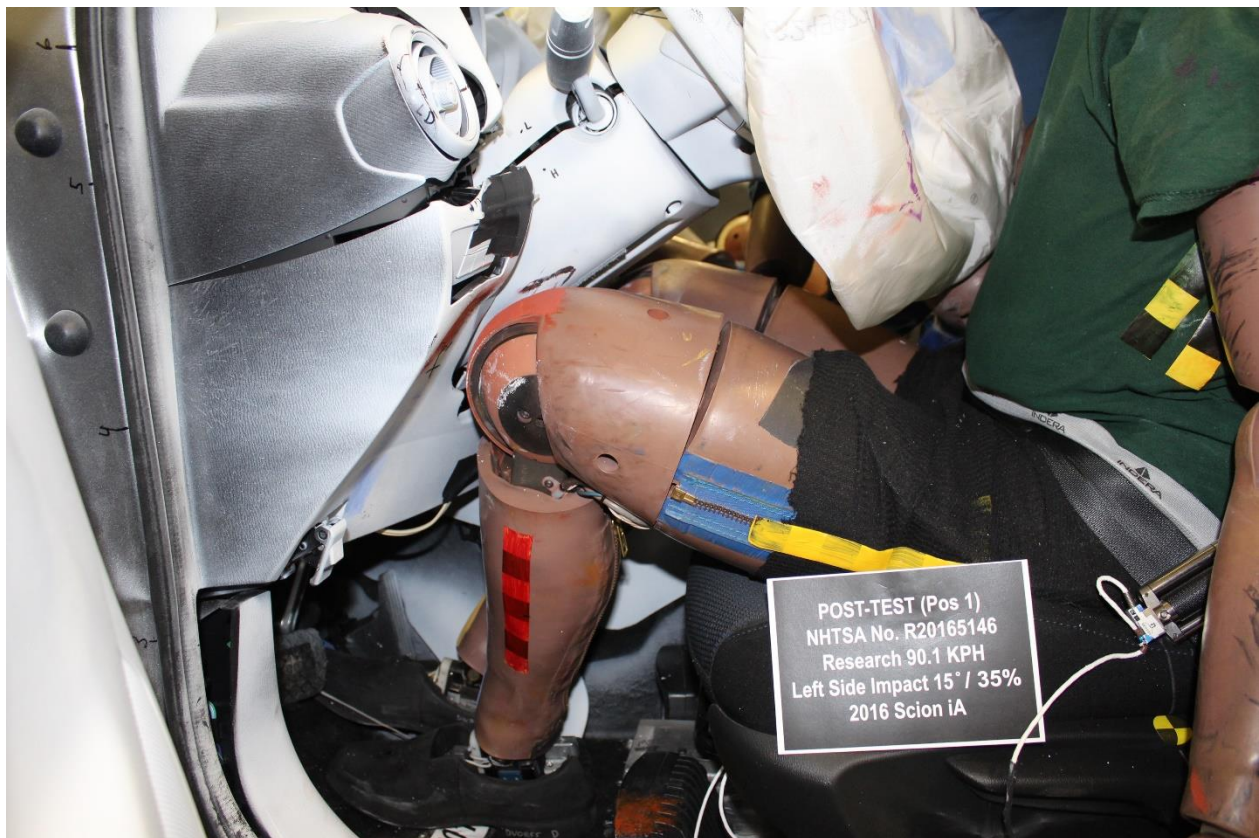
No. 069 Pre-Test View of Driver Right Knee and Bolster



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



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



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



No. 073 Pre-Test View of Driver Abdomen



No. 074 Post-Test View of Driver Abdomen



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



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



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



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

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



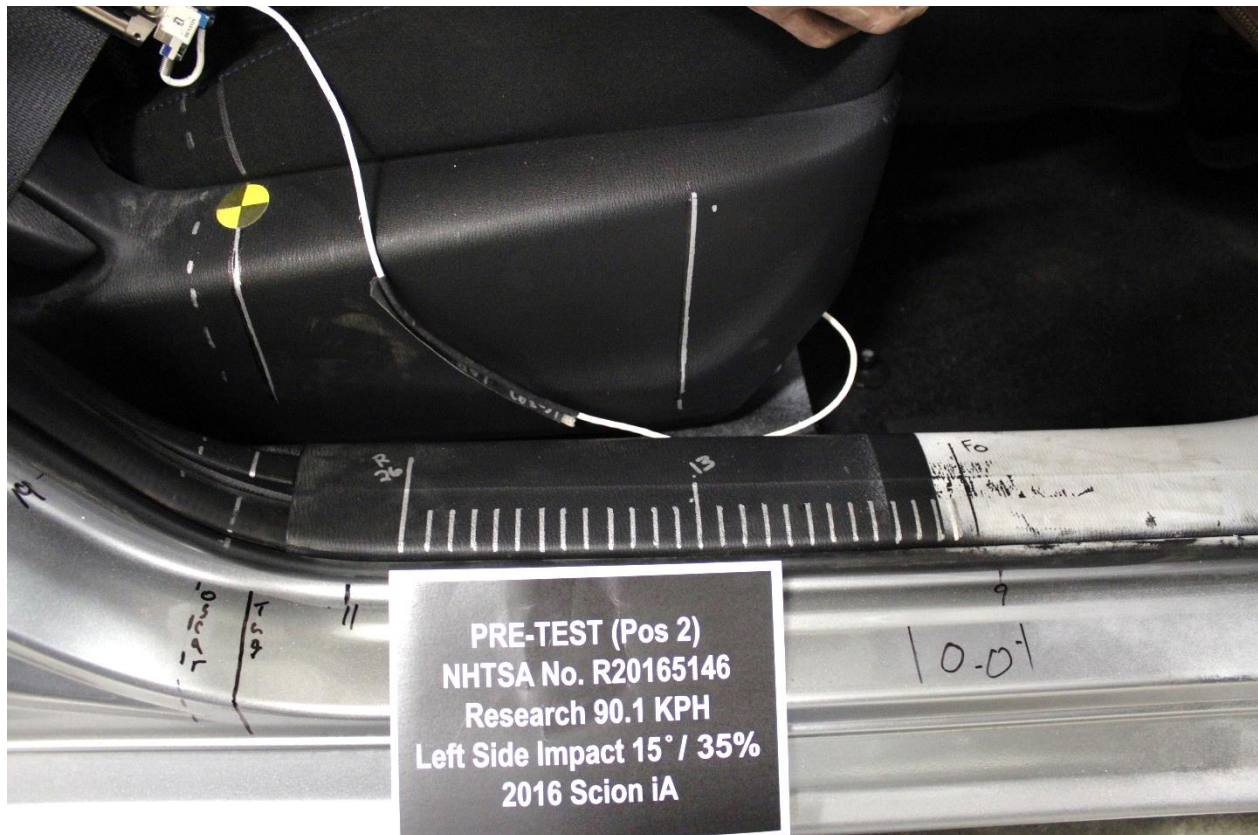
No. 101: Post-Test Right Side Passenger and Interior View



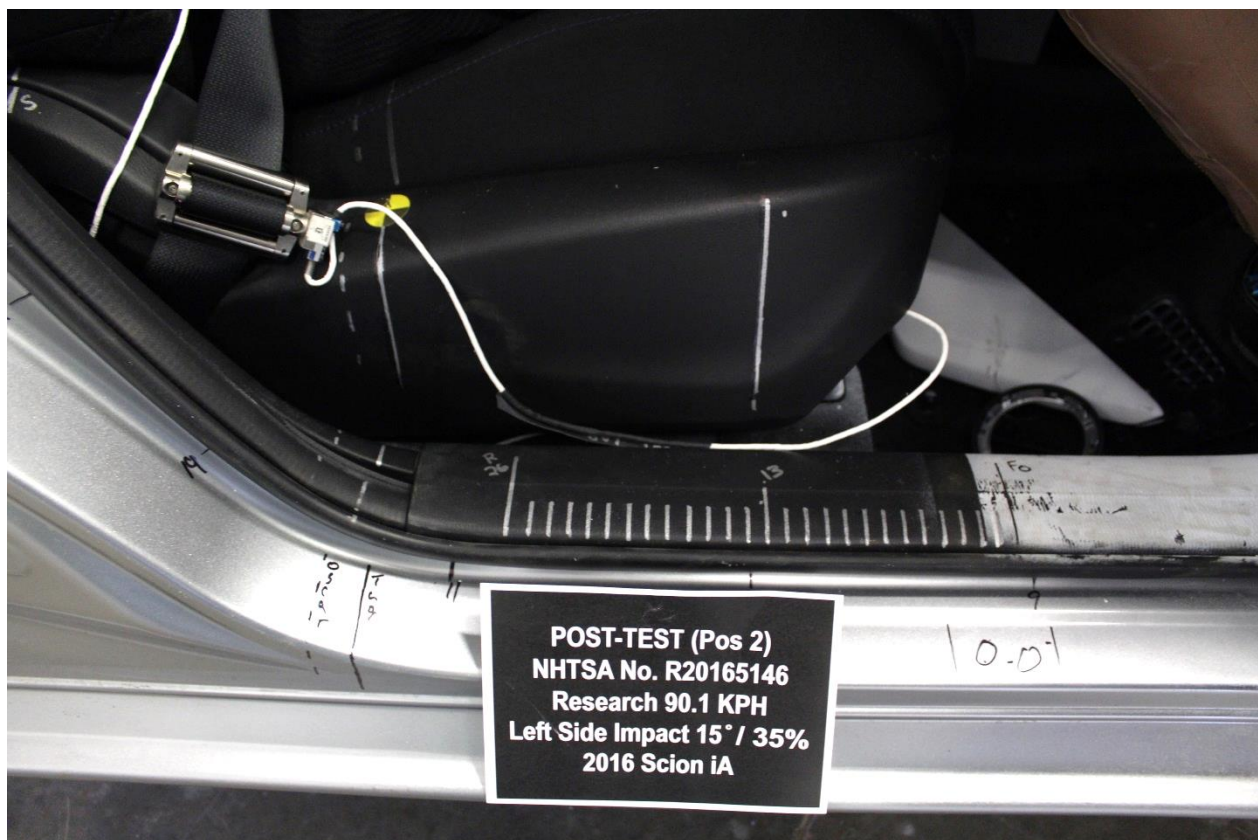
No. 102: Pre-Test View of Passenger Door Clearance



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



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



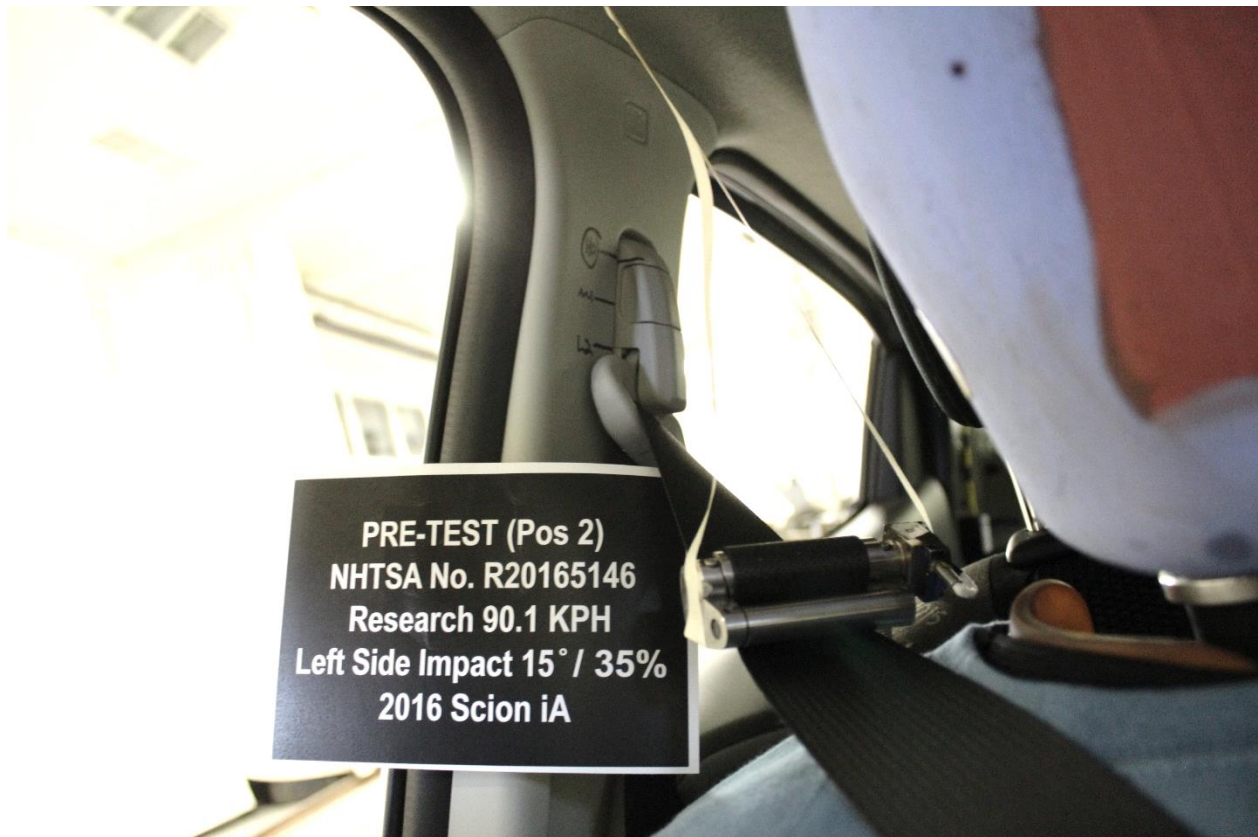
No. 105: Post-Test Passenger Seat Fore-Aft Markings (plastic moved not seat)



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



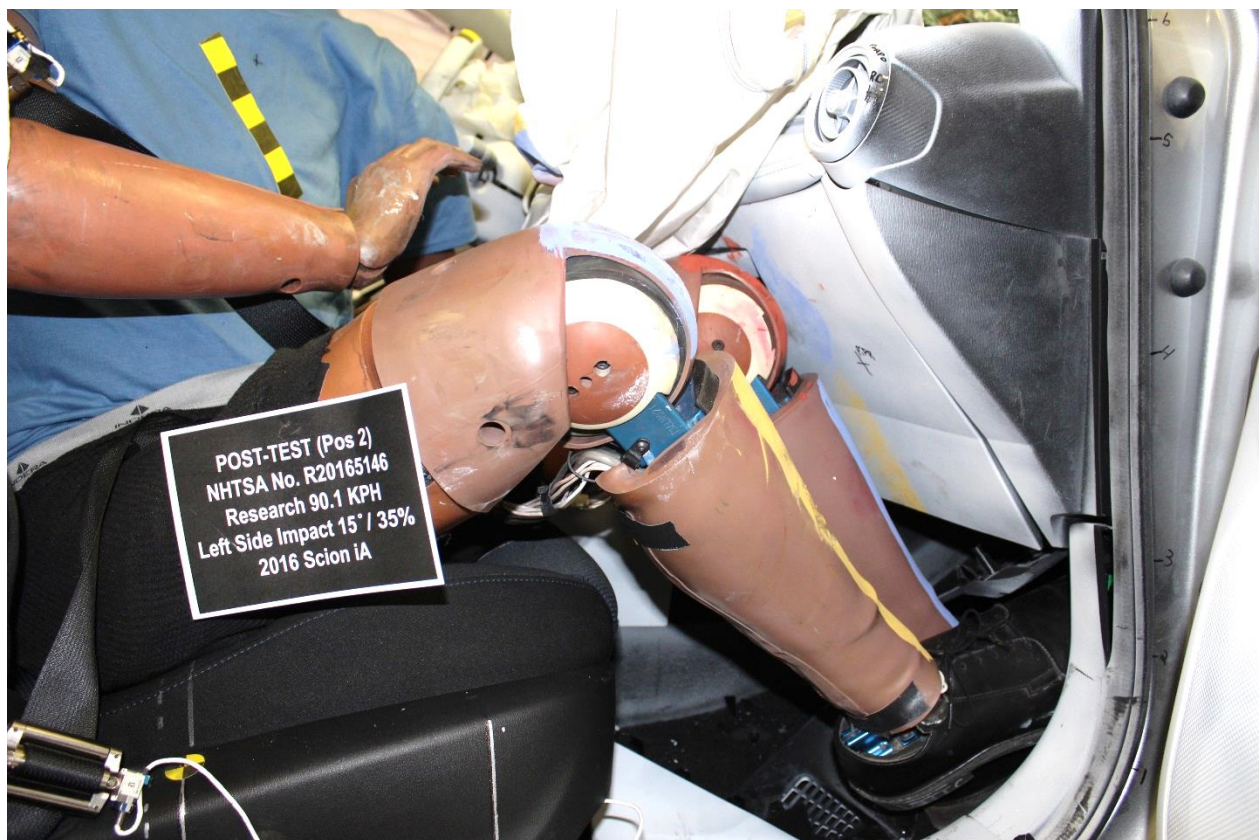
No. 110: Pre-Test View of Passenger Feet



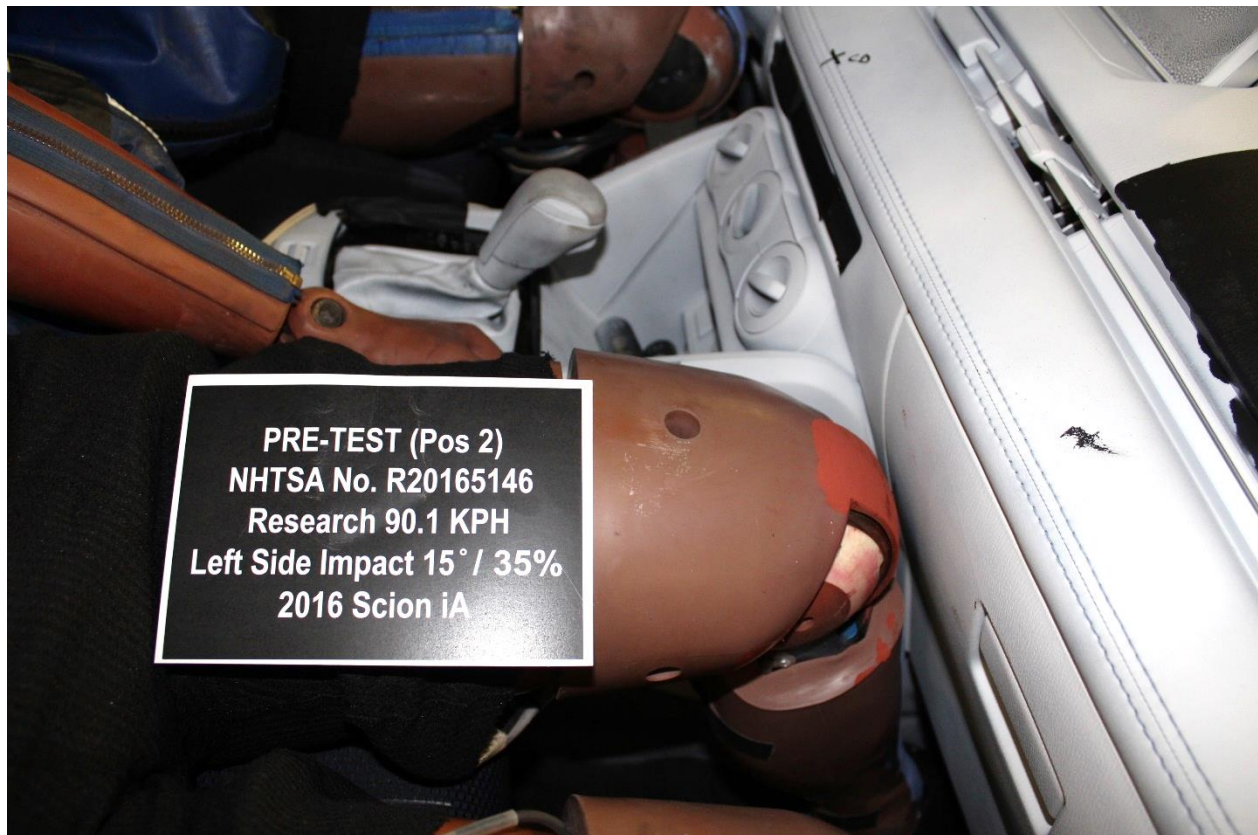
No. 111: Post-Test View of Passenger Feet



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



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



PRE-TEST (Pos 2)
NHTSA No. R20165146
Research 90.1 KPH
Left Side Impact 15° / 35%
2016 Scion iA

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

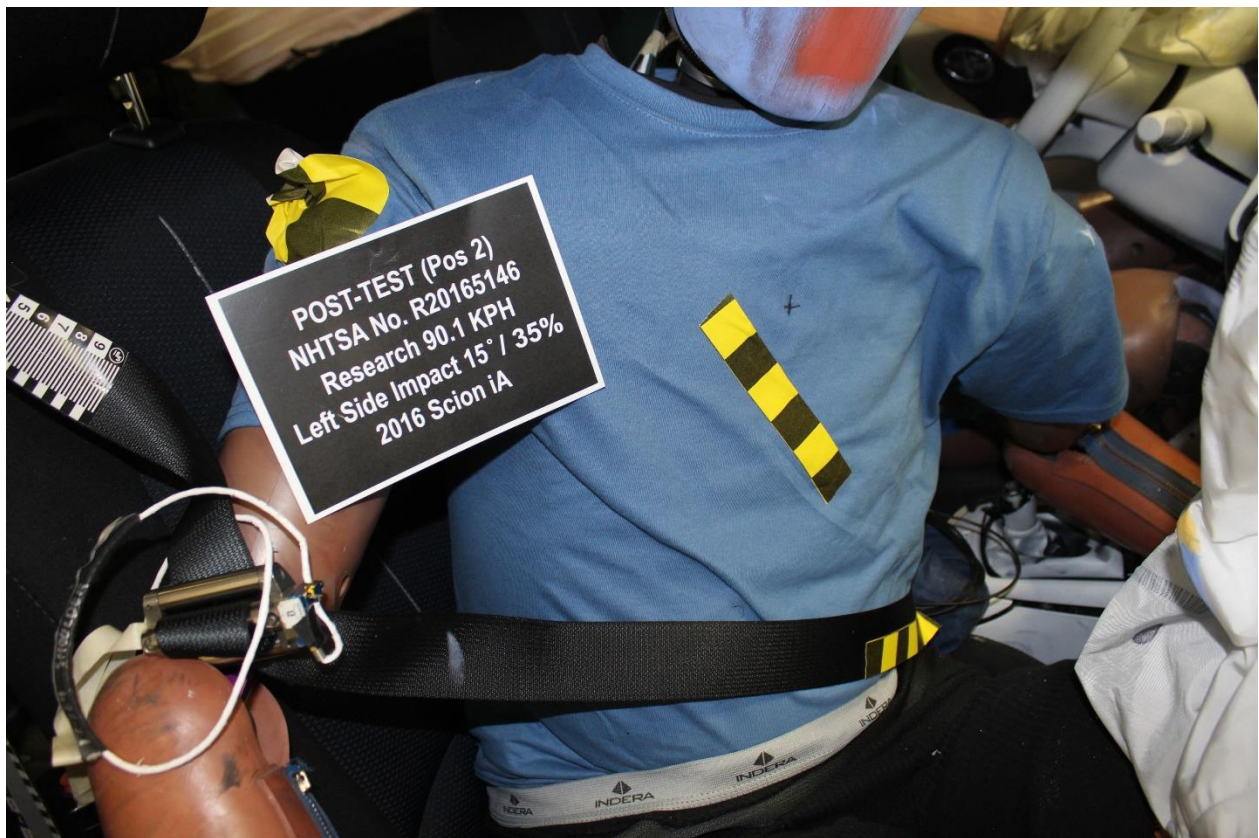


POST-TEST (Pos 2)
NHTSA No. R20165146
Research 90.1 KPH
Left Side Impact 15° / 35%
2016 Scion iA

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



No. 116: Pre-Test View of Passenger Abdomen



No. 117: Post-Test View of Passenger Abdomen



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

Photo Not Applicable

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



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

Photo Not Applicable

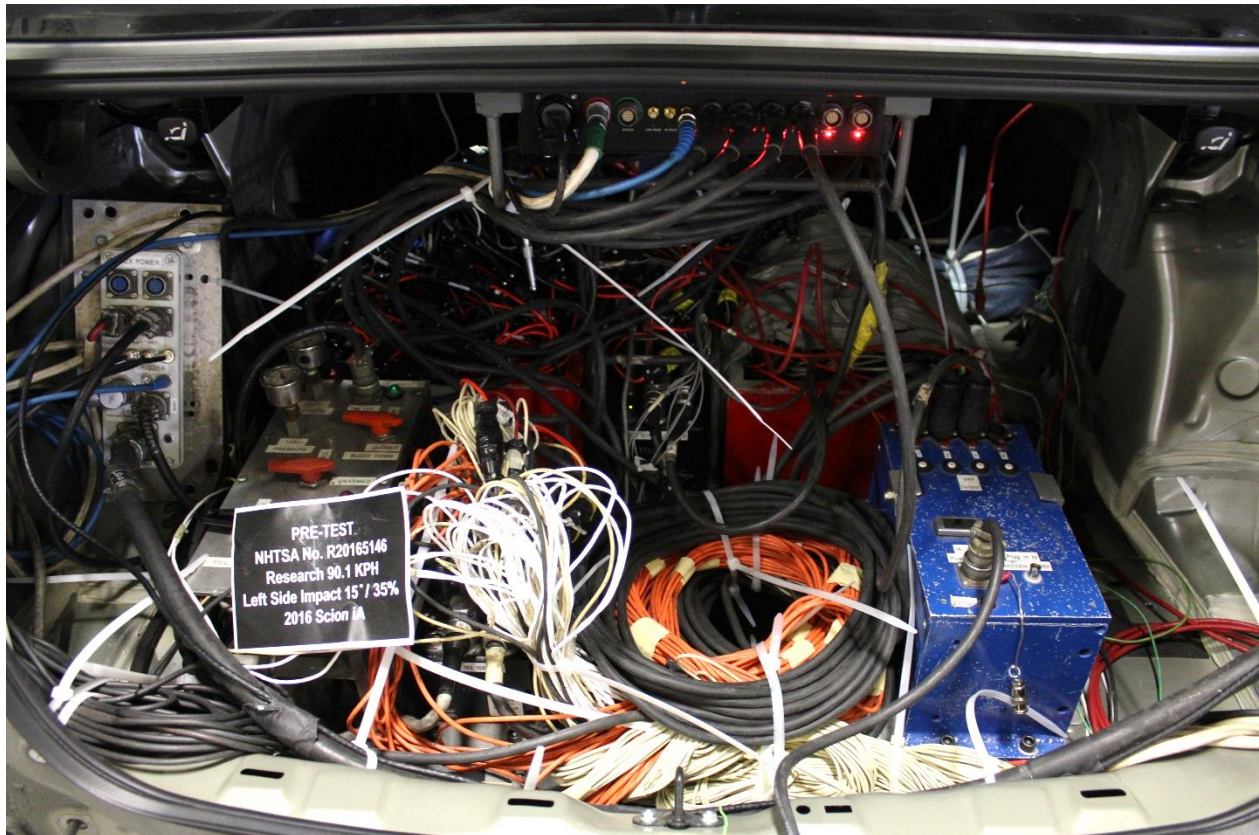
No. 121: Post-Test View of Passenger Body contact with Interior

Photo Not Applicable

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



No. 123: Post-Test Passenger Contact With Glovebox



No. 124: Pre-Test Ballast Locations

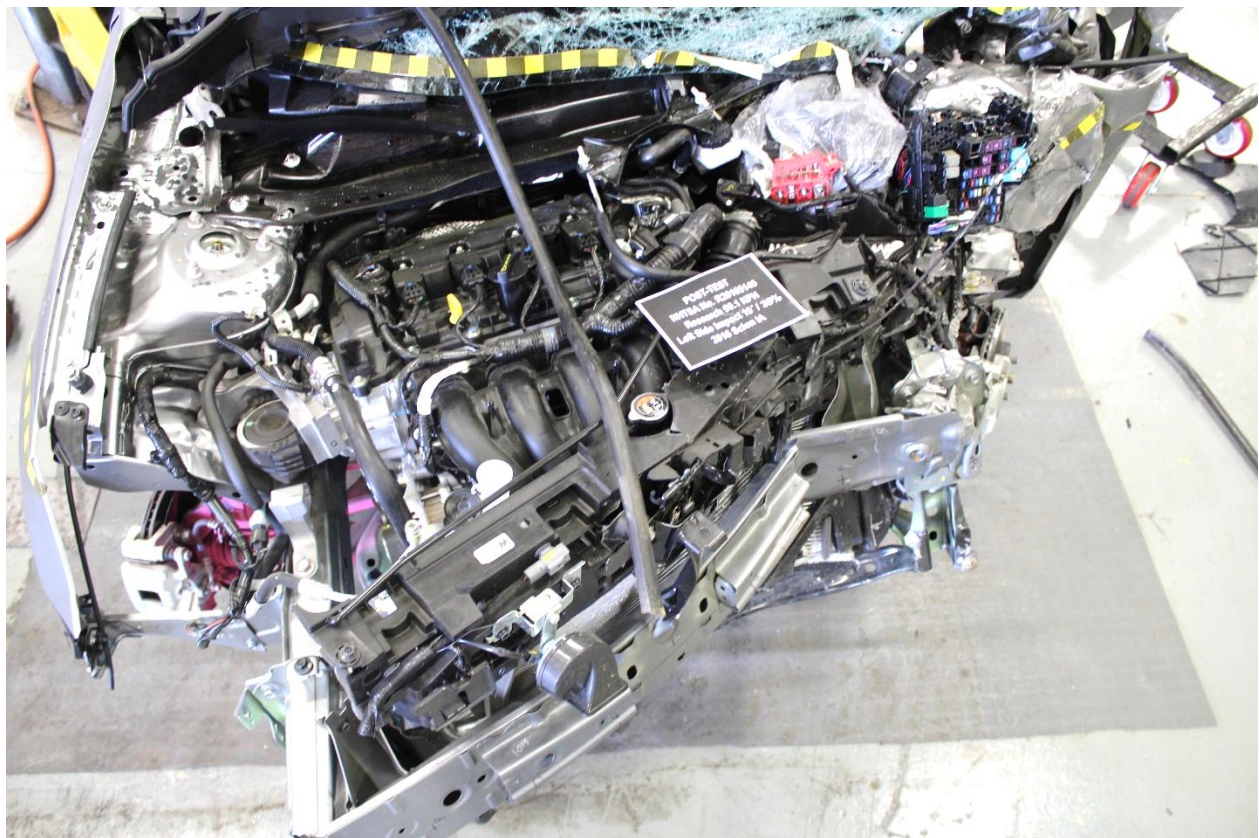


No. 125: Post-Test Speed Trap Readout





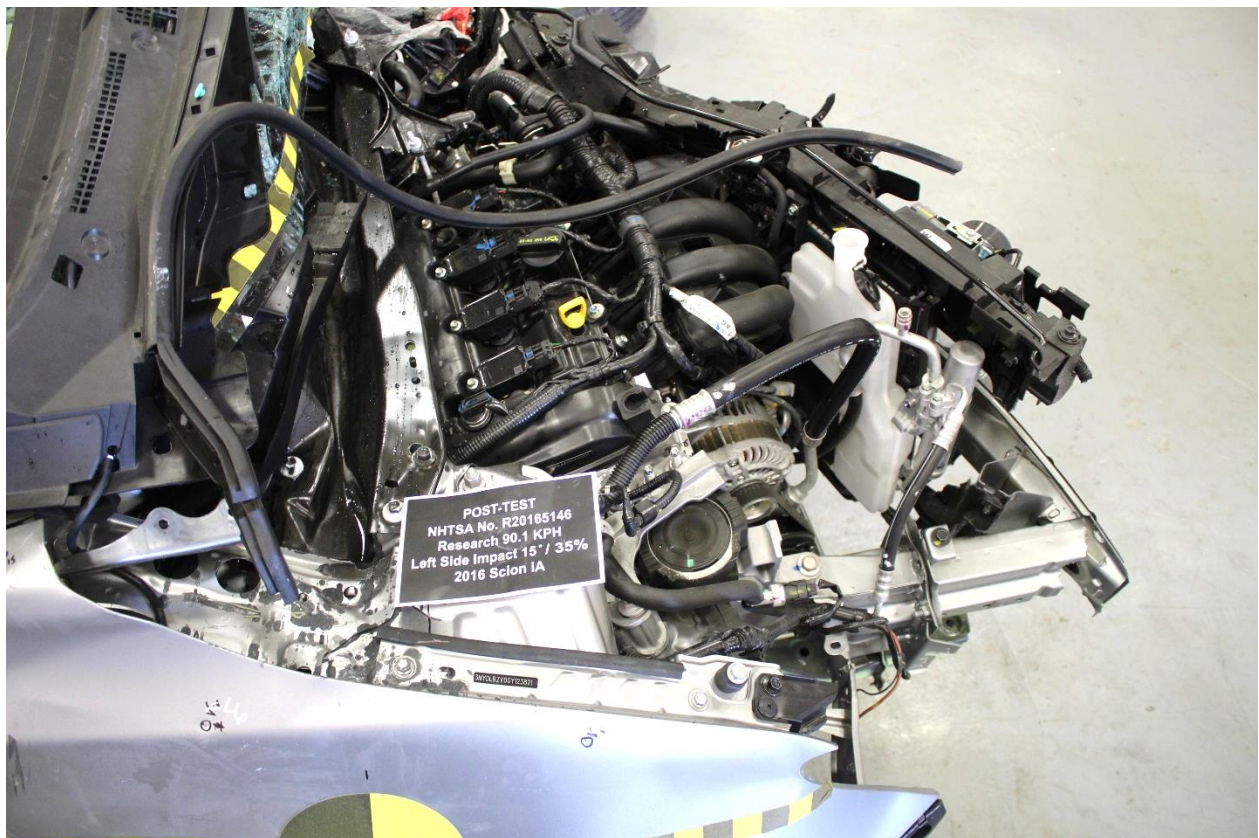
No. 128: Pre-Test Engine Compartment View



No. 129: Post-Test Engine Compartment View



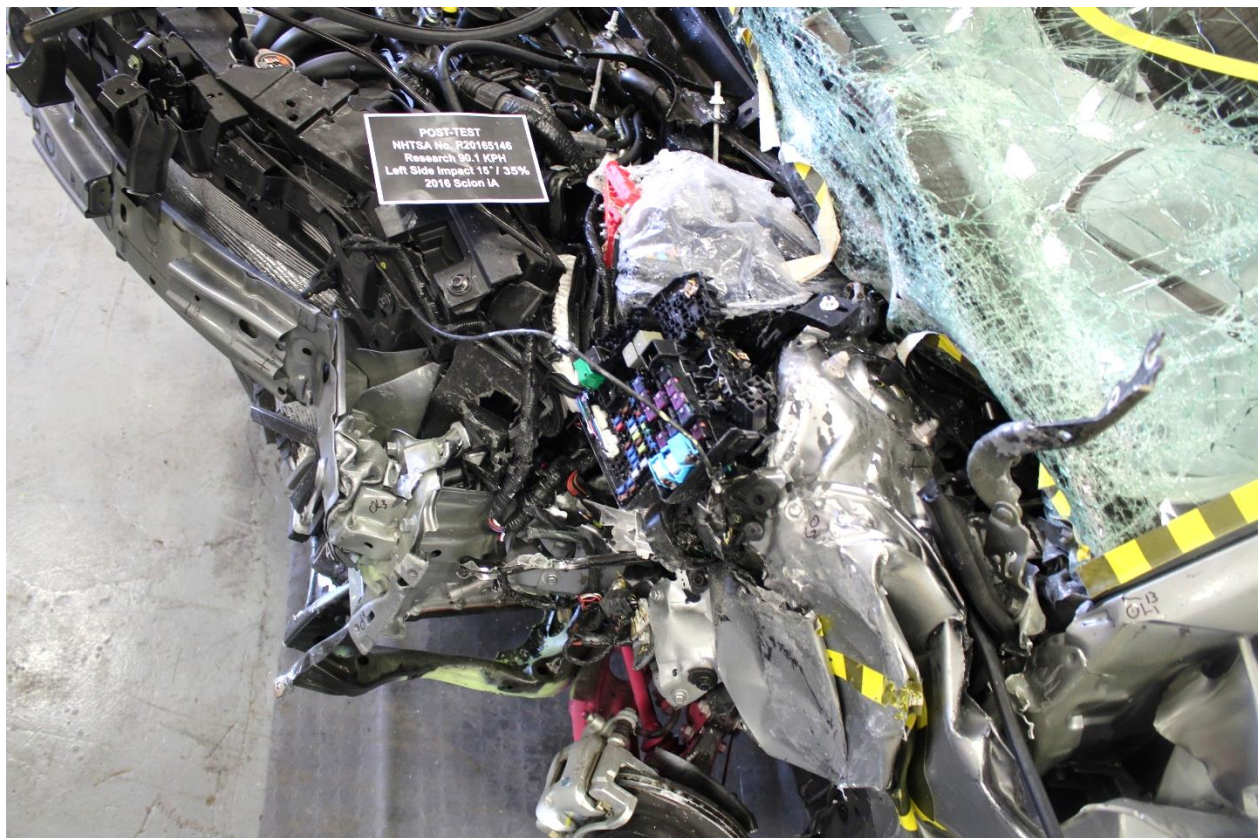
No. 130: Pre-Test Right Side Engine Compartment View



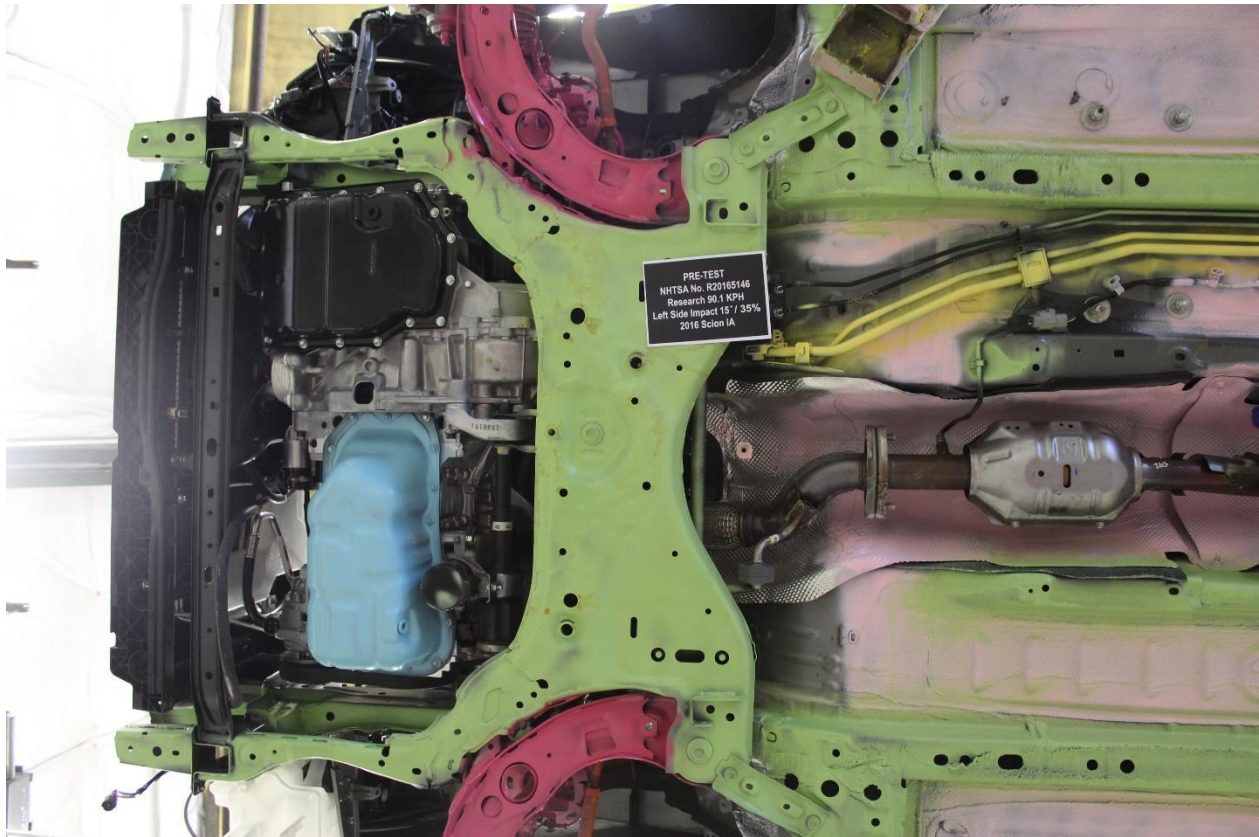
No. 131: Post-Test Right Side Engine Compartment View



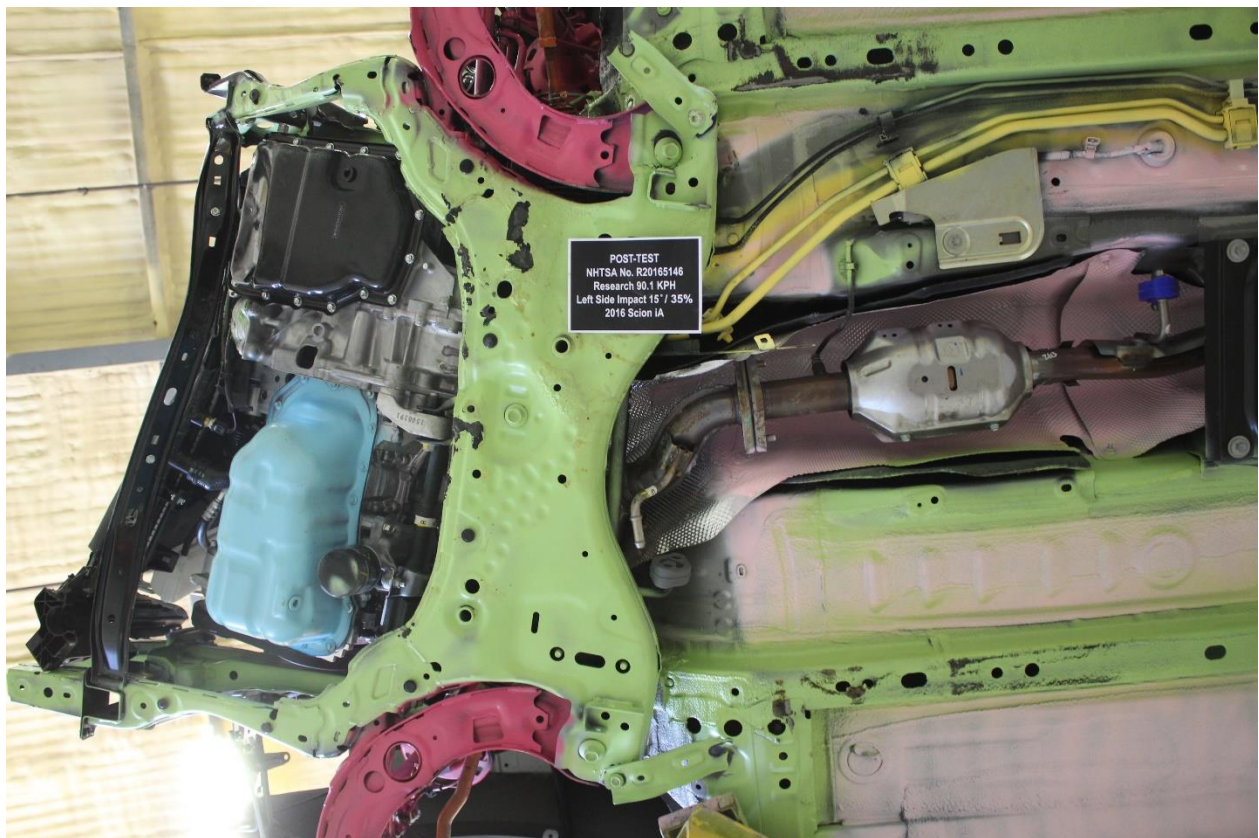
No. 132: Pre-Test Left Side Engine Compartment View



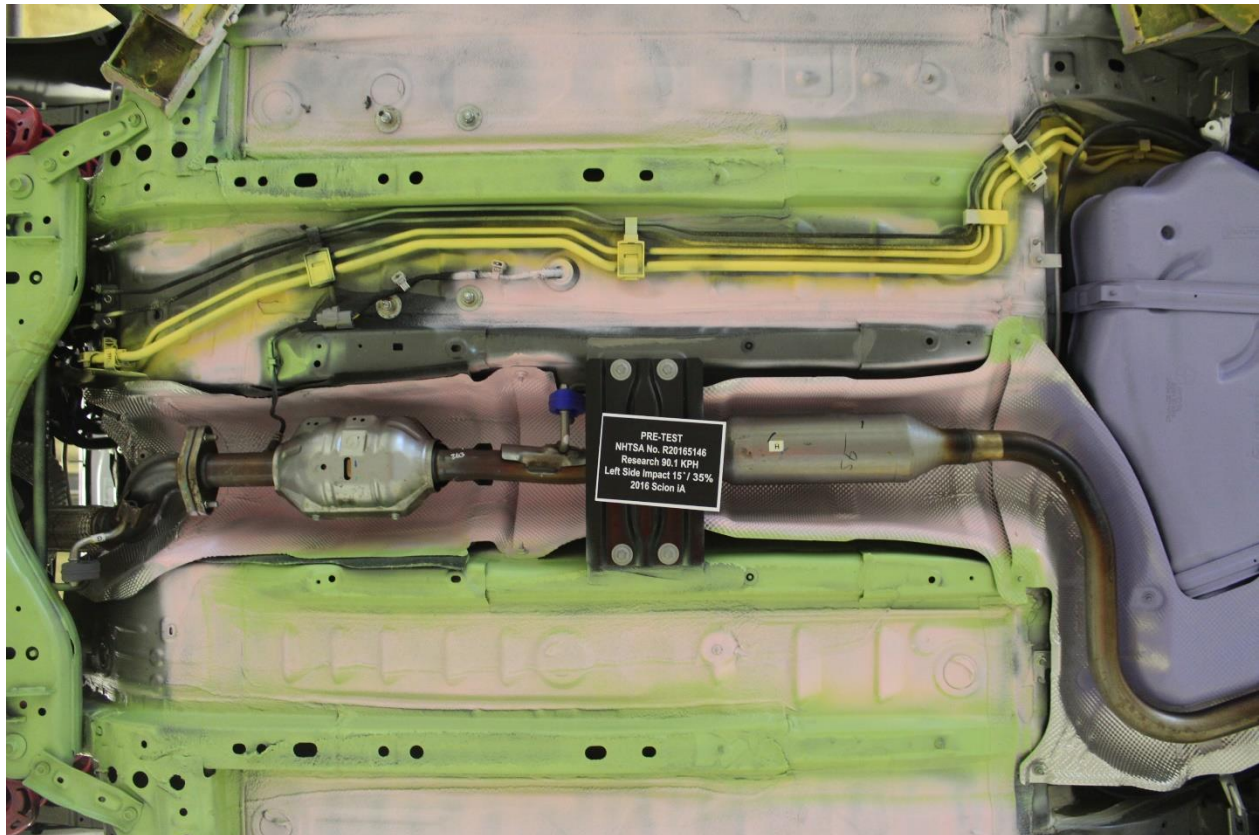
No. 133: Post-Test Left Side Engine Compartment View



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



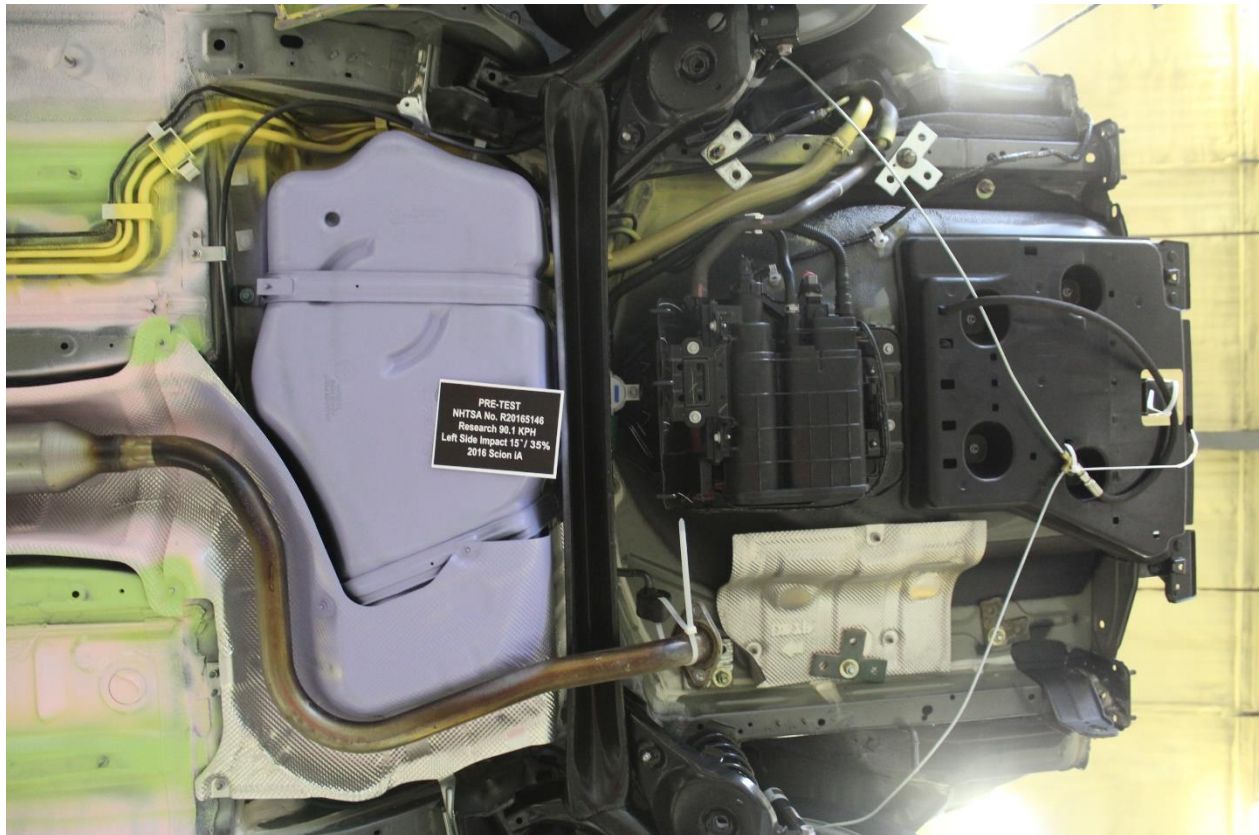
No. 135: Post-Test View of Front Underbody (perpendicular to vehicle)



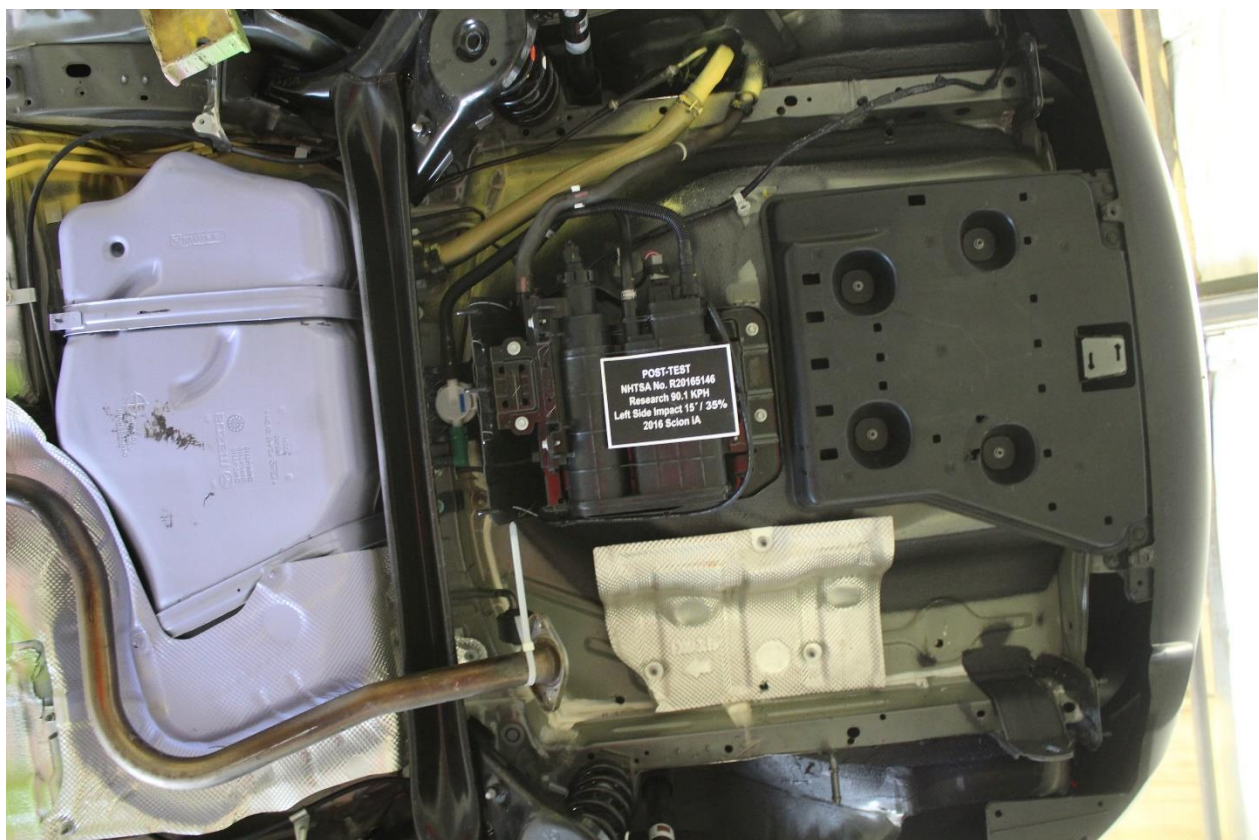
No. 136: Pre-Test View of Mid Underbody (perpendicular to vehicle)



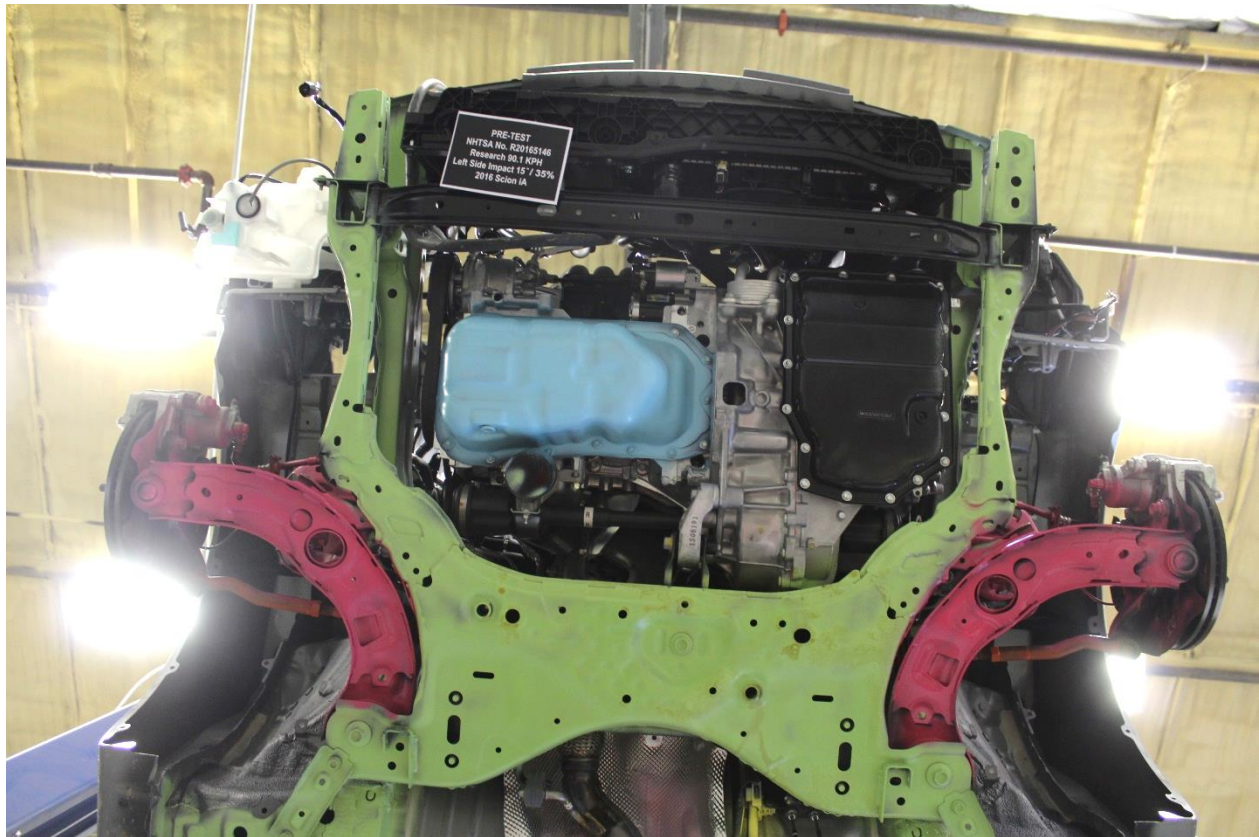
No. 137: Post-Test View of Mid Underbody (perpendicular to vehicle)



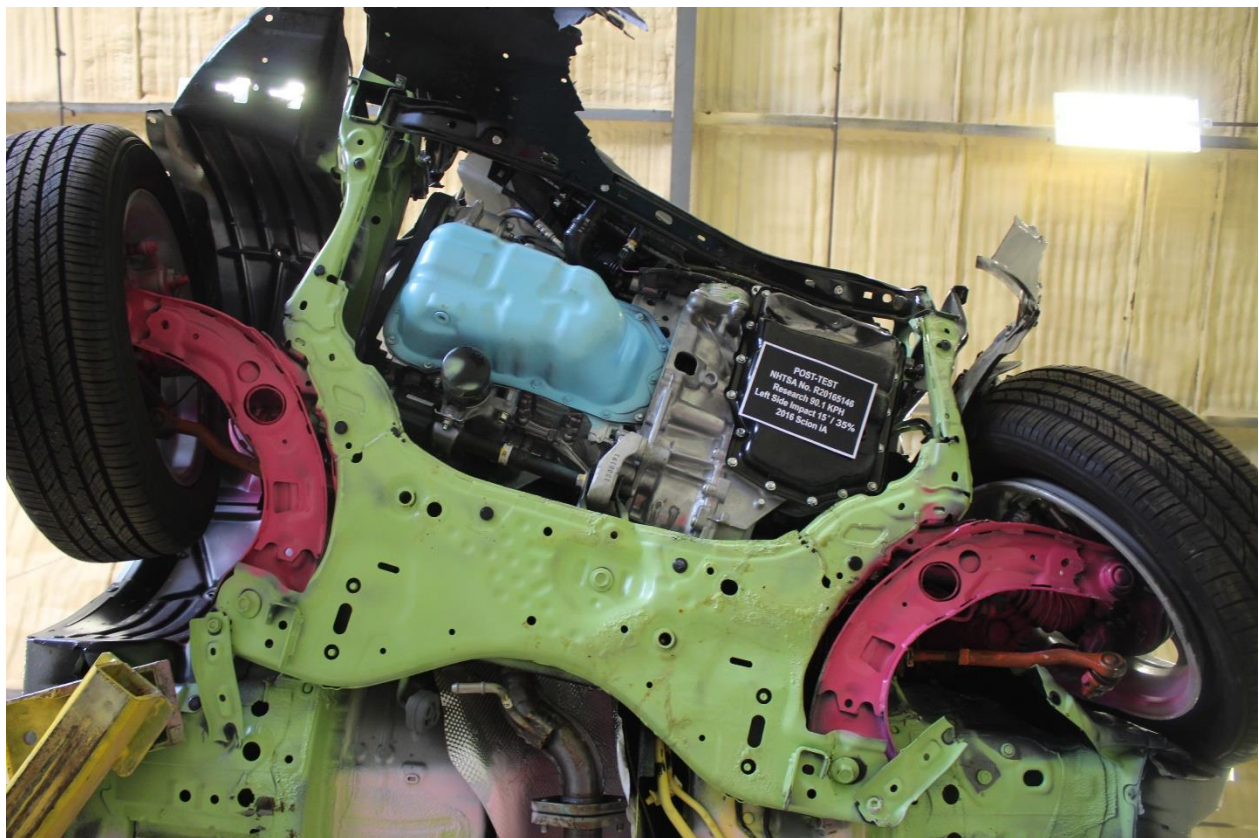
No. 138: Pre-Test View of Rear Underbody (perpendicular to vehicle)



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



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



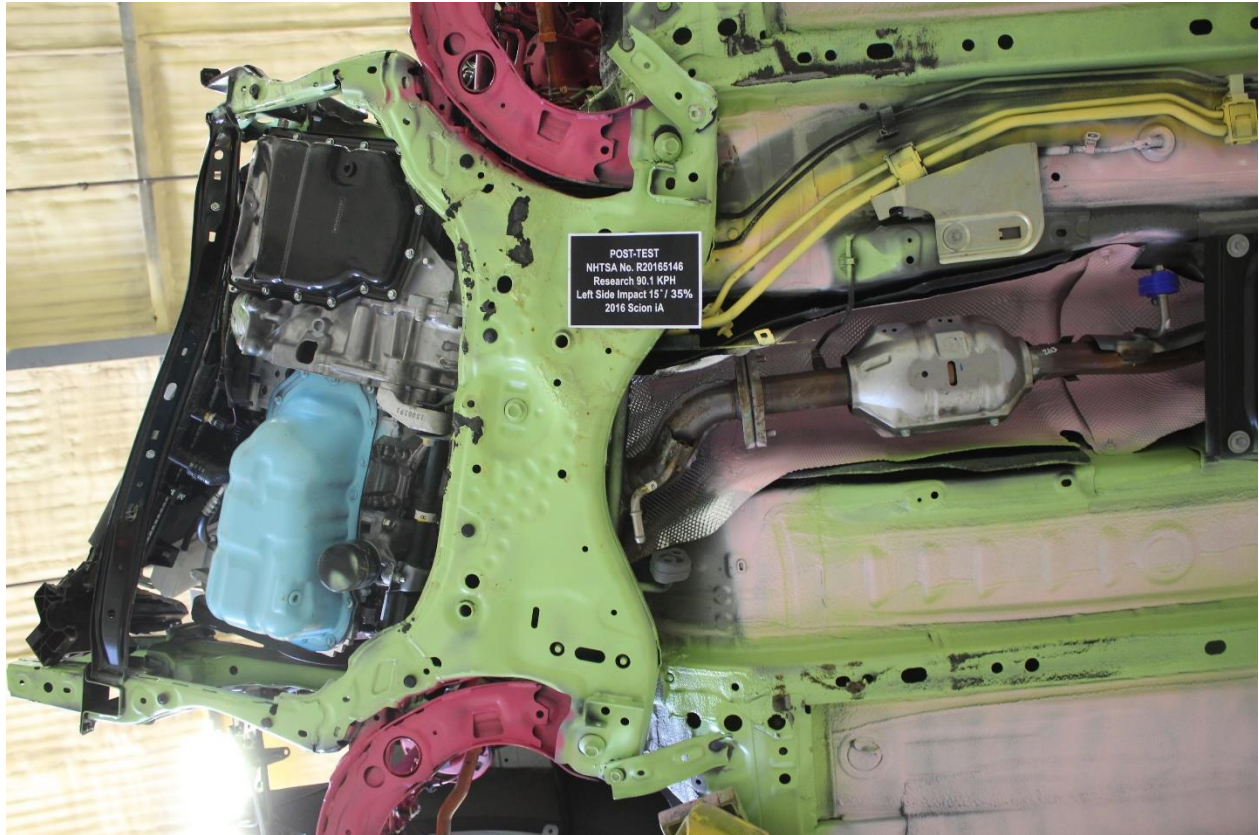
No. 141: Post-Test View of Steering rack and or sway bar



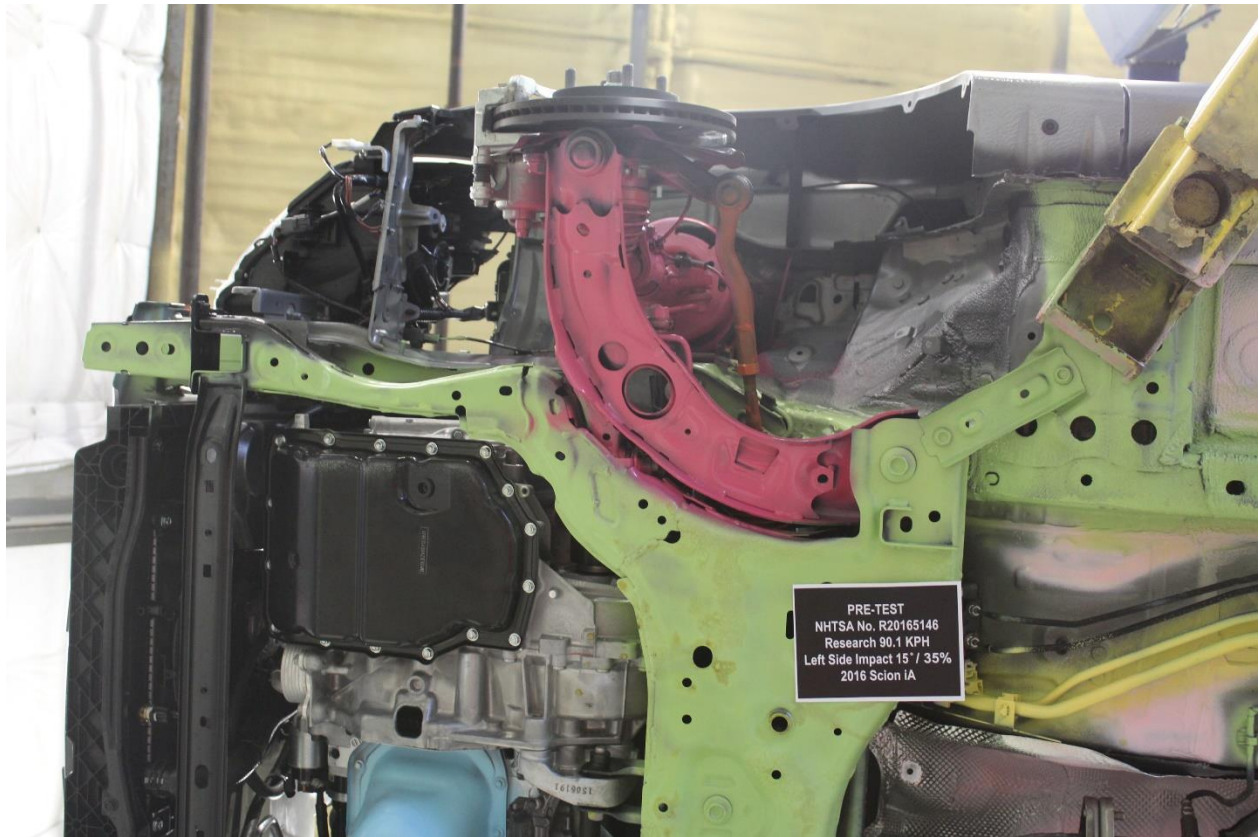
No. 142: Pre-Test Bumper to Rail Attachments and Crush Initiators



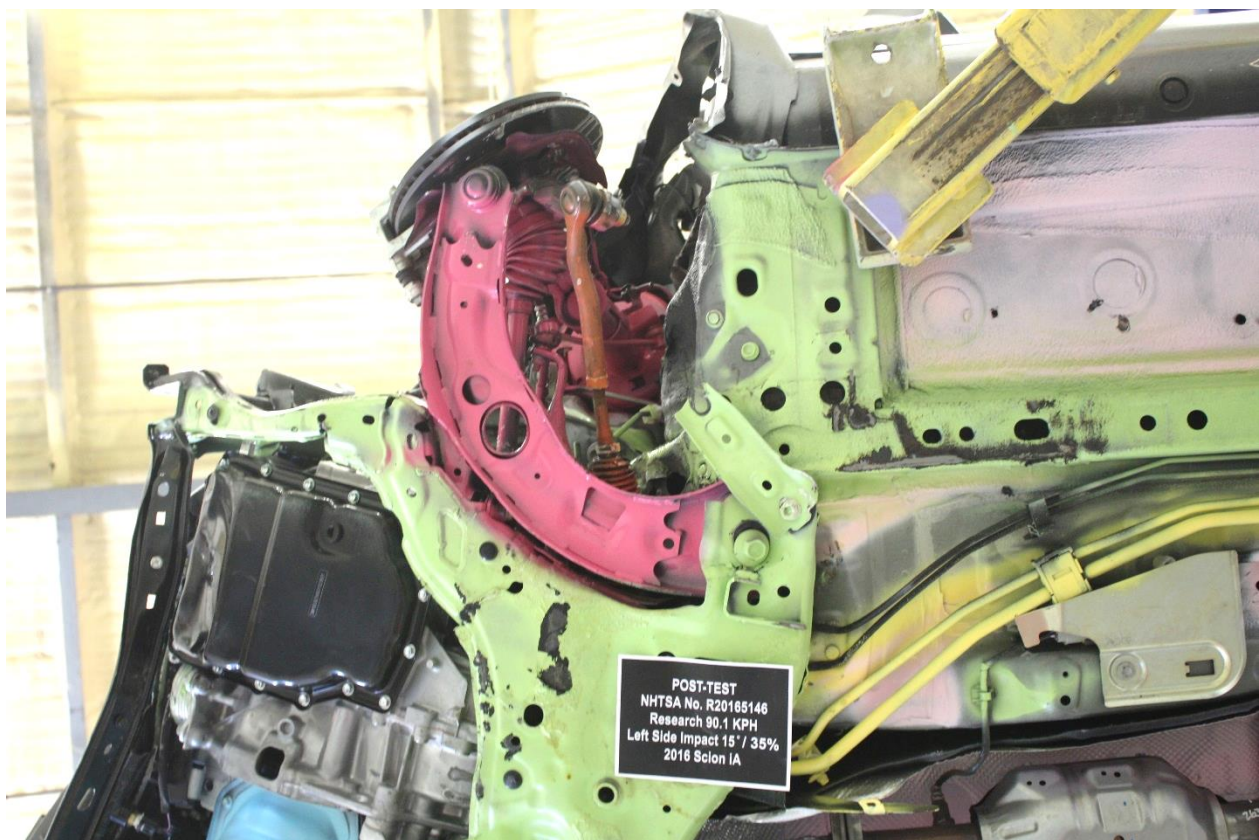
No. 143: Post-Test Bumper to Rail Attachments and Crush Initiators



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



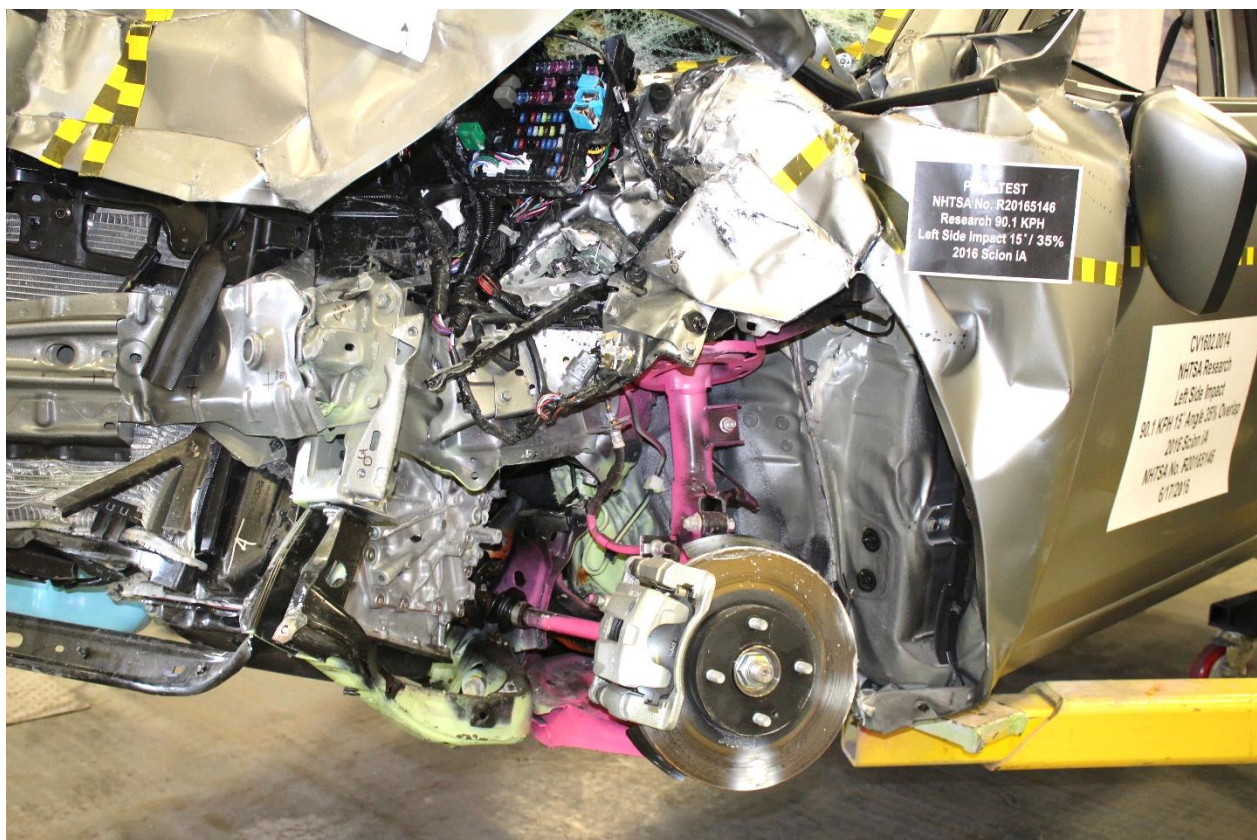
No. 145: Pre-Test Frame Rail with tire removed



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



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



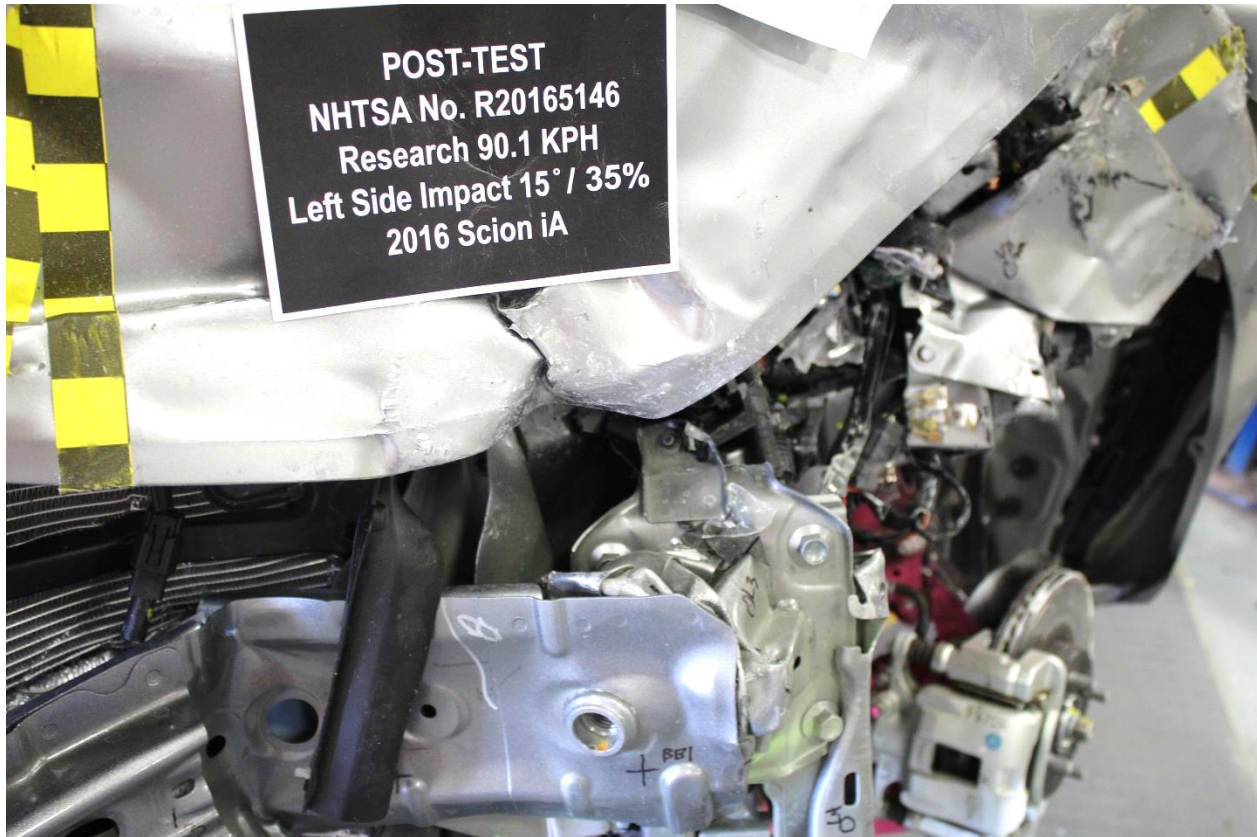
No. 148: Post-Test $\frac{3}{4}$ View of Front Driver Wheel Well w/ Tire Removed



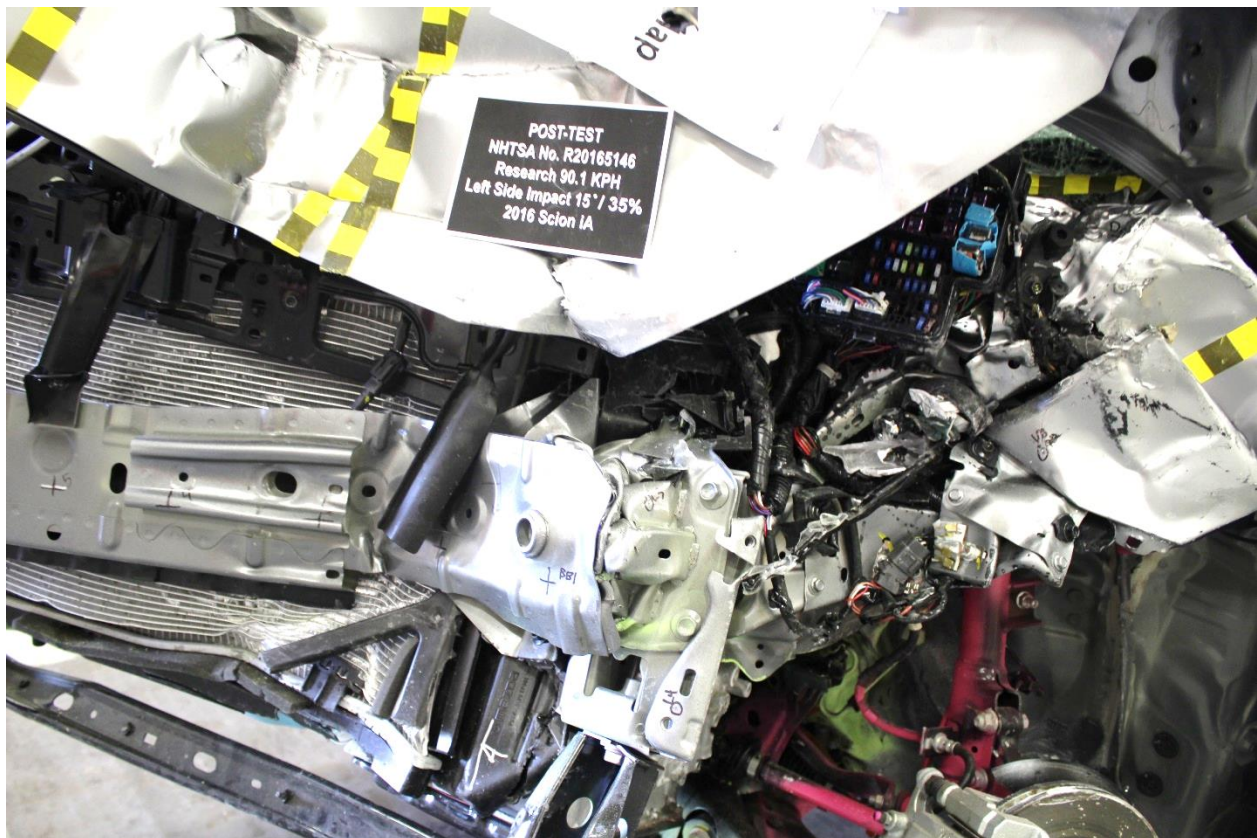
No. 149: Post-Test Side View of Front Driver Wheel Well w/ Tire Removed



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



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



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



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



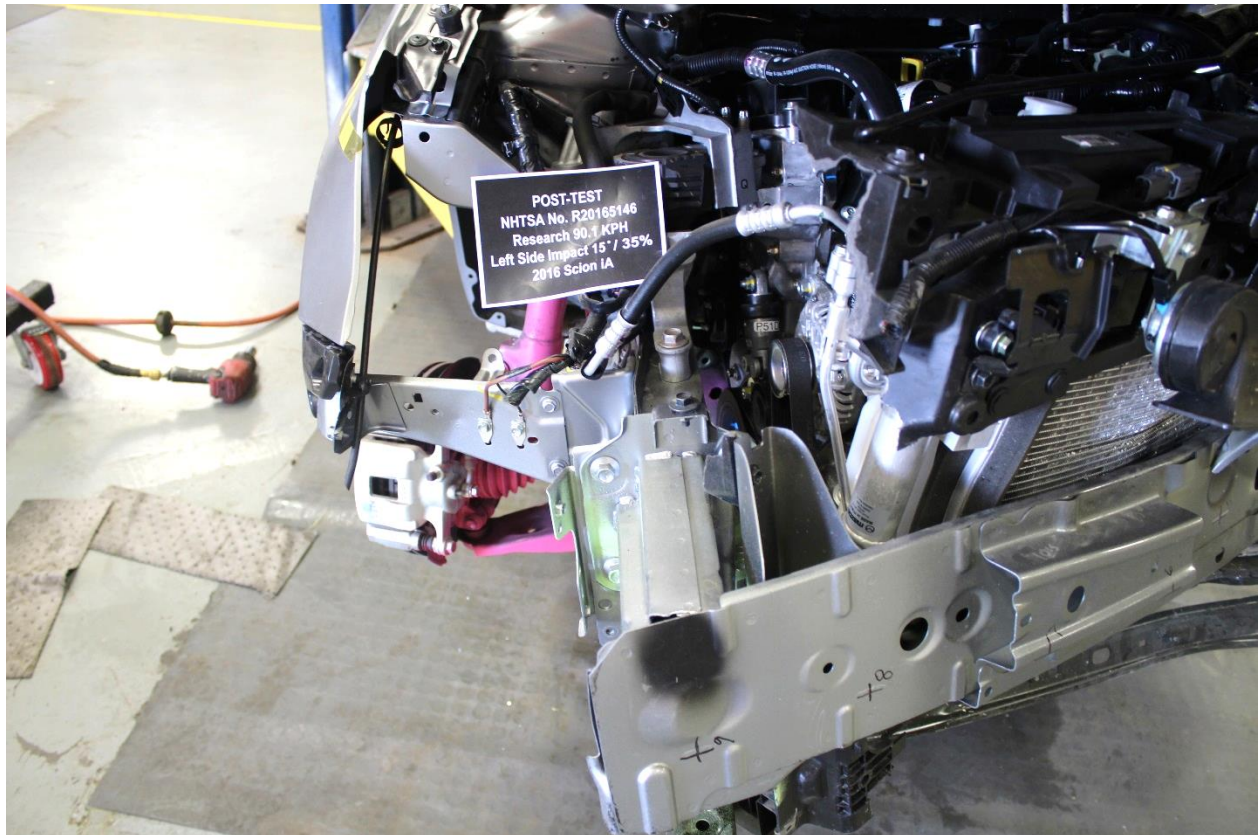
No. 154: Post-Test ¾ View of Front Passenger Wheel Well w/ Tire Removed



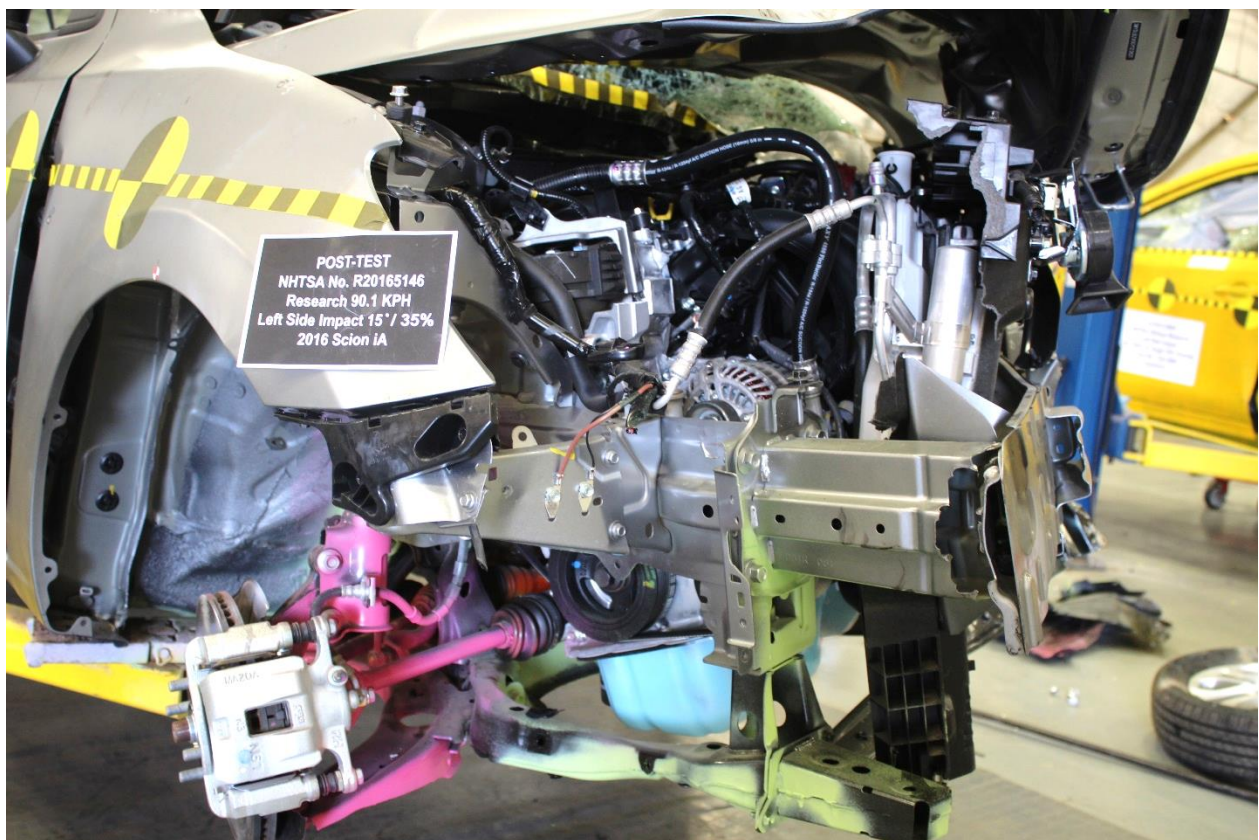
No. 155: Post-Test Side View of Front Passenger Wheel Well w/ Tire Removed



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



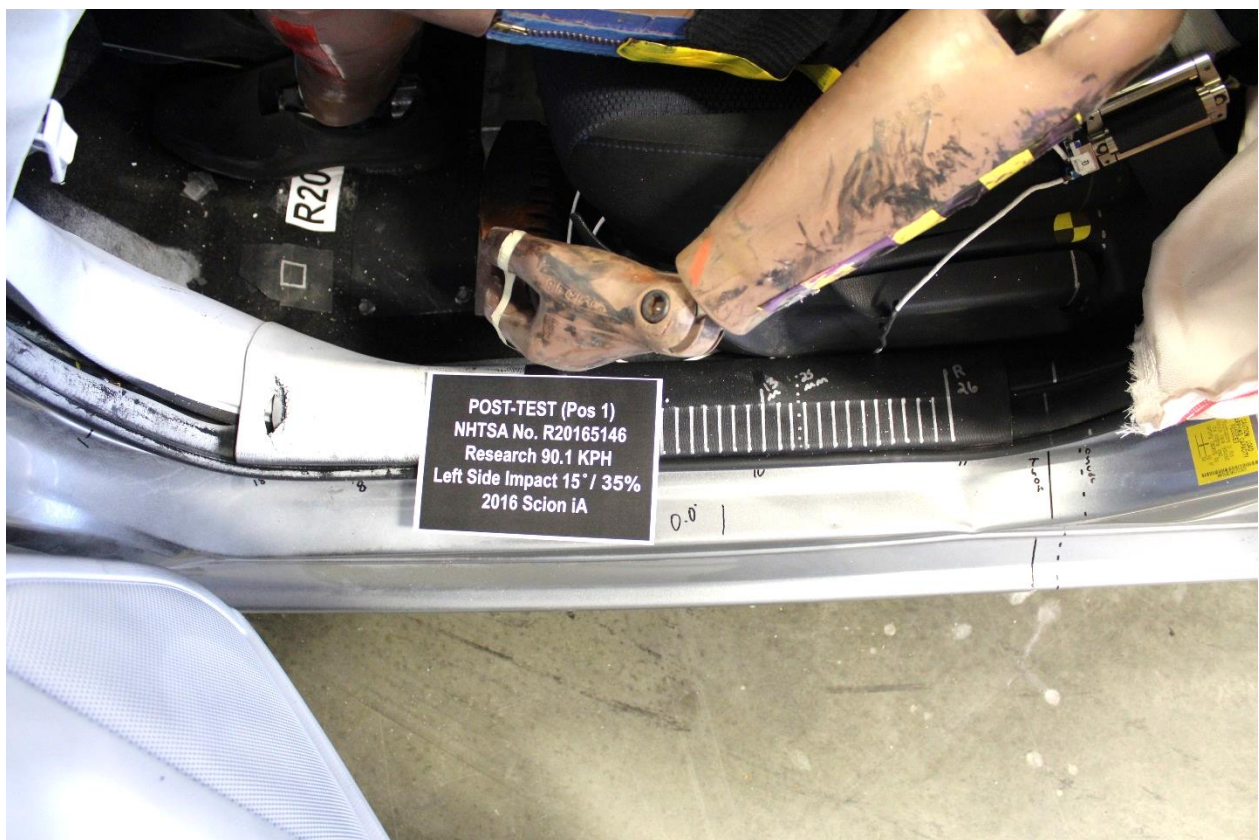
No. 157: Post-Test Looking Down at the Front Passenger Shotgun



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



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



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



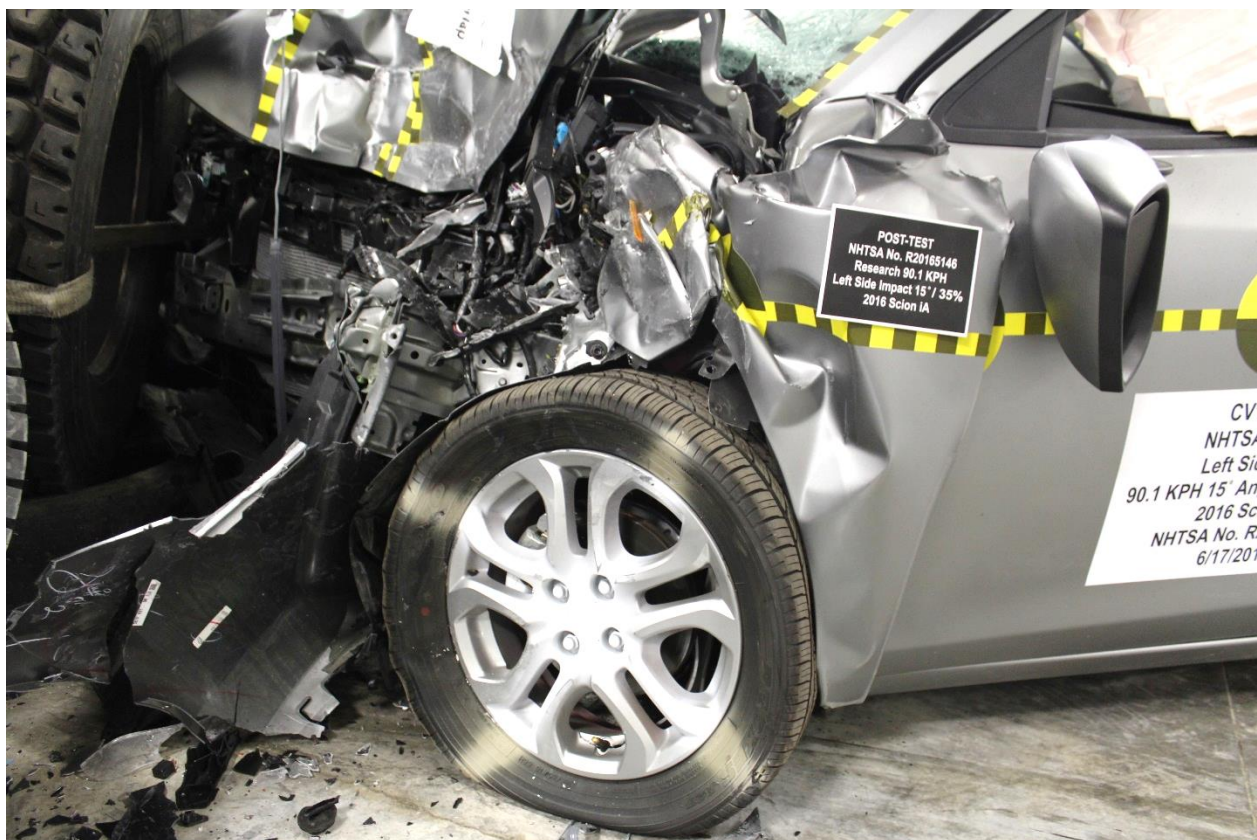
No. 161: Post-Test View of Deformation of A pillar-Struck Side



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



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



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



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



No. 166: Post-Test View of Windshield Separation



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



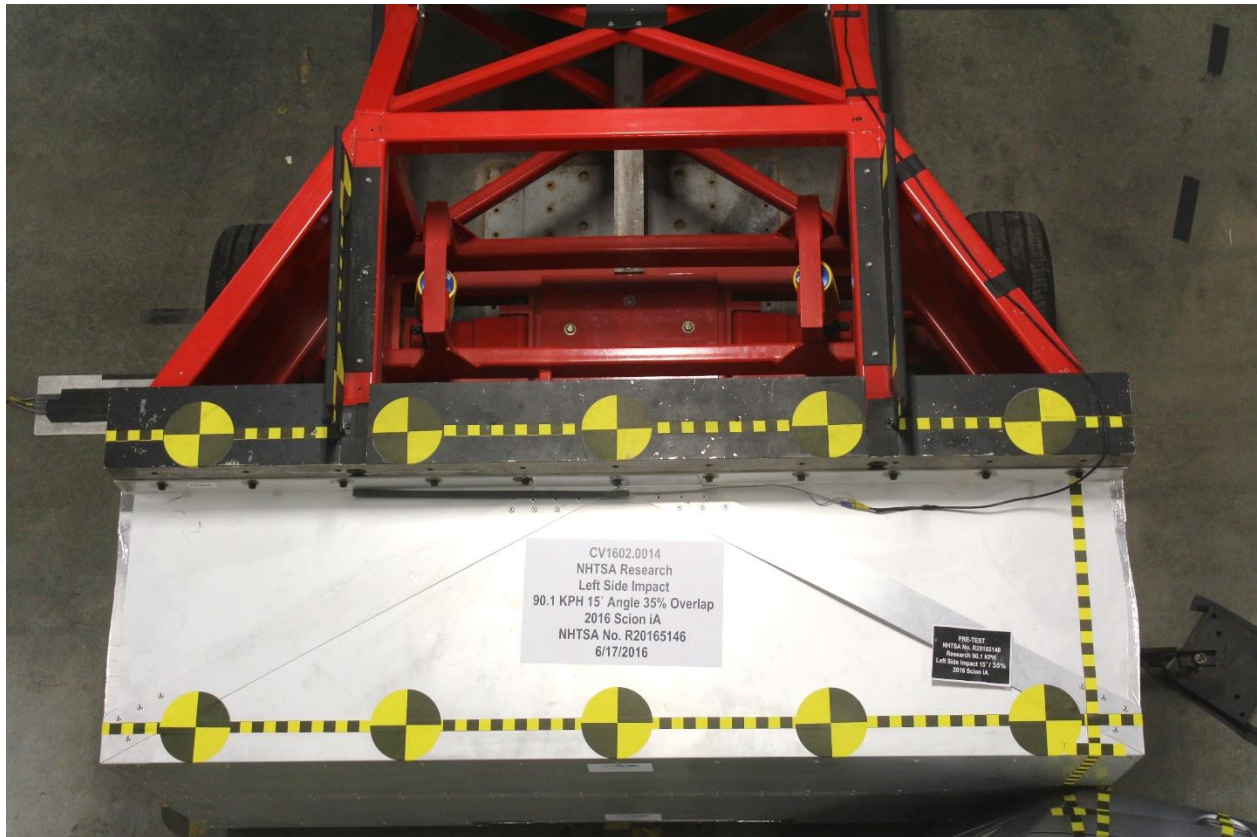
No. 168: Post-Test Left Side View of OMDB



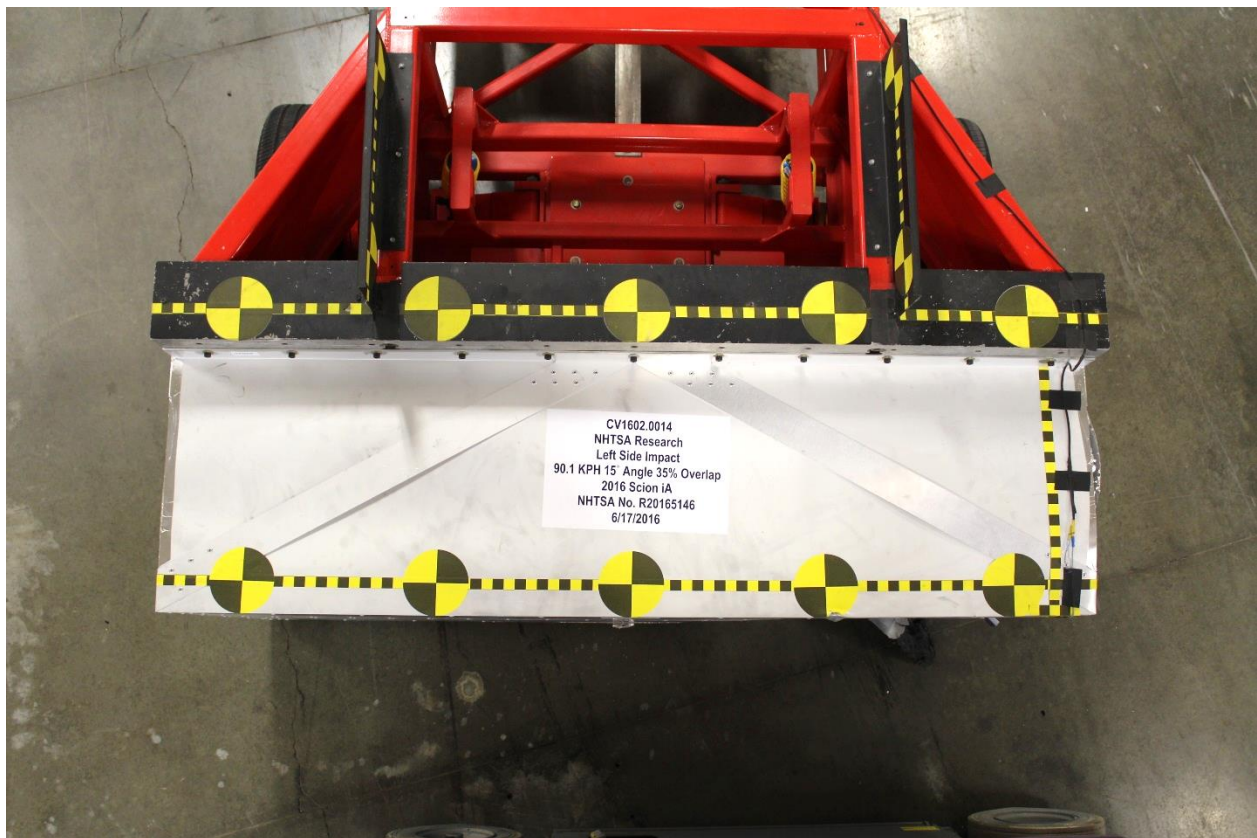
No. 169: Pre-Test Right Side View of OMDB



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



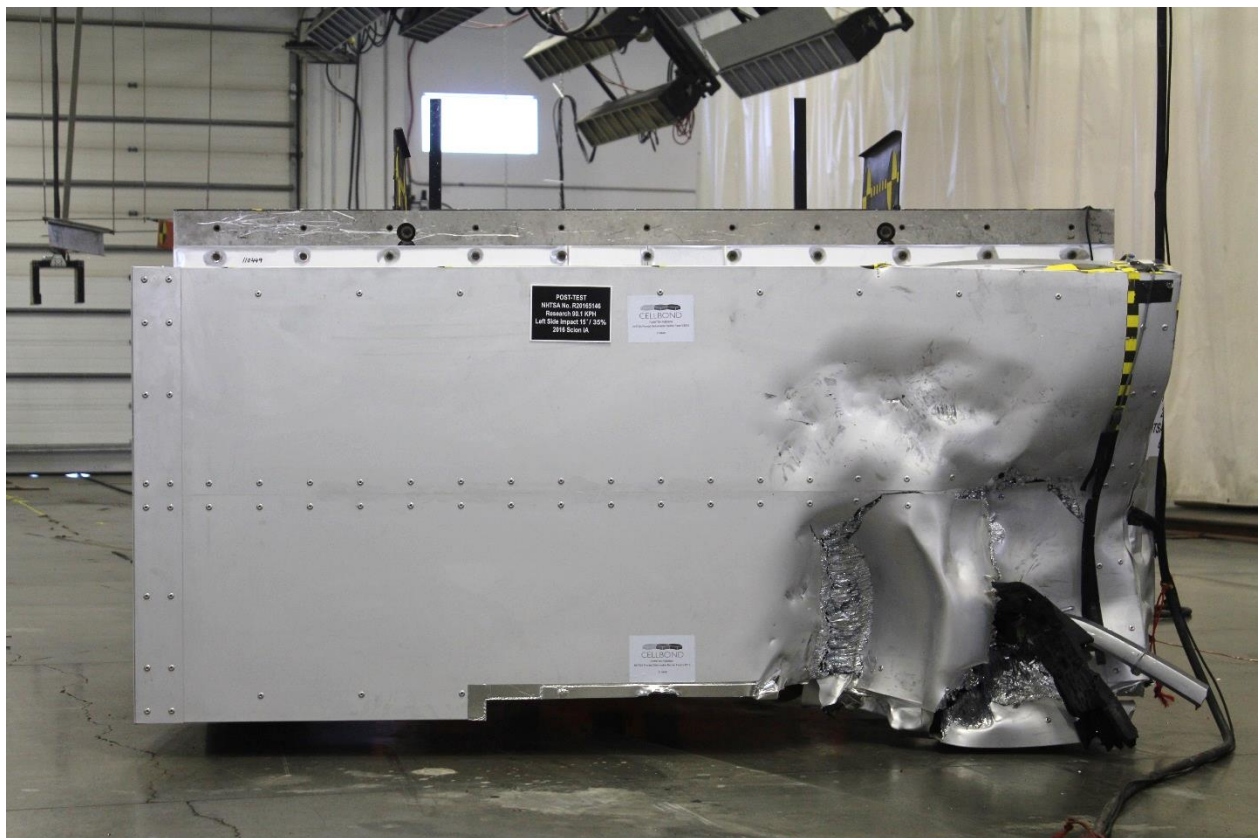
No. 171: Pre-Test Top View of OMDB



No. 172: Post-Test Top View of OMDB



No. 173: Pre-Test Front View of OMDB



No. 174: Post-Test Front View of OMDB



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



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



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



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



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



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



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



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



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



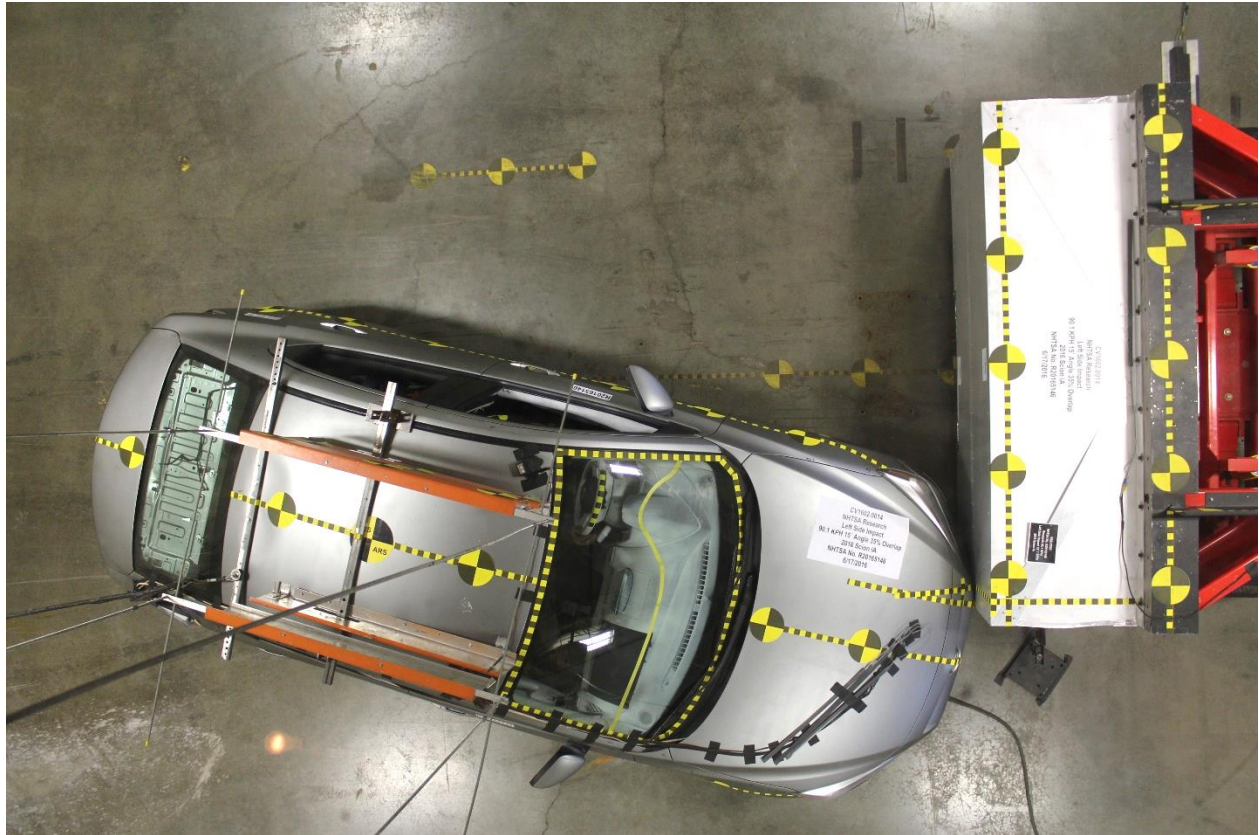
No. 184: Post-Test OMDB & Vehicle, Right Side



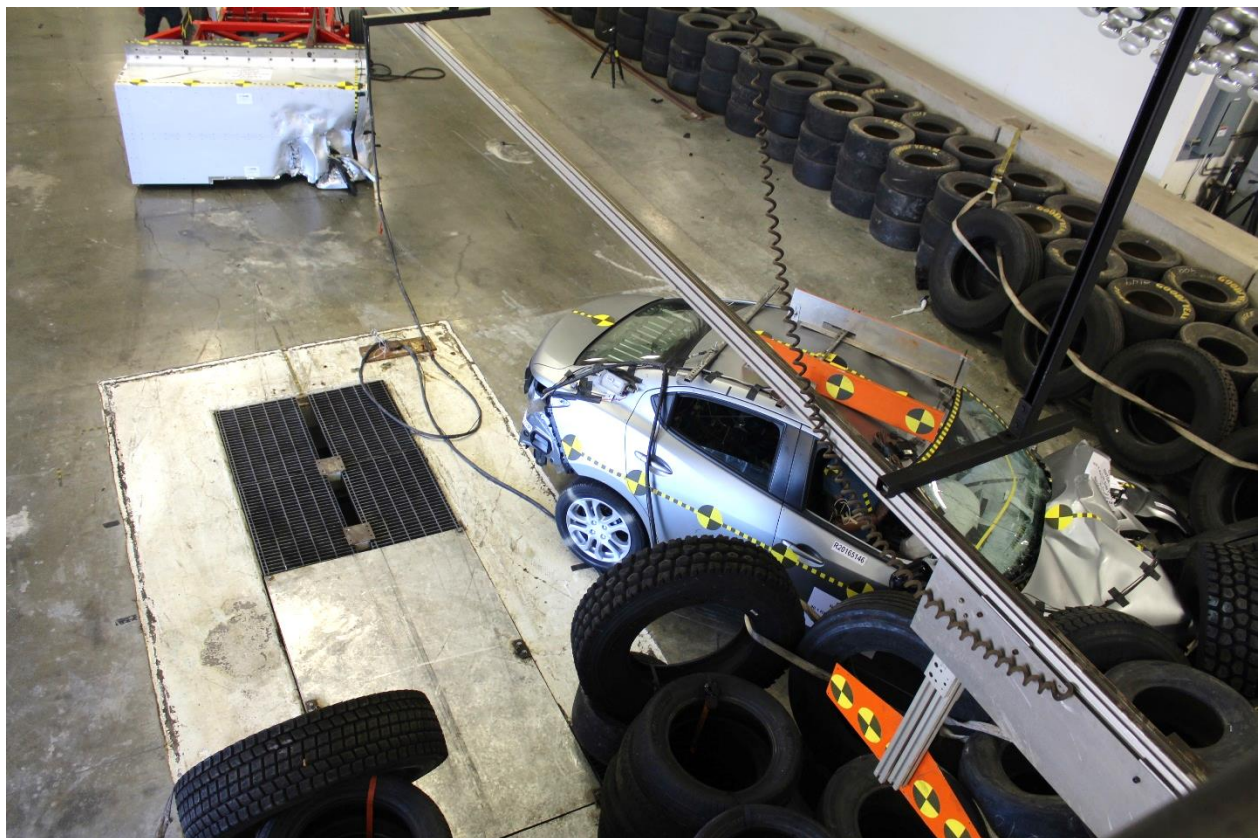
No. 185: Pre-Test O MDB & Vehicle, Left Side



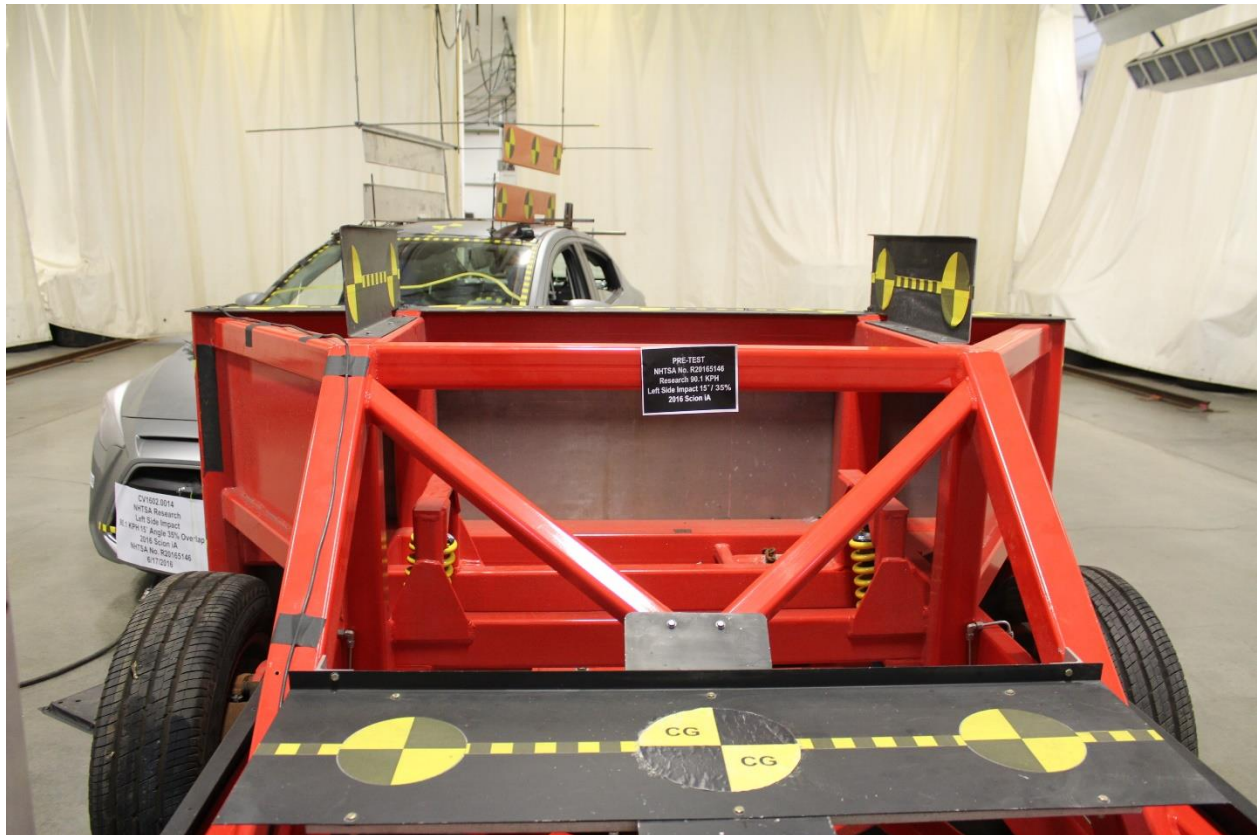
No. 186: Post-Test O MDB & Vehicle, Left Side



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



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



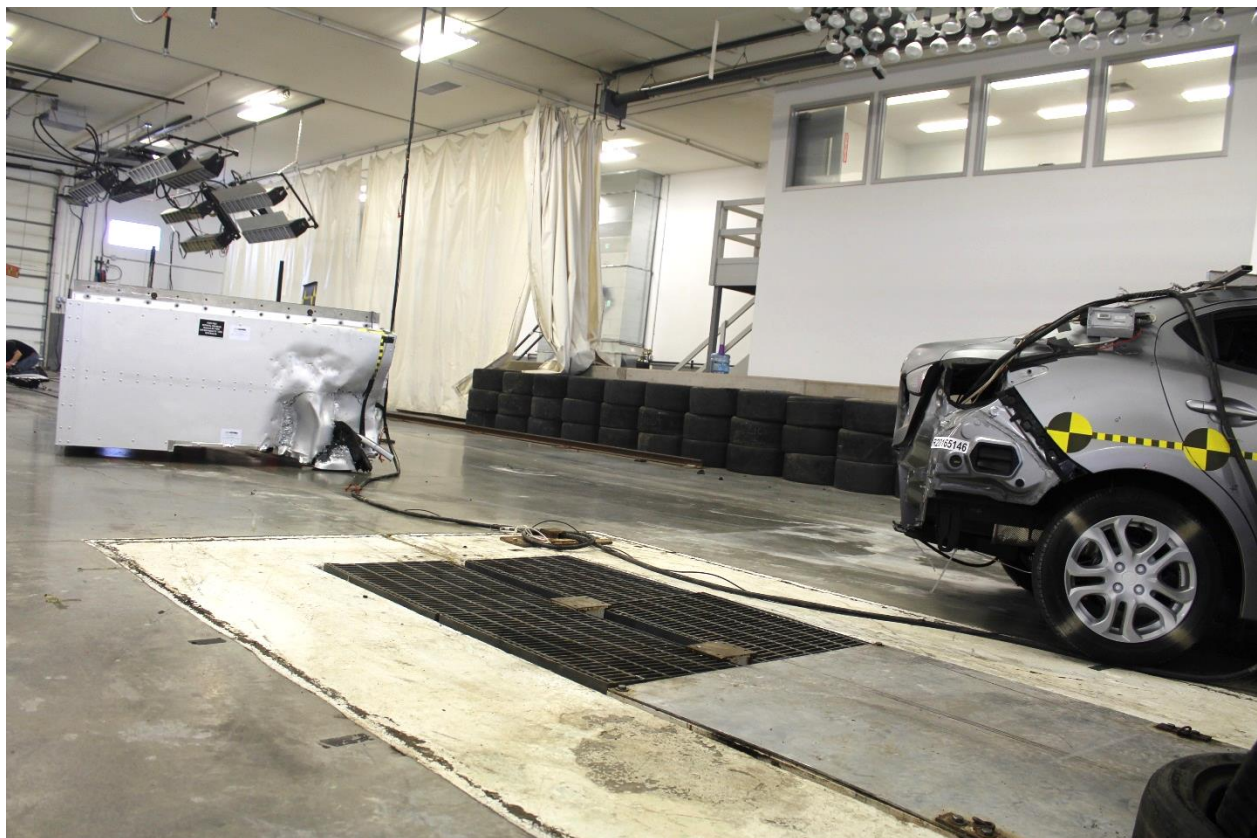
No. 189: Pre-Test OMDB & Vehicle, Rear View



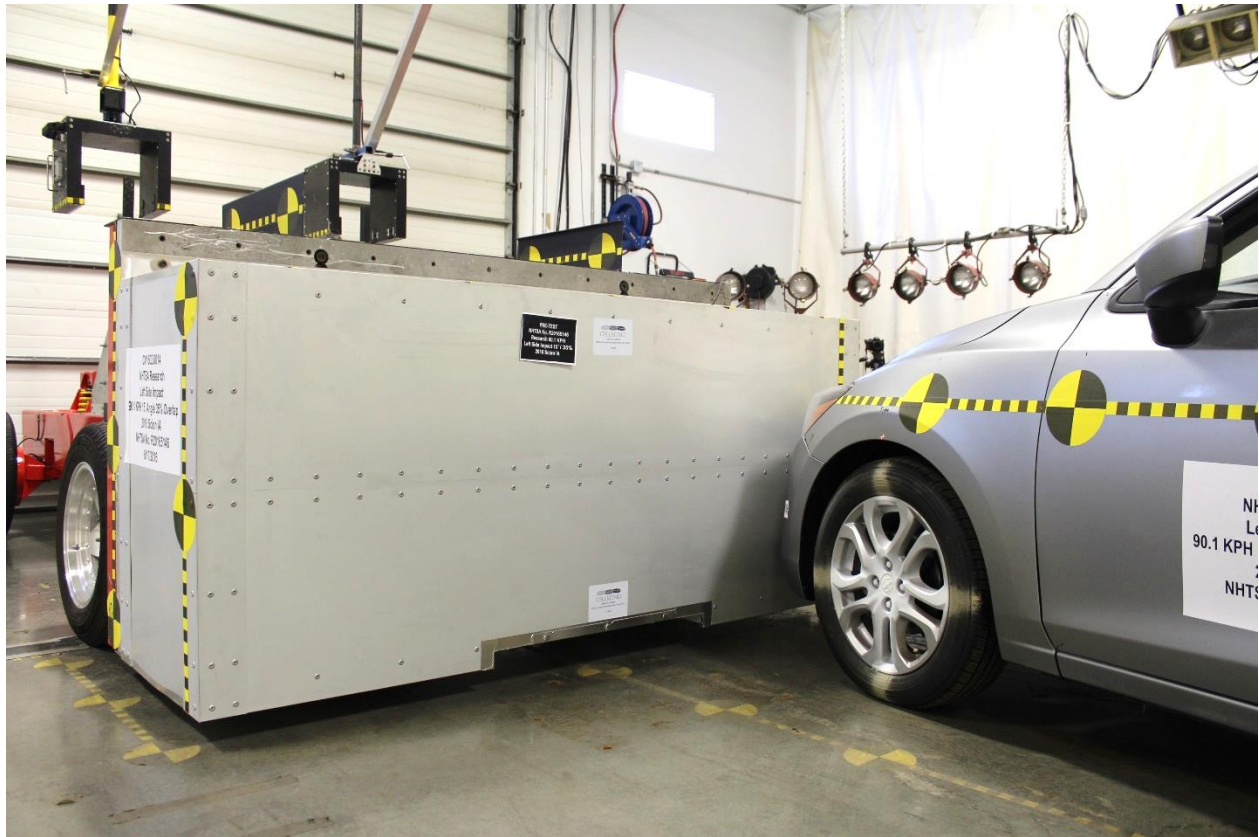
No. 190: Post-Test OMDB & Vehicle, Rear View



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



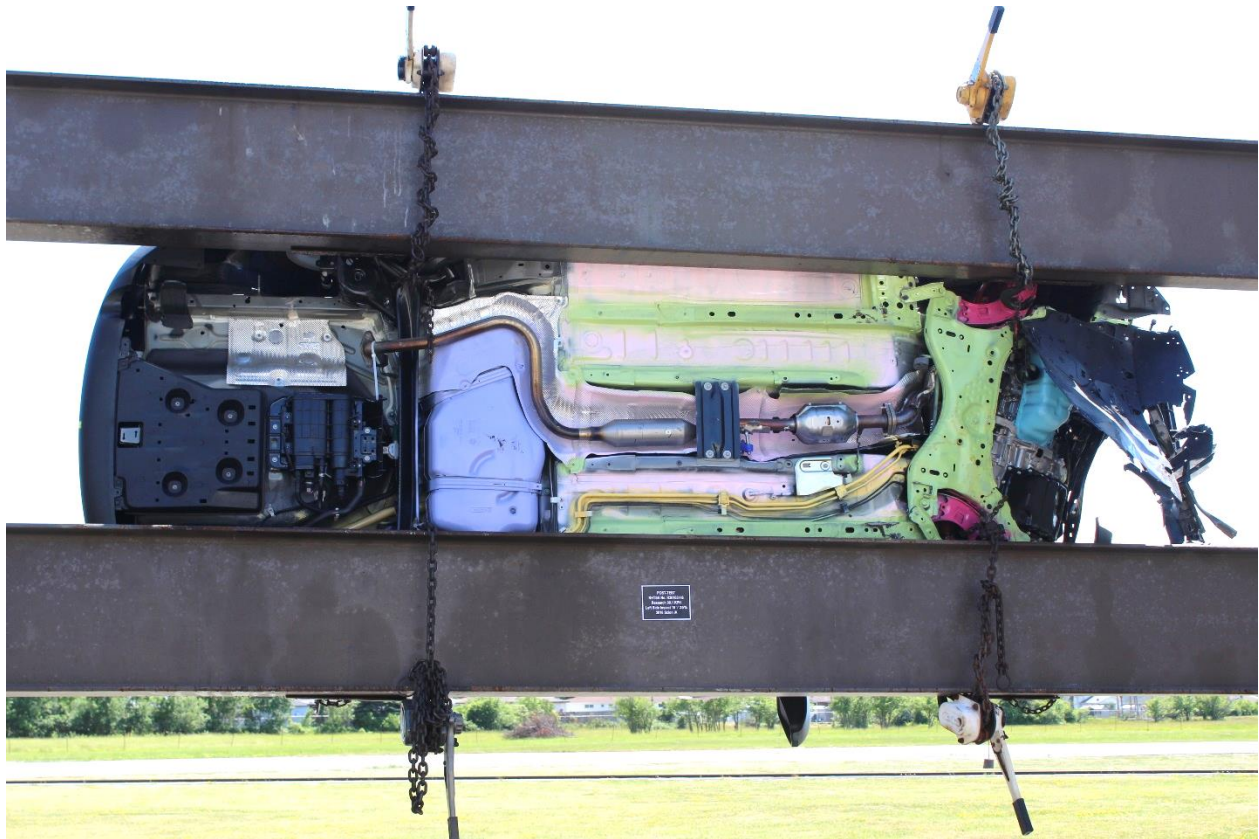
No. 192: Post-Test OMDB & Vehicle, Front View



No. 193: Pre-Test OMDB & Vehicle Alignment



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



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



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



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



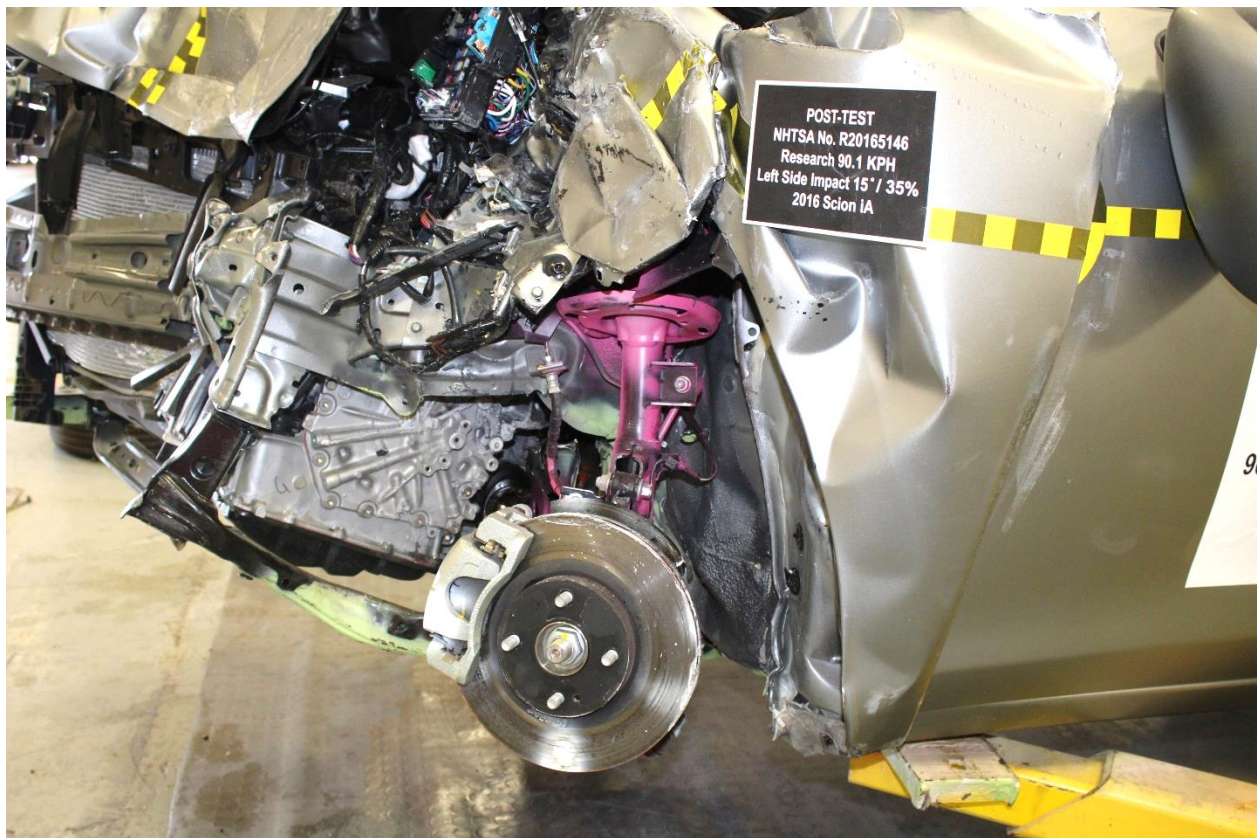
No. 198: Vehicle at 360 Degrees on Static Rollover Device



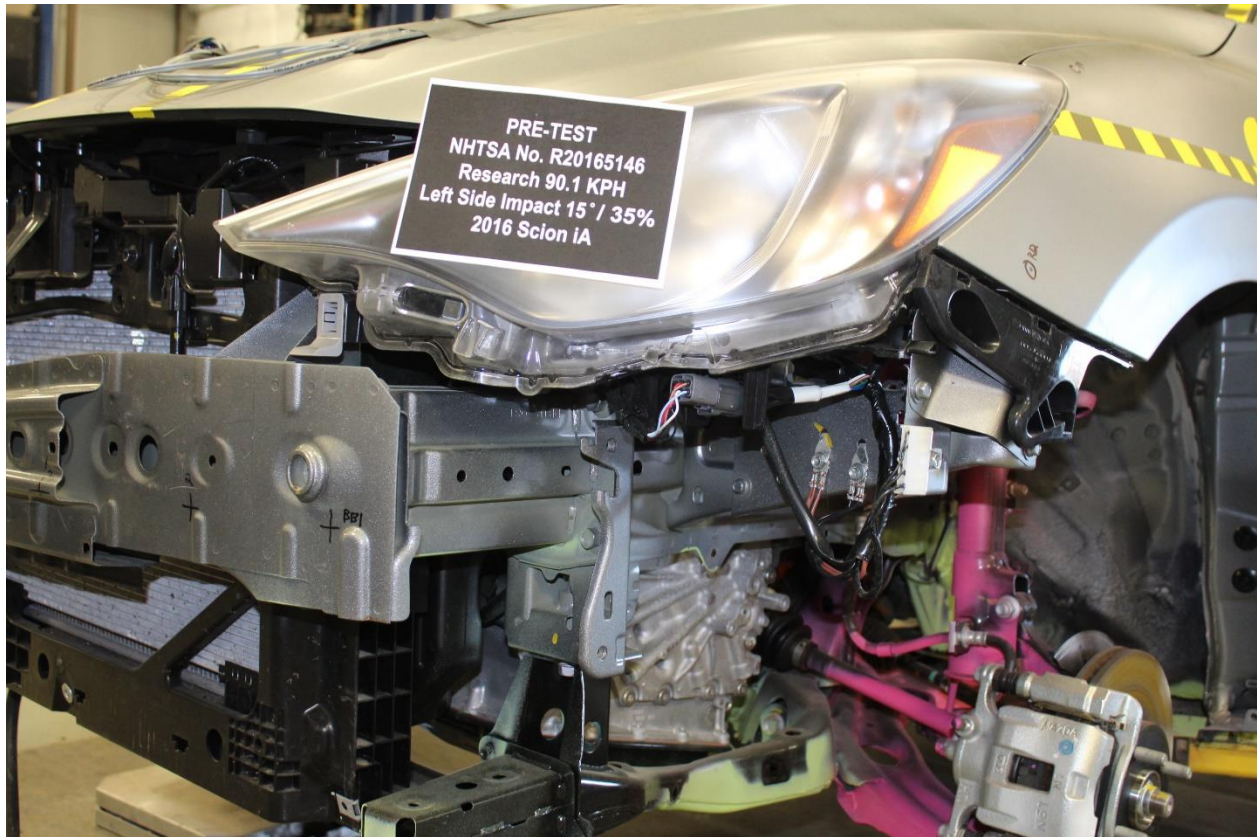
No. 199: Impact Photo



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



No. 201 Post-Test Vehicle Bumper Left View



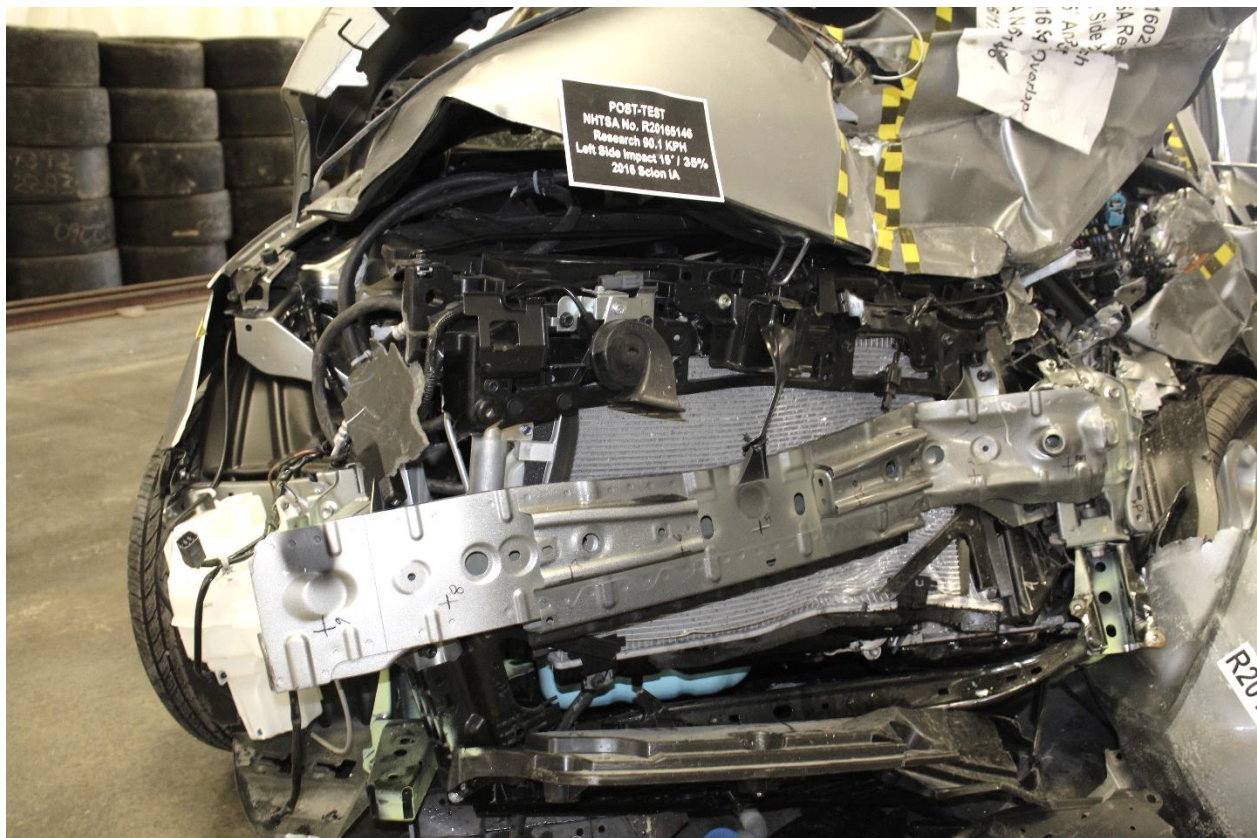
No. 202 Pre-Test Vehicle Bumper Left Front View



No. 203 Post-Test Vehicle Bumper Left Front View



No. 204 Pre-Test Vehicle Bumper Front View



No. 205 Post-Test Vehicle Bumper Front View



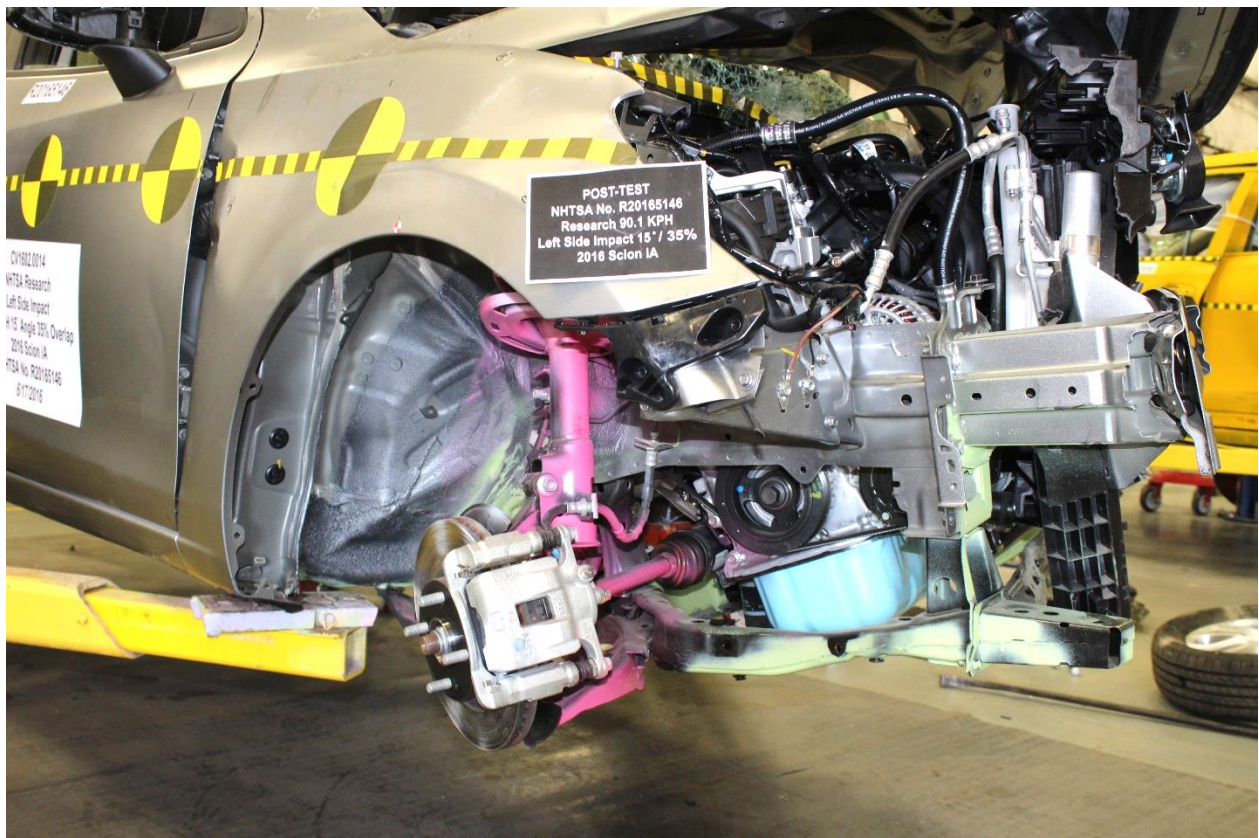
No. 206 Pre-Test Vehicle Bumper Right Side View



No. 207 Post-Test Vehicle Bumper Right View



No. 208 Pre-Test Vehicle Bumper Right Front View



No. 209 Post-Test Vehicle Bumper Right Front View

APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

Table of Data Plots

No.	Description	Page
Plot 1	V2P1 Head CG X Acceleration	B-9
Plot 2	V2P1 Head CG Y Acceleration	B-9
Plot 3	V2P1 Head CG Z Acceleration	B-9
Plot 4	V2P1 Head CG Angular Velocity About X	B-9
Plot 5	V2P1 Head CG Angular Velocity About Y	B-10
Plot 6	V2P1 Head CG Angular Velocity About Z	B-10
Plot 7	V2P1 Upper Neck X Force	B-10
Plot 8	V2P1 Upper Neck Y Force	B-10
Plot 9	V2P1 Upper Neck Z Force	B-11
Plot 10	V2P1 Upper Neck X Moment	B-11
Plot 11	V2P1 Upper Neck Y Moment	B-11
Plot 12	V2P1 Upper Neck Z Moment	B-11
Plot 13	V2P1 Lower Neck X Force	B-12
Plot 14	V2P1 Lower Neck Y Force	B-12
Plot 15	V2P1 Lower Neck Z Force	B-12
Plot 16	V2P1 Lower Neck X Moment	B-12
Plot 17	V2P1 Lower Neck Y Moment	B-13
Plot 18	V2P1 Lower Neck Z Moment	B-13
Plot 19	V2P1 Front Neck Spring Tower Load Cell	B-13
Plot 20	V2P1 Rear Neck Spring Tower Load Cell	B-13
Plot 21	V2P1 Occipital Condyle Rotation Potentiometer	B-14
Plot 22	V2P1 Upper Left DGIR X Displacement	B-14
Plot 23	V2P1 Upper Left DGIR Y Rotation	B-14
Plot 24	V2P1 Upper Left DGIR Z Rotation	B-14
Plot 25	V2P1 Upper Right DGIR X Displacement	B-15
Plot 26	V2P1 Upper Right DGIR Y Rotation	B-15
Plot 27	V2P1 Upper Right DGIR Z Rotation	B-15
Plot 28	V2P1 Lower Left DGIR X Displacement	B-15
Plot 29	V2P1 Lower Left DGIR Y Rotation	B-16
Plot 30	V2P1 Lower Left DGIR Z Rotation	B-16
Plot 31	V2P1 Lower Right DGIR X Displacement	B-16
Plot 32	V2P1 Lower Right DGIR Y Rotation	B-16
Plot 33	V2P1 Lower Right DGIR Z Rotation	B-17
Plot 34	V2P1 Spine Force X	B-17
Plot 35	V2P1 Spine Force Y	B-17
Plot 36	V2P1 Spine Force Z	B-17
Plot 37	V2P1 Spine Moment X	B-18
Plot 38	V2P1 Spine Moment Y	B-18
Plot 39	V2P1 T6 X Acceleration	B-18
Plot 40	V2P1 T6 Y Acceleration	B-18
Plot 41	V2P1 T6 Z Acceleration	B-19
Plot 42	V2P1 T1 X Acceleration	B-19
Plot 43	V2P1 T1 Y Acceleration	B-19
Plot 44	V2P1 T1 Z Acceleration	B-19
Plot 45	V2P1 Abdomen Left DGIR X Displacement	B-20
Plot 46	V2P1 Abdomen Left DGIR Y Rotation	B-20
Plot 47	V2P1 Abdomen Left DGIR Z Rotation	B-20
Plot 48	V2P1 Abdomen Right DGIR X Displacement	B-20
Plot 49	V2P1 Abdomen Right DGIR Y Rotation	B-21
Plot 50	V2P1 Abdomen Right DGIR Z Rotation	B-21
Plot 51	V2P1 Pelvis Acetabulum Left X Force	B-21
Plot 52	V2P1 Pelvis Acetabulum Left Y Force	B-21
Plot 53	V2P1 Pelvis Acetabulum Left Z Force	B-22
Plot 54	V2P1 Pelvis Acetabulum Right X Force	B-22
Plot 55	V2P1 Pelvis Acetabulum Right Y Force	B-22
Plot 56	V2P1 Pelvis Acetabulum Right Z Force	B-22
Plot 57	V2P1 Pelvis X Acceleration	B-23

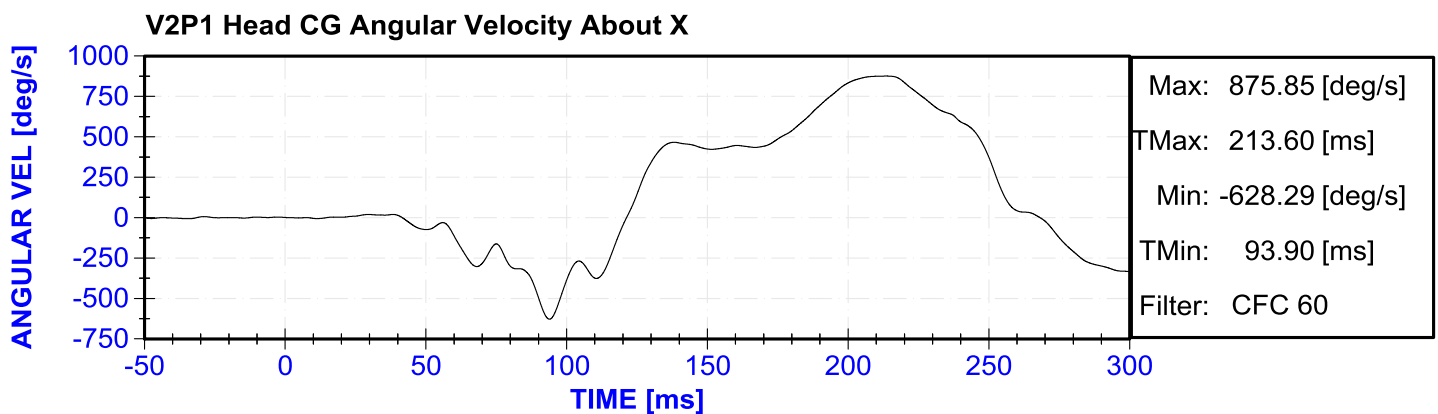
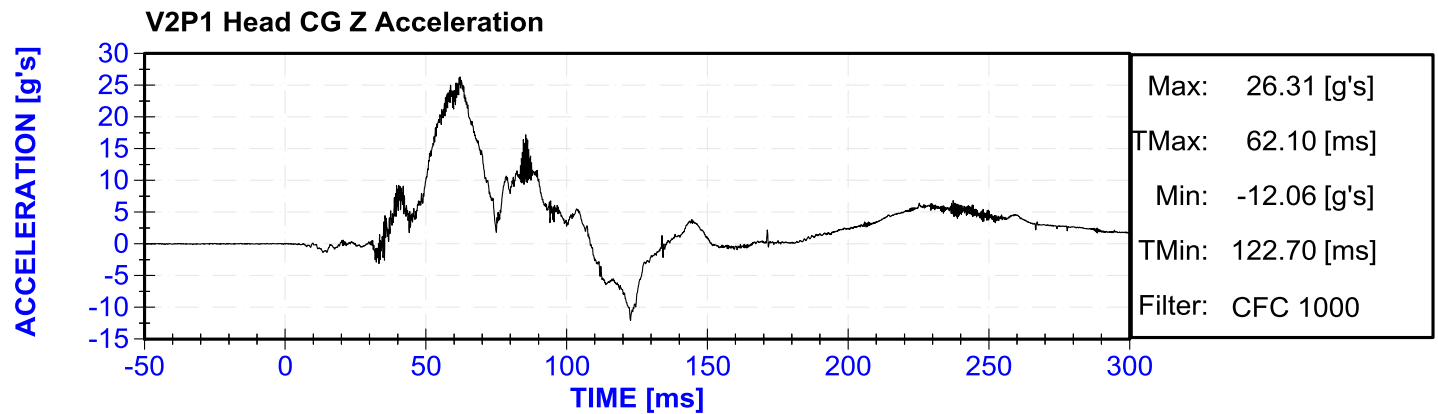
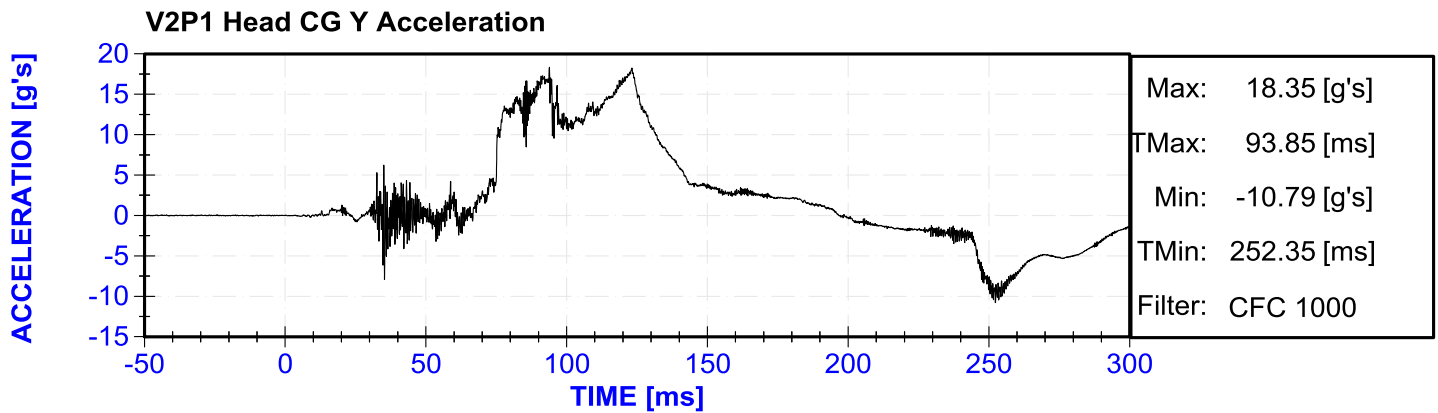
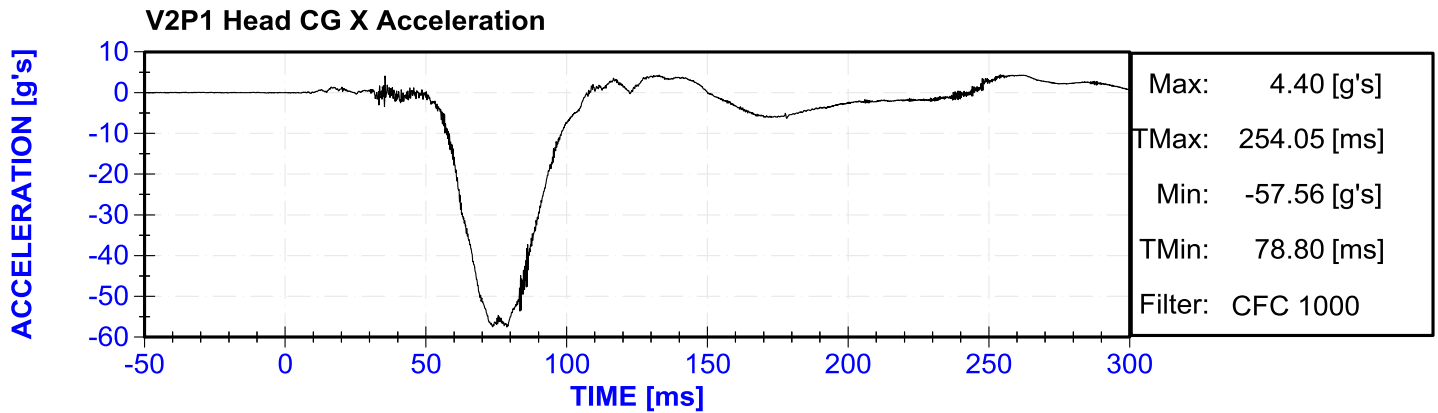
Plot 58	V2P1 Pelvis Y Acceleration	B-23
Plot 59	V2P1 Pelvis Z Acceleration	B-23
Plot 60	V2P1 ASIS Left X Force	B-23
Plot 61	V2P1 Left ASIS Y Moment	B-24
Plot 62	V2P1 ASIS Right X Force	B-24
Plot 63	V2P1 Right ASIS Y Moment	B-24
Plot 64	V2P1 Femur Left X Force	B-24
Plot 65	V2P1 Femur Left Y Force	B-25
Plot 66	V2P1 Femur Left Z Force	B-25
Plot 67	V2P1 Femur Left X Moment	B-25
Plot 68	V2P1 Femur Left Y Moment	B-25
Plot 69	V2P1 Femur Right X Force	B-26
Plot 70	V2P1 Femur Right Y Force	B-26
Plot 71	V2P1 Femur Right Z Force	B-26
Plot 72	V2P1 Femur Right X Moment	B-26
Plot 73	V2P1 Femur Right Y Moment	B-27
Plot 74	V2P1 Knee Left X Displacement	B-27
Plot 75	V2P1 Knee Right X Displacement	B-27
Plot 76	V2P1 Upper Tibia Left Z Force	B-27
Plot 77	V2P1 Upper Tibia Left X Moment	B-28
Plot 78	V2P1 Upper Tibia Left Y Moment	B-28
Plot 79	V2P1 Upper Tibia Right Z Force	B-28
Plot 80	V2P1 Upper Tibia Right X Moment	B-28
Plot 81	V2P1 Upper Tibia Right Y Moment	B-29
Plot 82	V2P1 Lower Tibia Left X Force	B-29
Plot 83	V2P1 Lower Tibia Left Y Force	B-29
Plot 84	V2P1 Lower Tibia Left Z Force	B-29
Plot 85	V2P1 Lower Tibia Left X Moment	B-30
Plot 86	V2P1 Lower Tibia Left Y Moment	B-30
Plot 87	V2P1 Lower Tibia Right X Force	B-30
Plot 88	V2P1 Lower Tibia Right Y Force	B-30
Plot 89	V2P1 Lower Tibia Right Z Force	B-31
Plot 90	V2P1 Lower Tibia Right X Moment	B-31
Plot 91	V2P1 Lower Tibia Right Y Moment	B-31
Plot 92	V2P1 Left Mid Tibia X Acceleration	B-31
Plot 93	V2P1 Left Mid Tibia Y Acceleration	B-32
Plot 94	V2P1 Right Mid Tibia X Acceleration	B-32
Plot 95	V2P1 Right Mid Tibia Y Acceleration	B-32
Plot 96	V2P1 Foot Left X Acceleration	B-32
Plot 97	V2P1 Foot Left Z Acceleration	B-33
Plot 98	V2P1 Foot Right X Acceleration	B-33
Plot 99	V2P1 Foot Right Z Acceleration	B-33
Plot 100	V2P1 Ankle Left X Rotation	B-33
Plot 101	V2P1 Ankle Left Y Rotation	B-34
Plot 102	V2P1 Ankle Left Z Rotation	B-34
Plot 103	V2P1 Ankle Right X Rotation	B-34
Plot 104	V2P1 Ankle Right Y Rotation	B-34
Plot 105	V2P1 Ankle Right Z Rotation	B-35
Plot 106	V2 Driver Lap Belt Force	B-35
Plot 107	V2 Driver Shoulder Belt Upper Force	B-35
Plot 108	V2 Driver Shoulder Belt Displacement	B-35
Plot 109	V2P2 Head CG X Acceleration	B-36
Plot 110	V2P2 Head CG Y Acceleration	B-36
Plot 111	V2P2 Head CG Z Acceleration	B-36
Plot 112	V2P2 Head CG Angular Velocity About X	B-36
Plot 113	V2P2 Head CG Angular Velocity About Y	B-37
Plot 114	V2P2 Head CG Angular Velocity About Z	B-37
Plot 115	V2P2 Upper Neck X Force	B-37
Plot 116	V2P2 Upper Neck Y Force	B-37

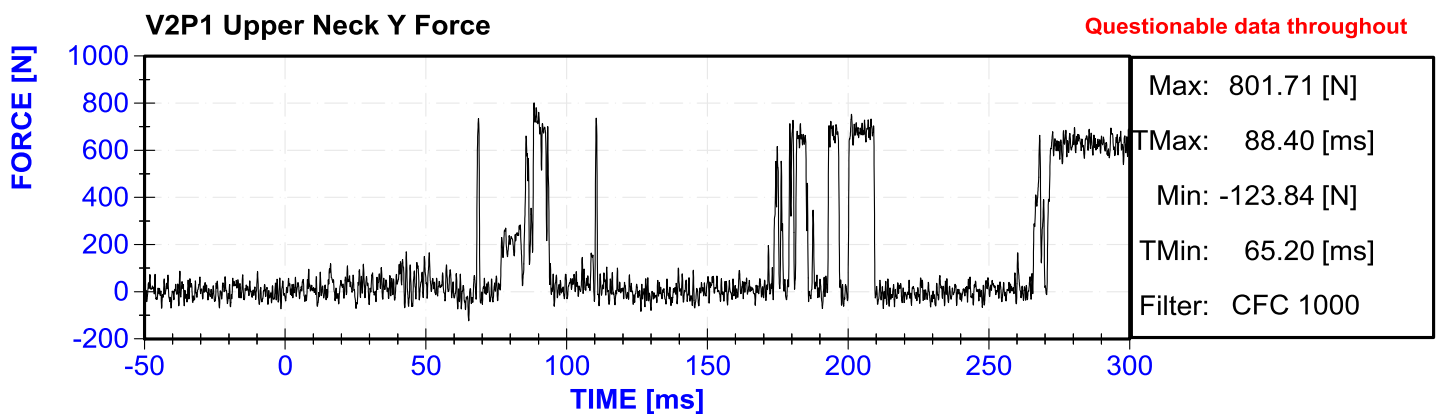
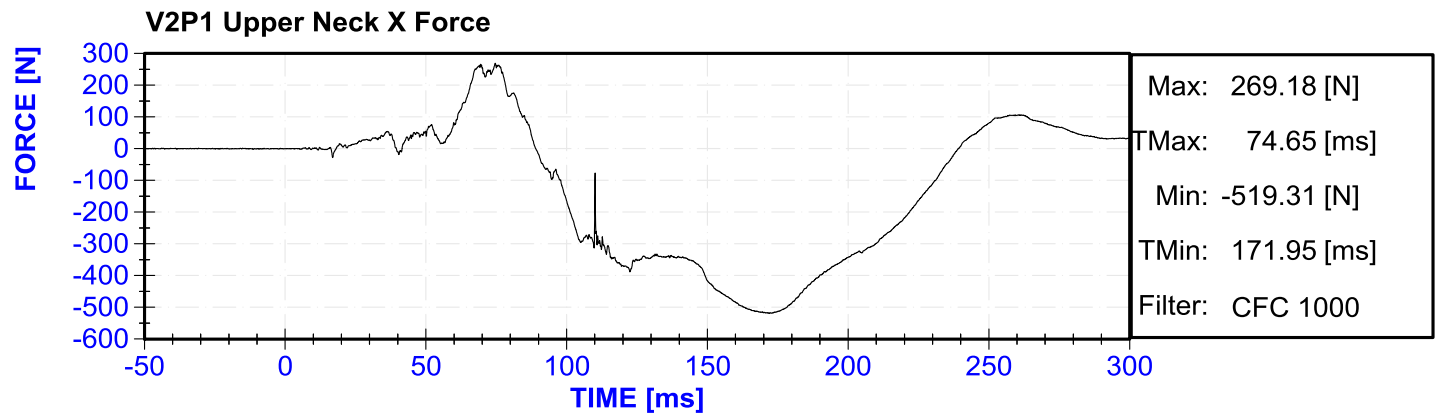
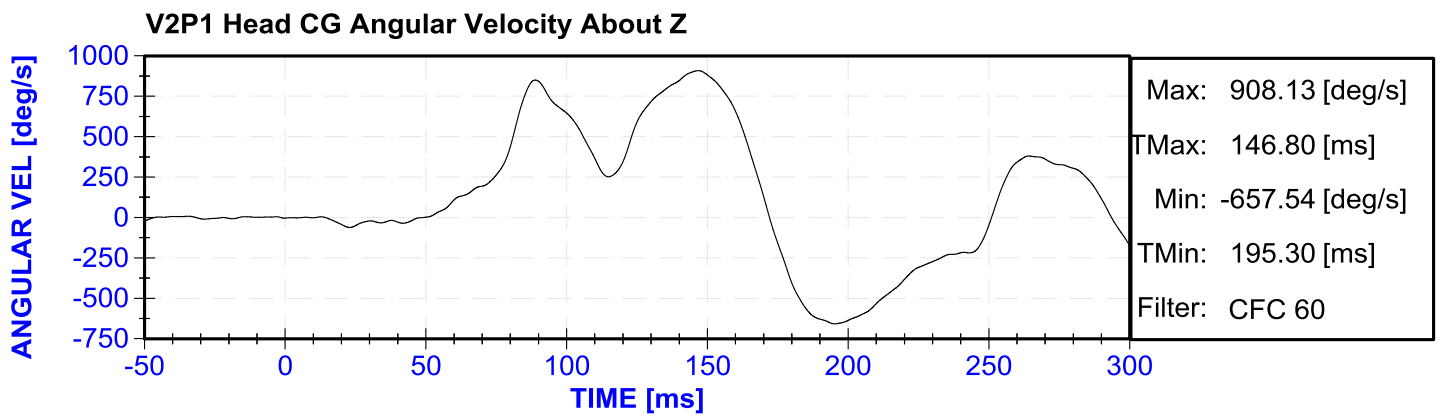
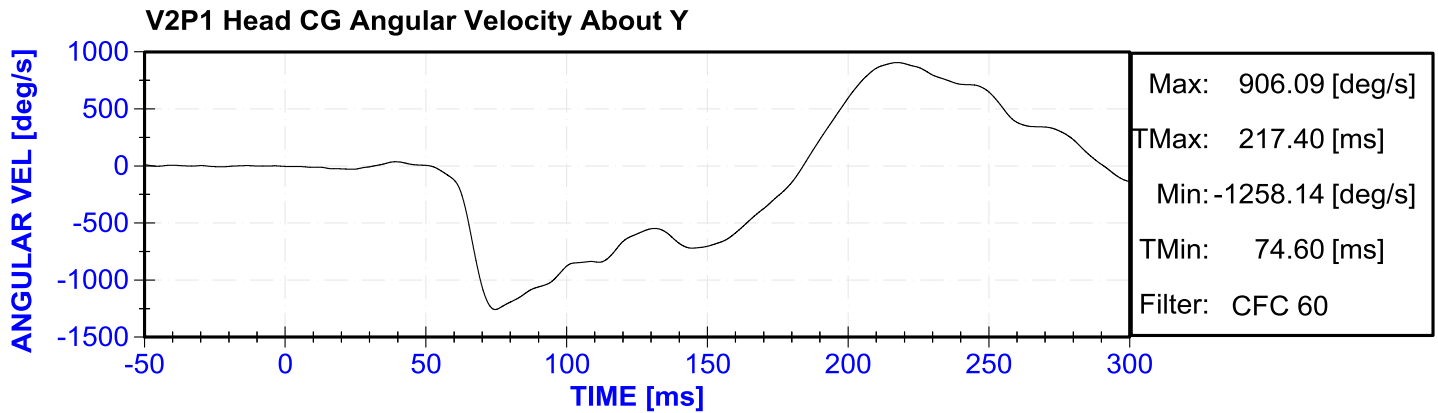
Plot 117	V2P2 Upper Neck Z Force	B-38
Plot 118	V2P2 Upper Neck X Moment	B-38
Plot 119	V2P2 Upper Neck Y Moment	B-38
Plot 120	V2P2 Upper Neck Z Moment	B-38
Plot 121	V2P2 Lower Neck X Force	B-39
Plot 122	V2P2 Lower Neck Y Force	B-39
Plot 123	V2P2 Lower Neck Z Force	B-39
Plot 124	V2P2 Lower Neck X Moment	B-39
Plot 125	V2P2 Lower Neck Y Moment	B-40
Plot 126	V2P2 Lower Neck Z Moment	B-40
Plot 127	V2P2 Front Neck Spring Tower Load Cell	B-40
Plot 128	V2P2 Rear Neck Spring Tower Load Cell	B-40
Plot 129	V2P2 Occipital Condyle Rotation Potentiometer	B-41
Plot 130	V2P2 Upper Left DGIR X Displacement	B-41
Plot 131	V2P2 Upper Left DGIR Y Rotation	B-41
Plot 132	V2P2 Upper Left DGIR Z Rotation	B-41
Plot 133	V2P2 Upper Right DGIR X Displacement	B-42
Plot 134	V2P2 Upper Right DGIR Y Rotation	B-42
Plot 135	V2P2 Upper Right DGIR Z Rotation	B-42
Plot 136	V2P2 Lower Left DGIR X Displacement	B-42
Plot 137	V2P2 Lower Left DGIR Y Rotation	B-43
Plot 138	V2P2 Lower Left DGIR Z Rotation	B-43
Plot 139	V2P2 Lower Right DGIR X Displacement	B-43
Plot 140	V2P2 Lower Right DGIR Y Rotation	B-43
Plot 141	V2P2 Lower Right DGIR Z Rotation	B-44
Plot 142	V2P2 Spine Force X	B-44
Plot 143	V2P2 Spine Force Y	B-44
Plot 144	V2P2 Spine Force Z	B-44
Plot 145	V2P2 Spine Moment X	B-45
Plot 146	V2P2 Spine Moment Y	B-45
Plot 147	V2P2 T6 X Acceleration	B-45
Plot 148	V2P2 T6 Y Acceleration	B-45
Plot 149	V2P2 T6 Z Acceleration	B-46
Plot 150	V2P2 T1 X Acceleration	B-46
Plot 151	V2P2 T1 Y Acceleration	B-46
Plot 152	V2P2 T1 Z Acceleration	B-46
Plot 153	V2P2 Abdomen Left DGIR X Displacement	B-47
Plot 154	V2P2 Abdomen Left DGIR Y Rotation	B-47
Plot 155	V2P2 Abdomen Left DGIR Z Rotation	B-47
Plot 156	V2P2 Abdomen Right DGIR X Displacement	B-47
Plot 157	V2P2 Abdomen Right DGIR Y Rotation	B-48
Plot 158	V2P2 Abdomen Right DGIR Z Rotation	B-48
Plot 159	V2P2 Pelvis Acetabulum Left X Force	B-48
Plot 160	V2P2 Pelvis Acetabulum Left Y Force	B-48
Plot 161	V2P2 Pelvis Acetabulum Left Z Force	B-49
Plot 162	V2P2 Pelvis Acetabulum Right X Force	B-49
Plot 163	V2P2 Pelvis Acetabulum Right Y Force	B-49
Plot 164	V2P2 Pelvis Acetabulum Right Z Force	B-49
Plot 165	V2P2 Pelvis X Acceleration	B-50
Plot 166	V2P2 Pelvis Y Acceleration	B-50
Plot 167	V2P2 Pelvis Z Acceleration	B-50
Plot 168	V2P2 ASIS Left X Force	B-50
Plot 169	V2P2 Left ASIS Y Moment	B-51
Plot 170	V2P2 ASIS Right X Force	B-51
Plot 171	V2P2 Right ASIS Y Moment	B-51
Plot 172	V2P2 Femur Left X Force	B-51
Plot 173	V2P2 Femur Left Y Force	B-52
Plot 174	V2P2 Femur Left Z Force	B-52
Plot 175	V2P2 Femur Left X Moment	B-52

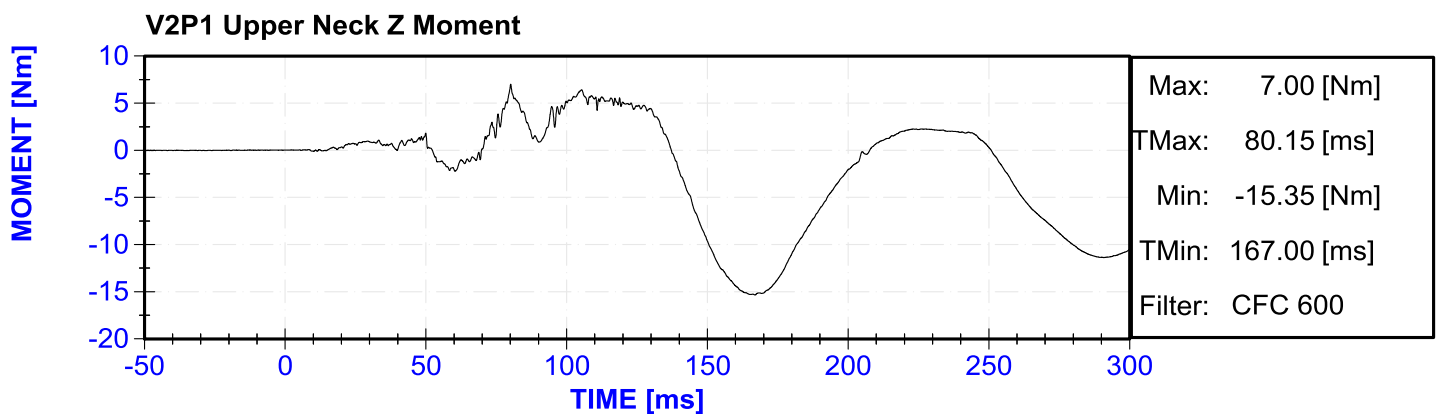
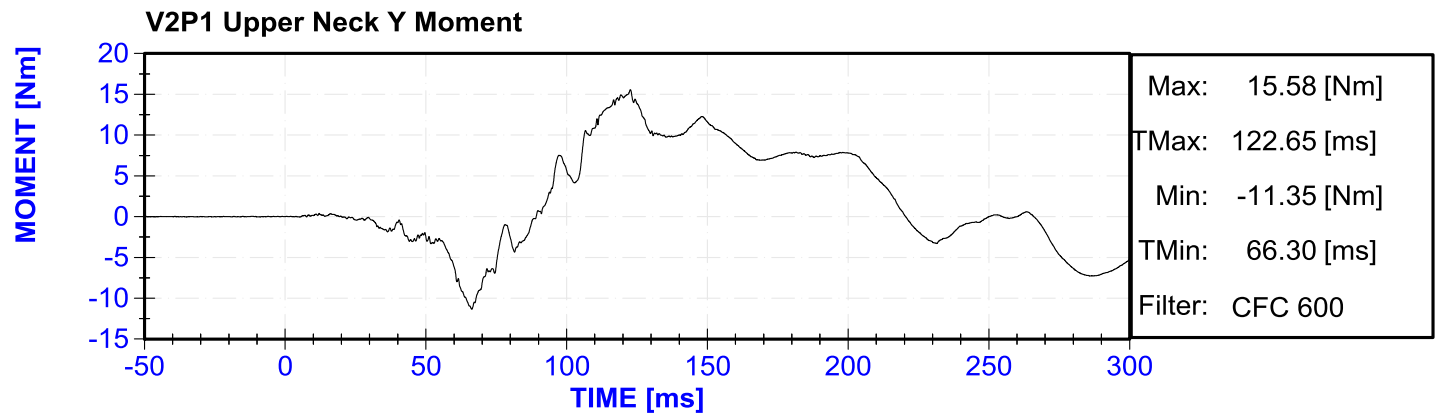
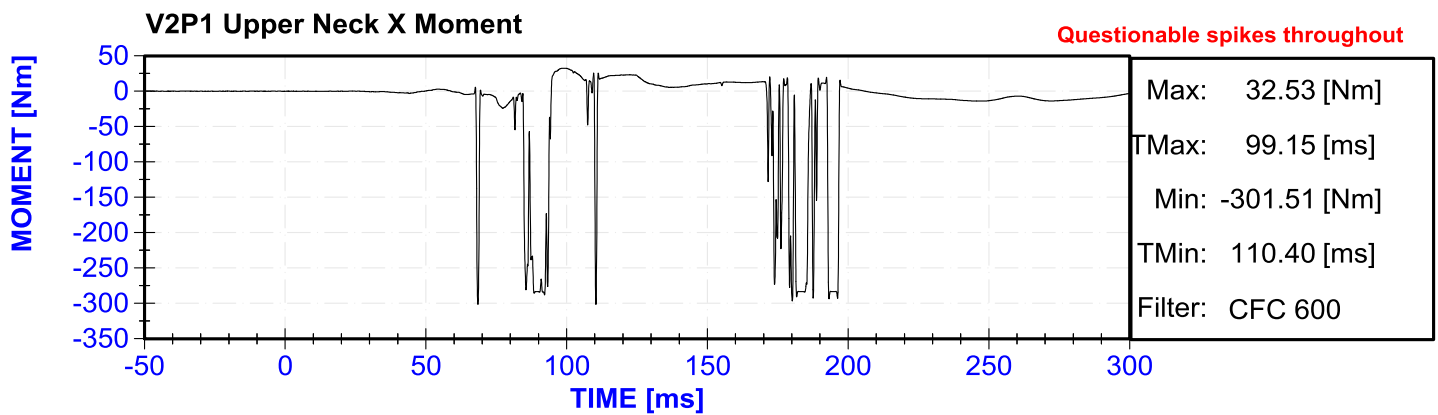
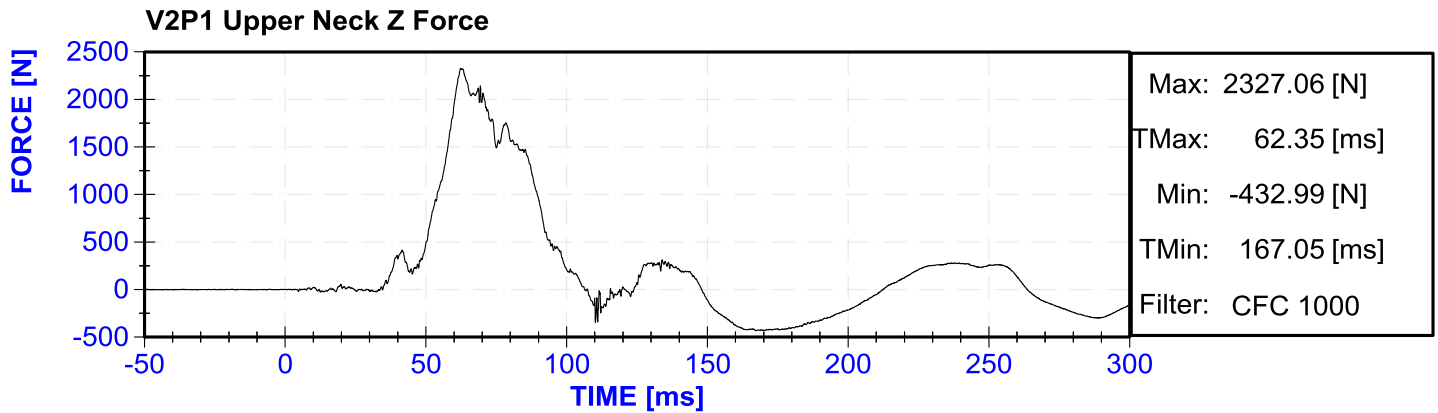
Plot 176	V2P2 Femur Left Y Moment	B-52
Plot 177	V2P2 Femur Right X Force	B-53
Plot 178	V2P2 Femur Right Y Force	B-53
Plot 179	V2P2 Femur Right Z Force	B-53
Plot 180	V2P2 Femur Right X Moment	B-53
Plot 181	V2P2 Femur Right Y Moment	B-54
Plot 182	V2P2 Knee Left X Displacement	B-54
Plot 183	V2P2 Knee Right X Displacement	B-54
Plot 184	V2P2 Upper Tibia Left Z Force	B-54
Plot 185	V2P2 Upper Tibia Left X Moment	B-55
Plot 186	V2P2 Upper Tibia Left Y Moment	B-55
Plot 187	V2P2 Upper Tibia Right Z Force	B-55
Plot 188	V2P2 Upper Tibia Right X Moment	B-55
Plot 189	V2P2 Upper Tibia Right Y Moment	B-56
Plot 190	V2P2 Lower Tibia Left X Force	B-56
Plot 191	V2P2 Lower Tibia Left Y Force	B-56
Plot 192	V2P2 Lower Tibia Left Z Force	B-56
Plot 193	V2P2 Lower Tibia Left X Moment	B-57
Plot 194	V2P2 Lower Tibia Left Y Moment	B-57
Plot 195	V2P2 Lower Tibia Right X Force	B-57
Plot 196	V2P2 Lower Tibia Right Y Force	B-57
Plot 197	V2P2 Lower Tibia Right Z Force	B-58
Plot 198	V2P2 Lower Tibia Right X Moment	B-58
Plot 199	V2P2 Lower Tibia Right Y Moment	B-58
Plot 200	V2P2 Left Mid Tibia X Acceleration	B-58
Plot 201	V2P2 Left Mid Tibia Y Acceleration	B-59
Plot 202	V2P2 Right Mid Tibia X Acceleration	B-59
Plot 203	V2P2 Right Mid Tibia Y Acceleration	B-59
Plot 204	V2P2 Foot Left X Acceleration	B-59
Plot 205	V2P2 Foot Left Z Acceleration	B-60
Plot 206	V2P2 Foot Right X Acceleration	B-60
Plot 207	V2P2 Foot Right Z Acceleration	B-60
Plot 208	V2P2 Ankle Left X Rotation	B-60
Plot 209	V2P2 Ankle Left Y Rotation	B-61
Plot 210	V2P2 Ankle Left Z Rotation	B-61
Plot 211	V2P2 Ankle Right X Rotation	B-61
Plot 212	V2P2 Ankle Right Y Rotation	B-61
Plot 213	V2P2 Ankle Right Z Rotation	B-62
Plot 214	V2 Passenger Lap Belt Force	B-62
Plot 215	V2 Passenger Shoulder Belt Upper Force	B-62
Plot 216	V2 Passenger Shoulder Belt Displacement	B-62
Plot 217	V2 Left Rear Sill X Acceleration	B-63
Plot 218	V2 Left Rear Sill Y Acceleration	B-63
Plot 219	V2 Left Rear Sill Redundant X Acceleration	B-63
Plot 220	V2 Left Rear Sill Redundant Y Acceleration	B-63
Plot 221	V2 Right Rear Sill X Acceleration	B-64
Plot 222	V2 Right Rear Sill Y Acceleration	B-64
Plot 223	V2 Vehicle CG X Acceleration	B-64
Plot 224	V2 Vehicle CG Y Acceleration	B-64
Plot 225	V2 Vehicle CG Z Acceleration	B-65
Plot 226	V2 Vehicle CG Angular Rate X	B-65
Plot 227	V2 Vehicle CG Angular Rate Y	B-65
Plot 228	V2 Vehicle CG Angular Rate Z	B-65
Plot 229	V2 Driver Seat Track X Acceleration	B-66
Plot 230	V2 Driver Seat Track Y Acceleration	B-66
Plot 231	V2 Driver Seat Track Z Acceleration	B-66
Plot 232	V2 Driver Seat Thigh Bar X Acceleration	B-66
Plot 233	V2 Driver Seat Thigh Bar Z Acceleration	B-67
Plot 234	V2 Driver Floor Pan X Acceleration	B-67

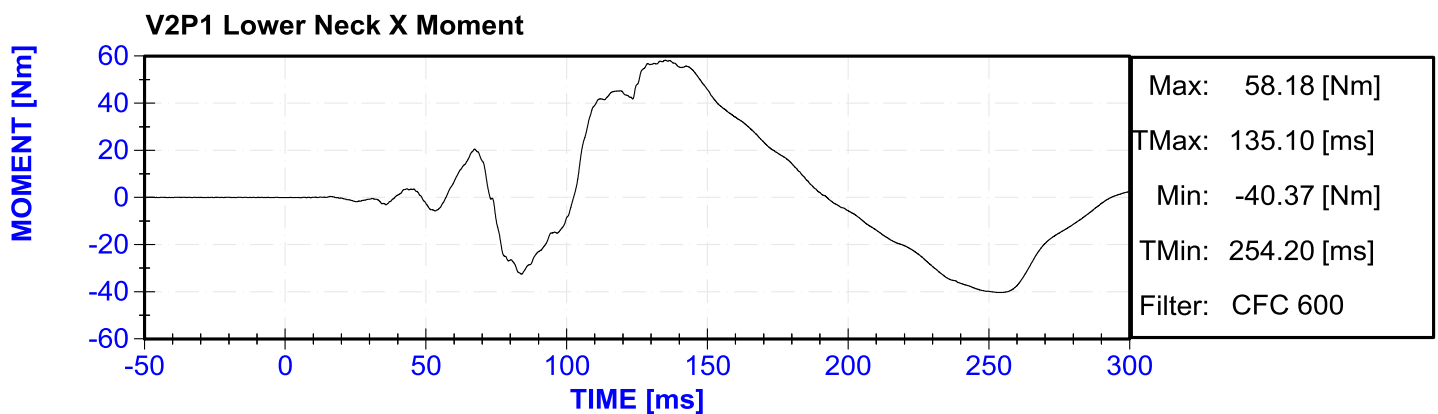
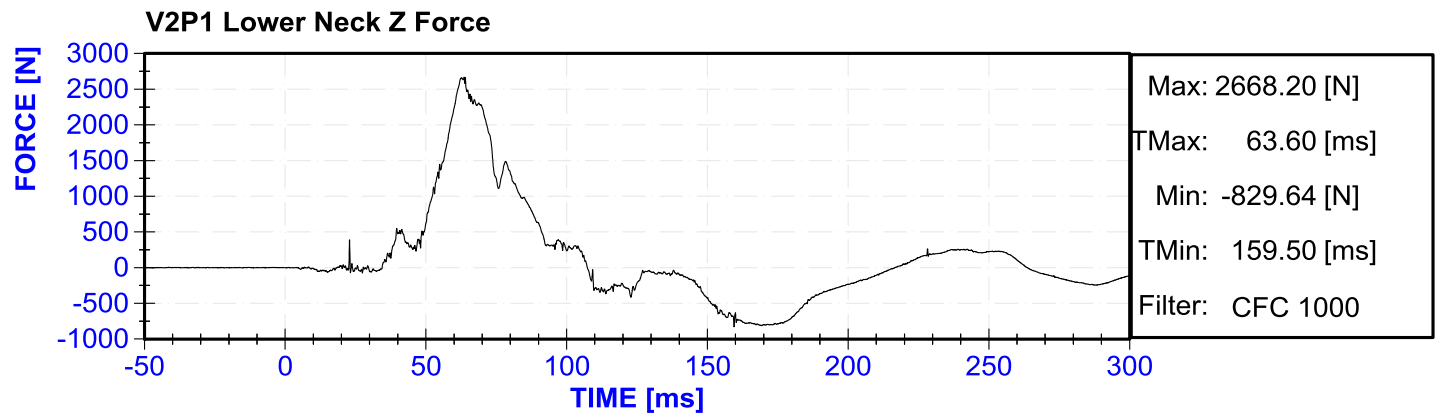
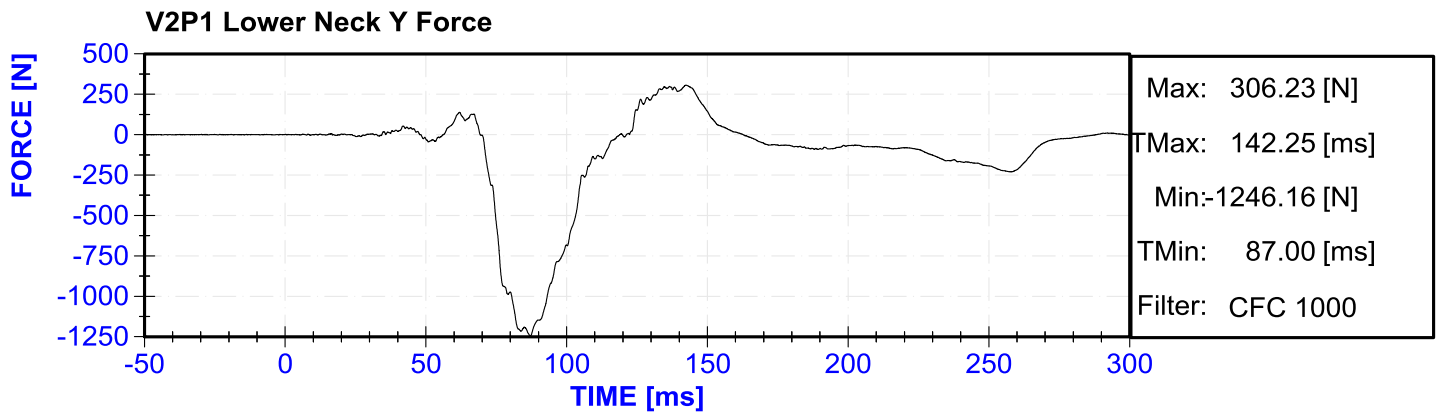
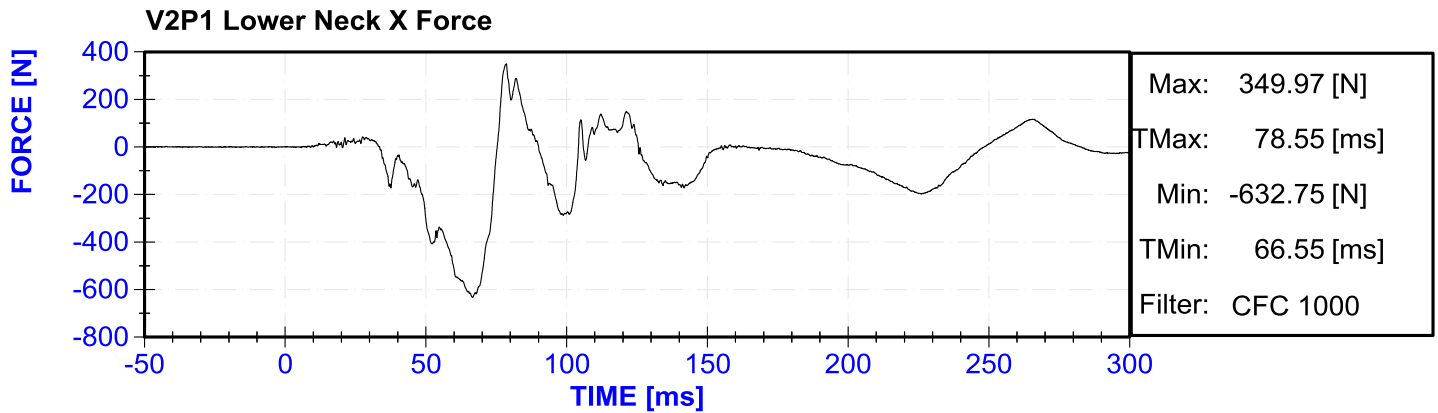
Plot 235	V2 Driver Floor Pan Y Acceleration	B-67
Plot 236	V2 Driver Floor Pan Z Acceleration	B-67
Plot 237	V2 Driver Floor Pan X Deflection	B-68
Plot 238	Driver Front Airbag Stage 1 Monitor	B-68
Plot 239	Driver Front Airbag Stage 2 Monitor	B-68
Plot 240	Driver Curtain Airbag Monitor	B-68
Plot 241	Driver Seat Torso Airbag Monitor	B-69
Plot 242	Driver Retractor Pretensioner Monitor	B-69
Plot 243	Driver Anchor Pretensioner Monitor	B-69
Plot 244	Passenger Front Airbag Stage 1 Monitor	B-69
Plot 245	Passenger Front Airbag Stage 2 Monitor	B-70
Plot 246	Passenger Curtain Airbag Monitor	B-70
Plot 247	Passenger Seat Pelvis Airbag Monitor	B-70
Plot 248	Passenger Retractor Pretensioner Monitor	B-70
Plot 249	Passenger Anchor Pretensioner Monitor	B-71
Plot 250	V1 OMDB CG X Acceleration	B-71
Plot 251	V1 OMDB CG Y Acceleration	B-71
Plot 252	V1 OMDB CG Z Acceleration	B-71
Plot 253	V1 OMDB CG Angular Rate X	B-72
Plot 254	V1 OMDB CG Angular Rate Y	B-72
Plot 255	V1 OMDB CG Angular Rate Z	B-72
Plot 256	V1 OMDB Rear C/L X Acceleration	B-72
Plot 257	V1 OMDB Rear C/L Y Acceleration	B-73
Plot 258	V1 OMDB Rear C/L Z Acceleration	B-73
Plot 259	V2P1 Fx on head acting through the O.C. joint only	B-73
Plot 260	V2P1 Fz on head acting through the O.C. joint only	B-73
Plot 261	V2P1 My on head acting through the O.C. joint only	B-74
Plot 262	V2P1 Fx on head acting through the total neck section	B-74
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
Plot 274	V2P1 Chest Right Upper Dz	B-77
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

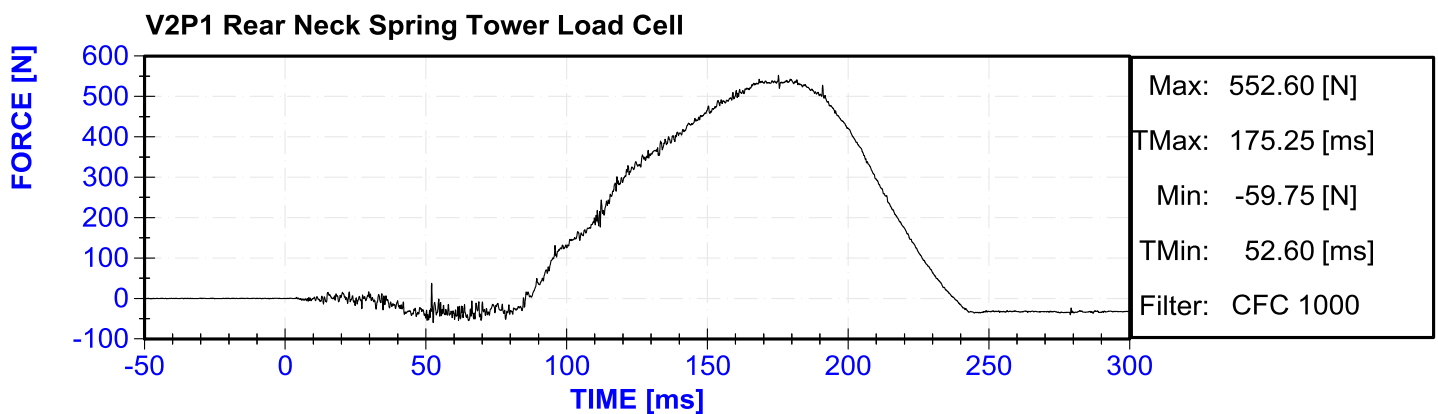
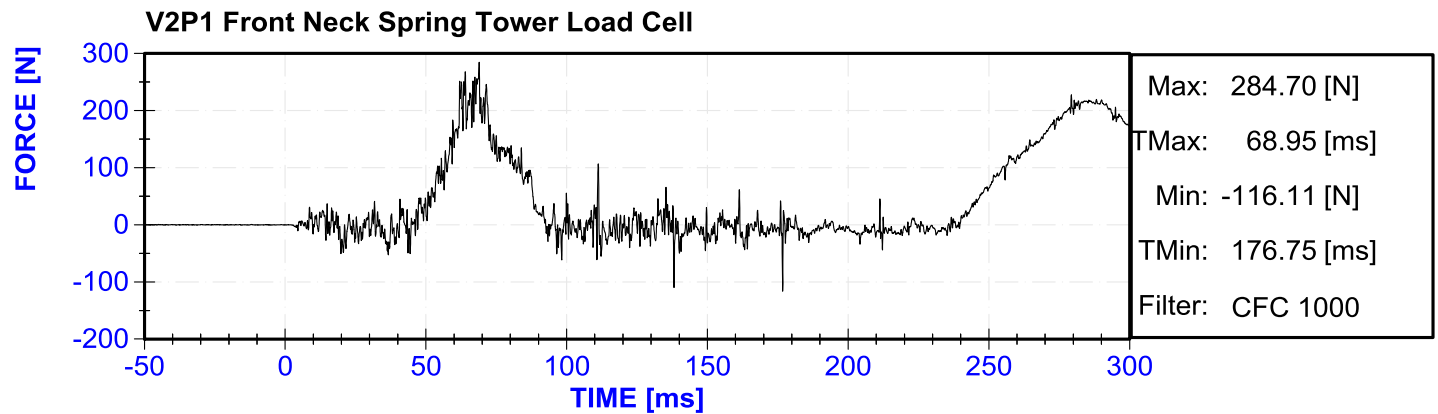
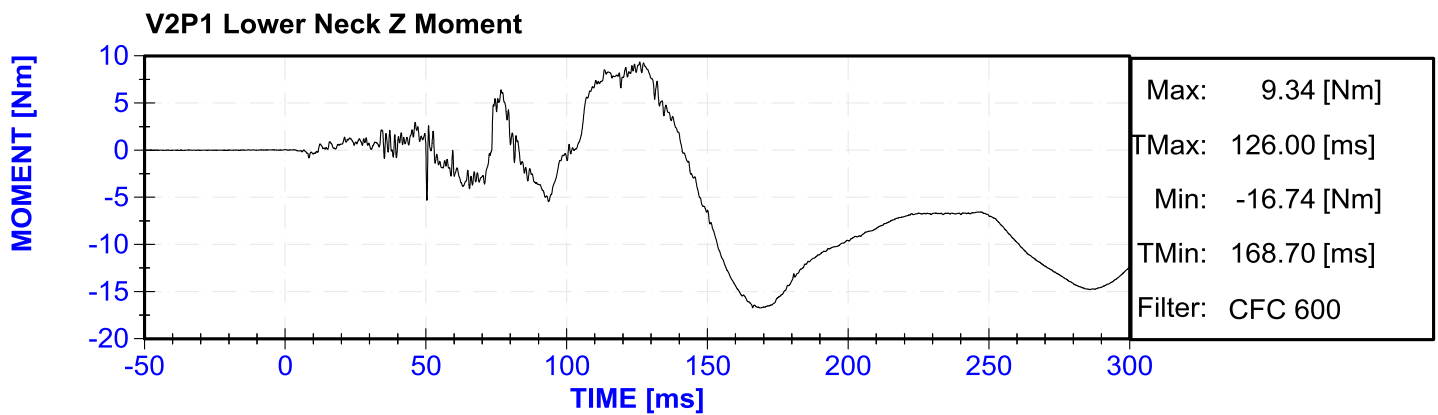
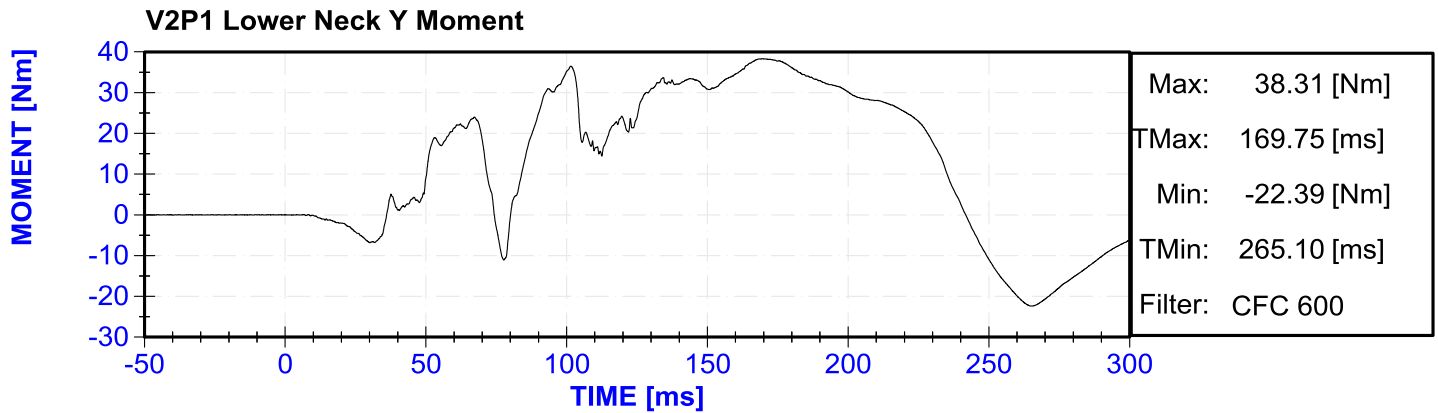
Plot 294	V2P2 My on head acting through the O.C. joint only	B-82
Plot 295	V2P2 Fx on head acting through the total neck section	B-82
Plot 296	V2P2 Fy on head acting through the total neck section	B-82
Plot 297	V2P2 Fz on head acting through the total neck section	B-83
Plot 298	V2P2 Mx on head acting 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

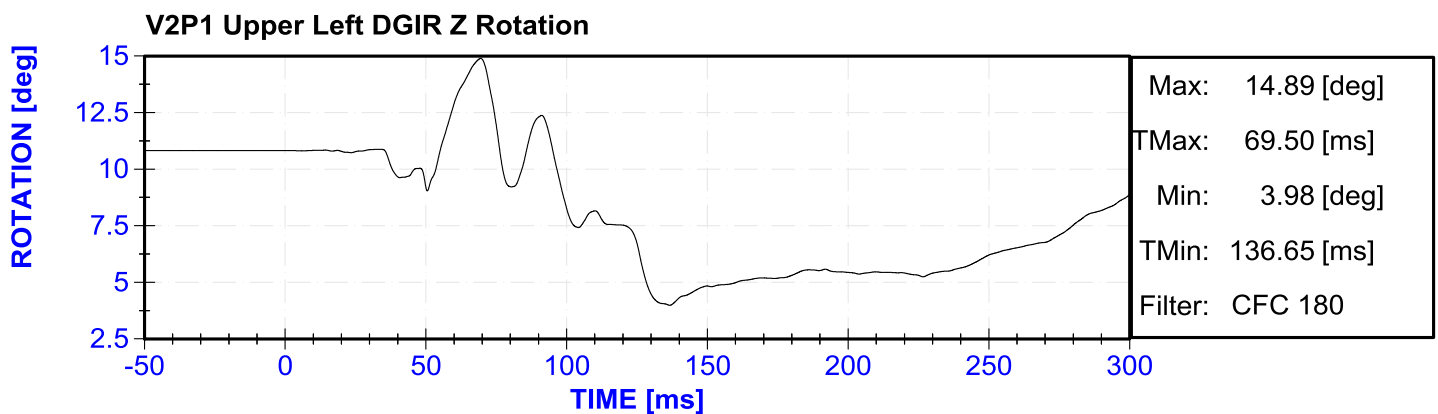
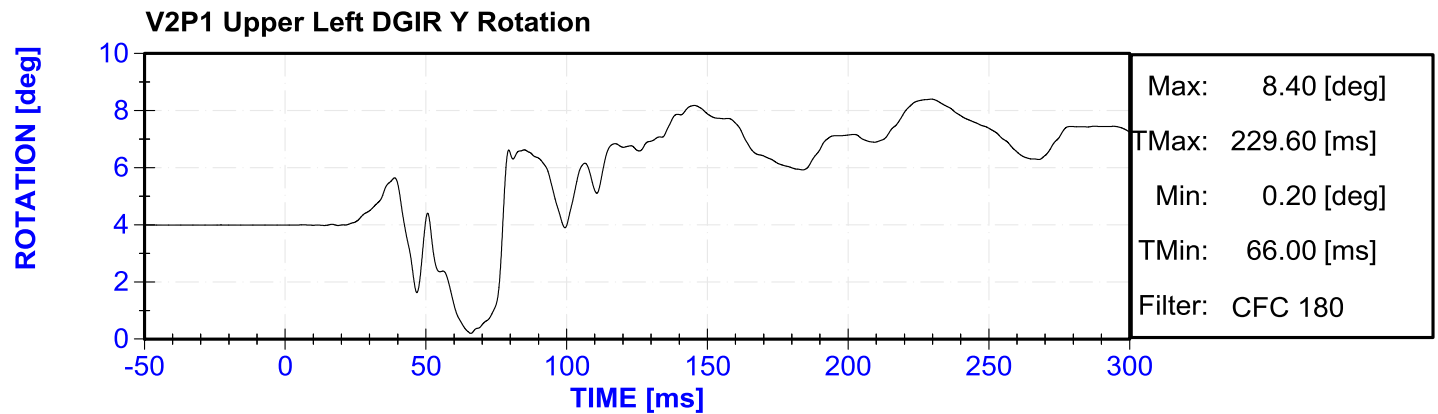
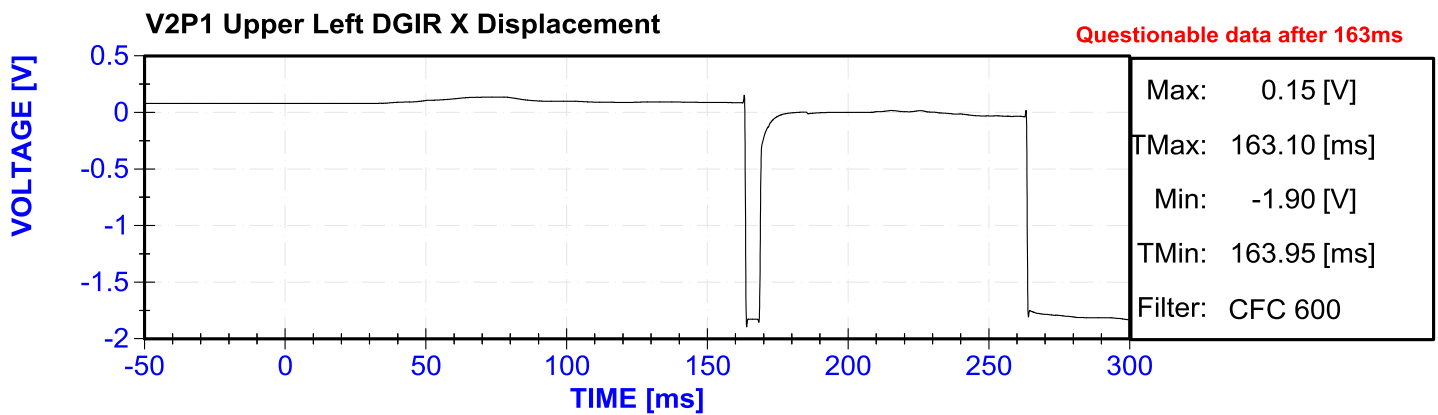
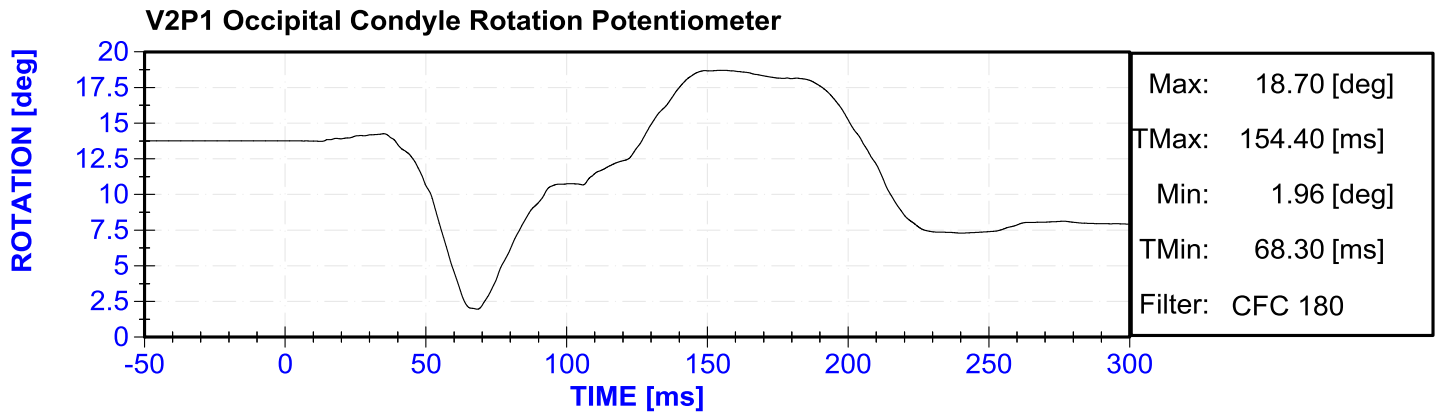


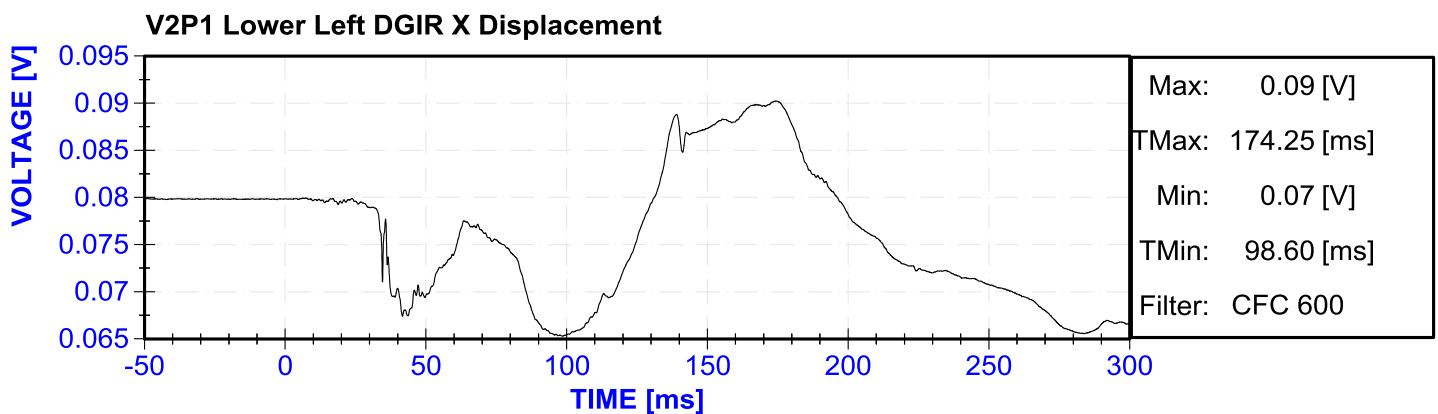
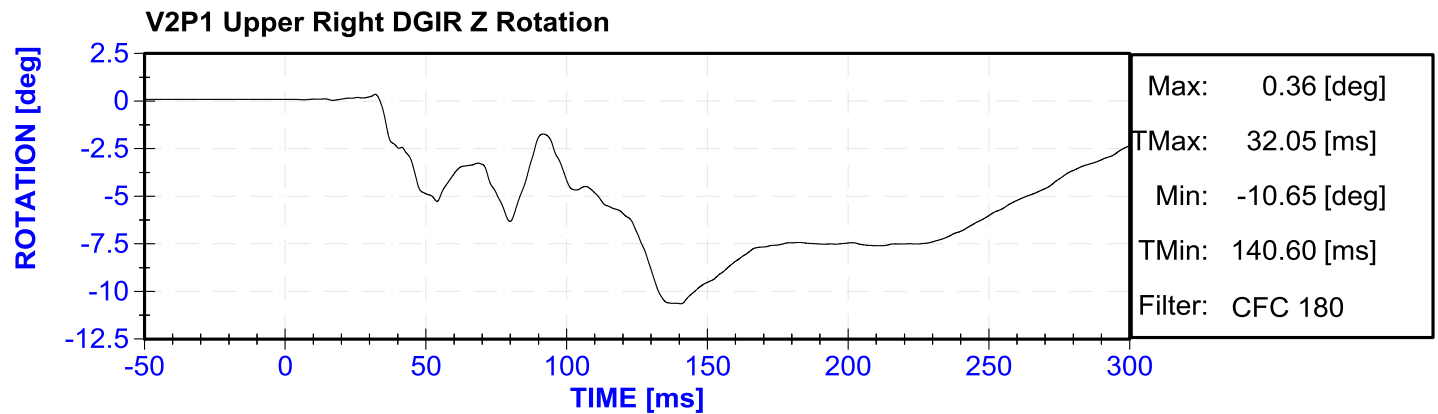
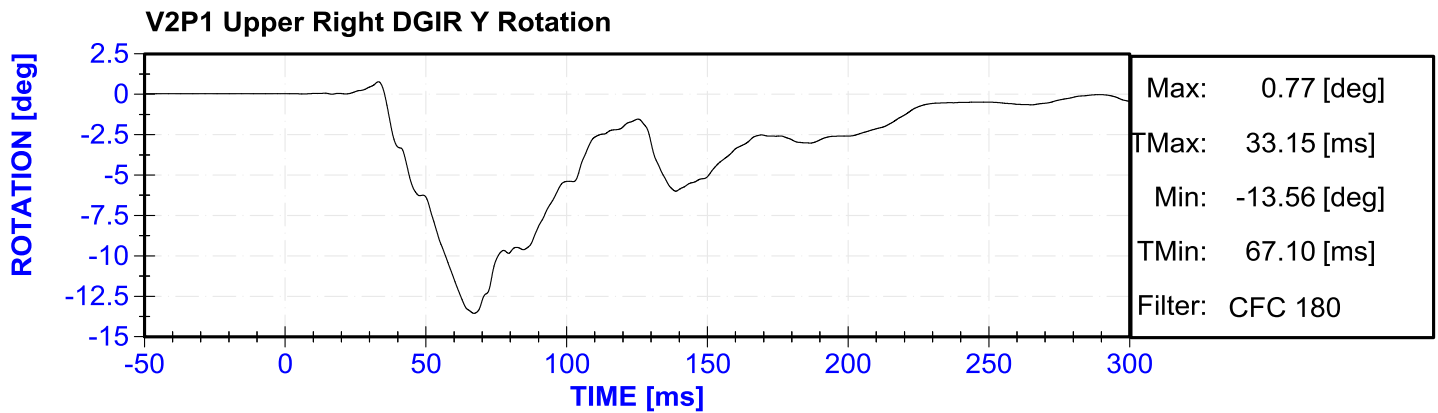
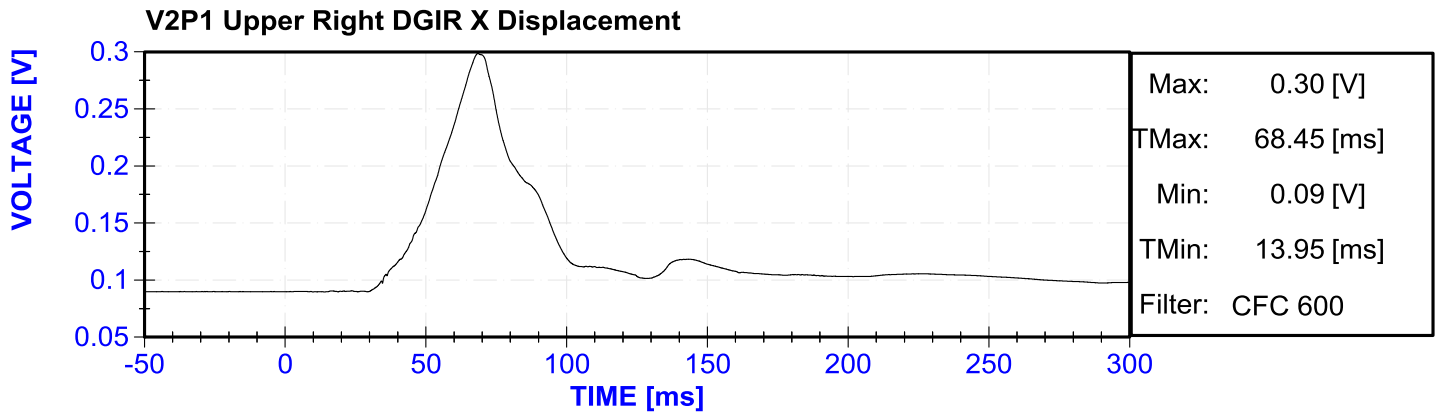


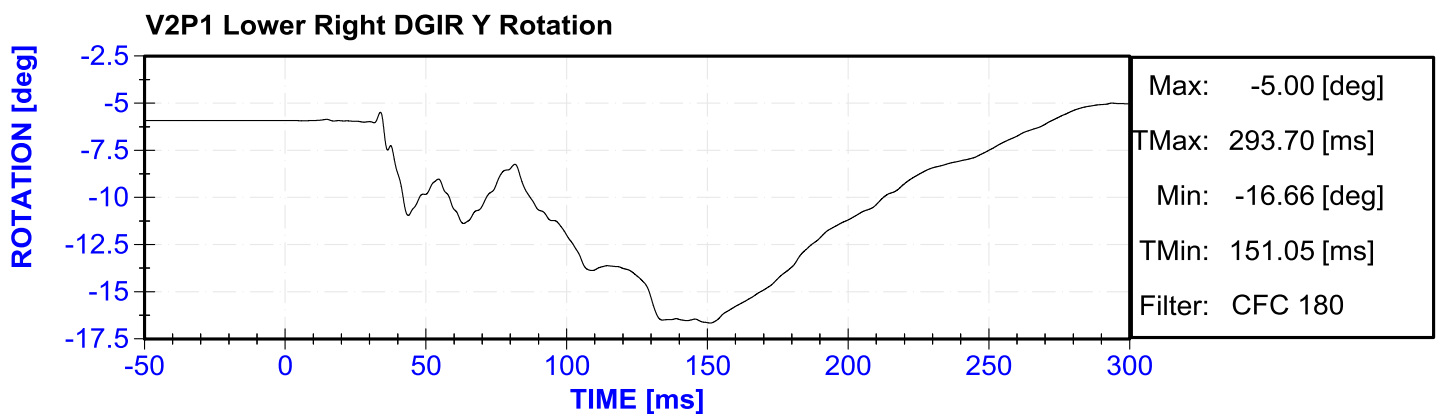
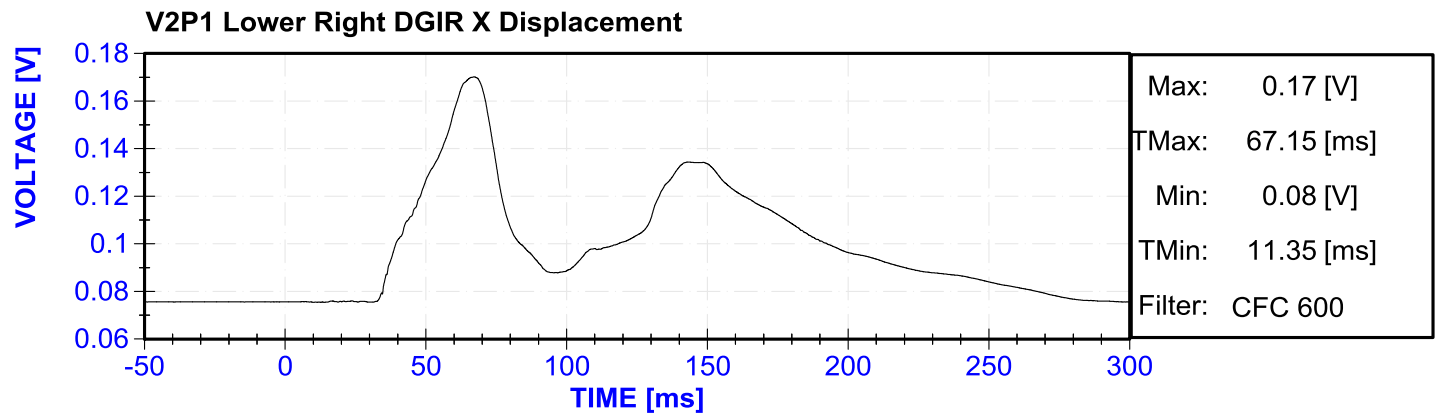
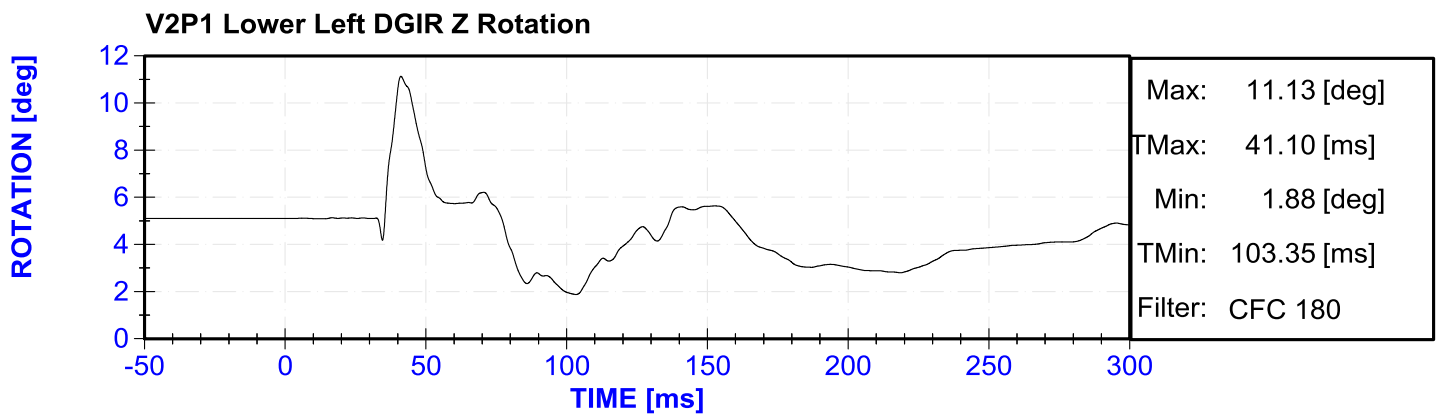
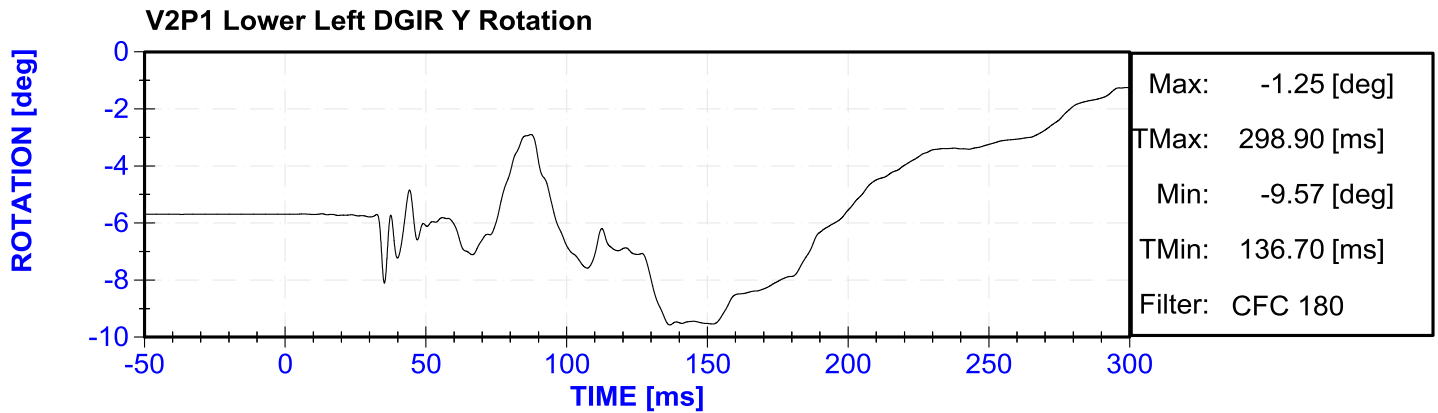


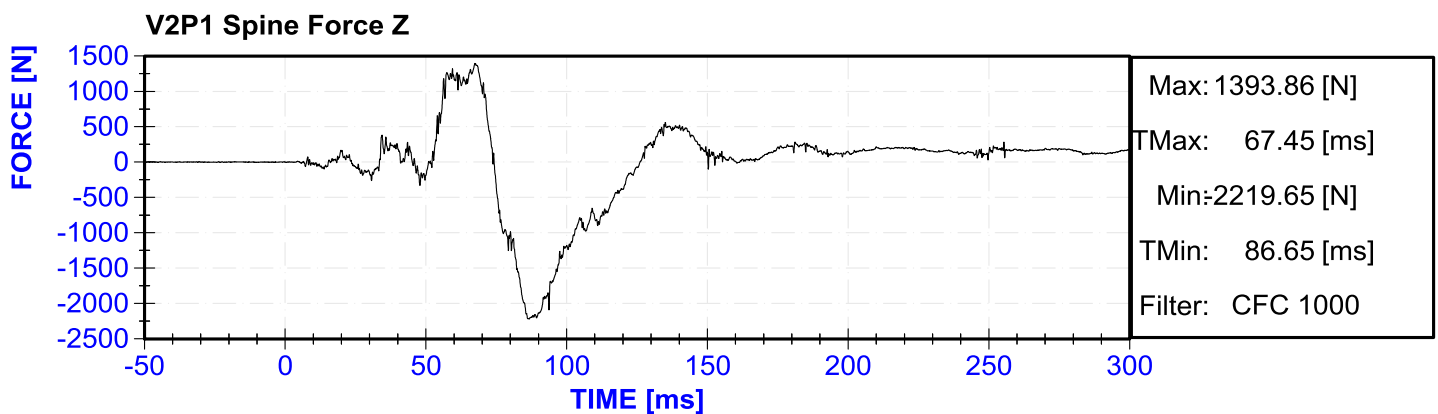
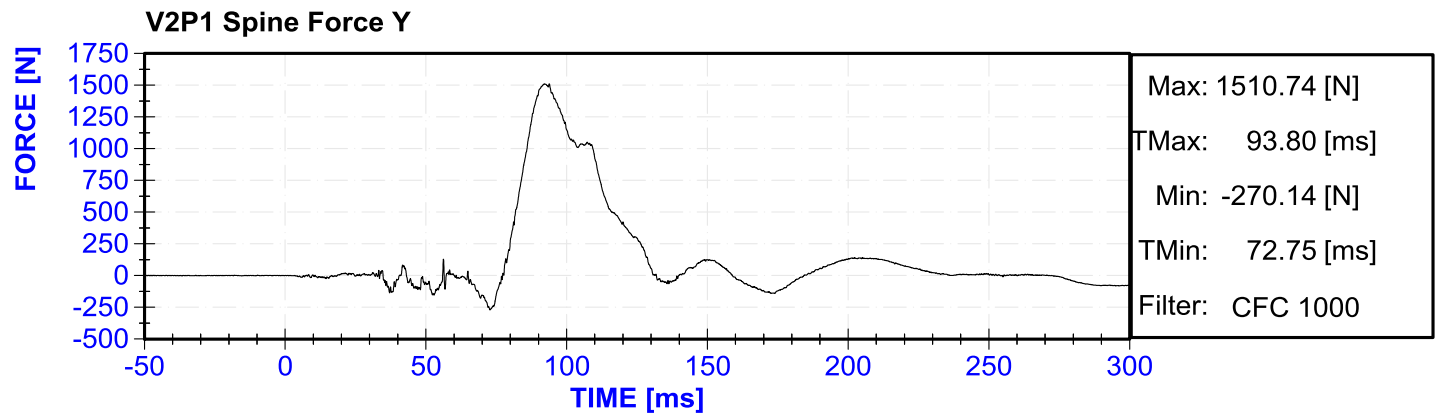
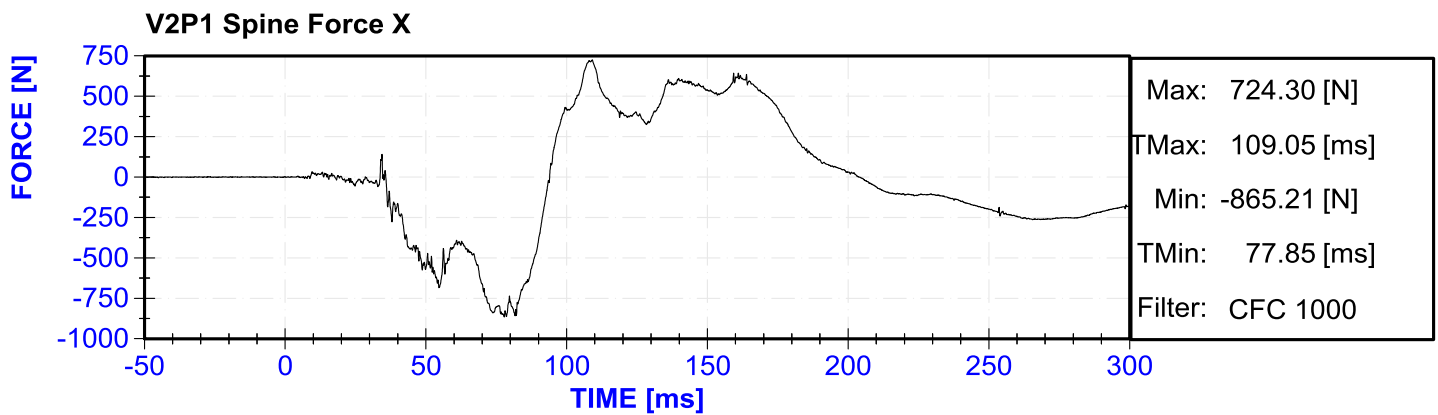
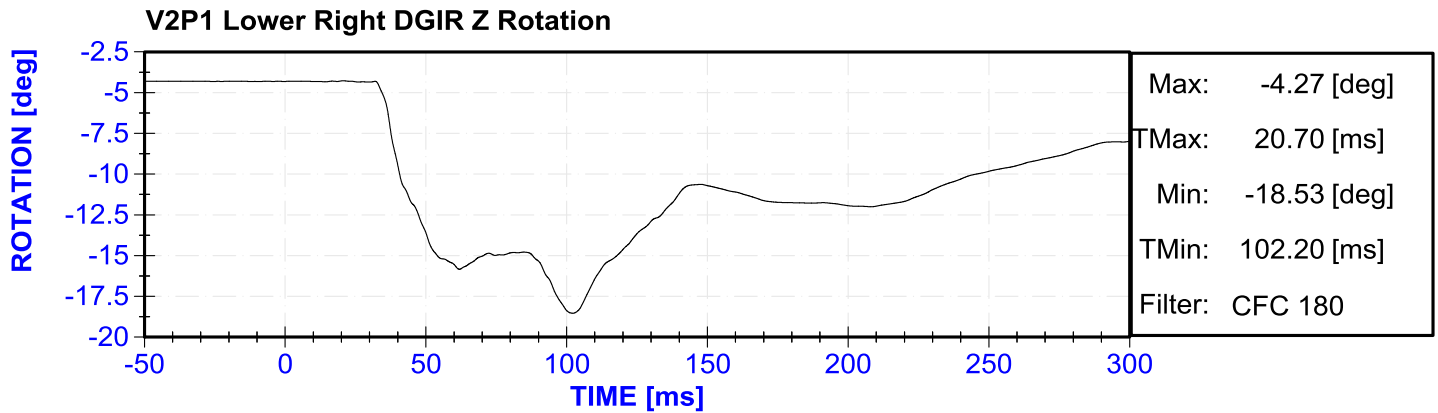


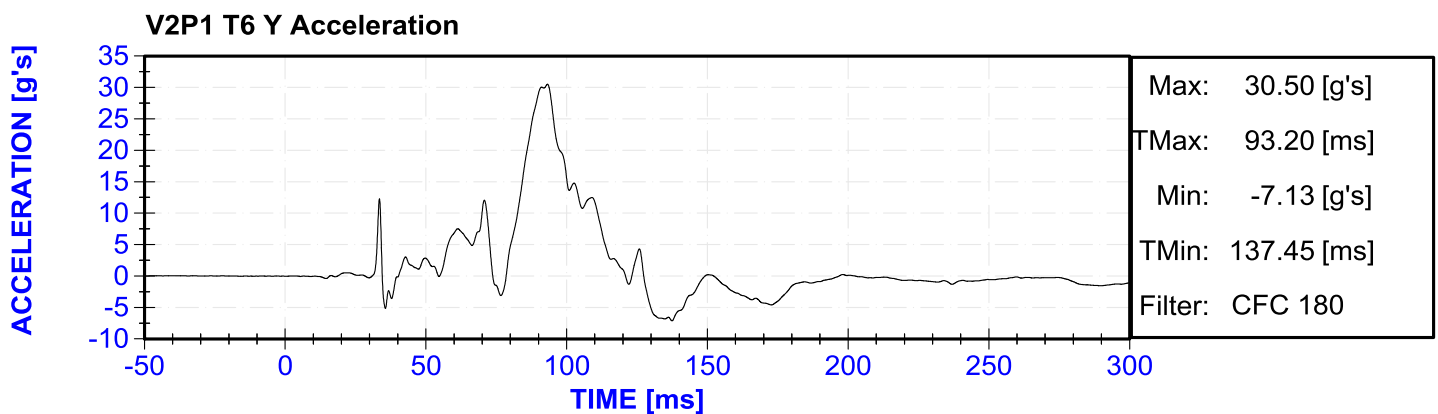
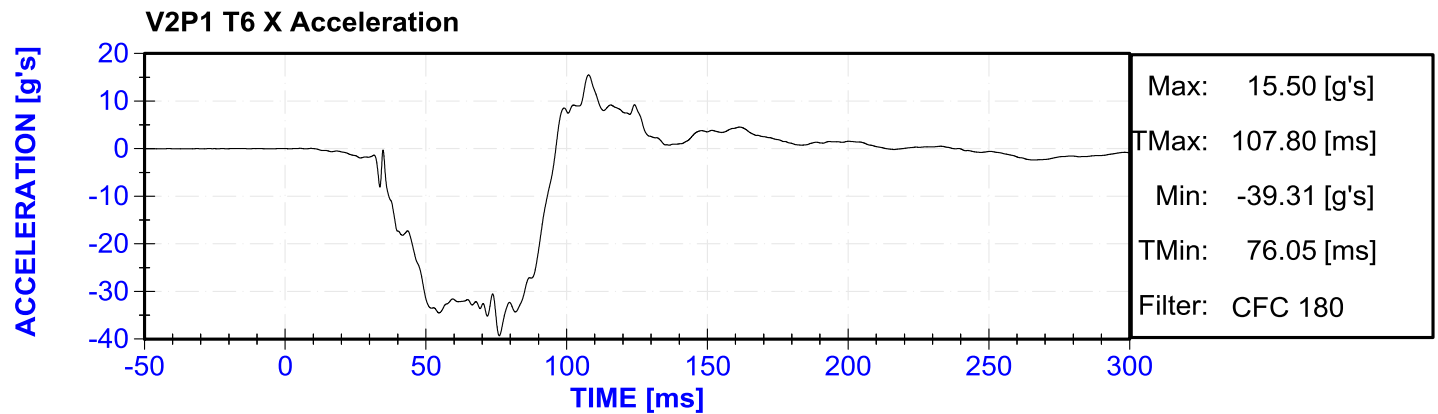
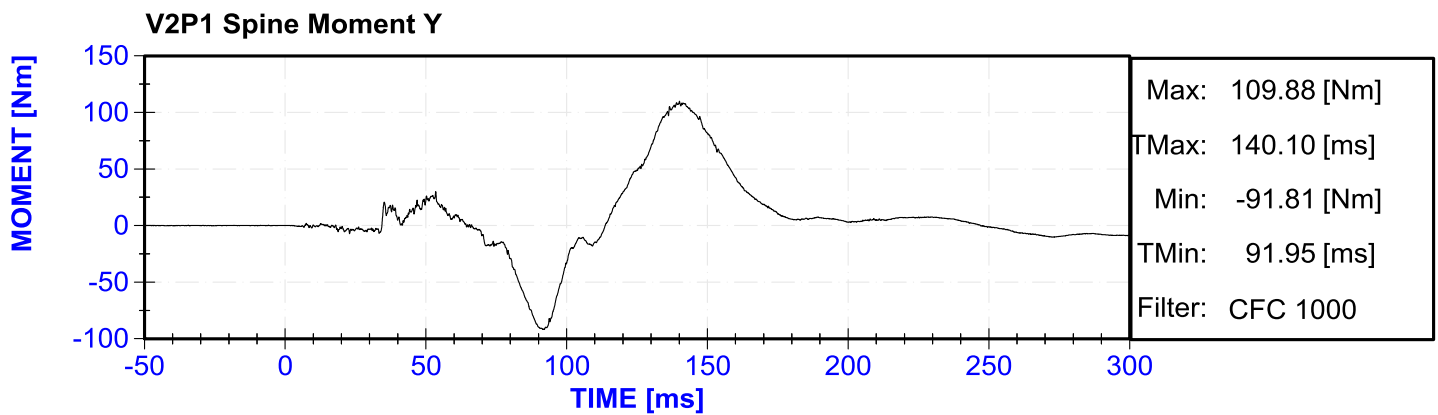
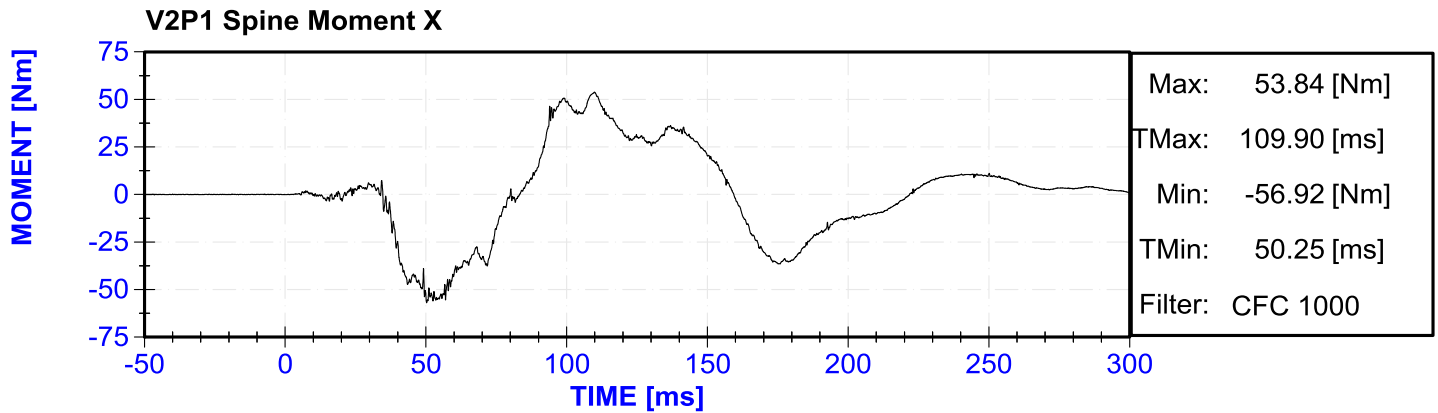


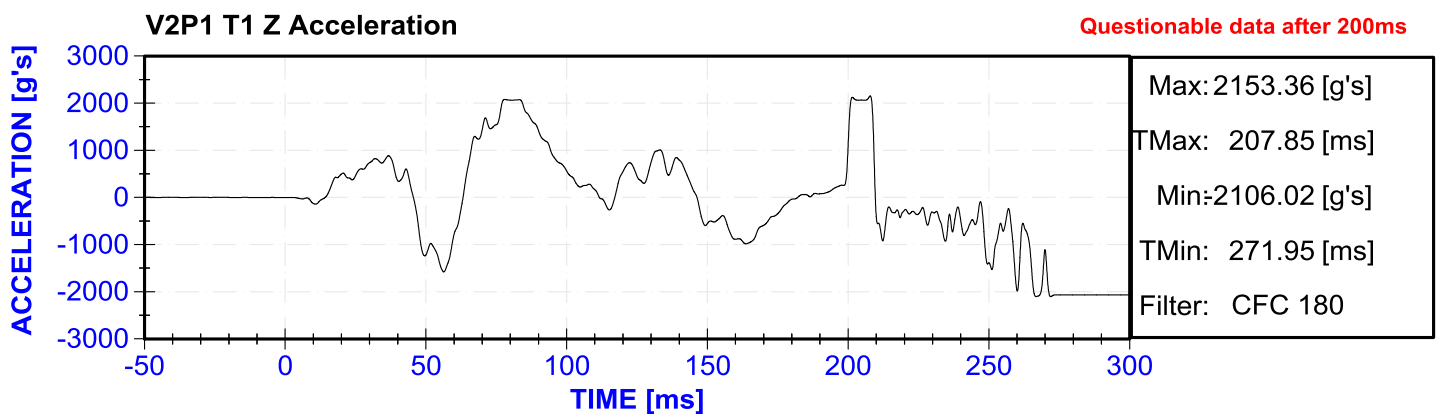
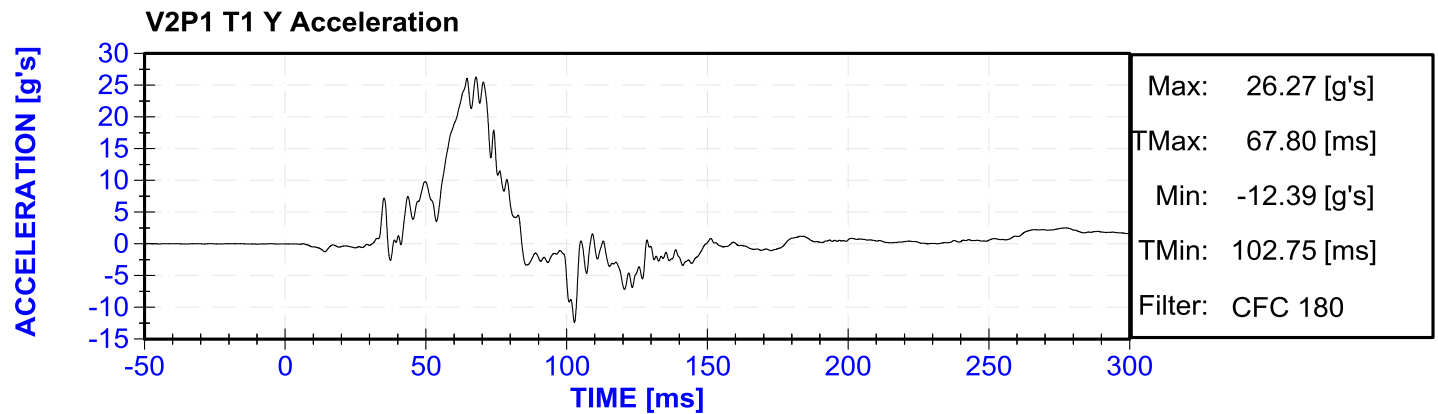
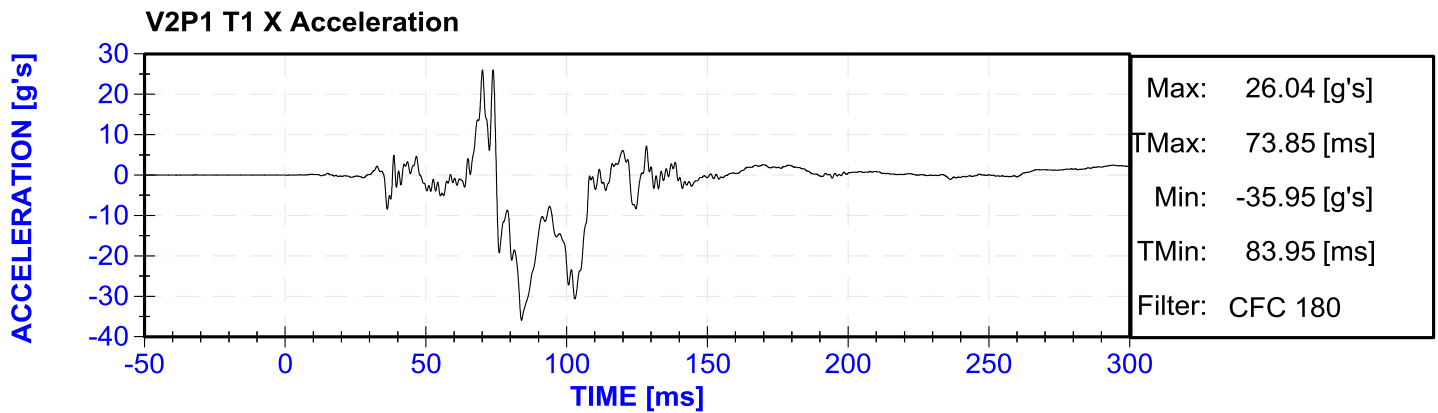
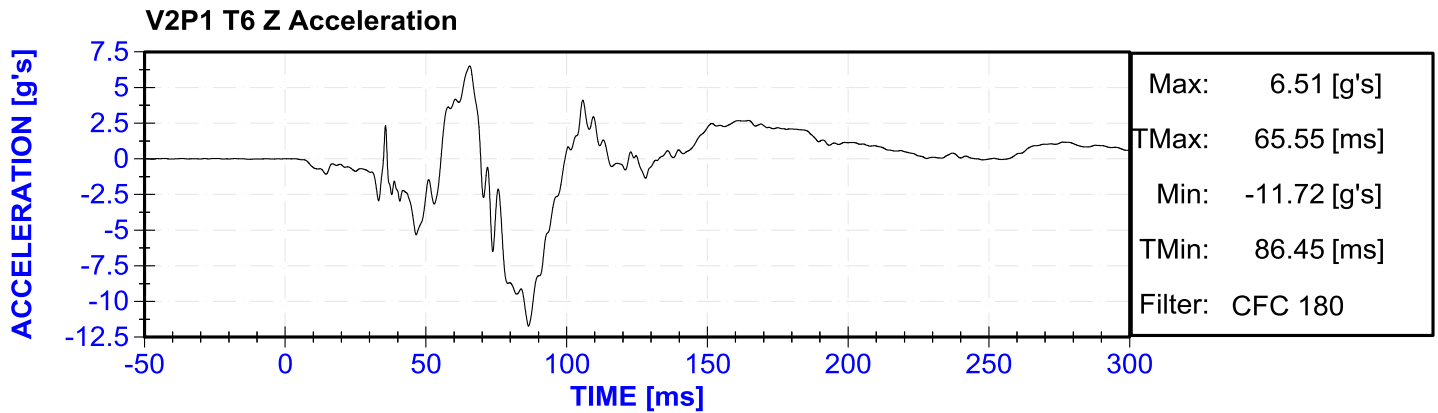






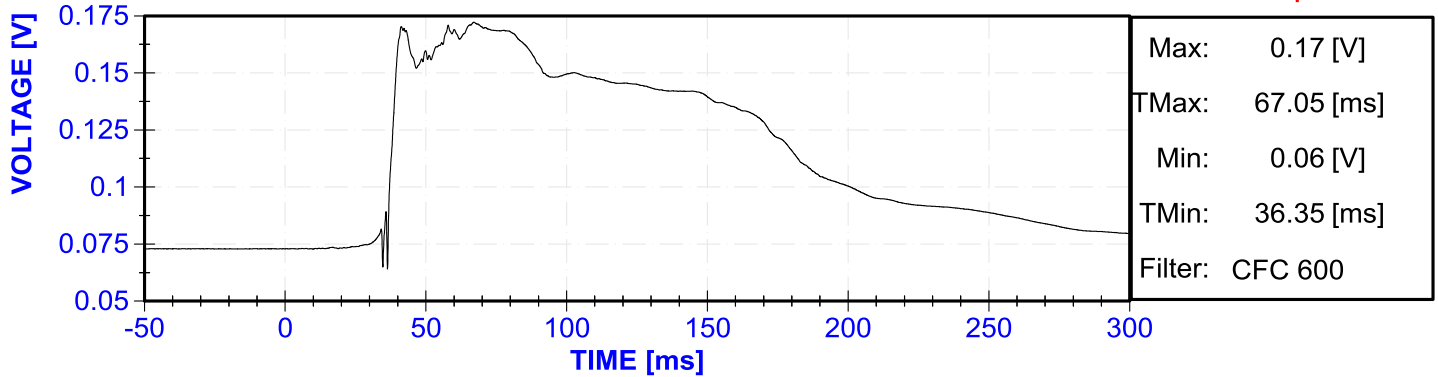






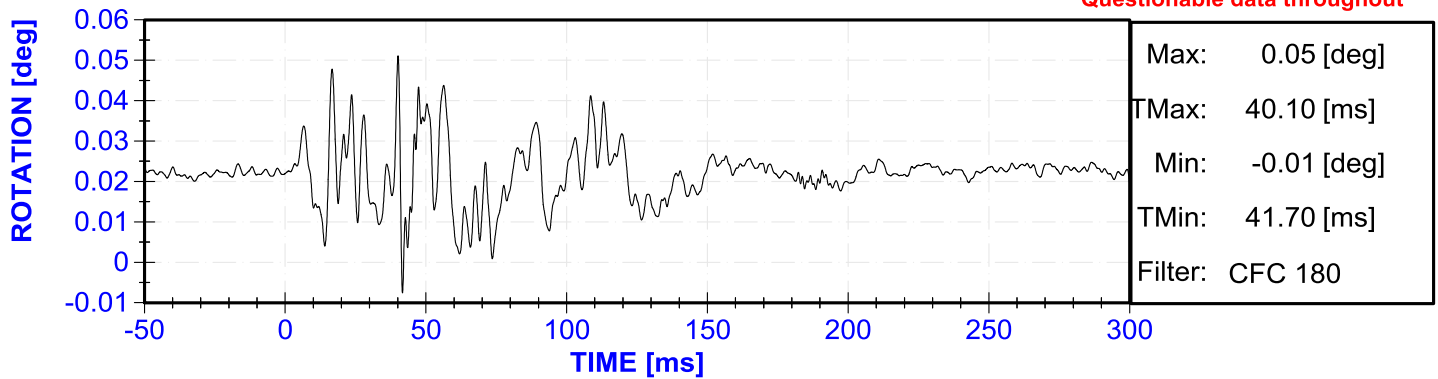
V2P1 Abdomen Left DGIR X Displacement

Questionable spike 35ms



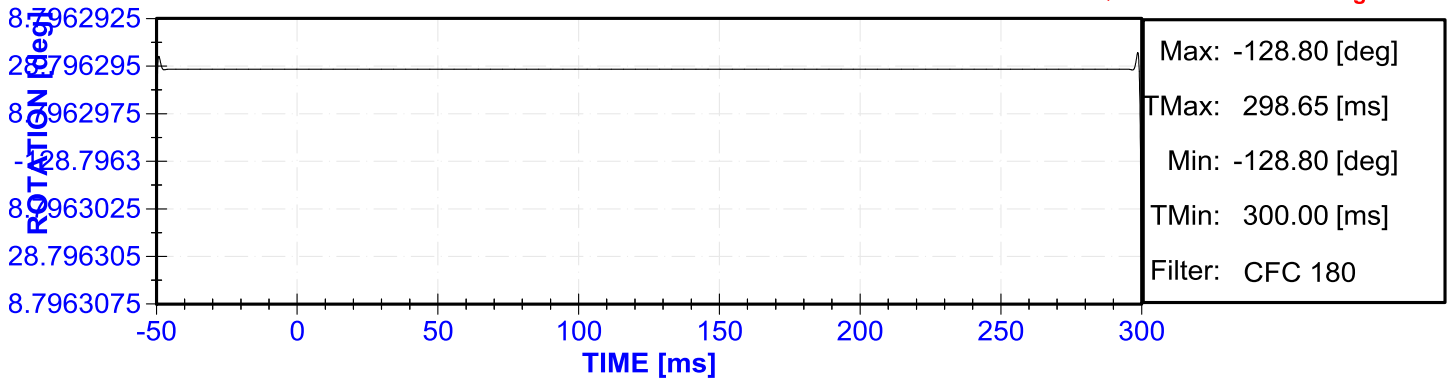
V2P1 Abdomen Left DGIR Y Rotation

Questionable data throughout

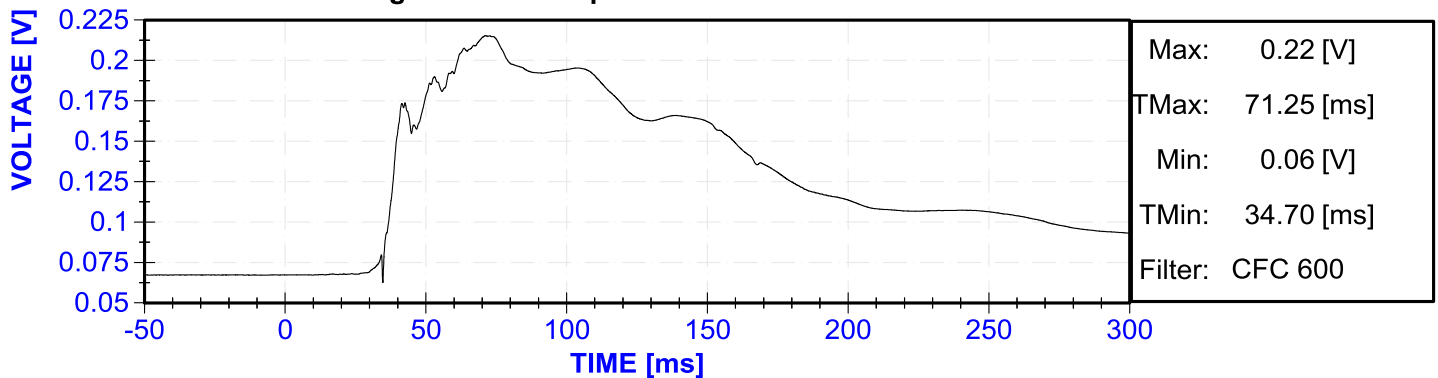


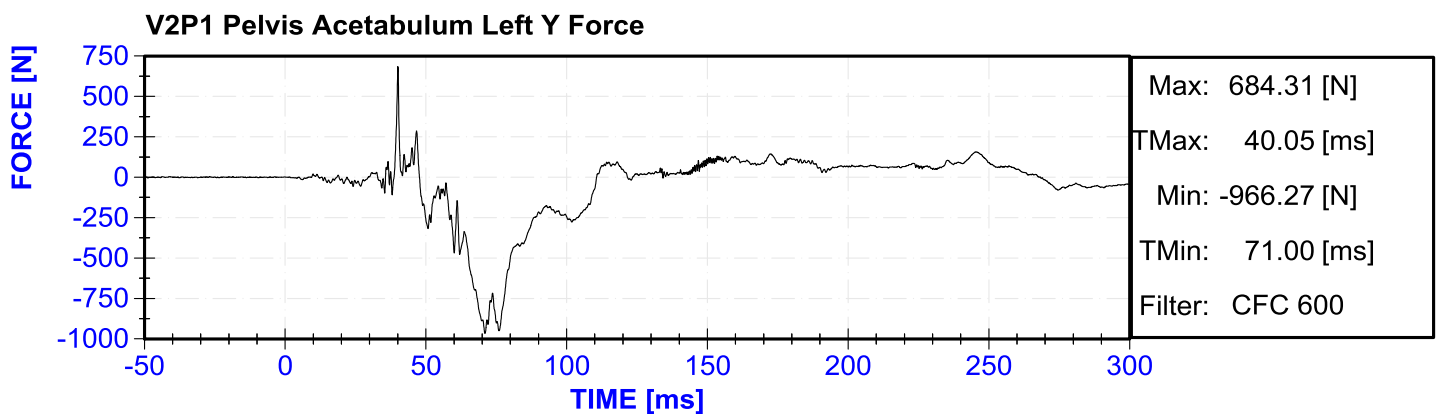
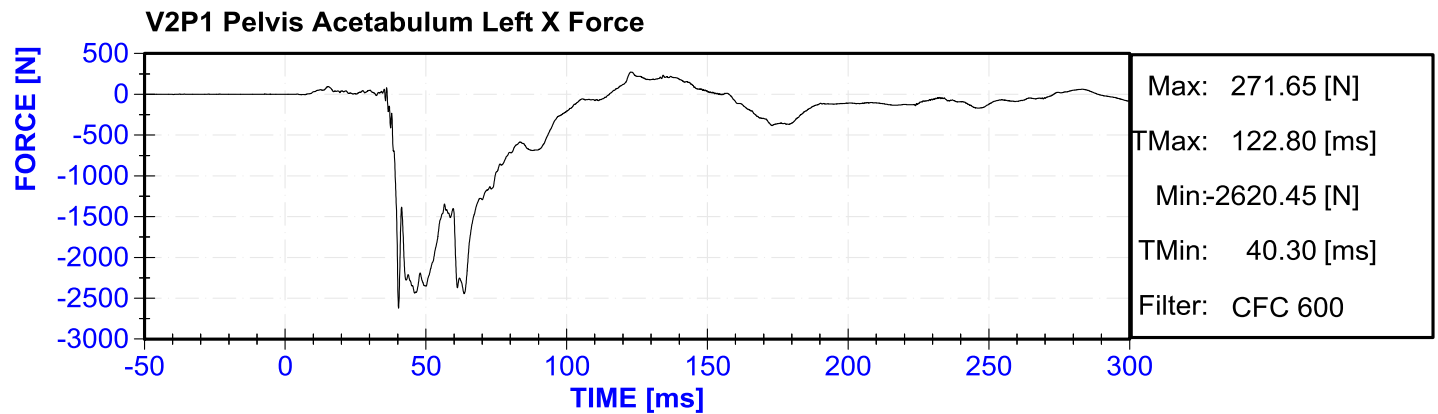
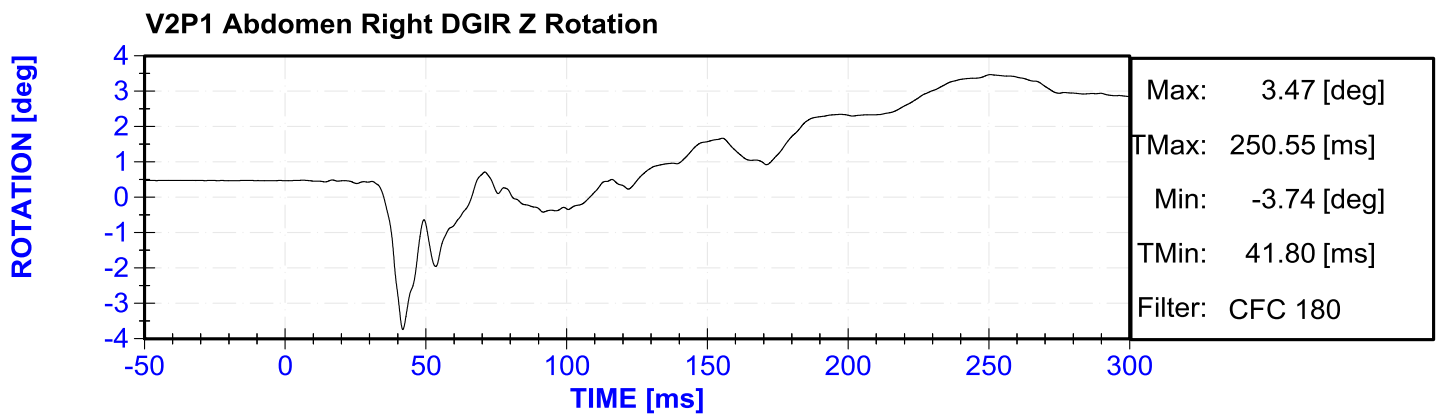
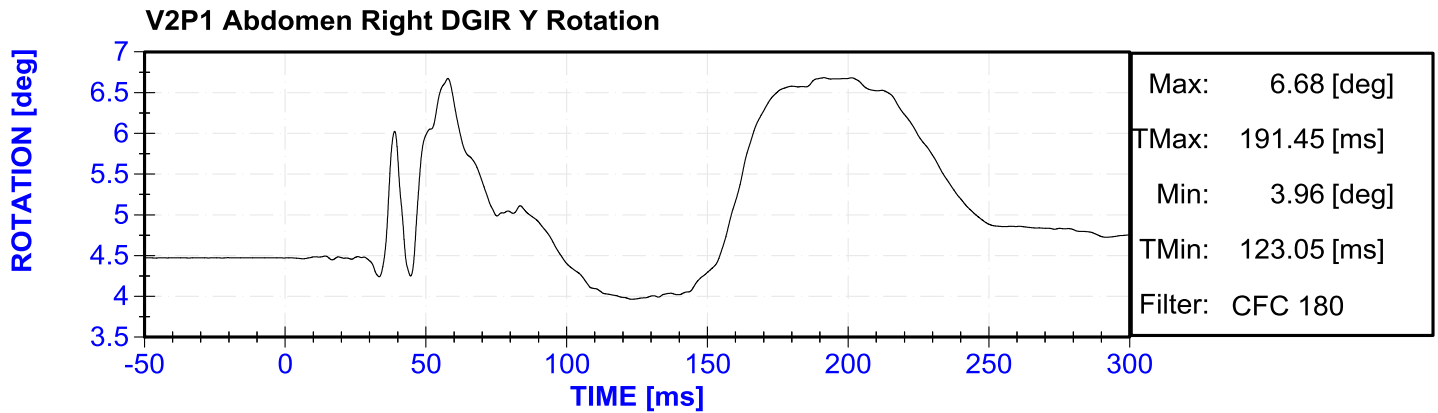
V2P1 Abdomen Left DGIR Z Rotation

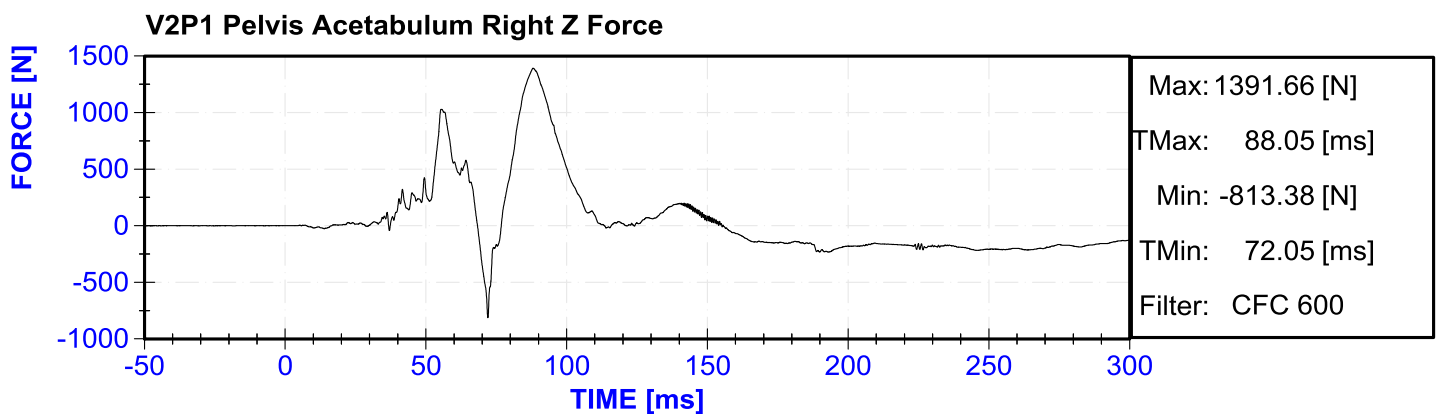
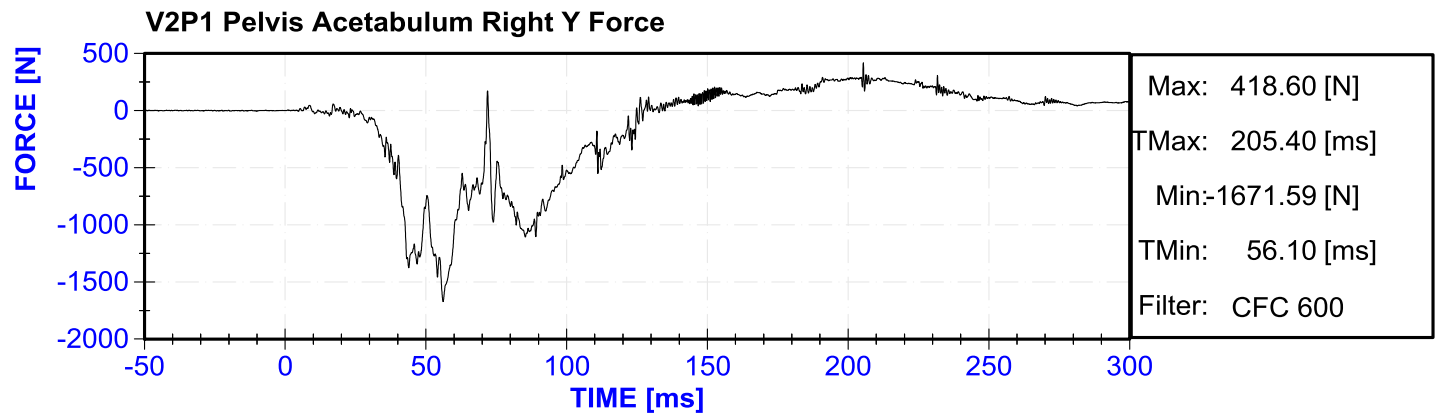
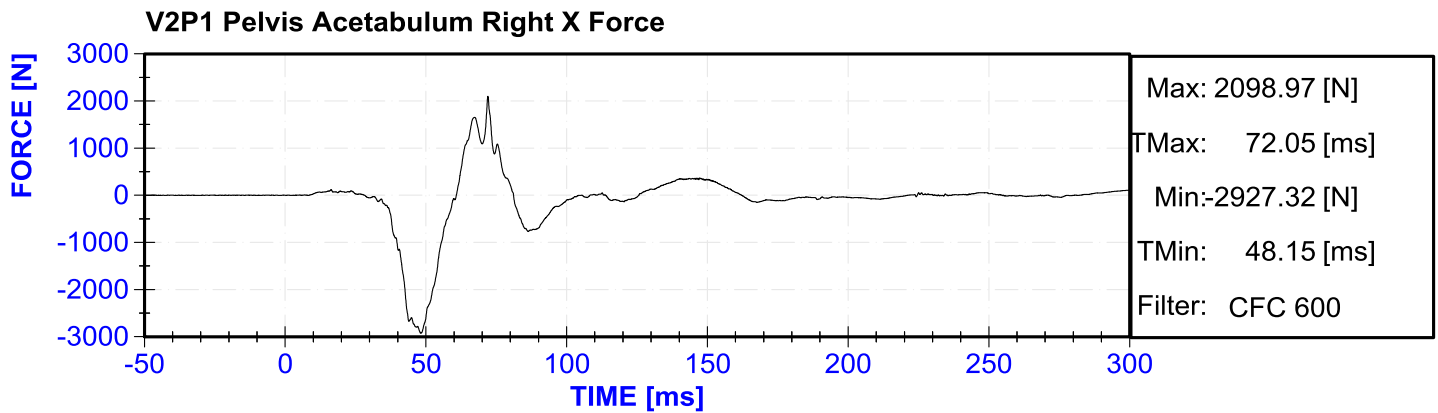
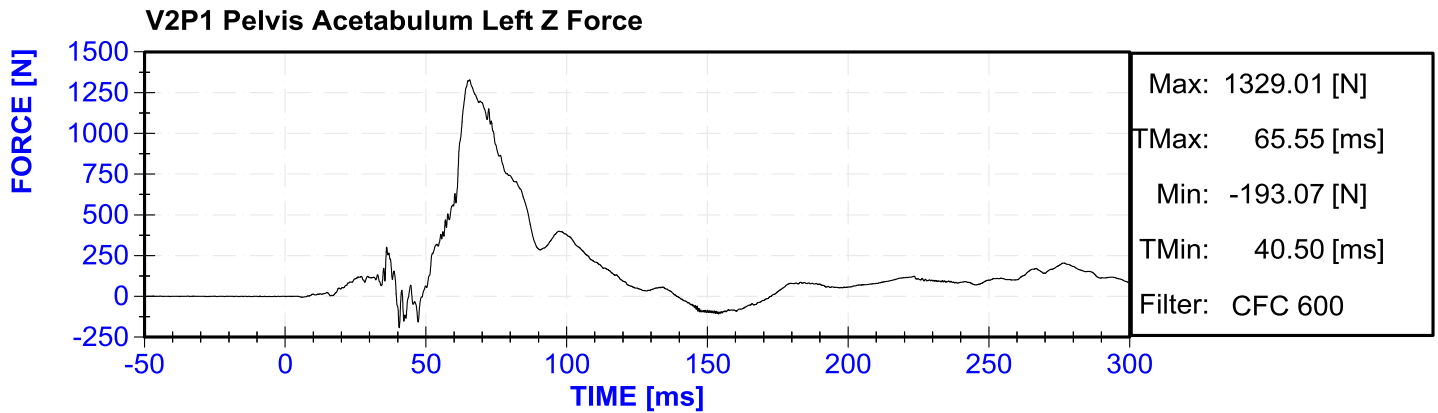
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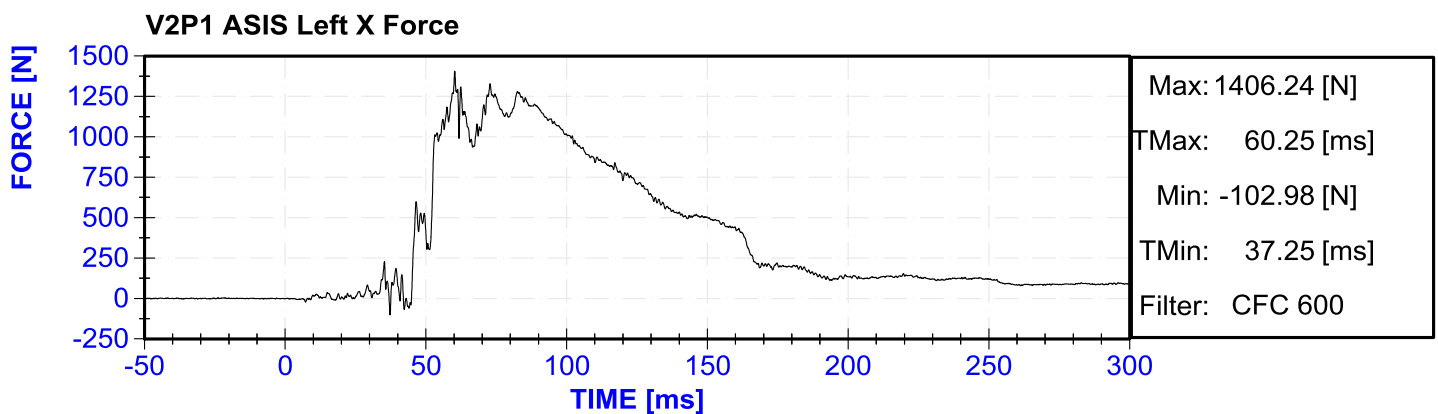
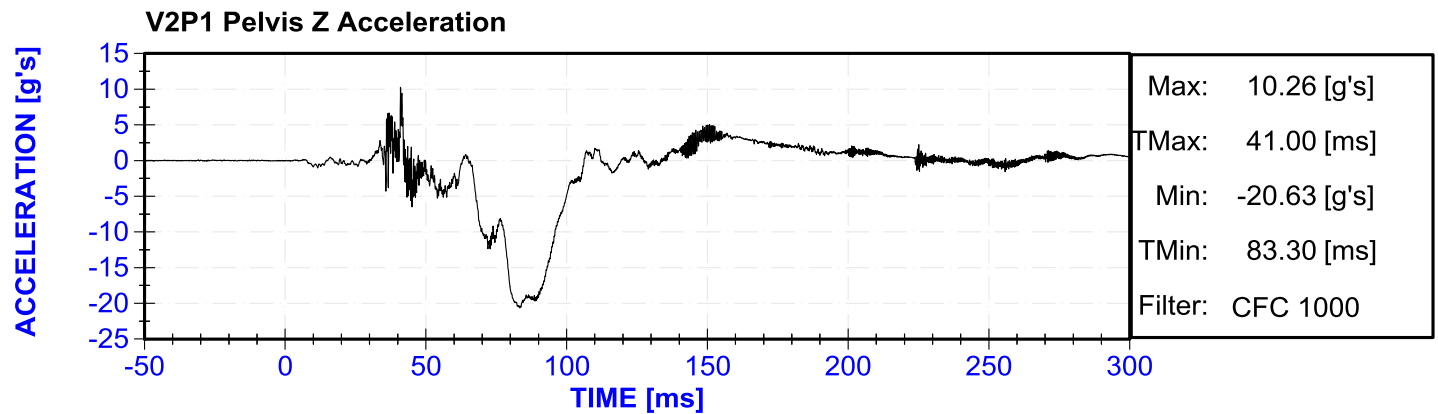
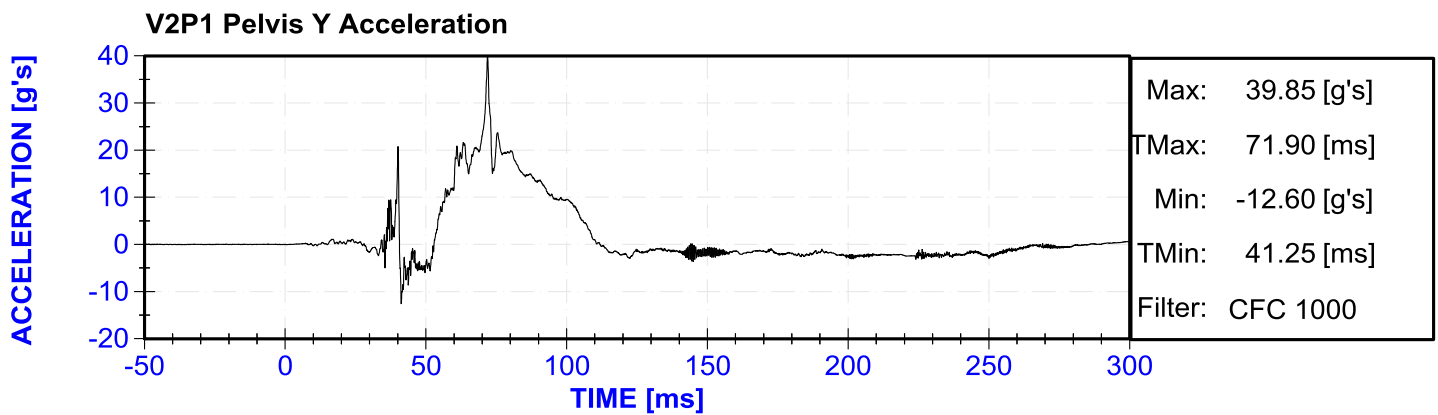
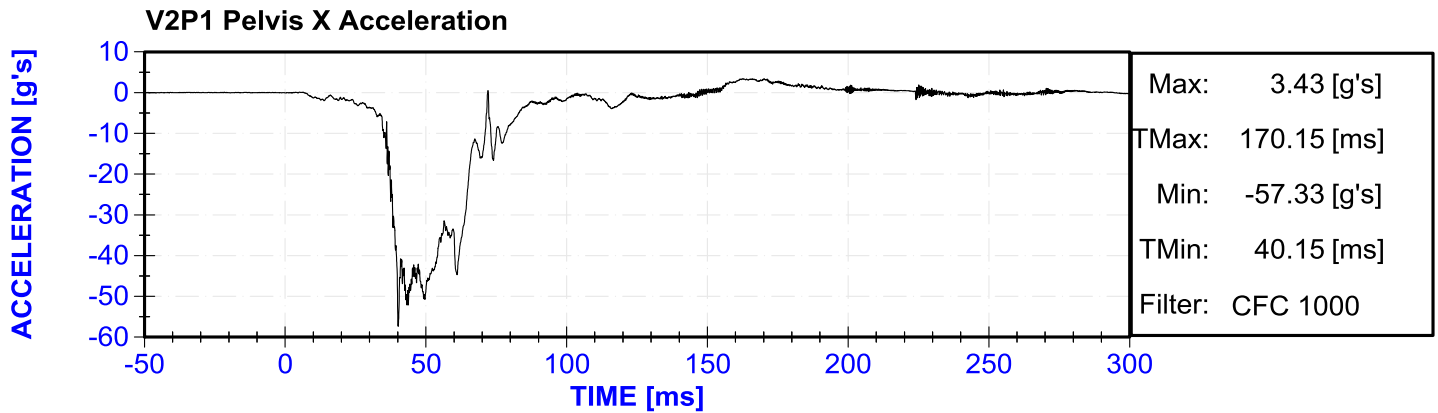


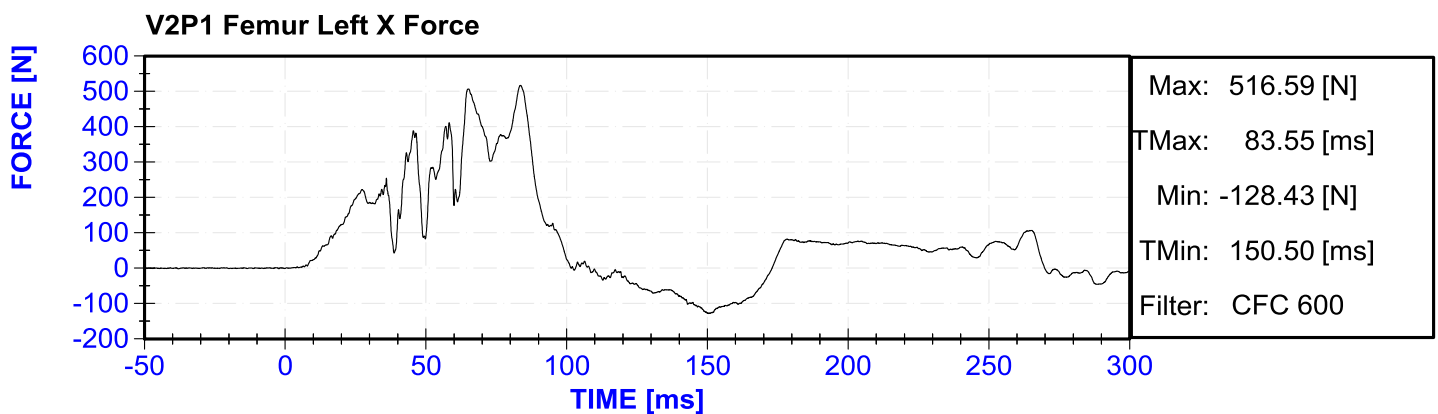
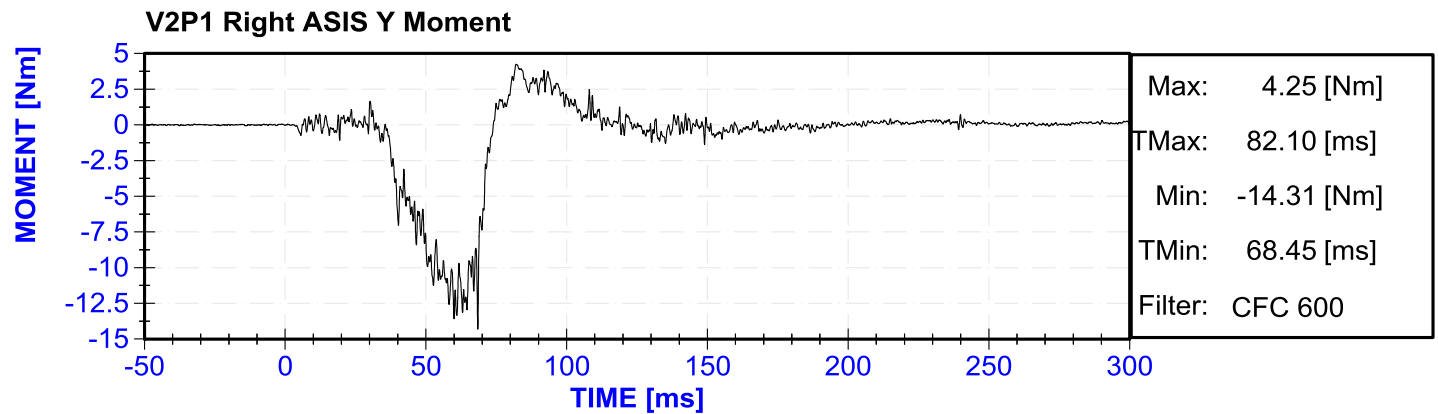
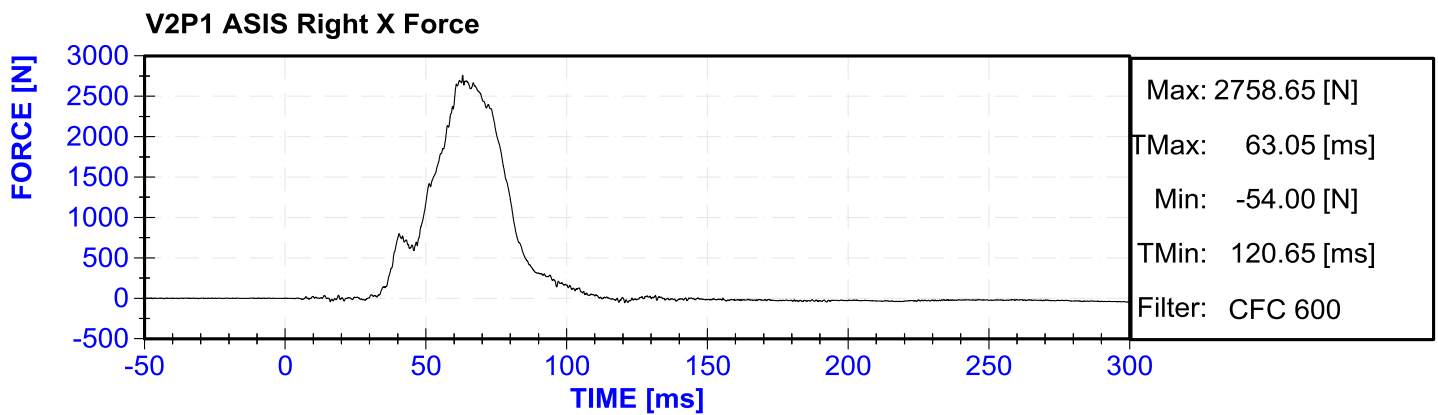
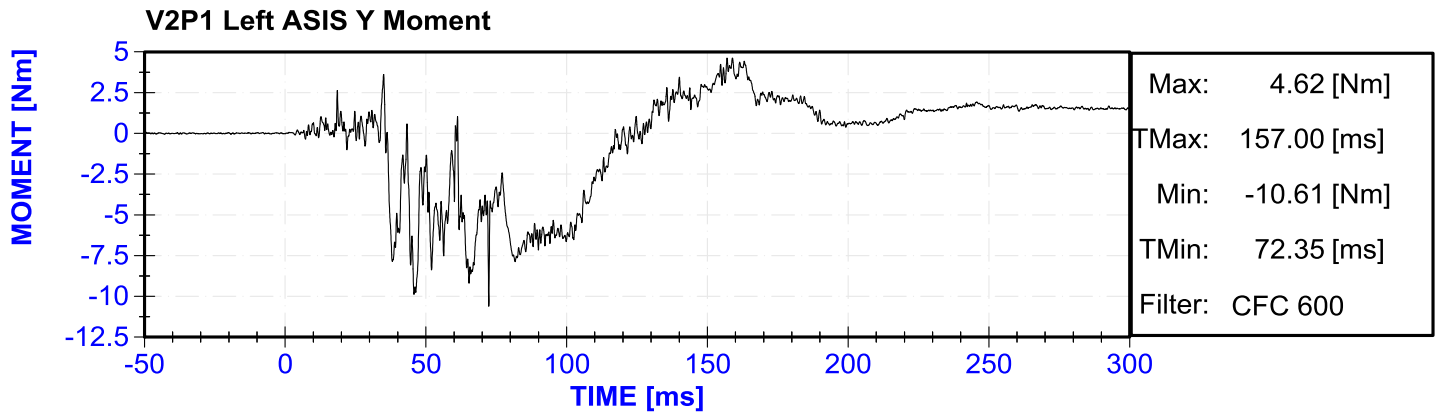
V2P1 Abdomen Right DGIR X Displacement

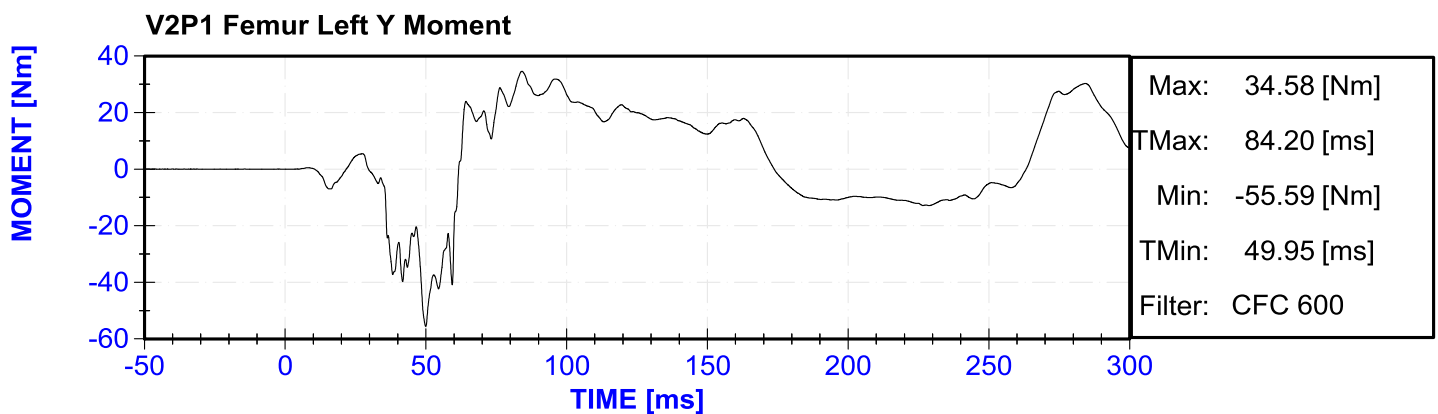
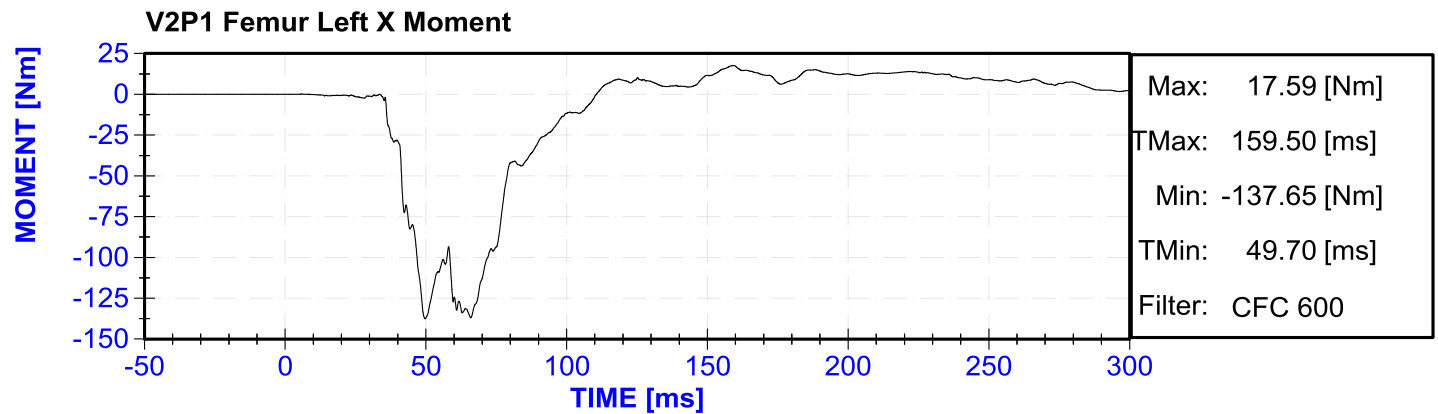
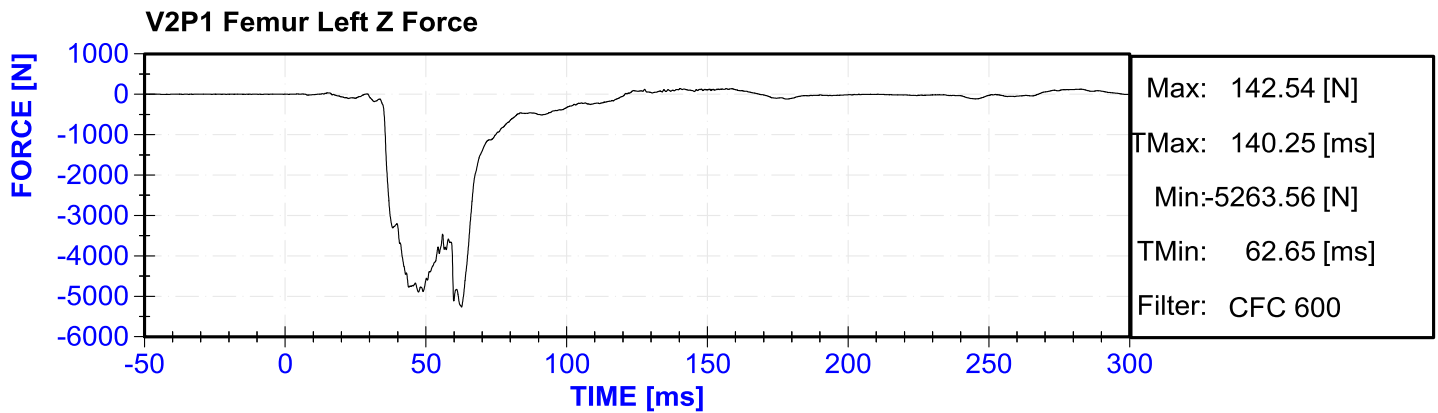
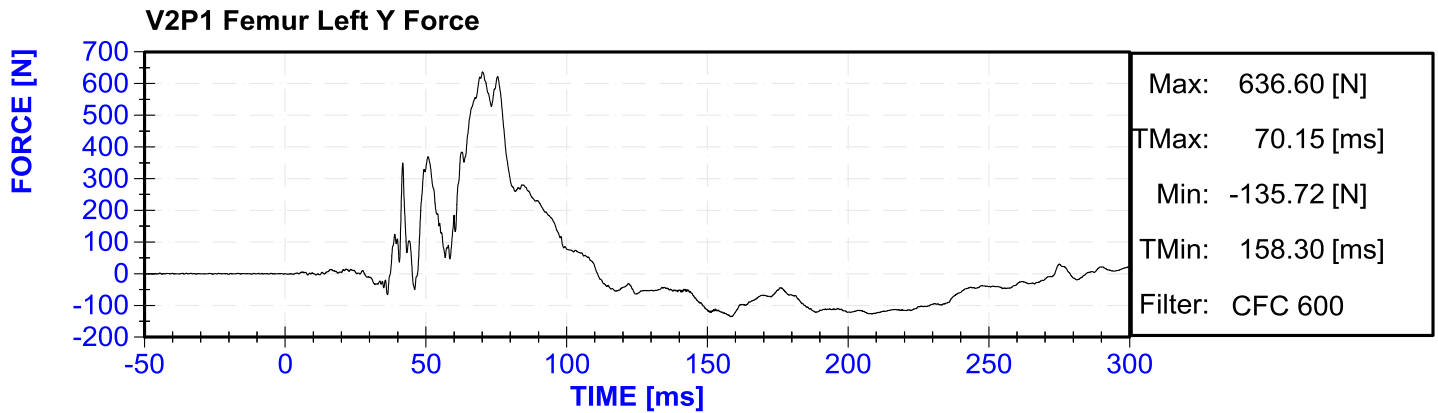


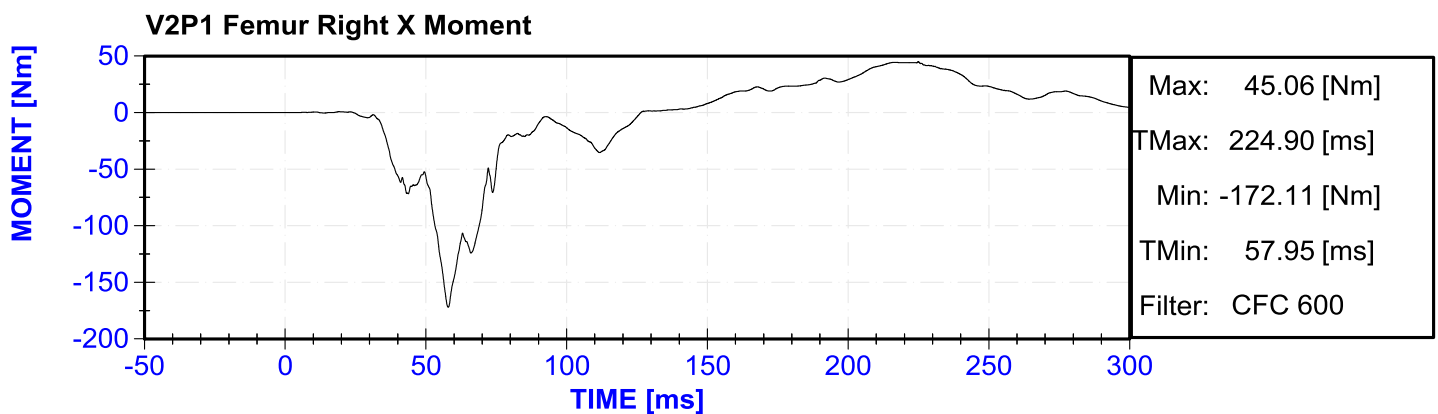
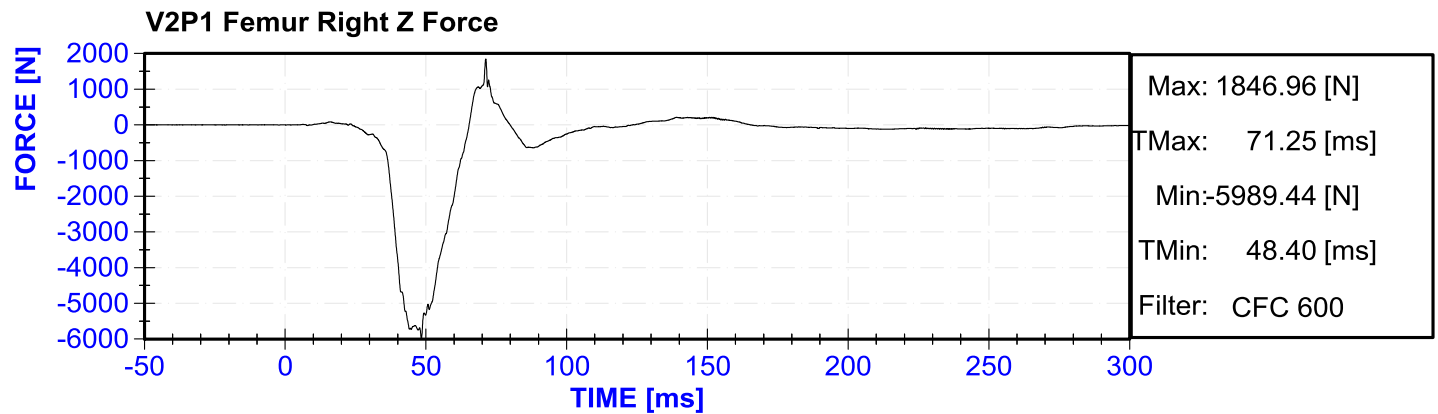
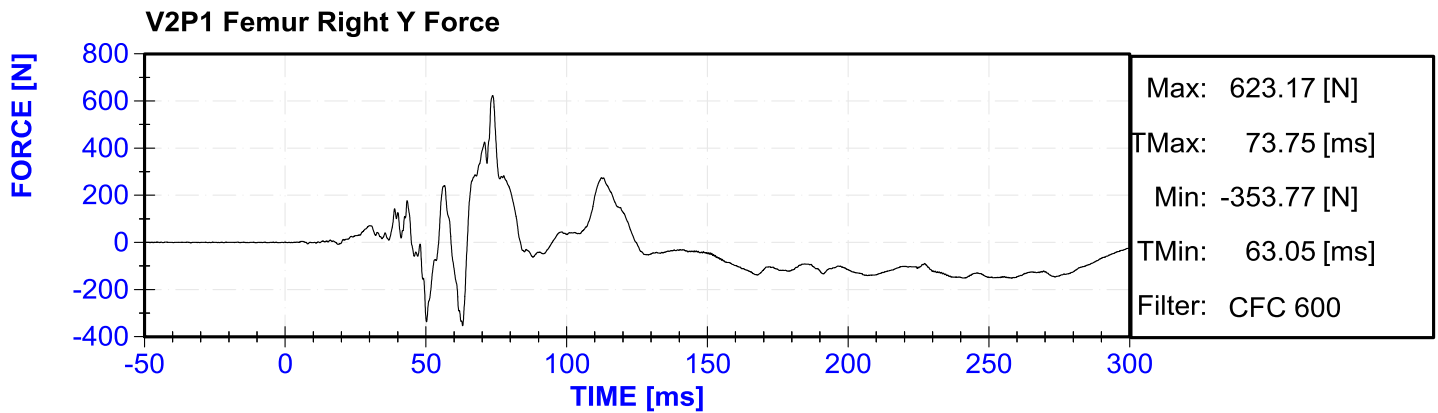
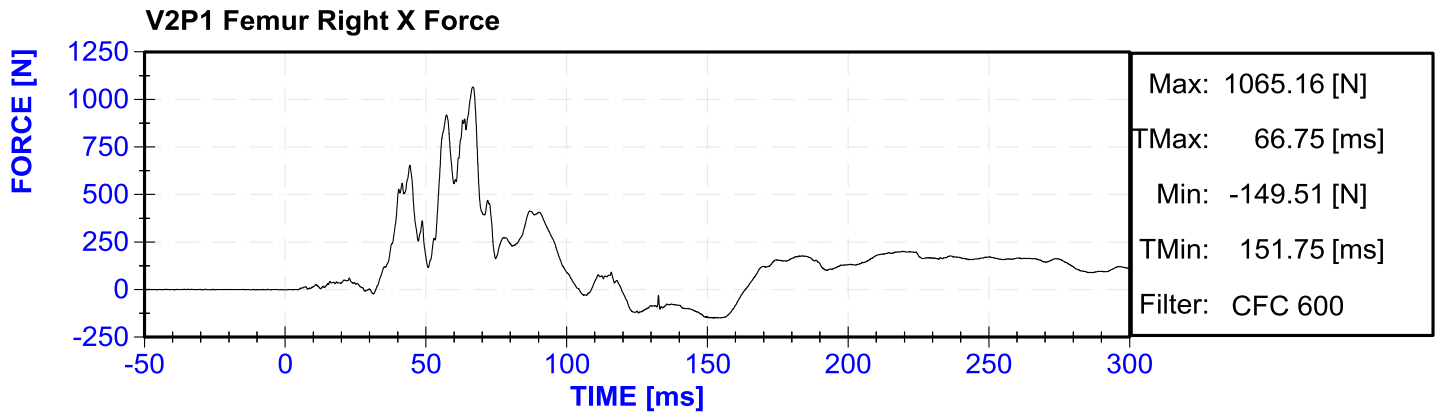


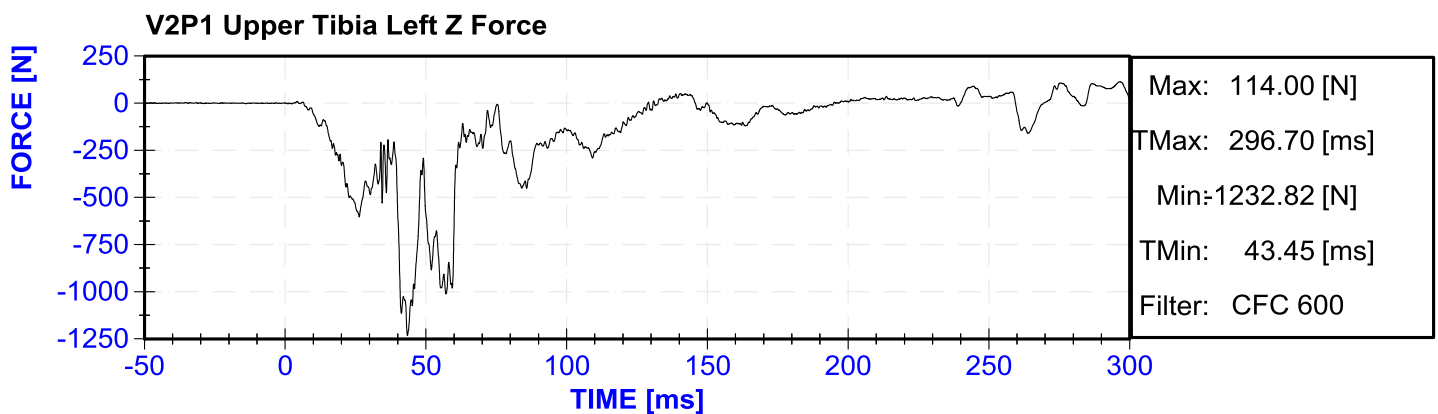
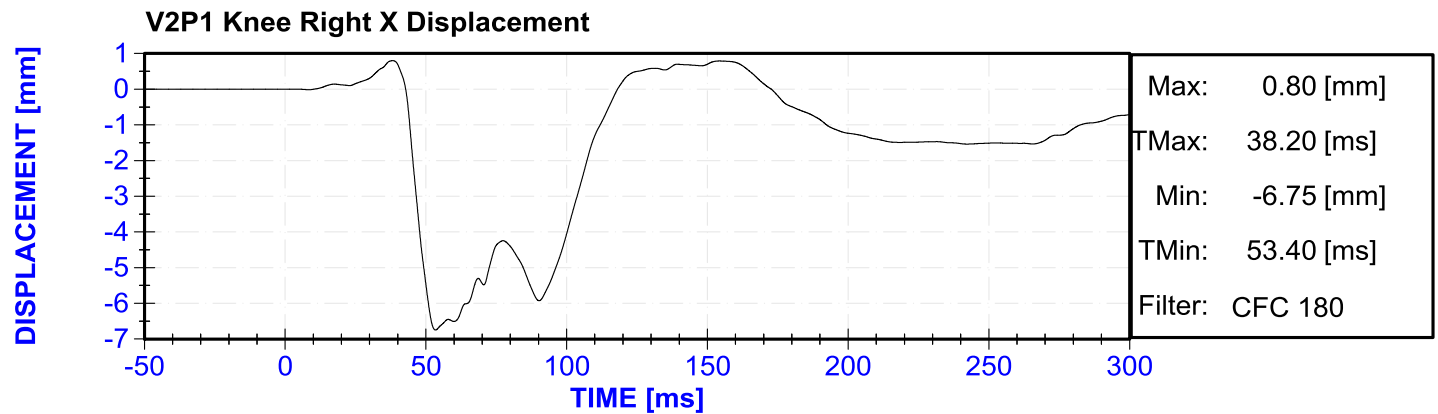
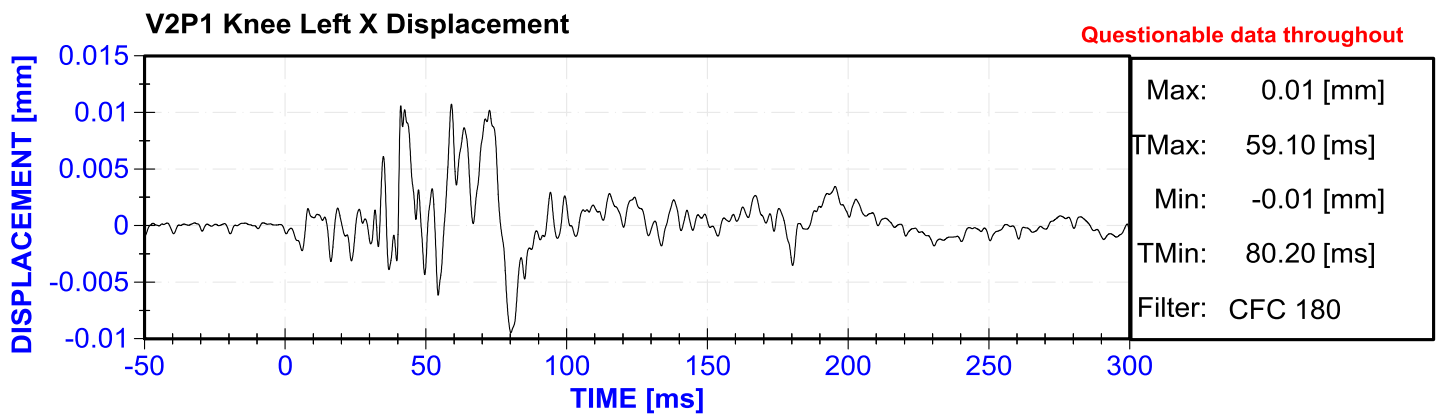
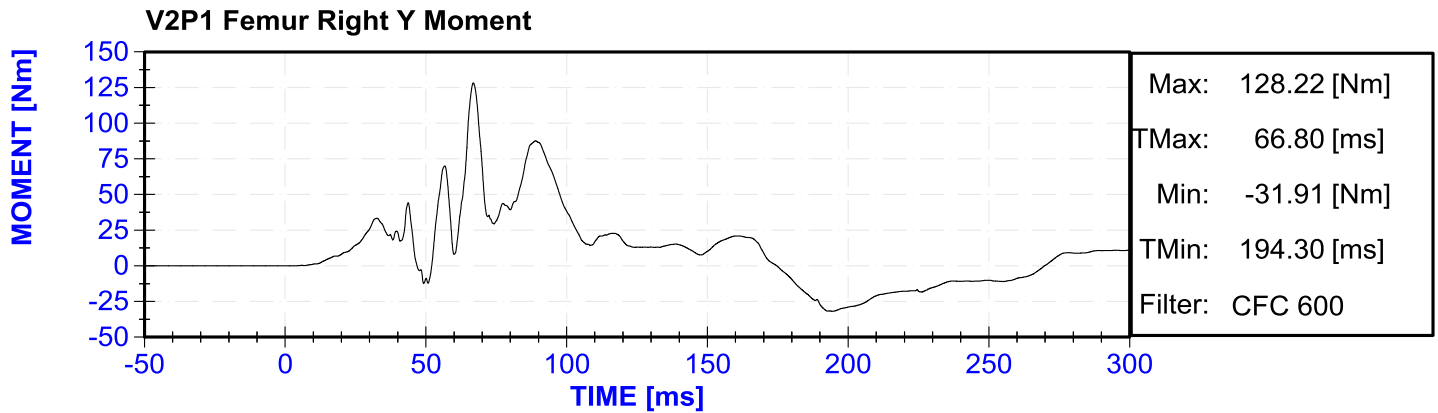


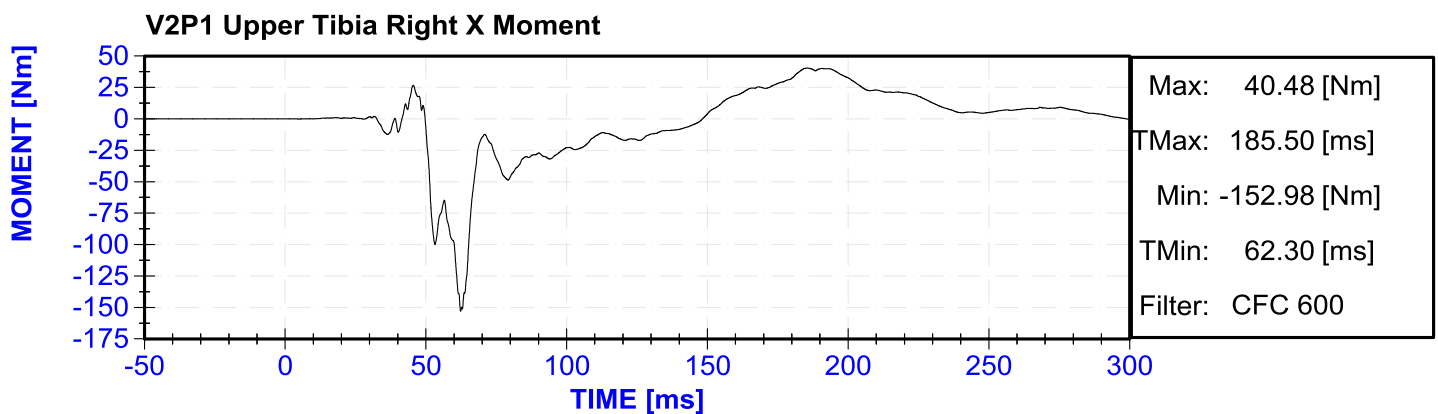
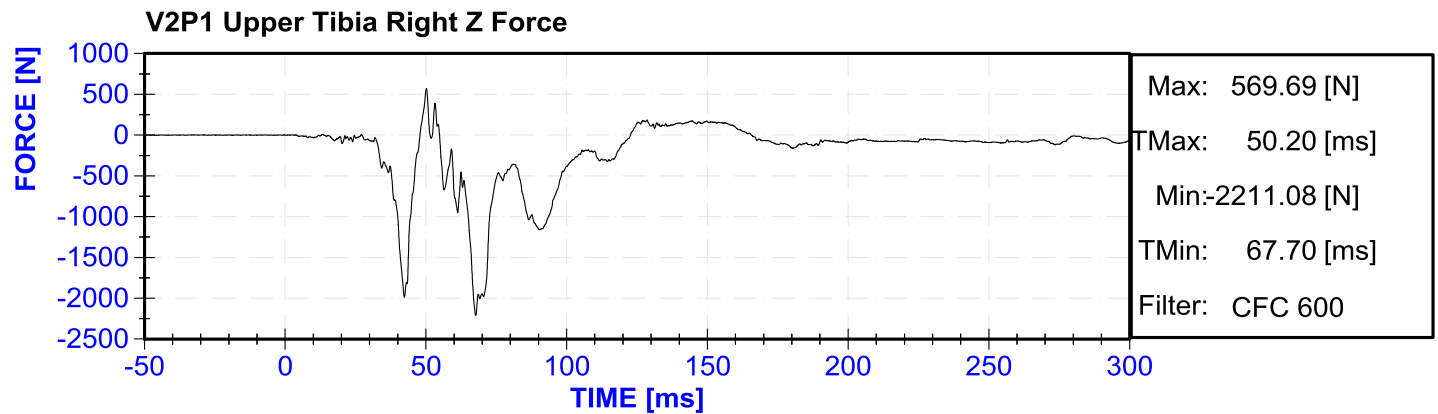
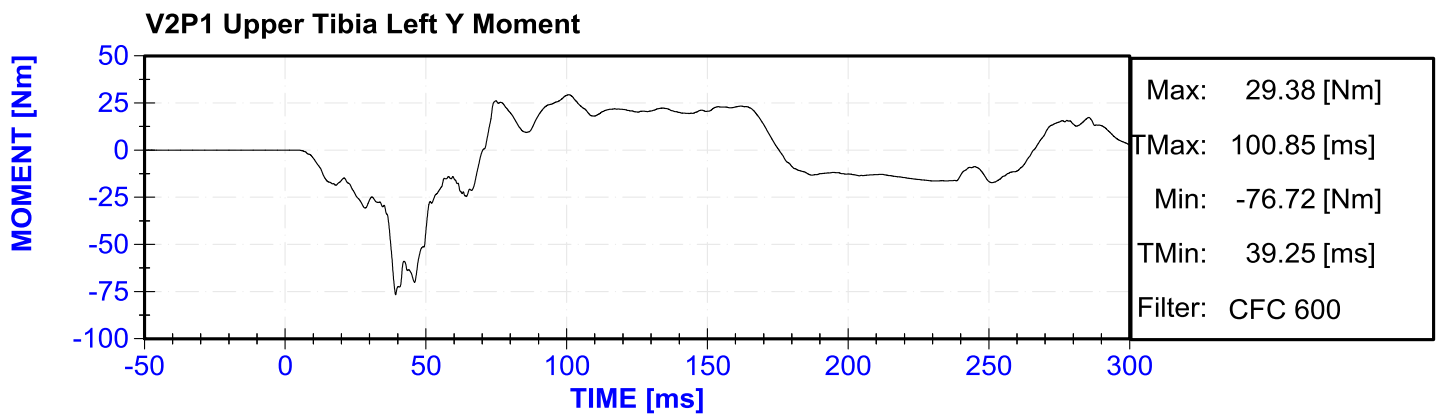
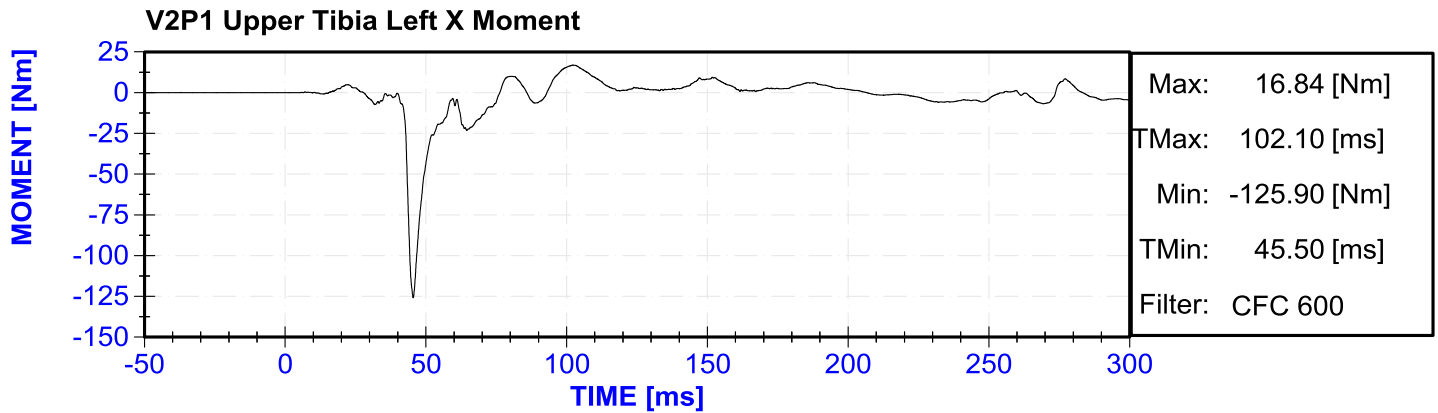


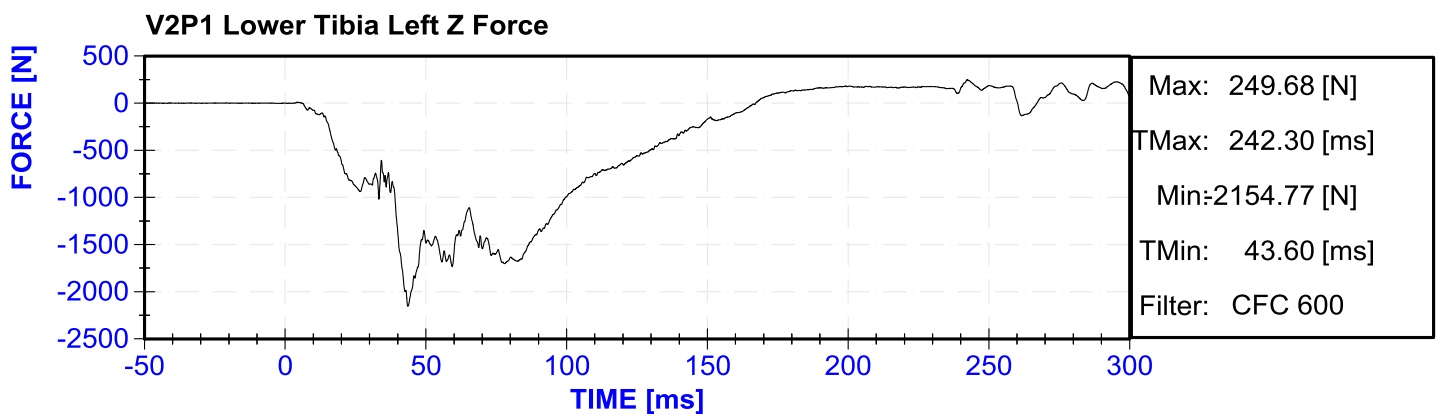
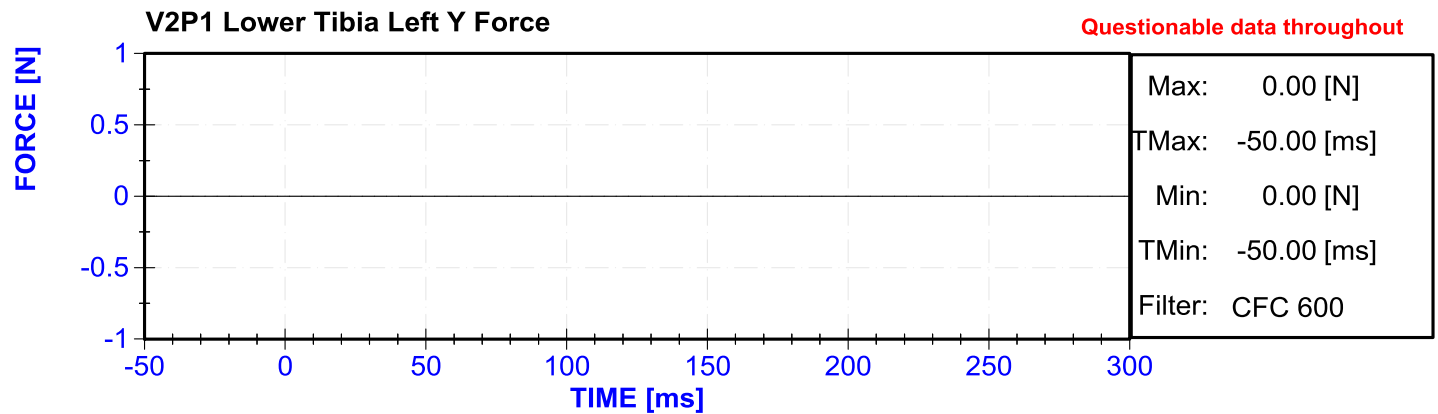
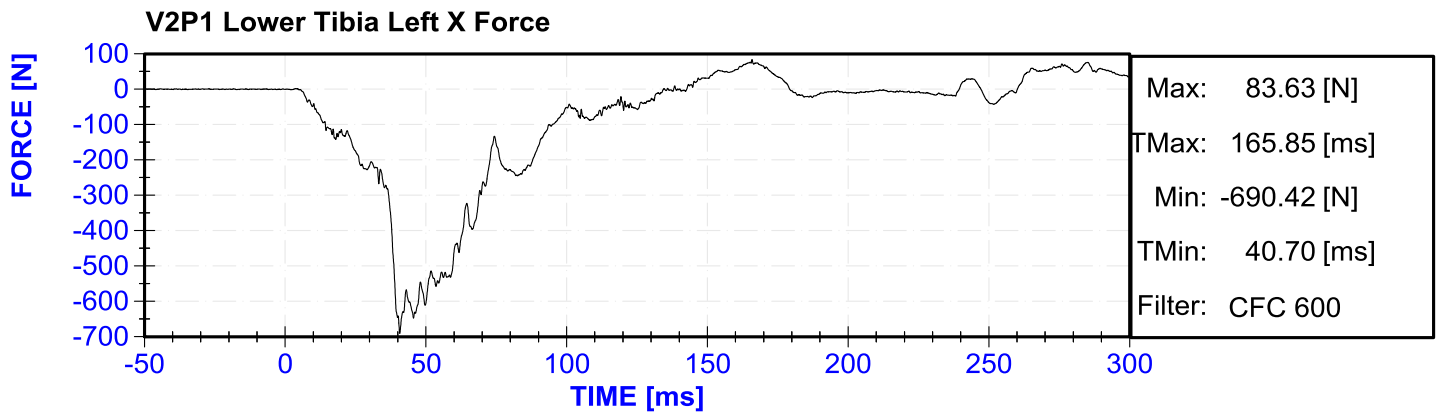
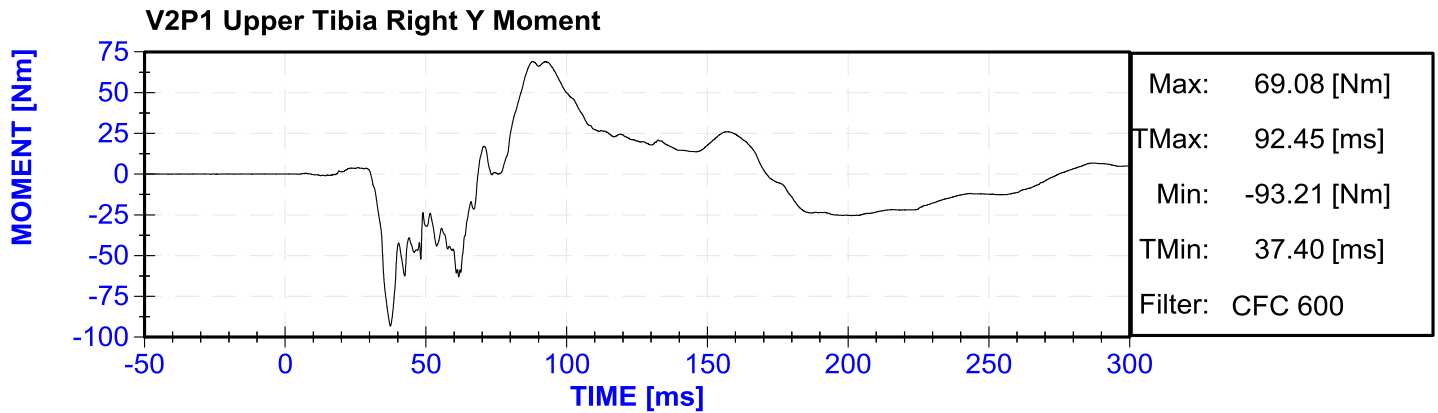


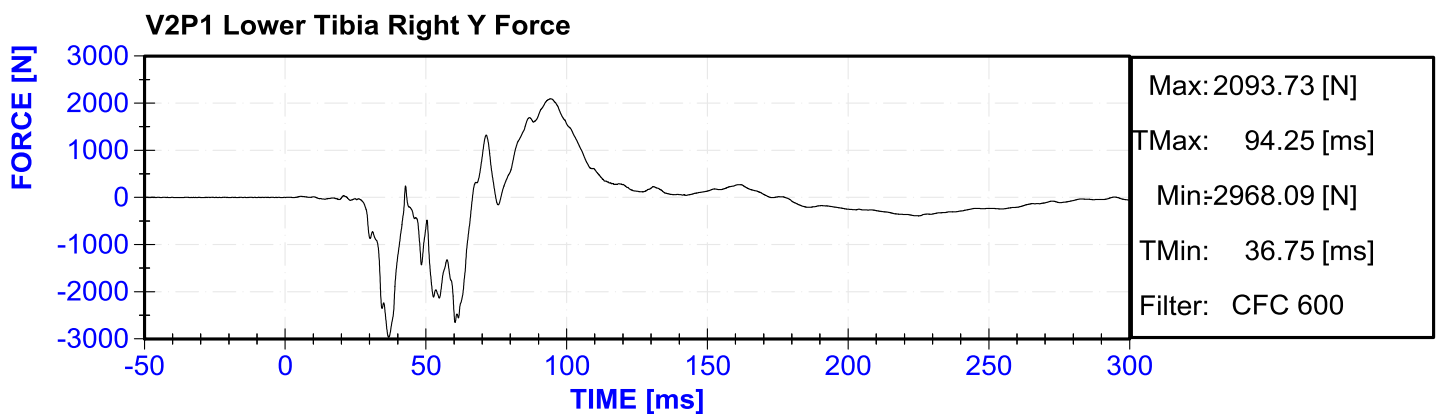
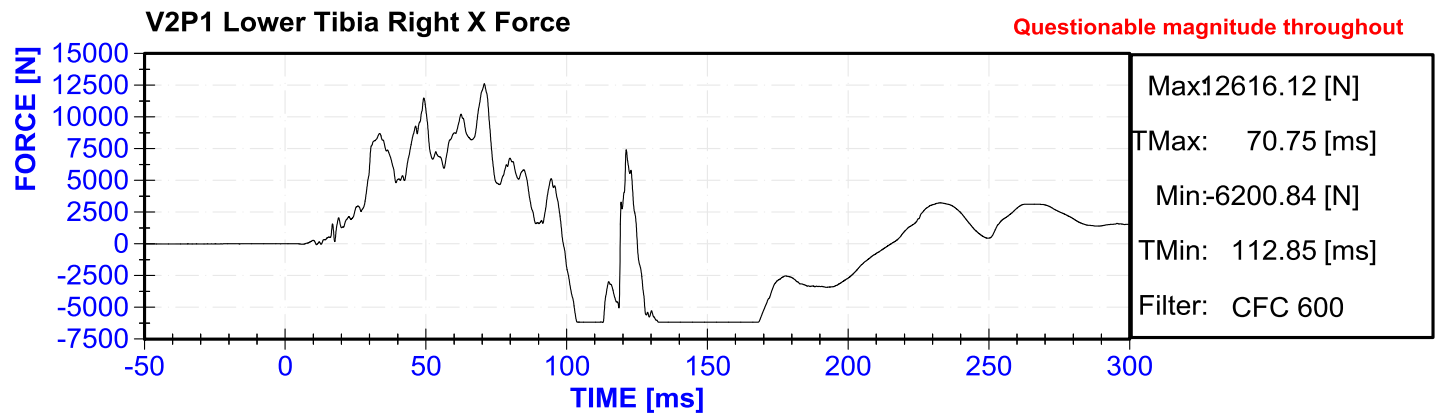
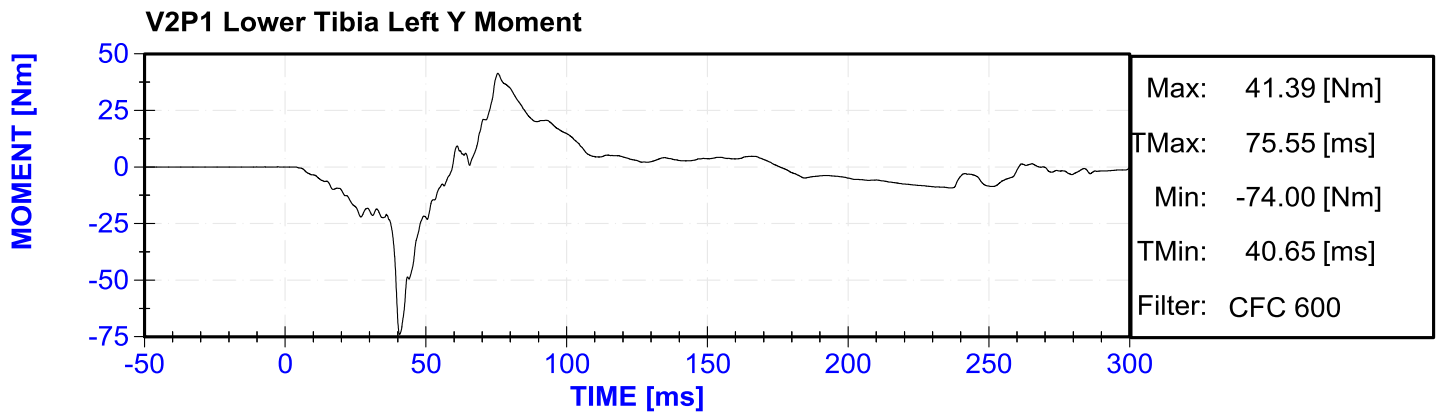
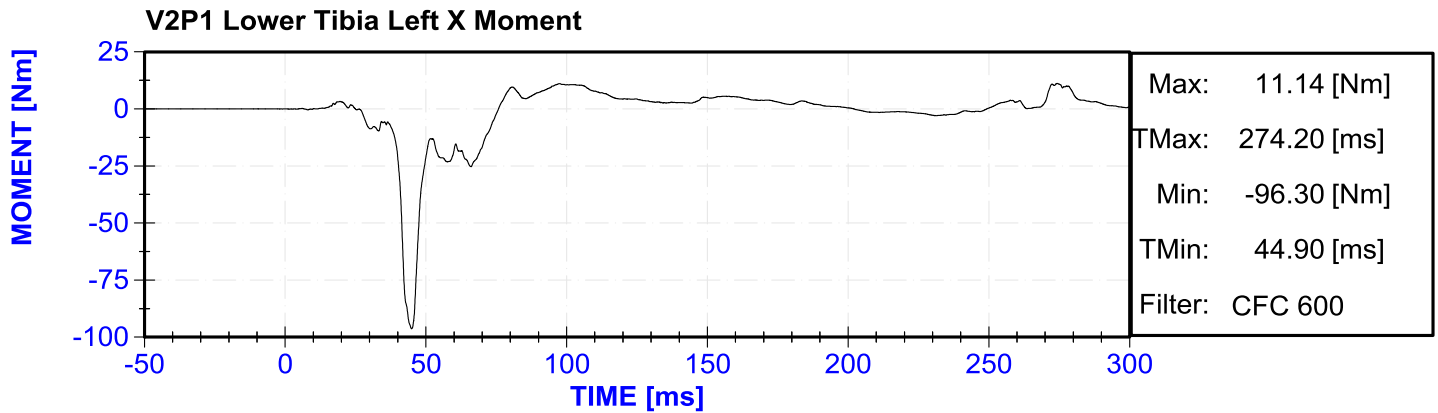


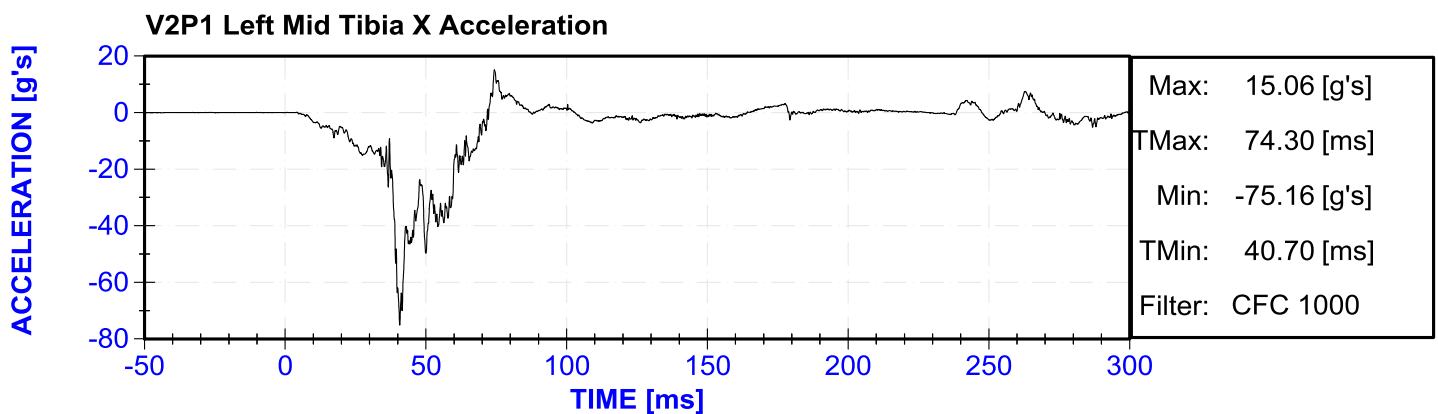
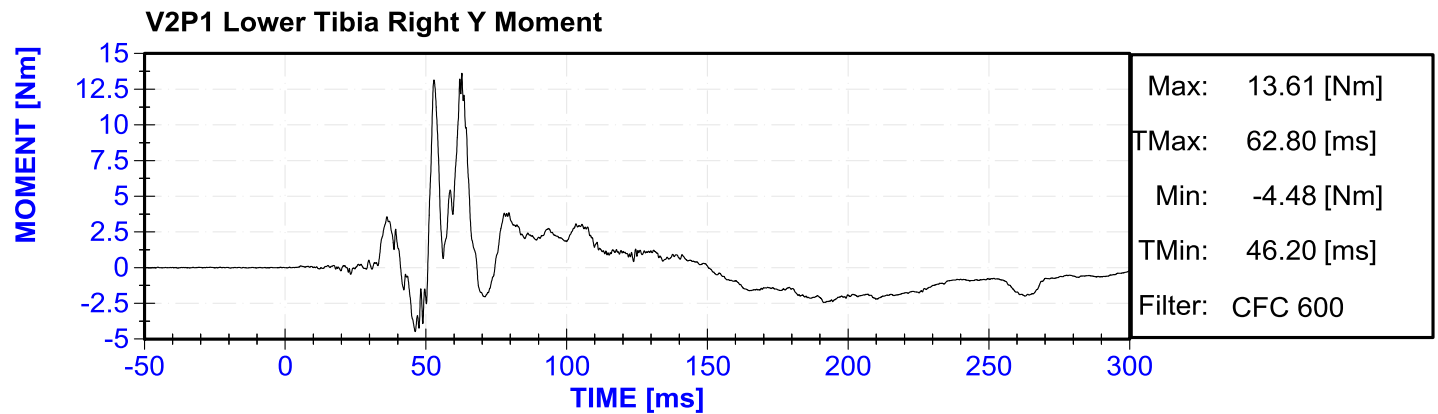
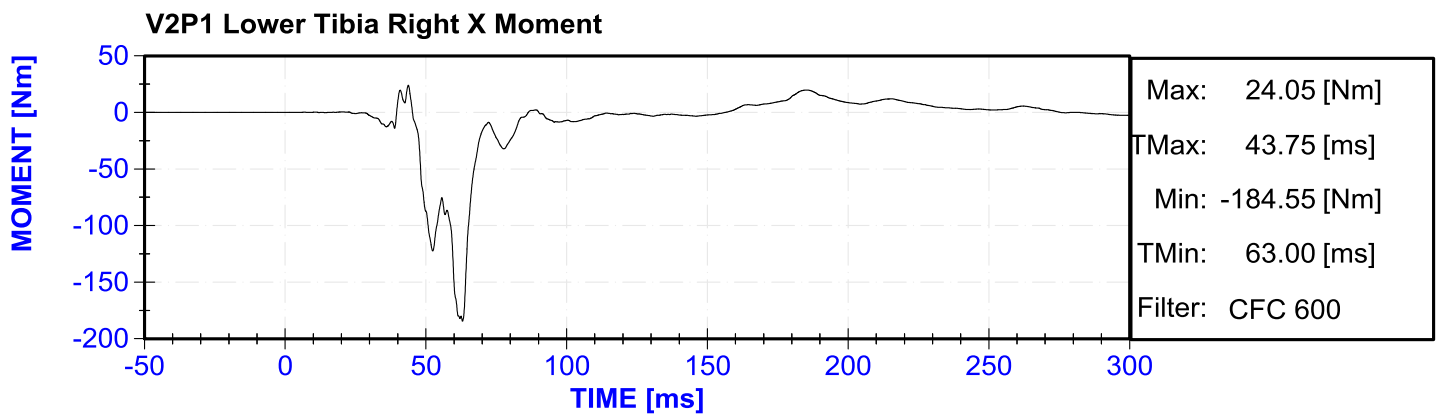
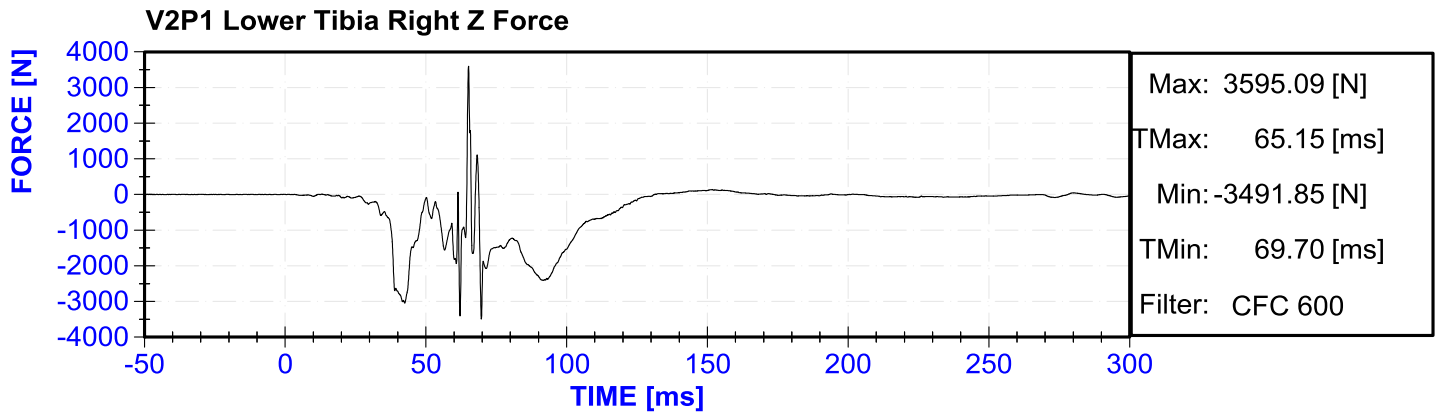


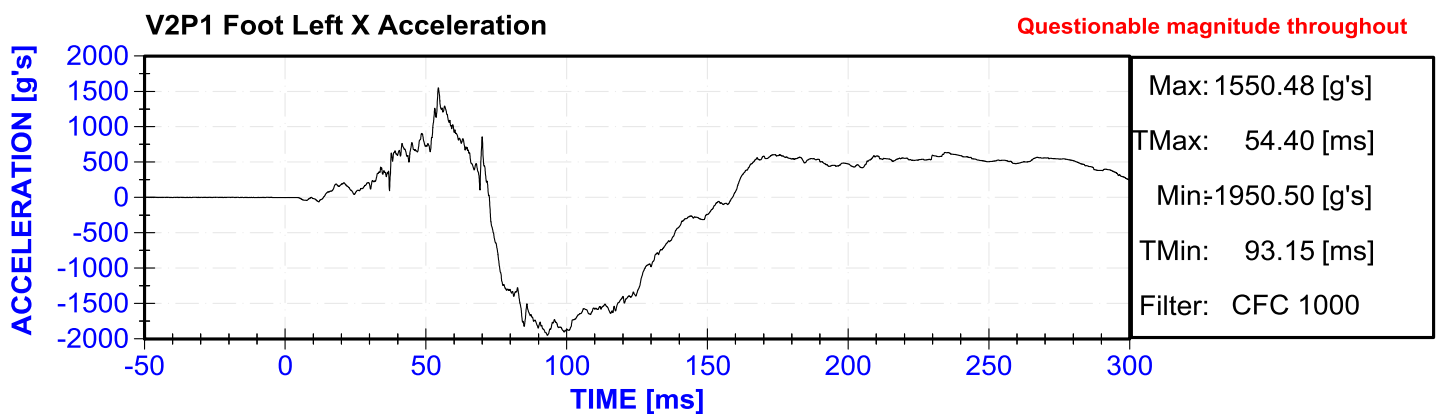
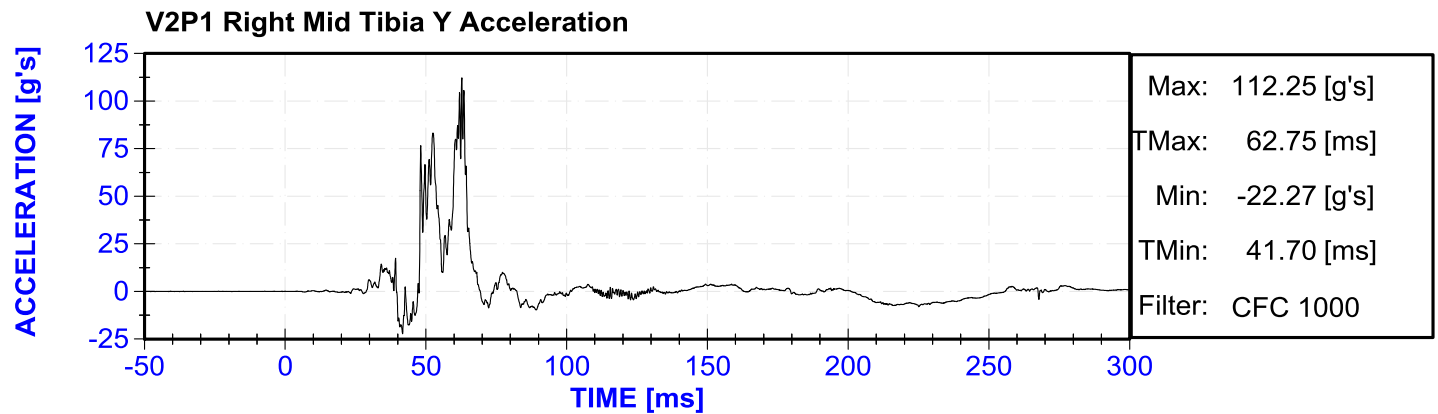
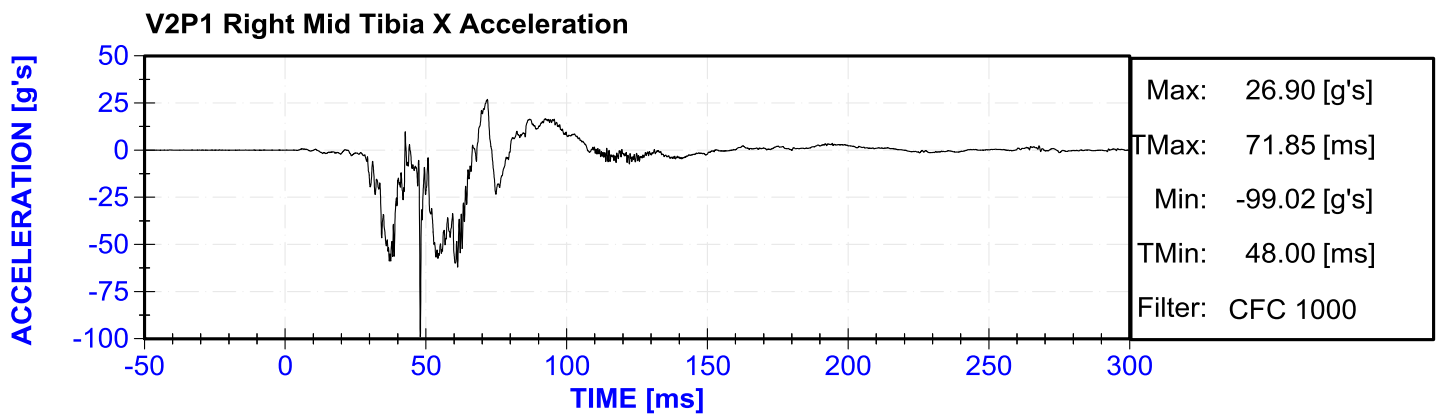
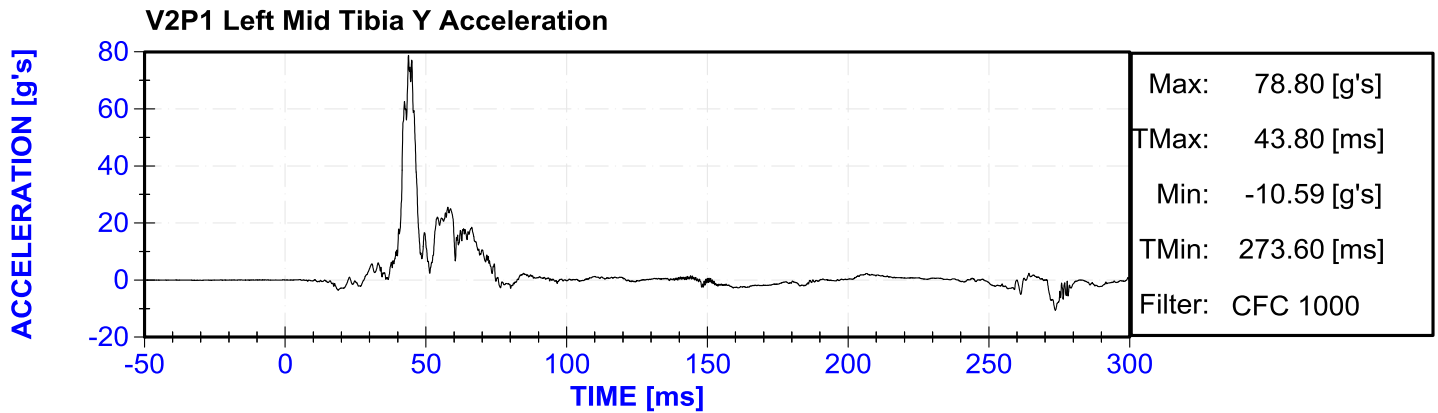


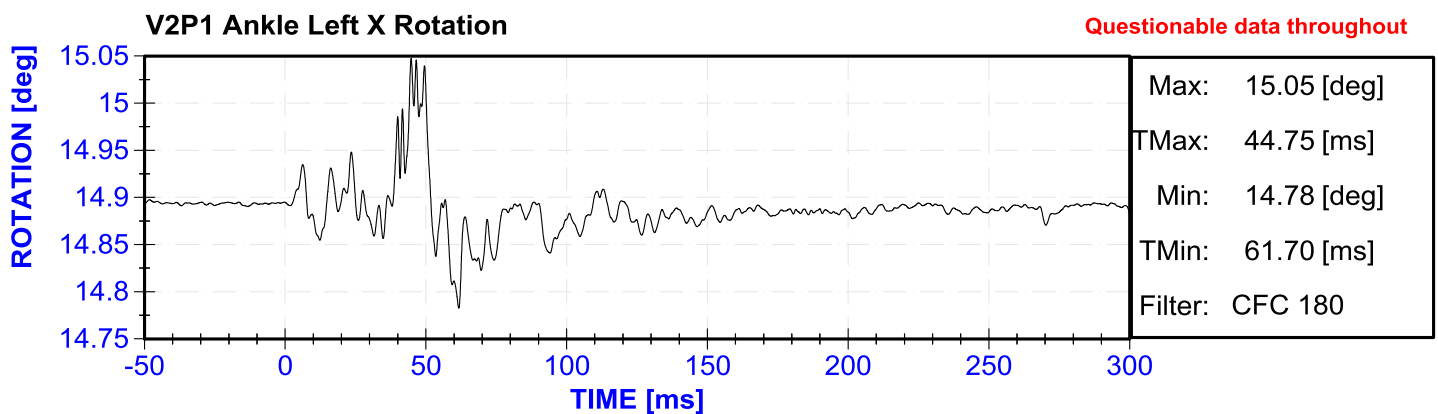
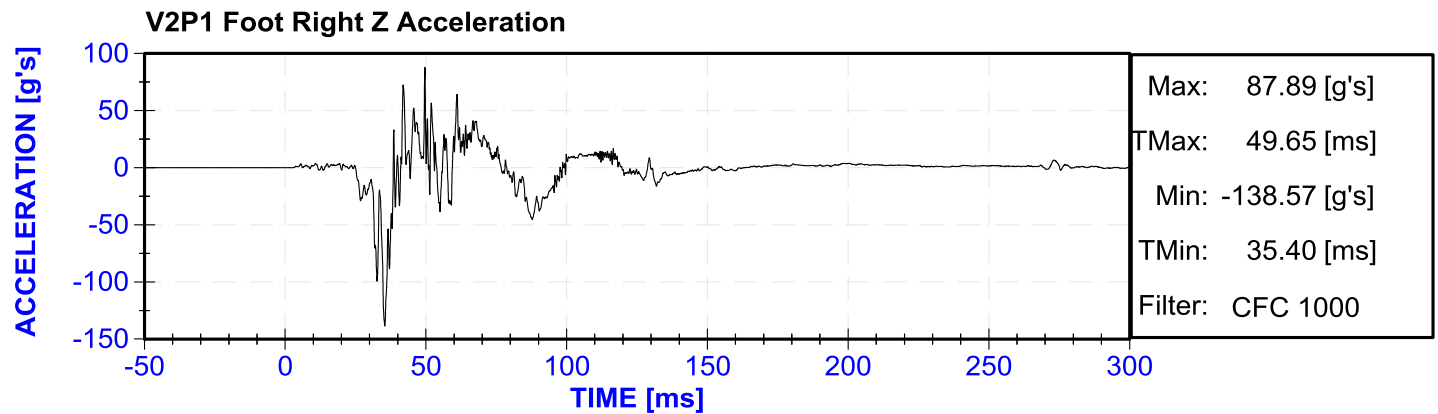
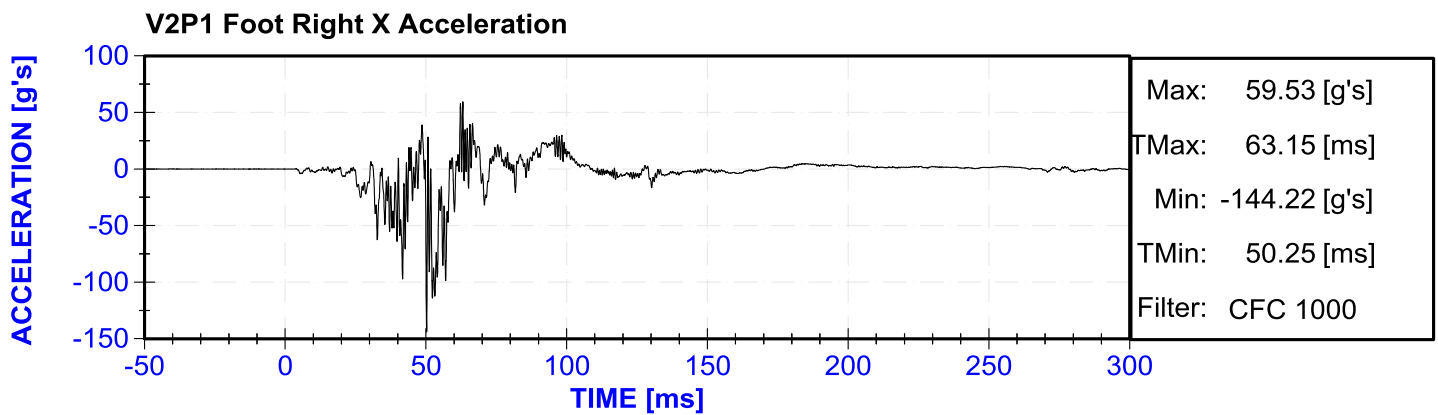
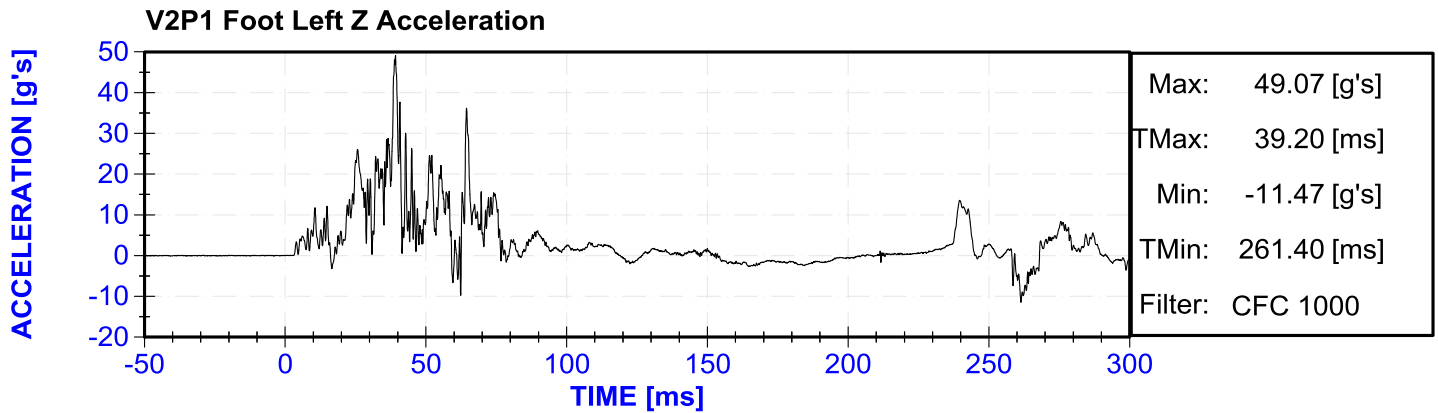


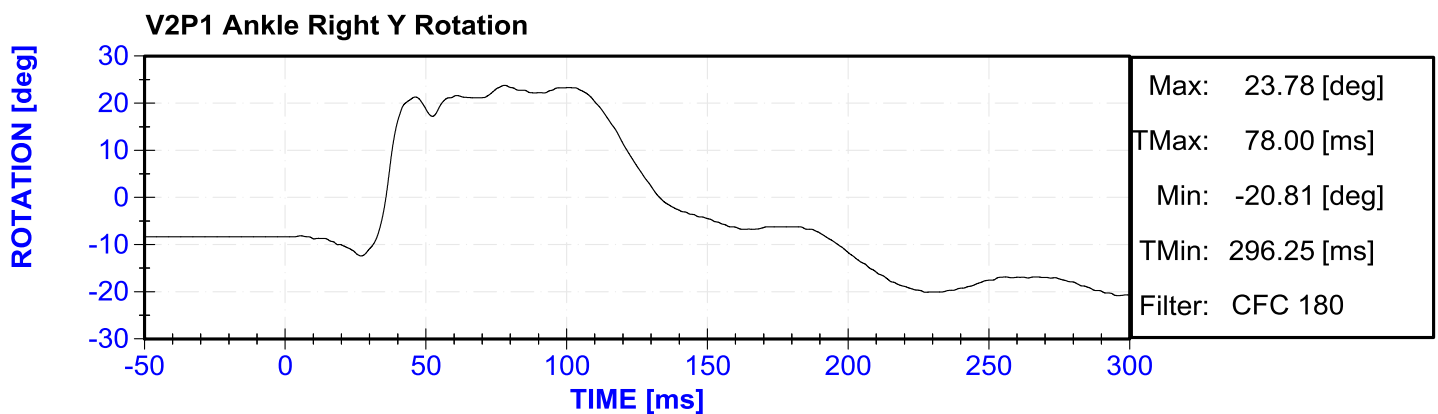
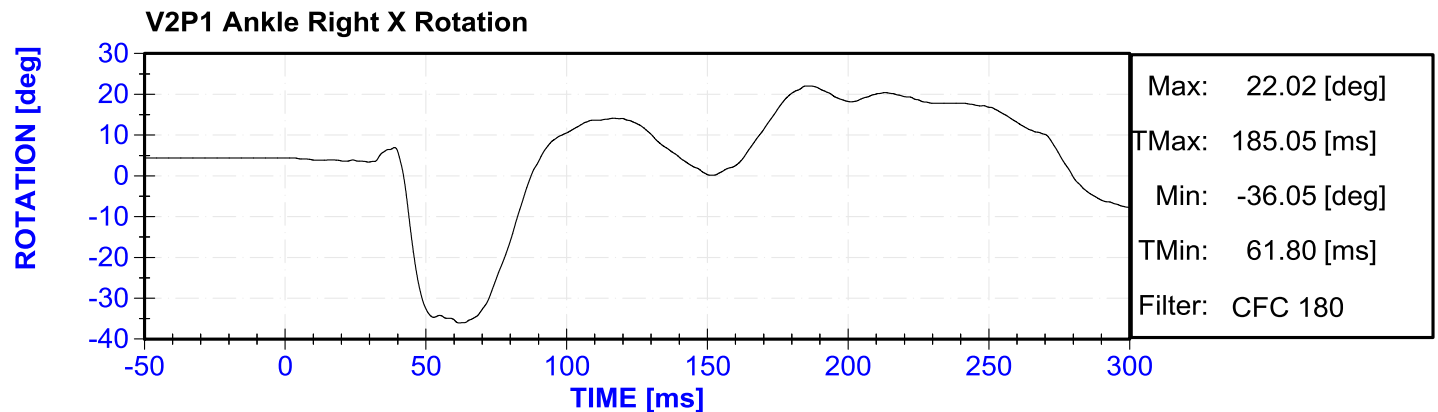
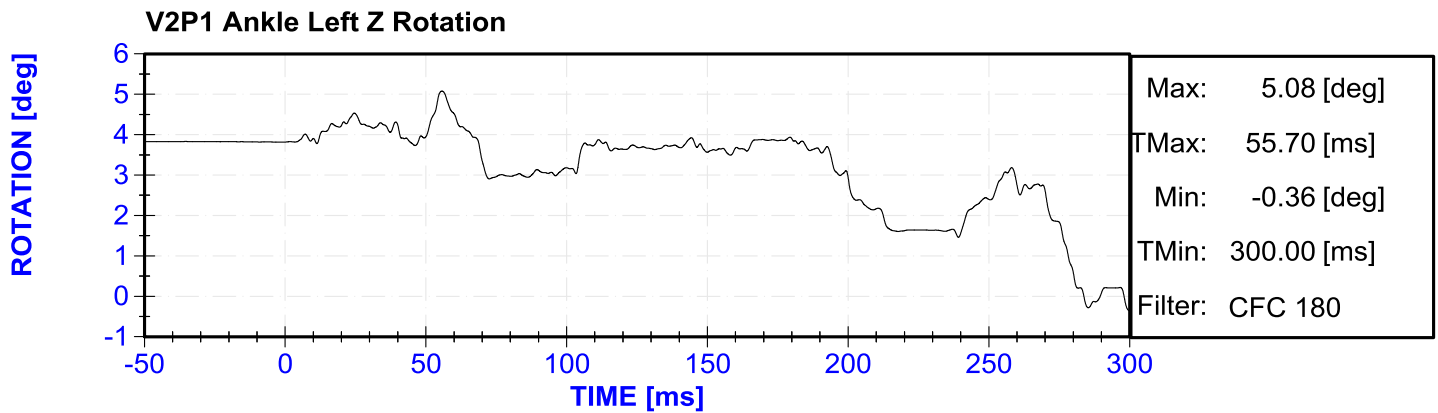
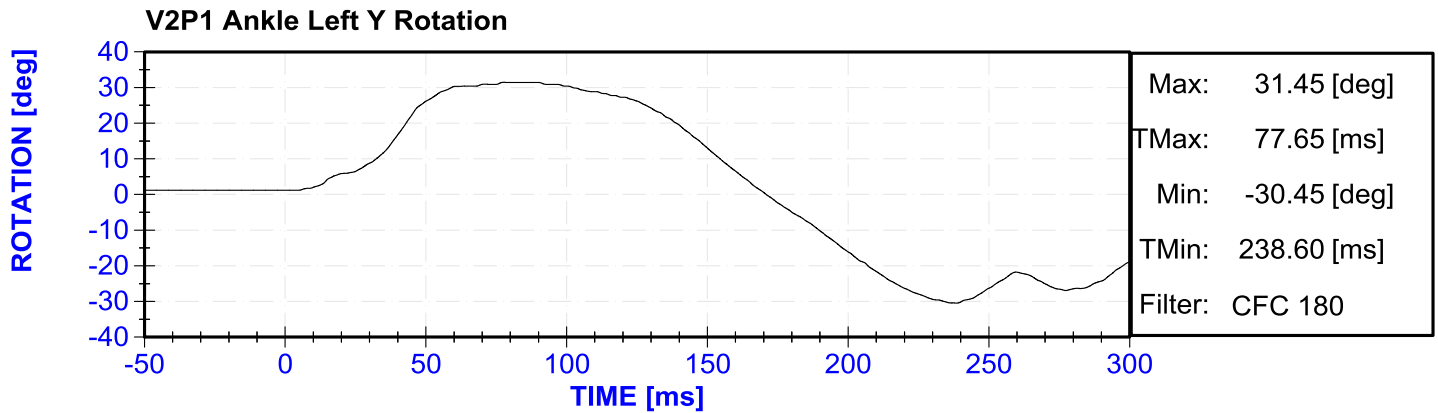


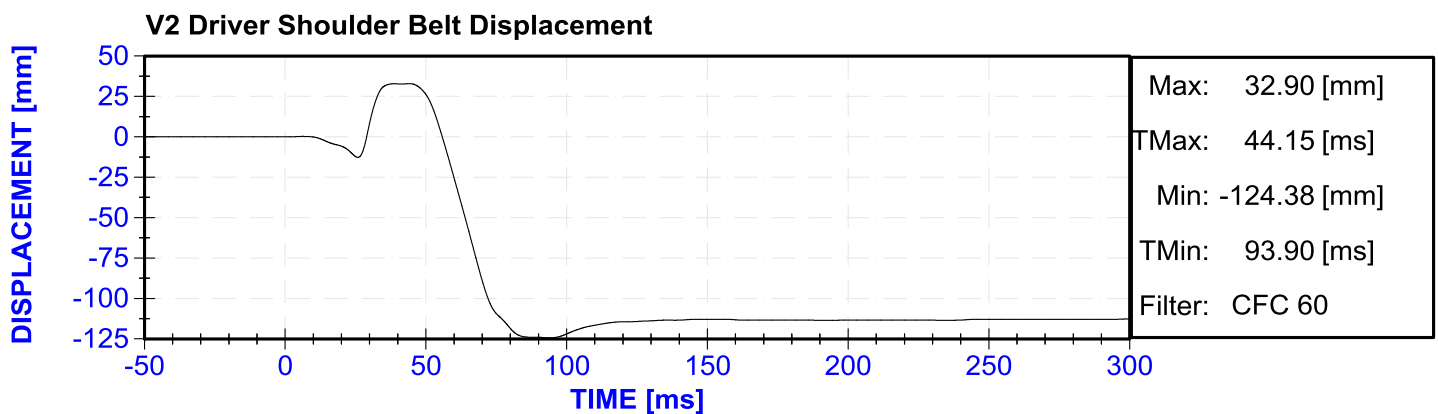
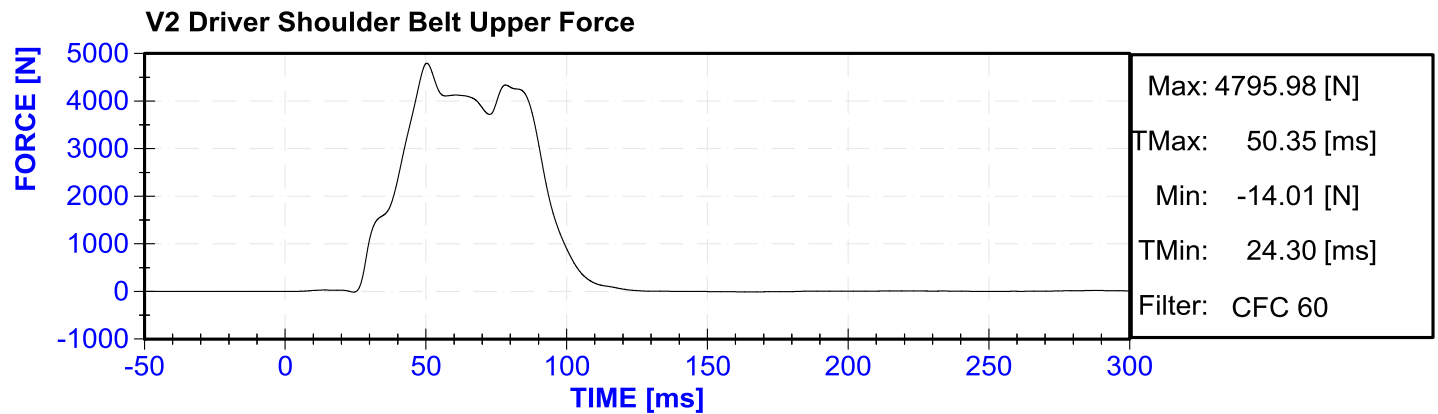
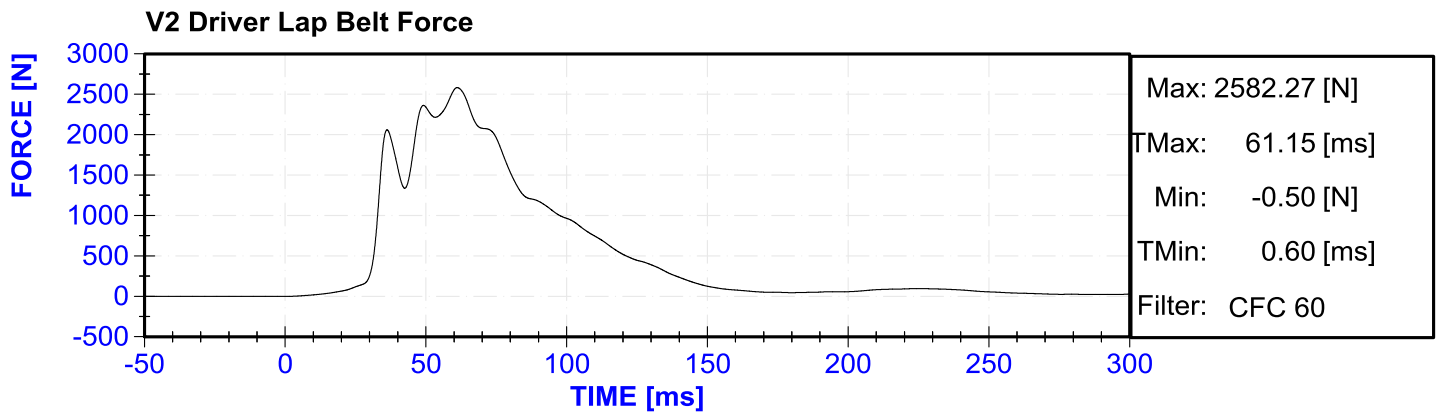
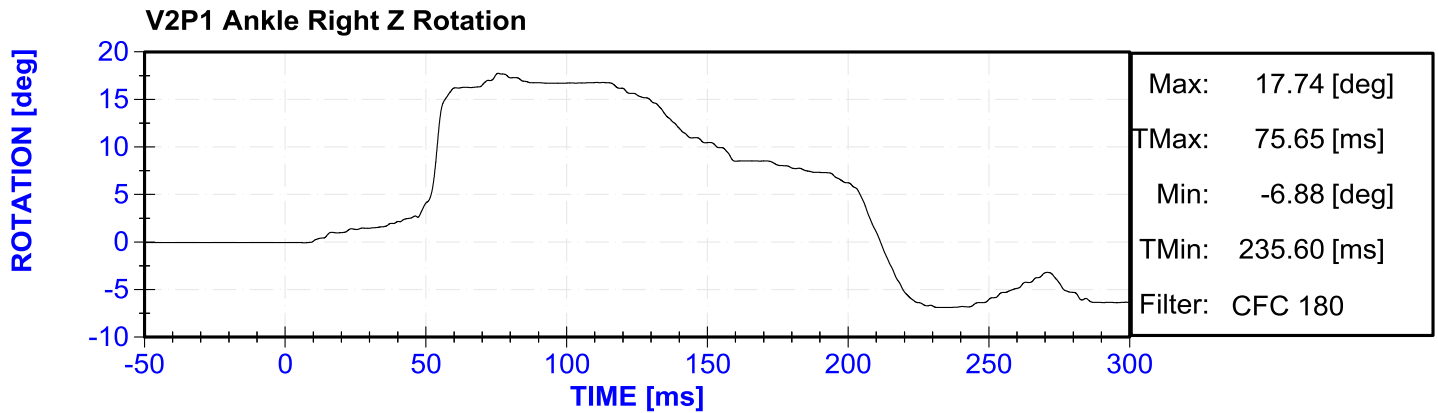


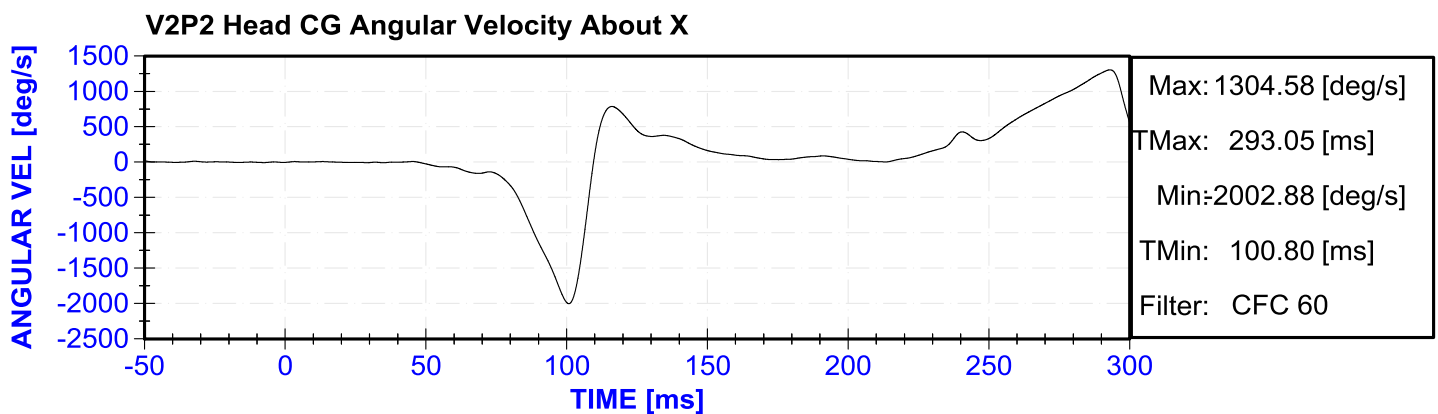
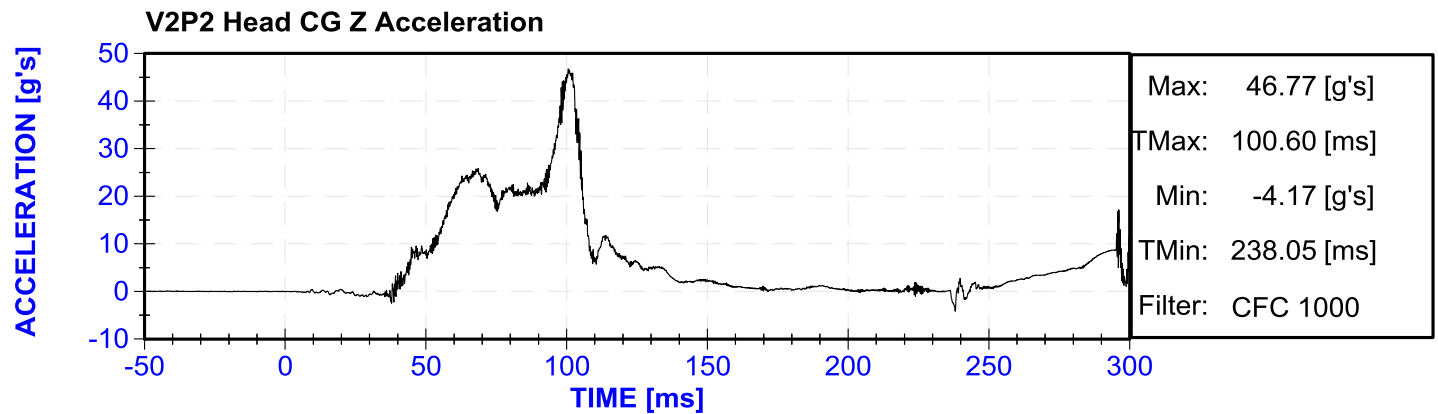
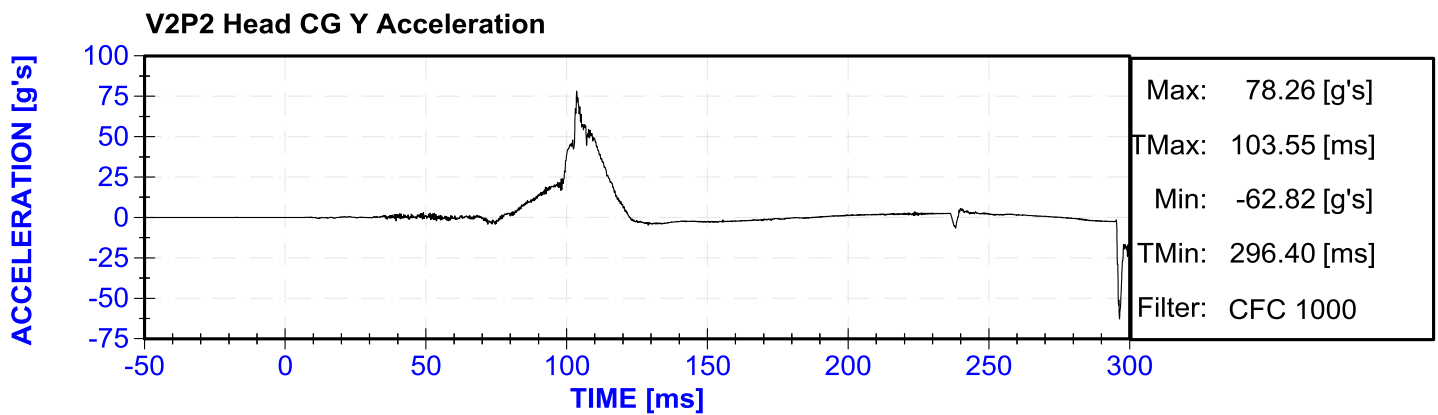
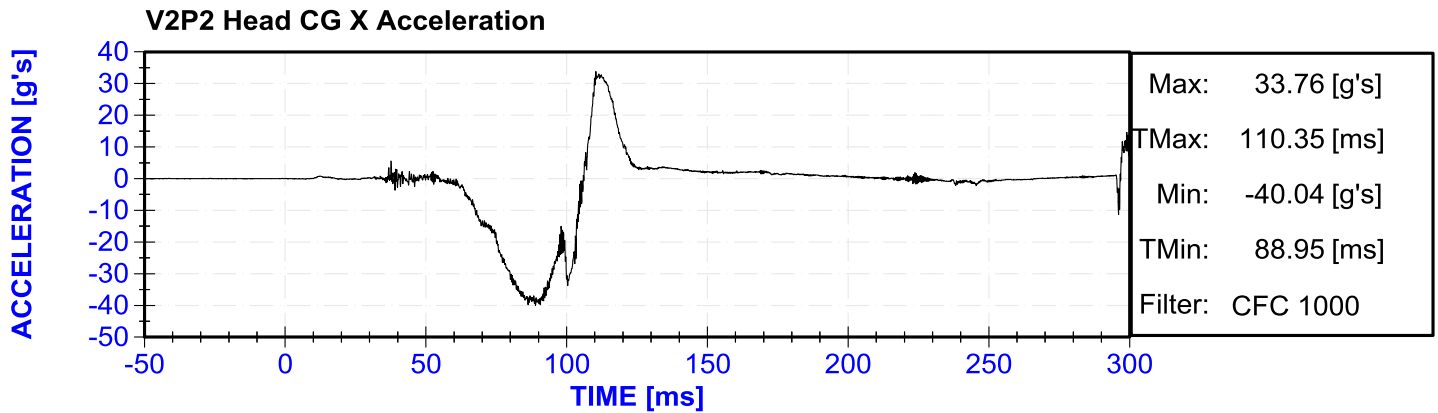


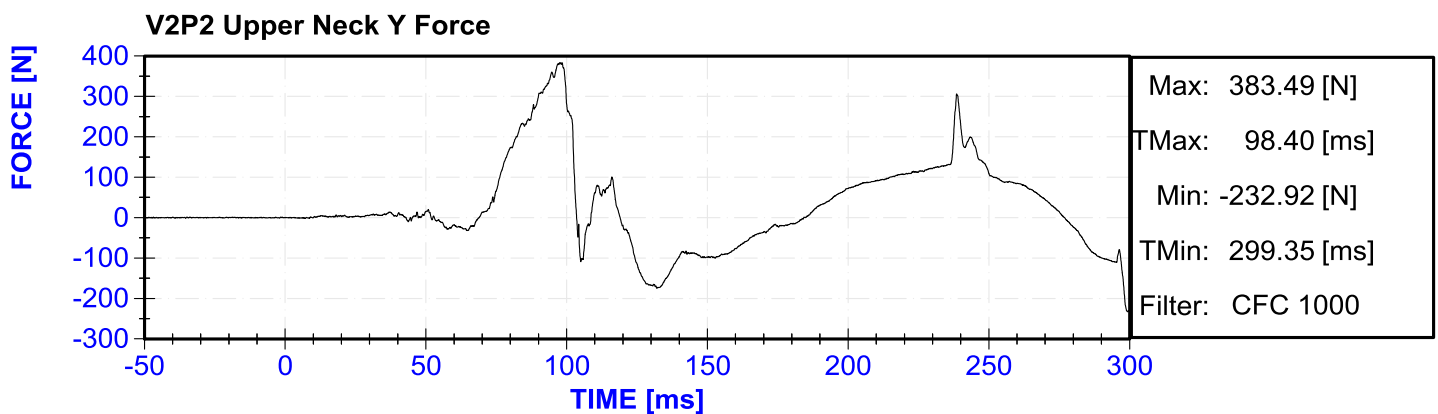
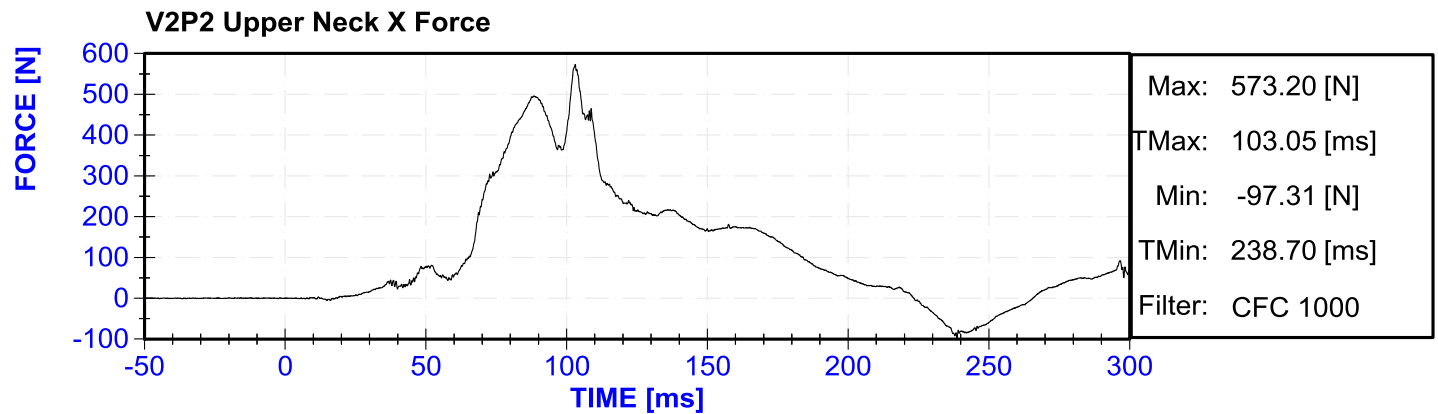
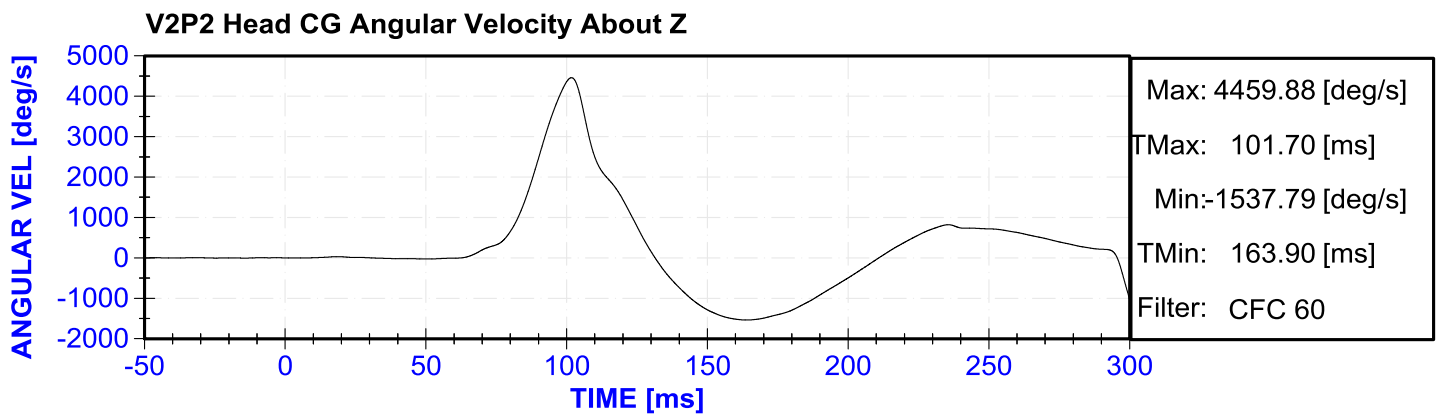
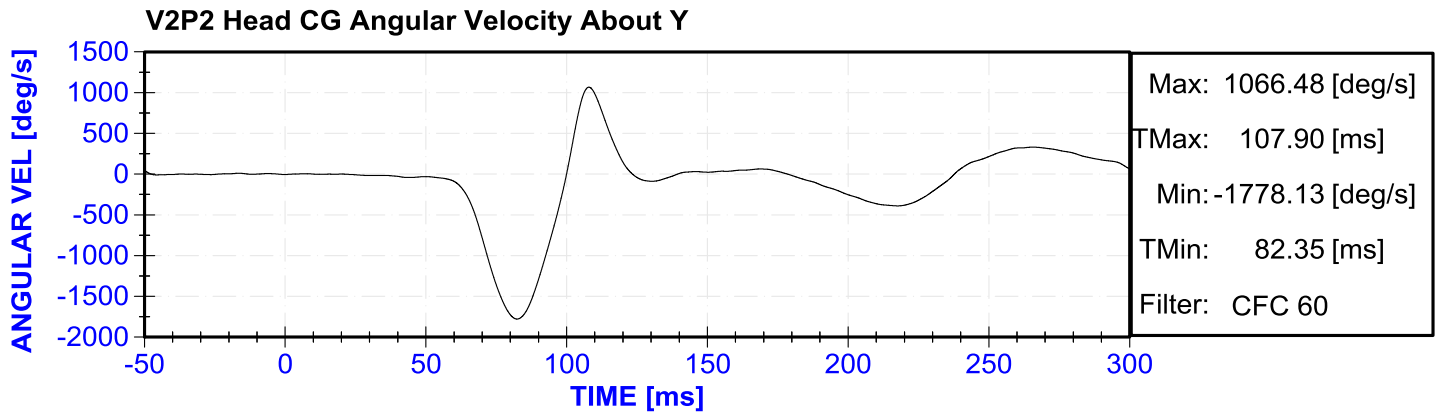


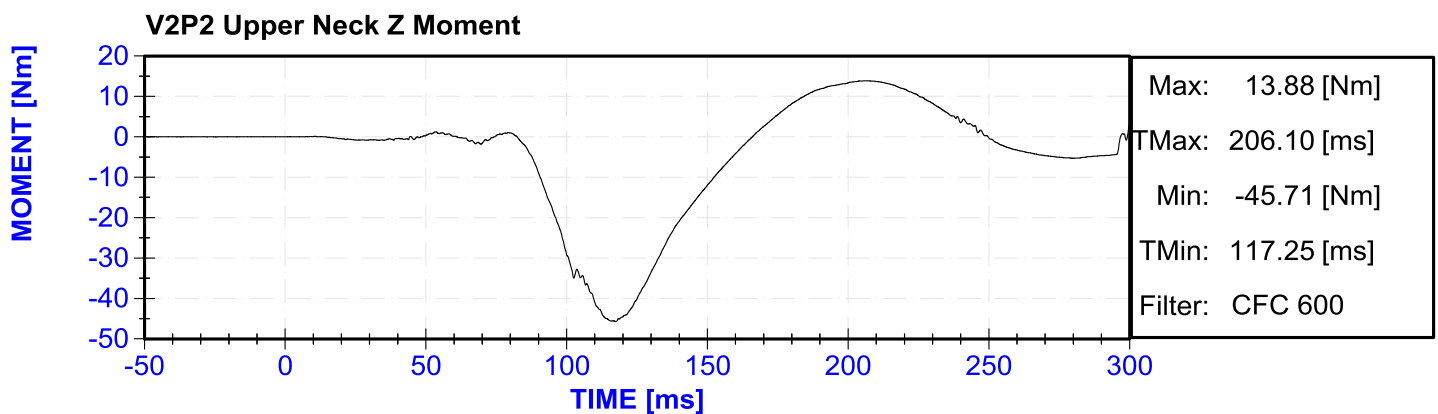
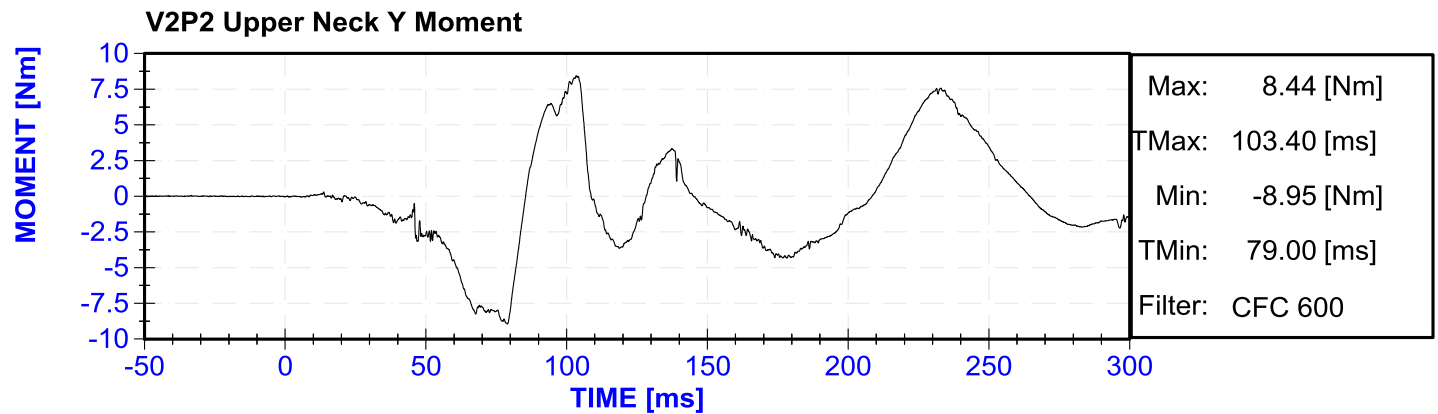
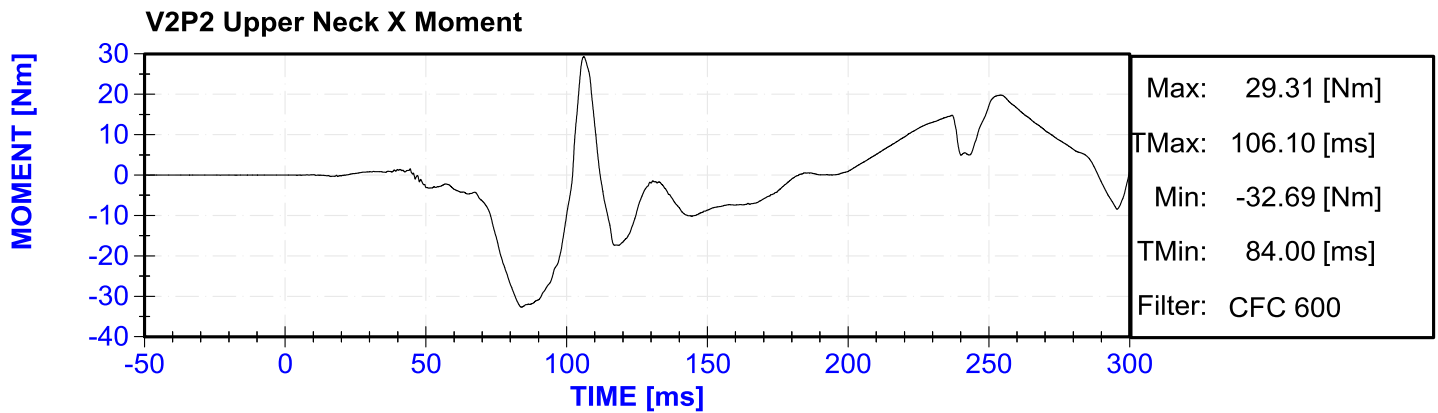
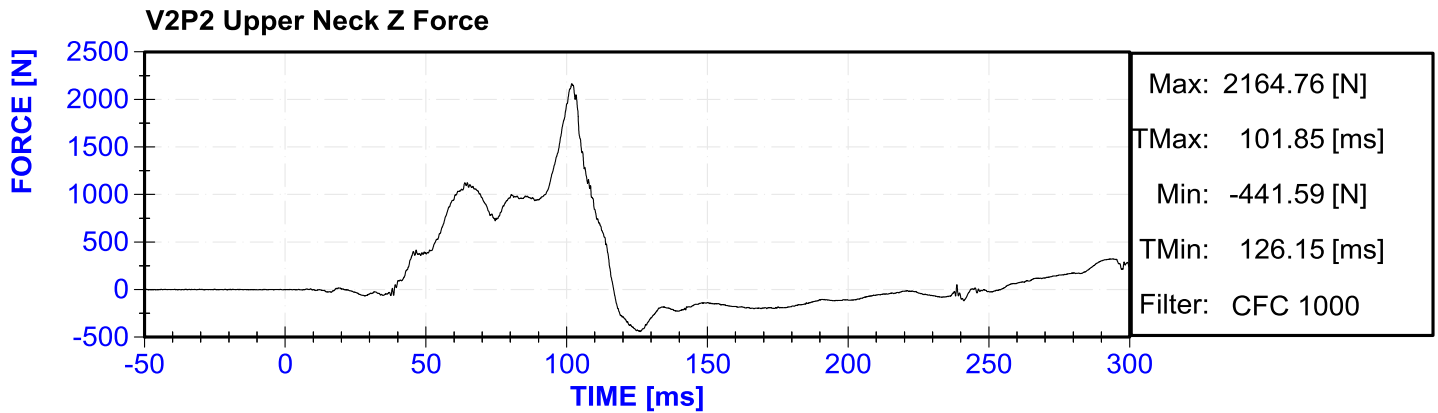


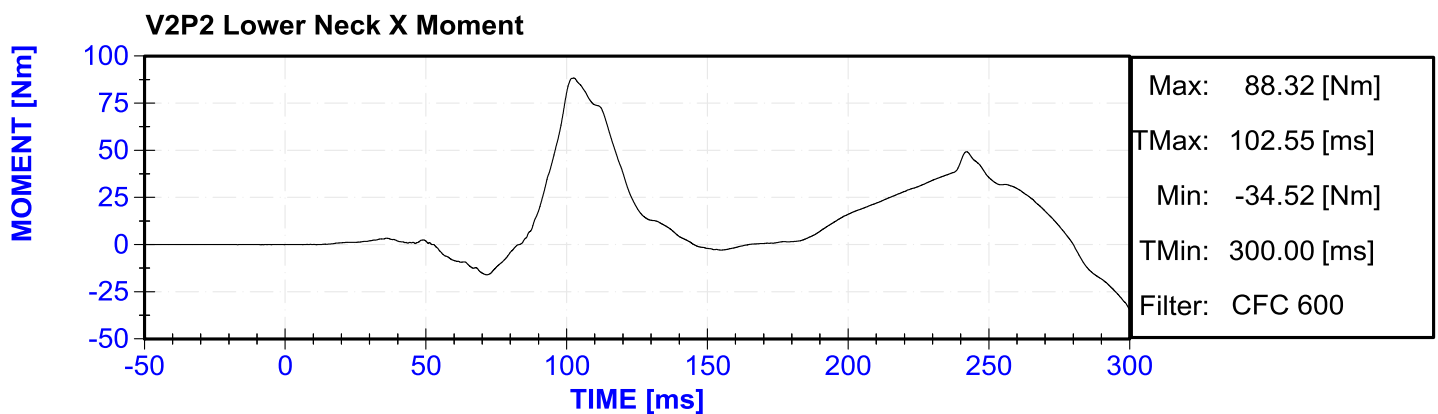
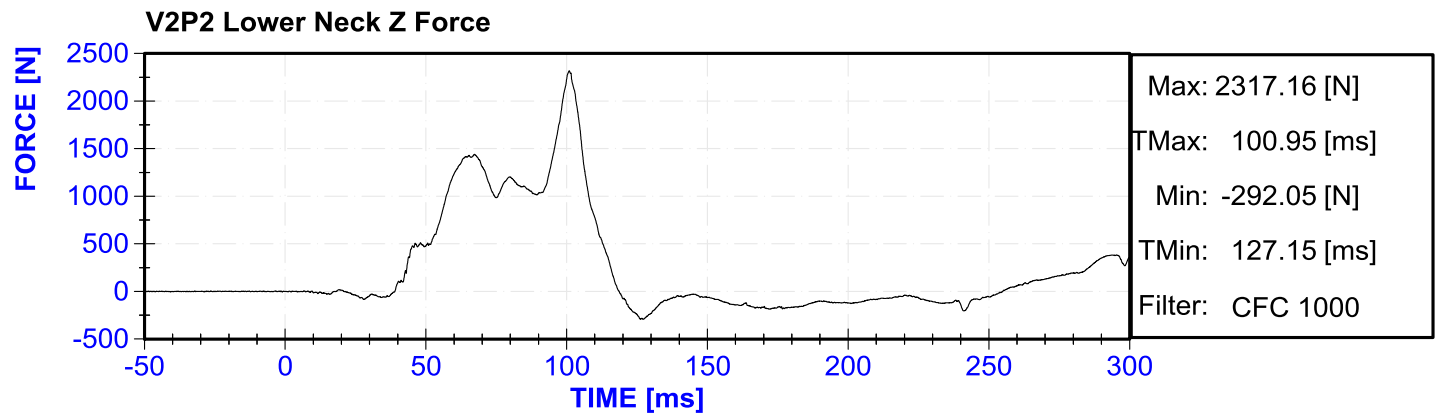
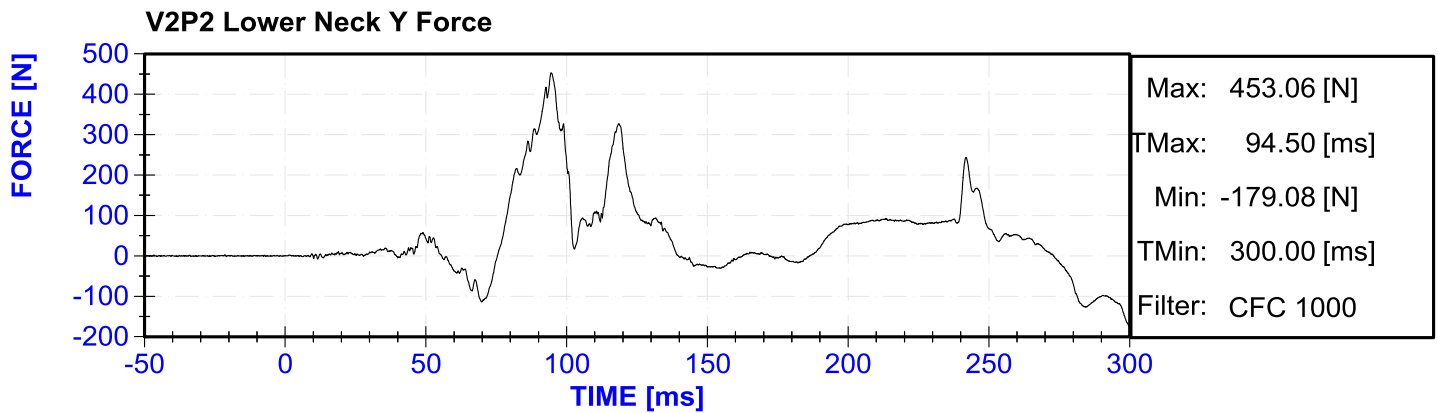
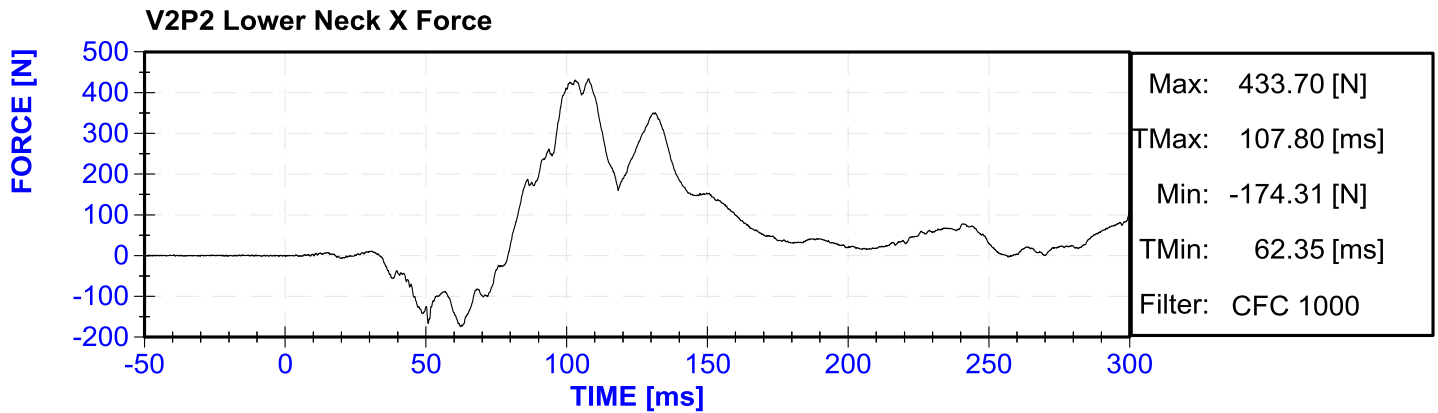


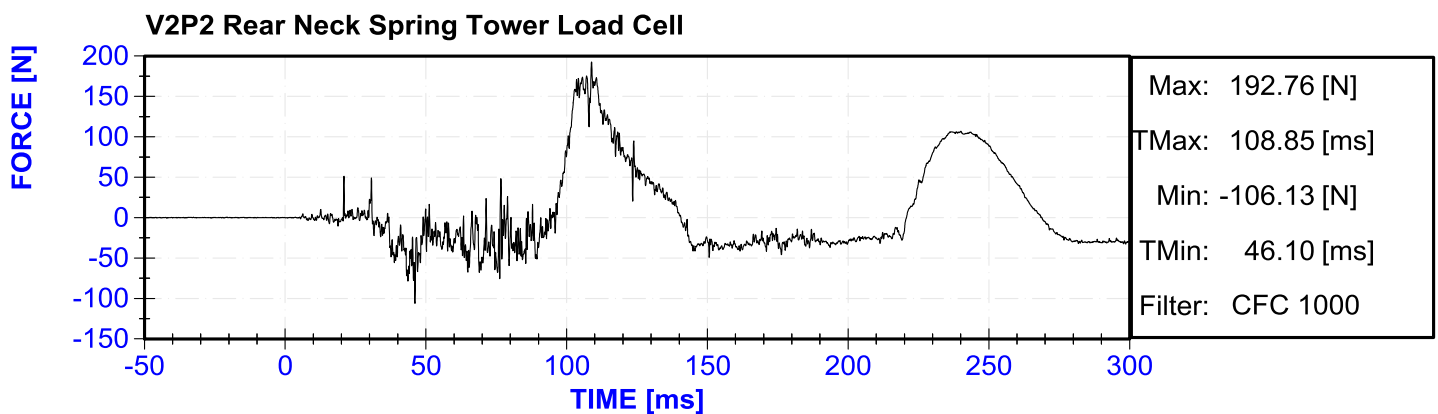
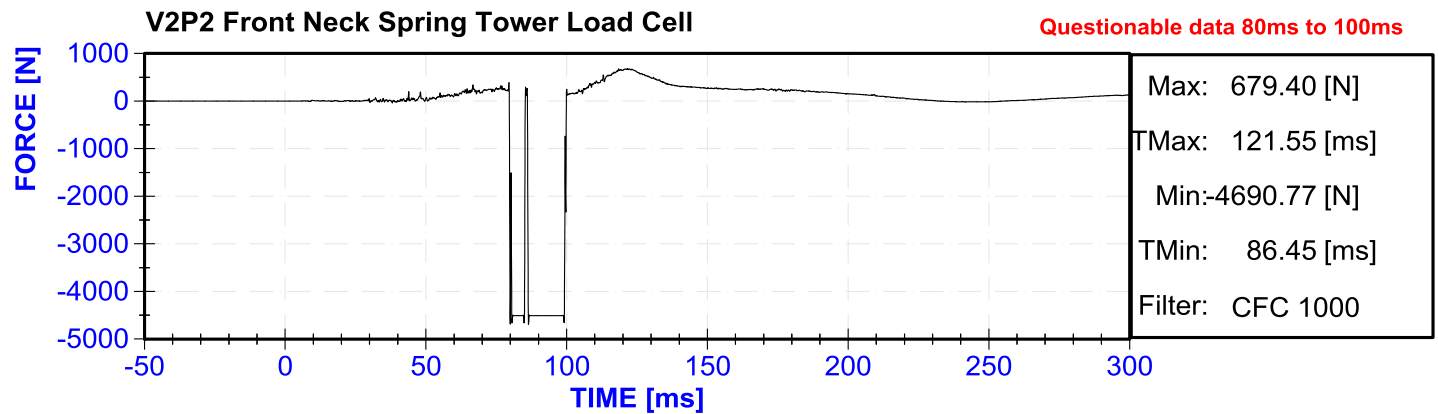
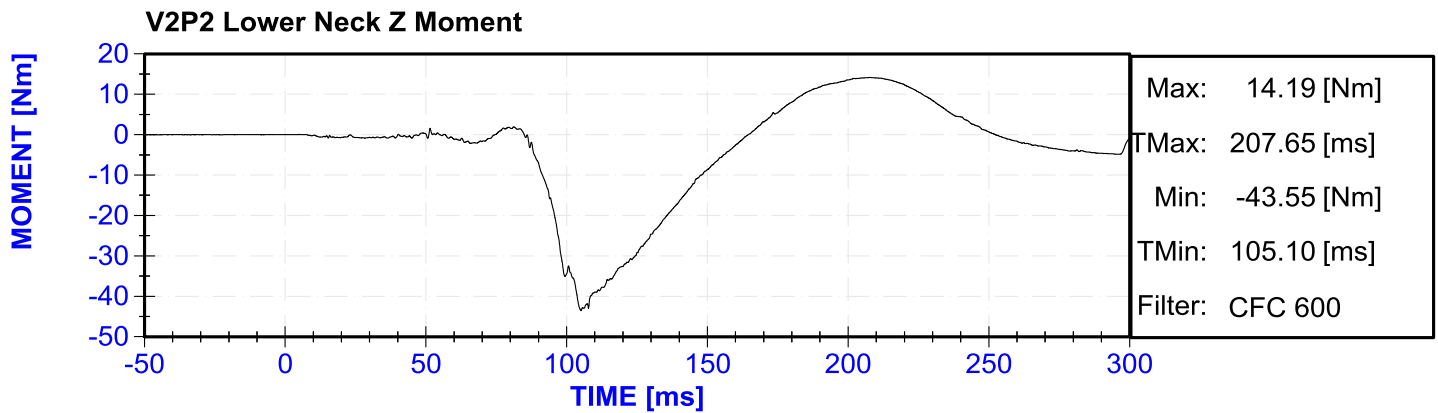
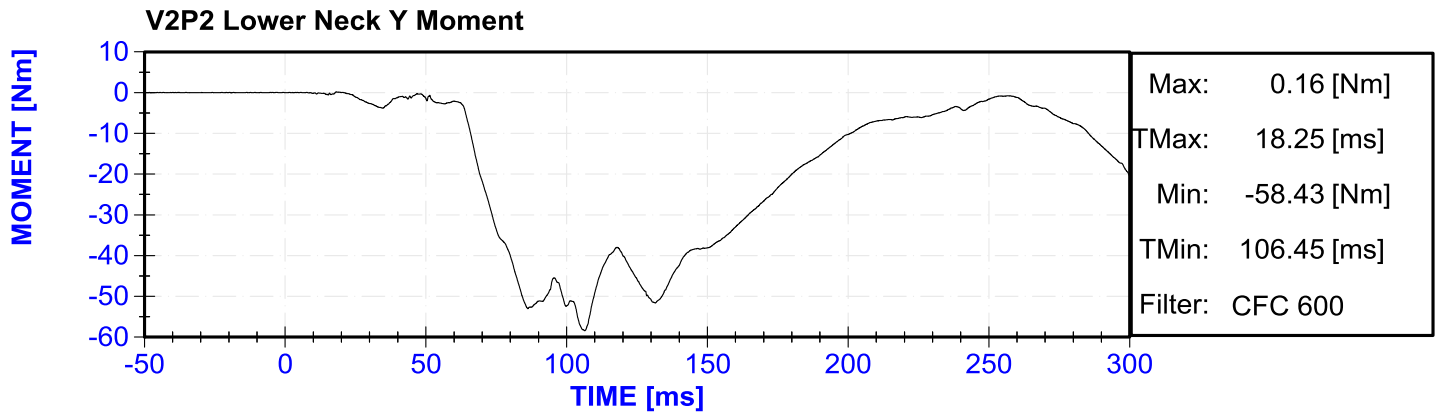


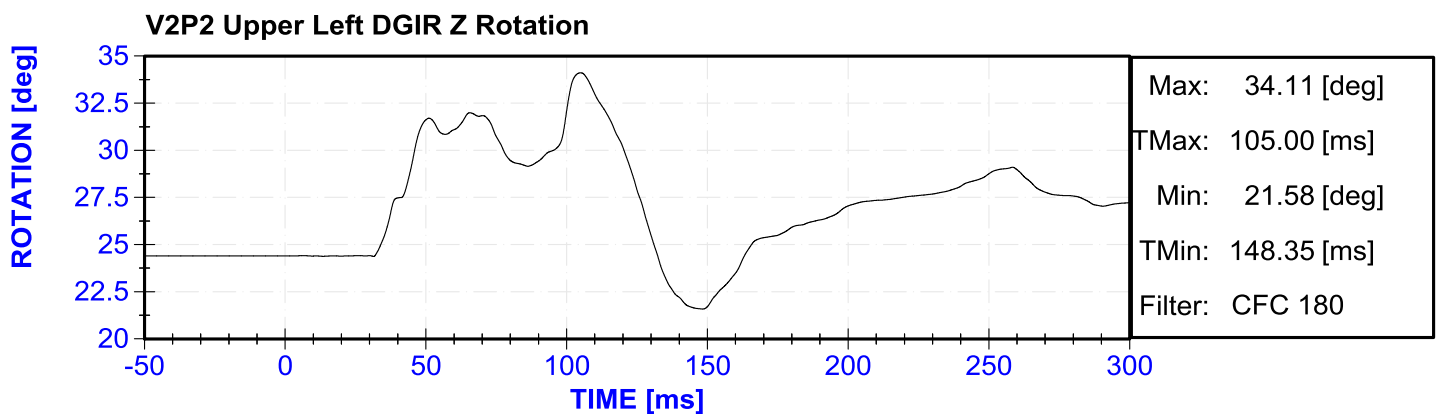
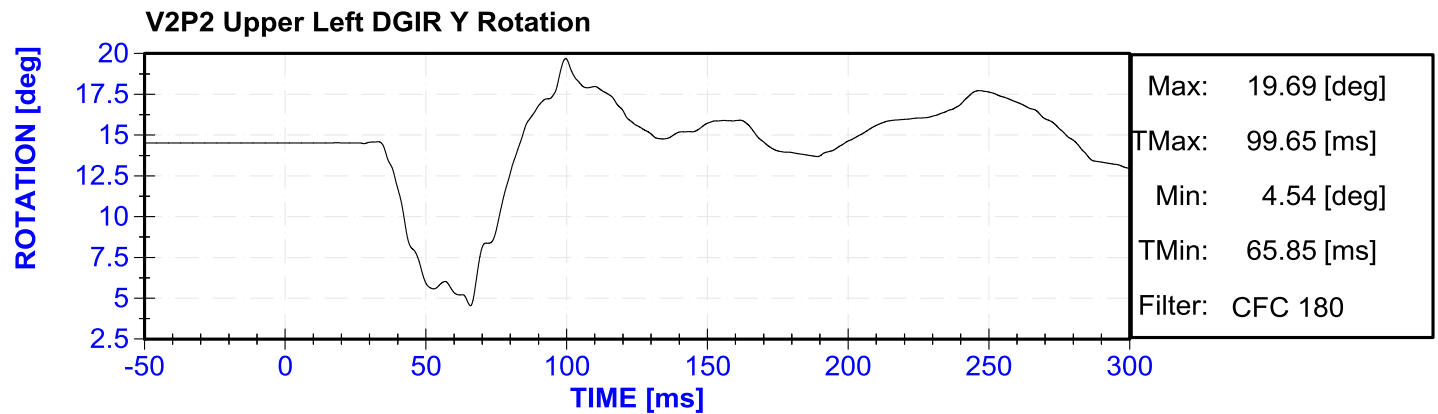
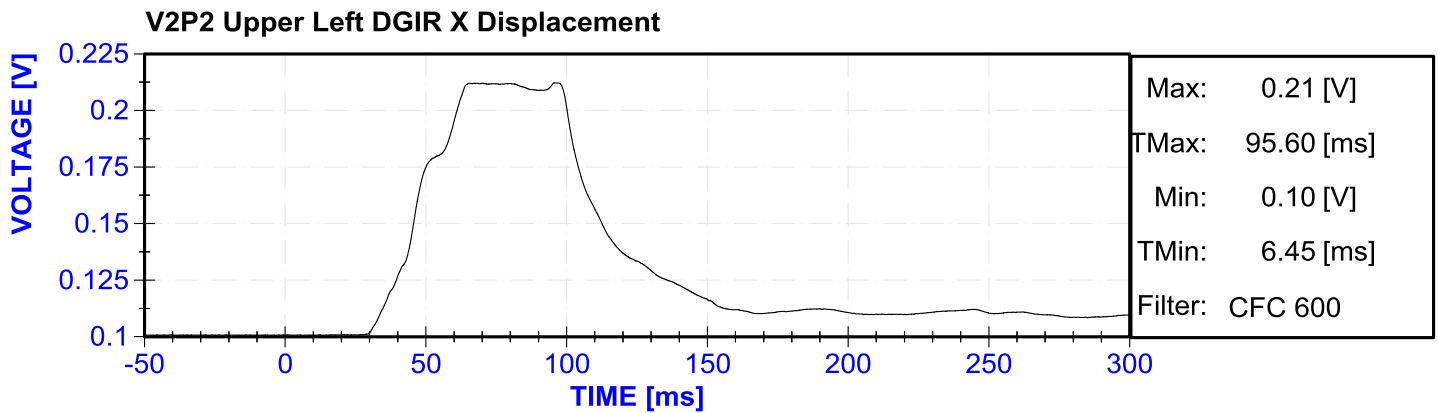
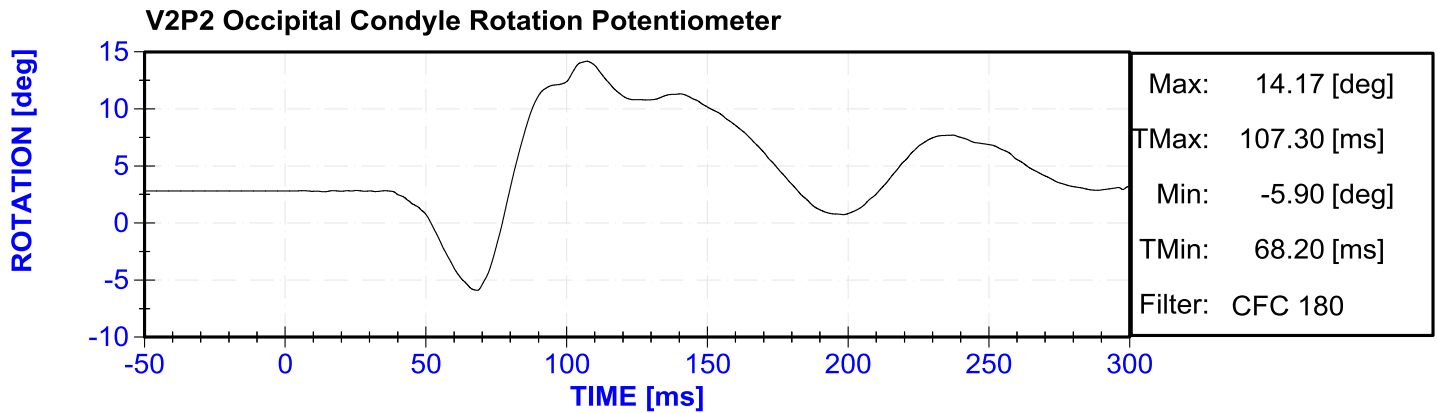


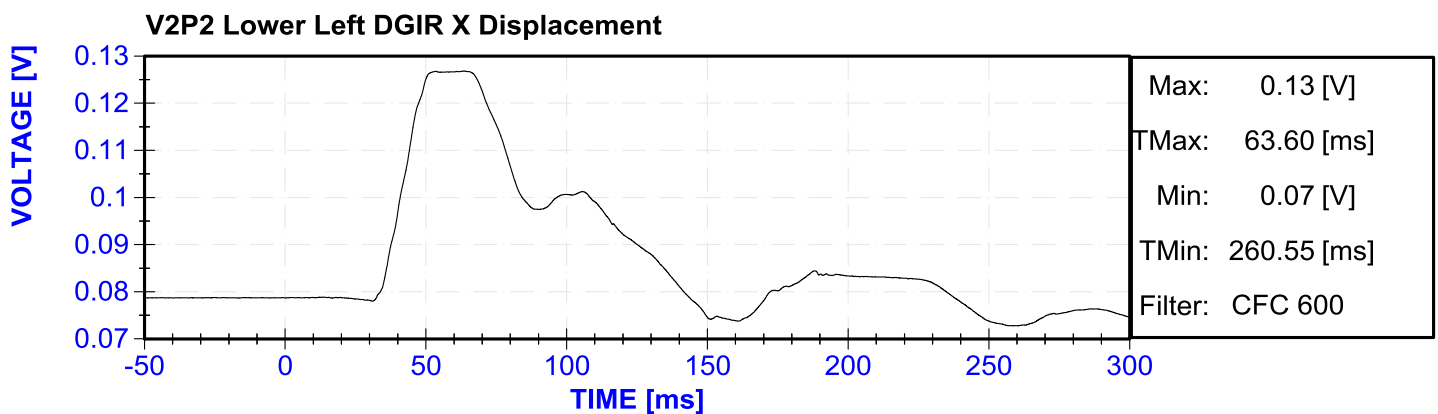
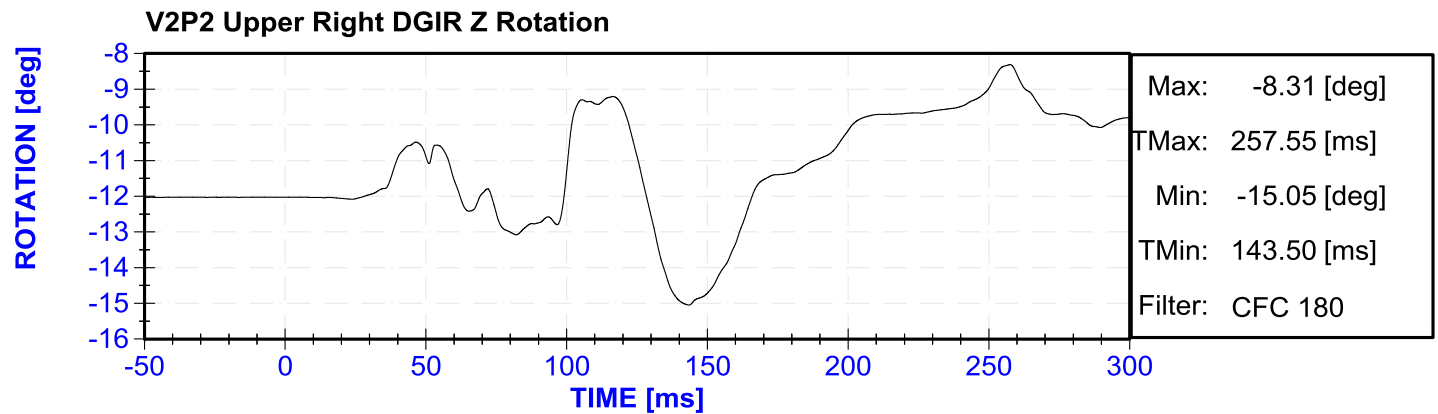
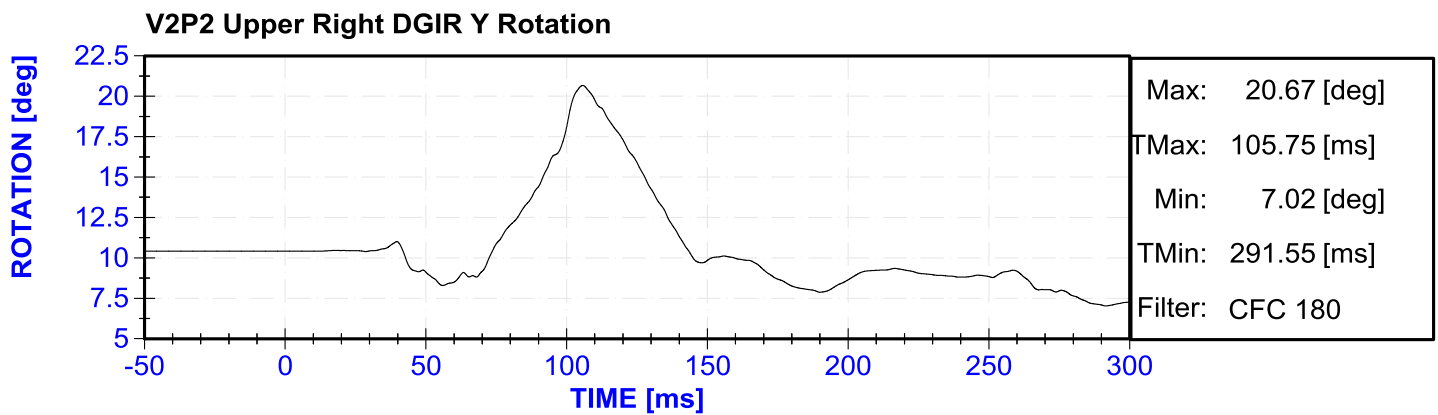
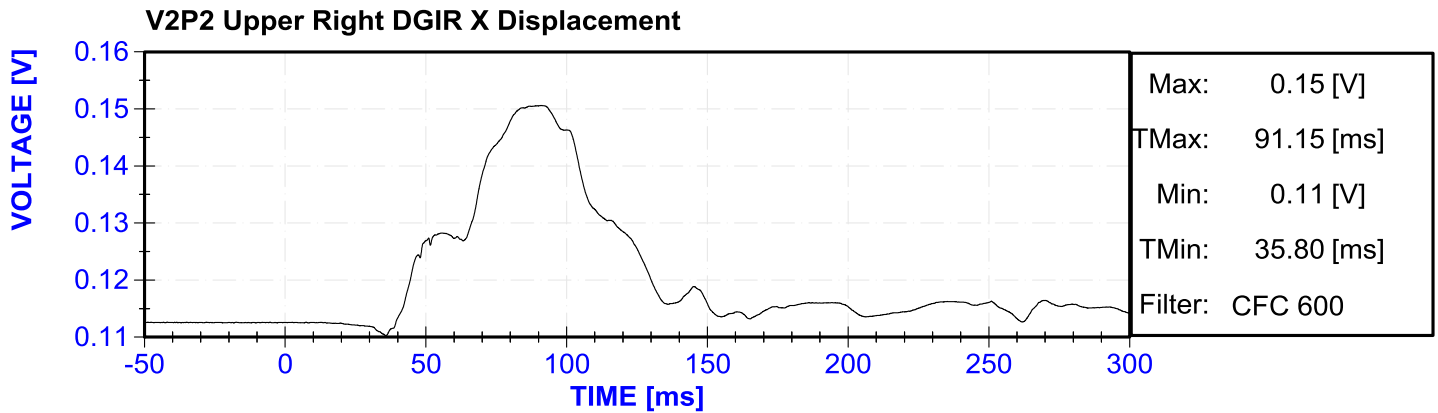


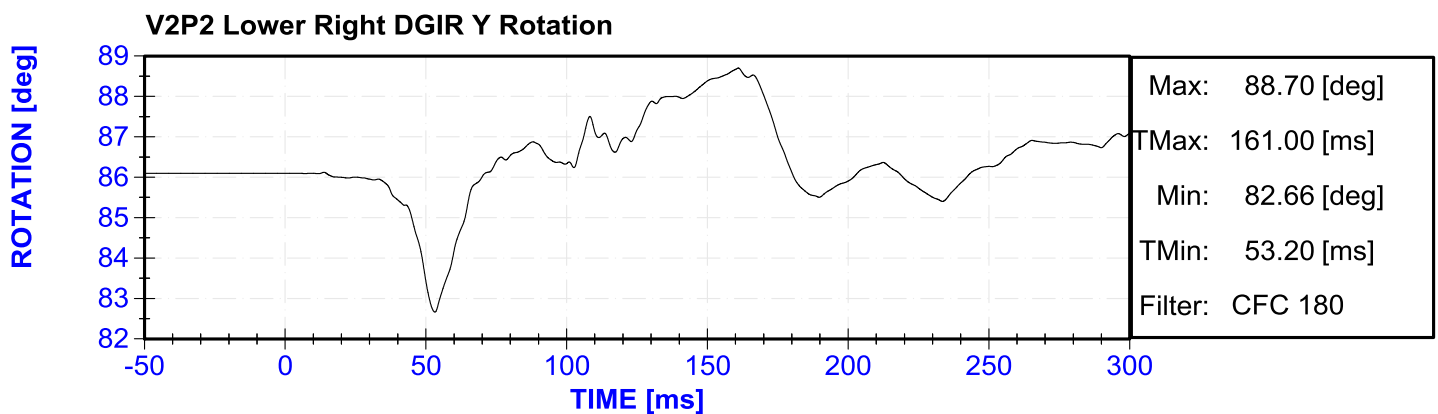
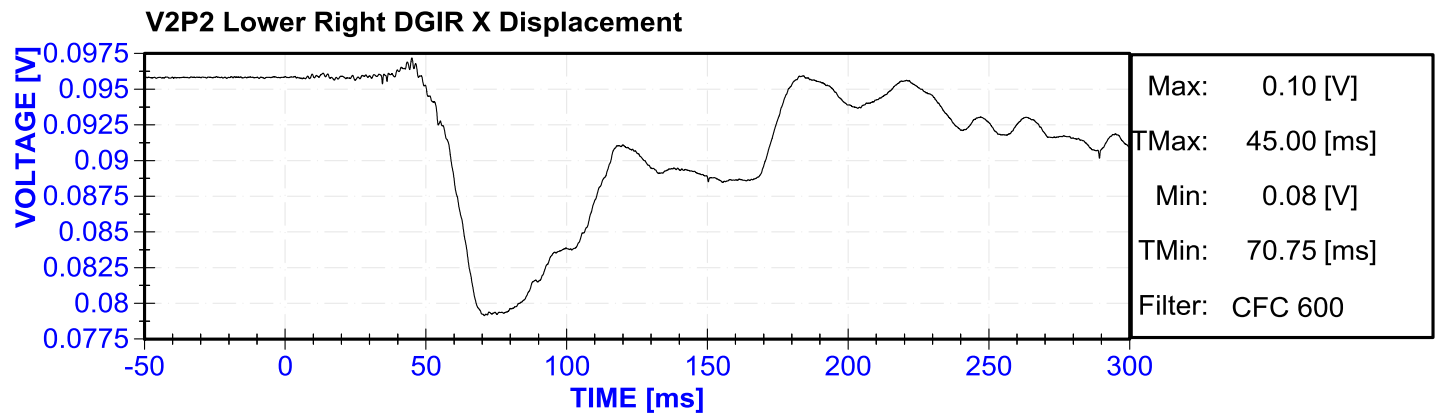
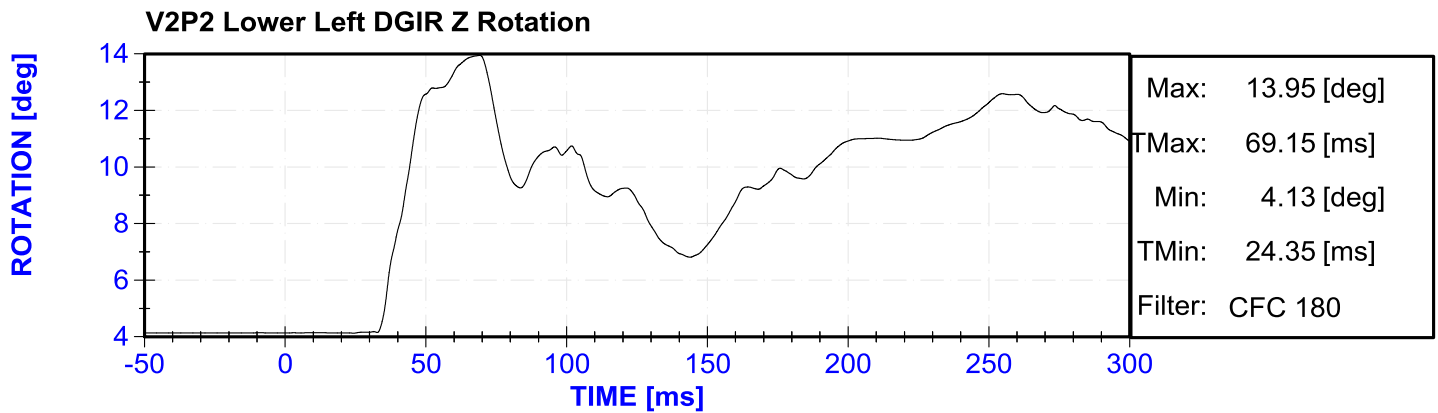
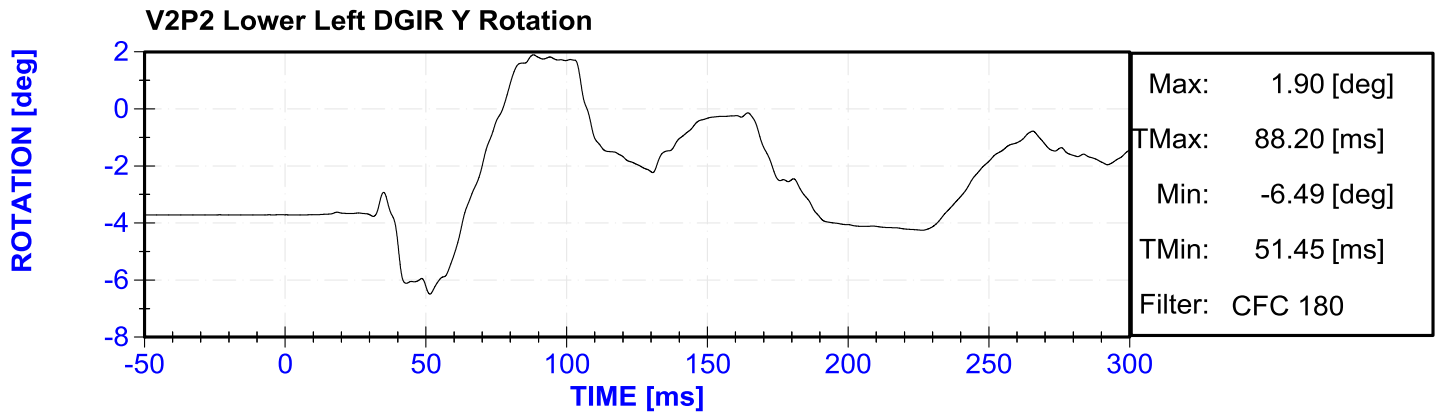


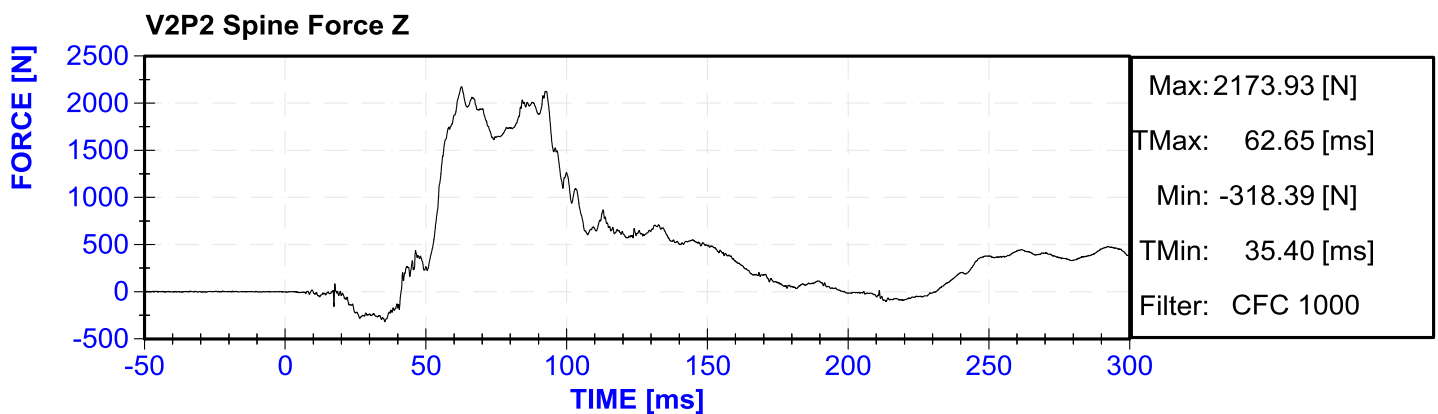
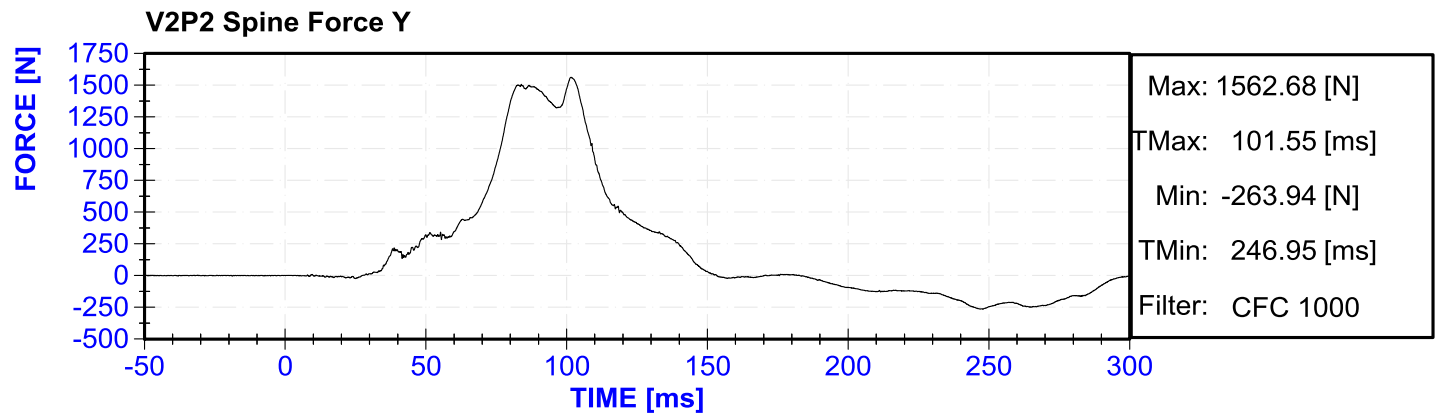
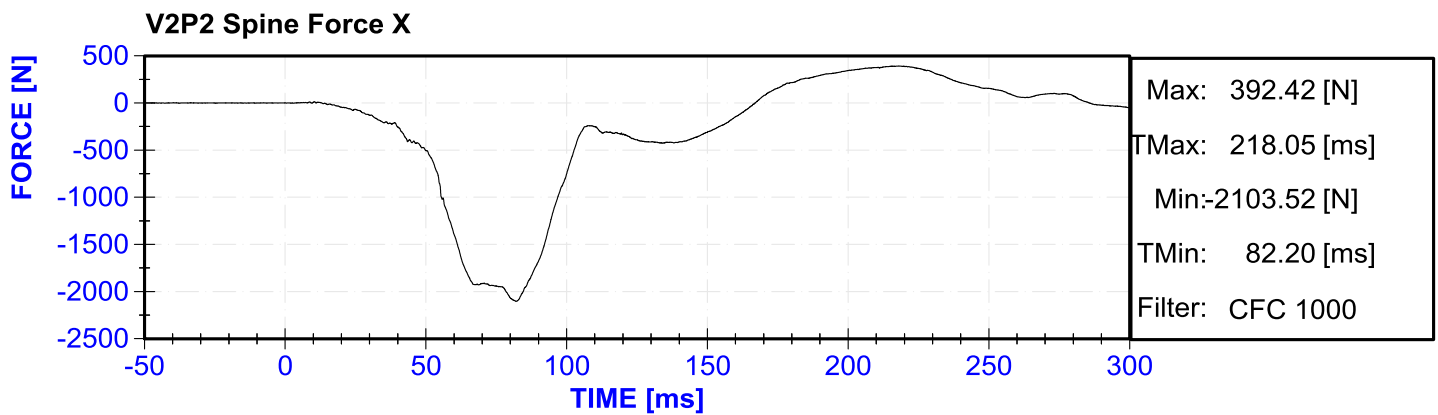
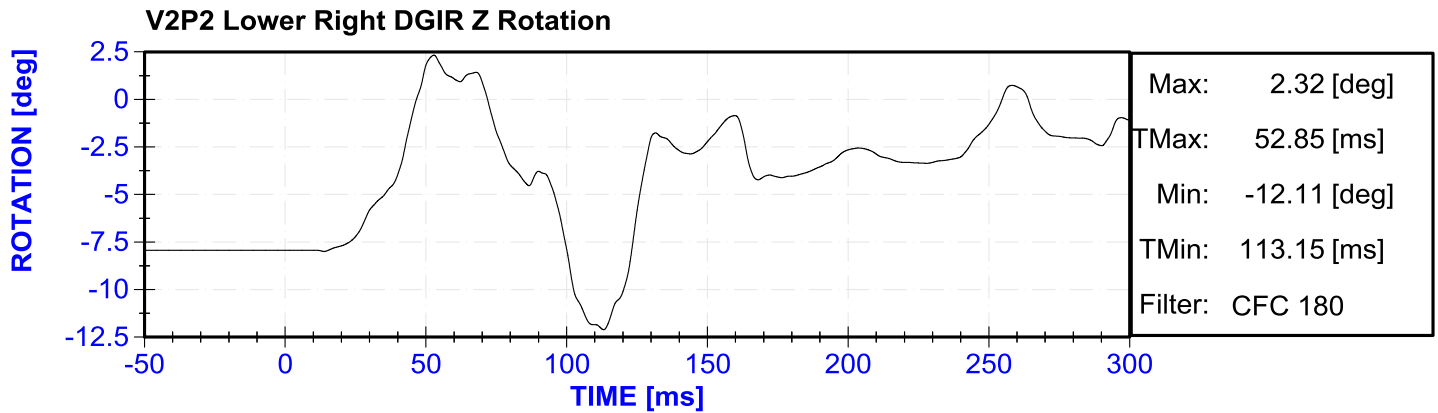


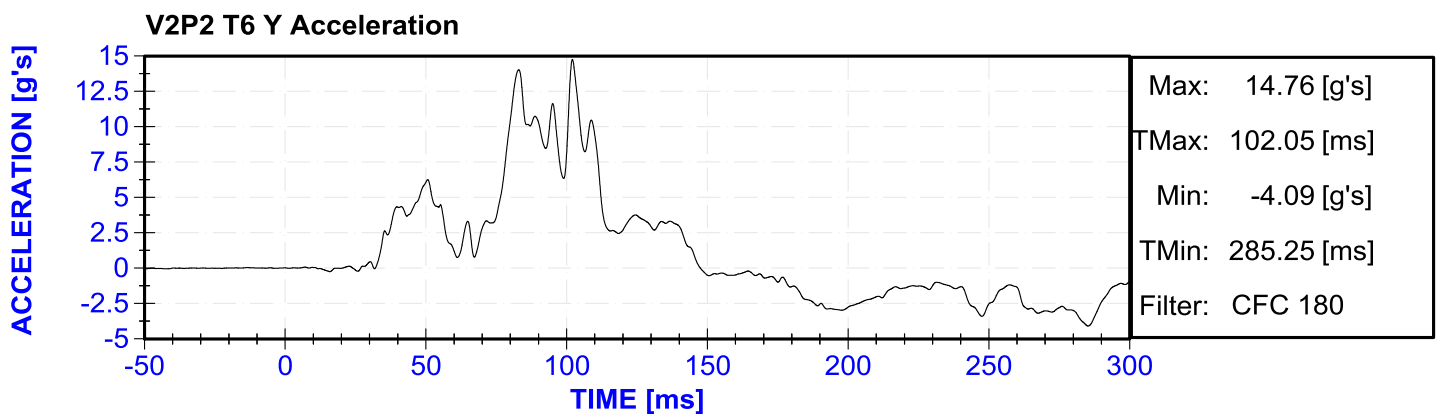
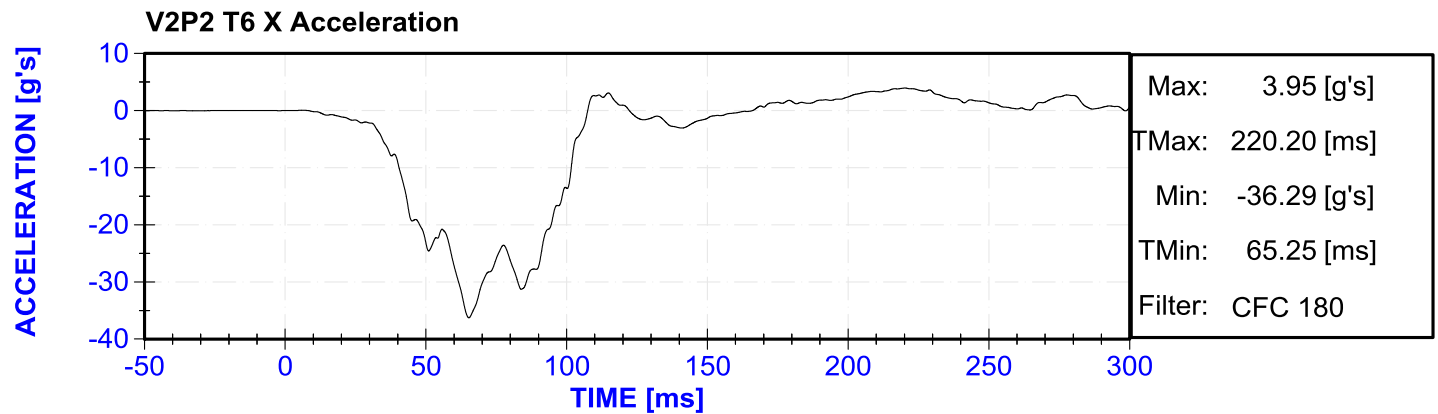
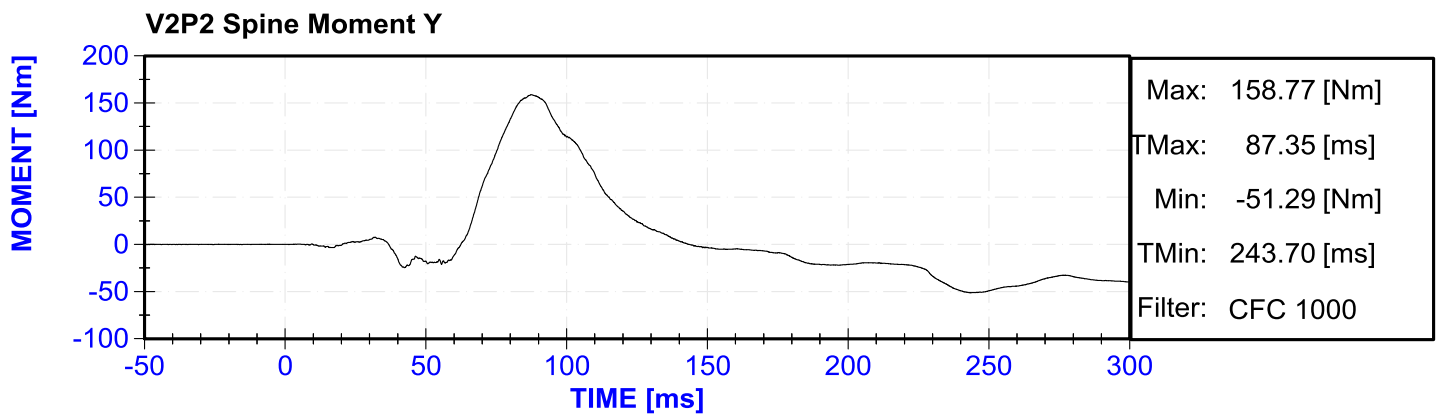
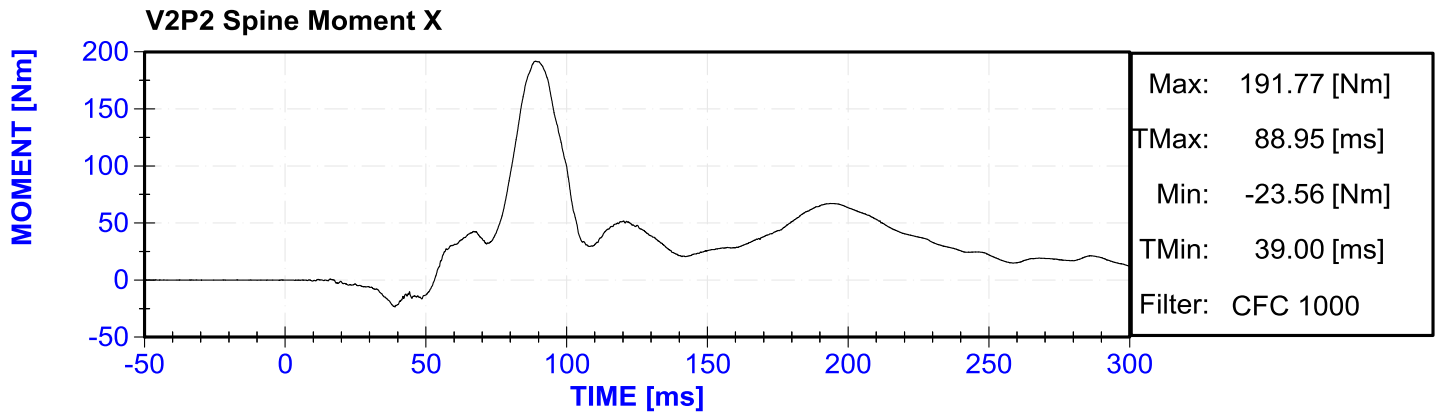


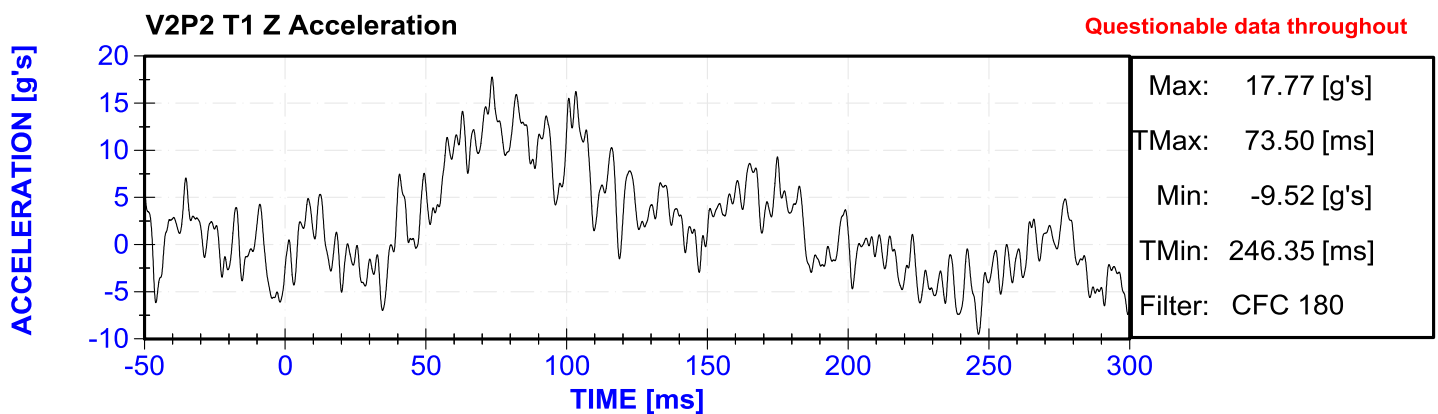
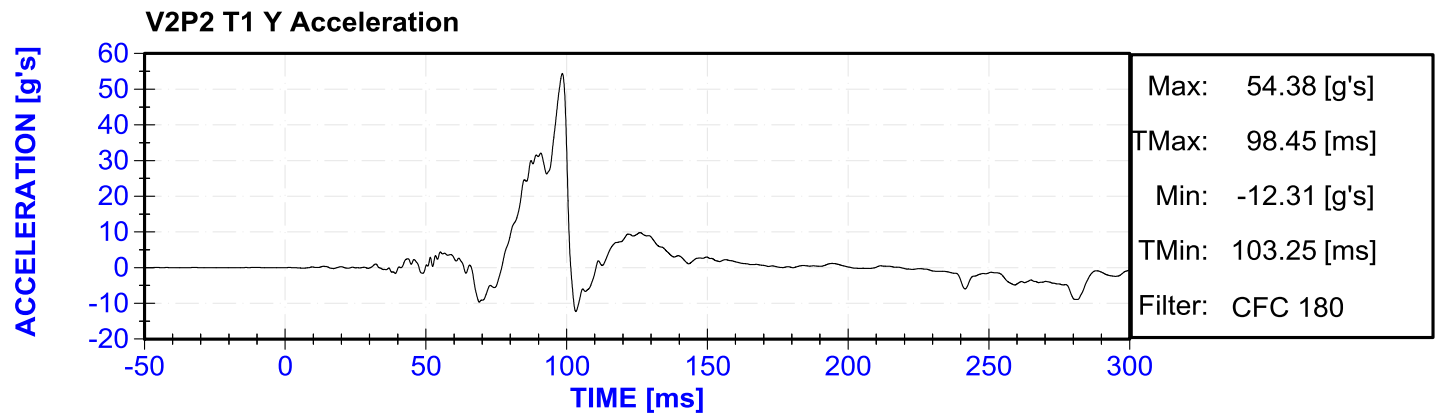
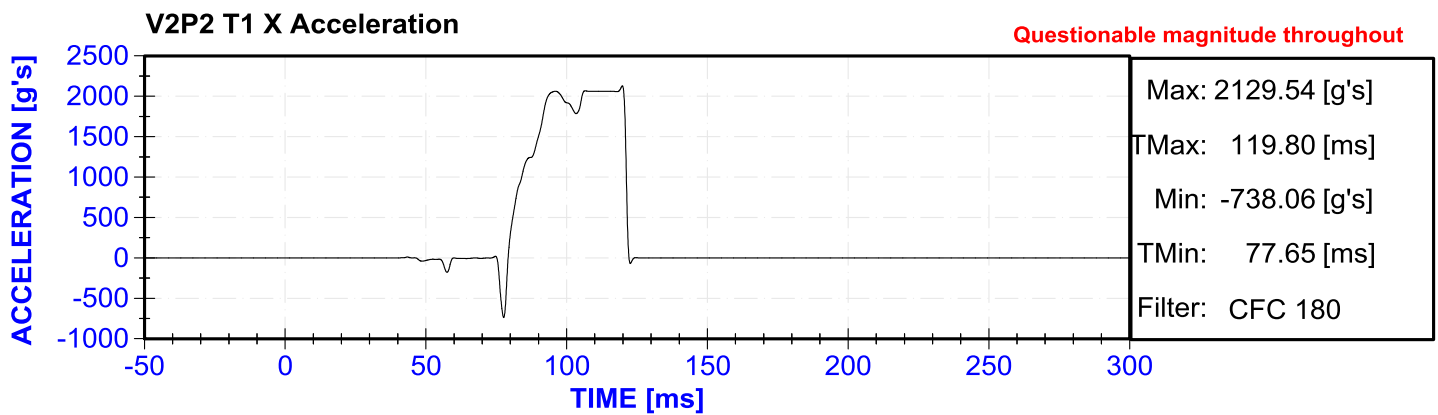
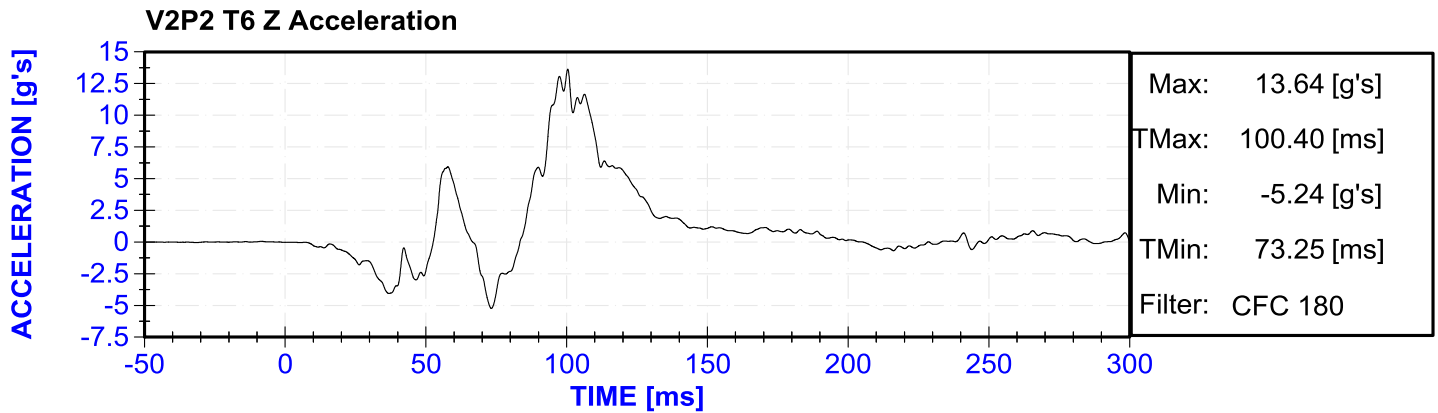






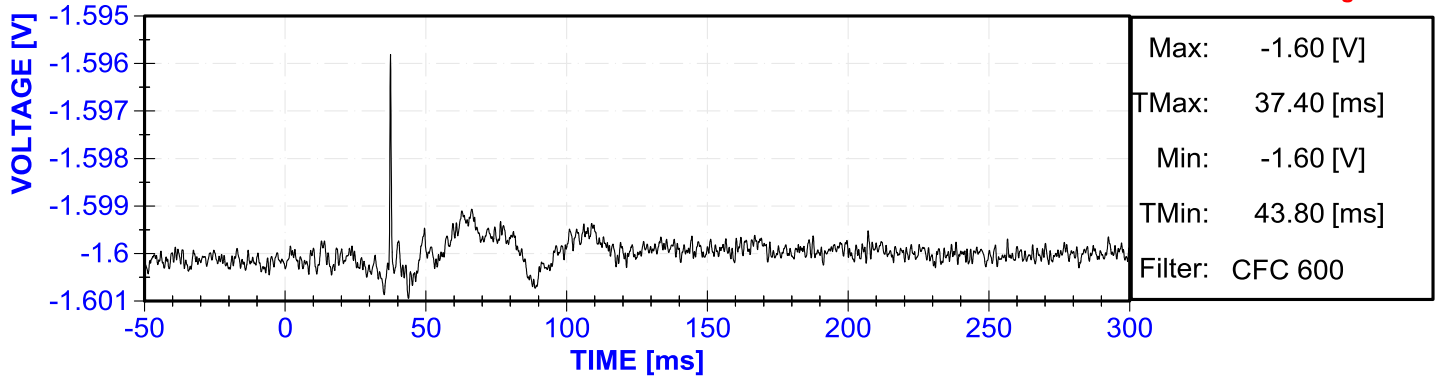






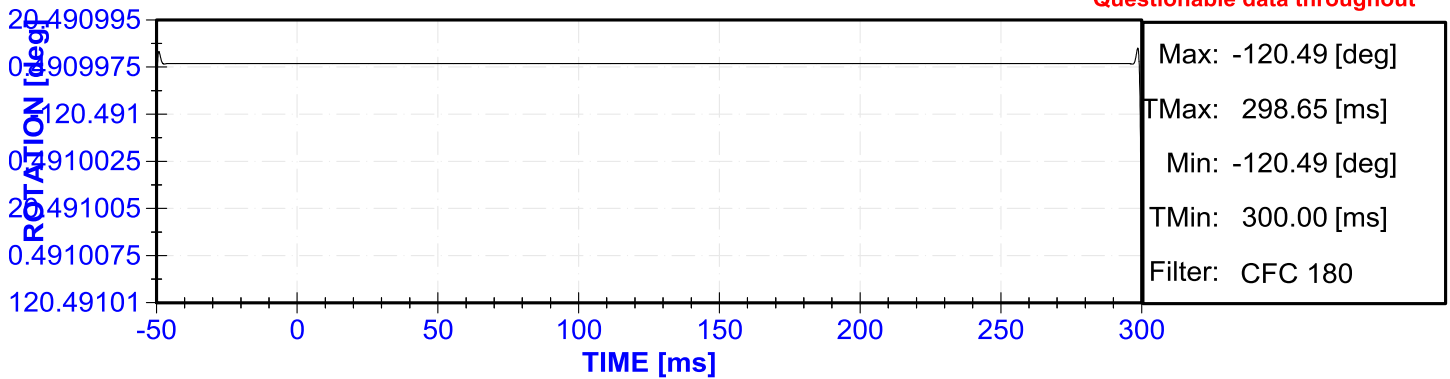
V2P2 Abdomen Left DGIR X Displacement

Questionable data throughout

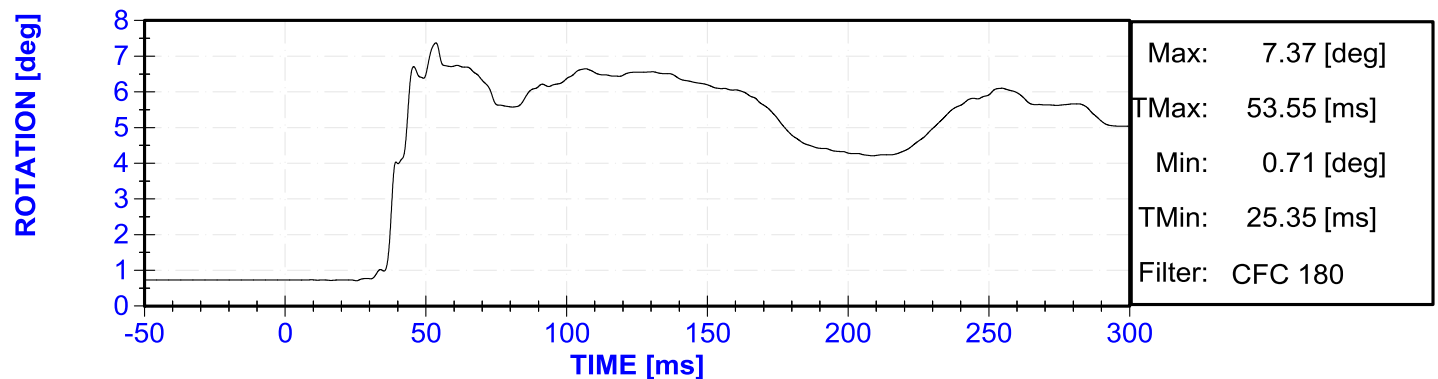


V2P2 Abdomen Left DGIR Y Rotation

Questionable data throughout

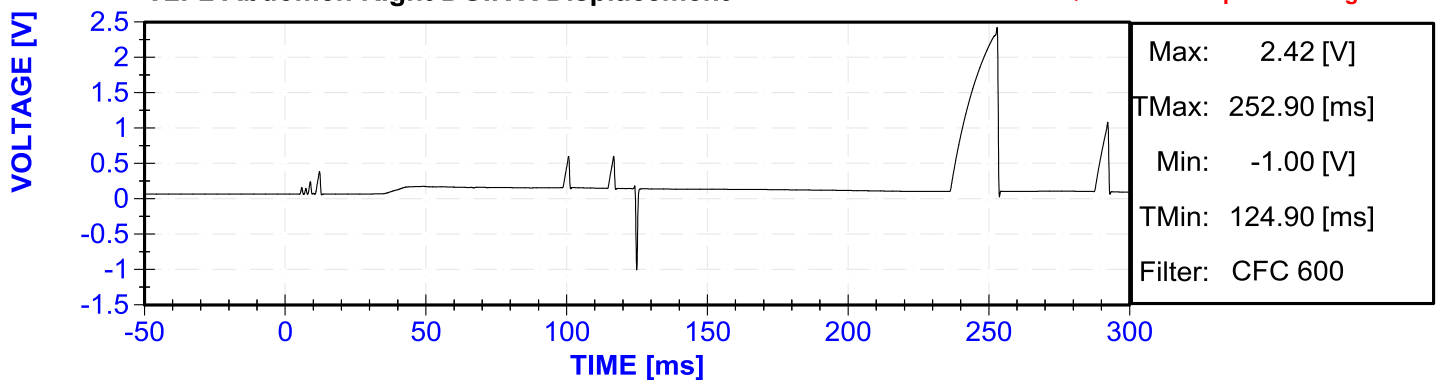


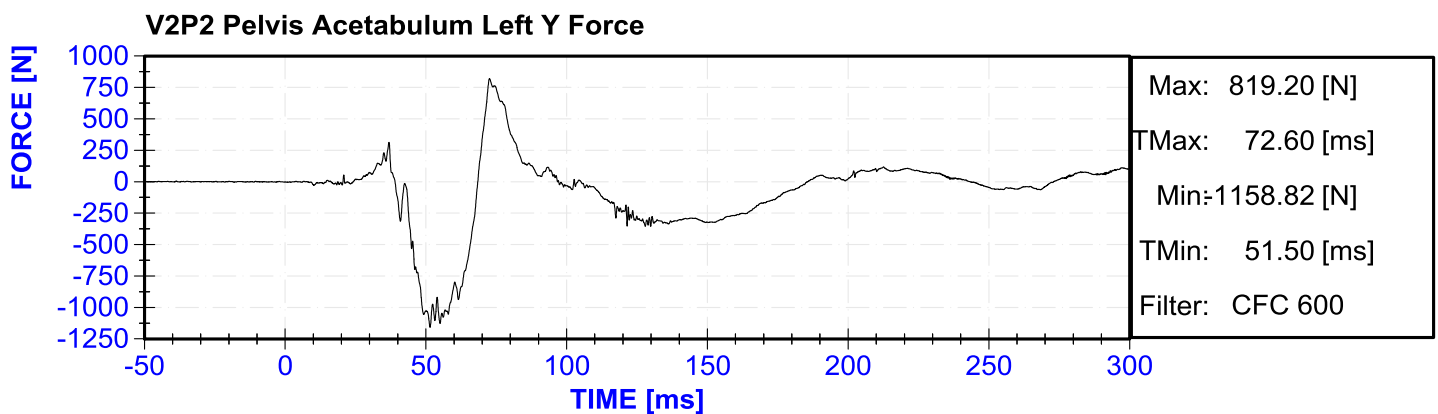
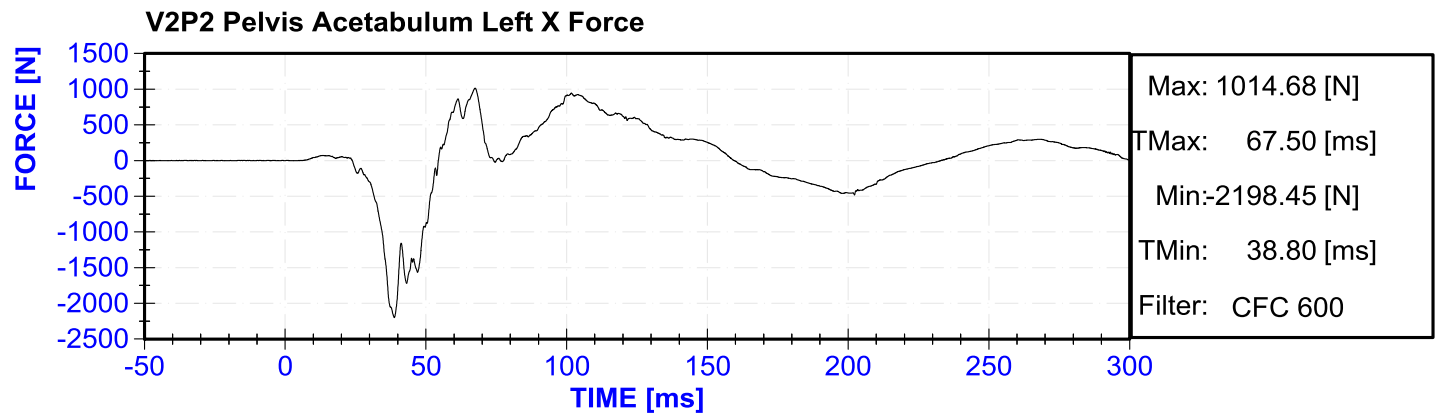
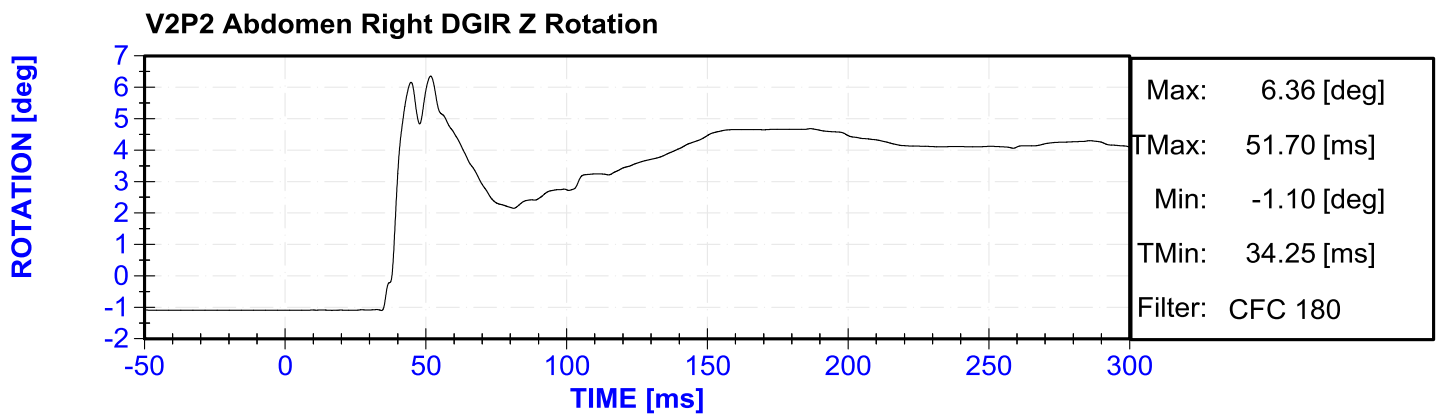
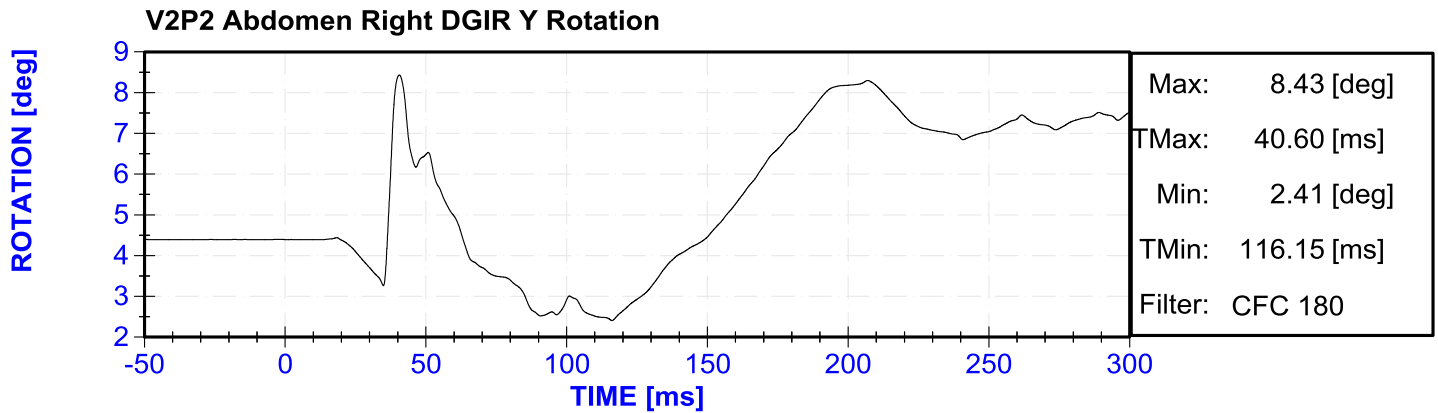
V2P2 Abdomen Left DGIR Z Rotation

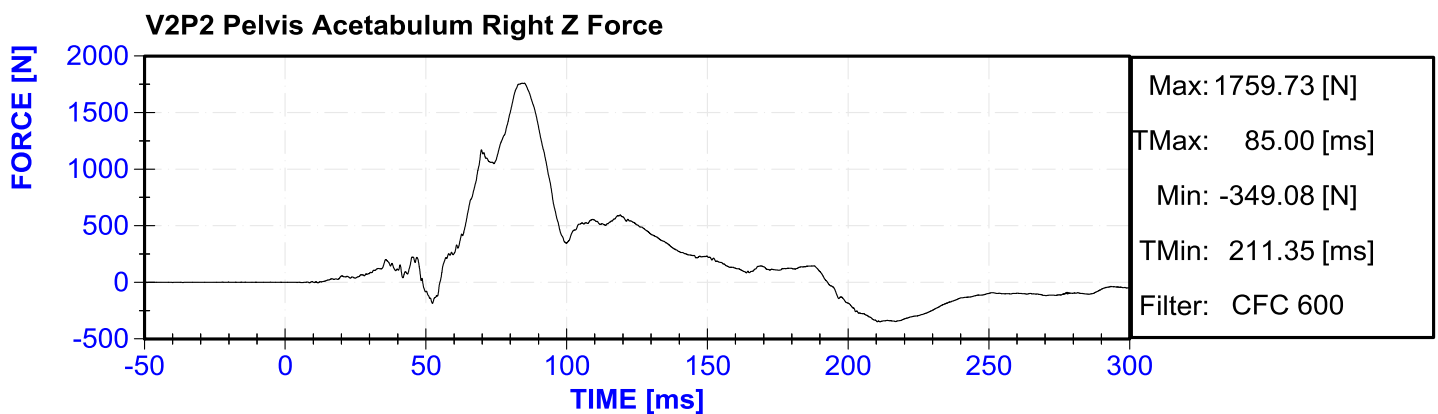
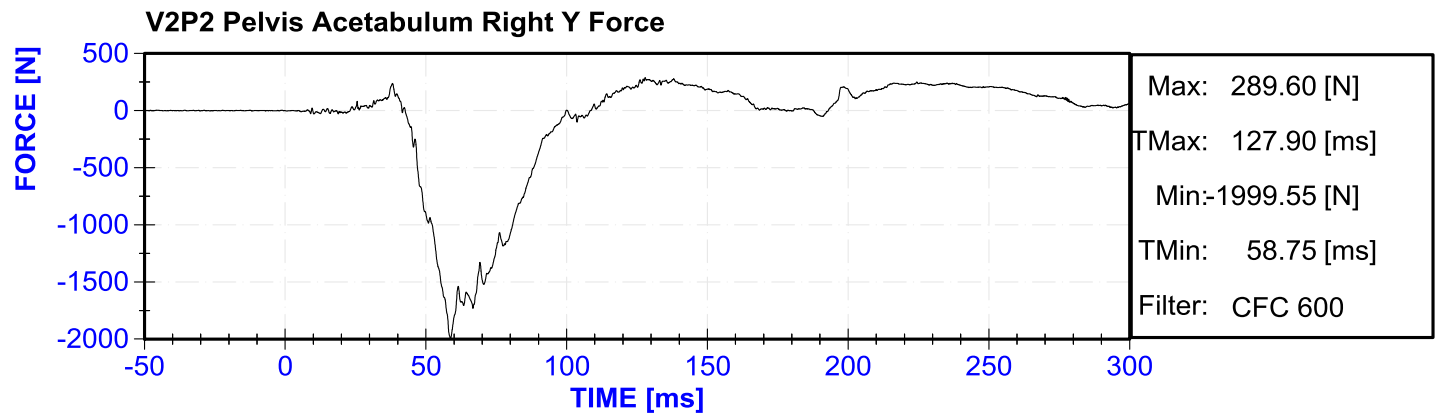
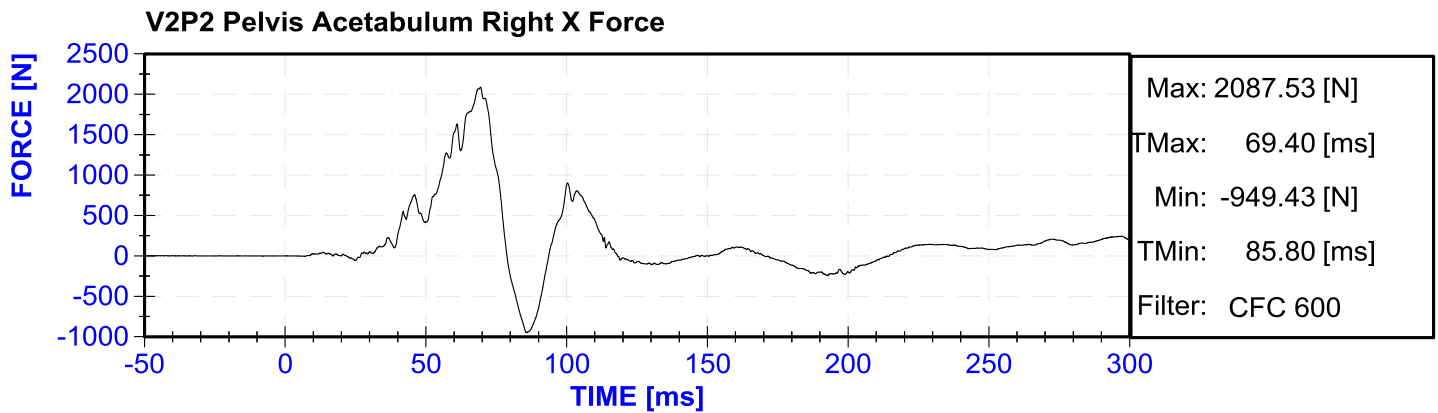
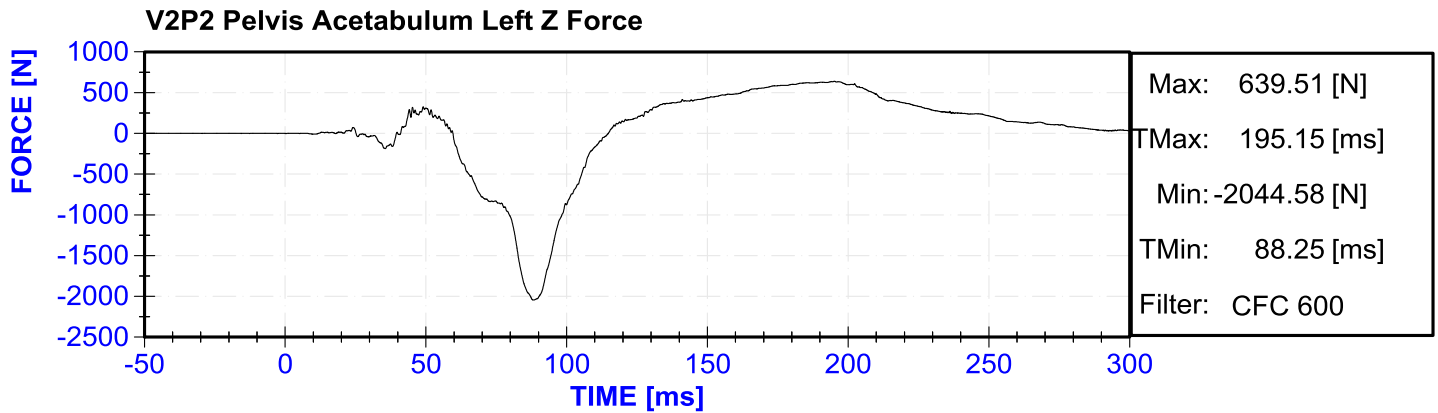


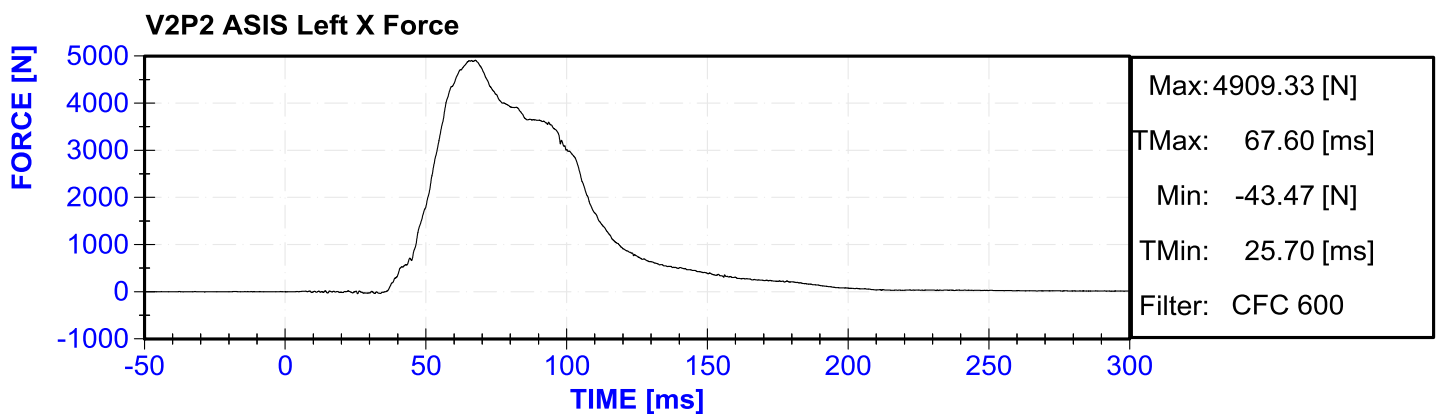
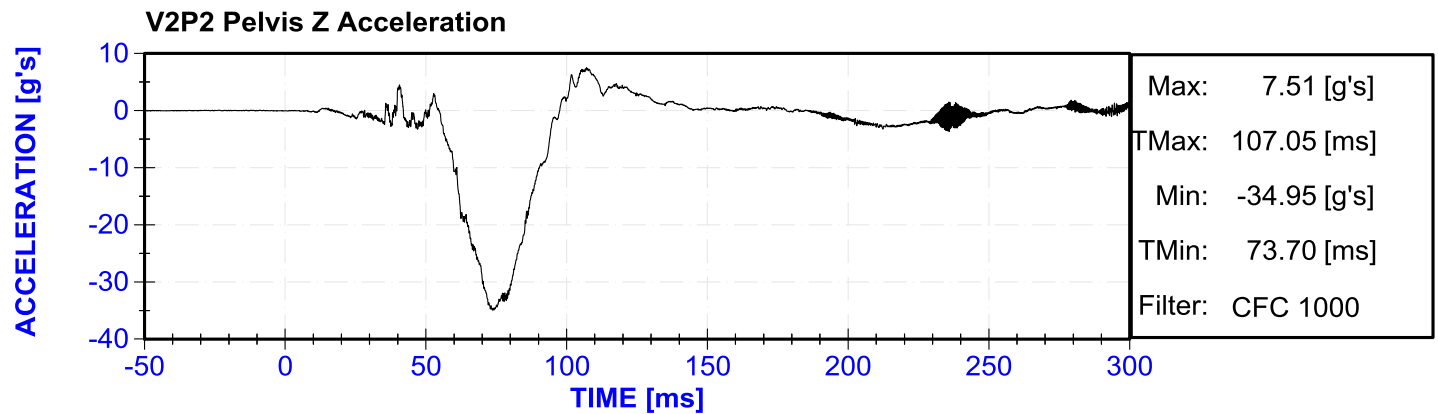
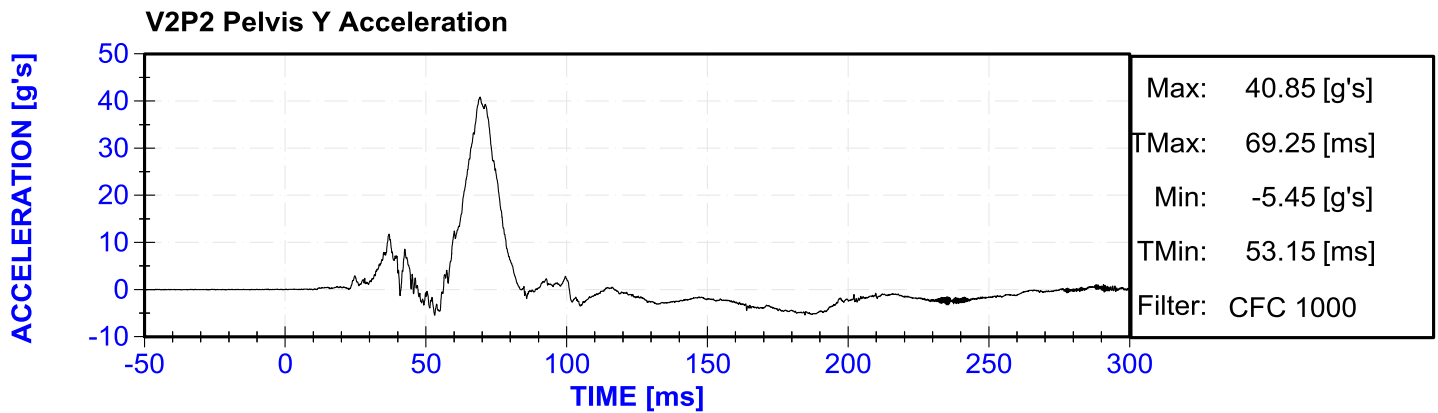
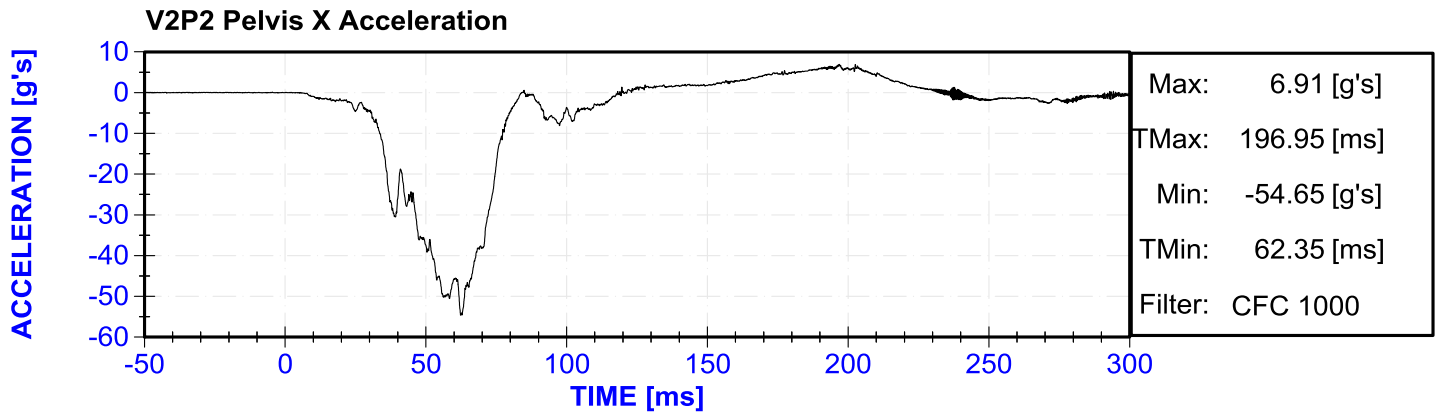
V2P2 Abdomen Right DGIR X Displacement

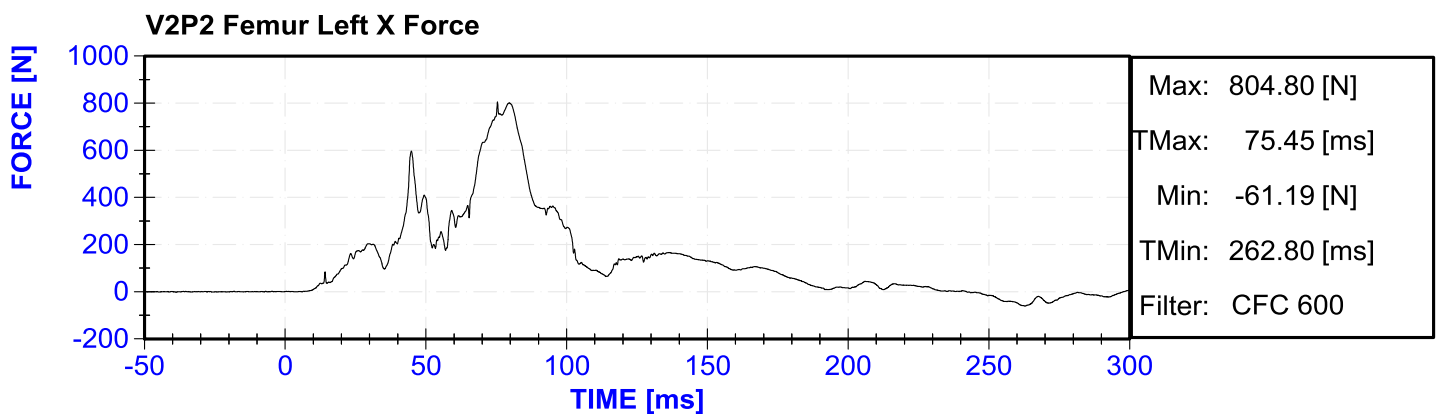
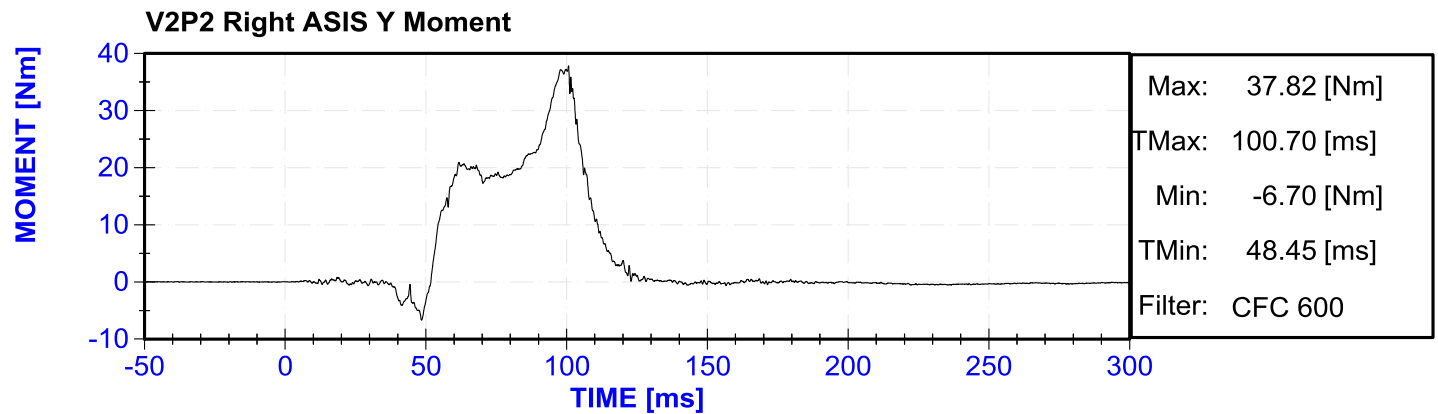
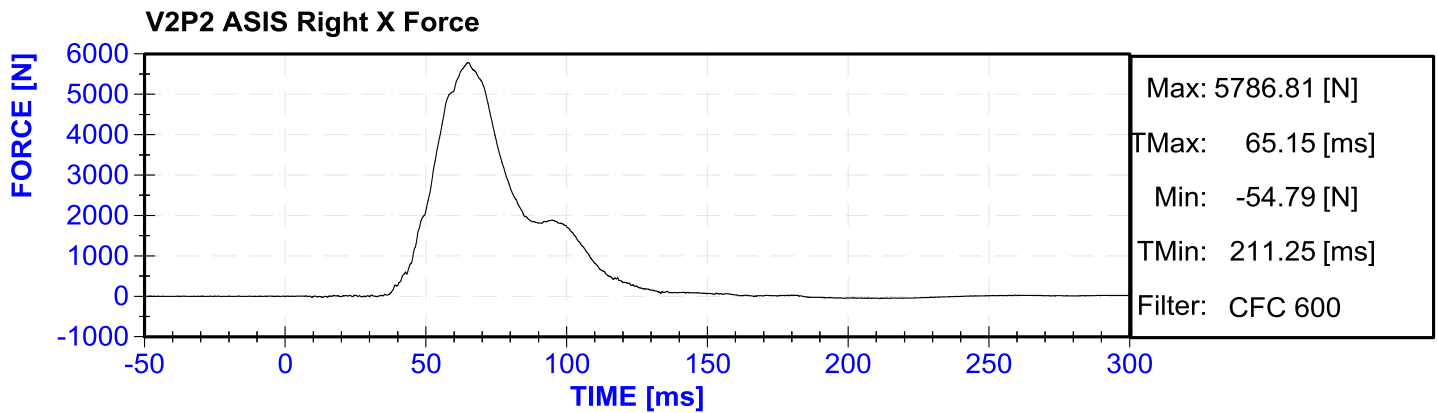
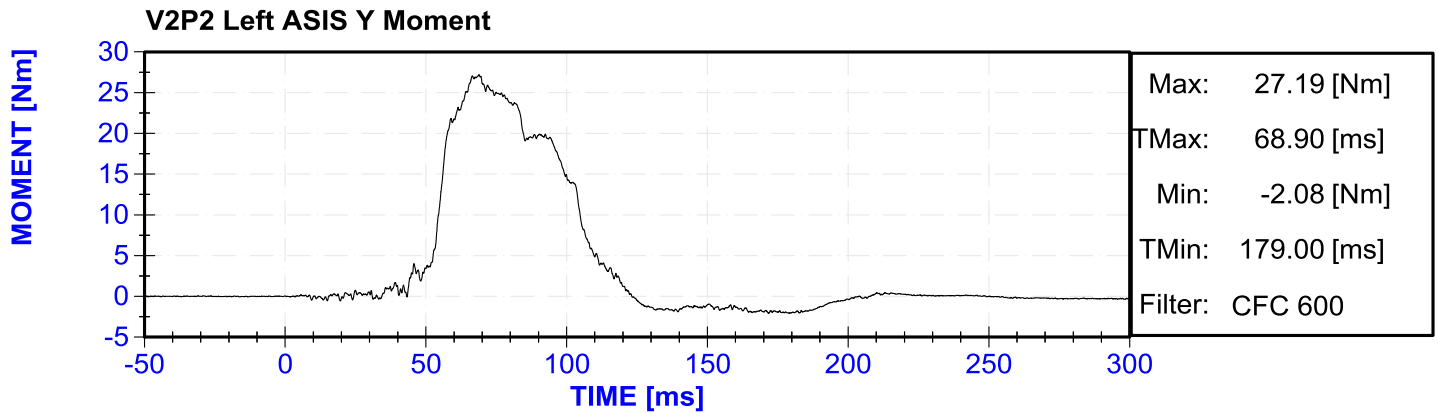
Questionable spikes throughout

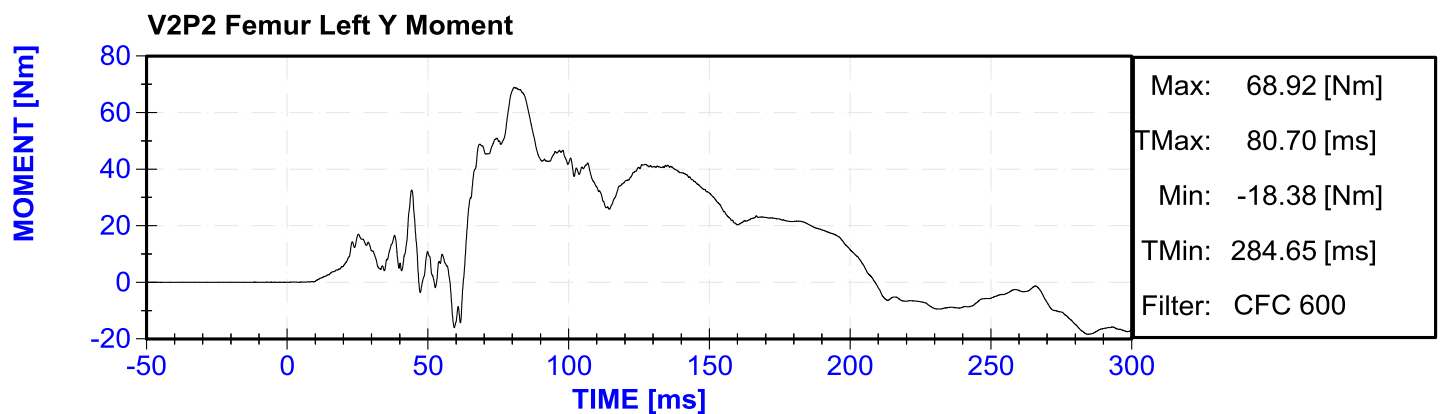
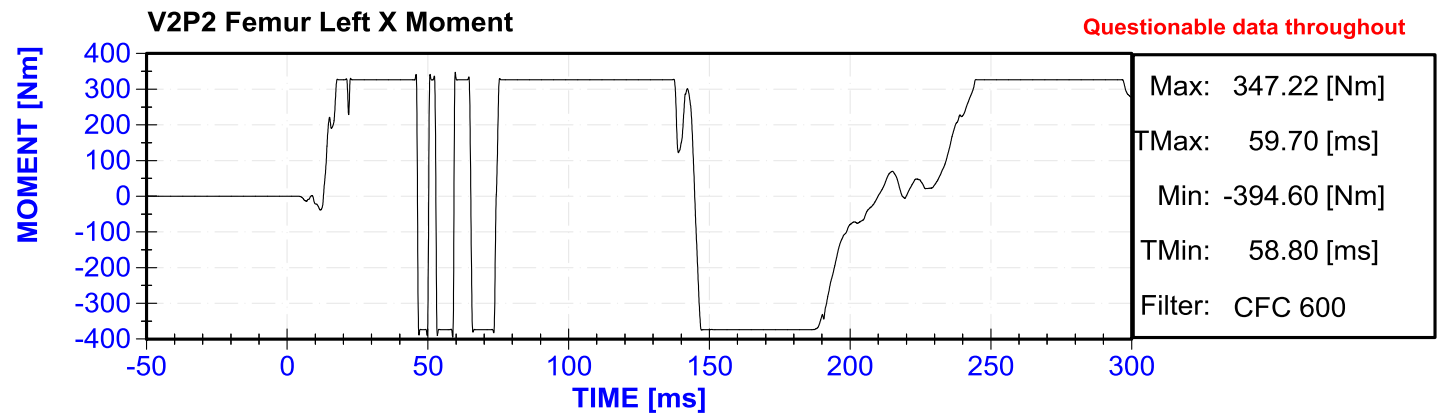
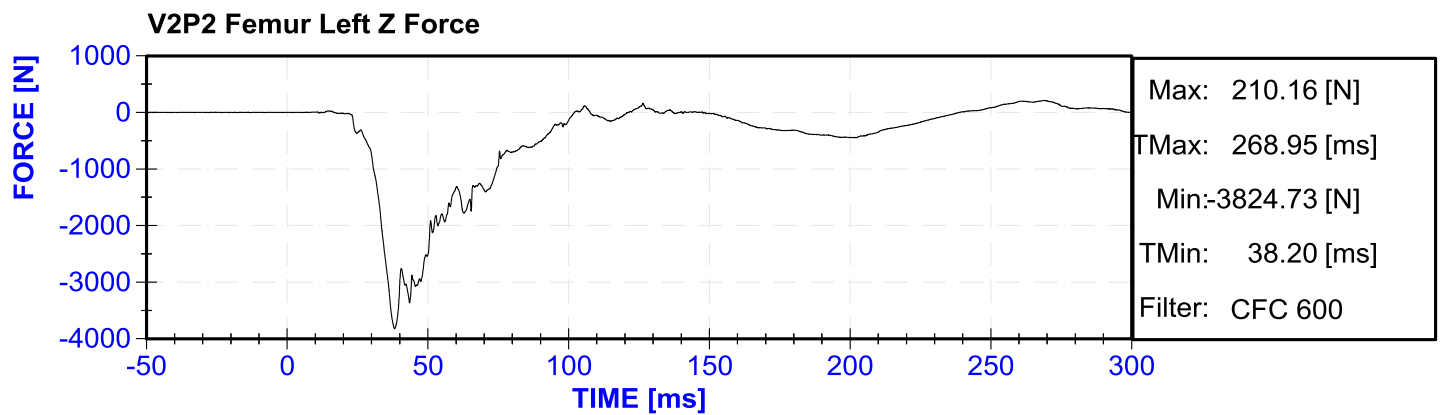
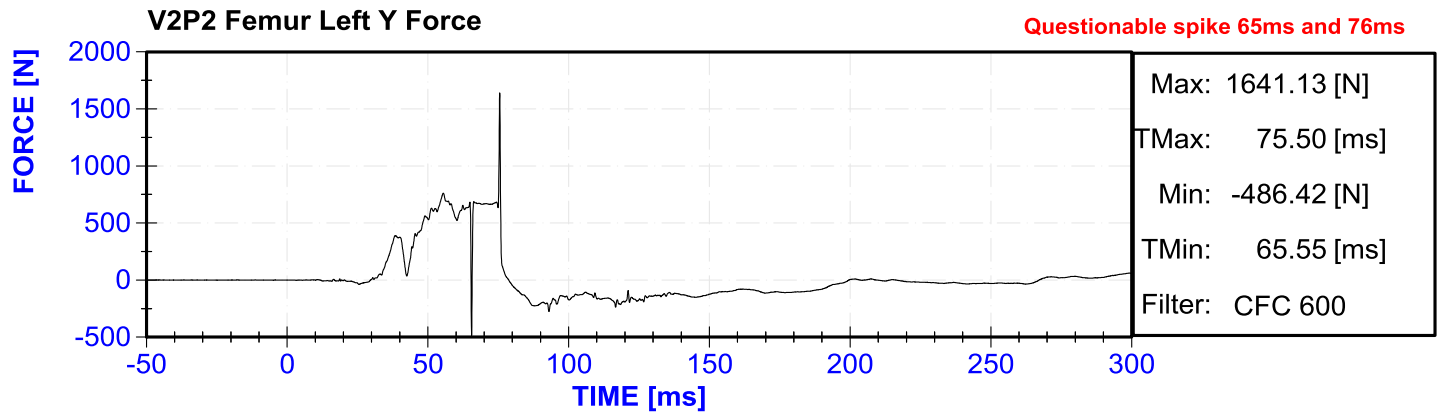


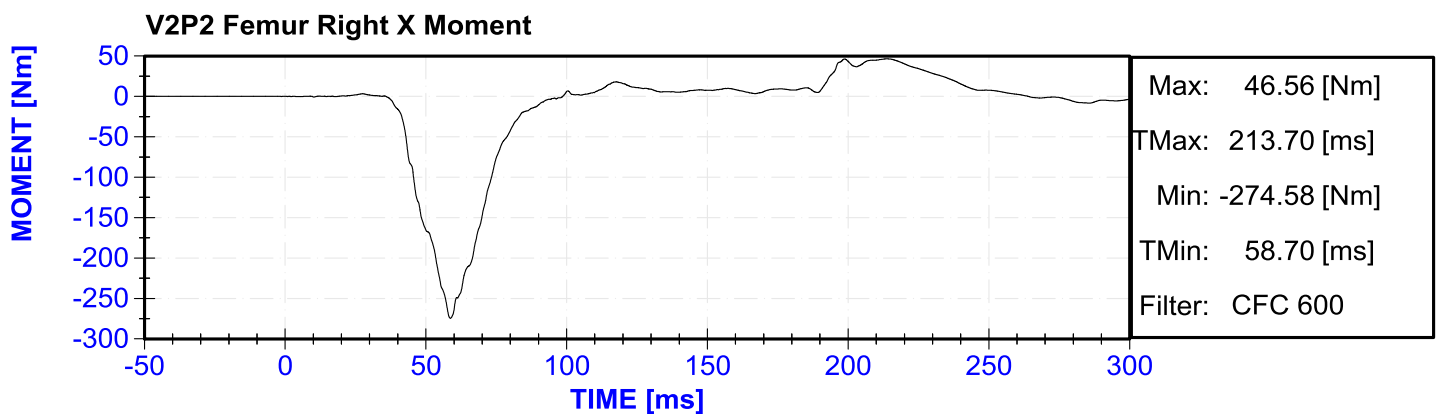
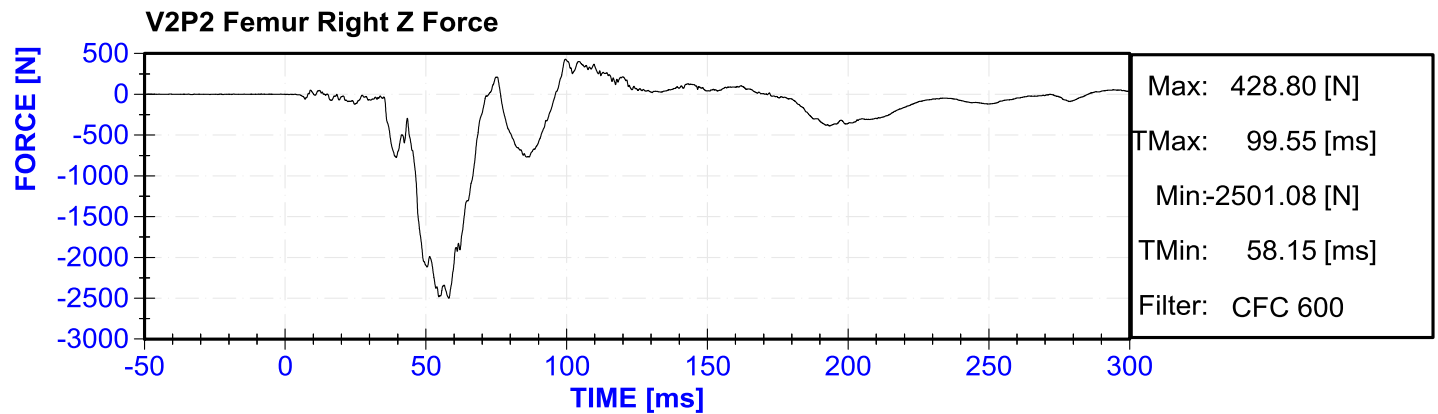
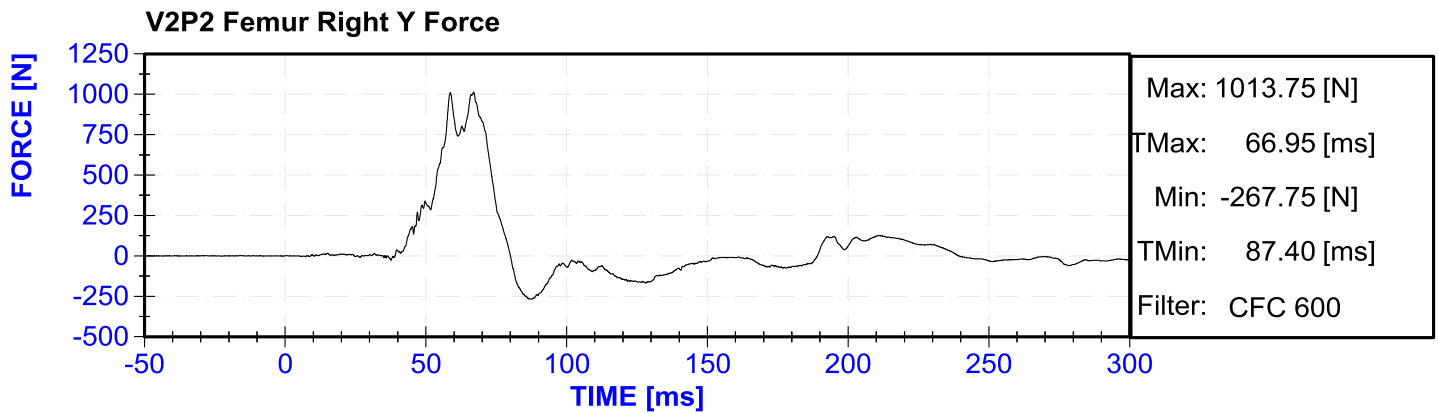
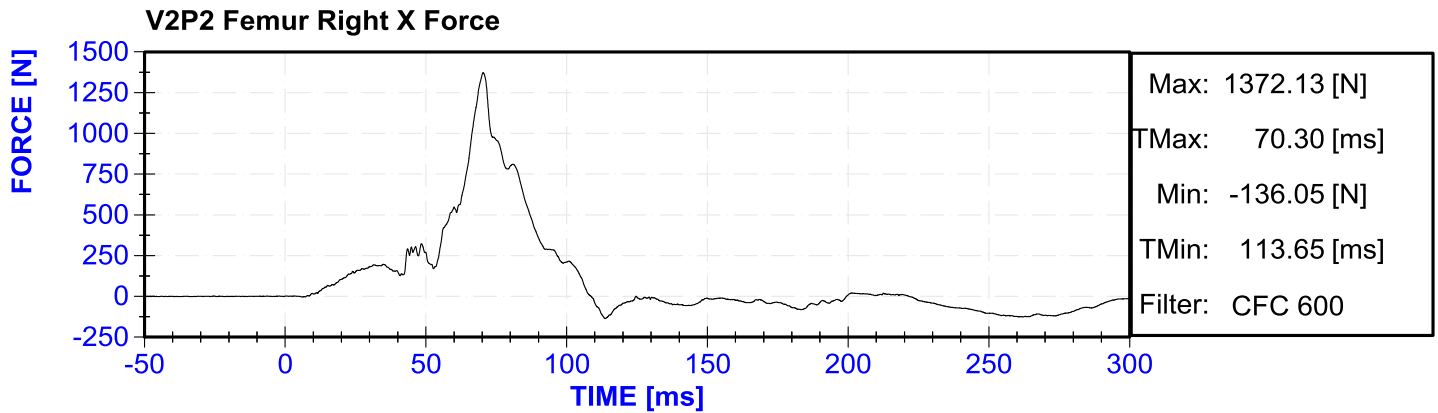


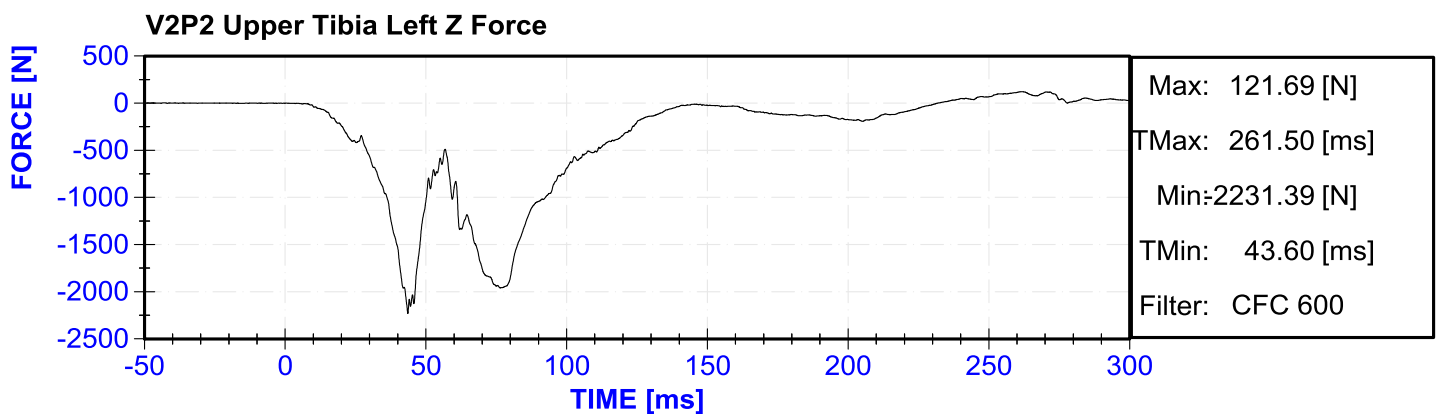
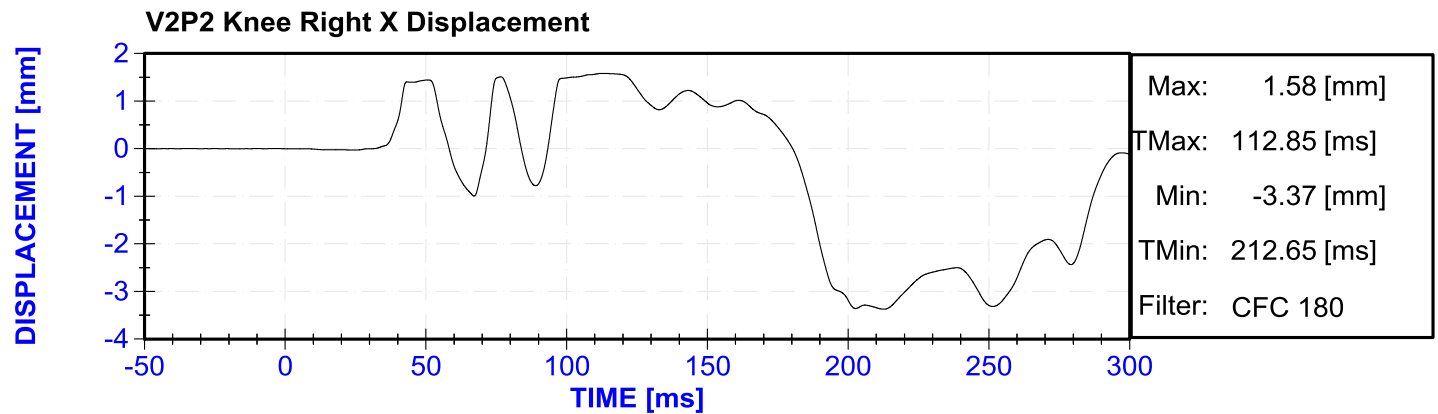
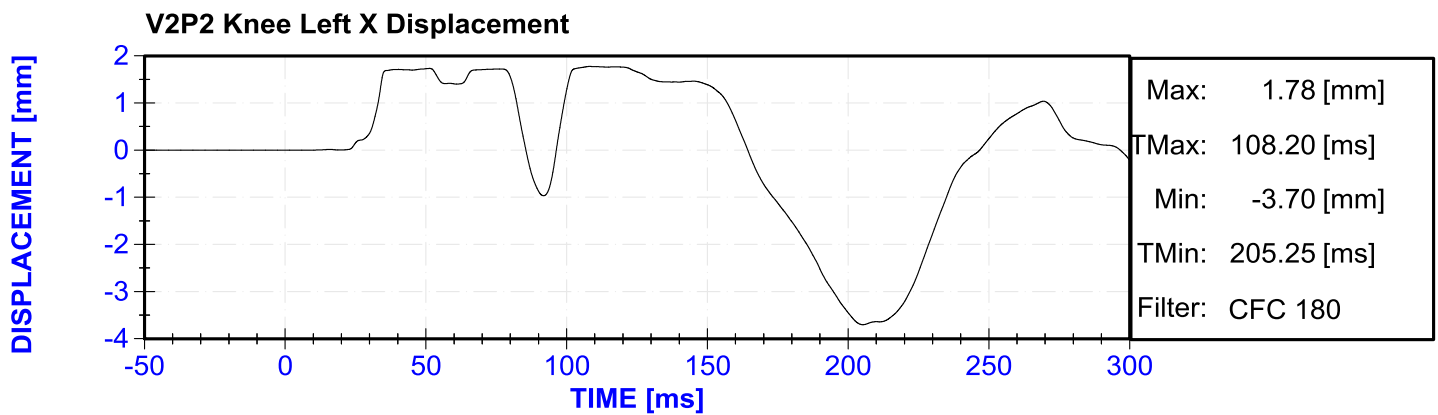
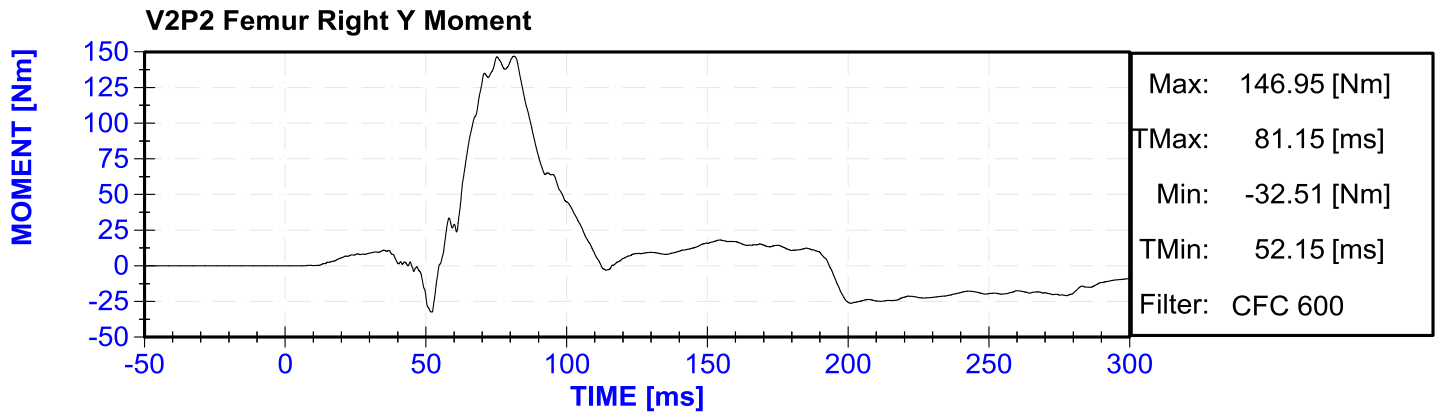


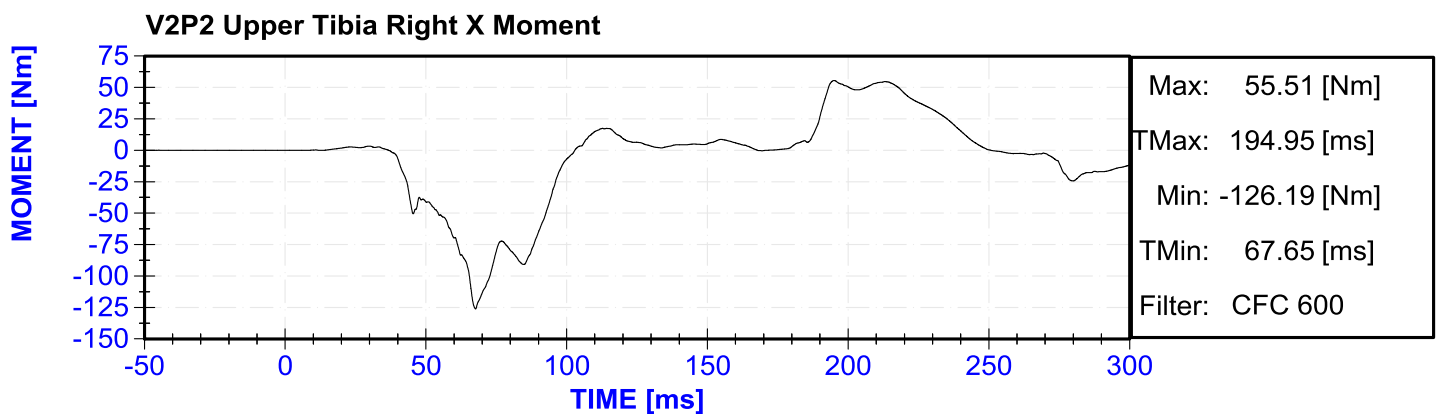
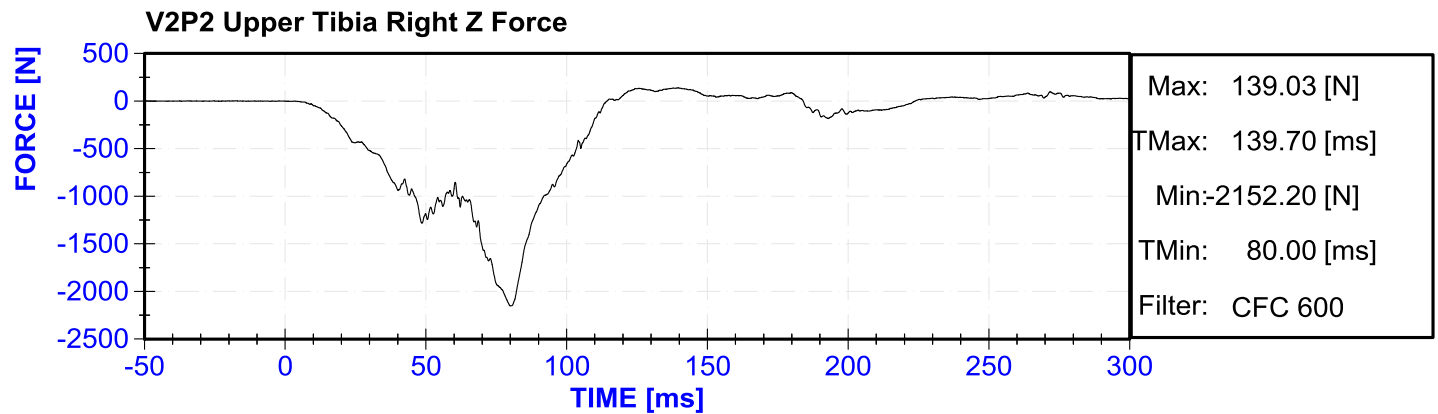
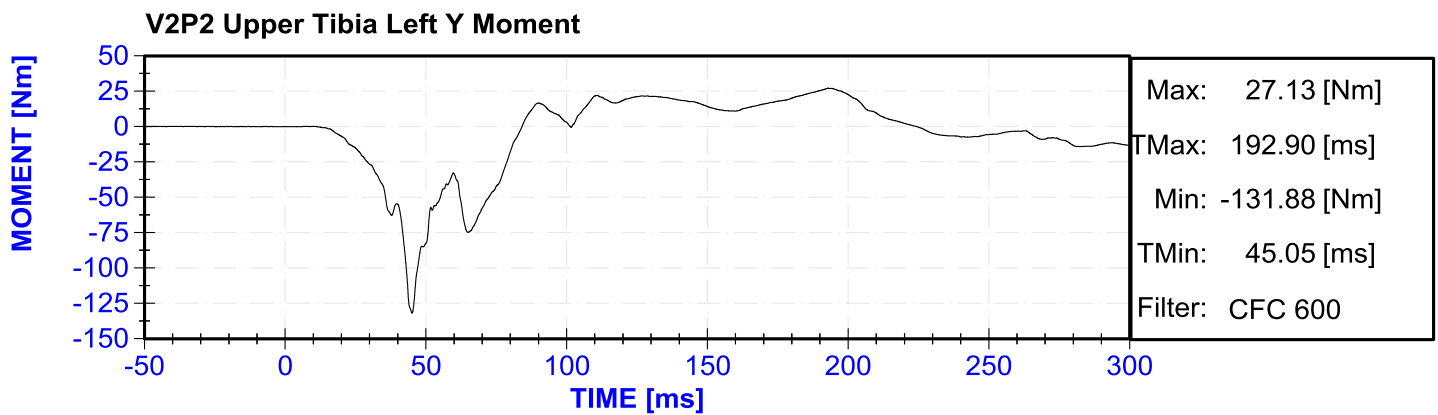
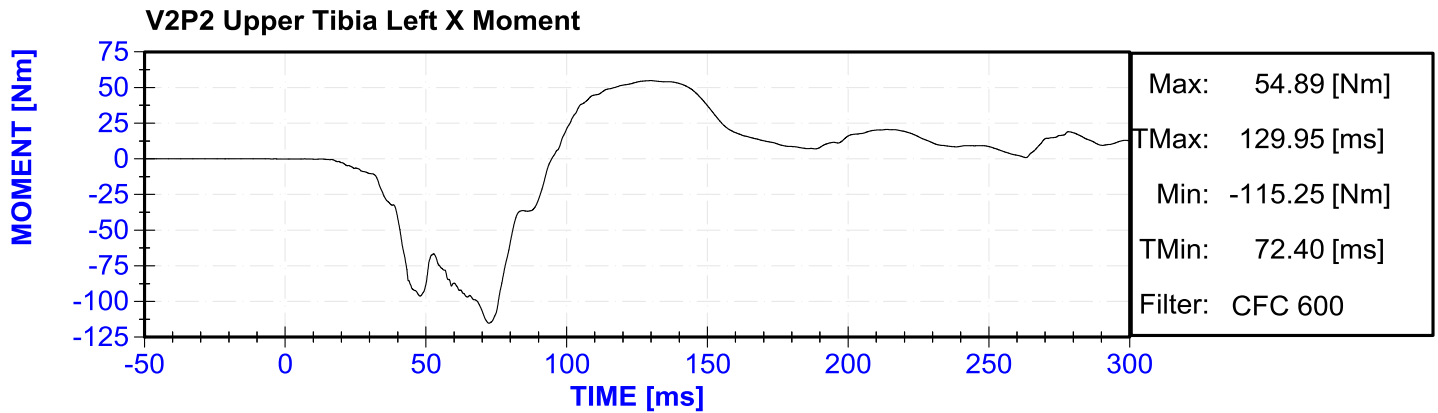


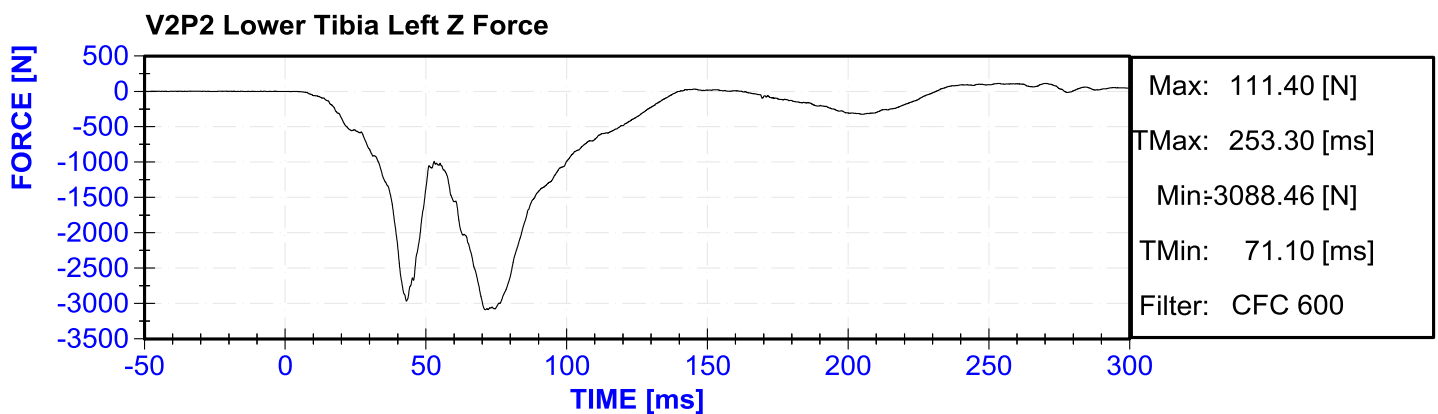
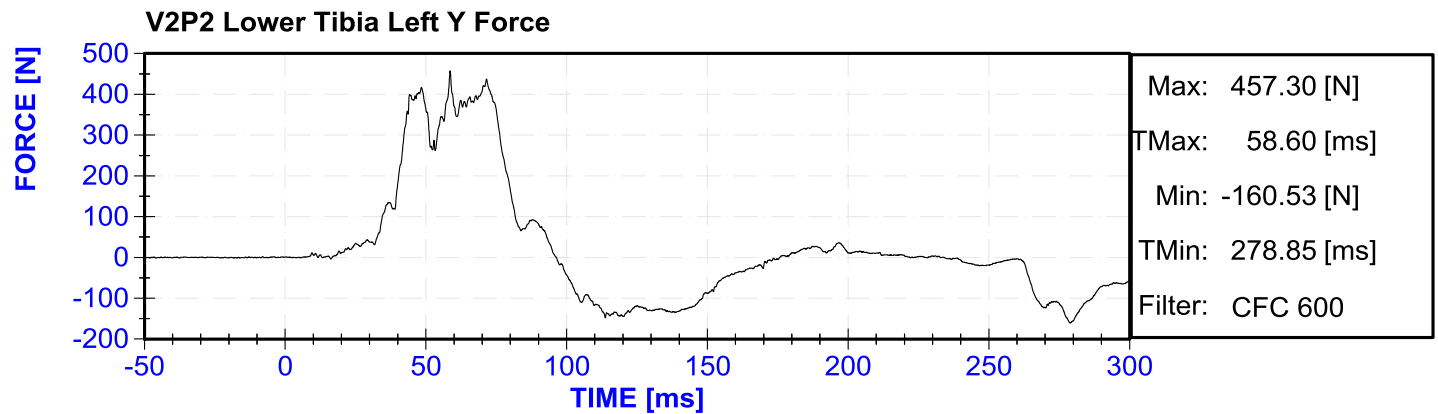
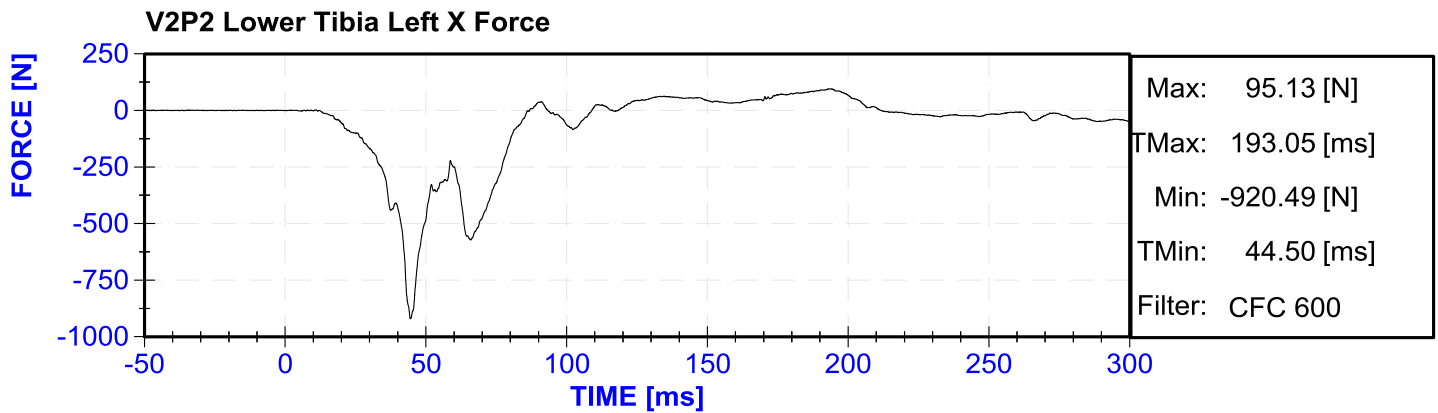
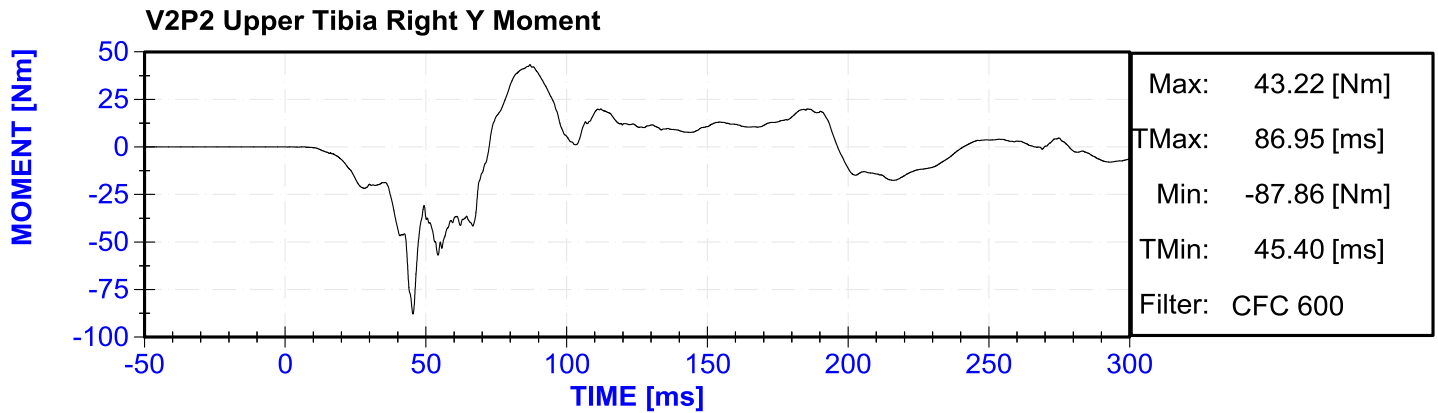


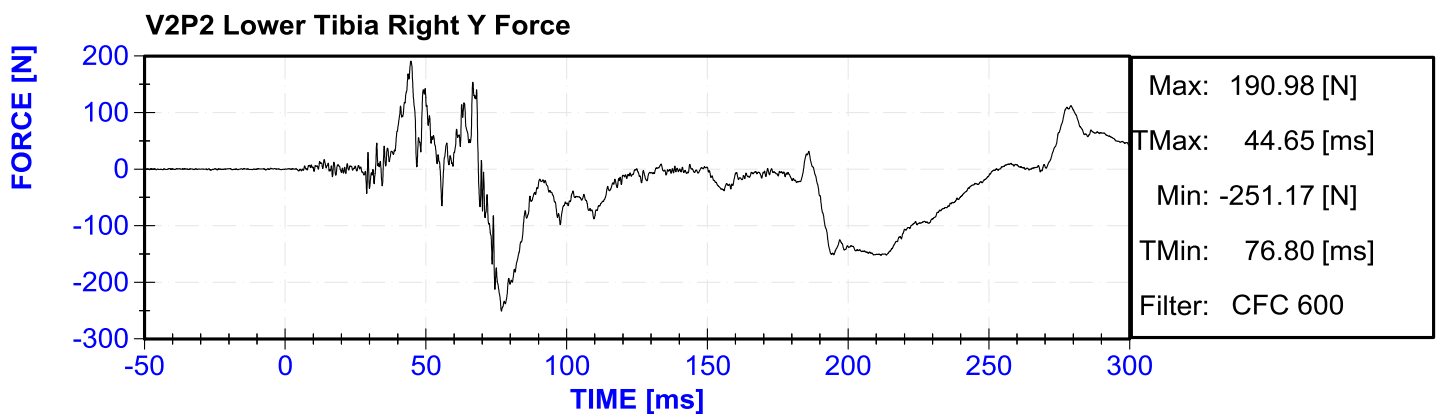
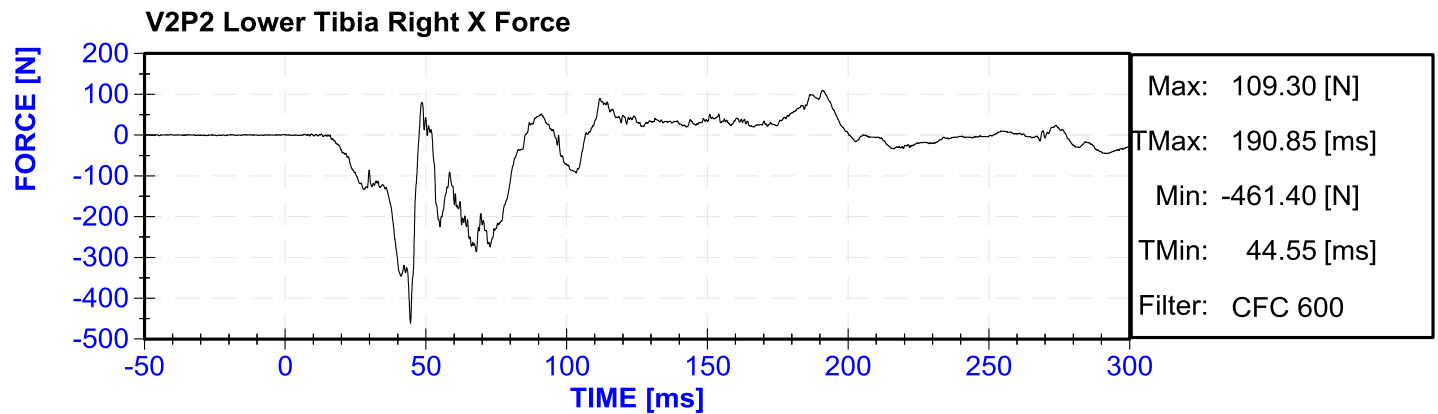
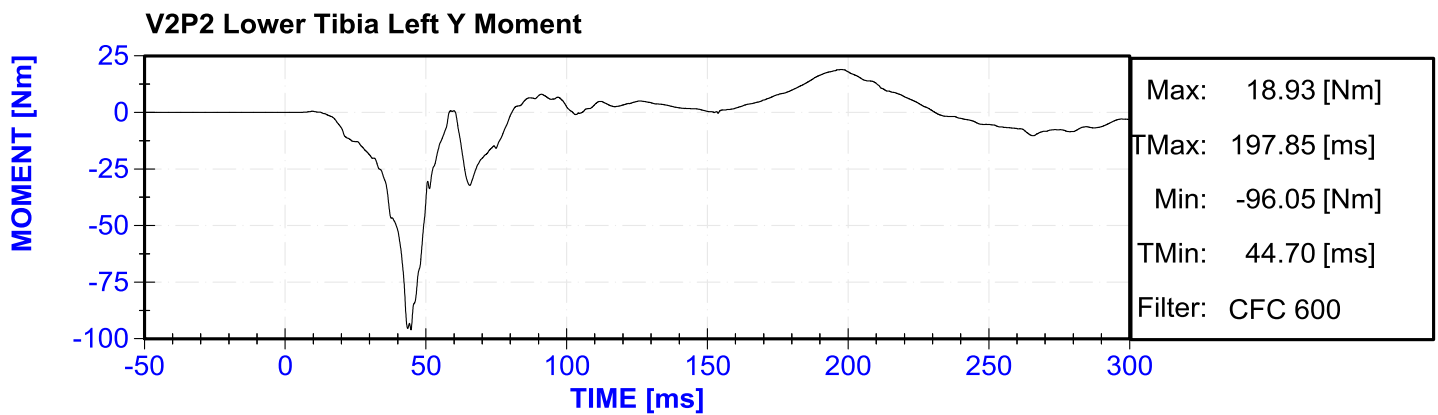
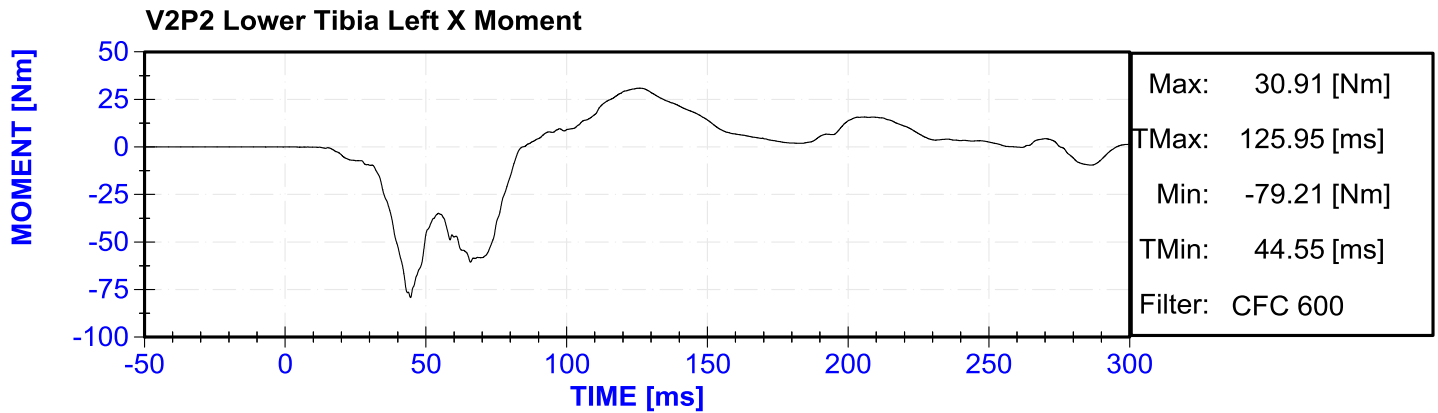


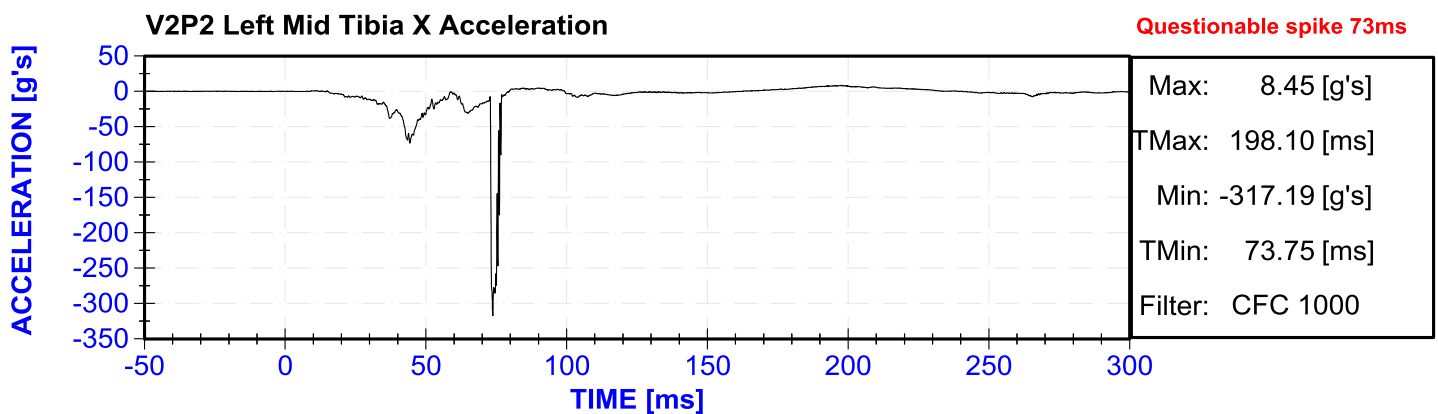
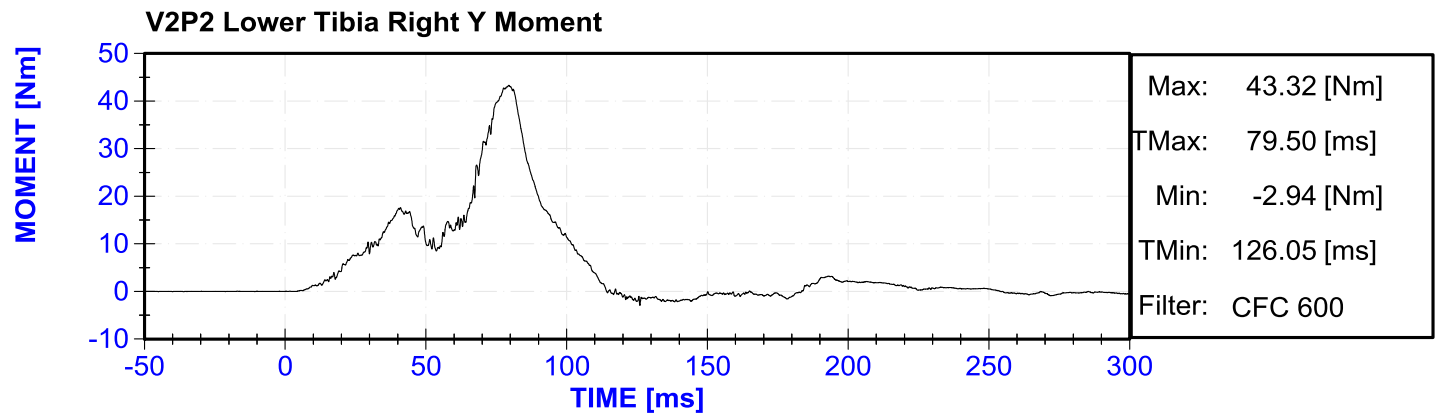
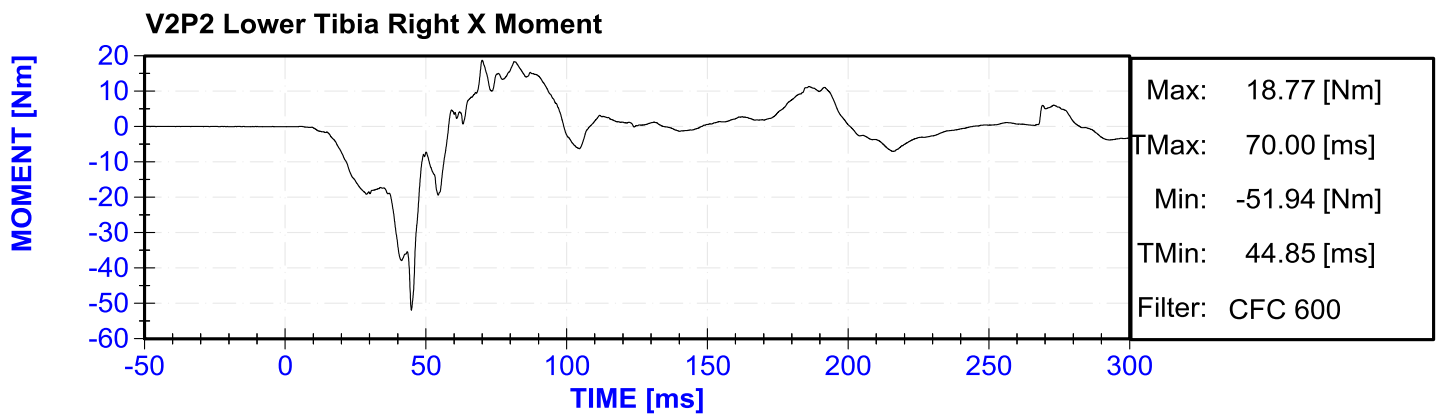
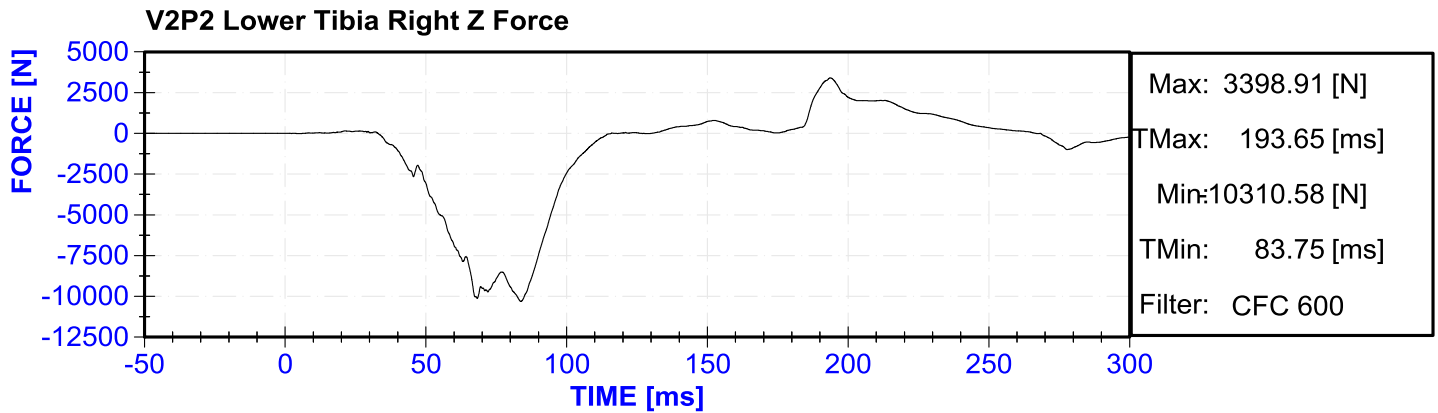


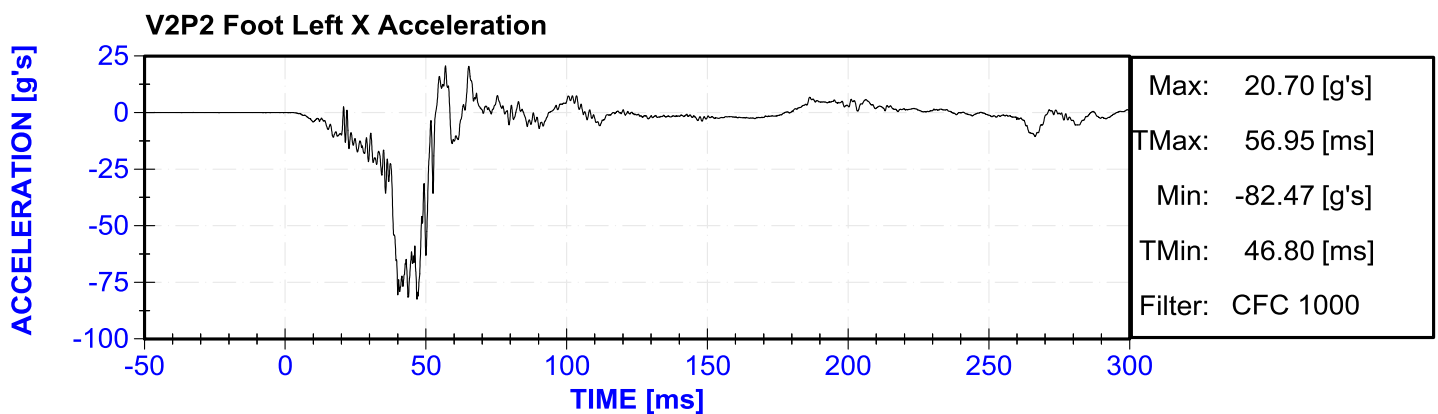
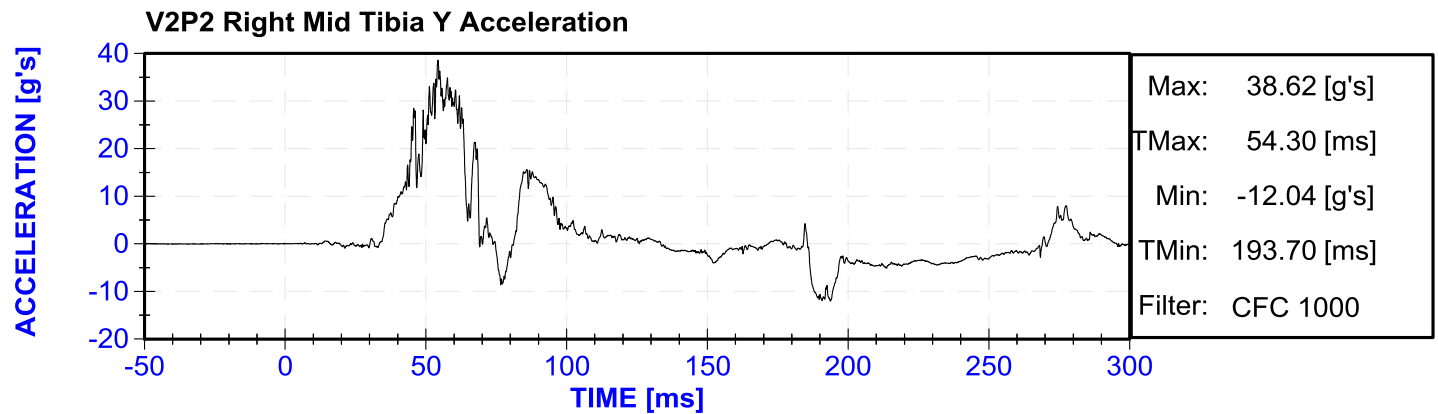
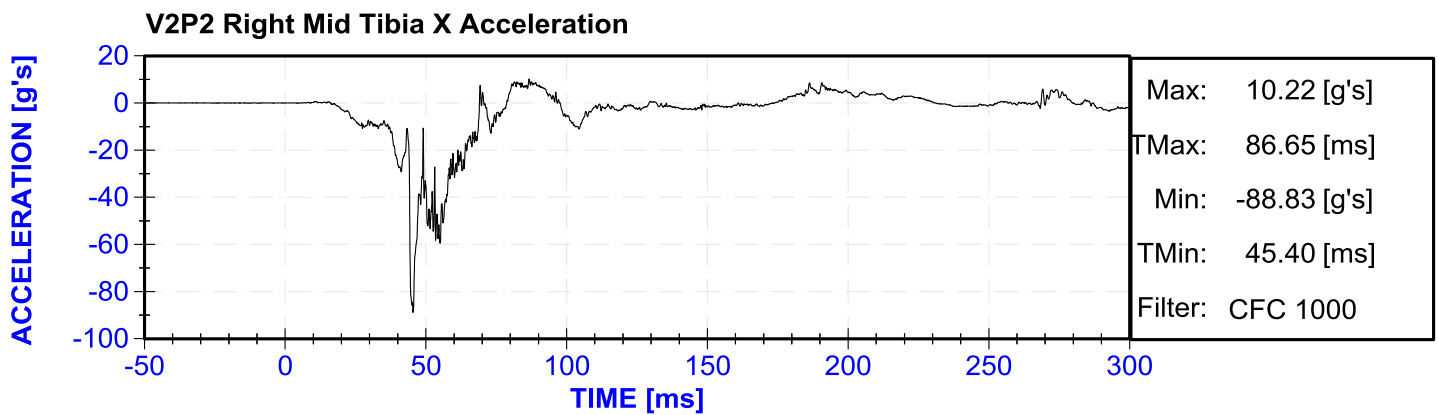
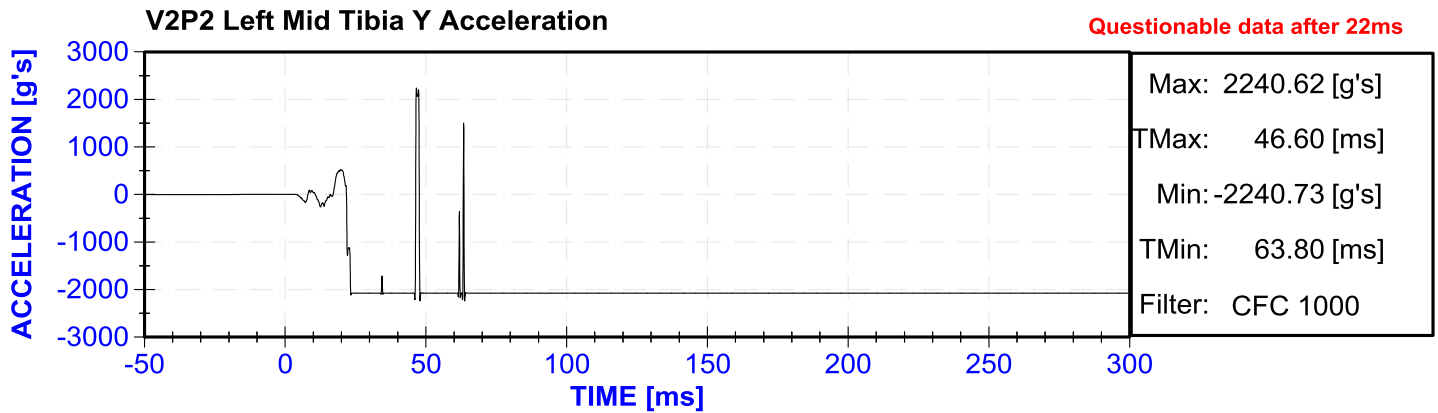


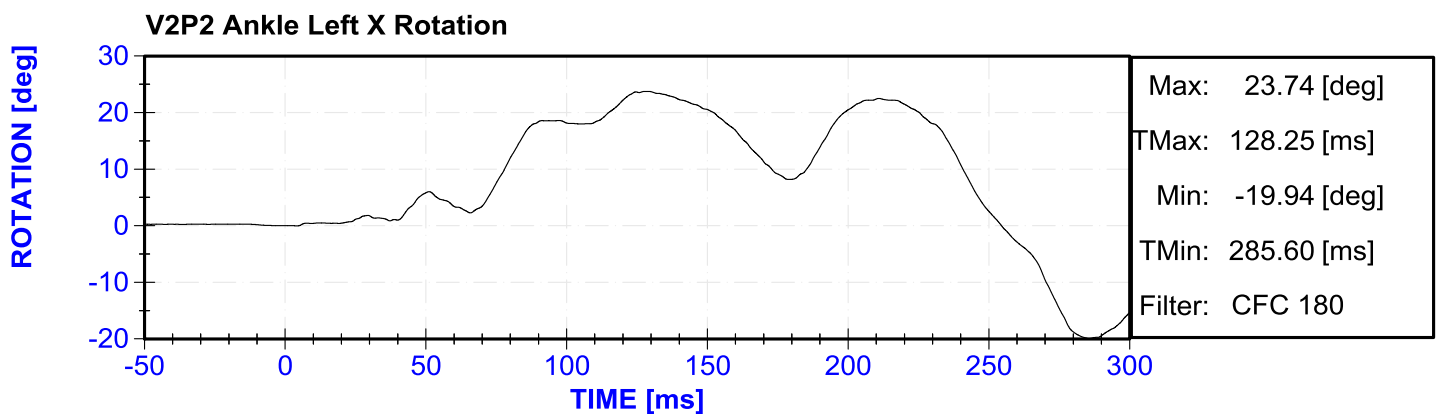
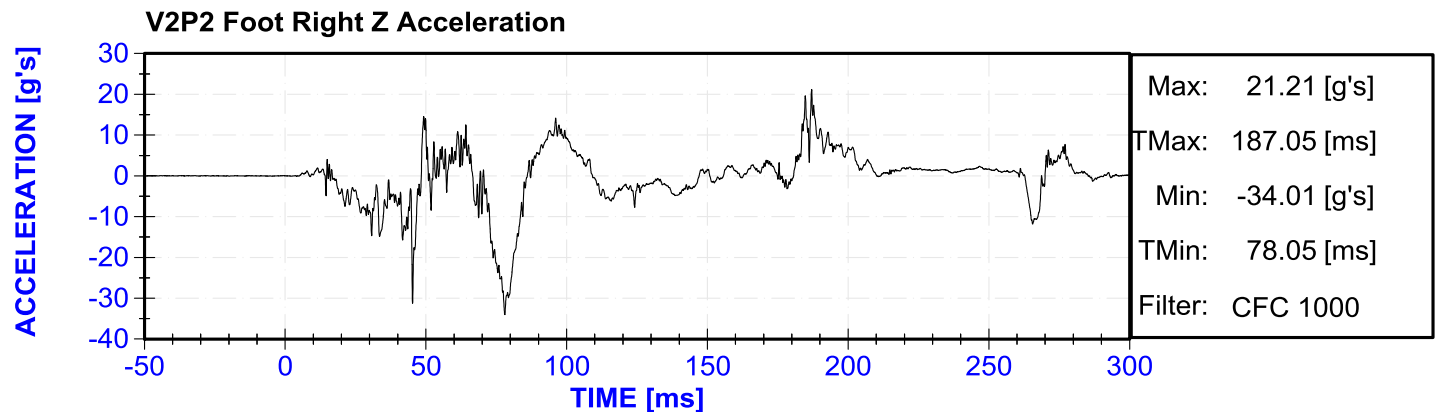
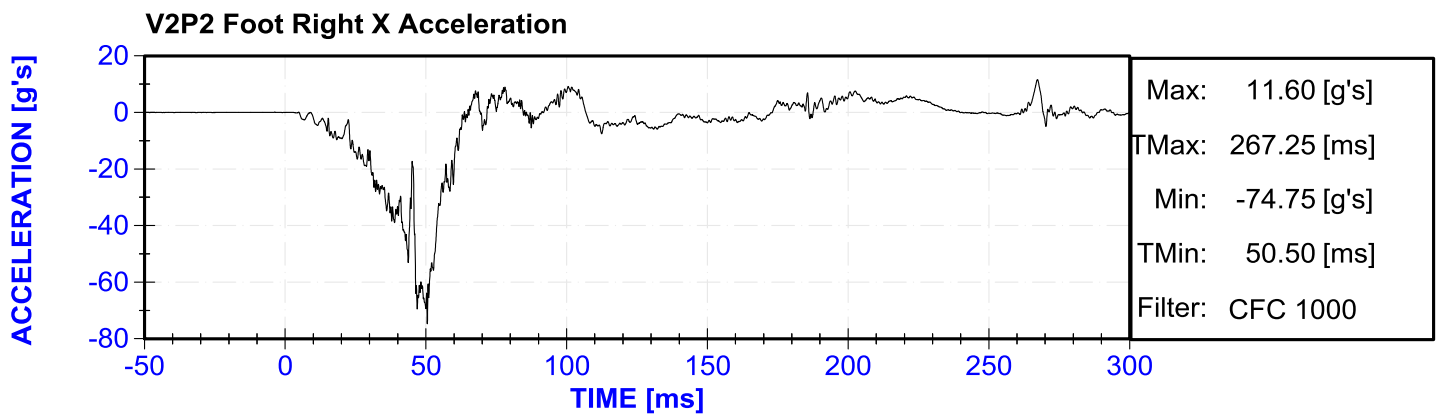
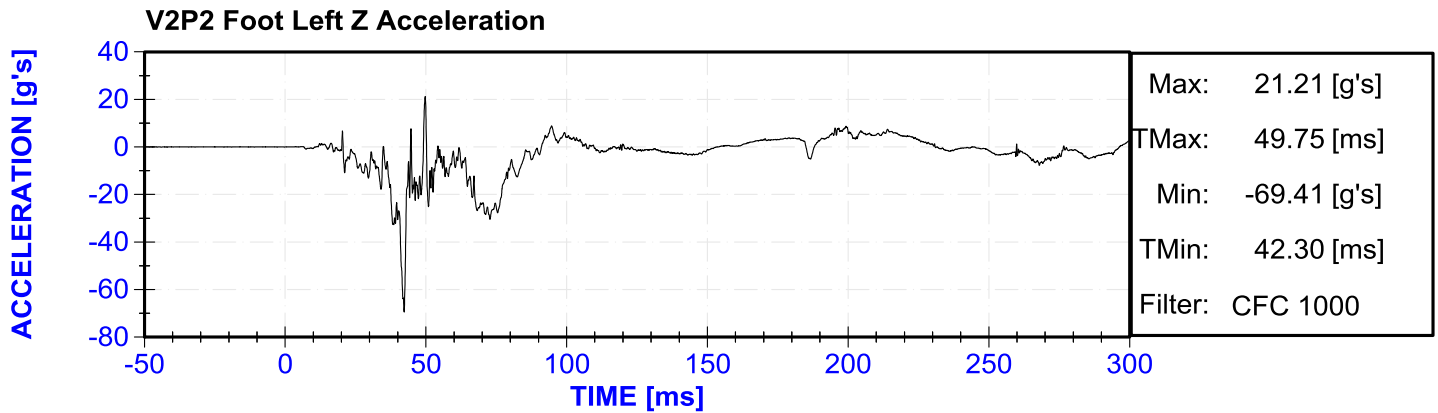


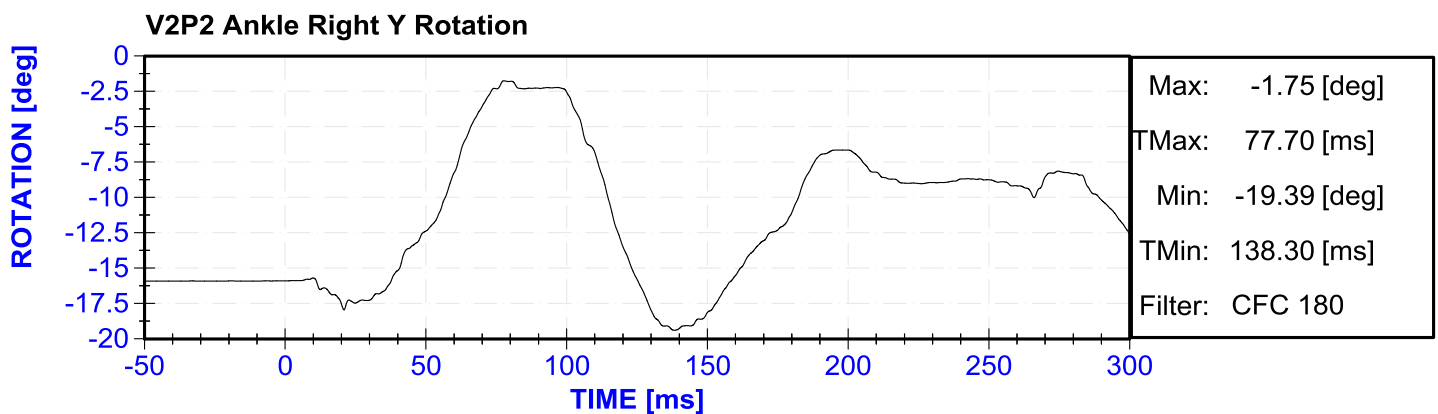
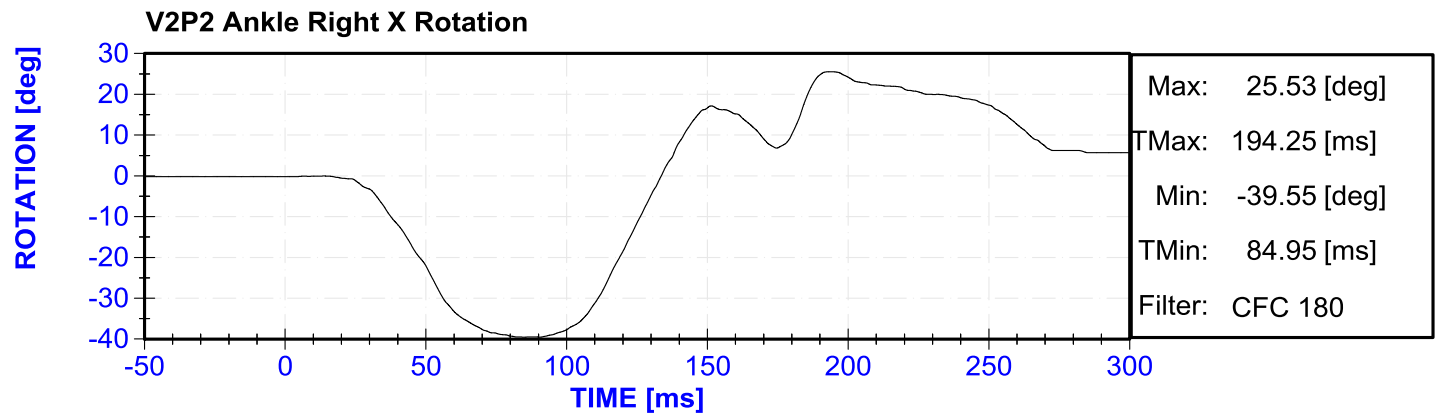
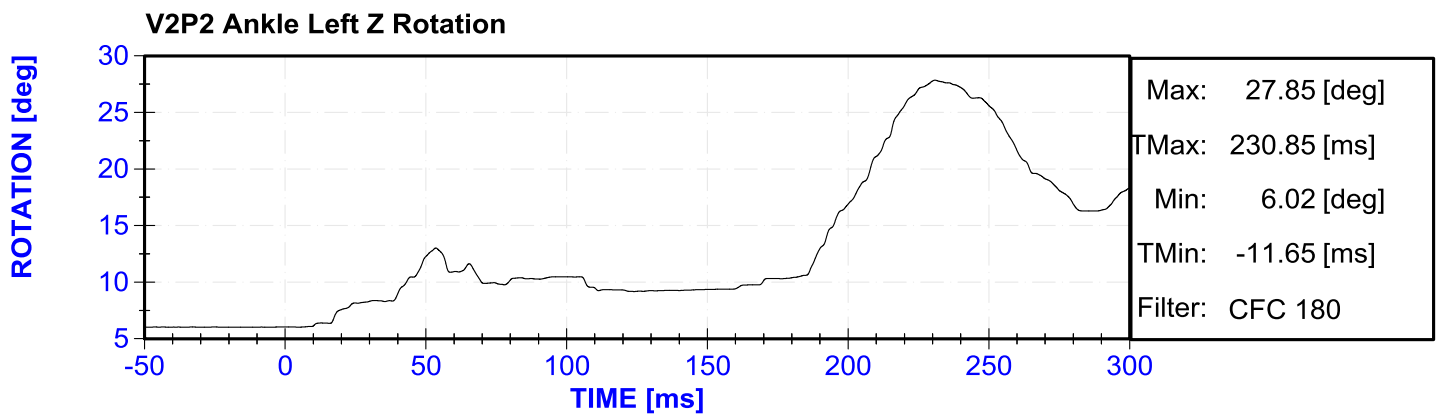
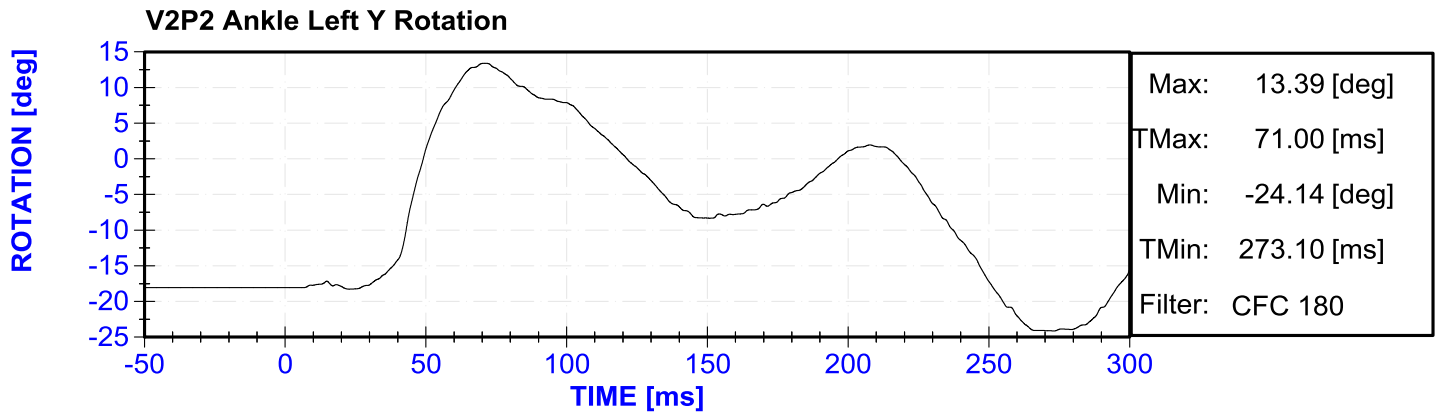


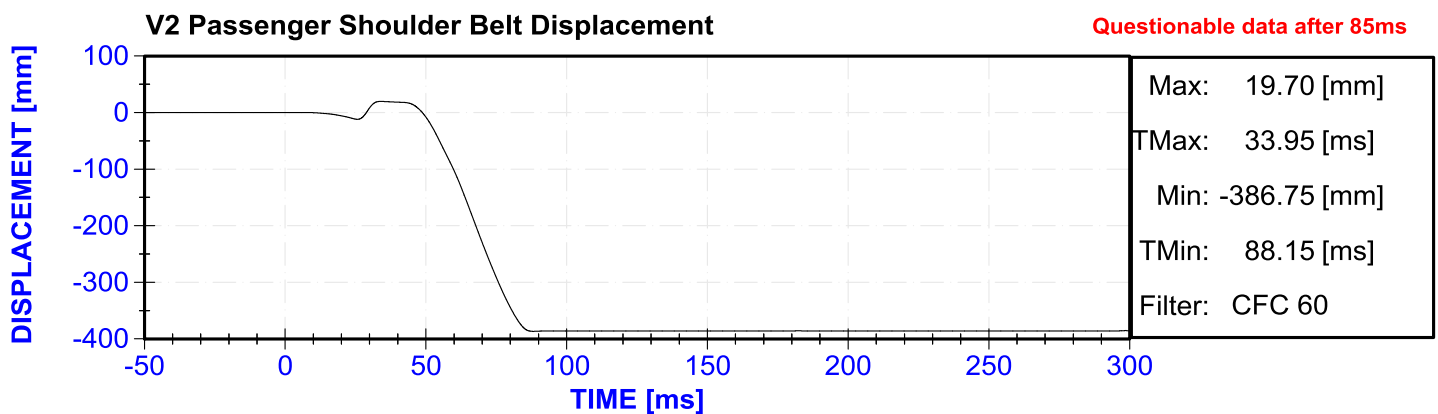
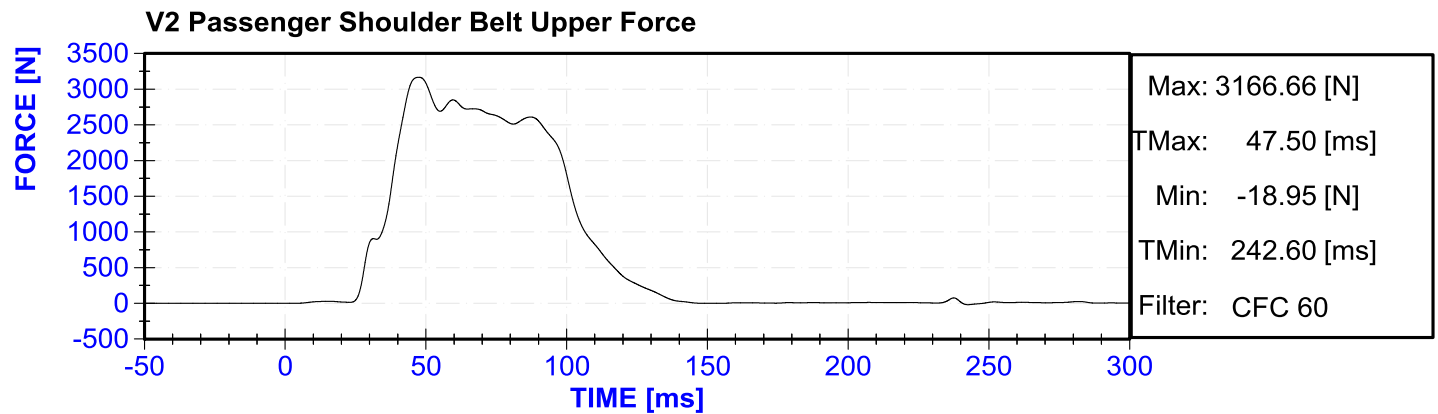
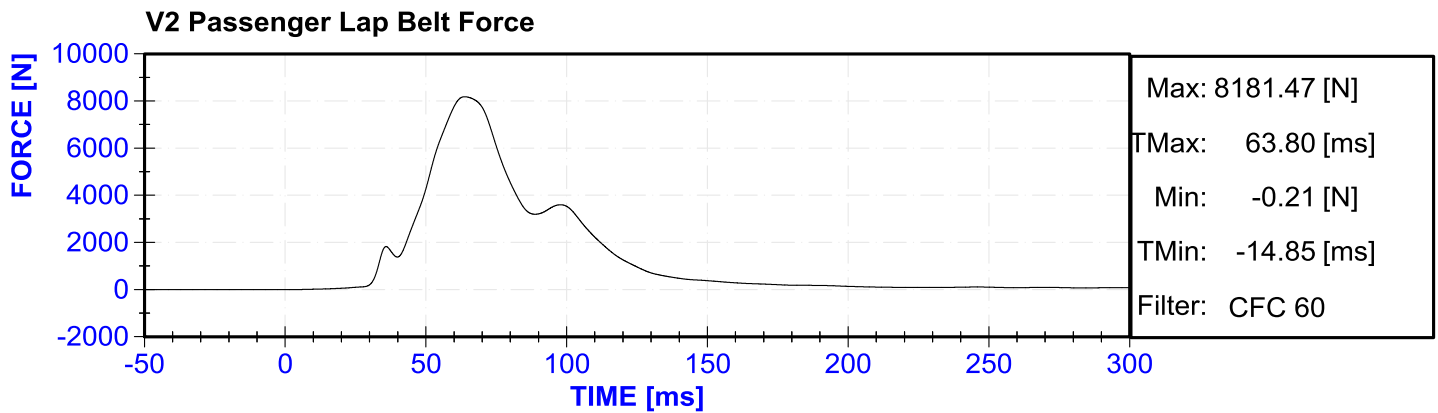
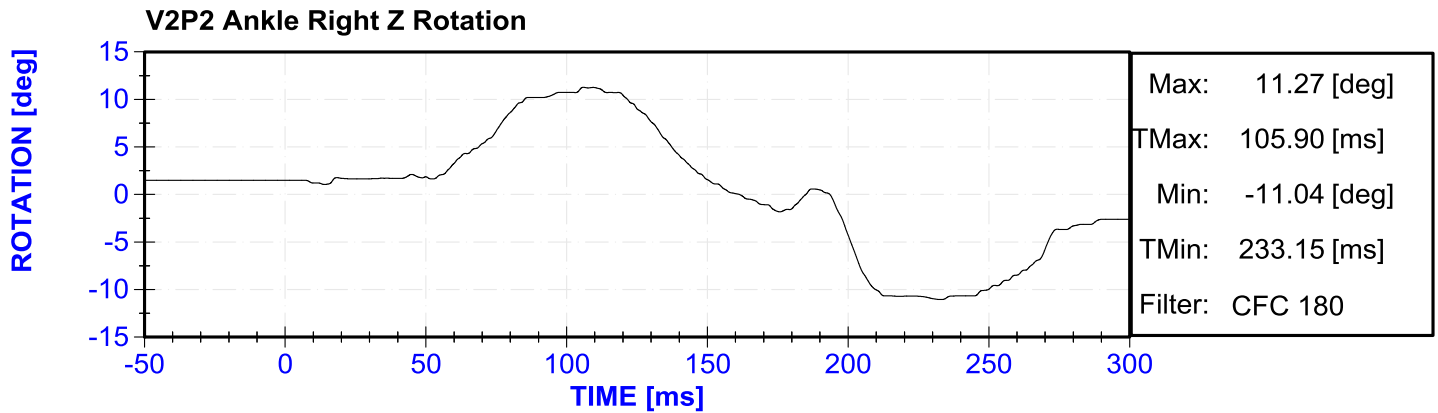


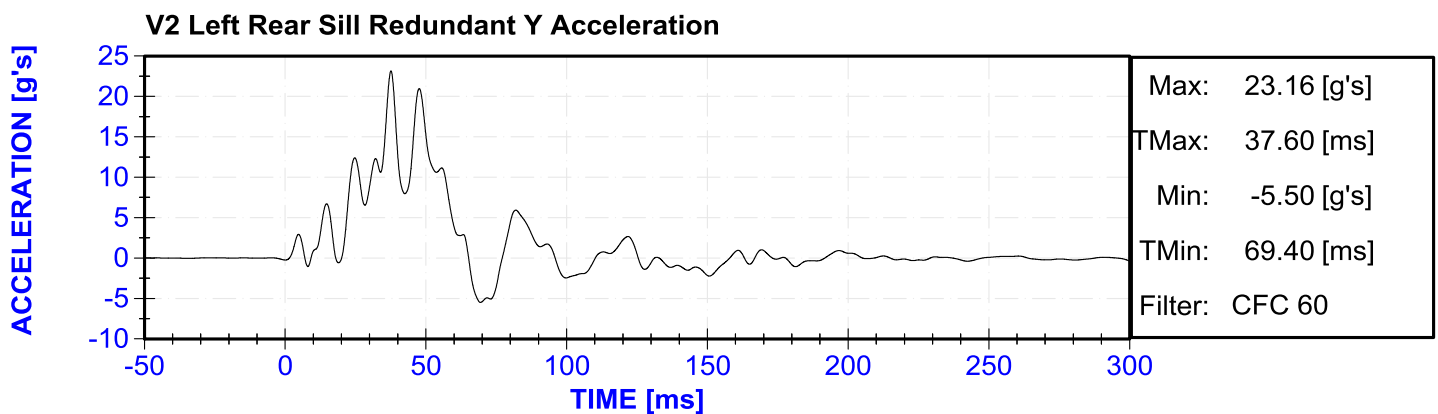
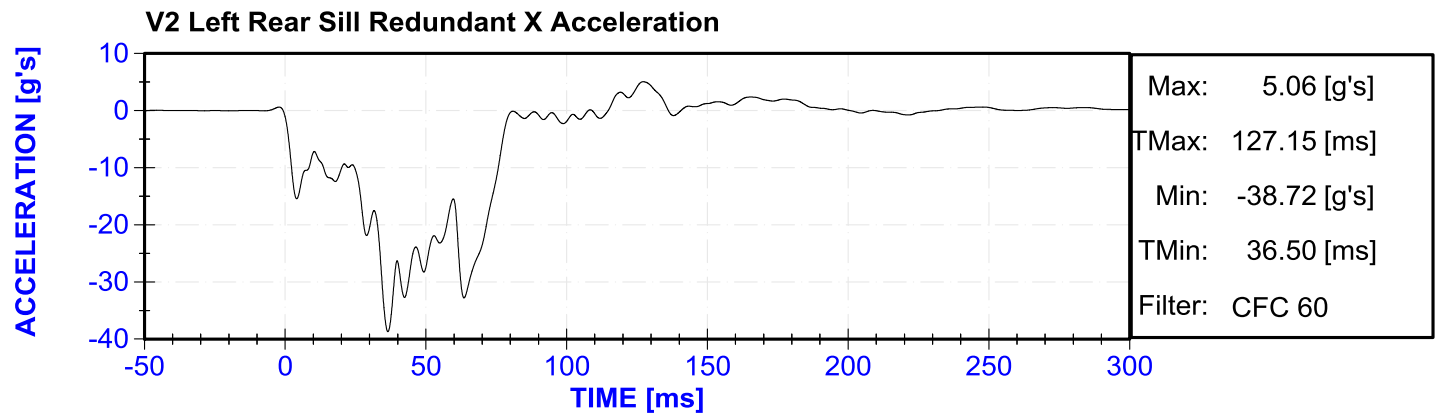
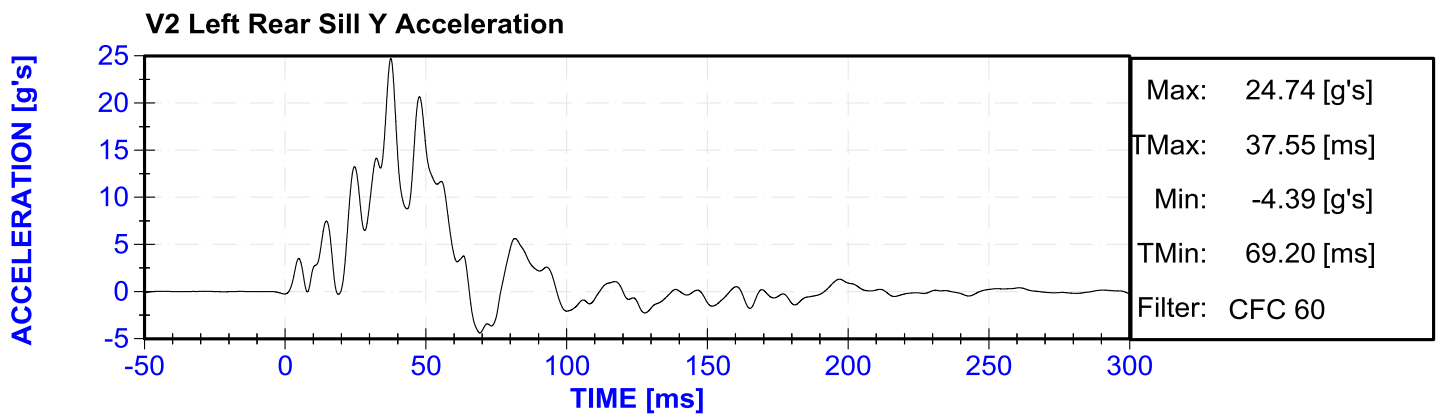
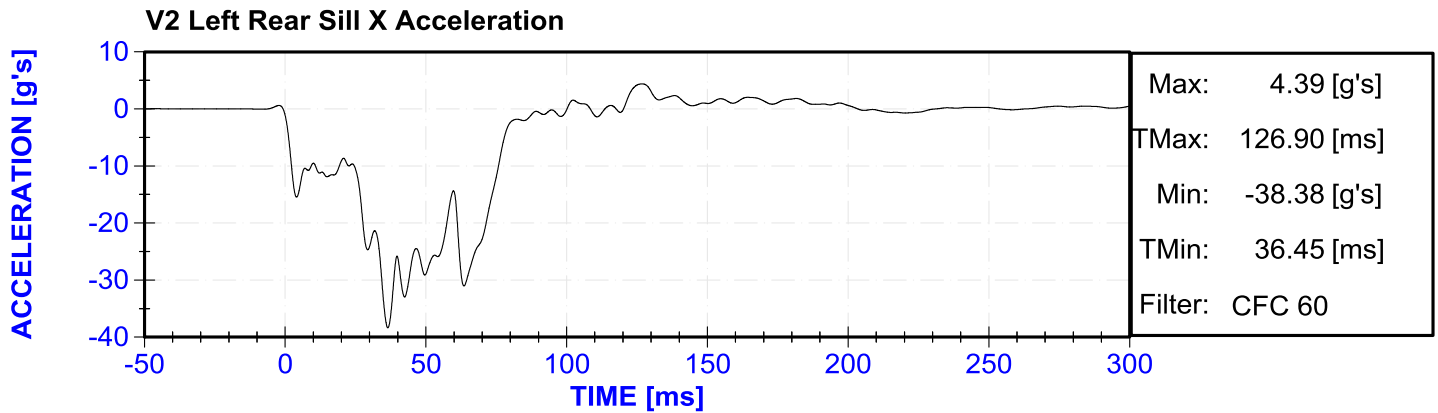


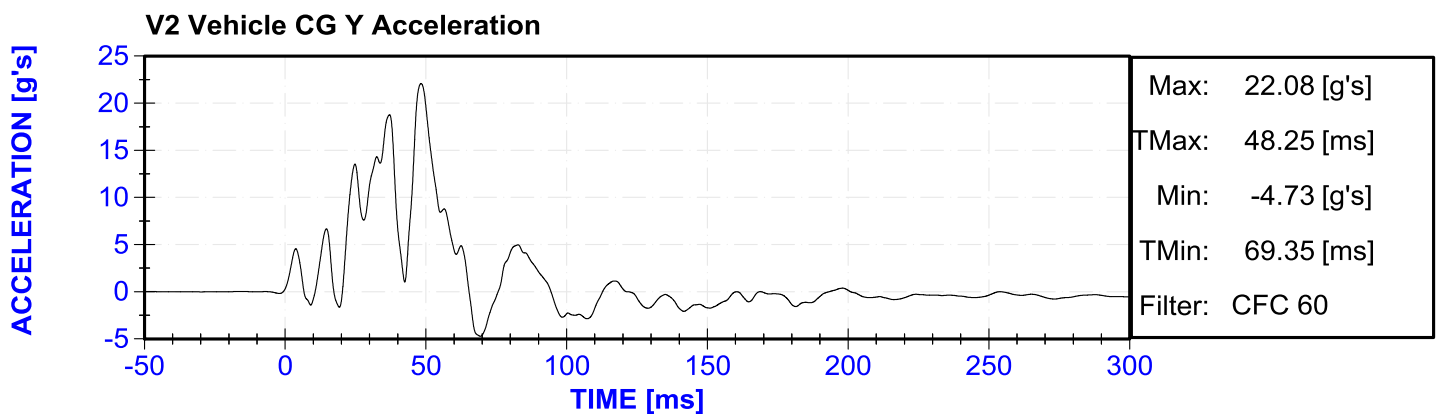
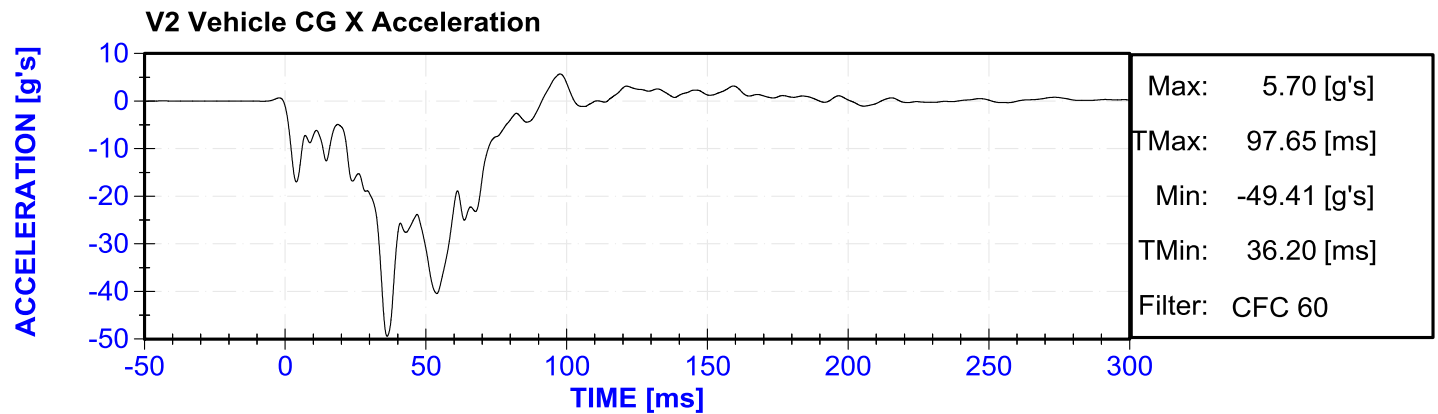
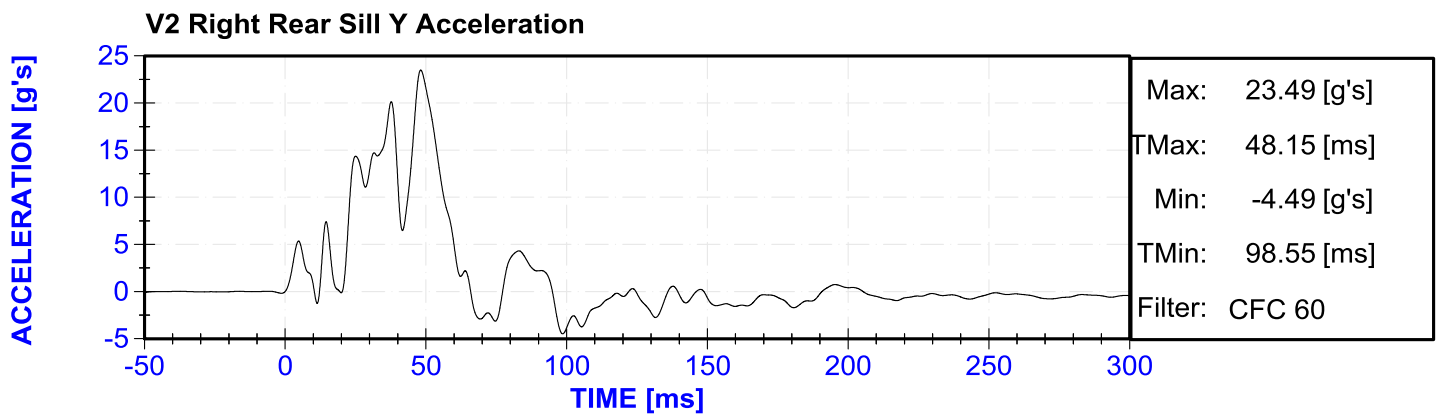
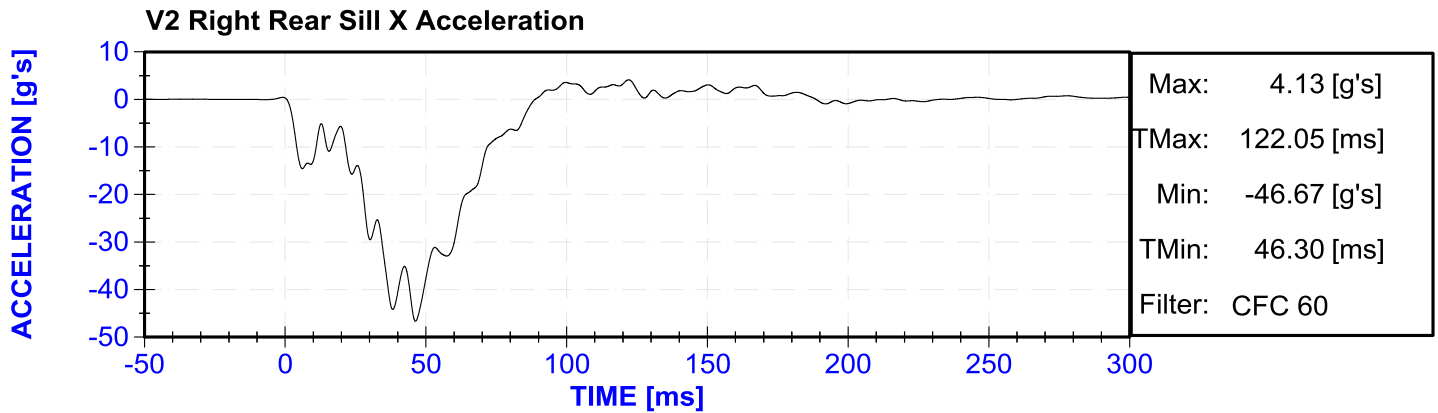


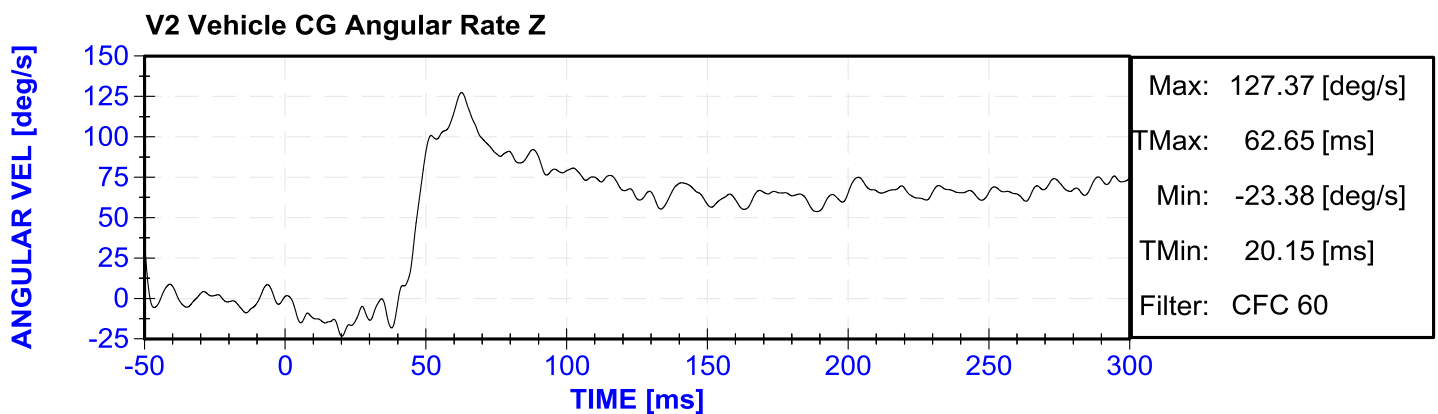
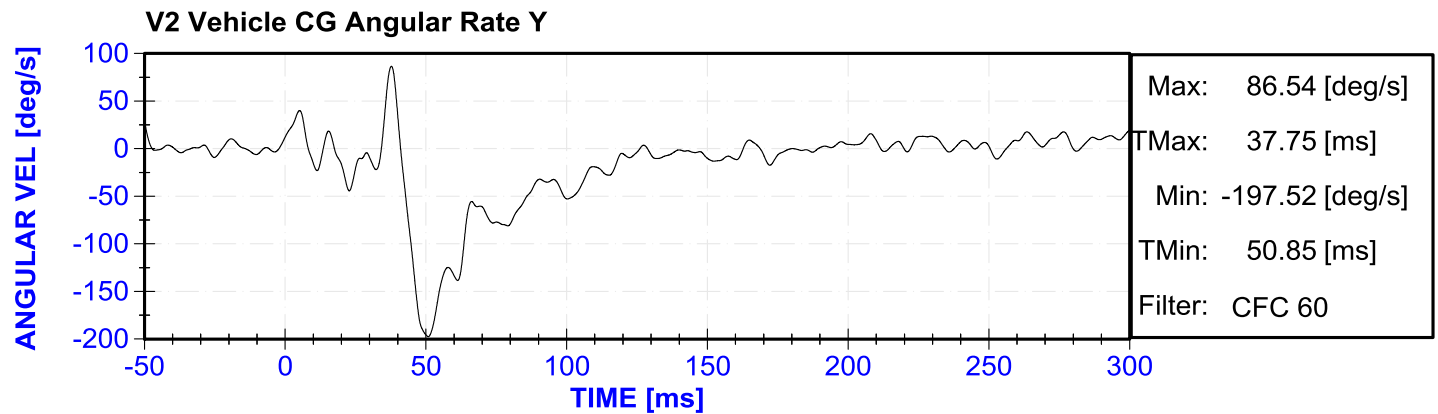
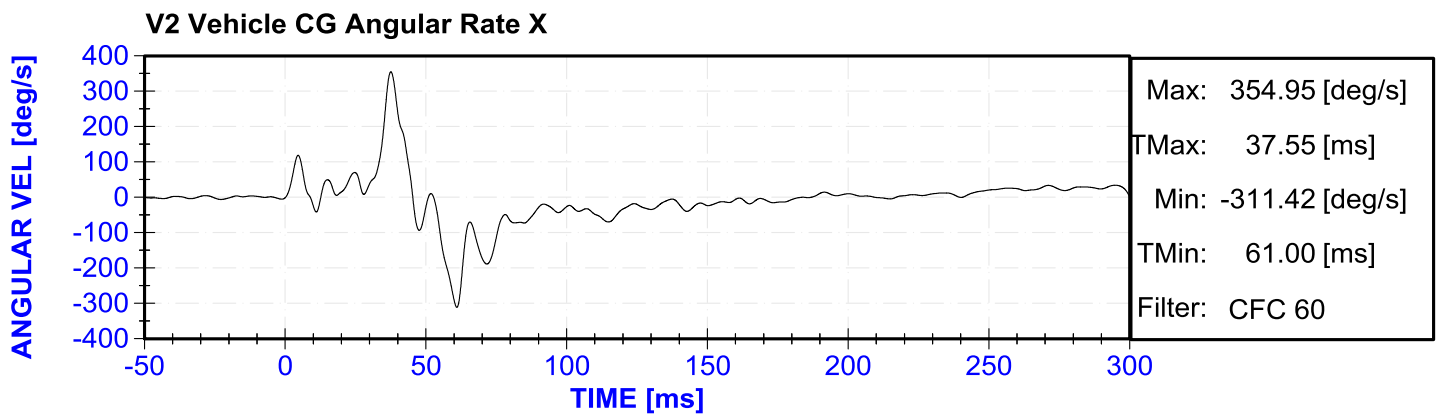
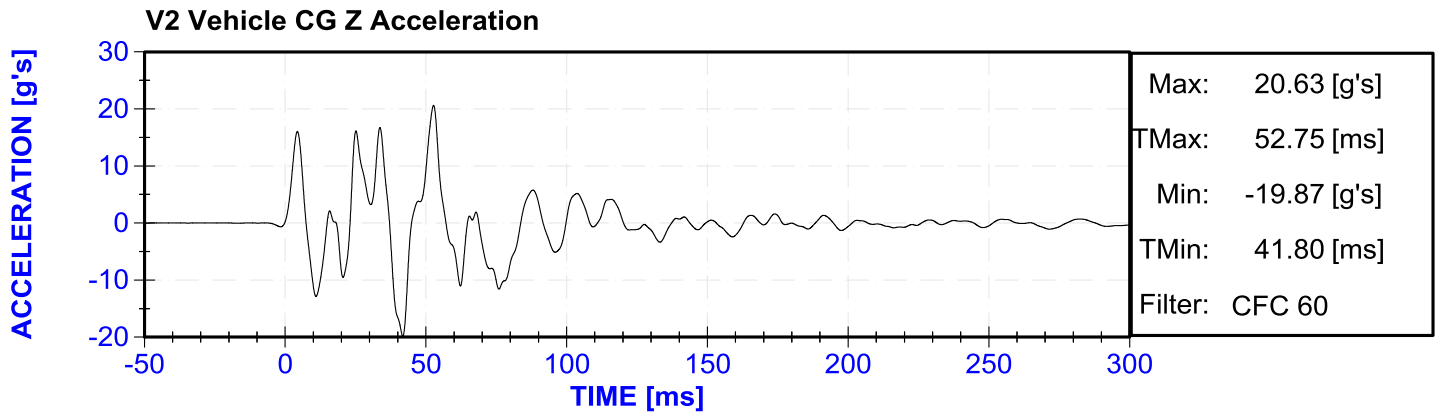


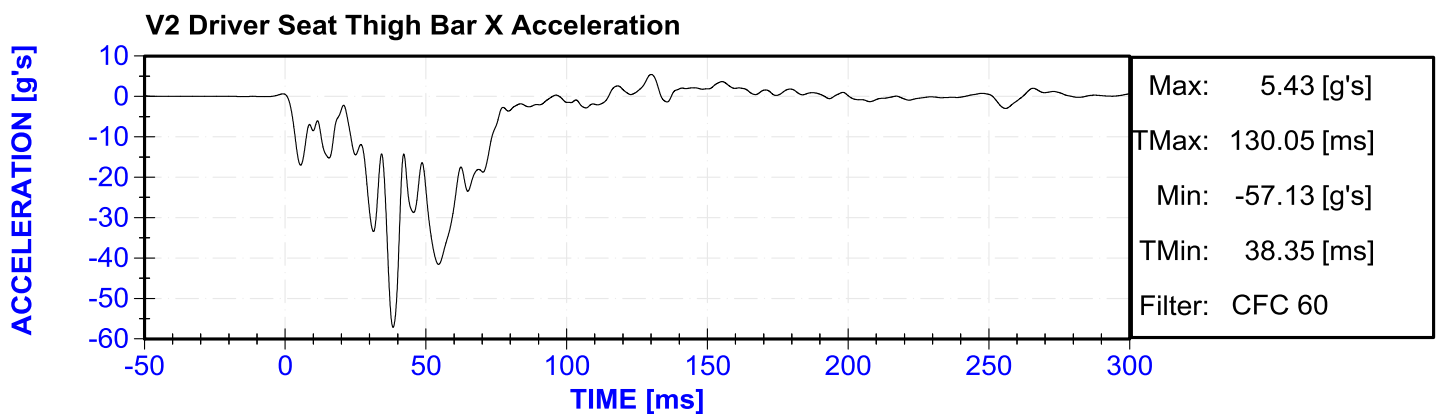
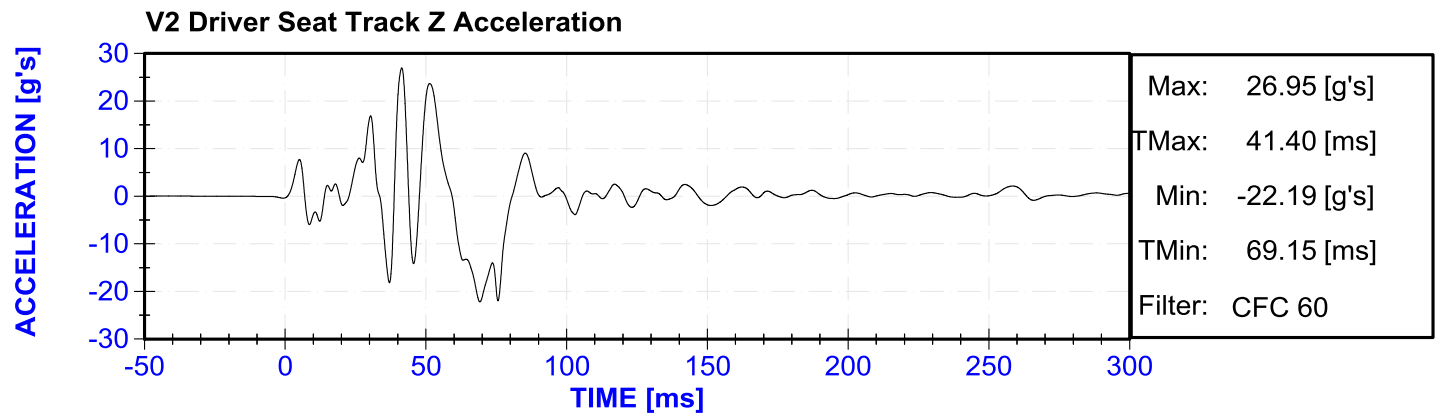
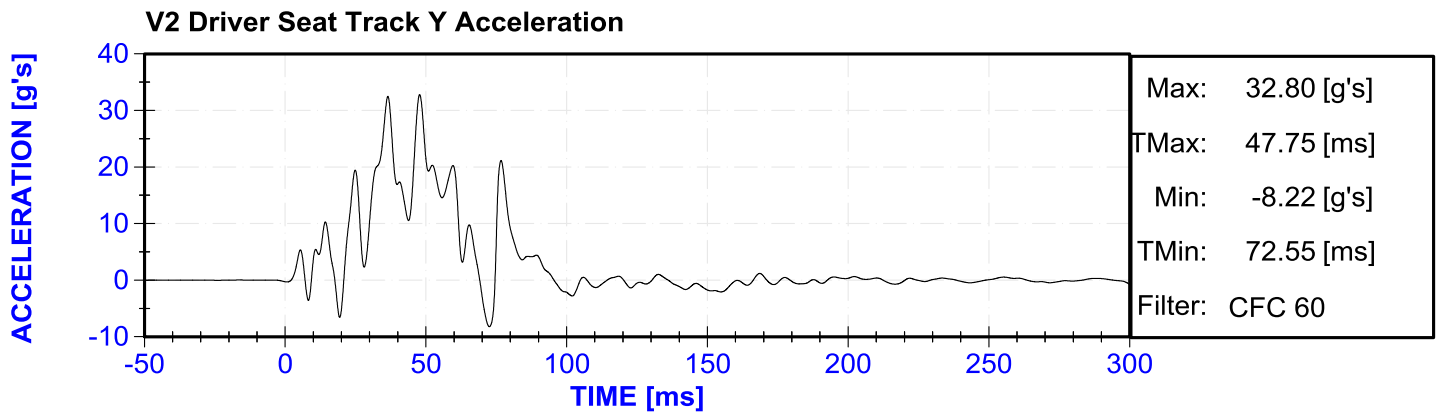
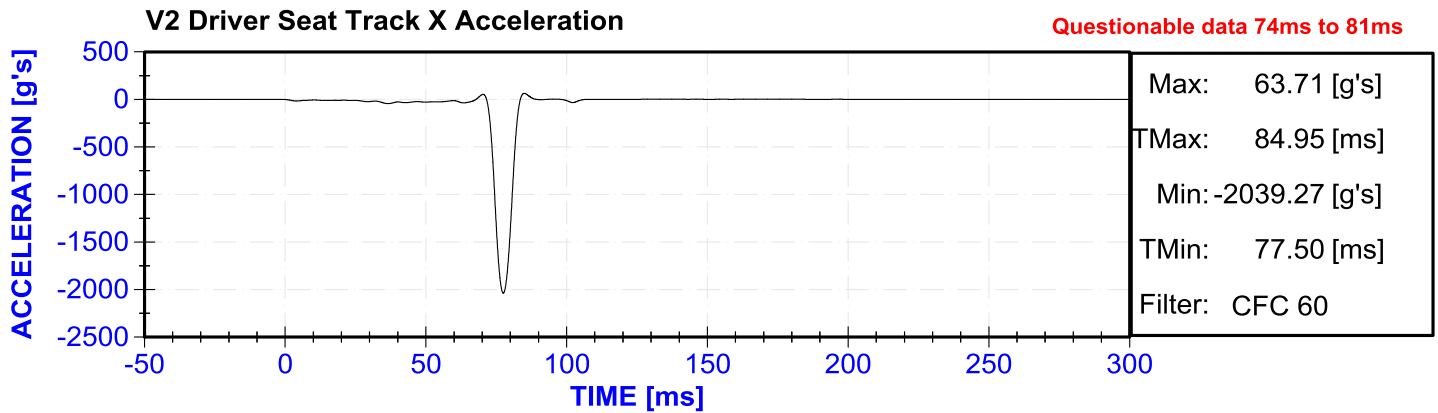


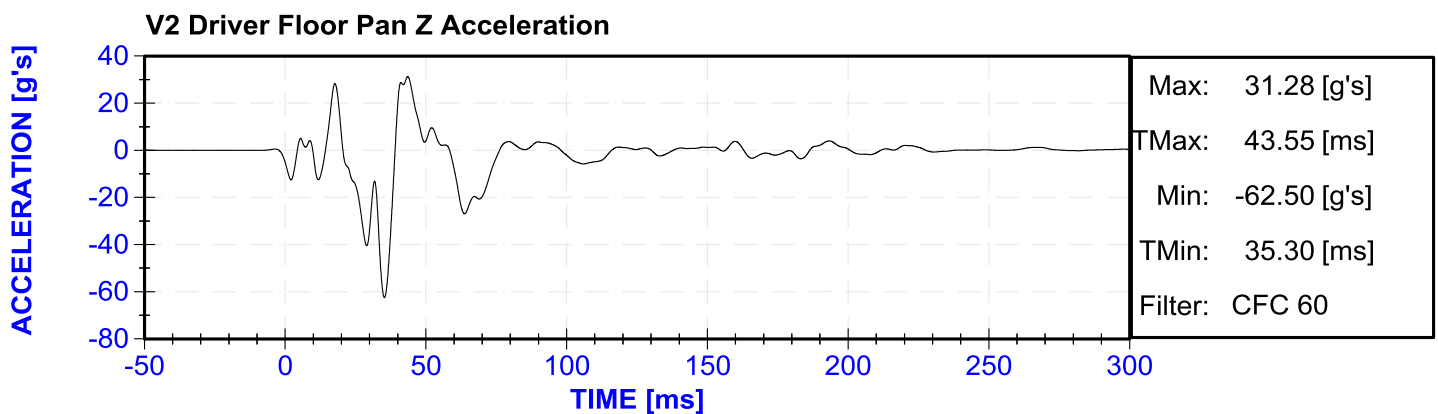
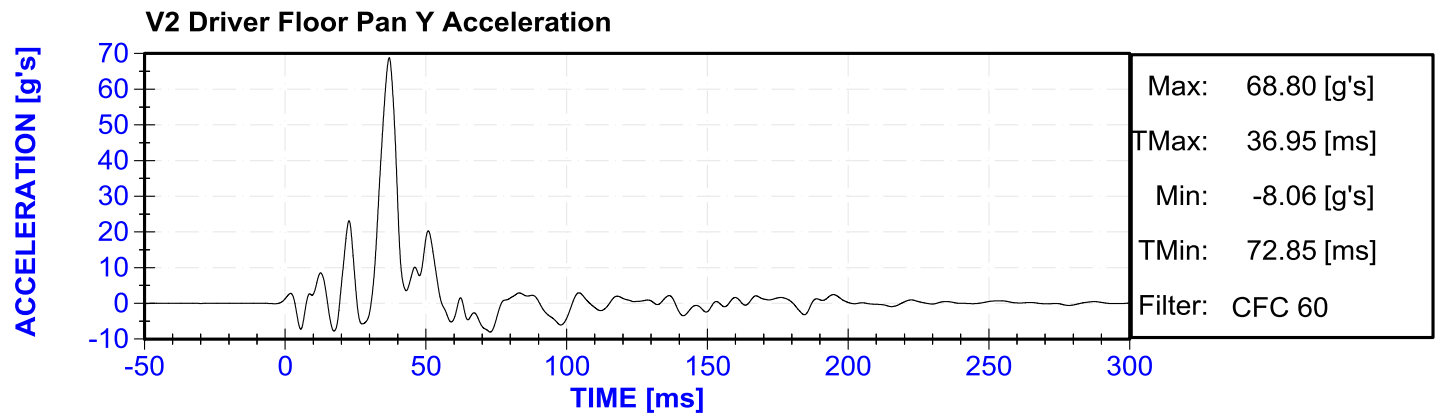
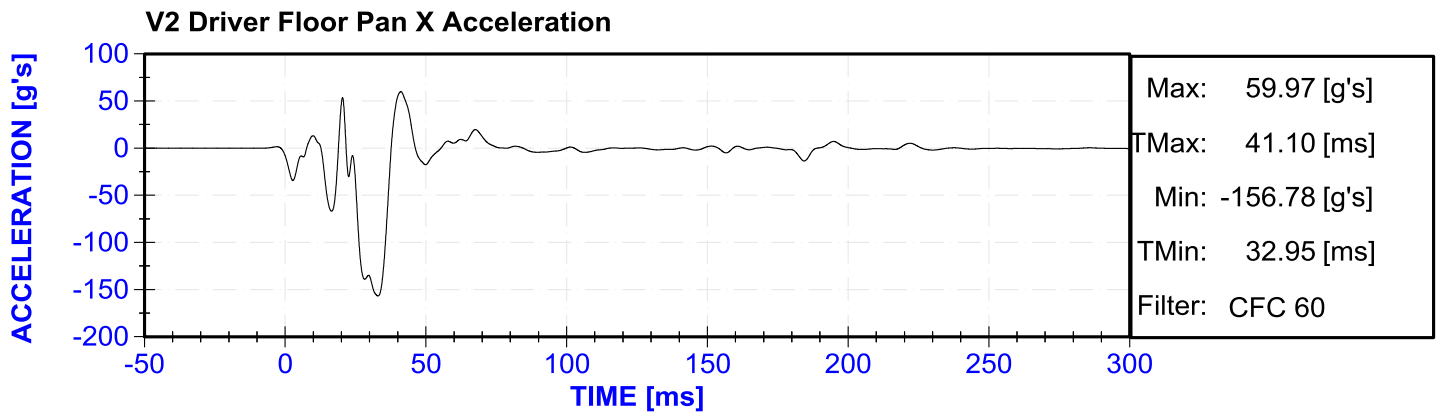
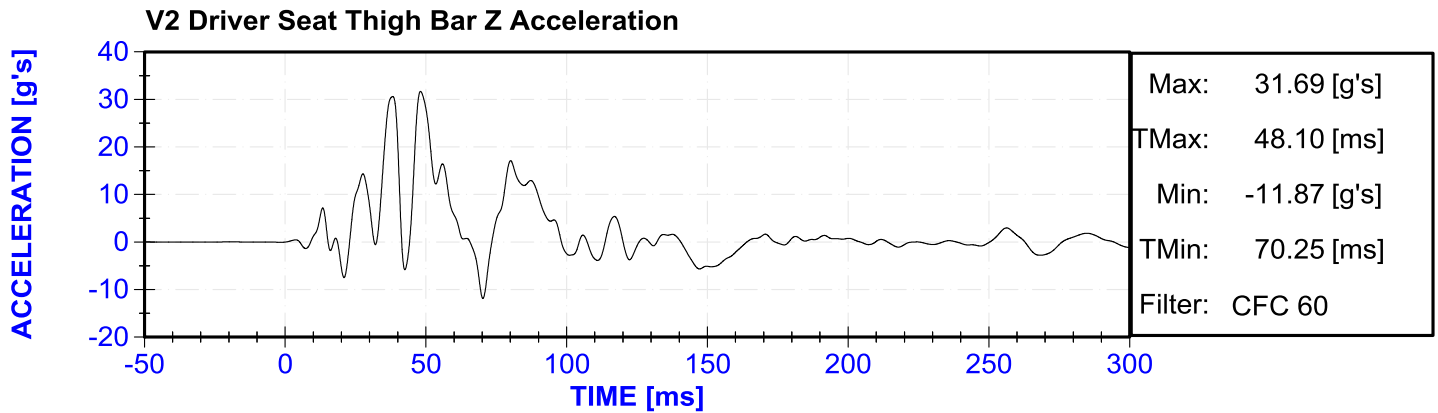


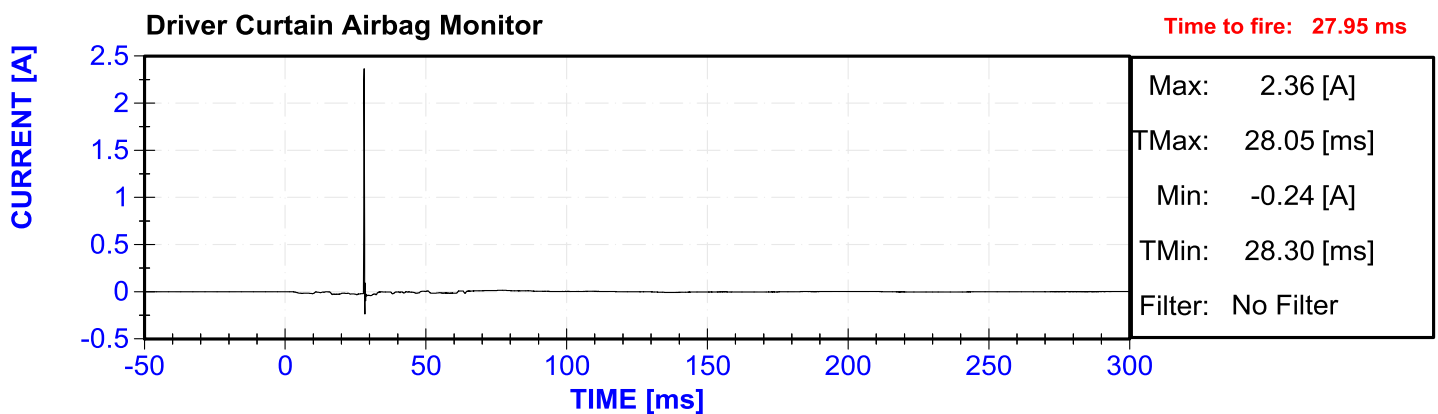
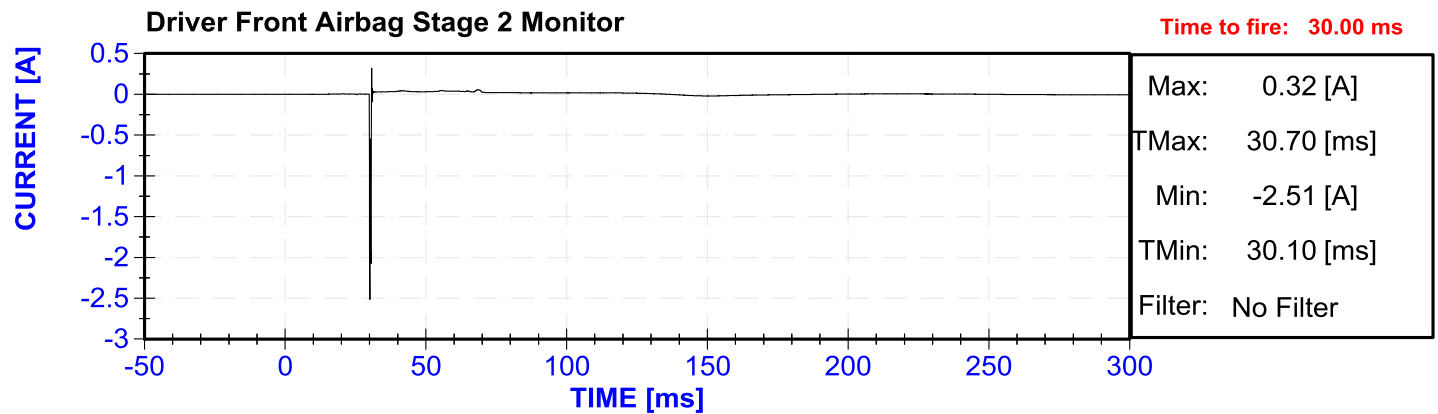
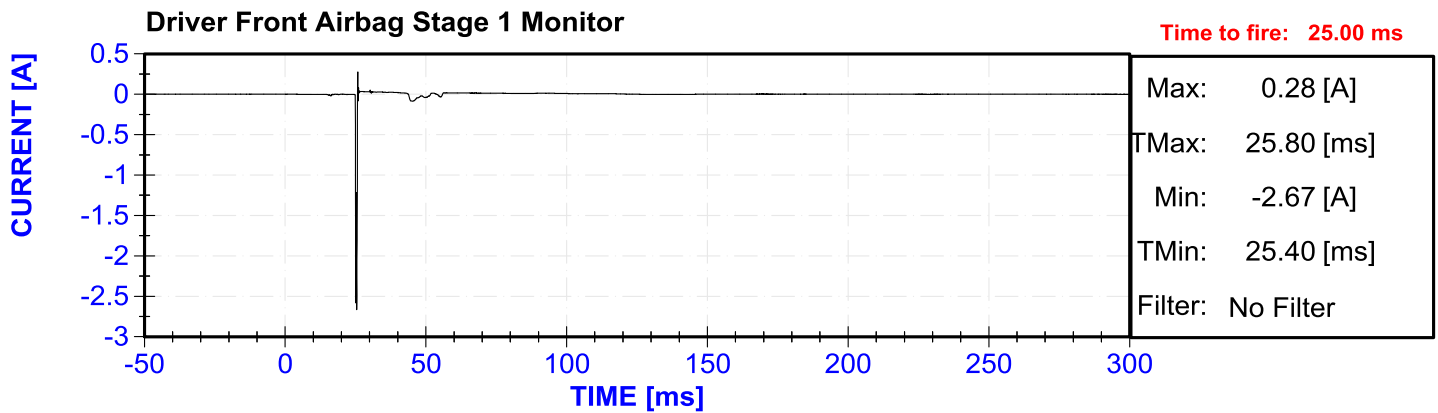
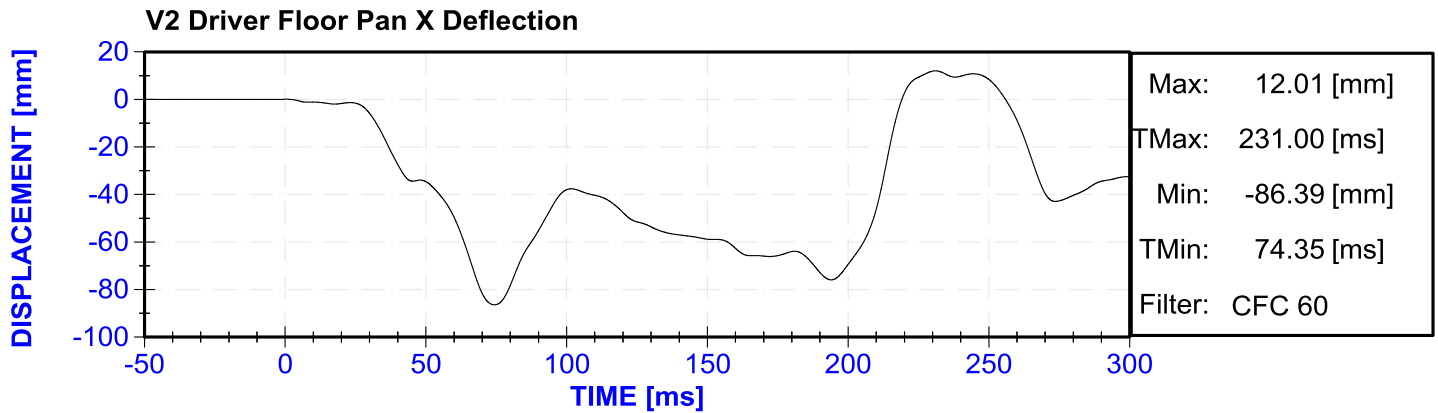


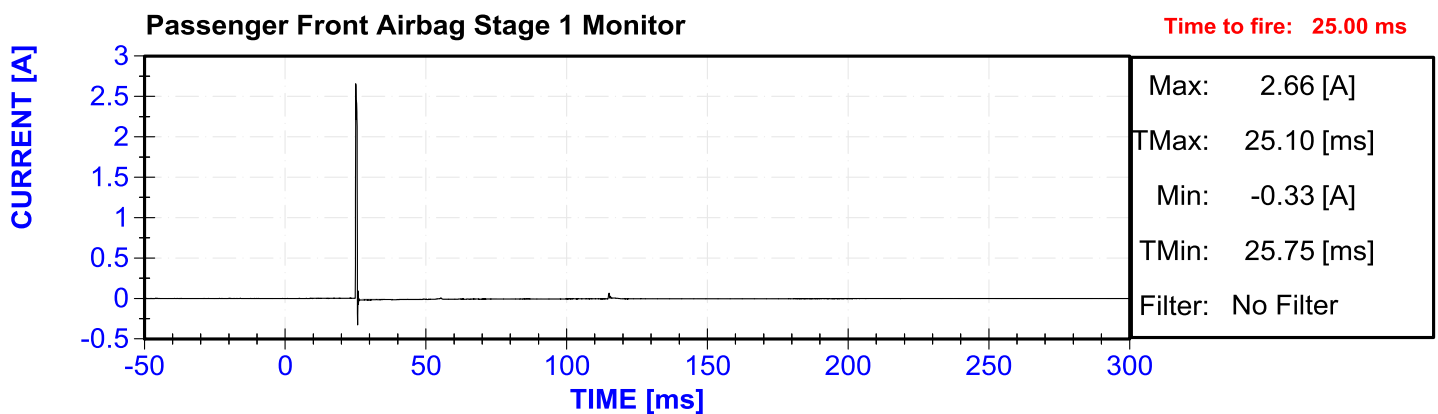
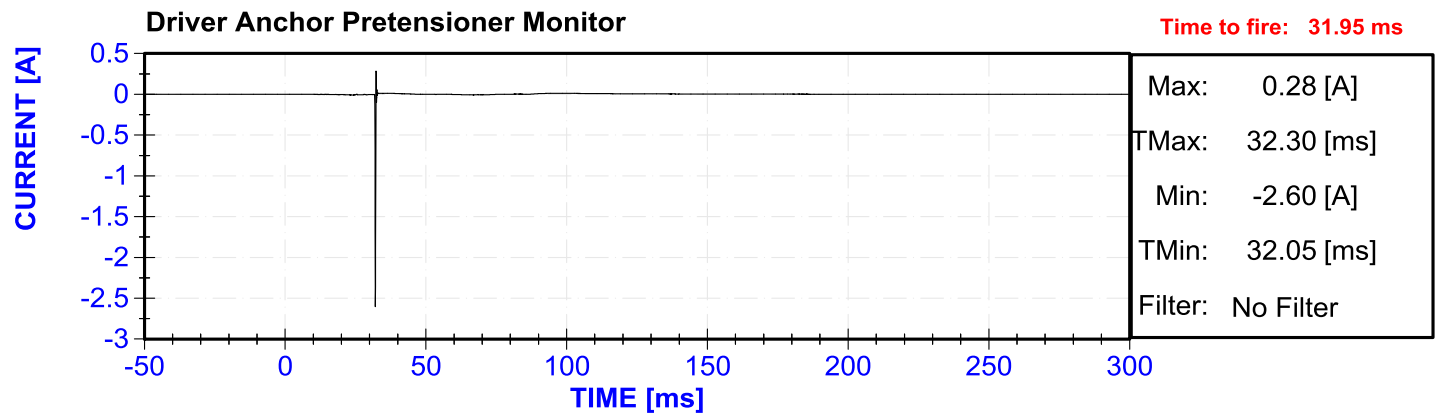
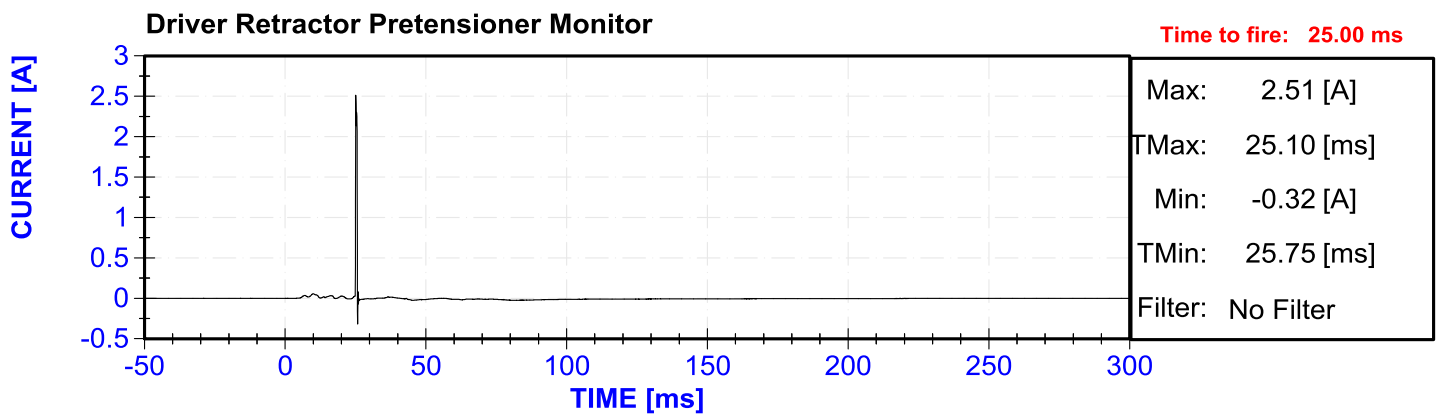
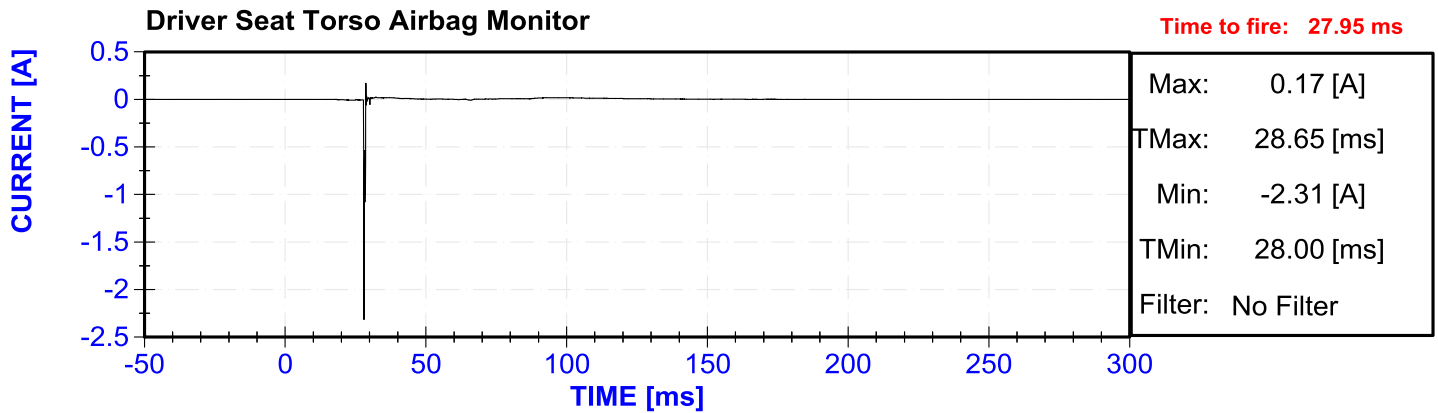


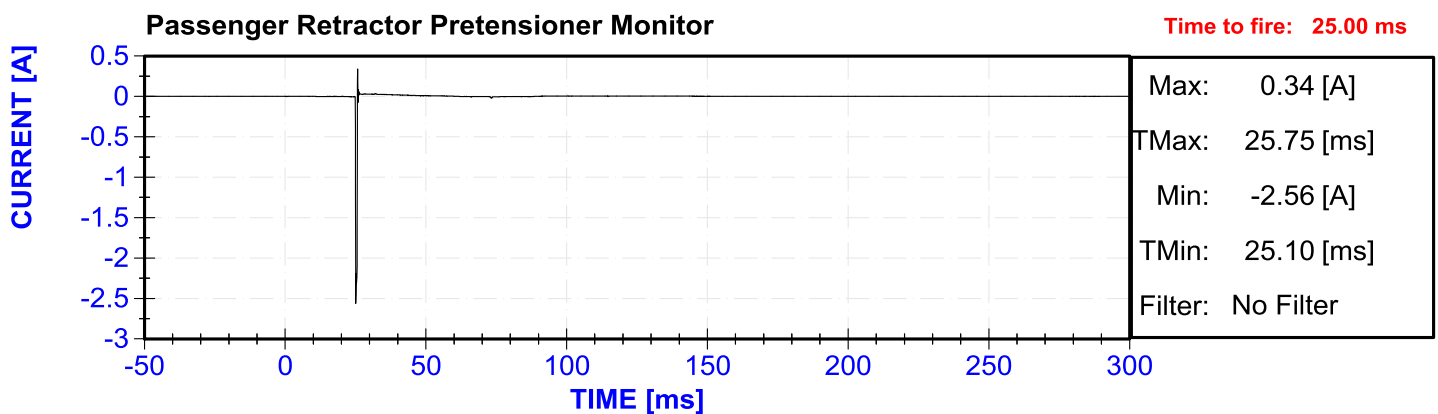
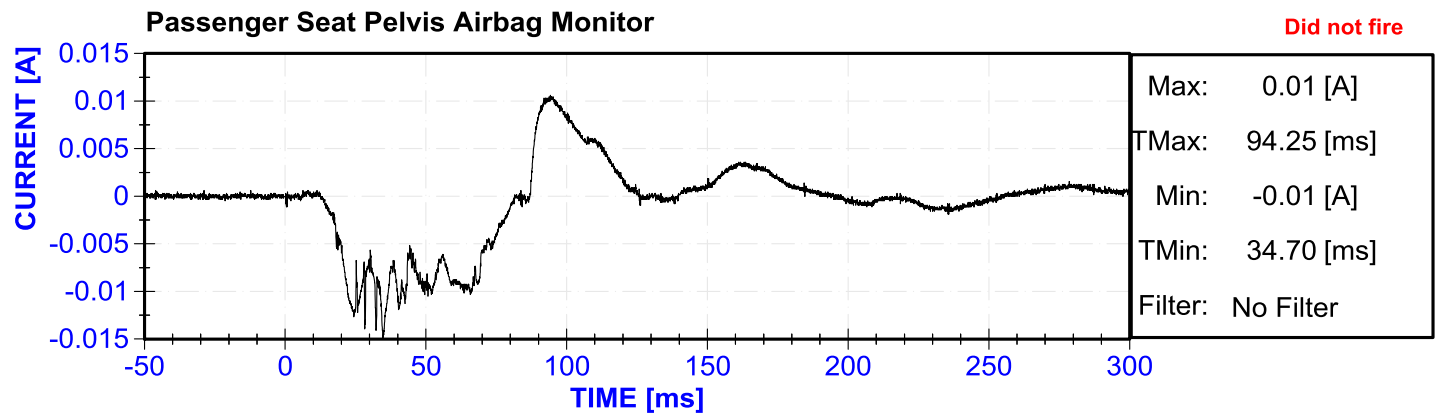
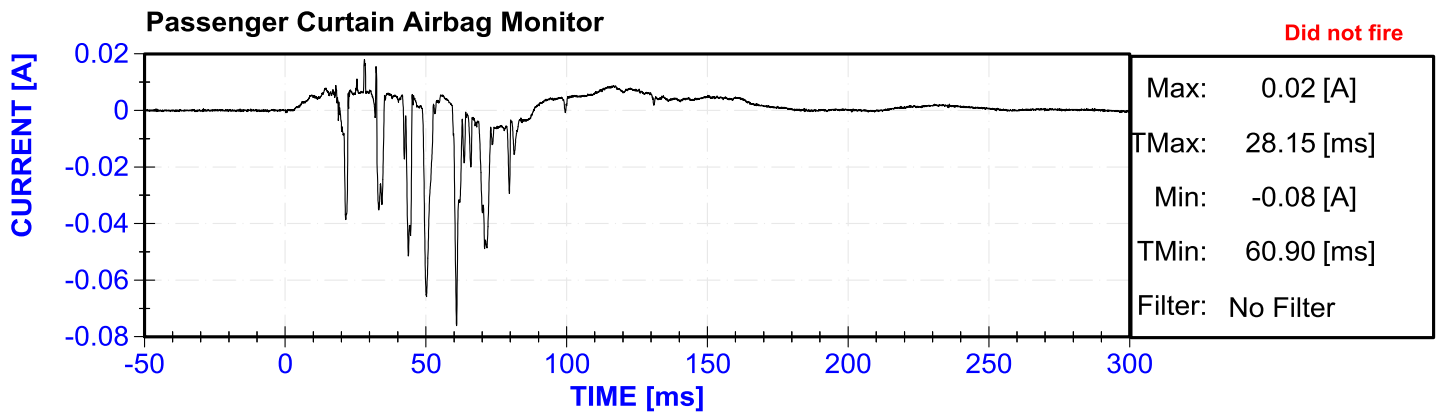
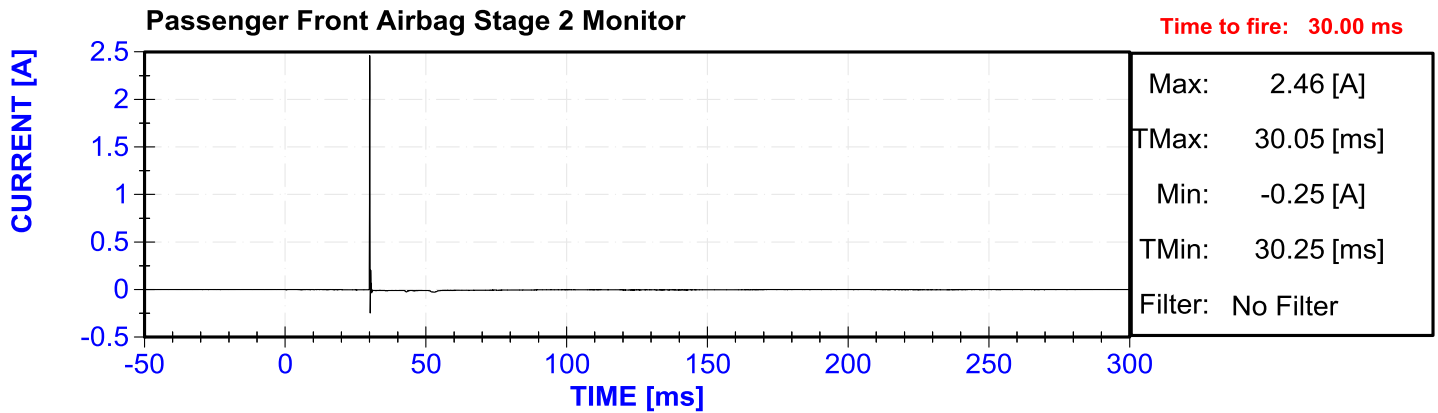


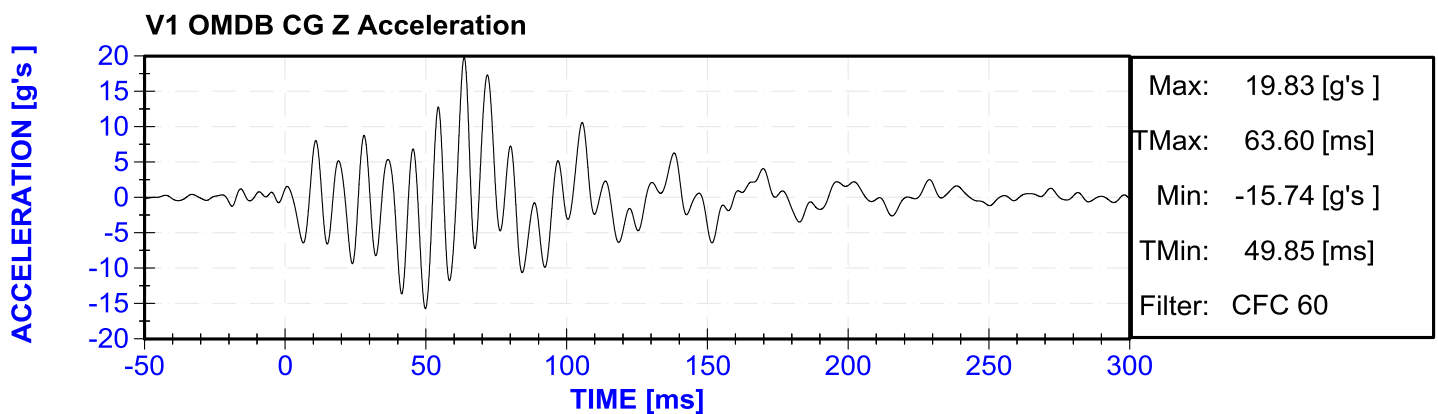
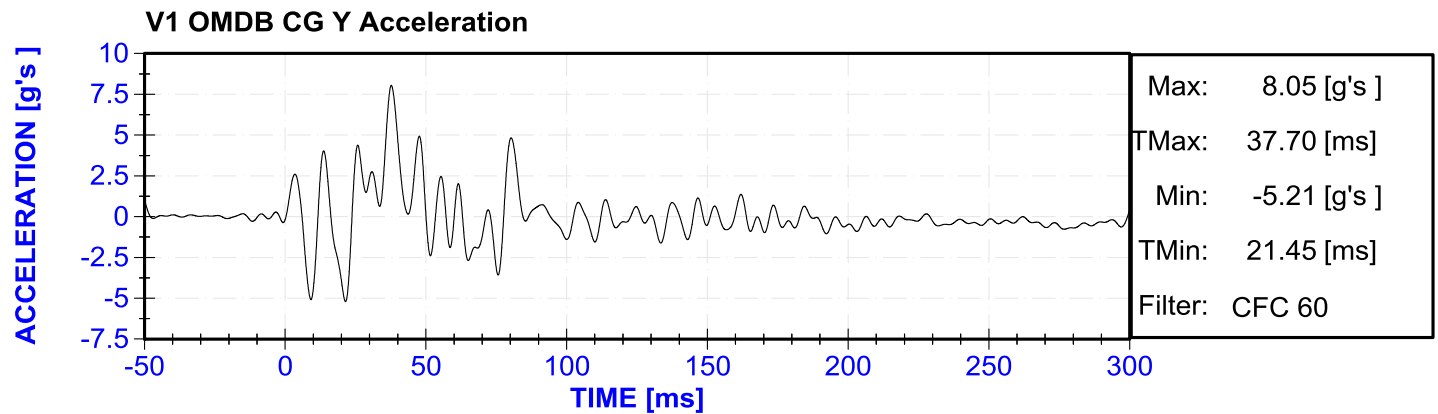
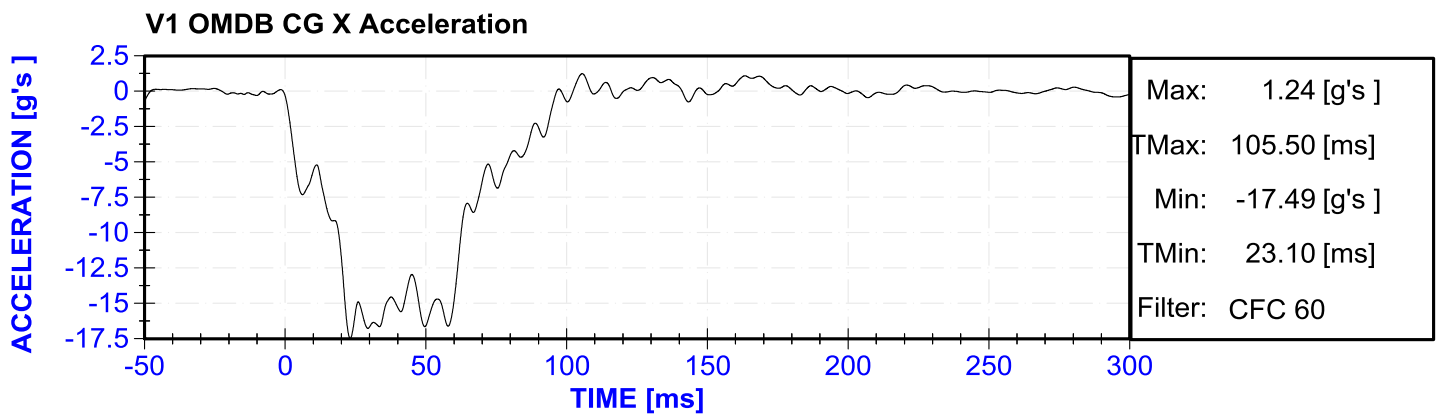
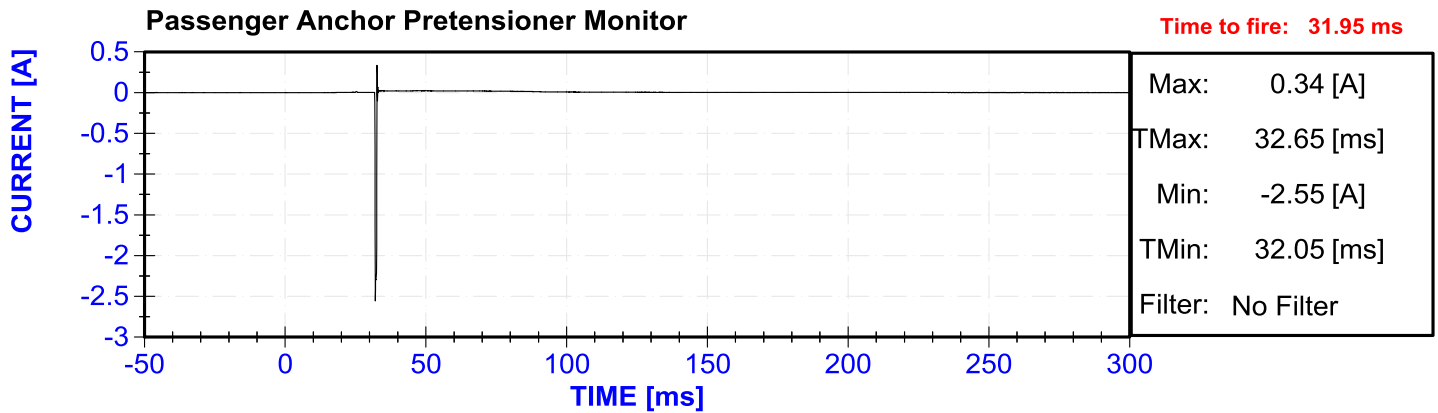


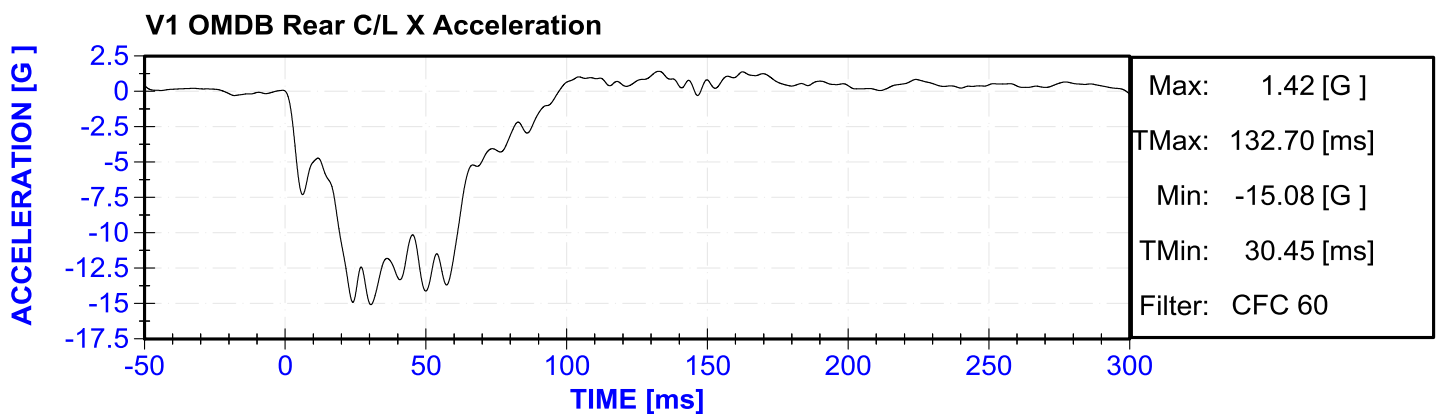
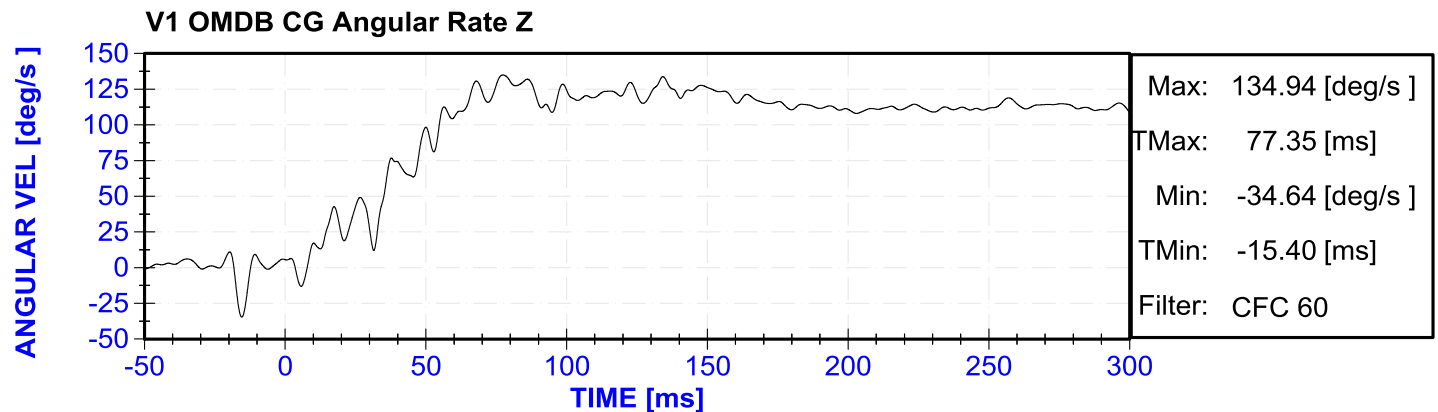
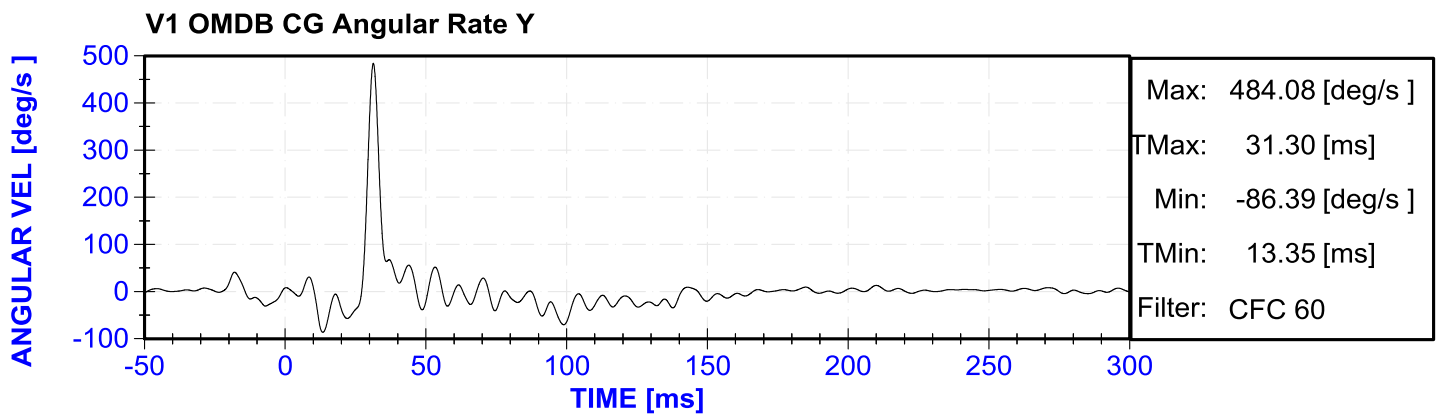
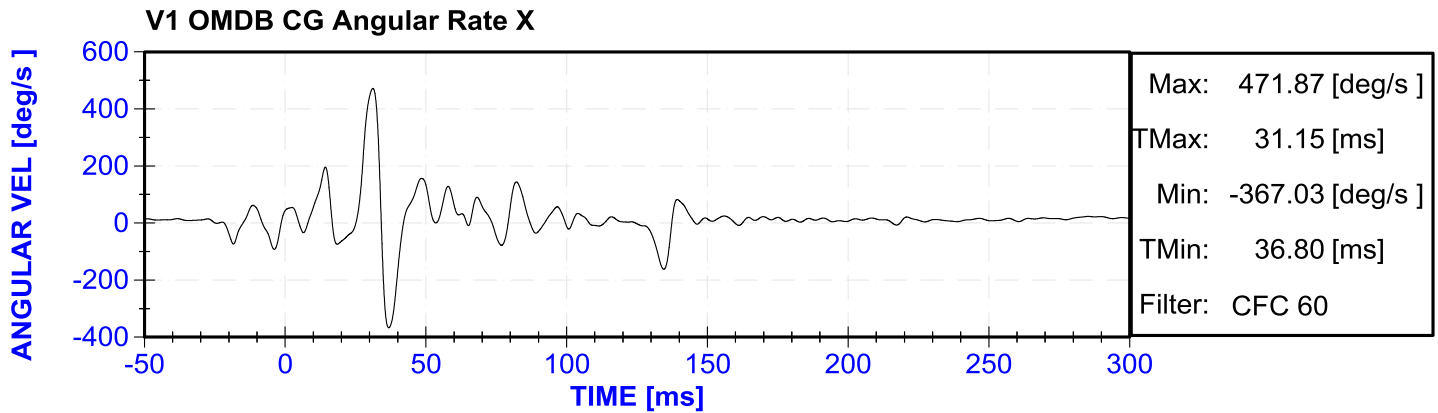


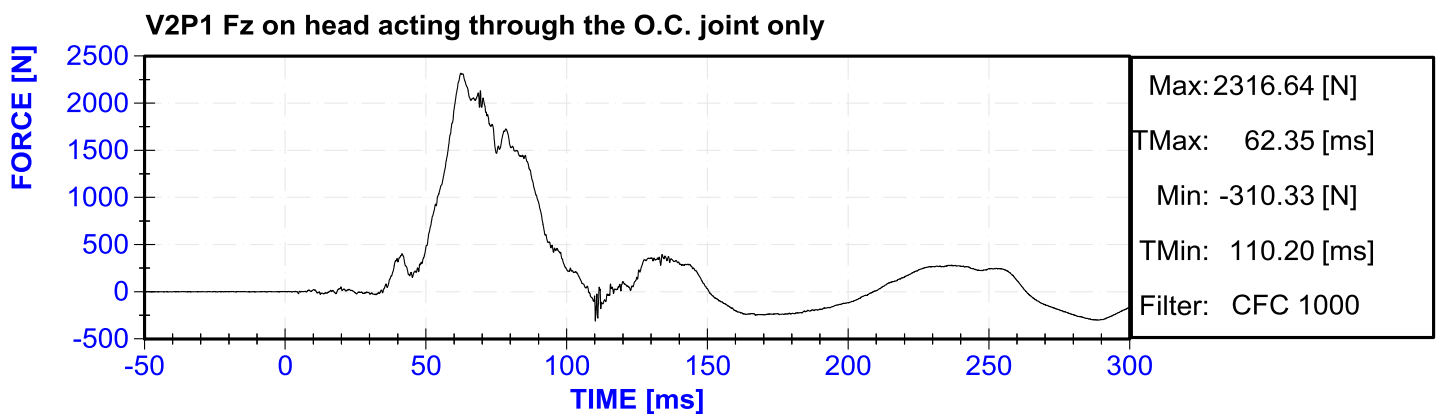
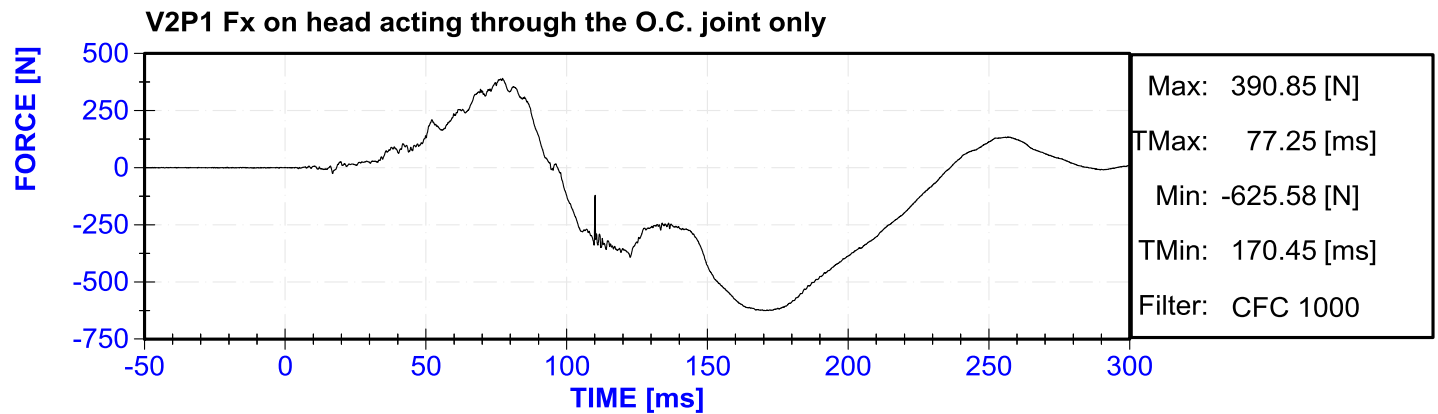
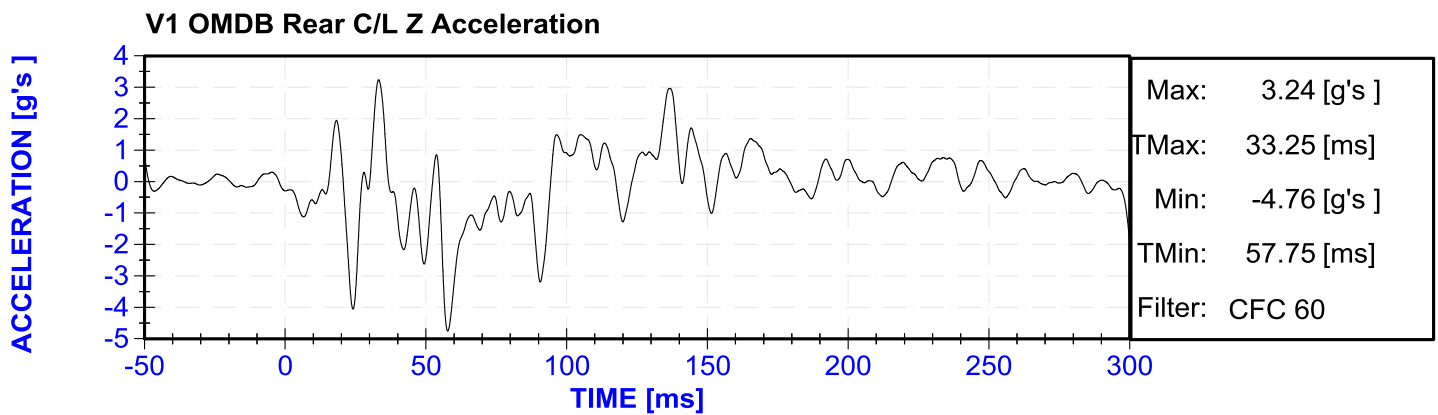
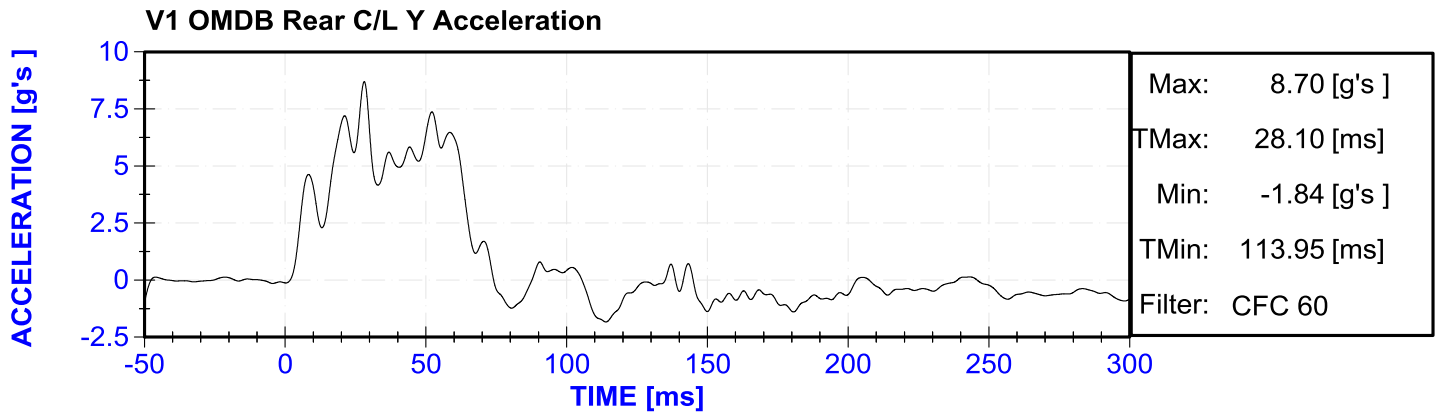




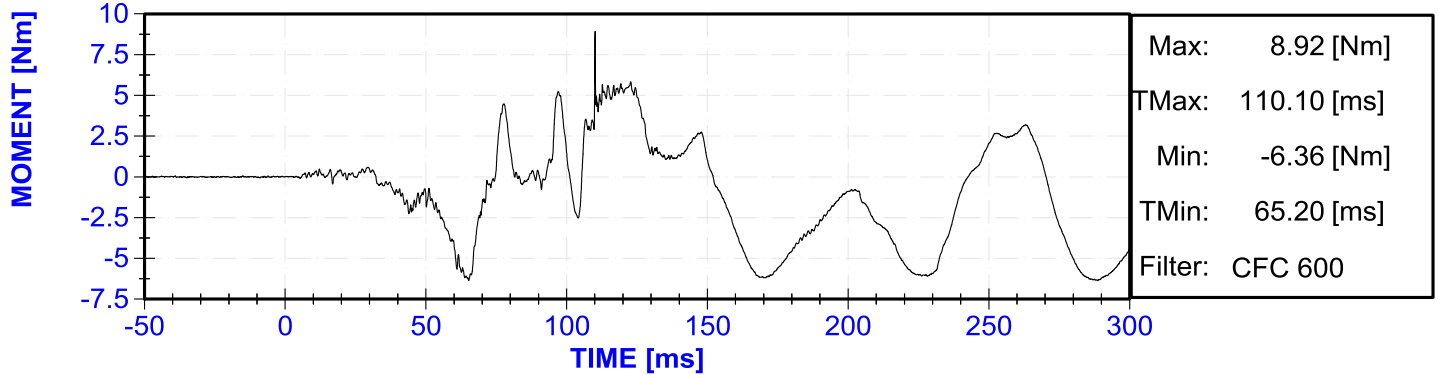




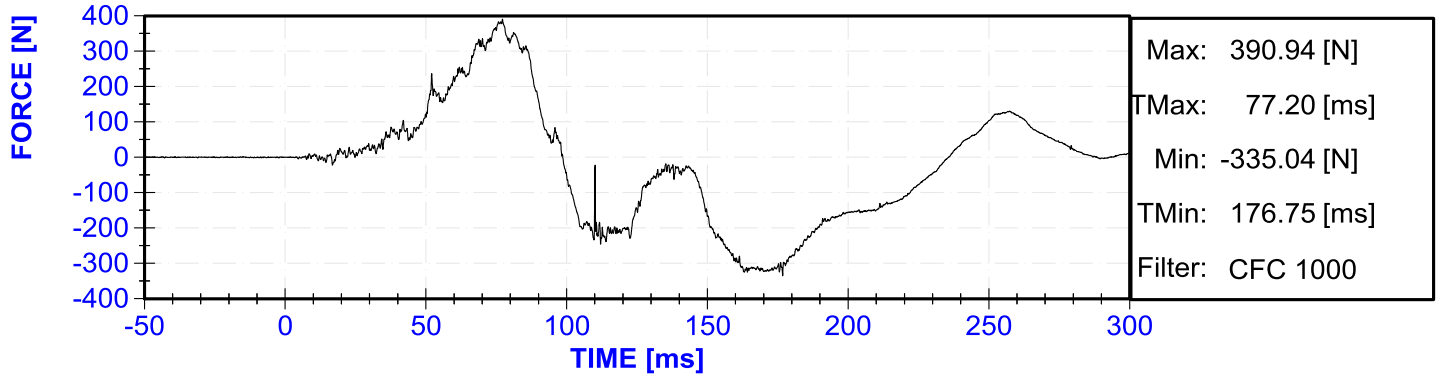




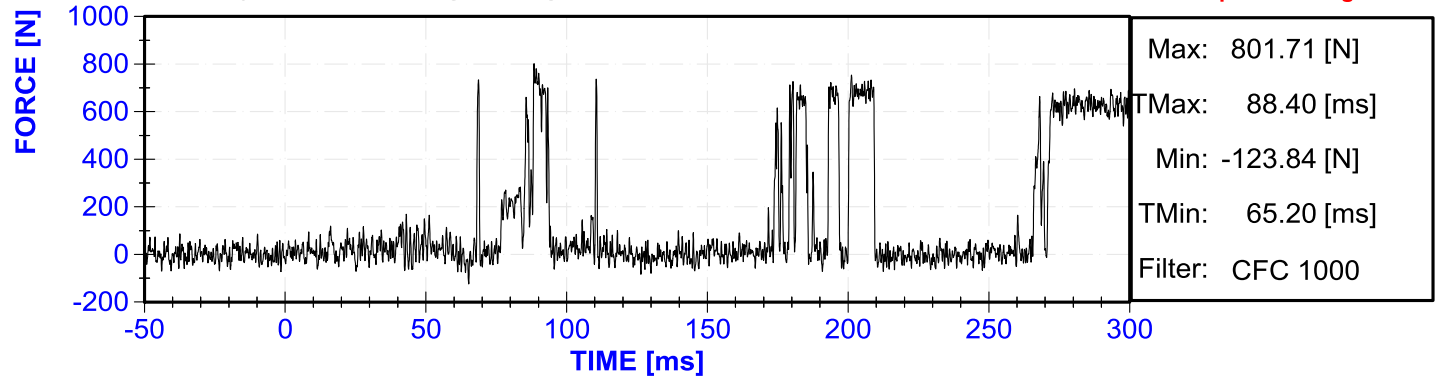
V2P1 My on head acting through the O.C. joint only



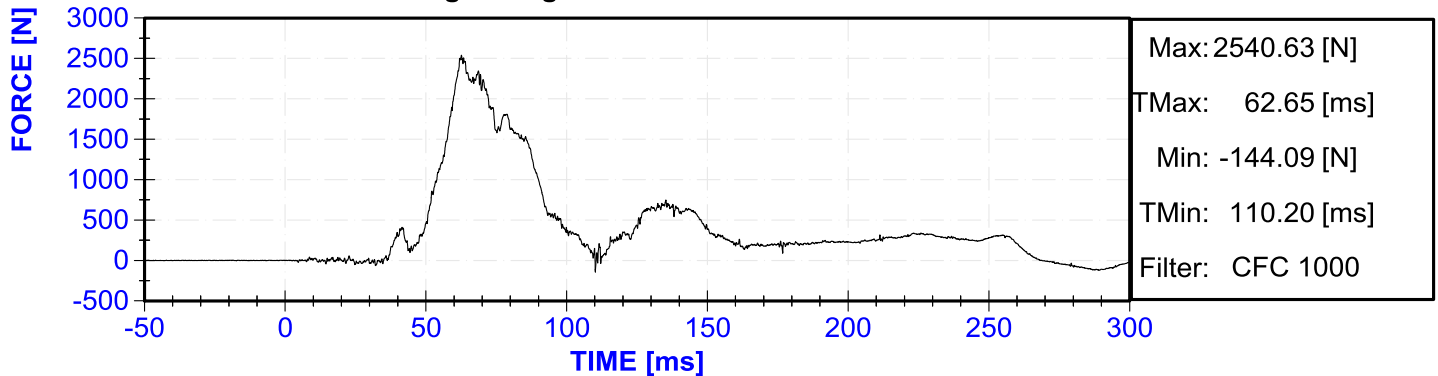
V2P1 Fx on head acting through the total neck section

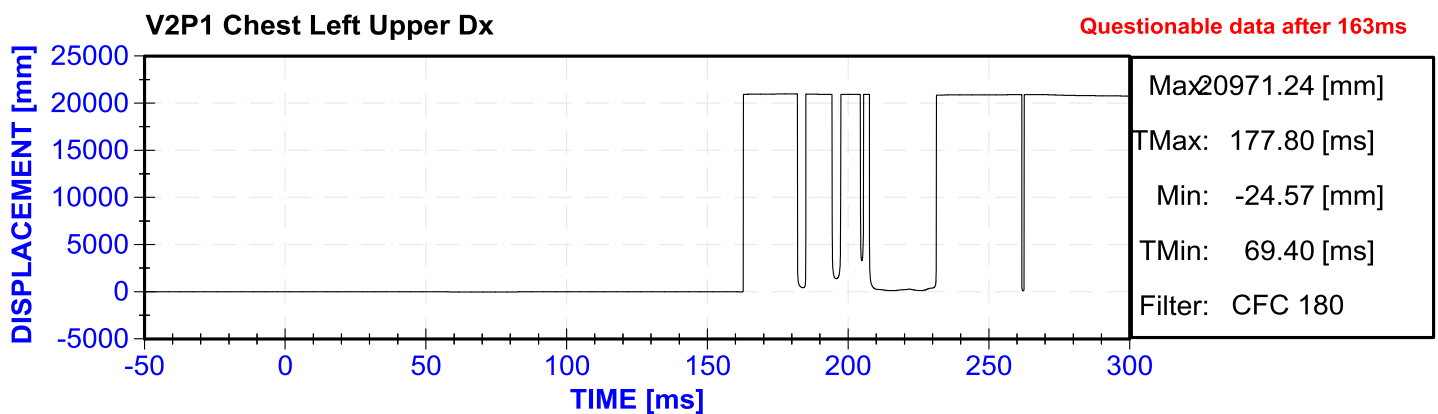
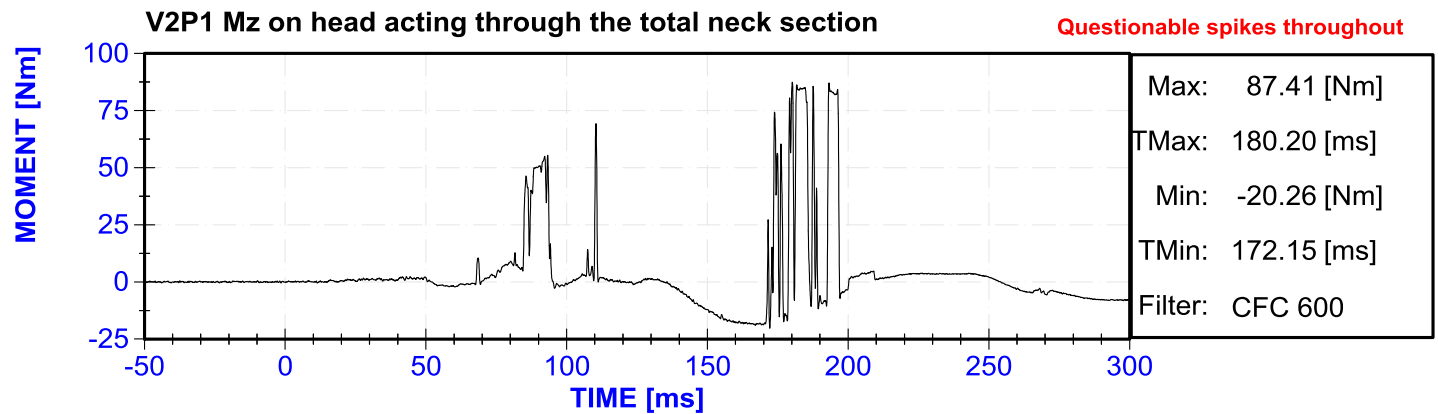
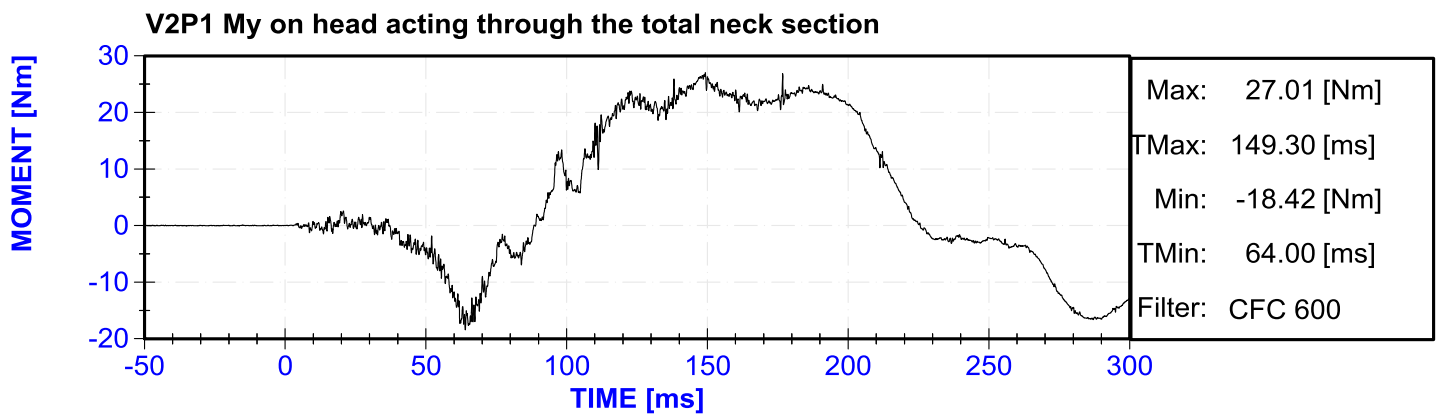
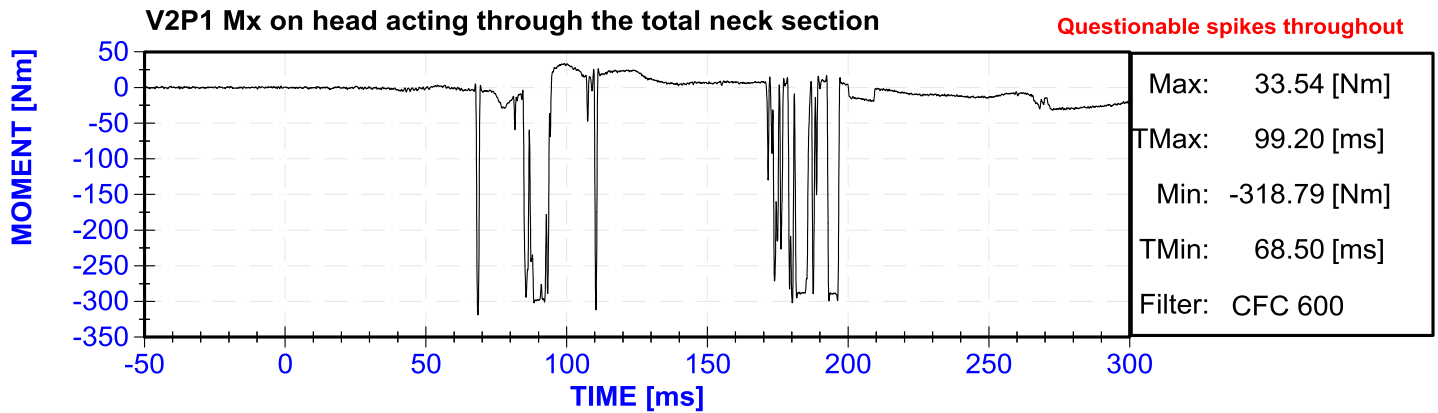


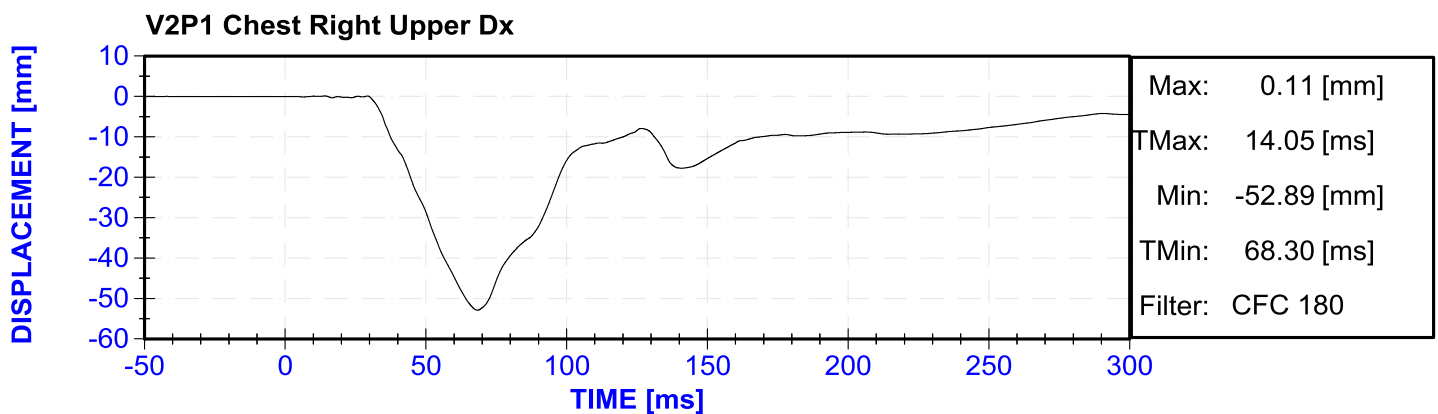
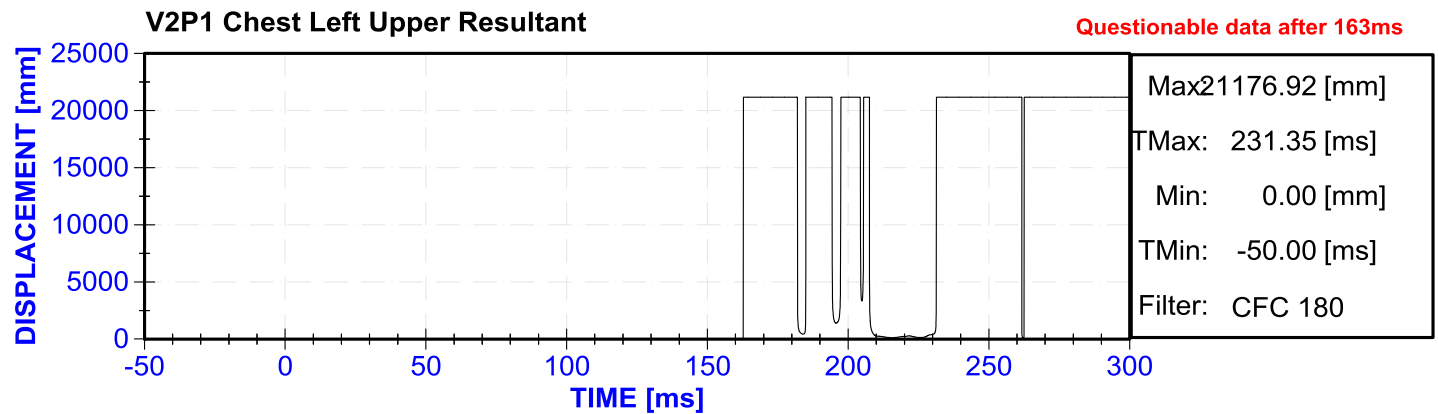
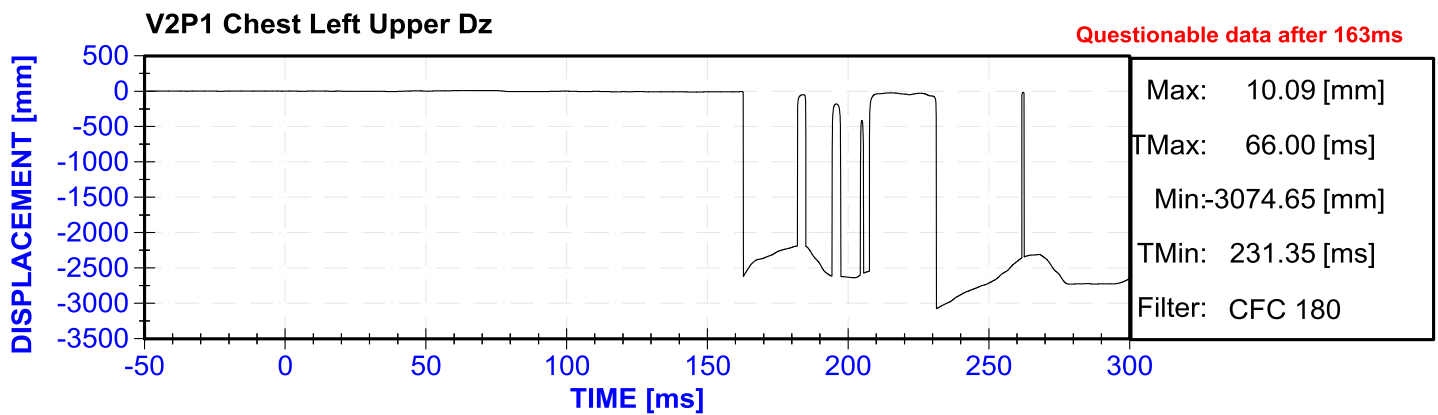
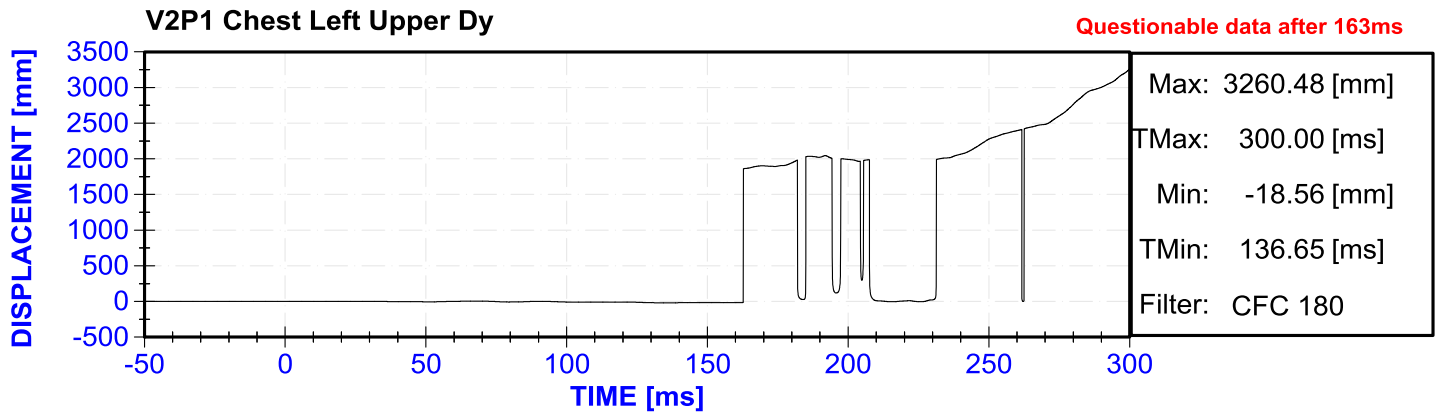
V2P1 Fy on head acting through the total neck section

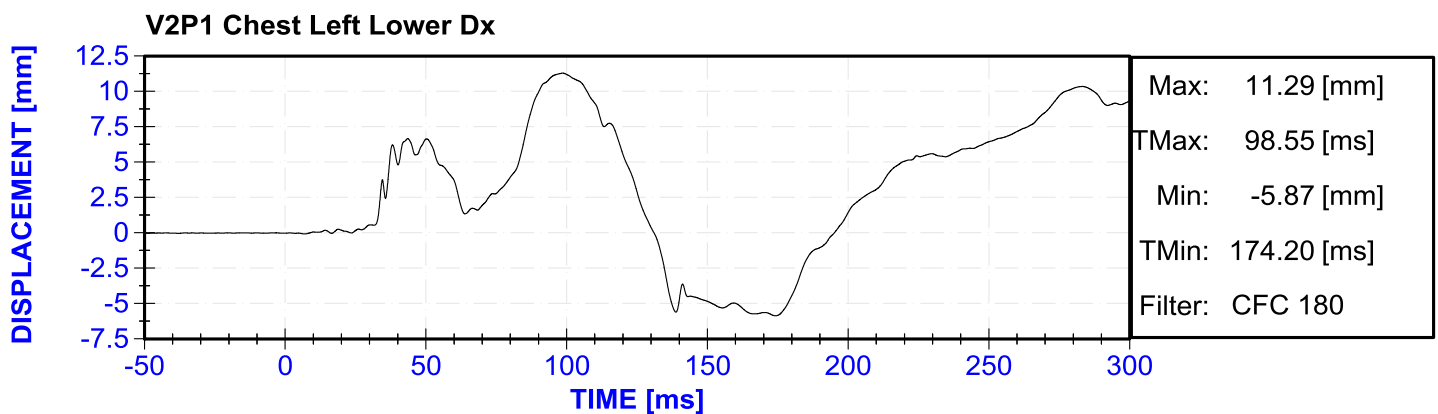
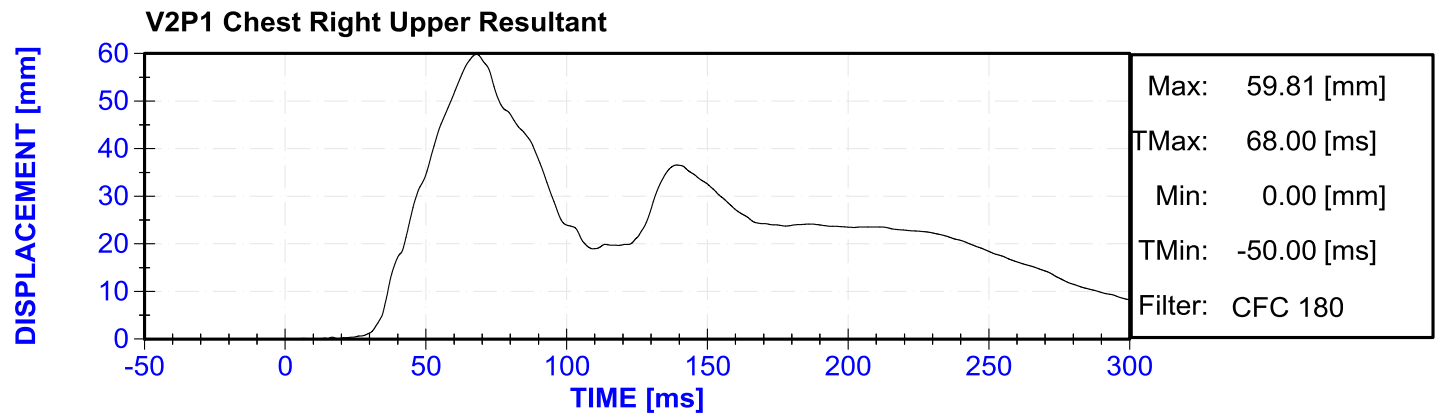
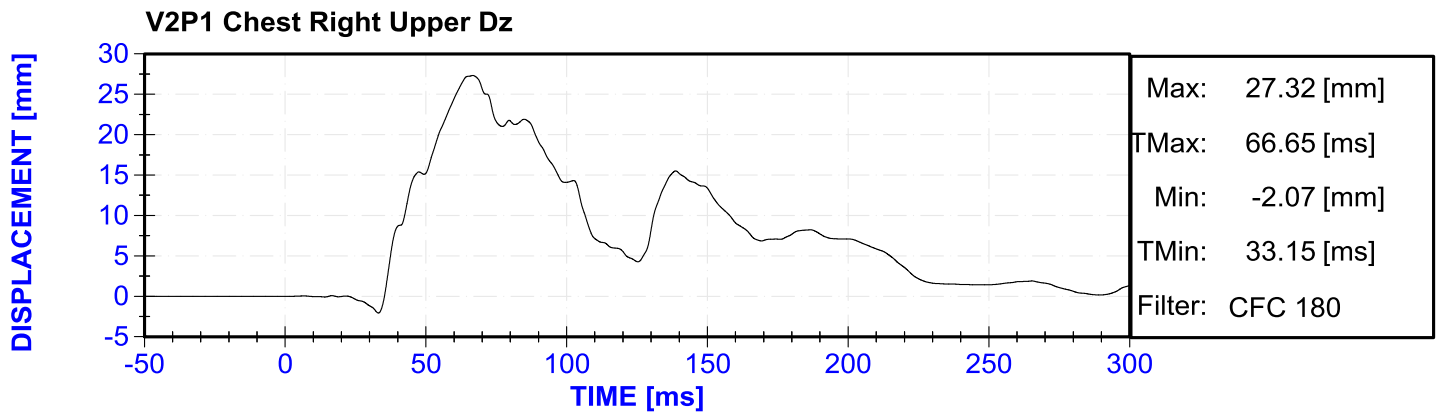
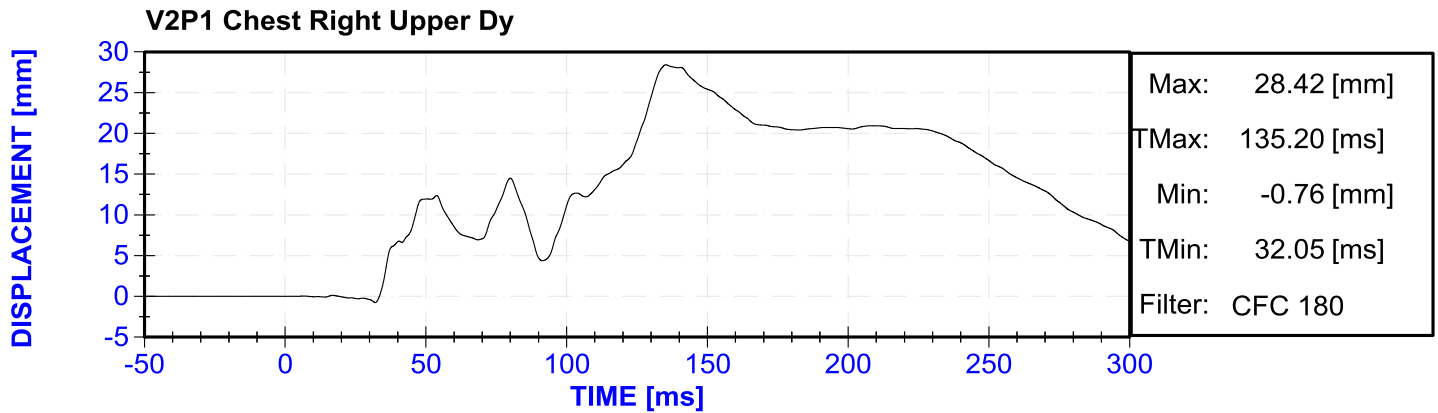


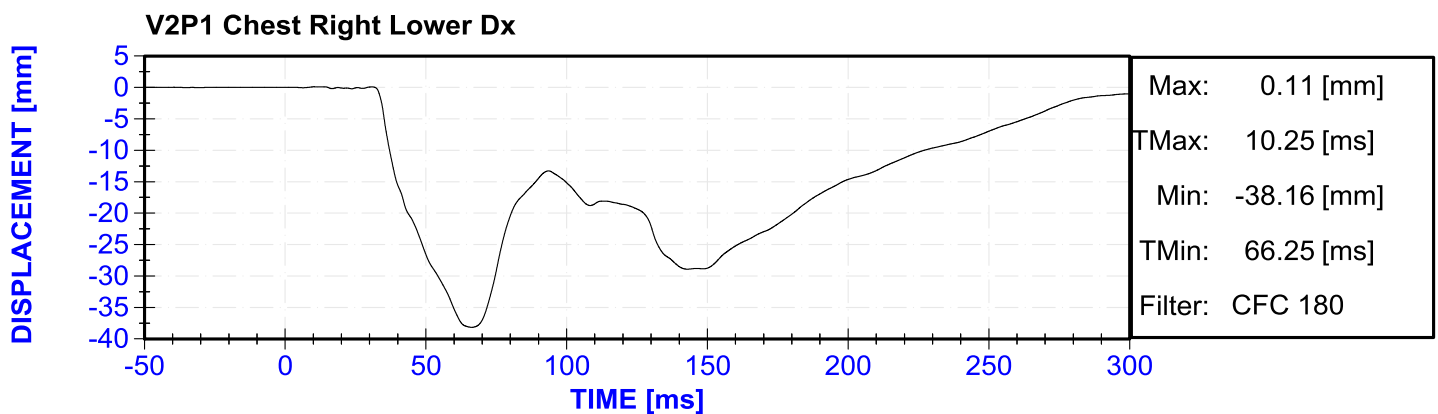
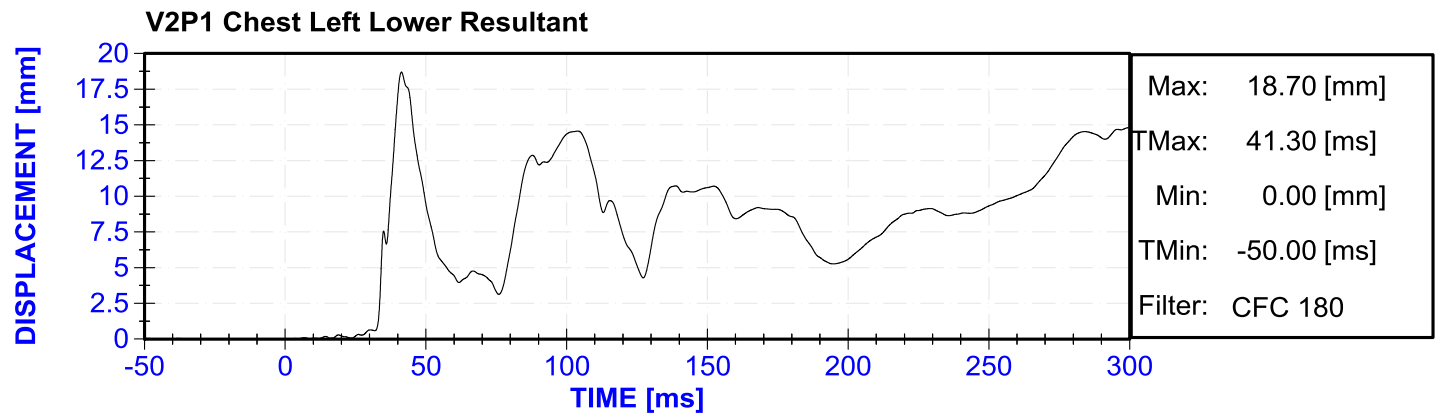
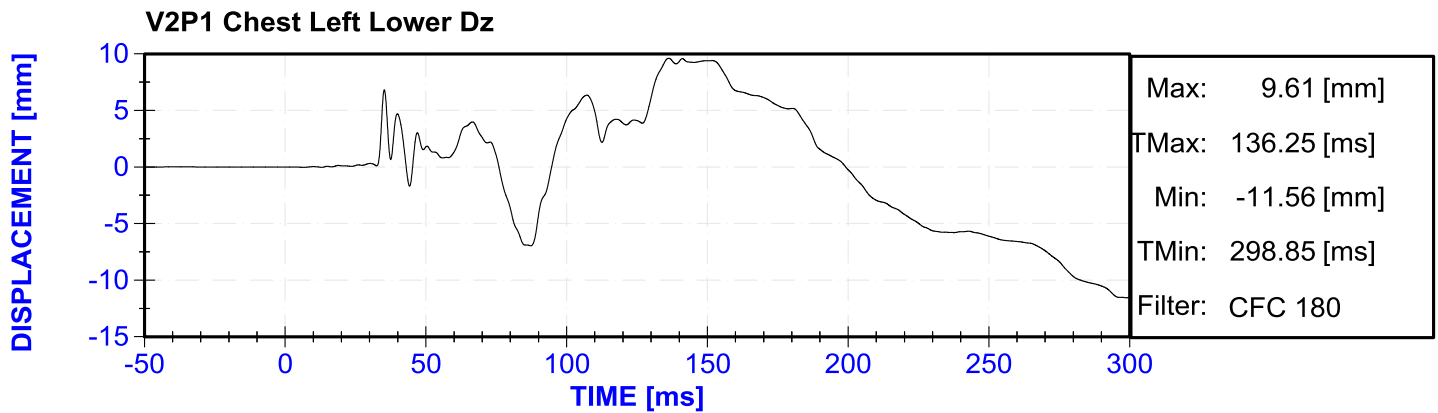
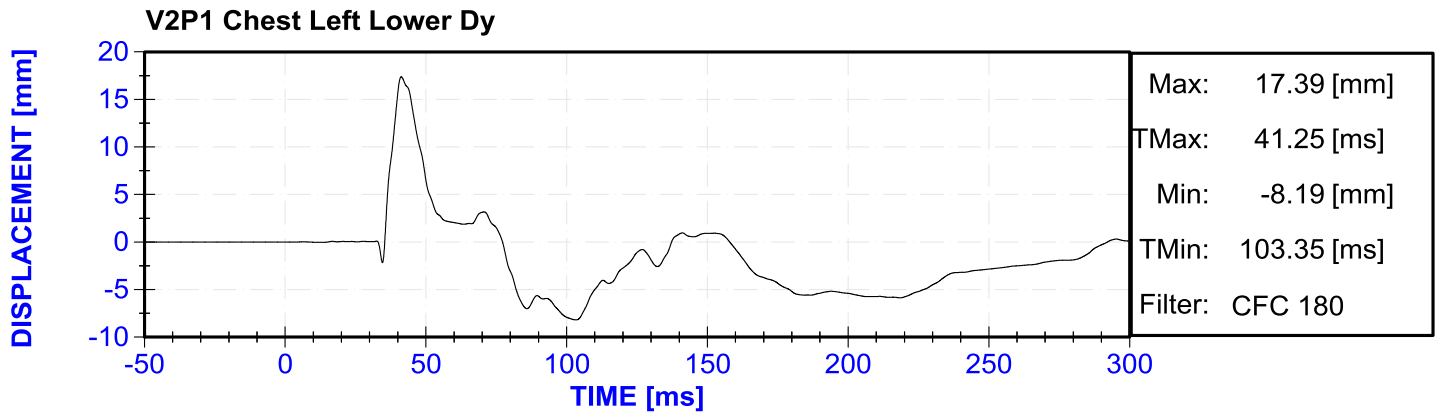
V2P1 Fz on head acting through the total neck section

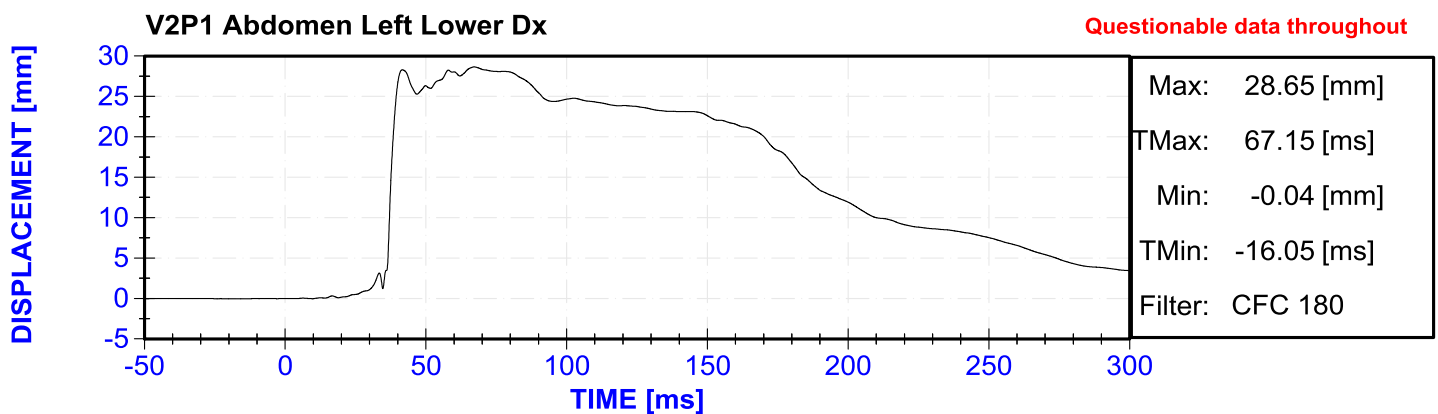
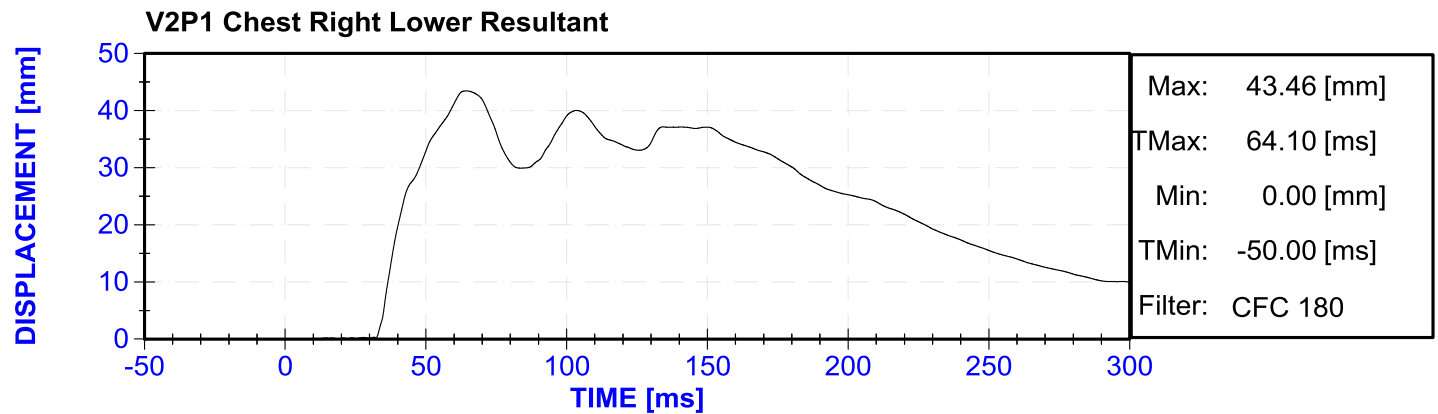
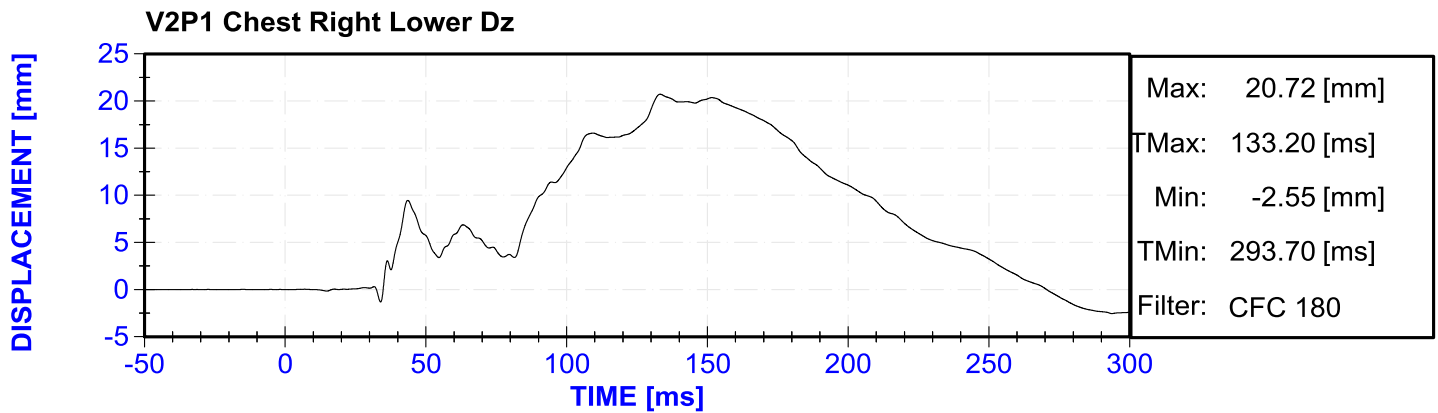
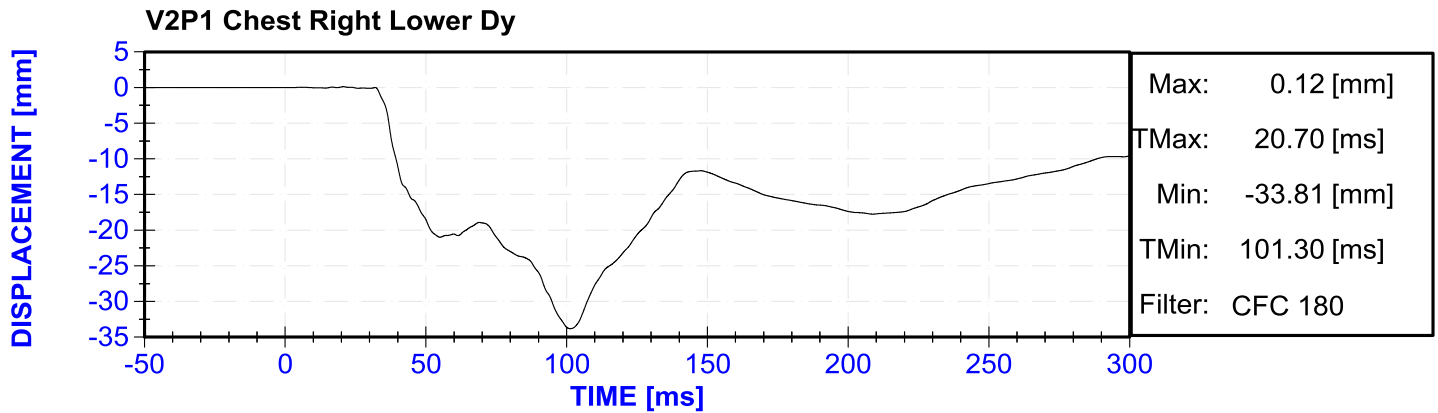


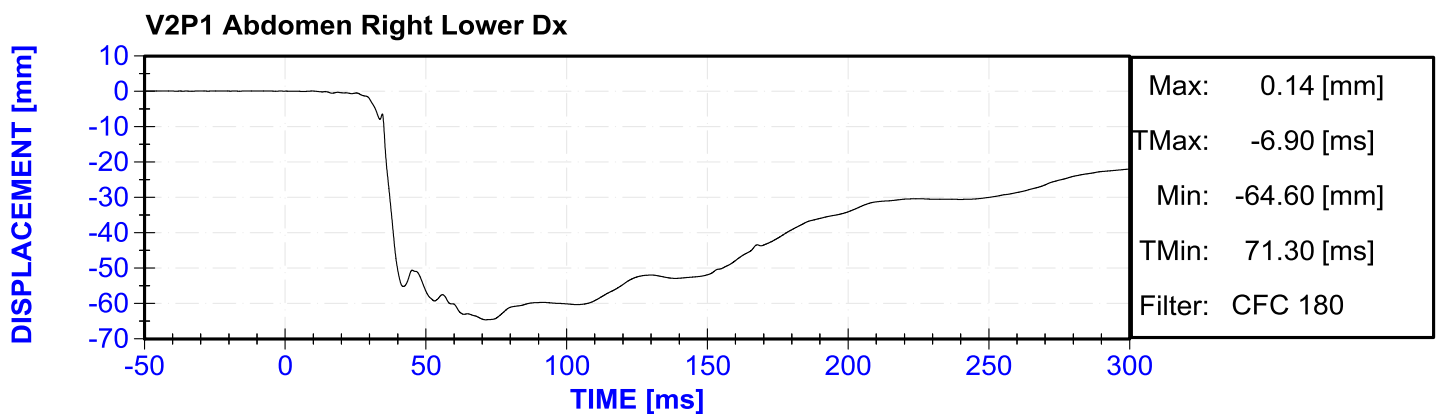
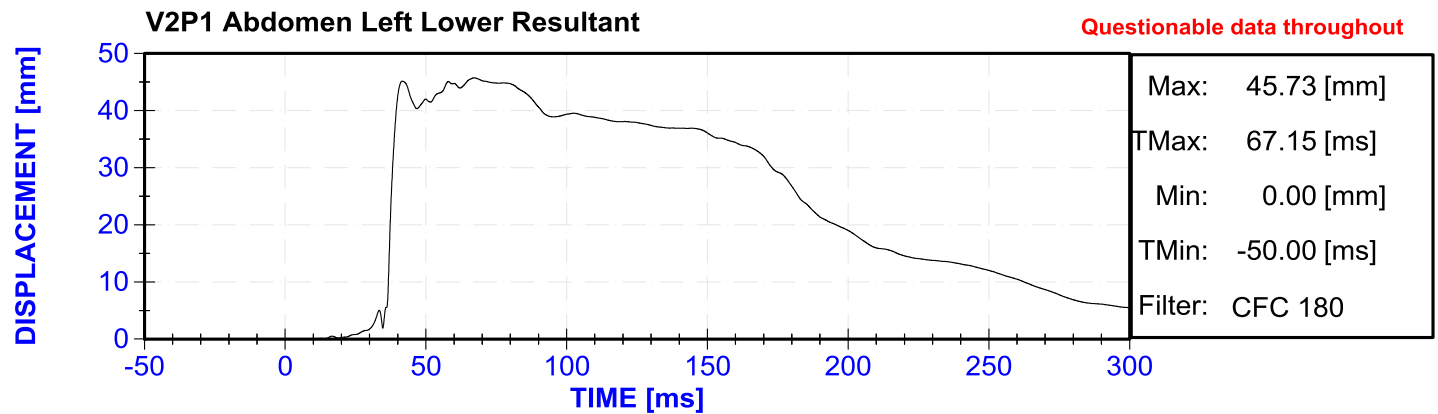
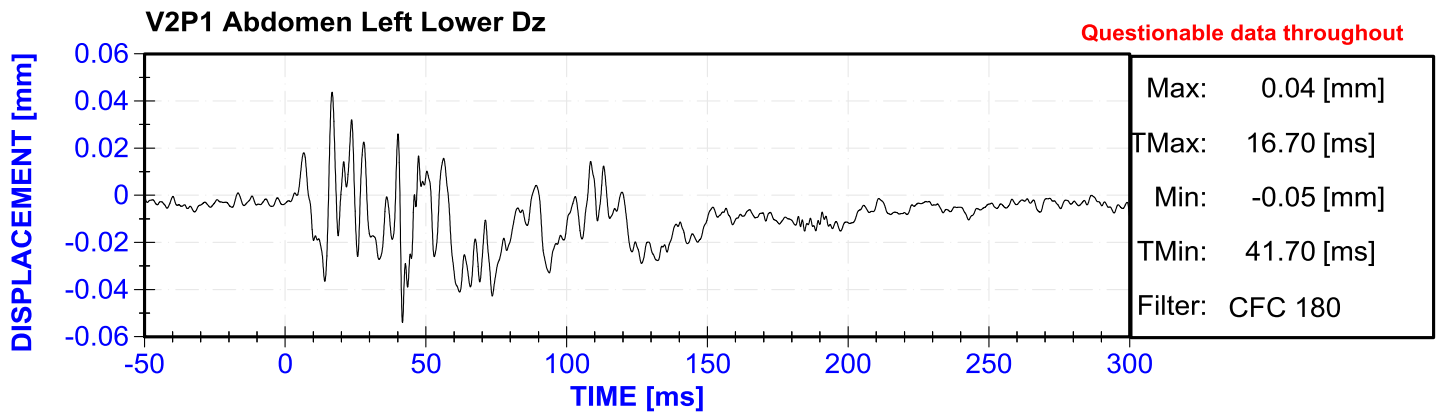
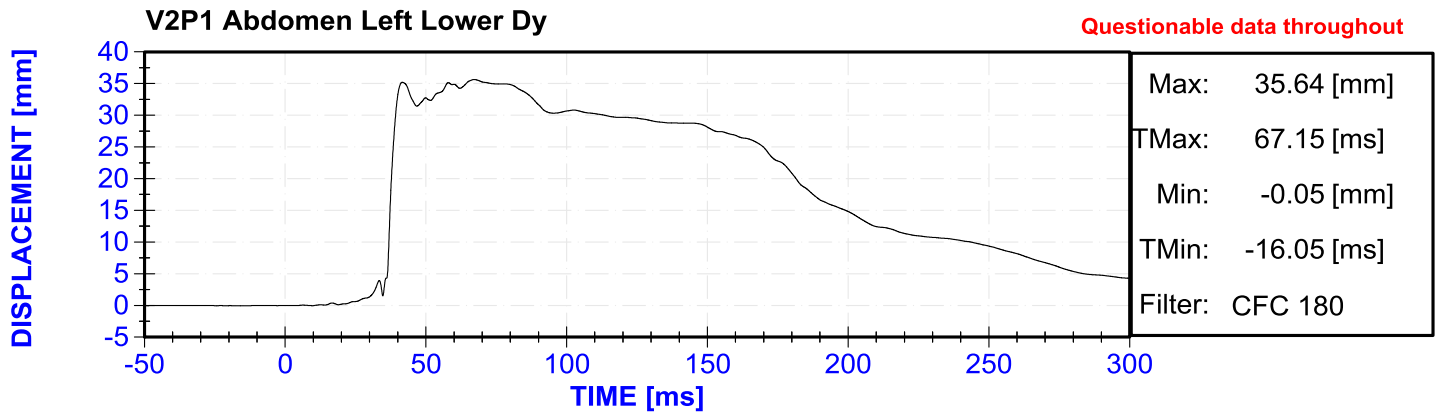


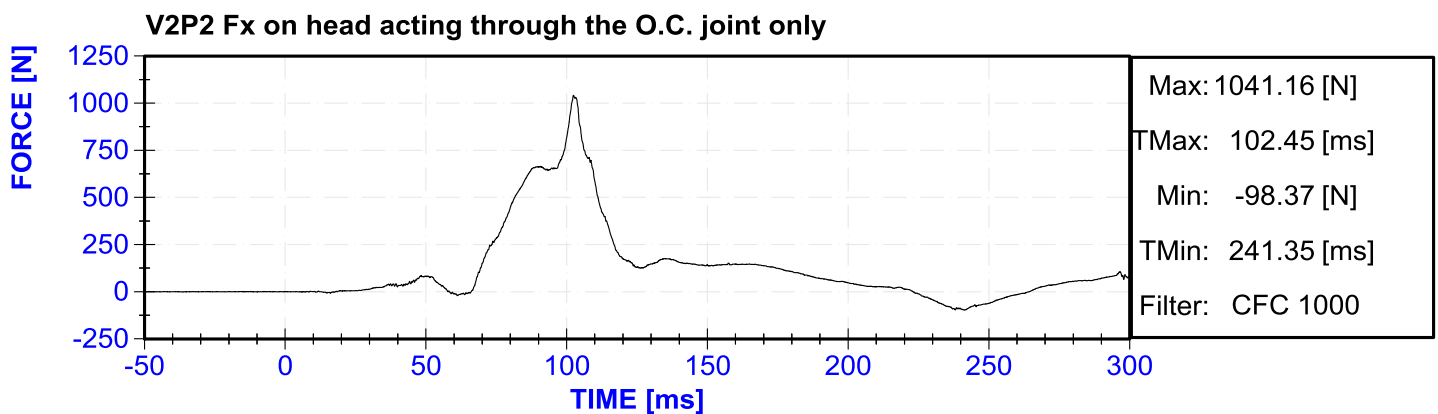
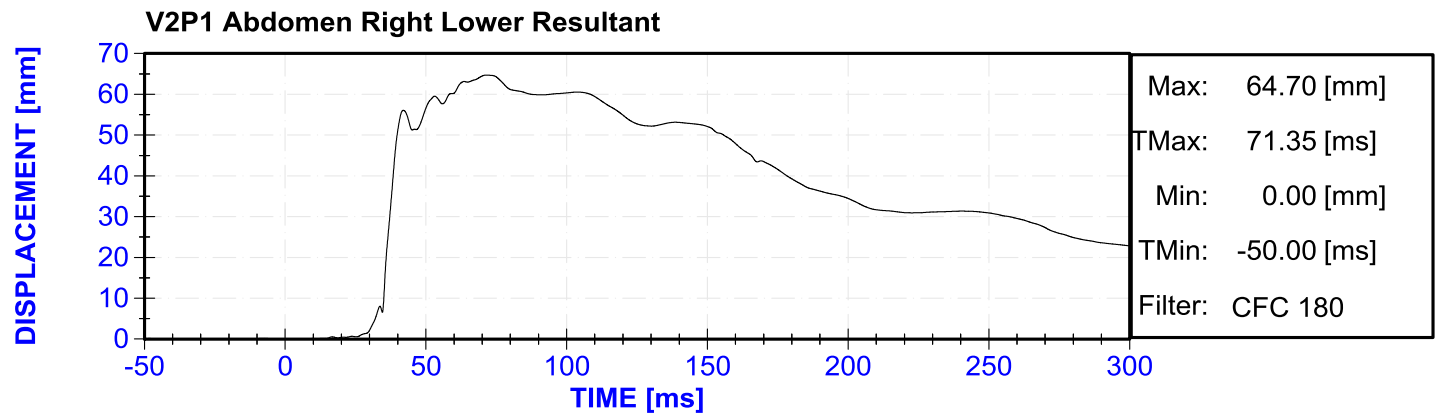
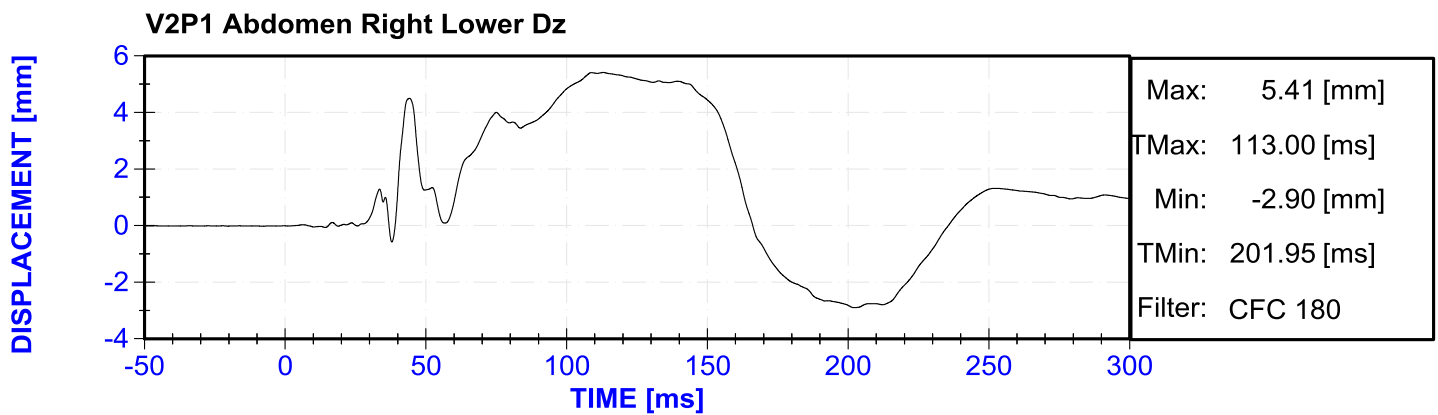
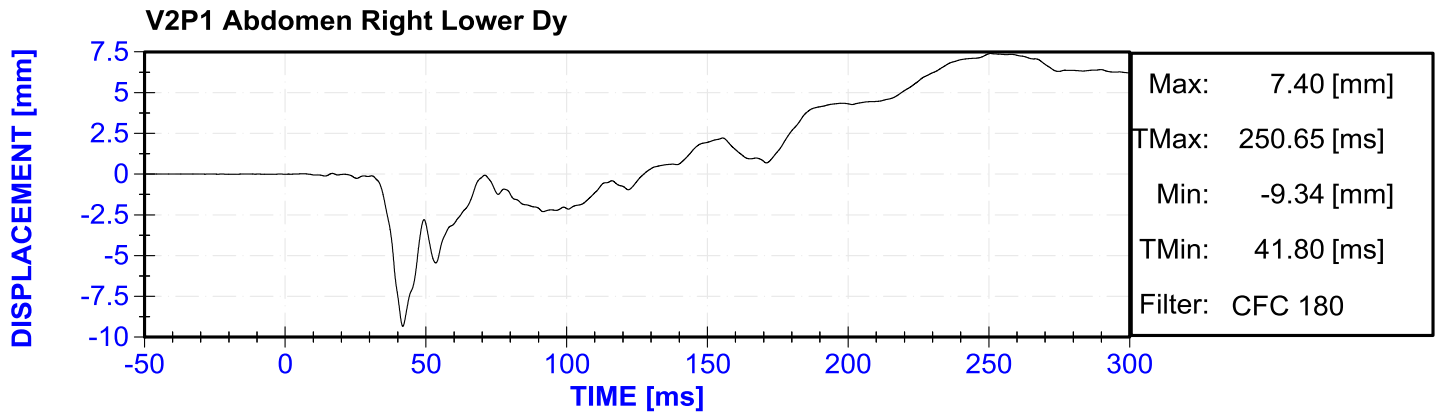


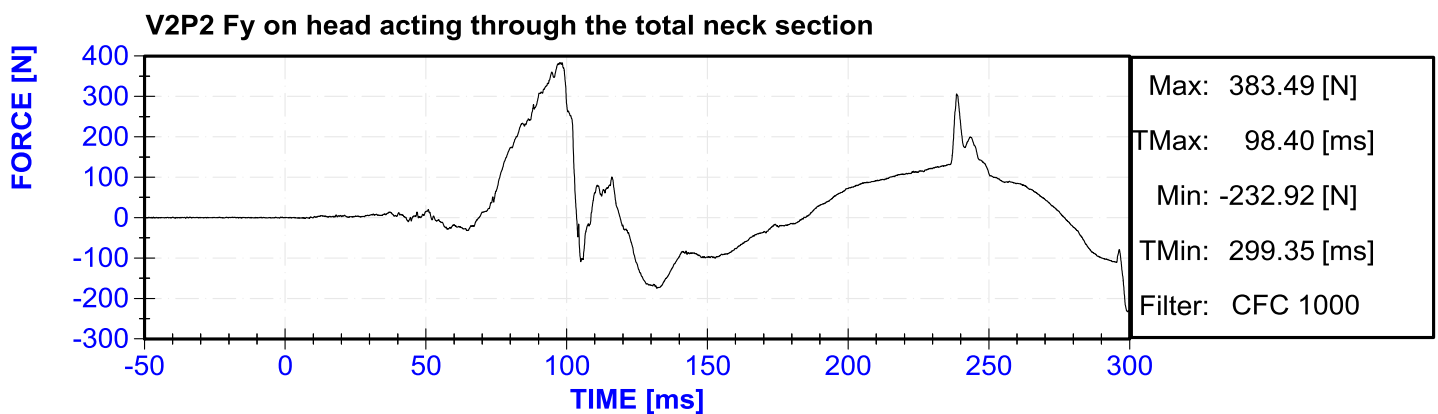
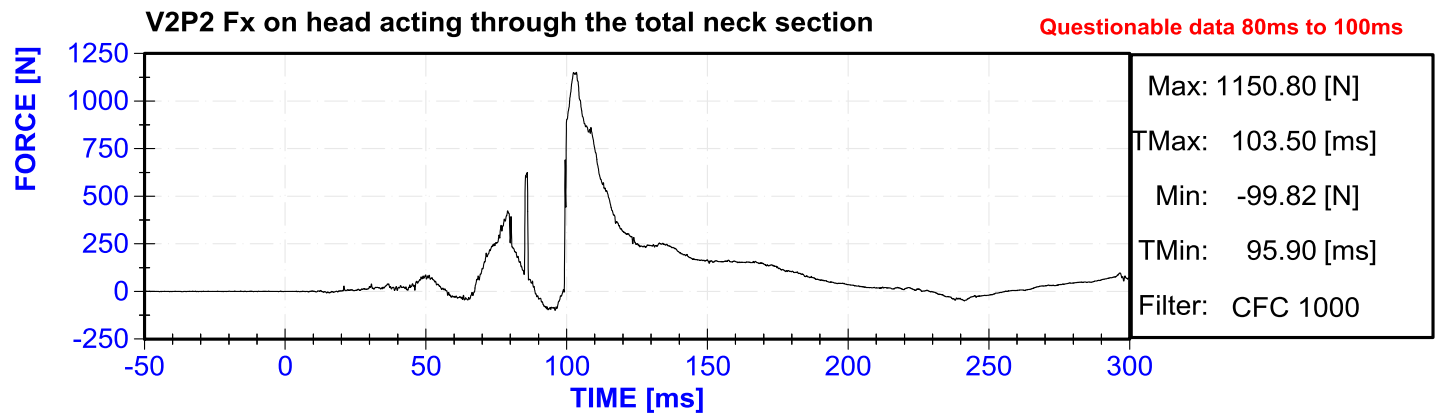
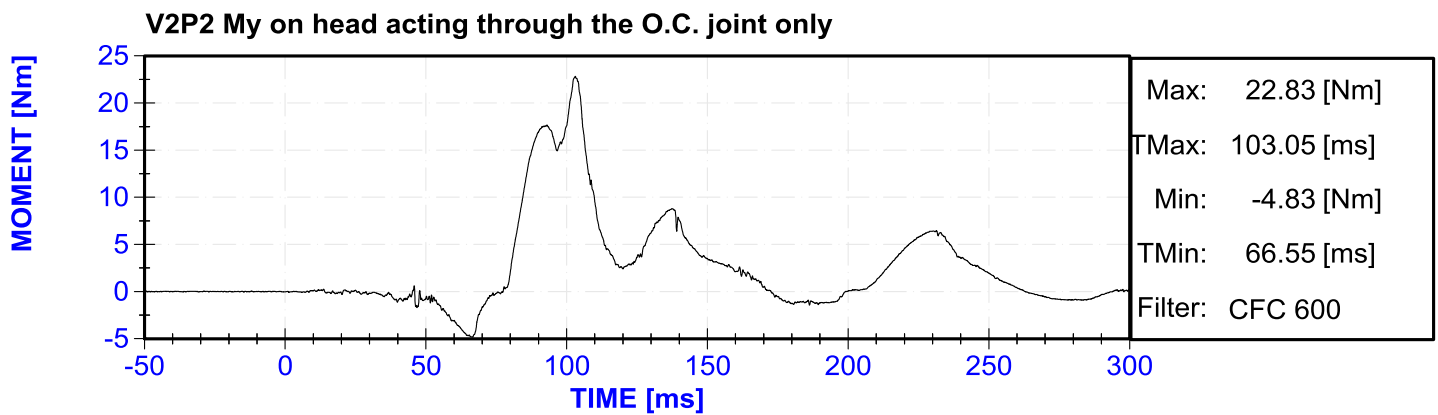
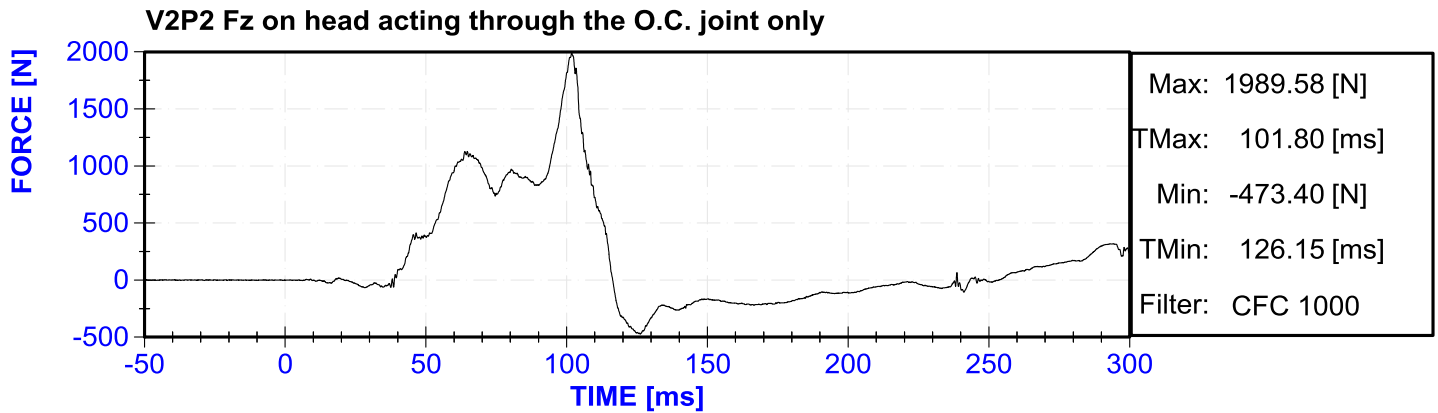


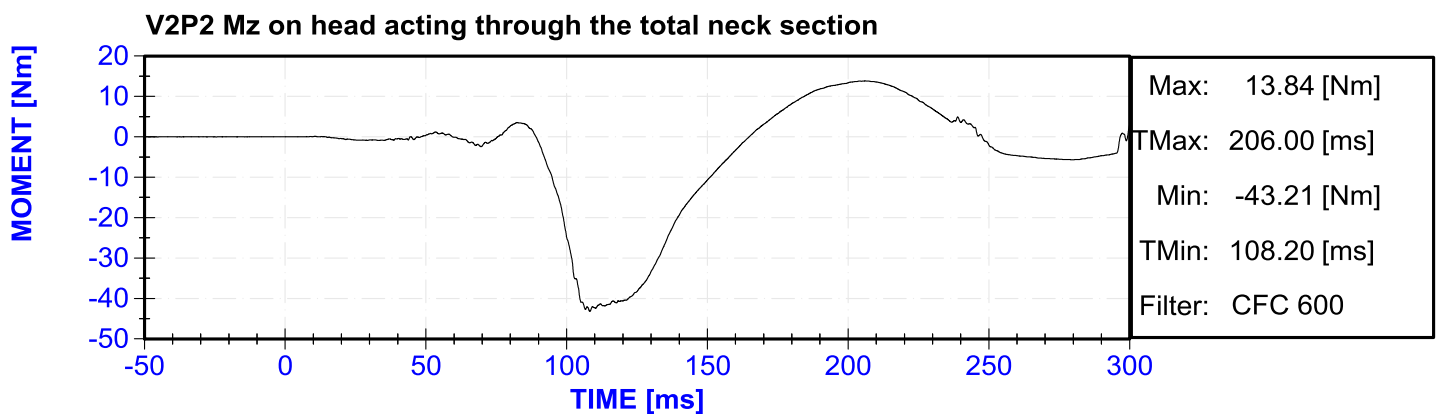
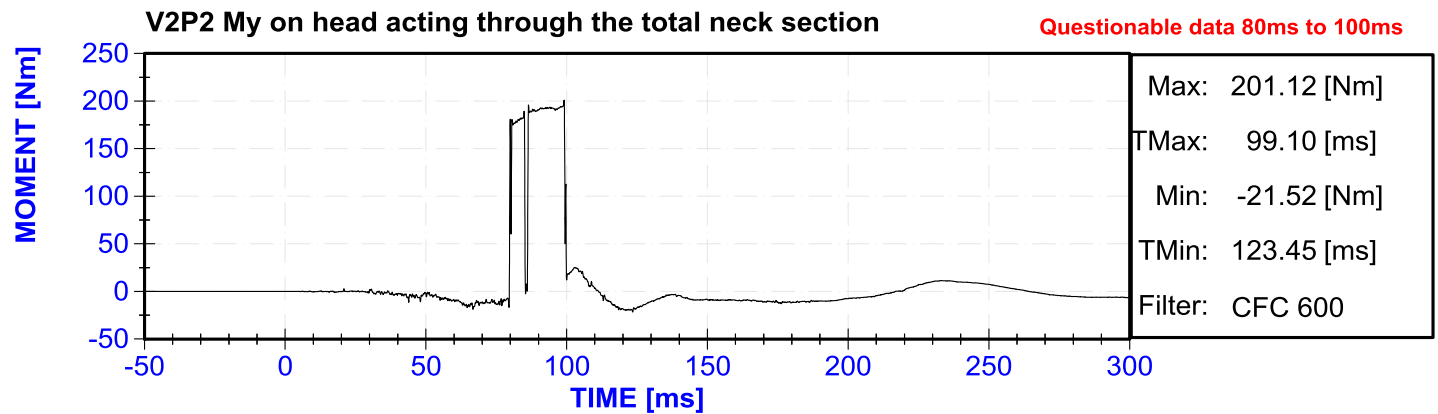
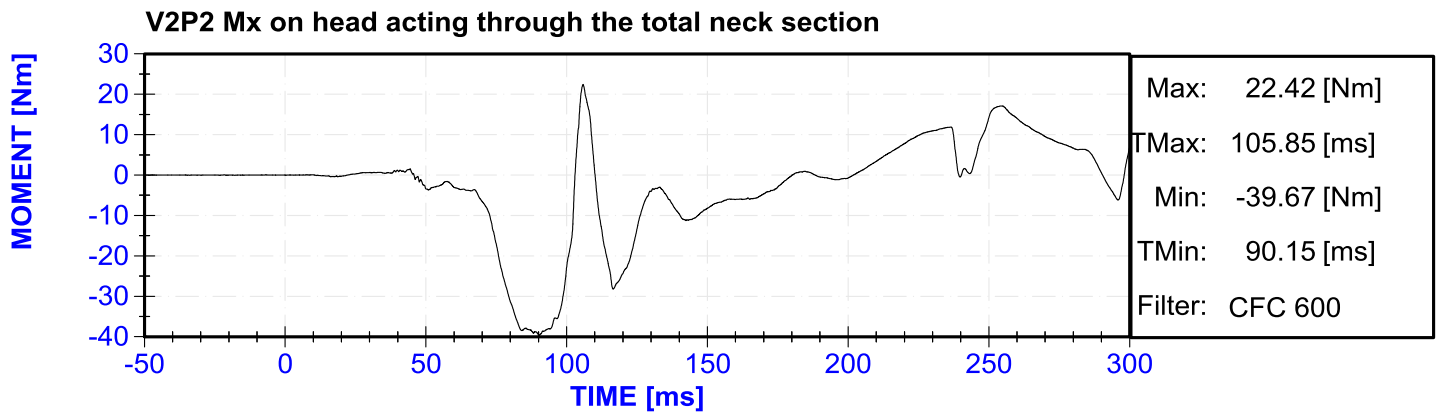
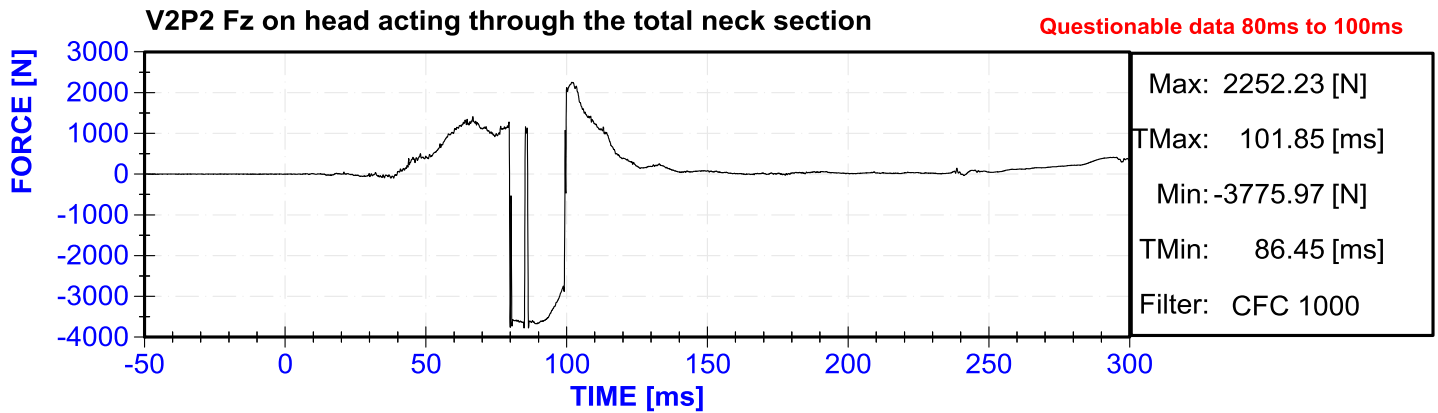


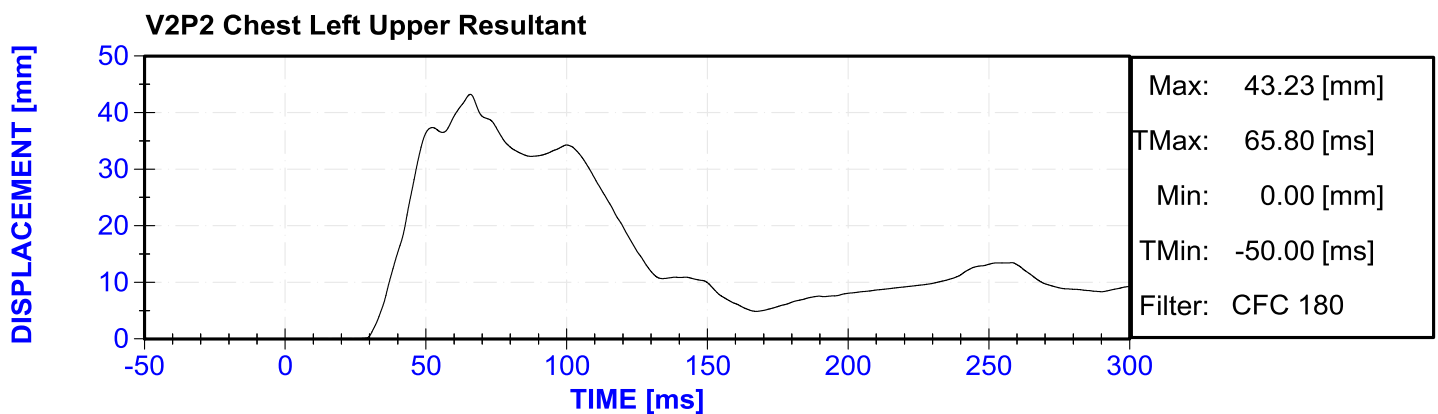
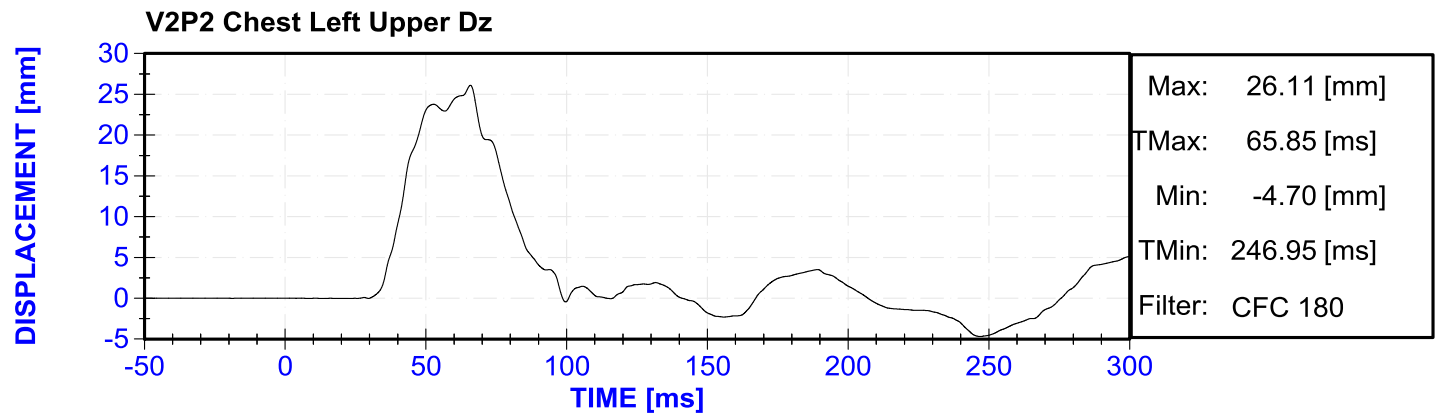
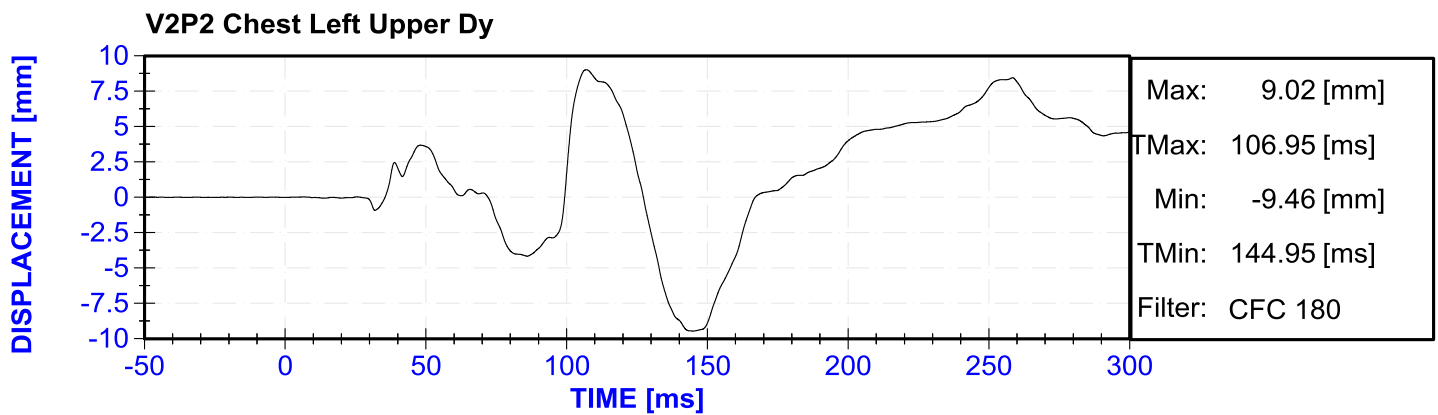
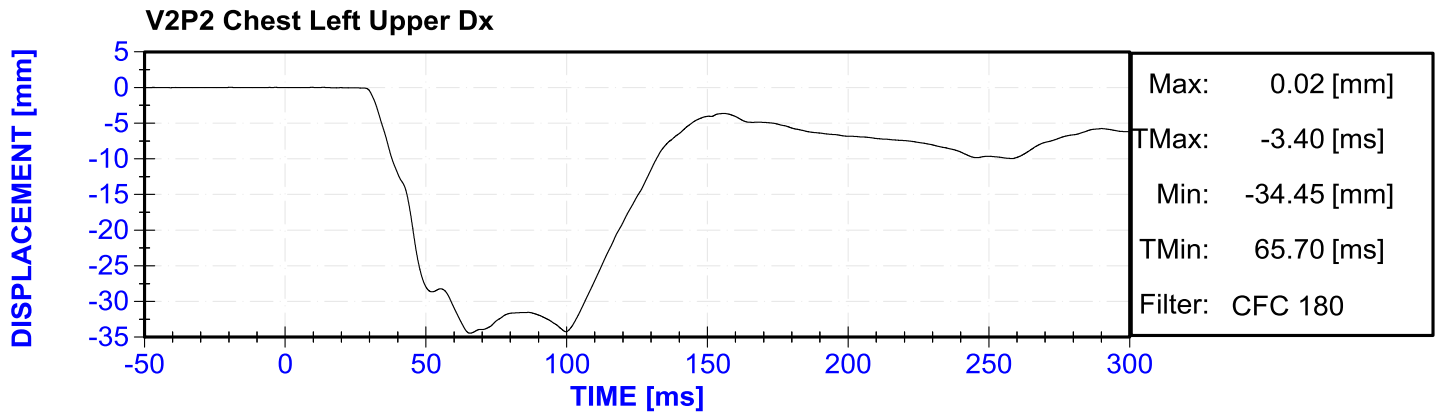


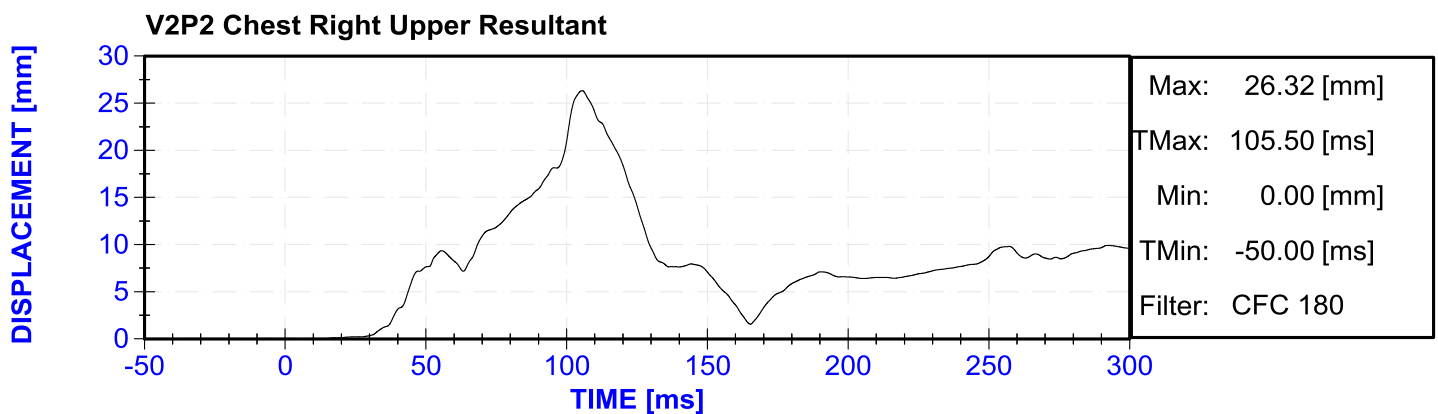
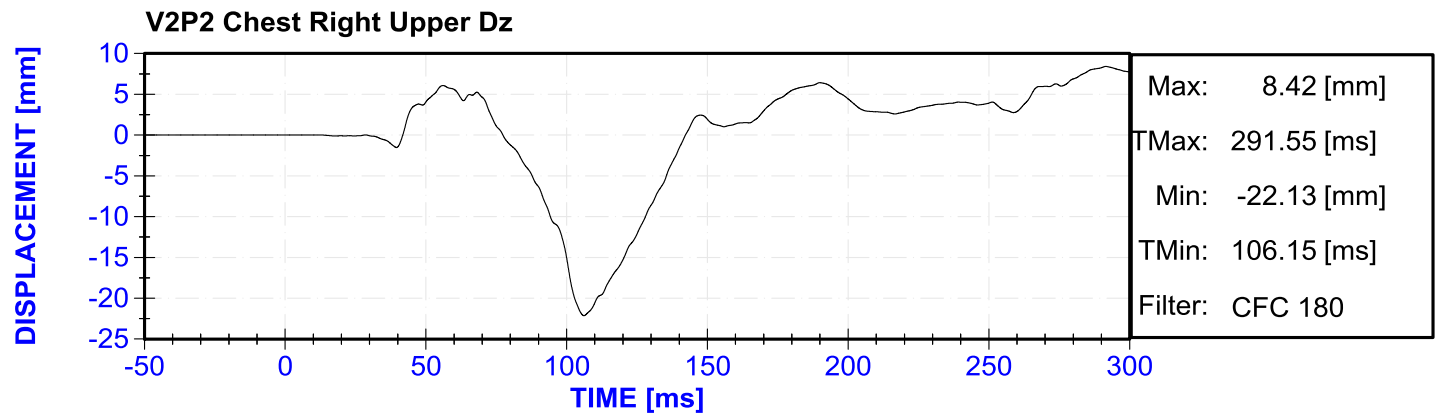
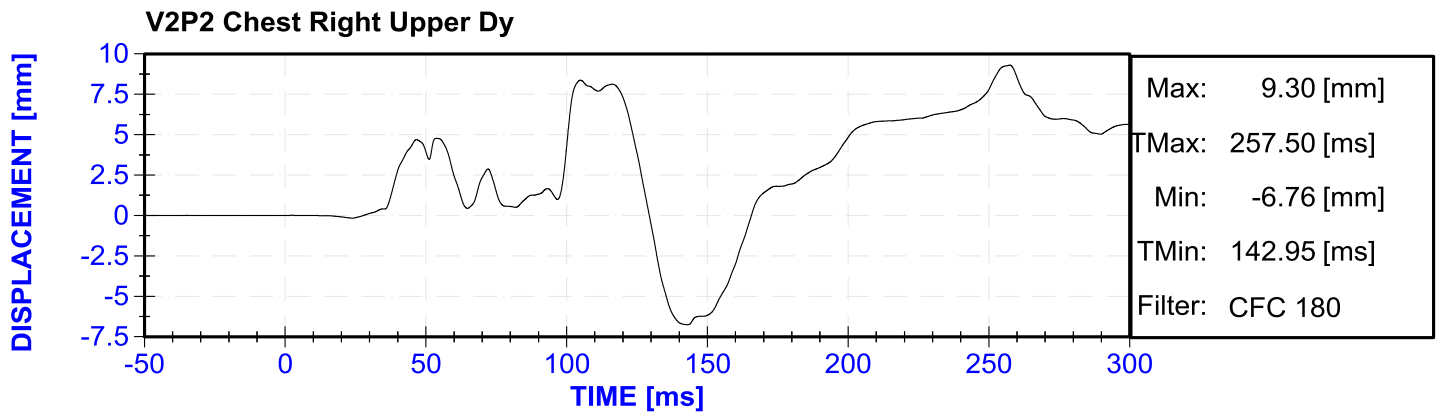
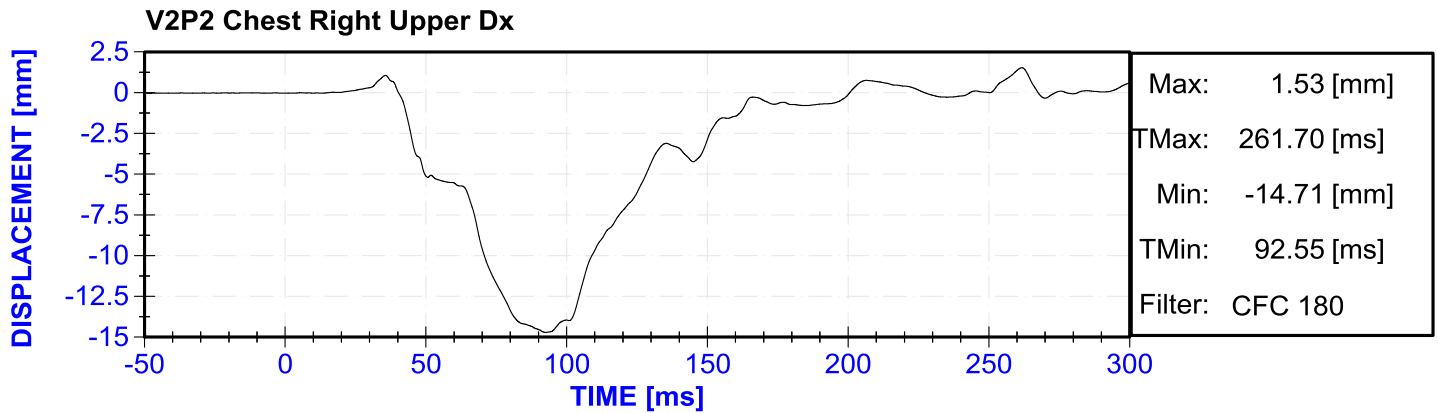


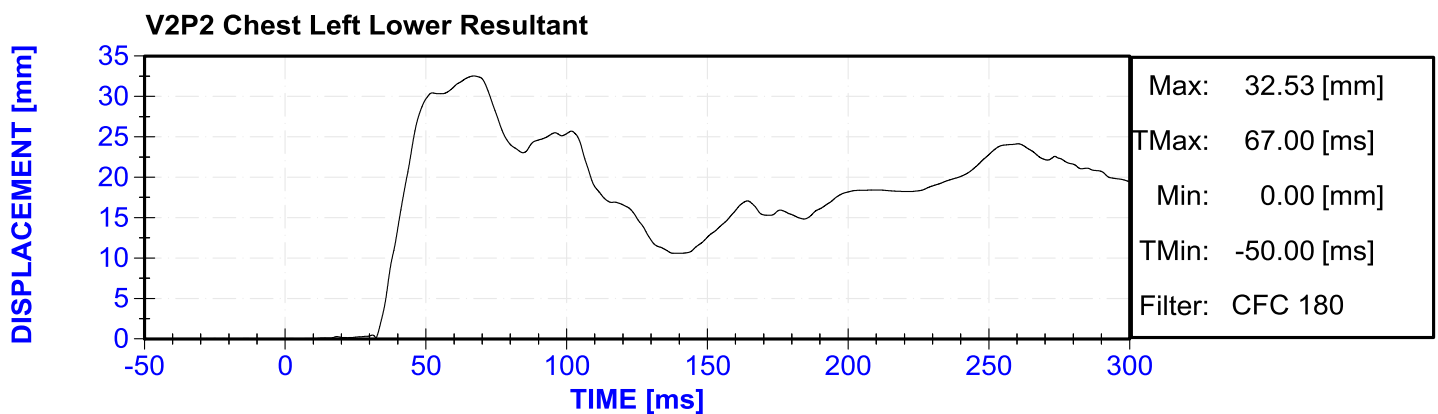
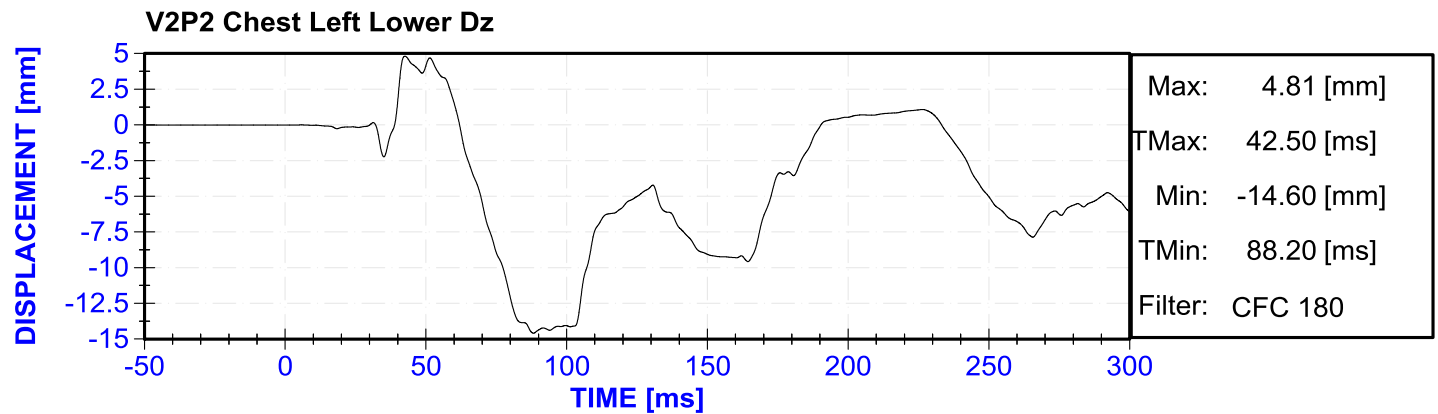
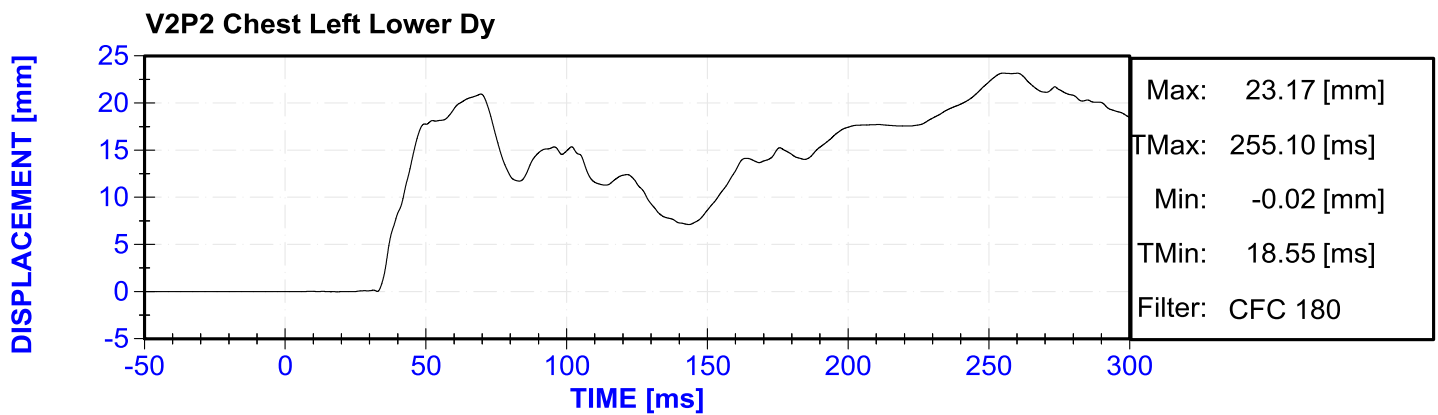
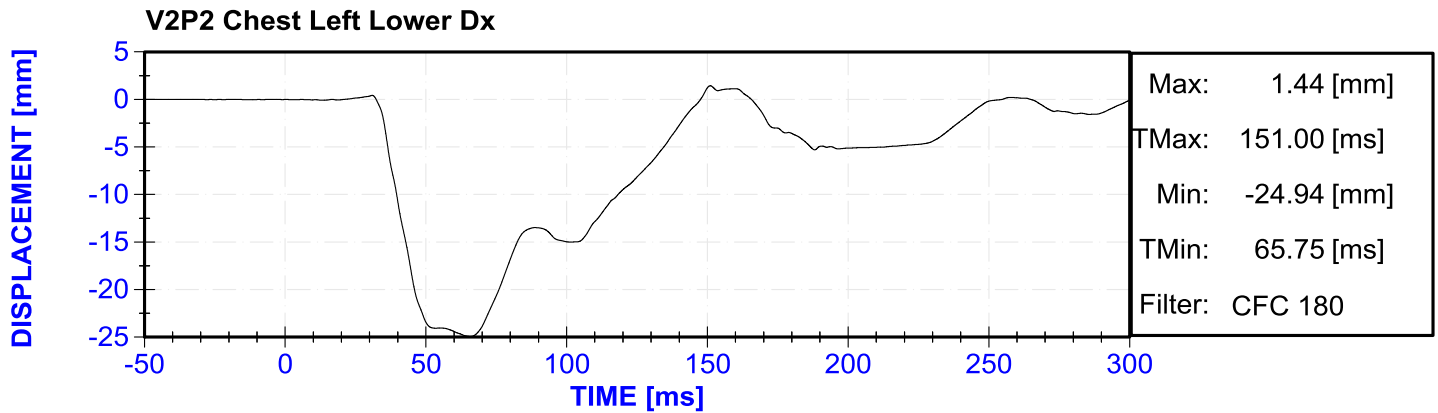


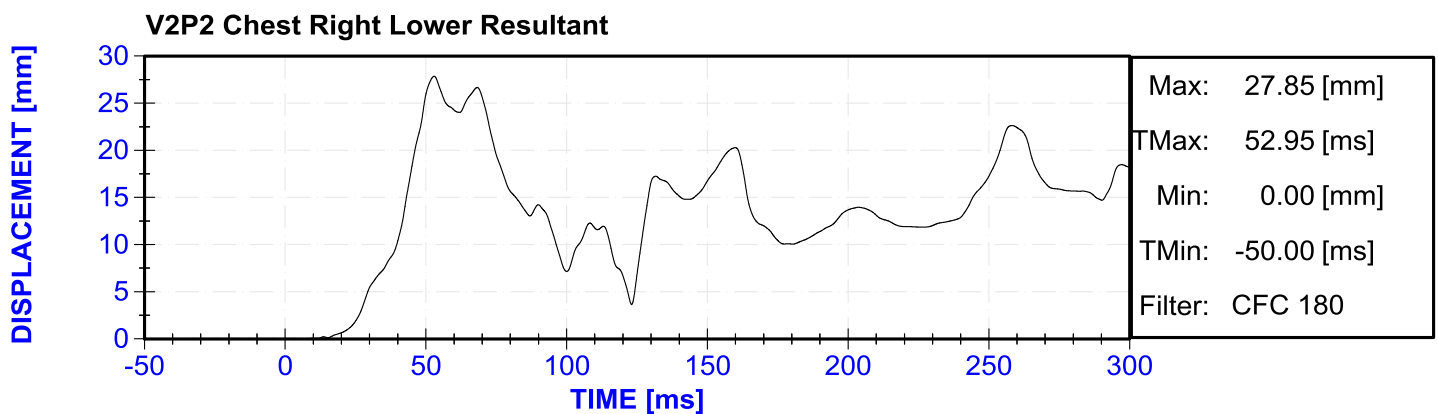
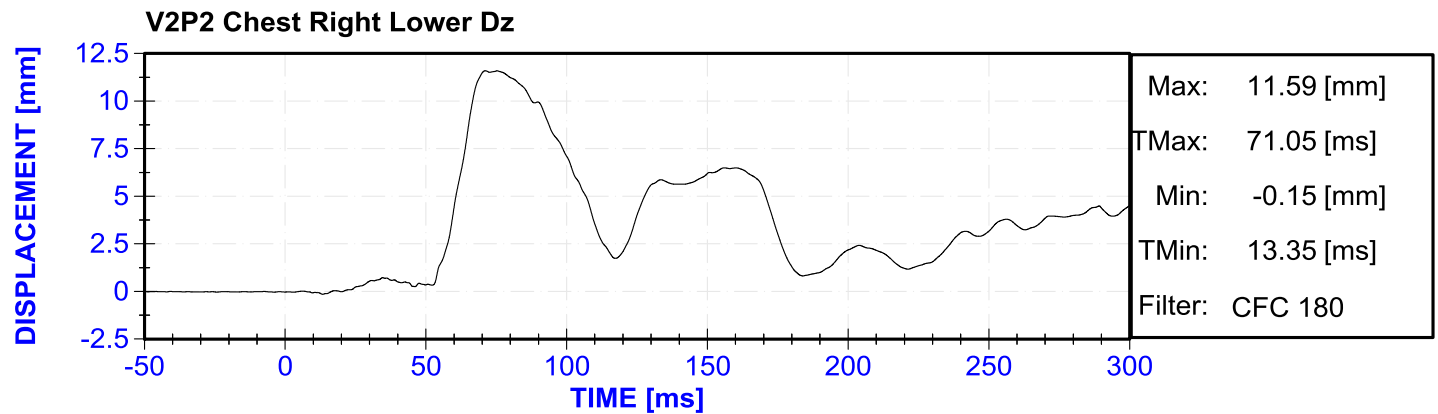
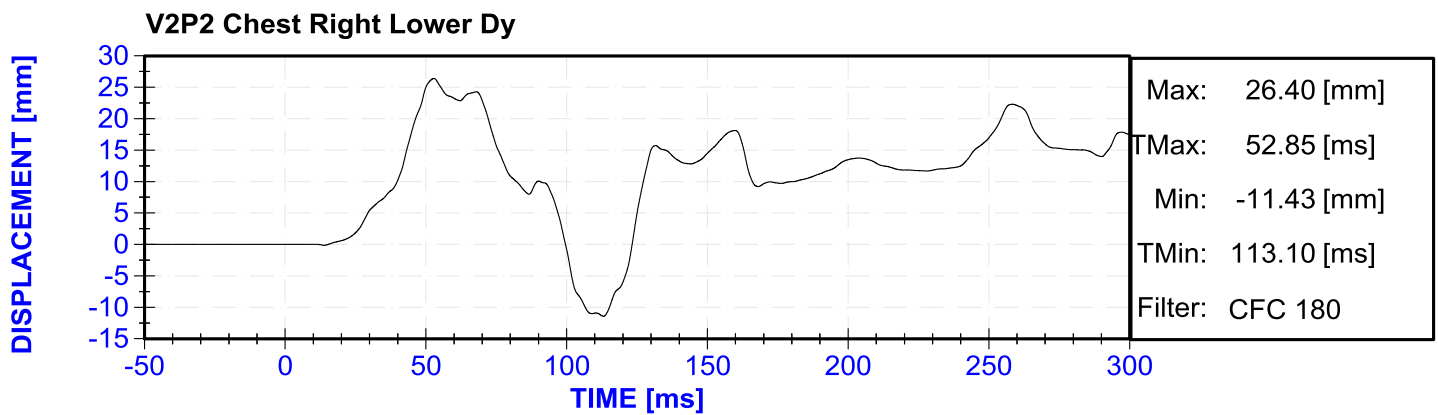
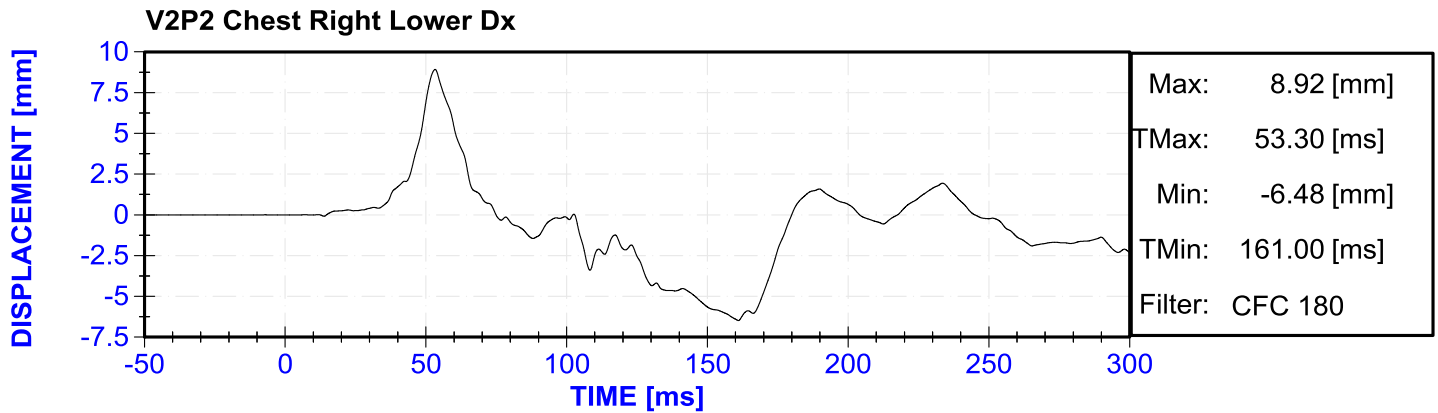


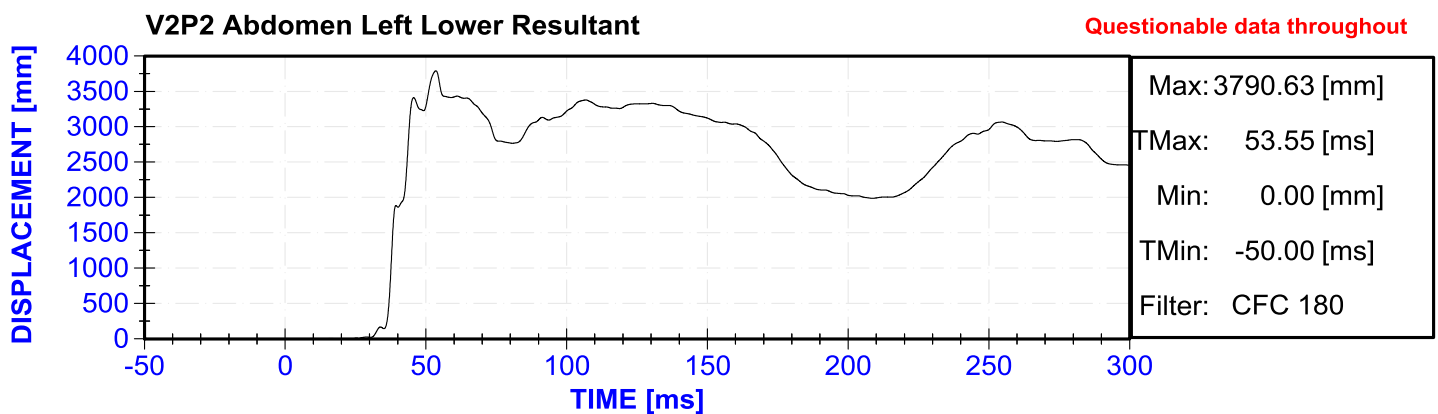
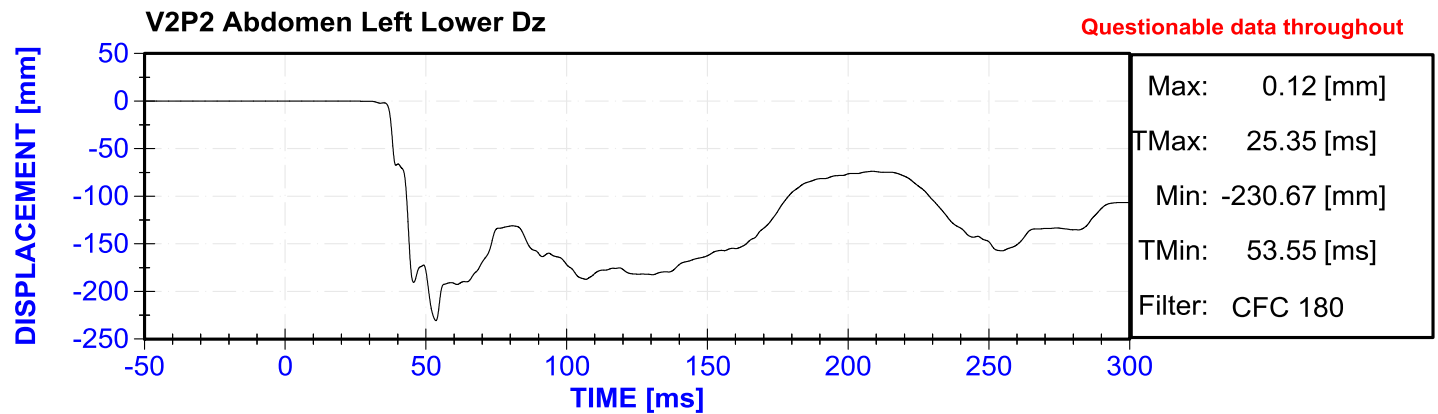
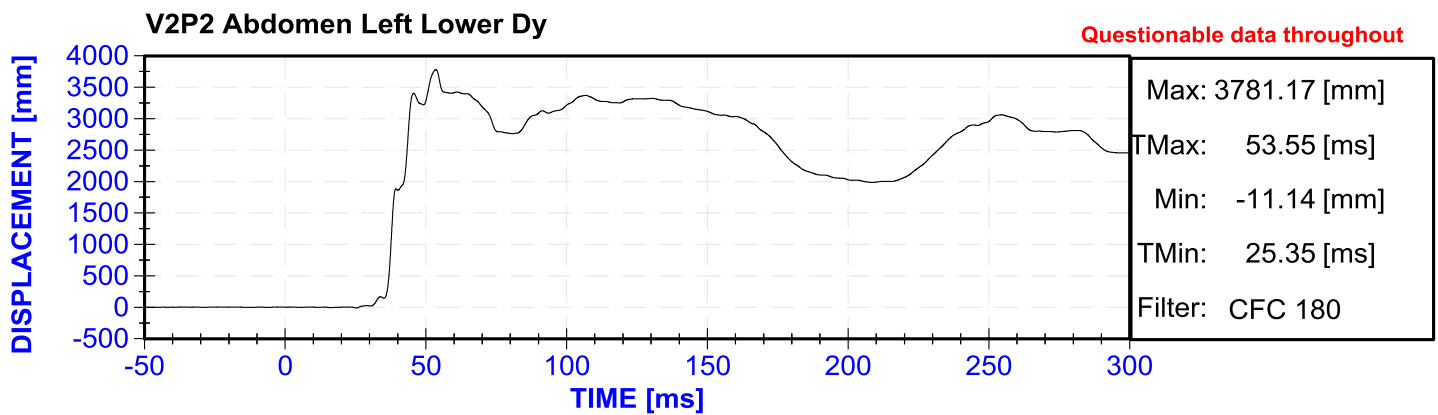
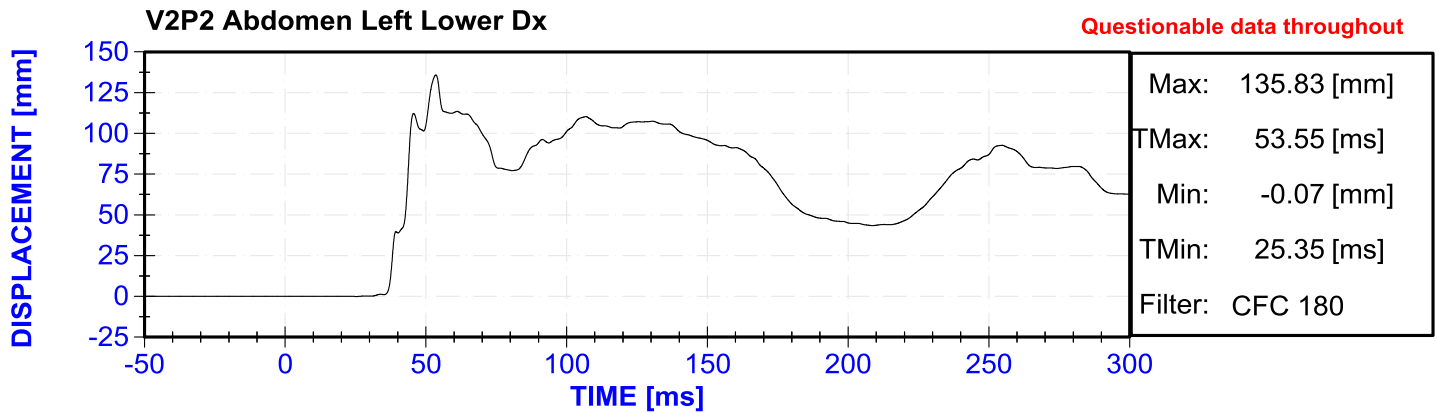


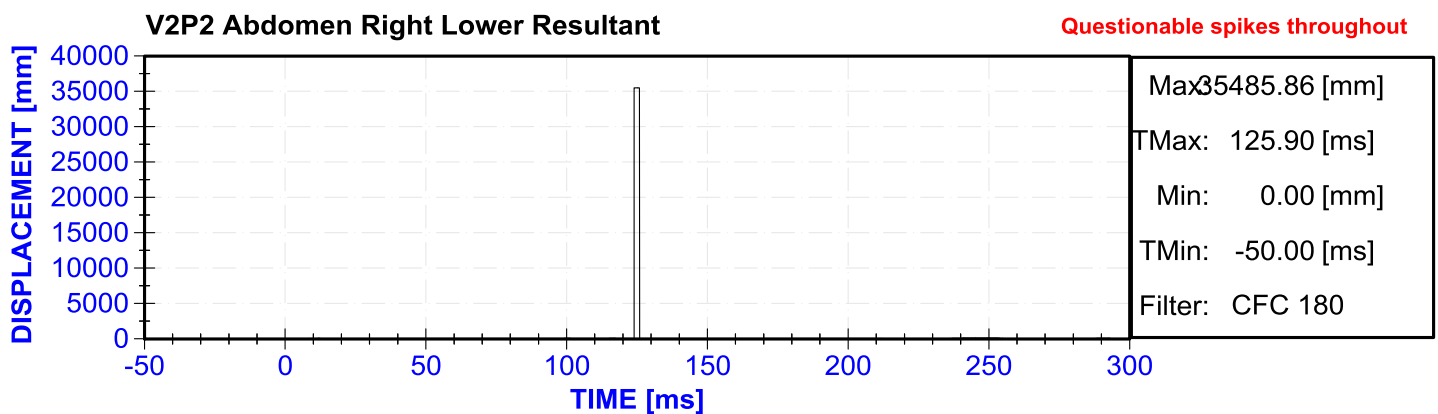
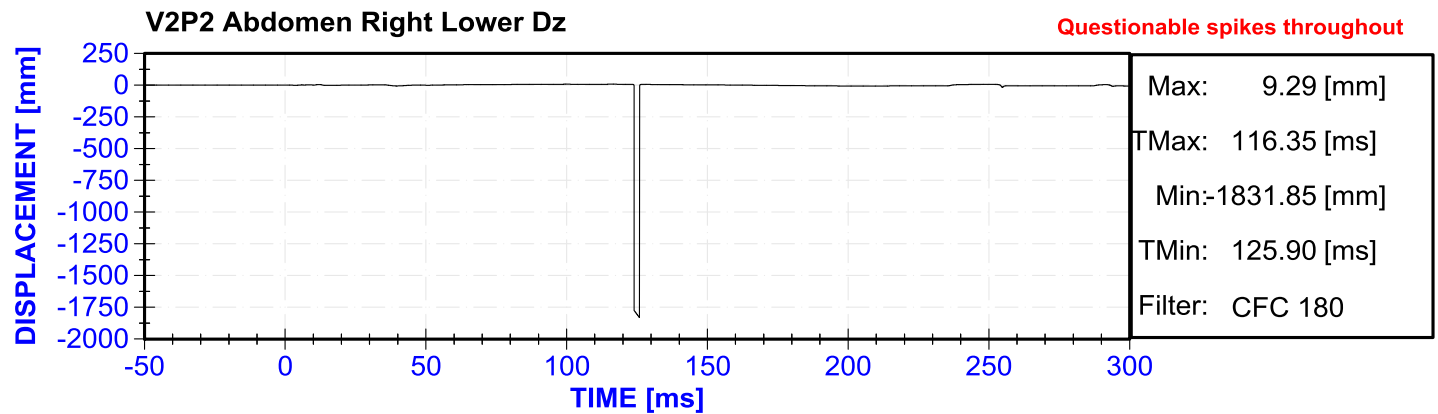
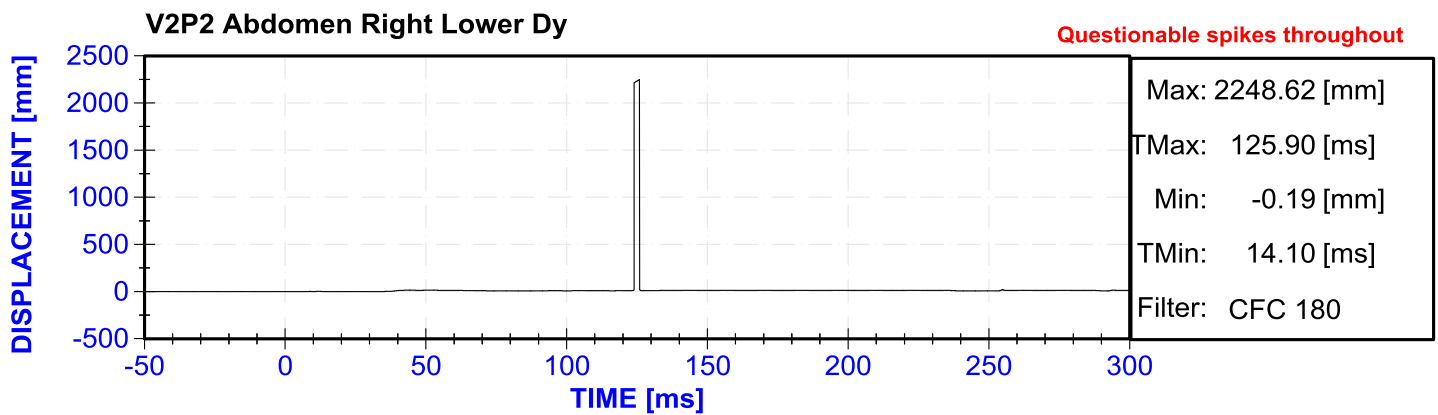
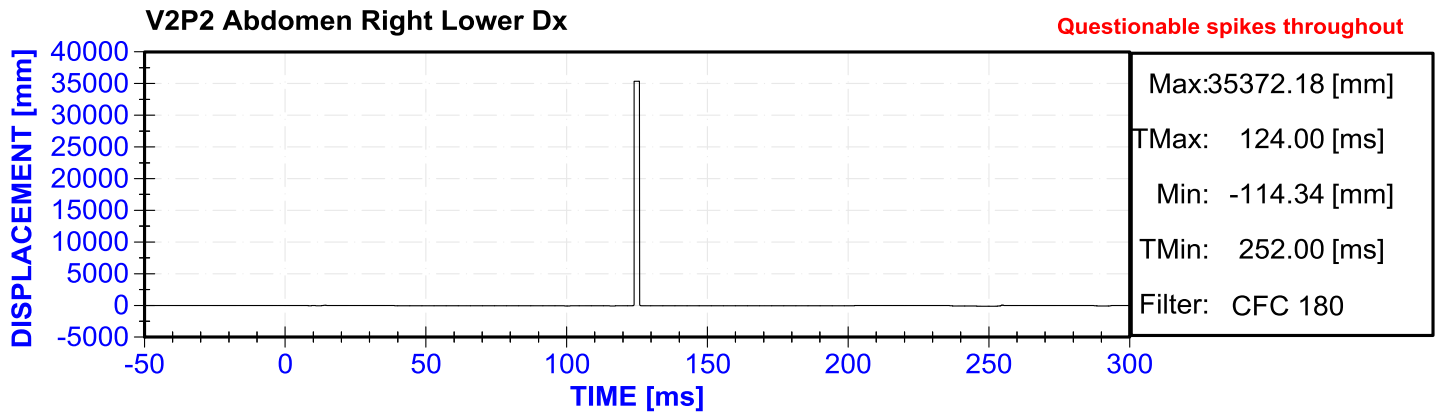












APPENDIX C

DUMMY CALIBRATION DATA

Table C-1: Dummy Information

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

Table C-2: THOR Ankle Zero Offset Information

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

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

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

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

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

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

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

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

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

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

Table 4 – THOR IR-TRACC Polarity

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

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

THOR 50th Male 015

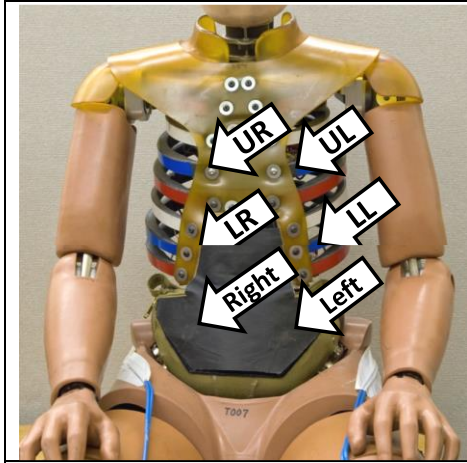


Figure 1. Manipulation to determine thoracic and abdominal IR-TRACC polarity.

Channel	Motion
DX	Push inward
RY	Push upward
RZ	Push rightward

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

THOR 50th Male 016

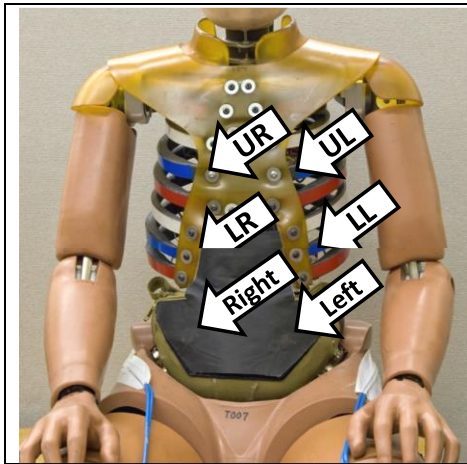


Figure 2. Manipulation to determine thoracic and abdominal IR-TRACC polarity.

Channel	Motion
DX	Push inward
RY	Push upward
RZ	Push rightward

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

Test Data/Sensor Repair Notes

THOR Inspection Checklist

Date: 6/16/2016		
NHTSA Representative: James Saunders		
Inspection Reporter: M. Goehle		
Inspection type (check one): ☒ Pre-Test ☐ Post-Test		
Dummy S/N: 0015	Legs S/N: LX0038/LX0039	
Dummy Description: THOR-M 50th Male		
Date of last Certification: July 2015		
<u>Tests conducted:</u> <u>Since last inspection:</u> M6V3T2M – OEM Oblique Crash	<u>Since last certification:</u> <i>Partial Certification 5-24-16</i> R20155228 - 2015 Sentra M6V3T2M – OEM Oblique Crash	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> - 13NECKFR00THFOZP,Front Neck Spring Tower Load Cell, Questionable data throughout - 13NECKUP00THMOYP,Upper Neck Y Moment, Questionable spike 60.4ms - 13ABDOLE00THVO0P,Abdomen Left DGIR X Displacement, Questionable spikes throughout - 13ABDOLE00THANYP,Abdomen Left DGIR Y Rotation, Questionable data throughout - 13ABDORI00THVO0P,Abdomen Right DGIR X Displacement, Questionable 15.5ms, 133ms - 13THSP0100THACXP,T1 X Acceleration, Questionable magnitude throughout - 13THSP0100THACZP,T1 Z Acceleration, Questionable spikes throughout - 13FEMRLE00THFOYP,Femur Left Y Force, Questionable spike 54.1ms and 58.8ms - 13FEMRLE00THMOXP,Femur Left X Moment, Questionable data after 12.5ms - 13TIBILE00THACYP,Tibia Left Y Acceleration, Questionable spike 98.5ms - 13TIBIRILOTHFOZP,Tibia Lower Right Z Force, Questionable data 59ms to 72ms - 13TIBIRI00THACXP,Tibia Right X Acceleration, Questionable spike 61.4ms - 13TIBIRI00THACYP,Tibia Right Y Acceleration, Questionable spike 61.4ms		
<u>Physical evidence of damage:</u> None New		
<u>Anecdotal evidence of damage:</u> None		
<u>Equipment delivered to Borrower:</u> THOR 0015 ATD 26 Accelerometers 3 Angular Rate Sensors 2 Skull Spring LC 1 Condyle Pot 1 Upper Neck LC 6 IRTraccs 12 Rotational Pots	<i>Continued</i> 1 Spine LC 2 Acetabulum LC 2 ASIS LC 2 Femur LC 2 LX Leg Assemblies 2 Upper Tibia LC 2 Lower Tibia LC 6 Ank1e Potentiometers	<i>Continued</i> 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	Front Neck Spring jam nut was loose. Tightened.
SHOULDER	
Y / N	Urethane shoulder pads show no evidence of contact Left hand shoulder pad torn, inboard 
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.

	
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	Right knee- right cover flesh torn New heavy scuffing on left knee skin. 
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	Additional scuffing on left calf. Left forearm flesh damaged near elbow, heavy scuffing/abrasions all over left forearm, left humerus bent, puncture through palm of right hand. Heavy scuffing on front of right calf. Both thigh zippers detaching from flesh. Zippers detaching on left and right calves. Torn zippers/flesh on L & R forearms. Left molded foot cracked at rear upper heal



Left hand thumb cracked at base of thumb and pointer finger merge, Left hand cut at base of pointer finger outboard at knuckle





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: 6/20/2016		
NHTSA Representative: James Saunders		
Inspection Reporter: M. Goehle		
Inspection type (check one): ☐ Pre-Test ☒ Post-Test		
Dummy S/N: 0015	Legs S/N: LX0038/LX0039	
Dummy Description: THOR-M 50th Male		
Date of last Certification: July 2015		
<u>Tests conducted:</u> <u>Since last inspection:</u> R20165146 - Scion iA	<u>Since last certification:</u> <i>Partial Certification 5-24-16</i> R20155228 - 2015 Sentra M6V3T2M – OEM Oblique Crash R20165146 – Scion iA	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> - 13NECKFR00THFOZP,Front Neck Spring Tower Load Cell, Questionable data 80ms to 100ms - 13ABDOLE00THVO0P,Abdomen Left DGIR X Displacement, Questionable data throughout - 13ABDOLE00THANYP,Abdomen Left DGIR Y Rotation, Questionable data throughout - 13ABDORI00THVO0P,Abdomen Right DGIR X Displacement, Questionable spikes - 13THSP0100THACXP,T1 X Acceleration, Questionable magnitude throughout - 13THSP0100THACZP,T1 Z Acceleration, Questionable data throughout - 13FEMRLE00THFOYP,Femur Left Y Force, Questionable spike 65ms and 76ms - 13FEMRLE00THMOXP,Femur Left X Moment, Questionable data throughout - 13TIBILE00THACXP,Tibia Left X Acceleration, Questionable spike 73ms - 13TIBILE00THACYP,Tibia Left Y Acceleration, Questionable data after 22ms - 13TIBIRILOTHFOZP,Tibia Lower Right Z Force, Questionable magnitude throughout		
<u>Physical evidence of damage:</u> None New		
<u>Anecdotal evidence of damage:</u> None		
<u>Equipment delivered to Borrower:</u> THOR 0015 ATD 26 Accelerometers 3 Angular Rate Sensors 2 Skull Spring LC 1 Condyle Pot 1 Upper Neck LC 6 IRTraccs 12 Rotational Pots	<i>Continued</i> 1 Spine LC 2 Acetabulum LC 2 ASIS LC 2 Femur LC 2 LX Leg Assemblies 2 Upper Tibia LC 2 Lower Tibia LC 6 Ank1e Potentiometers	<i>Continued</i> 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	Front Neck Spring jam nut was loose. Tightened.
SHOULDER	
Y / N	Urethane shoulder pads show no evidence of contact Left hand shoulder pad torn, inboard 
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.

	
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	Right knee- right cover flesh torn New heavy scuffing on left knee skin. 
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	Additional scuffing on left calf. Left forearm flesh damaged near elbow, heavy scuffing/abrasions all over left forearm, left humerus bent, puncture through palm of right hand. Heavy scuffing on front of right calf. Both thigh zippers detaching from flesh. Zippers detaching on left and right calves. Torn zippers/flesh on L & R forearms. Left molded foot cracked at rear upper heal



Left hand thumb cracked at base of thumb and pointer finger merge, Left hand cut at base of pointer finger outboard at knuckle



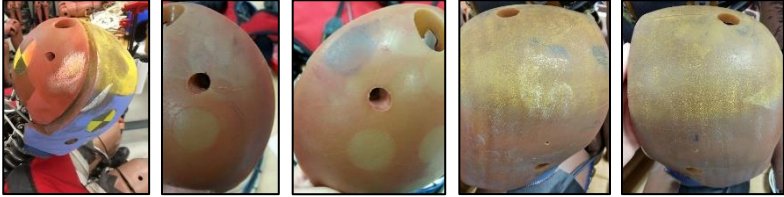


JACKET	
Y / N	Rib stiffeners show no sign of permanent deformation
Y / N	No evidence of tears or holes in jacket fabric, Velcro, or zippers
OTHER	

THOR Inspection Checklist

Date: 6/16/2016		
NHTSA Representative: James Saunders		
Inspection Reporter: M. Goehle		
Inspection type (check one): ☒ Pre-Test ☐ Post-Test		
Dummy S/N: 0016	Legs S/N: LX0018/LX0019	
Dummy Description: THOR 50th Male		
Date of last Certification: July 2015		
<u>Tests conducted:</u> <u>Since last inspection:</u> M6V3T2M – OEM Oblique Crash	<u>Since last certification:</u> <i>Partial Certification 5-24-16</i> R20155228 - 2015 Sentra M6V3T2M – OEM Oblique Crash	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> - 11NECKUP00THMOXP,Upper Neck X Moment, Questionable data throughout - 11NECKUP00THMOZP,Upper Neck Z Moment, Questionable spikes throughout - 11ABDOLE00THVO0P,Abdomen Left DGIR X Displacement, Questionable spike 26.9ms - 11ABDOLE00THANYP,Abdomen Left DGIR Y Rotation, Questionable data throughout - 11ABDOLE00THANZP,Abdomen Left DGIR Z Rotation, Questionable data throughout - 11THSP0100THACZP,T1 Z Acceleration, Questionable data throughout - 11KNSLLE00THDSXP,Knee Left X Displacement, Questionable data throughout - 11TIBILELOTHFOYP,Tibia Lower Left Y Force, Questionable data throughout - 11FOOTLE00THACXP,Foot Left X Acceleration, Questionable magnitude throughout - 11ANKLLE00THANXP,Ankle Left X Rotation, Questionable data throughout - 11TIBIRI00THACXP,Tibia Right X Acceleration, Questionable data throughout		
<u>Physical evidence of damage:</u> None New		
<u>Anecdotal evidence of damage:</u> N/A		
<u>Equipment delivered to Borrower:</u> THOR 0016 ATD 2 LX Leg Assemblies 0018 & 0019 2 Lower Tibia Load Cells 2 Upper Tibia Load Cells 19 Rotational Potentiometers 1 Left Knee Slider Potentiometer 1 Right Knee Slider Potentiometer 25 Accelerometers 2 Achilles Load Cells	<i>Continued</i> 3 Angular Rate Sensors 2 Skull Spring Load Cells 1 Upper Neck Load Cell 1 Lower Neck Load Cell 6 IRTRACCs 1 Thoracic Spine Load Cell 1 Right Acetabulum Load Cell 1 Left Acetabulum Load Cell	2 ASIS Load Cells 2 Femur Load Cells 1 Interface Cable 1 IES Tilt Sensors 1 Laptop 1 H-Point Tool 1 Neck Foam Assembly 1 Neck Skin 1 Toolbox

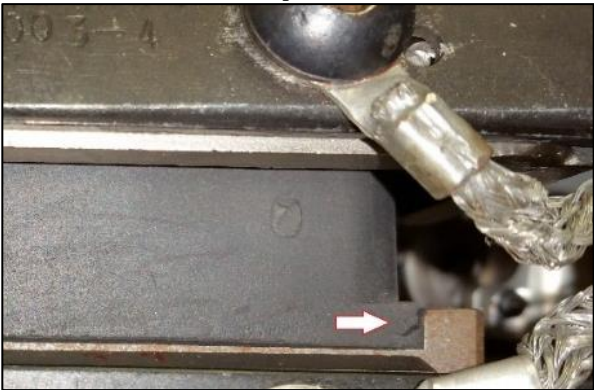
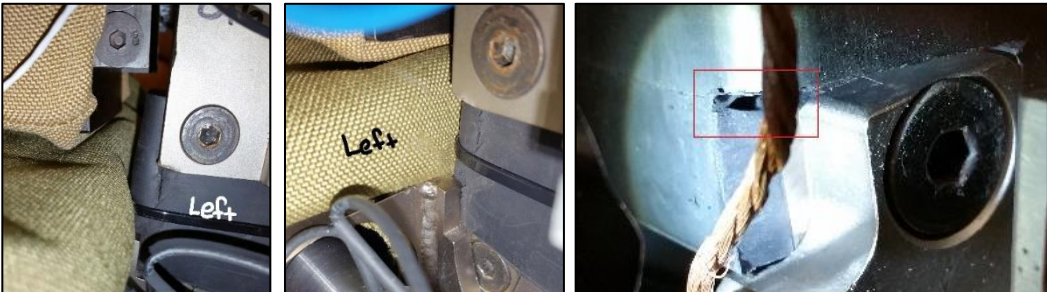
Note: New Damage is in Red

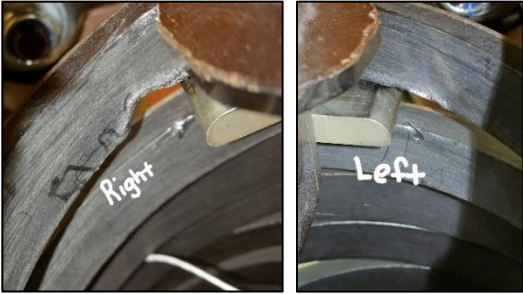
HEAD	
Y / N	Rear head cap mounts securely to head
Y / N	Head skin fits securely over skull
Y / N	Head skin shows no sign of tears or damage
Y / N	Interior components of skull cavity (ballast, accelerometer mount, accelerometers) securely attached
Y / N	Head securely mounted to OC joint
OTHER	Right rear of head and right side of skull cap abrasions and scuffing. Rear head cap has a superficial cut and some scuffing. Head skin has scuffing. 
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 Permanent compression of the first neck soft stop 
Y / N	Neck securely attached to upper neck load cell
Y / N	Neck securely attached to lower neck load cell
Y / N	Neck pitch change joint mechanism mating teeth are engaged
OTHER	
SHOULDER	
Y / N	Urethane shoulder pads show no evidence of contact
Y / N	Clavicles securely attached to sternum and shoulder
Y / N	No evidence of de-bonding, tearing, or permanent compression of posterior soft stops
OTHER	Urethane Pads are both torn, completely through, near the neck. We put Gaffer's tape over the tears to protect.  LH shoulder bumper missing. RH shoulder bumper deformed



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	Small cut on the thoracic spine  Tears and rubbing damage to the front left Lumbar Spine. Tears also on rear sides – right side is pictured.  Damage is present on the surrounding metal structures of the Lumbar Spine 
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THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material Both of the top two ribs, left and right, have contact damage 
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 Urethane bib has signs of washer penetration repair and a tear 
Y / N	Ribs securely attached to posterior spine
Y / N	Rib stiffeners show no evidence of bending (no gaps between ribs and stiffeners)
OTHER	There is heavy scuffing to the left upper arm, lower arm, and hand  The left hand and lower arm (inside and out) have cuts/punctures  The right lower arm (inside and out) has scuffing

	  The inside of the right hand has cuts and the thumb is tearing   The back of the right elbow has a small tear
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 Both sides have tears on the lower portion of the bag, and right side is torn near top
	  
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 Scuffing to the right knee Slice on Right knee



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
Zipper pulling away from lower leg flesh of the left leg on both sides, and the front is scuffed. Heavy scuffing on left thigh. Puncture in front on left calf.



Right foot is torn



Ankle Z Potentiometer wire is pinched. Velcro strap torn from LH tibia flesh at ankle

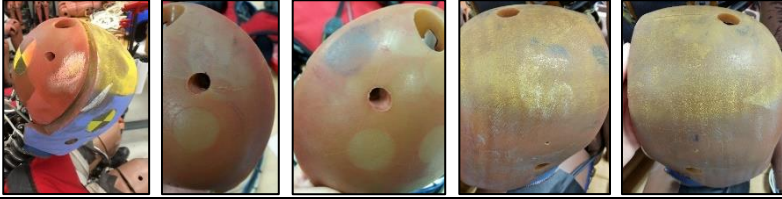


OTHER	
JACKET	
Y / N	Rib stiffeners show no sign of permanent deformation
Y / N	No evidence of tears or holes in jacket fabric, Velcro, or zippers
OTHER	

THOR Inspection Checklist

Date: 6/20/2016		
NHTSA Representative: James Saunders		
Inspection Reporter: M. Goehle		
Inspection type (check one): ☐ Pre-Test ☒ Post-Test		
Dummy S/N: 0016	Legs S/N: LX0018/LX0019	
Dummy Description: THOR 50 th Male		
Date of last Certification: July 2015		
<u>Tests conducted:</u> <u>Since last inspection:</u> R20165146 - Scion iA	<u>Since last certification:</u> <i>Partial Certification 5-24-16</i> R20155228 - 2015 Sentra M6V3T2M – OEM Oblique Crash R20165146 – Scion iA	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> - 11NECKUP00THFOYP, Upper Neck Y Force, Questionable data throughout - 11NECKUP00THMOXP, Upper Neck X Moment, Questionable spikes throughout - 11CHSTLEUPTHVO0P, Thorax Upper Left X Displacement, Questionable data after 163ms - 11ABDOLE00THVO0P, Abdomen Left DGIR X Displacement, Questionable spike 35ms - 11ABDOLE00THANYP, Abdomen Left DGIR Y Rotation, Questionable data throughout - 11ABDOLE00THANZP, Abdomen Left DGIR Z Rotation, Questionable data throughout - 11THSP0100THACZP, T1 Z Acceleration, Questionable data after 200ms - 11KNSLLE00THDSXP, Knee Left X Displacement, Questionable data throughout - 11TIBILELOTHFOYP, Tibia Lower Left Y Force, Questionable data throughout - 11FOOTLE00THACXP, Foot Left X Acceleration, Questionable magnitude throughout - 11ANKLLE00THANXP, Ankle Left X Rotation, Questionable data throughout - 11TIBIRILOTHFOXP, Tibia Lower Right X Force, Questionable magnitude throughout		
<u>Physical evidence of damage:</u> None New		
<u>Anecdotal evidence of damage:</u> N/A		
<u>Equipment delivered to Borrower:</u> THOR 0016 ATD 2 LX Leg Assemblies 0018 & 0019 2 Lower Tibia Load Cells 2 Upper Tibia Load Cells 19 Rotational Potentiometers 1 Left Knee Slider Potentiometer 1 Right Knee Slider Potentiometer 25 Accelerometers 2 Achilles Load Cells	<i>Continued</i> 3 Angular Rate Sensors 2 Skull Spring Load Cells 1 Upper Neck Load Cell 1 Lower Neck Load Cell 6 ITRACCs 1 Thoracic Spine Load Cell 1 Right Acetabulum Load Cell 1 Left Acetabulum Load Cell	2 ASIS Load Cells 2 Femur Load Cells 1 Interface Cable 1 IES Tilt Sensors 1 Laptop 1 H-Point Tool 1 Neck Foam Assembly 1 Neck Skin 1 Toolbox

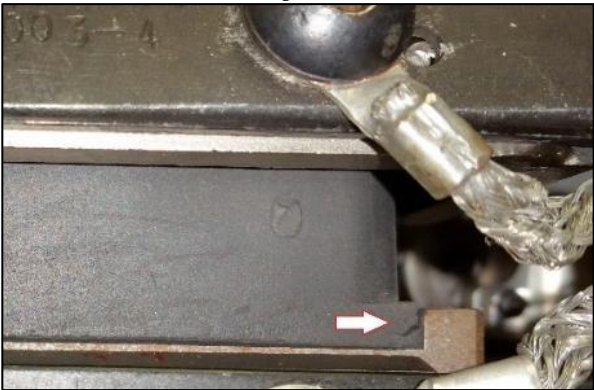
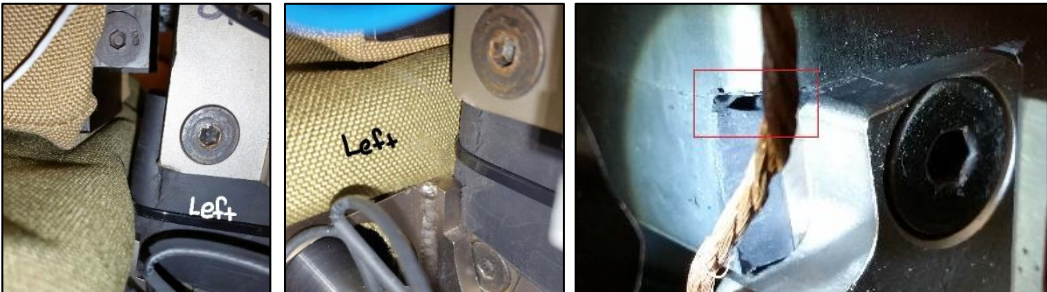
Note: New Damage is in Red *Molded shoes were installed for Scion iA test.

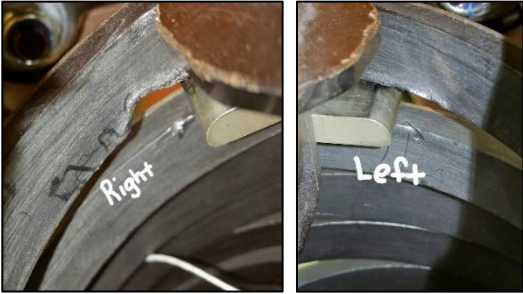
HEAD	
Y / N	Rear head cap mounts securely to head
Y / N	Head skin fits securely over skull
Y / N	Head skin shows no sign of tears or damage
Y / N	Interior components of skull cavity (ballast, accelerometer mount, accelerometers) securely attached
Y / N	Head securely mounted to OC joint
OTHER	Right rear of head and right side of skull cap abrasions and scuffing. Rear head cap has a superficial cut and some scuffing. Head skin has scuffing. 
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 Permanent compression of the first neck soft stop 
Y / N	Neck securely attached to upper neck load cell
Y / N	Neck securely attached to lower neck load cell
Y / N	Neck pitch change joint mechanism mating teeth are engaged
OTHER	
SHOULDER	
Y / N	Urethane shoulder pads show no evidence of contact
Y / N	Clavicles securely attached to sternum and shoulder
Y / N	No evidence of de-bonding, tearing, or permanent compression of posterior soft stops
OTHER	Urethane Pads are both torn, completely through, near the neck. We put Gaffer's tape over the tears to protect.  LH shoulder bumper missing. RH shoulder bumper deformed



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	Small cut on the thoracic spine  Tears and rubbing damage to the front left Lumbar Spine. Tears also on rear sides – right side is pictured.  Damage is present on the surrounding metal structures of the Lumbar Spine 
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THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material Both of the top two ribs, left and right, have contact damage 
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 Urethane bib has signs of washer penetration repair and a tear 
Y / N	Ribs securely attached to posterior spine
Y / N	Rib stiffeners show no evidence of bending (no gaps between ribs and stiffeners)
OTHER	There is heavy scuffing to the left upper arm, lower arm, and hand  The left hand and lower arm (inside and out) have cuts/punctures  The right lower arm (inside and out) has scuffing

	  The inside of the right hand has cuts and the thumb is tearing   The back of the right elbow has a small tear
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 Both sides have tears on the lower portion of the bag, and right side is torn near top
	  
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 Scuffing to the right knee Slice on Right knee



OTHER	
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LOWER EXTREMITY (LX)	
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Y / N	Rotational potentiometers in ankle securely attached
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Y / N	Achilles tendon provides resistance to dorsiflexion
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Y / N	No evidence of de-bonding, tearing, or permanent compression of ankle soft stops
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Y / N	No cuts, tears, or scuffing of leg flesh Zipper pulling away from lower leg flesh of the left leg on both sides, and the front is scuffed. Heavy scuffing on left thigh. Puncture in front on left calf.
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Right foot is torn



Ankle Z Potentiometer wire is pinched. Velcro strap torn from LH tibia flesh at ankle



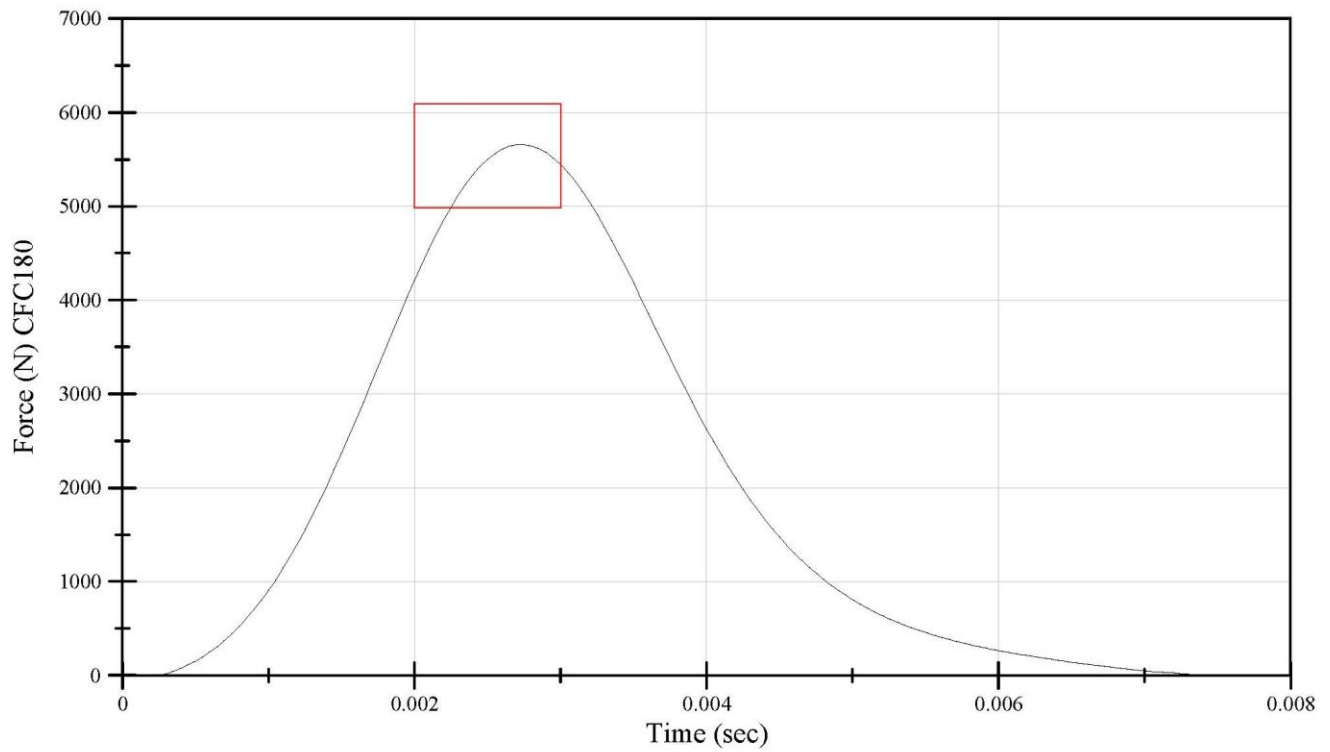
OTHER	
JACKET	
Y / N	Rib stiffeners show no sign of permanent deformation
Y / N	No evidence of tears or holes in jacket fabric, Velcro, or zippers
OTHER	

DUMMY CALIBRATIONS

50% ADULT MALE THOR015 DUMMY CALIBRATIONS

Test Temperature: 70 degrees
Relative Humidity: 52%
Test Velocity: 1.97 m/s

THOR Head Impact Certification
Probe Force
Serial Number: T015



Software Version: 2.4

File Name: T015HEAD150710-01_pro
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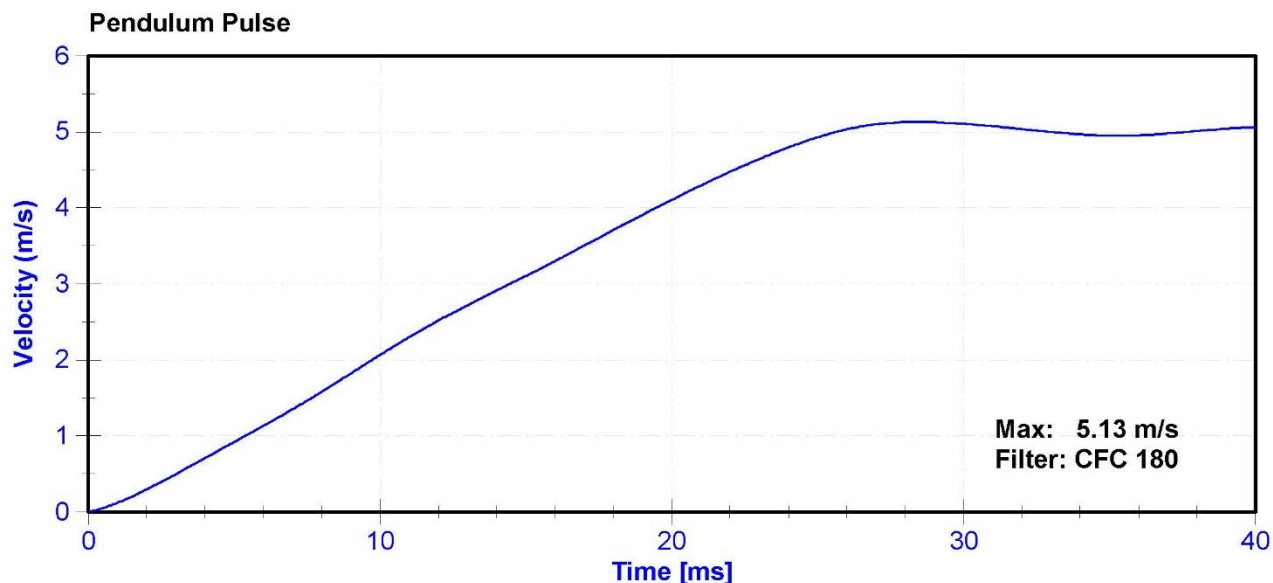
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

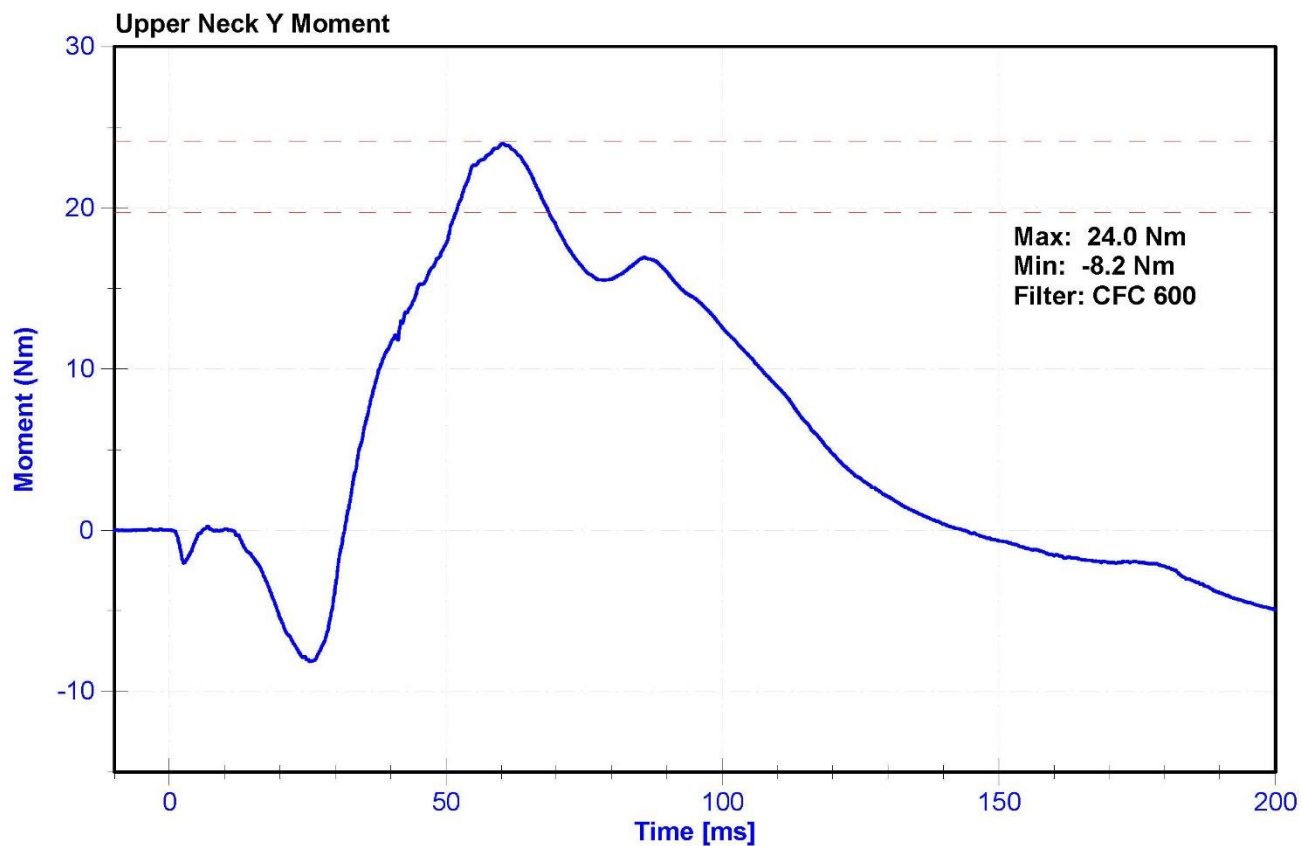
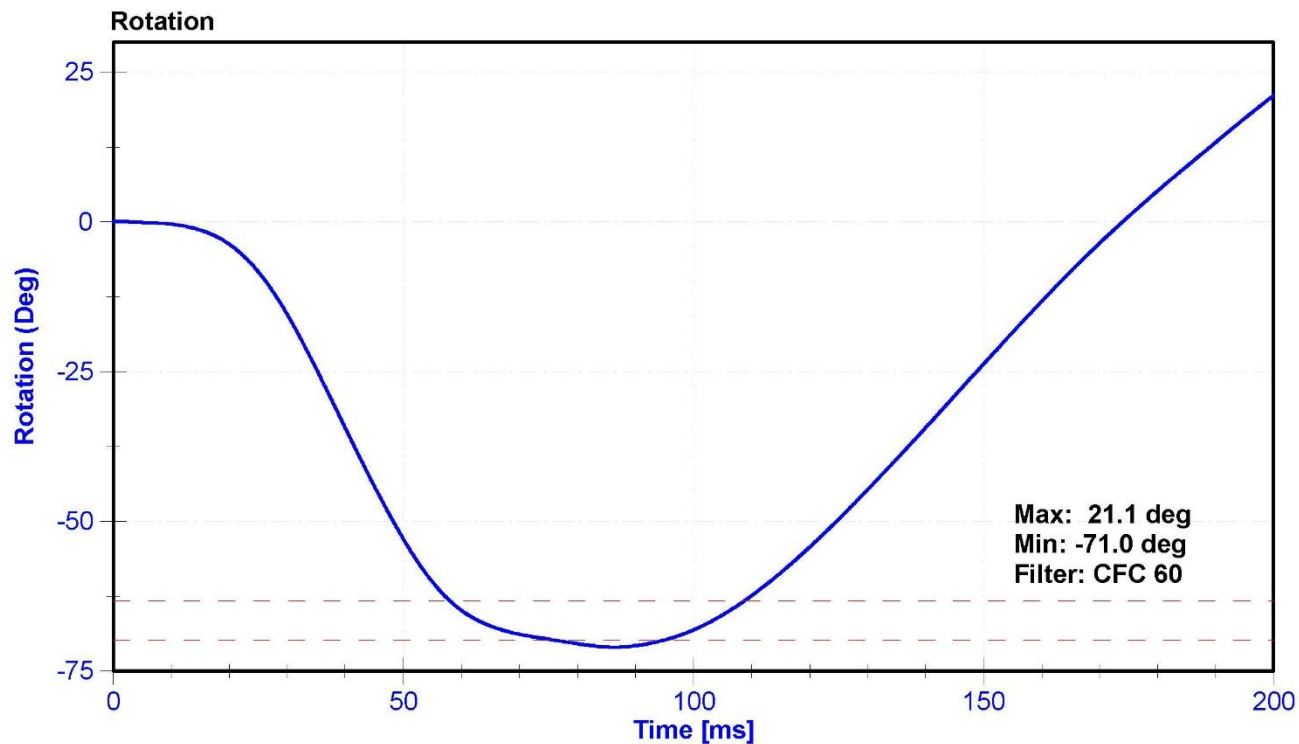
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	23.6	Pass
Velocity	4.95	5.05	m/s	4.985	Pass
Pendulum Impulse at 8ms	1.49	1.85	m/s	1.581	Pass
Pendulum Impulse at 16ms	3.08	3.86	m/s	3.300	Pass
Pendulum Impulse at 24ms	4.48	5.26	m/s	4.794	Pass
Peak Upper Neck Y Moment	19.7	24.1	Nm	23.96	Pass
Peak Upper Neck X Force	-1592	-1302	N	-1113.5	Fail
Maximum Upper Neck Z Force	877	1072	N	1051.6	Pass
First Peak Rear Neck Cable Force	1115	1282	N	1034.1	Fail
Peak Head Y Angular Rate	-1935	-1675	deg/s	-1822.4	Pass
Peak Head Y Rotation	-69.9	-63.3	deg	-70.99	Fail
Rotation Decay Time to Zero	83.0	86.2	ms	87.60	Fail

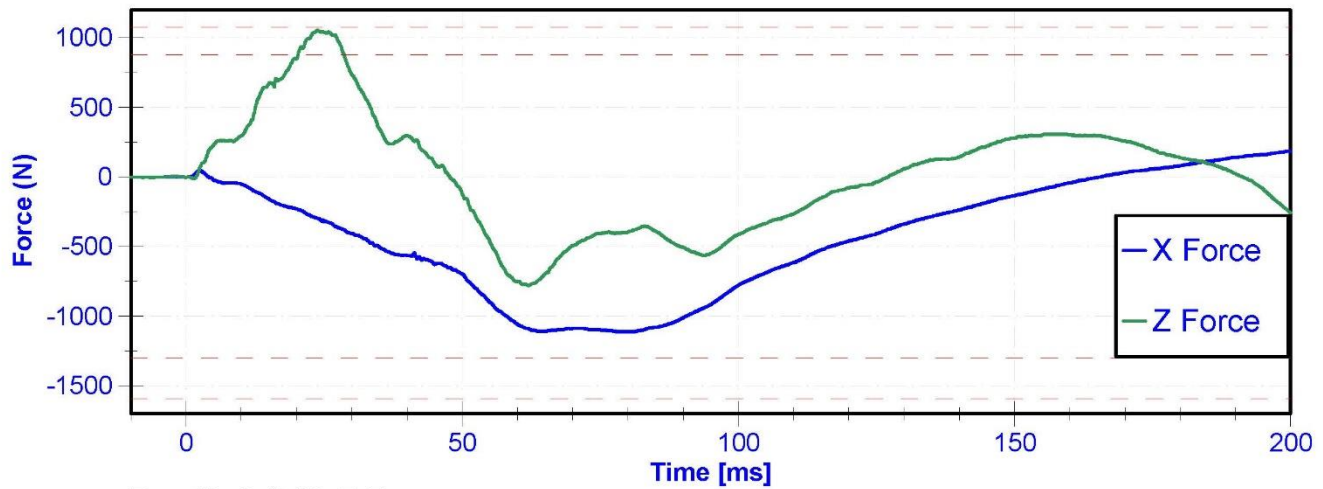
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Upper Neck Load Cell	Humanetics 3454JTF	LC-76Fx	4/20/2015	4/19/2016
Rear Neck Cable Load Cell	Humanetics 6005JFL	LC-80 Fz	3/12/2015	3/11/2016
Pendulum ARS	DTS ARS PRO-18K	ARS-9122	9/30/2015	9/29/2016
Head Y ARS	DTS ARS 18k	ARS-6120	4/28/2015	4/27/2016

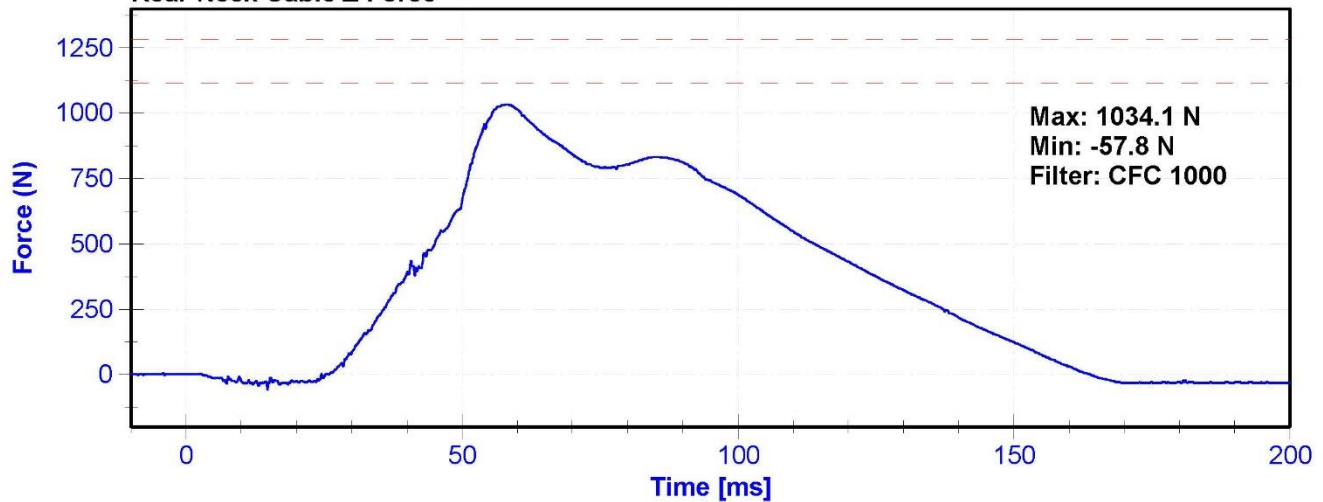




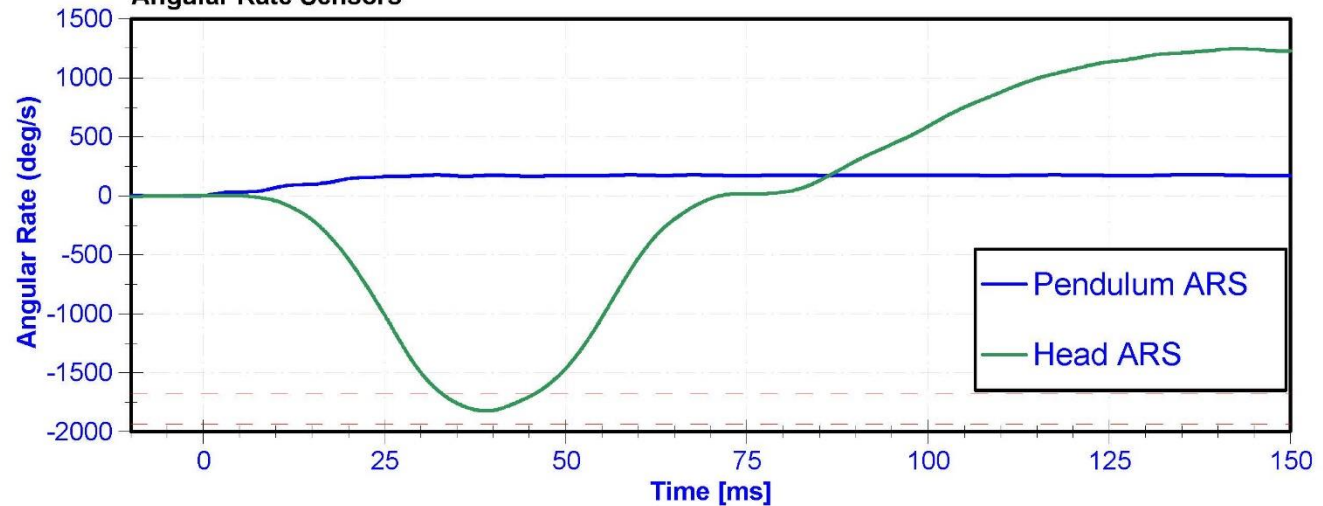
Upper Neck Force



Rear Neck Cable Z Force



Angular Rate Sensors



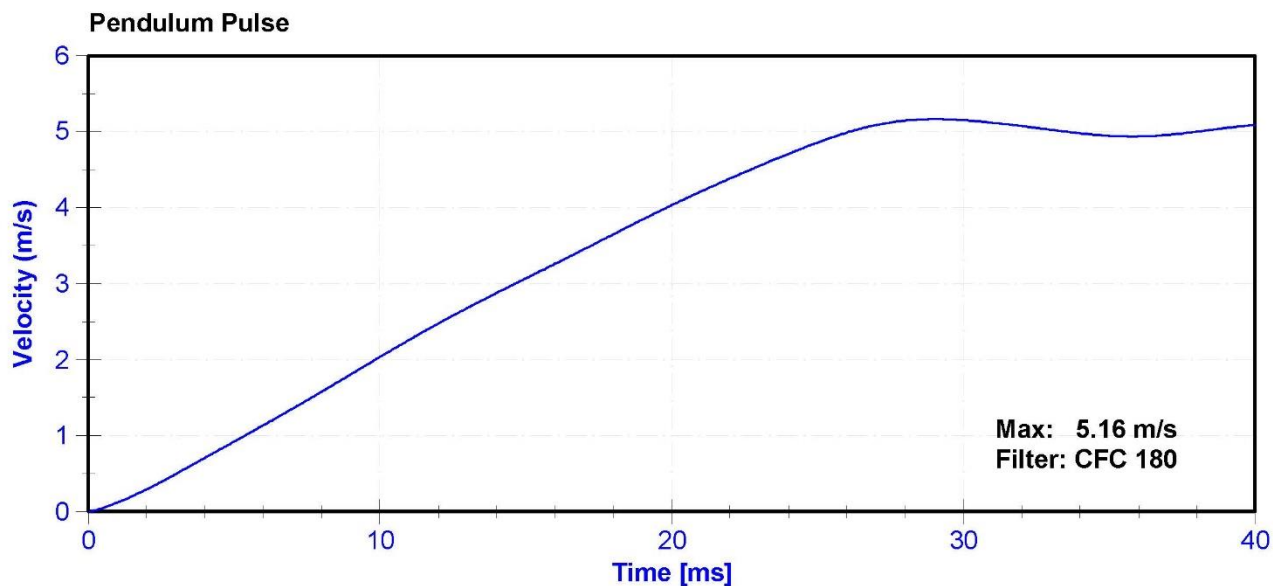
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

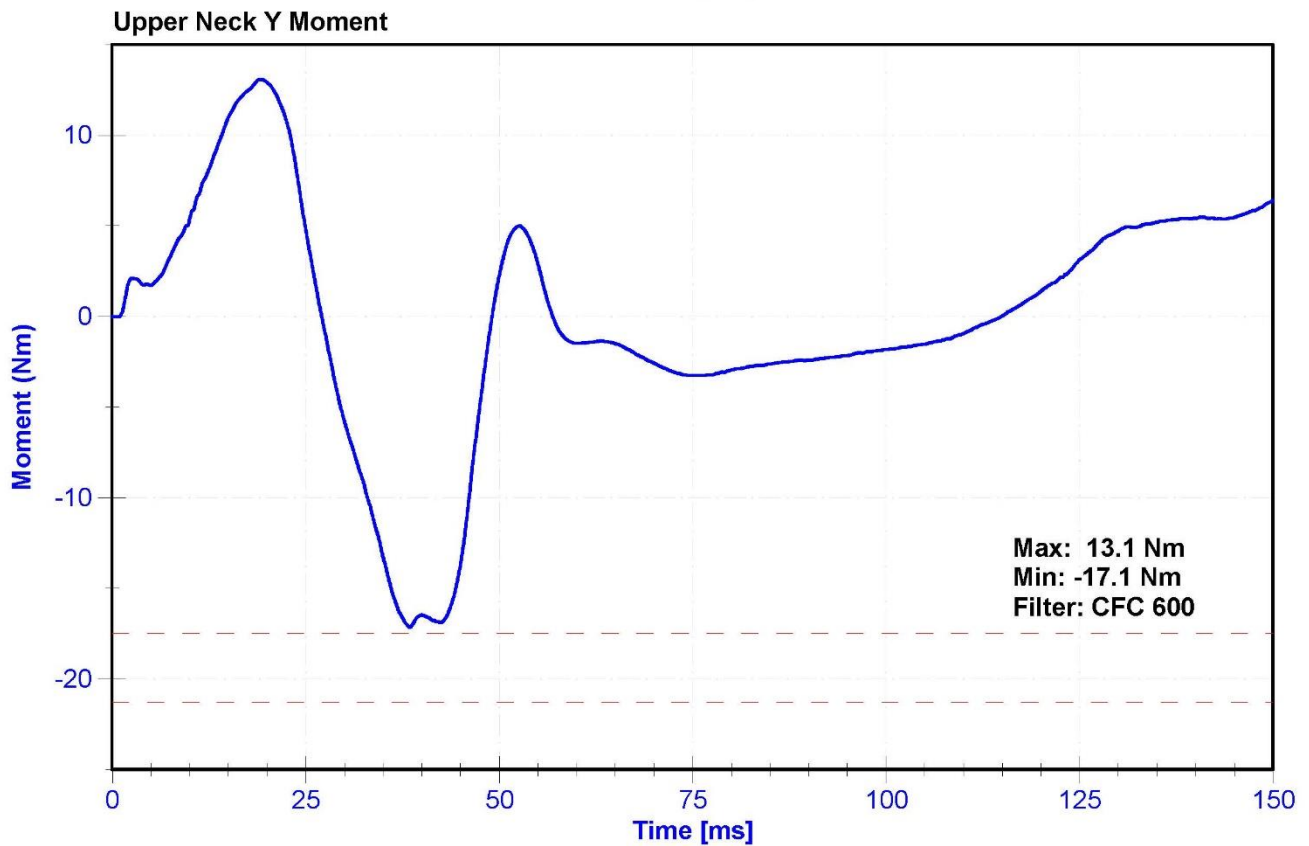
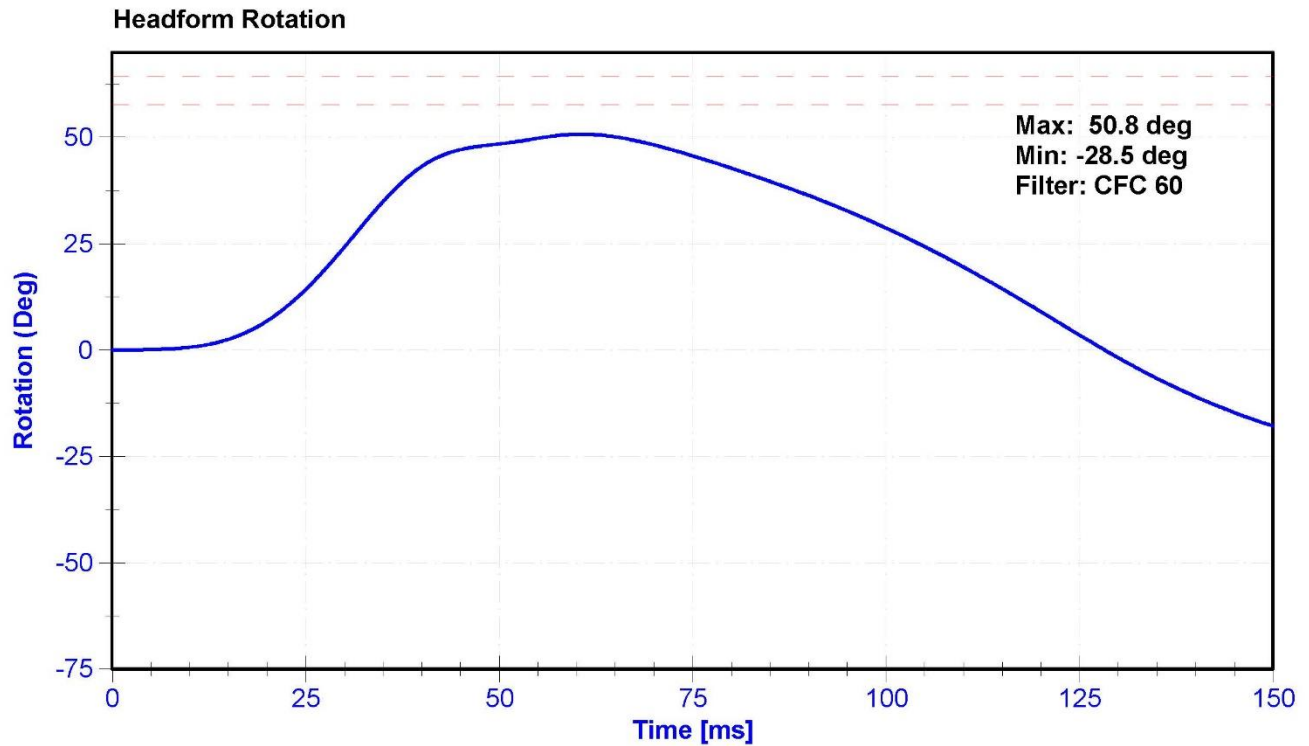
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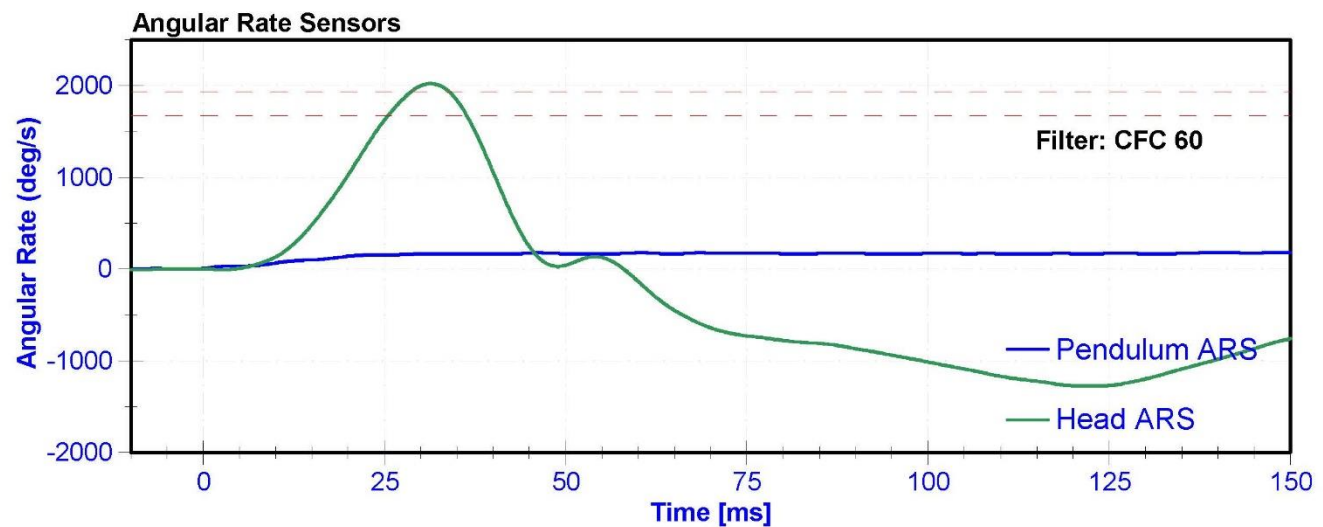
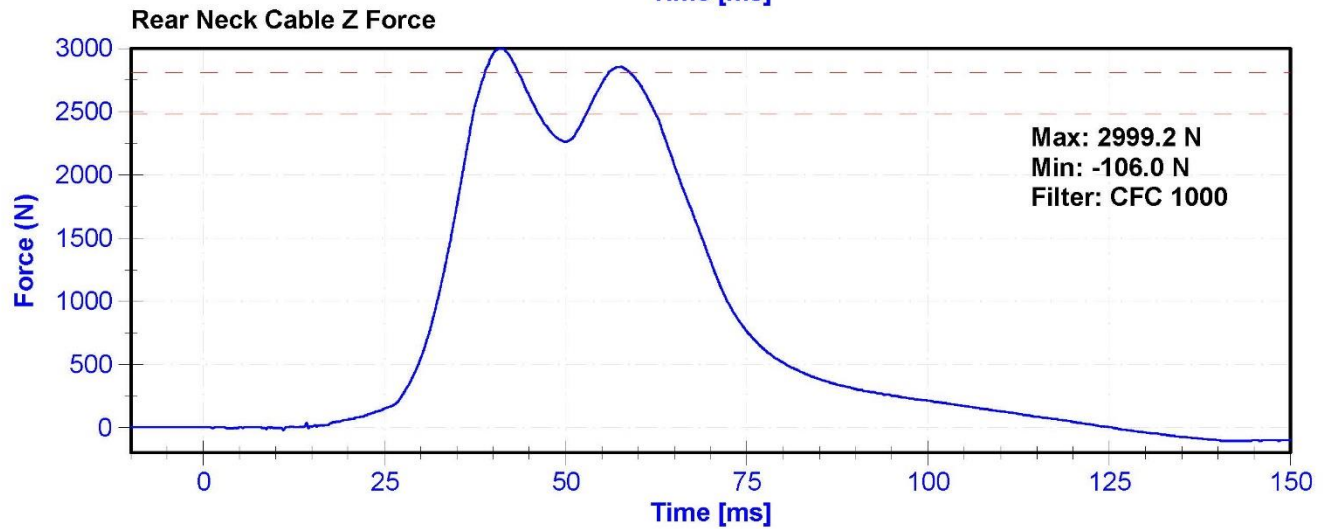
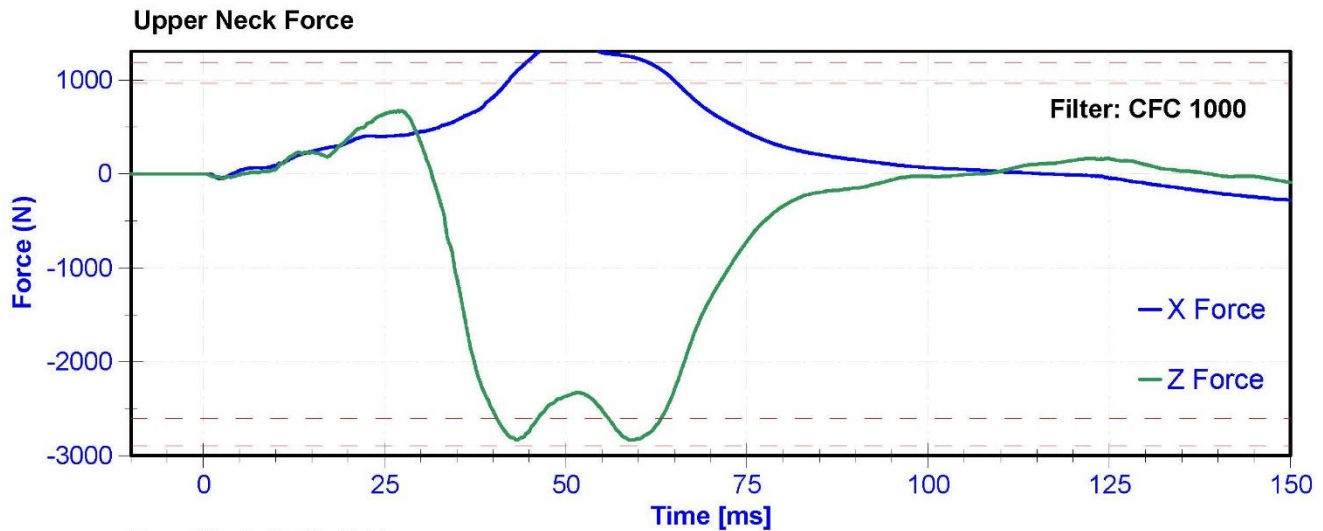
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	22.7	Pass
Velocity	4.95	5.05	m/s	5.015	Pass
Pendulum Impulse at 10ms	1.76	1.91	m/s	2.036	Fail
Pendulum Impulse at 20ms	3.50	3.75	m/s	4.032	Fail
Pendulum Impulse at 30ms	4.88	5.20	m/s	5.149	Pass
Peak Upper Neck Y Moment	-21.3	-17.5	Nm	-17.14	Fail
Peak Upper Neck X Force	967	1182	N	1385.1	Fail
Peak Upper Neck Z Force	-2893	-2603	N	-2833.2	Pass
Peak Front Neck Cable Force	2482	2809	N	2999.2	Fail
Peak Head Y Angular Rate	1907	2043	deg/s	2021.8	Pass
Peak Head Y Rotation	57.6	64.2	deg	50.77	Fail
Rotational Decay Time to Zero	79.3	82.5	ms	67.70	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Upper Neck Load Cell	Humanetics 3454JTF	LC-76Fx	4/20/2015	4/19/2016
Fr Neck Cable Load	Humanetics 10386	LC-DI7617 Fz	3/12/2015	3/11/2016
Pendulum ARS	DTS ARS PRO-18K	ARS-9122	9/30/2015	9/29/2016
Head ARS Y-Axis	DTS ARS 18k	ARS-6120	4/28/2015	4/27/2016







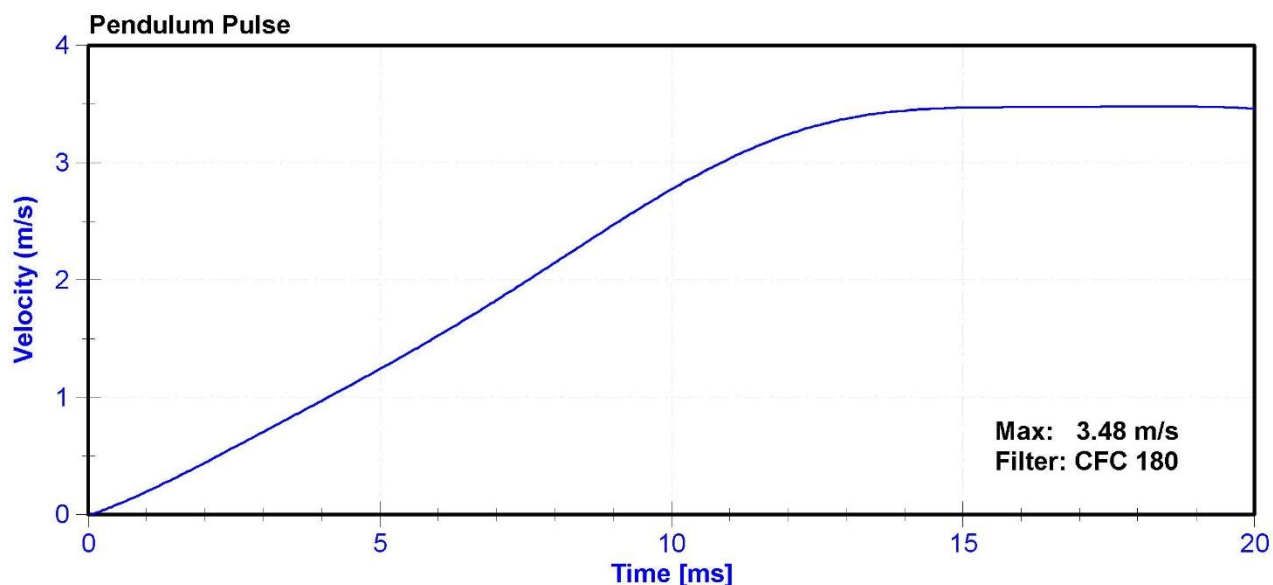
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

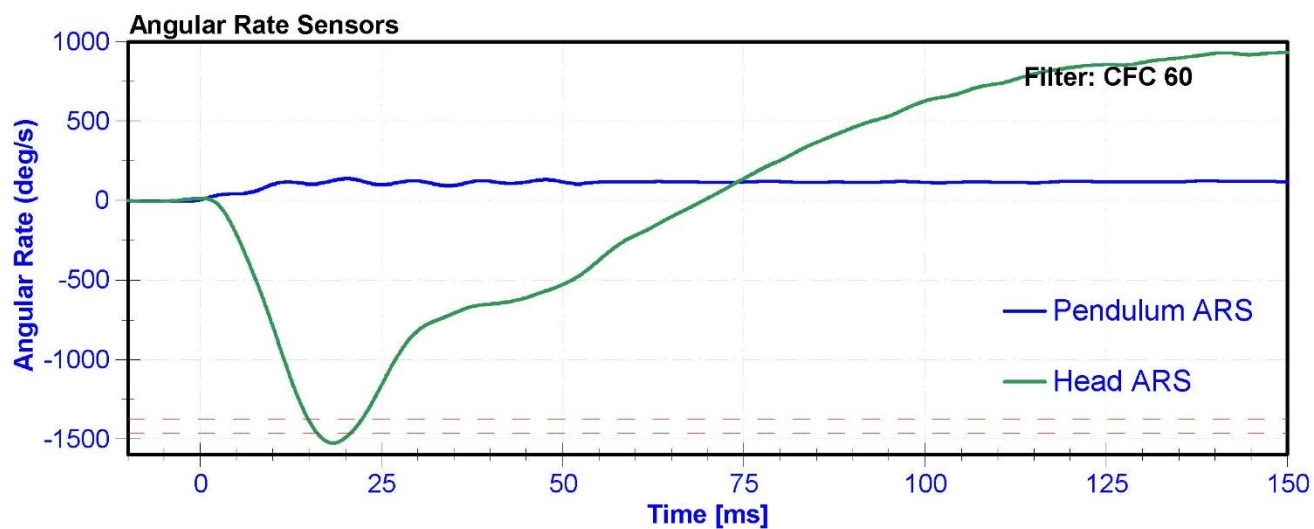
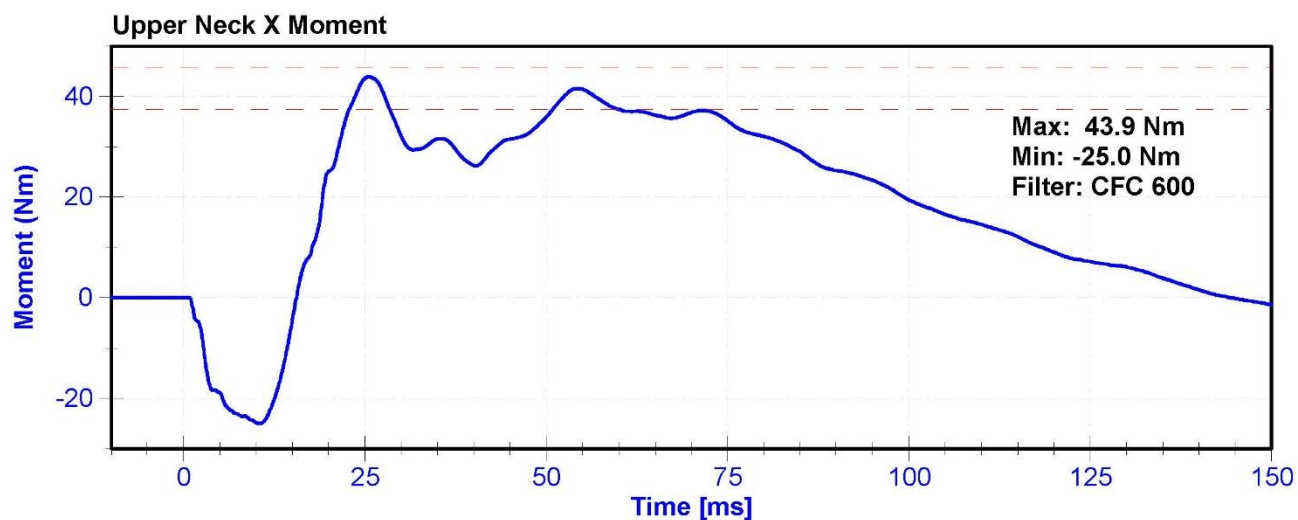
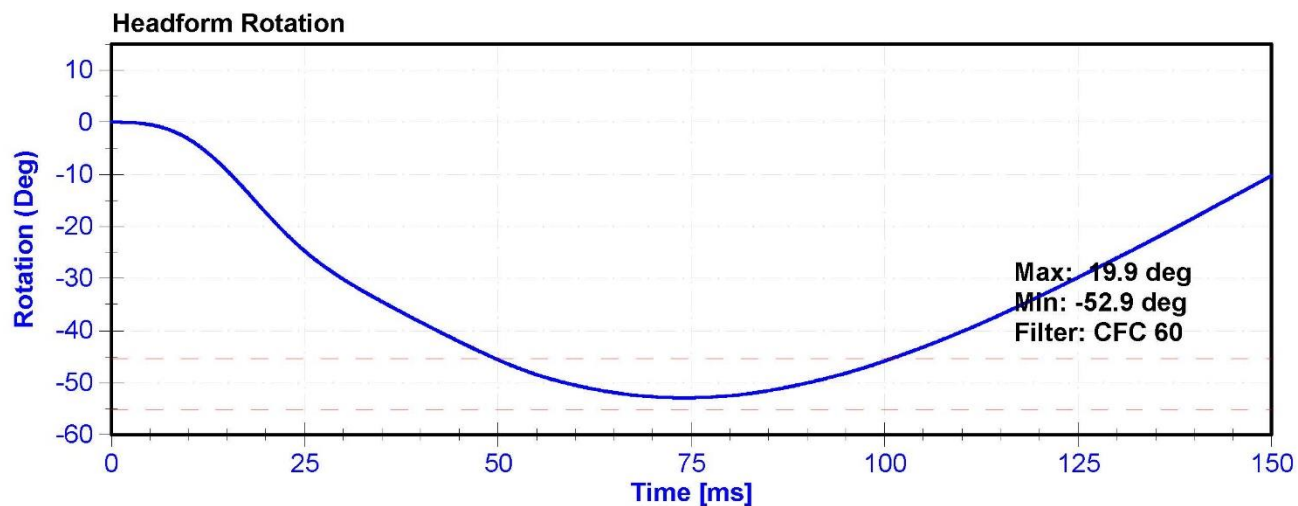
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	23.8	Pass
Velocity	3.35	3.45	m/s	3.432	Pass
Pendulum Impulse at 4ms	0.89	1.08	m/s	0.970	Pass
Pendulum Impulse at 8ms	2.04	2.36	m/s	2.147	Pass
Pendulum Impulse at 12ms	3.21	3.46	m/s	3.241	Pass
Peak Upper Neck X Moment after 40ms	37.4	45.7	Nm	41.58	Pass
Peak Head X Angular Rate	-1462	-1375	deg/s	-1525.9	Fail
Peak Head X Rotation	-55.3	-45.4	deg	-52.92	Pass
Rotational Decay Time to Zero	83.7	90.9	ms	88.85	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Upper Neck Load Cell	Humanetics 3454JTF	LC-76Mx	4/20/2015	4/19/2016
Pendulum ARS	DTS ARS PRO-18K	ARS-9122	9/30/2015	9/29/2016
Head X ARS	DTS ARS 18k	ARS-5921	4/30/2015	4/29/2016





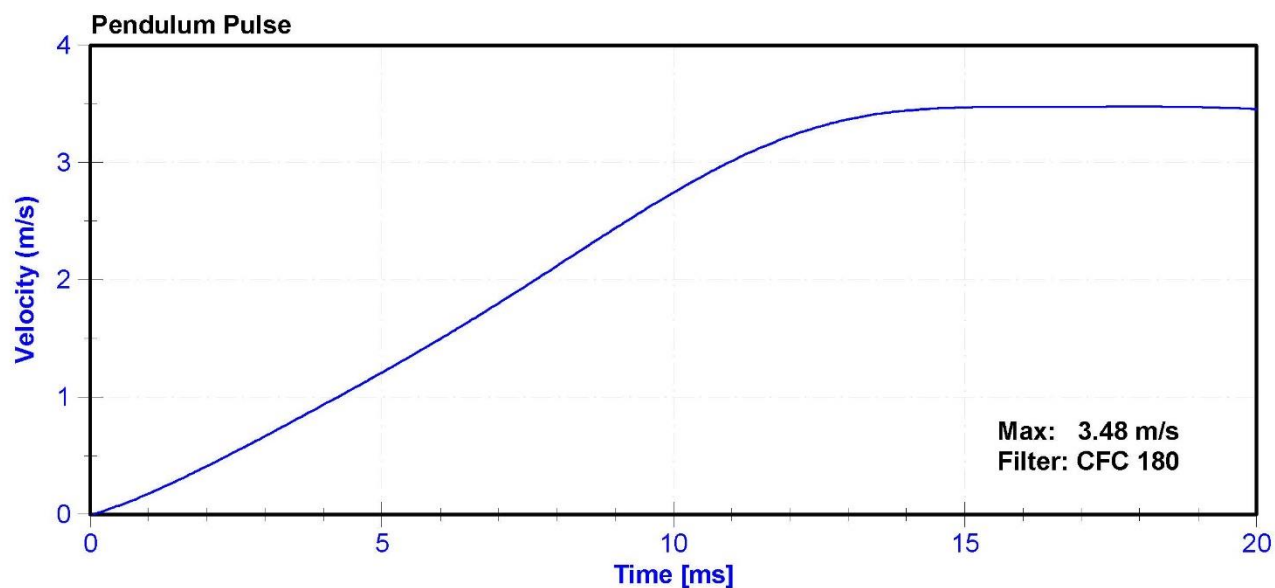
ATD Manufacturer	Humanetics	Test Technician	M. Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

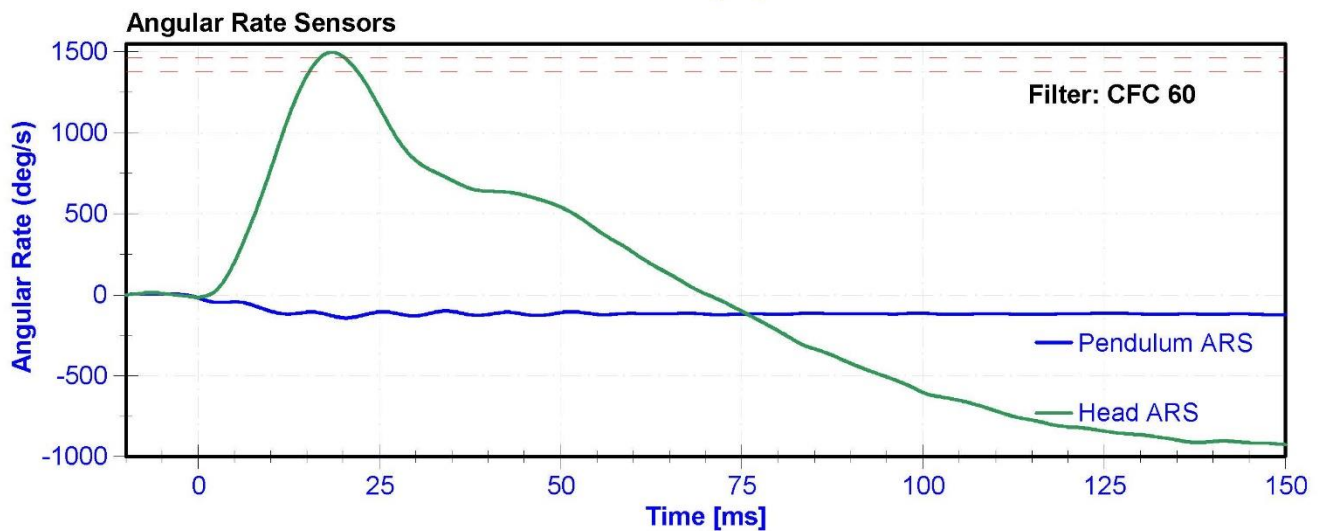
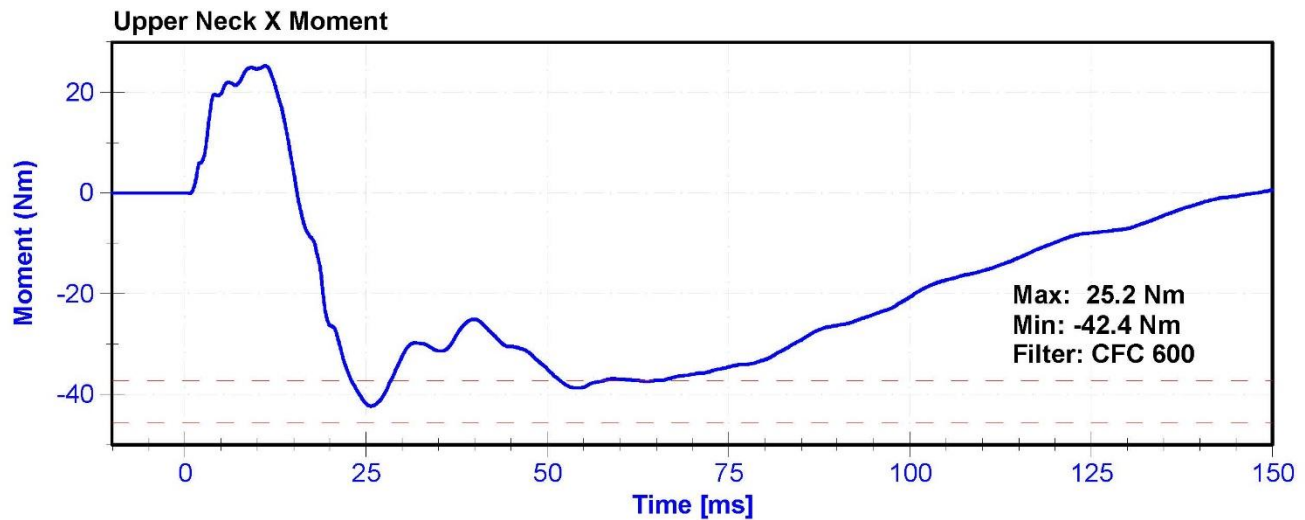
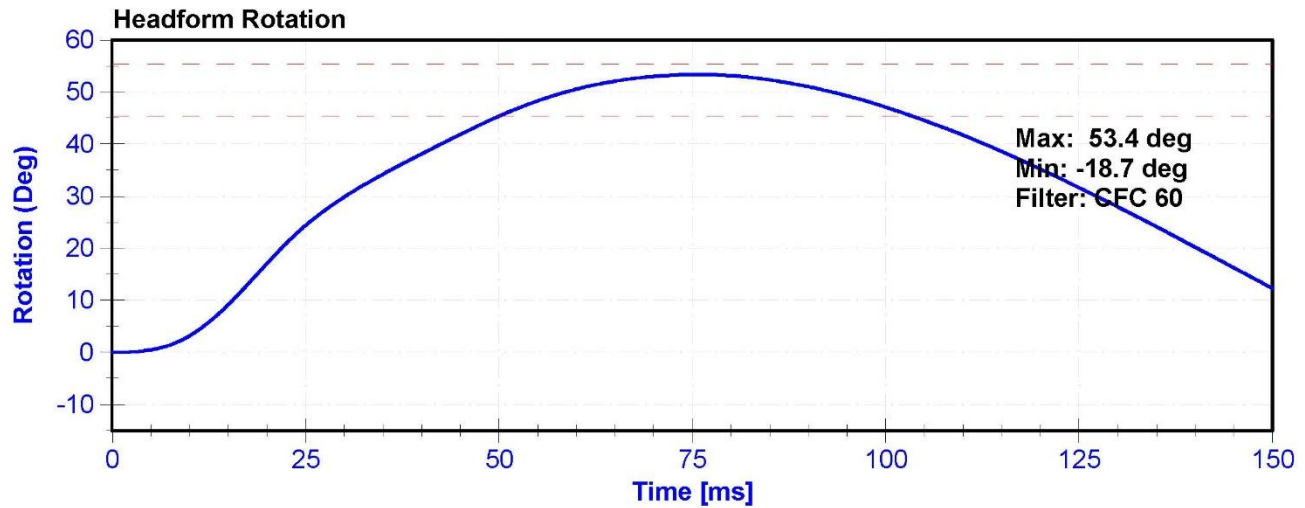
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	23.8	Pass
Velocity	3.35	3.45	m/s	3.43	Pass
Pendulum Impulse at 4ms	0.89	1.08	m/s	0.935	Pass
Pendulum Impulse at 8ms	2.04	2.36	m/s	2.118	Pass
Pendulum Impulse at 12ms	3.21	3.46	m/s	3.225	Pass
Peak Upper Neck X Moment after 40ms	-45.7	-37.4	Nm	-38.75	Pass
Peak Head X Angular Rate	1375	1462	deg/s	1498.1	Fail
Peak Head X Rotation	45.4	55.3	deg	53.39	Pass
Rotation Decay Time to Zero	83.7	90.9	ms	89.70	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Upper Neck Load Cell	Humanetics 10380J14	LC-DS9758 Mx	12/3/2015	12/2/2016
Pendulum ARS	DTS ARS PRO-18K	ARS-9122	9/30/2015	9/29/2016
Head X ARS	DTS ARS 18k	ARS-5921	4/30/2015	4/29/2016





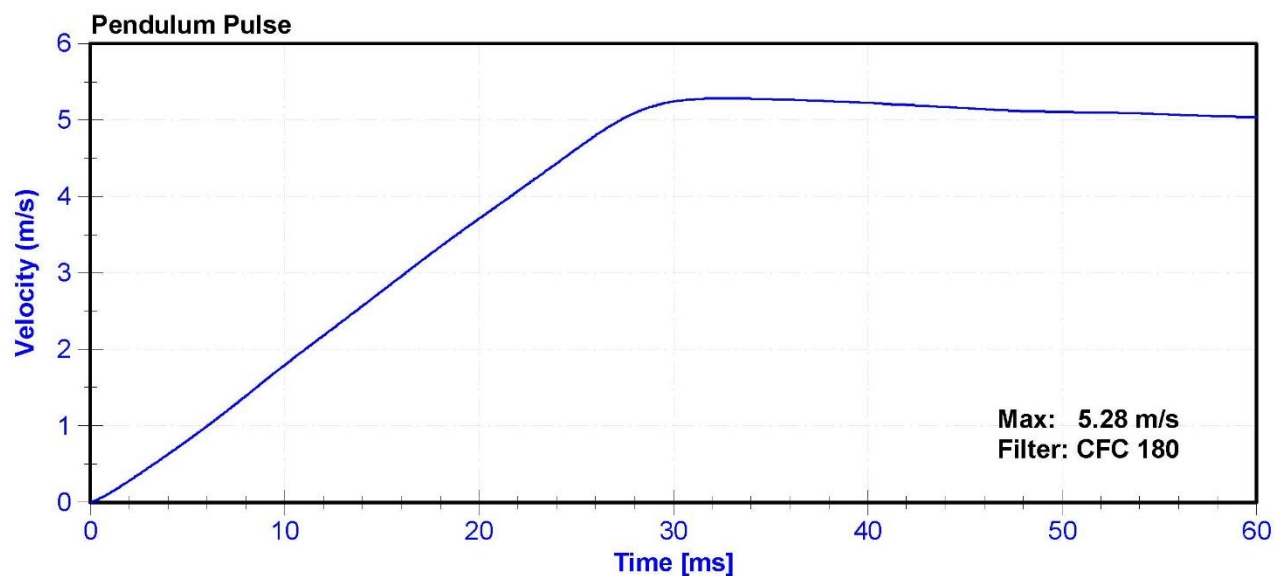
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

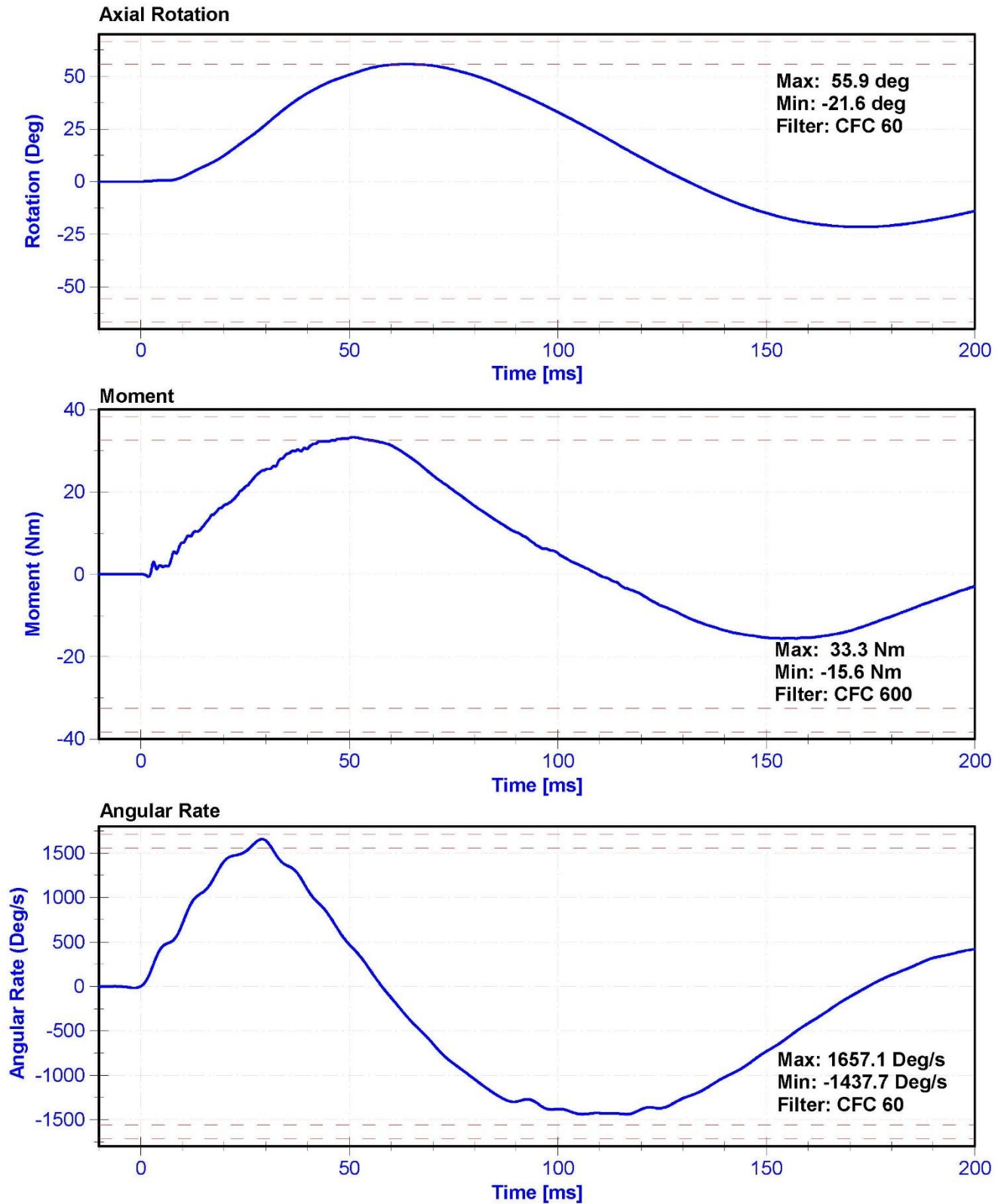
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	31.4	Pass
Velocity	4.95	5.05	m/s	5.045	Pass
Pendulum Impulse at 10ms	1.72	1.98	m/s	1.796	Pass
Pendulum Impulse at 15ms	2.67	2.97	m/s	2.762	Pass
Pendulum Impulse at 20ms	3.59	3.98	m/s	3.710	Pass
Pendulum Impulse at 25ms	4.43	4.92	m/s	4.619	Pass
Peak Upper Neck Z Moment	32.6	38.3	Nm	33.32	Pass
Peak Neck Axial Rotation	55.6	66.6	deg	55.87	Pass
Rotation Decay Time to Zero	58.0	61.6	ms	67.70	Fail
Peak Upper Neck Angular Velocity	1559	1709	deg/s	1657.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Neck Fixture Potentiometer	Servo 14CB1-3615	DS-0001	10/21/2015	10/20/2016
Upper Neck Load Cell	Humanetics 3454JTF	LC-76Mz	4/20/2015	4/19/2016
Upper Neck ARS	DTS ARS-PRO-8K	ARS-6424	1/19/2016	1/18/2017





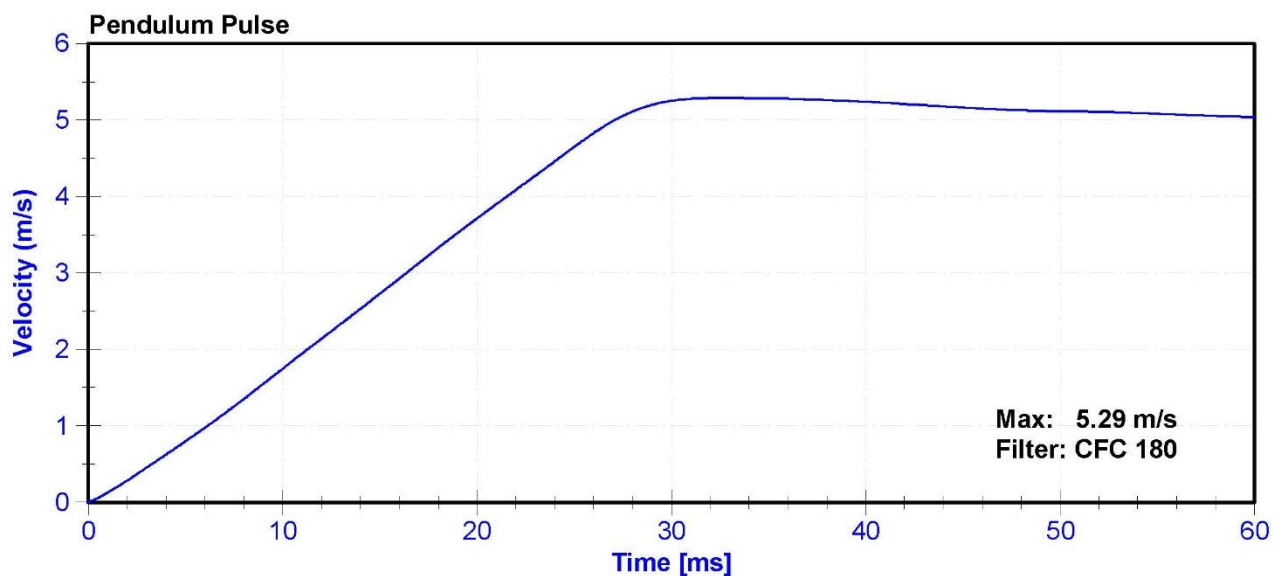
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

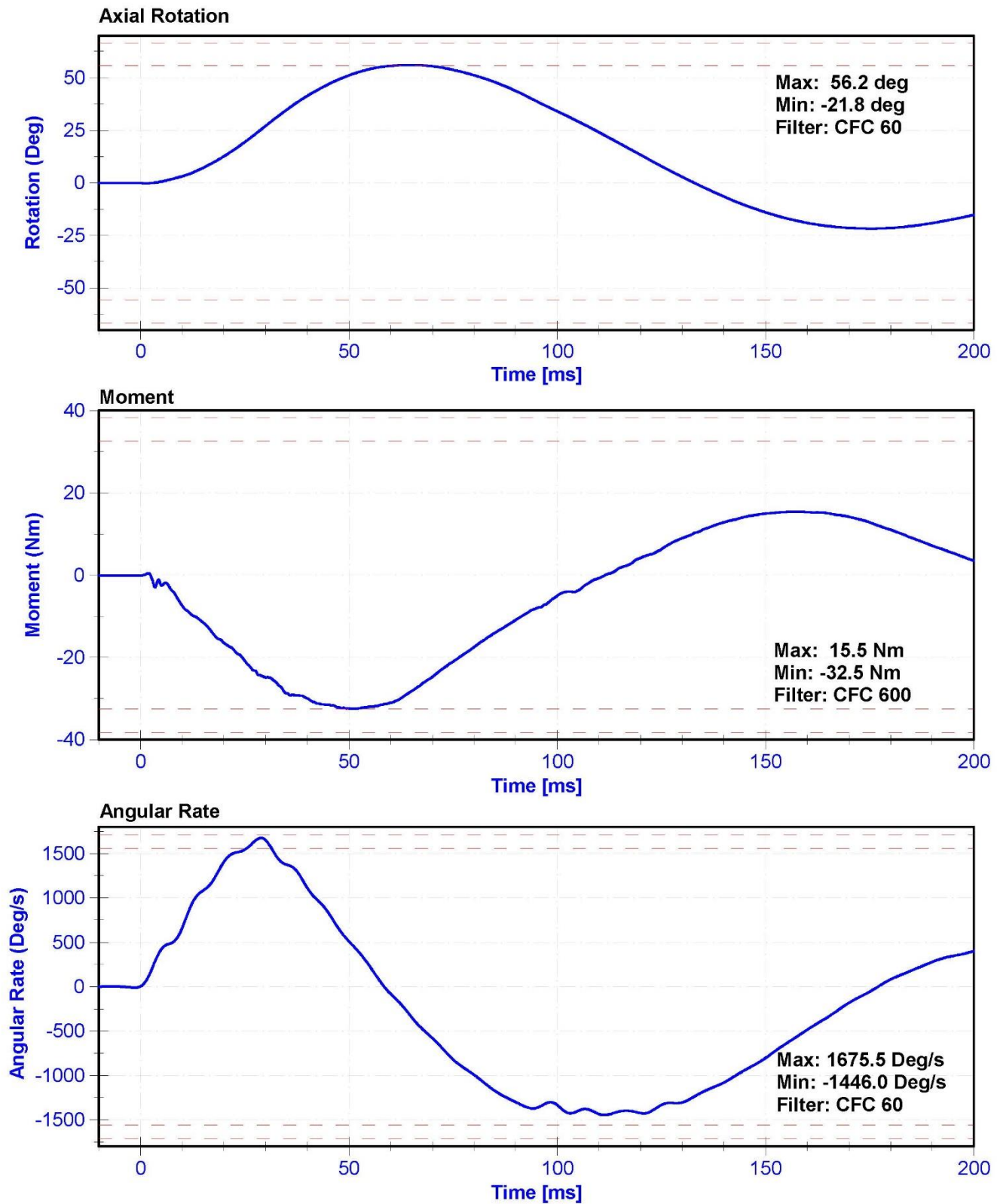
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	29.5	Pass
Velocity	4.95	5.05	m/s	5.045	Pass
Pendulum Impulse at 10ms	1.72	1.98	m/s	1.749	Pass
Pendulum Impulse at 15ms	2.67	2.97	m/s	2.727	Pass
Pendulum Impulse at 20ms	3.59	3.98	m/s	3.714	Pass
Pendulum Impulse at 25ms	4.43	4.92	m/s	4.648	Pass
Peak Upper Neck Z Moment	32.6	38.3	Nm	32.49	Fail
Peak Neck Axial Rotation	55.6	66.6	deg	56.18	Pass
Rotation Decay Time to Zero	58.0	61.6	ms	68.10	Fail
Peak Upper Neck Angular Velocity	1559	1709	deg/s	1675.5	Pass

Transducer Calibrations

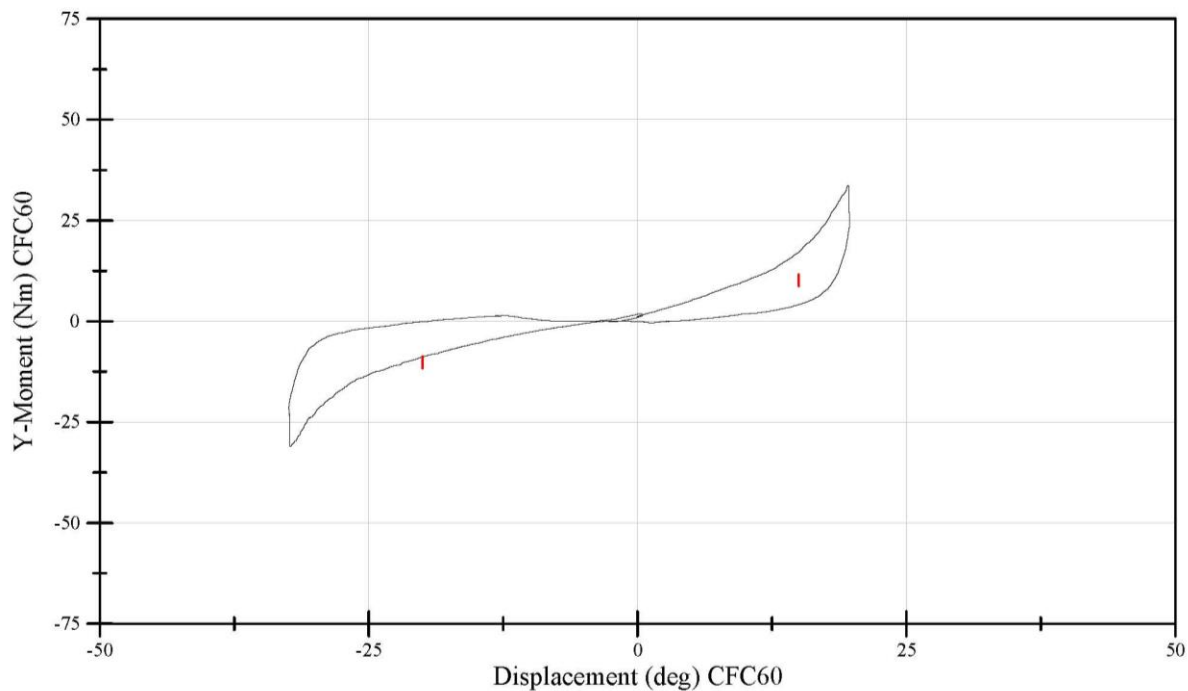
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Neck Fixture Potentiometer	Servo 14CB1-3615	DS-0001	10/21/2015	10/20/2016
Upper Neck Load Cell	Humanetics 3454JTF	LC-76Mz	4/20/2015	4/19/2016
Upper Neck ARS	DTS ARS-PRO-8K	ARS-6424	1/19/2016	1/18/2017





Test Temperature: 69.6 degrees
Relative Humidity: 52%
Test Velocity: 0 m/s

THOR Occipital Condyle Quasi-Static Certification Displacement vs. Torque Serial Number: T015

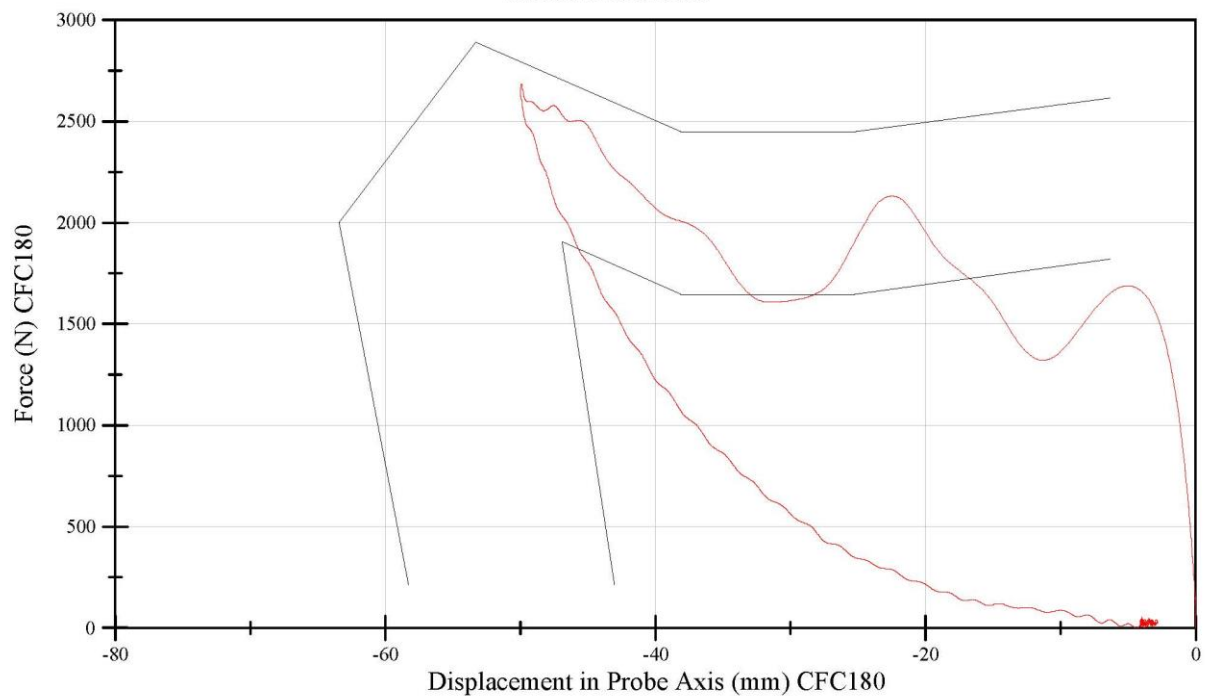


Software Version: 2.4

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Test Temperature: 70.4 degrees
Relative Humidity: 53%
Test Velocity: 4.26 m/s

THOR Upper Thorax Certification Thorax Response With Kroell Corridor Serial Number: T015



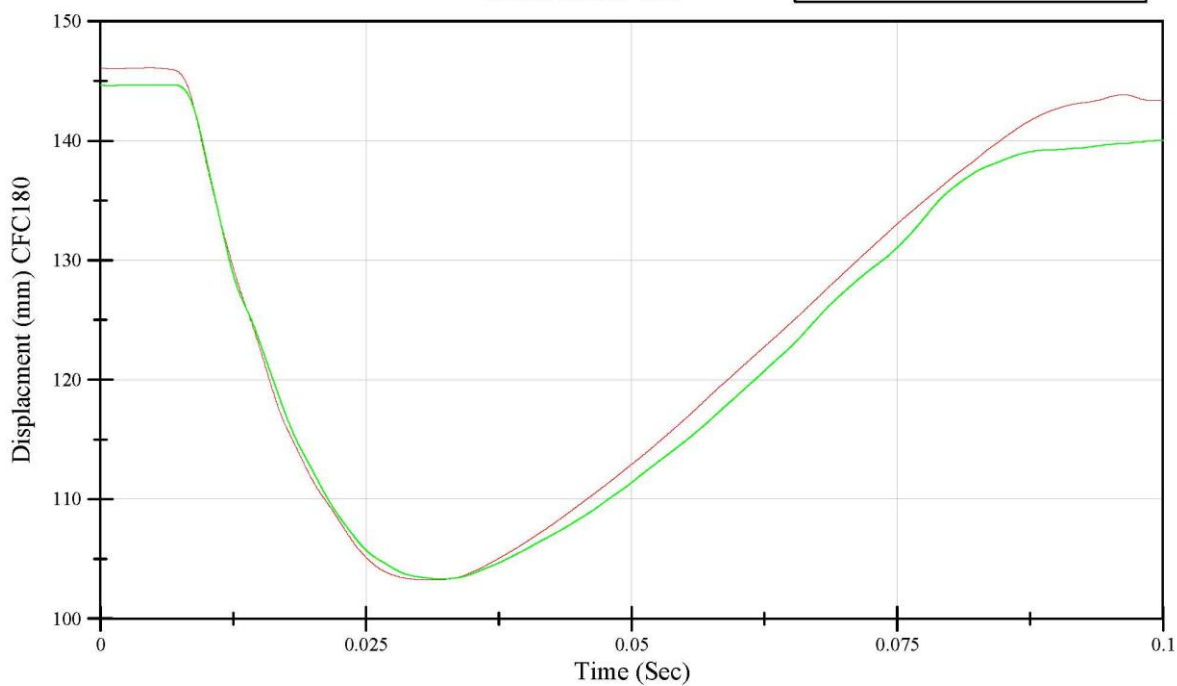
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Test Temperature: 70.4 degrees
Relative Humidity: 53%
Test Velocity: 4.26 m/s

THOR Upper Thorax Certification
Scaled IR-TRACC
Serial Number: T015

Left Upper IR-TRACC
Right Upper IR-TRACC



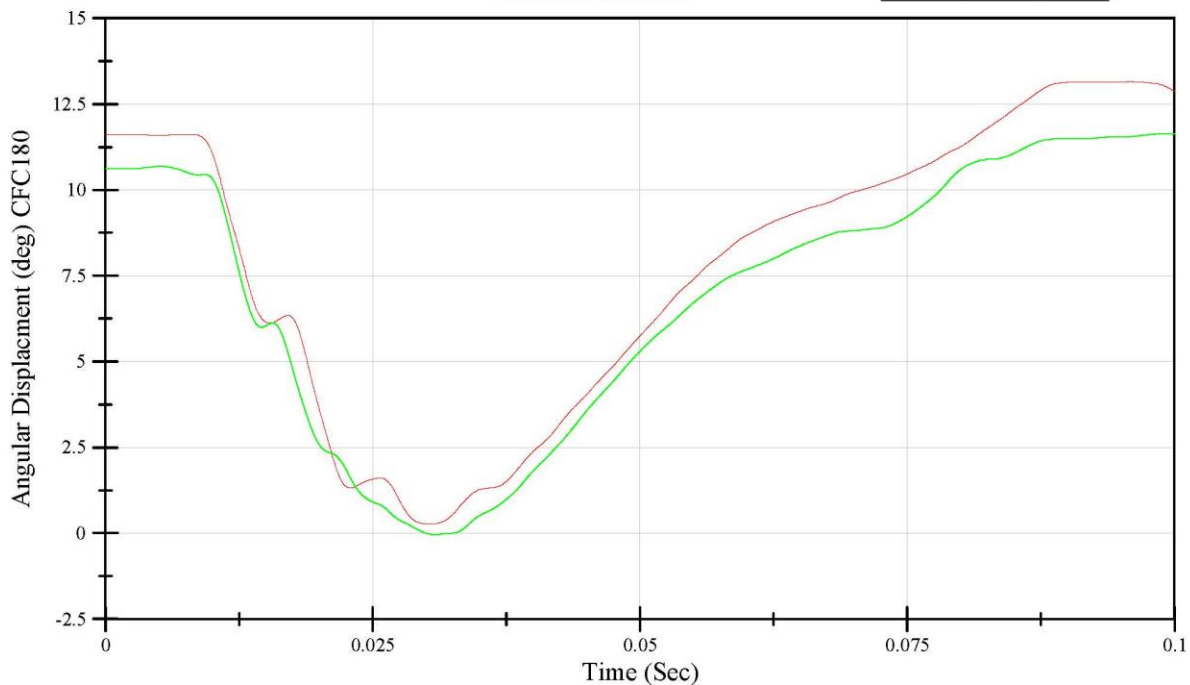
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File Name: T015THUP150710-02_pro.tdms
07/10/2015 09:24:33.0000

Test Temperature: 70.4 degrees
Relative Humidity: 53%
Test Velocity: 4.26 m/s

THOR Upper Thorax Certification
Y-Potentiometer
Serial Number: T015

Left Upper
Right Upper



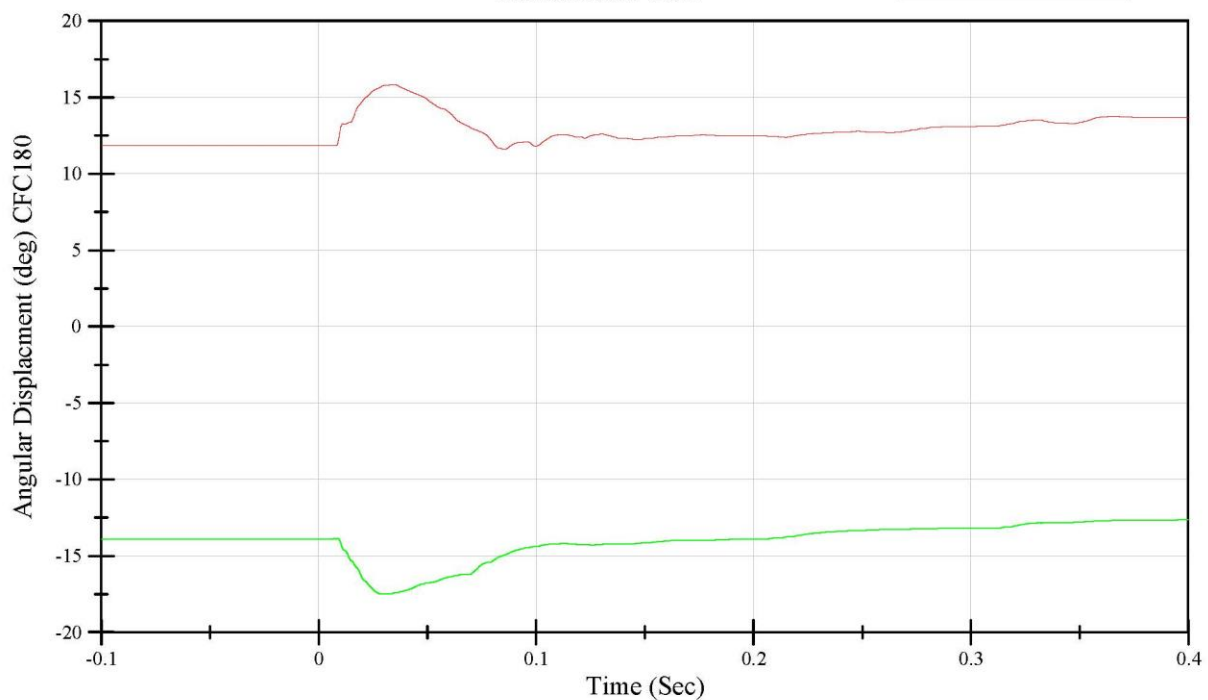
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07/10/2015 09:24:33.0000

Test Temperature: 70.4 degrees
Relative Humidity: 53%
Test Velocity: 4.26 m/s

THOR Upper Thorax Certification
Z-Potentiometer
Serial Number: T015

Left Upper
Right Upper

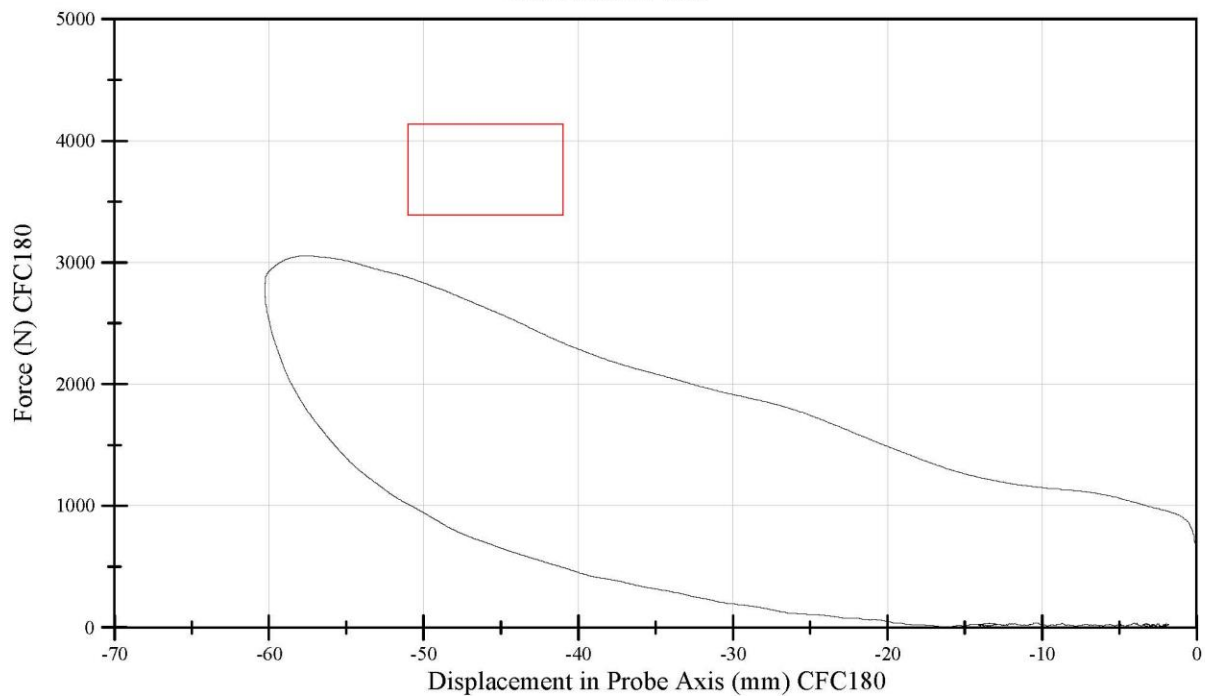


Software Version: 2.4

File Name: T015THUP150710-02_pro.tdms
07/10/2015 09:24:33.0000

Test Temperature: 70.4 degrees
Relative Humidity: 52%
Test Velocity: 4.27 m/s

THOR Lower Left Oblique Thorax Certification
Thorax Displacement vs. Probe Force
Serial Number: T015



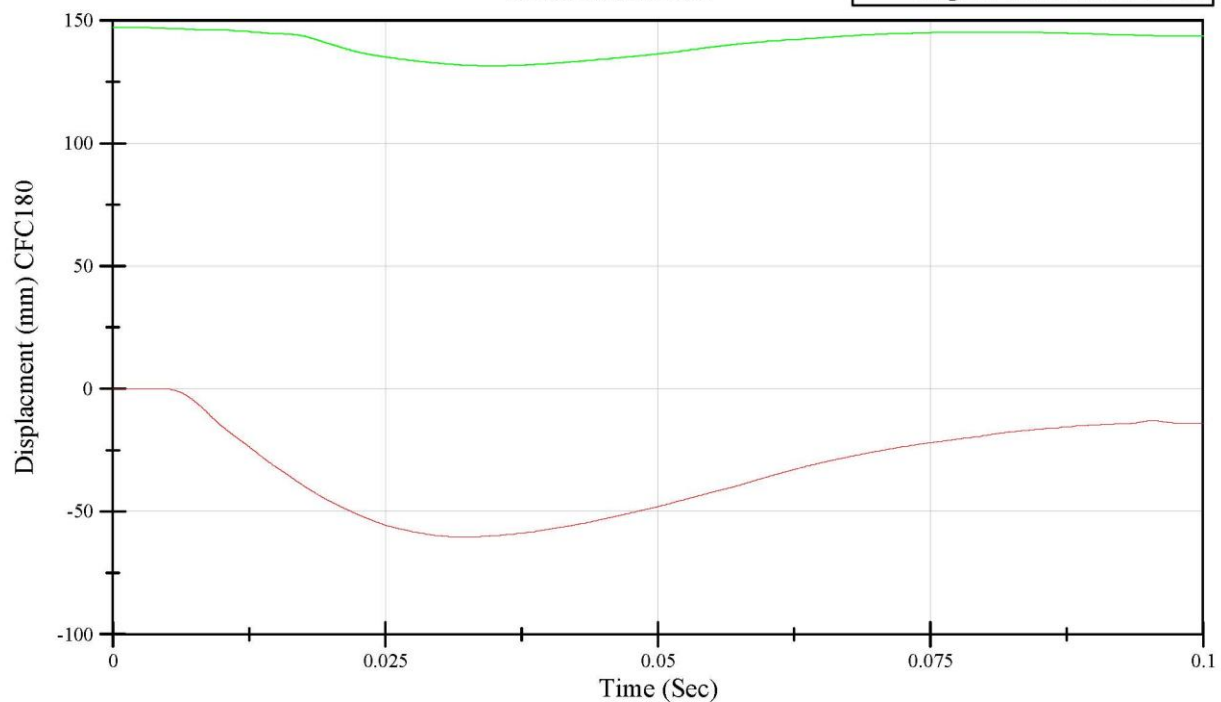
Software Version: 2.4

File Name: T015OBLE150710-01_pro
07/10/2015 14:01:12.0000

Test Temperature: 70.4 degrees
Relative Humidity: 52%
Test Velocity: 4.27 m/s

THOR Lower Left Oblique Thorax Certification
Scaled IR-TRACC
Serial Number: T015

Left Lower IR-TRACC
Right Lower IR-TRACC



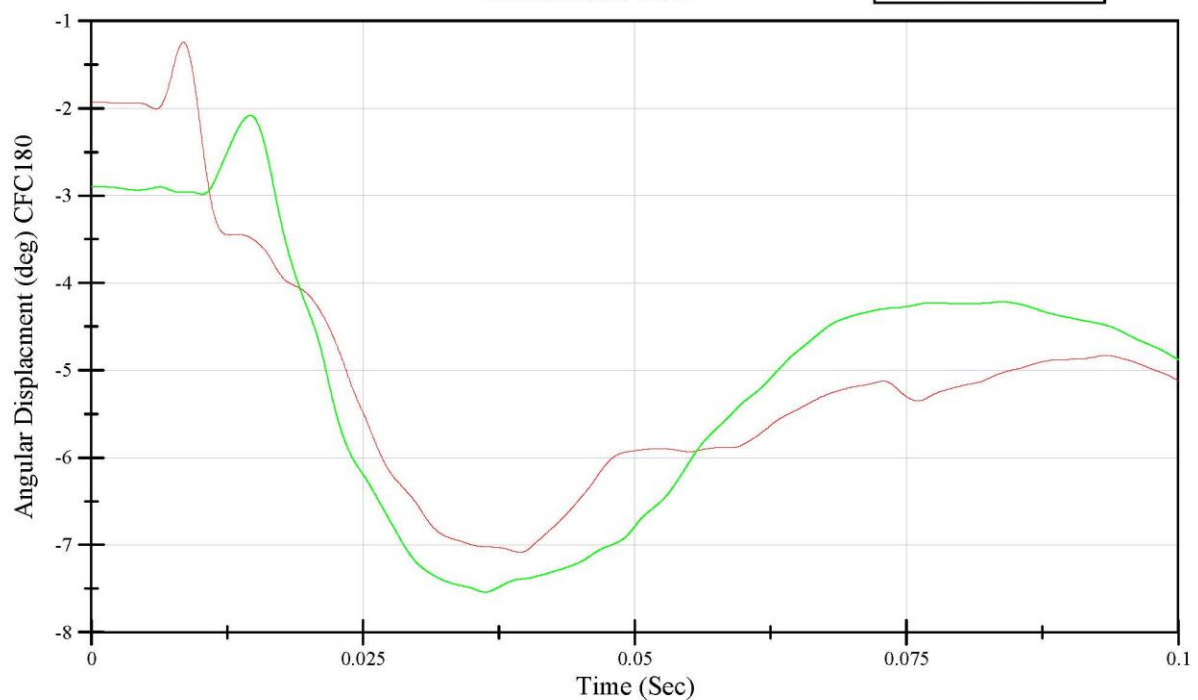
Software Version: 2.4

File Name: T015OBLE150710-01_pro
07/10/2015 14:01:12.0000

Test Temperature: 70.4 degrees
Relative Humidity: 52%
Test Velocity: 4.27 m/s

THOR Lower Left Oblique Thorax Certification
Y-Potentiometer
Serial Number: T015

Left Lower
Right Lower



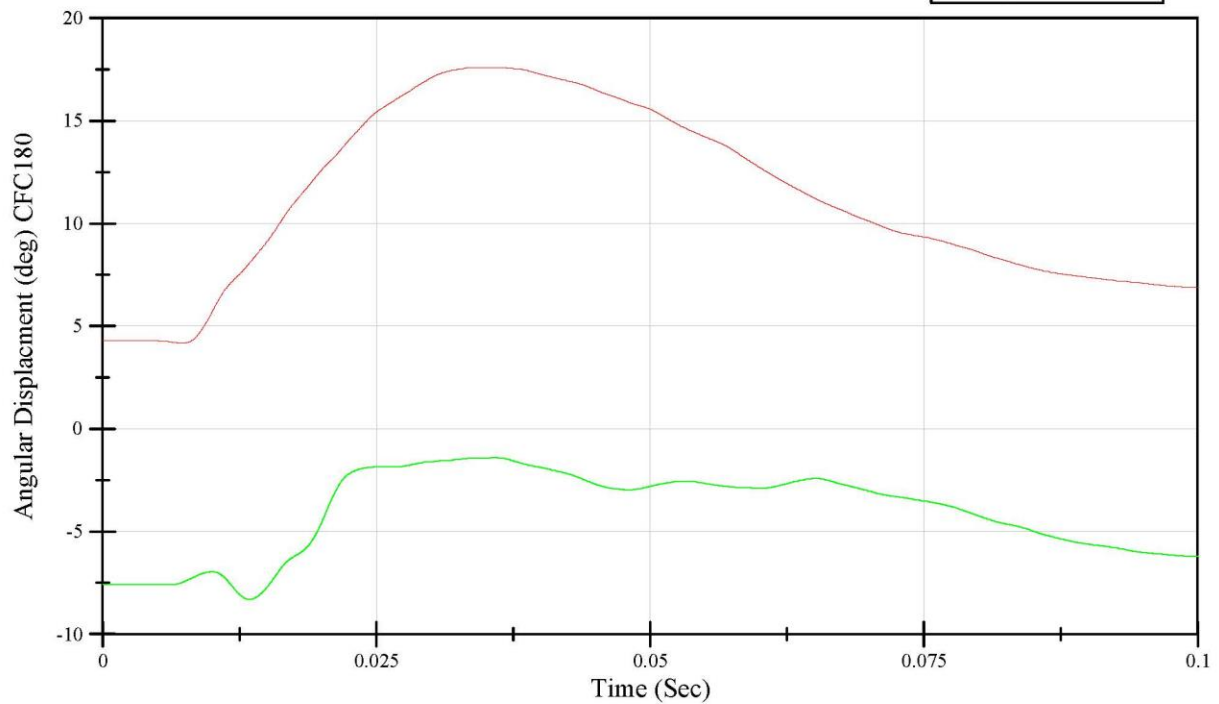
Software Version: 2.4

File Name: T015OBLE150710-01_pro
07/10/2015 14:01:12.0000

Test Temperature: 70.4 degrees
Relative Humidity: 52%
Test Velocity: 4.27 m/s

THOR Lower Left Oblique Thorax Certification
Z-Potentiometer
Serial Number: T015

Left Lower
Right Lower

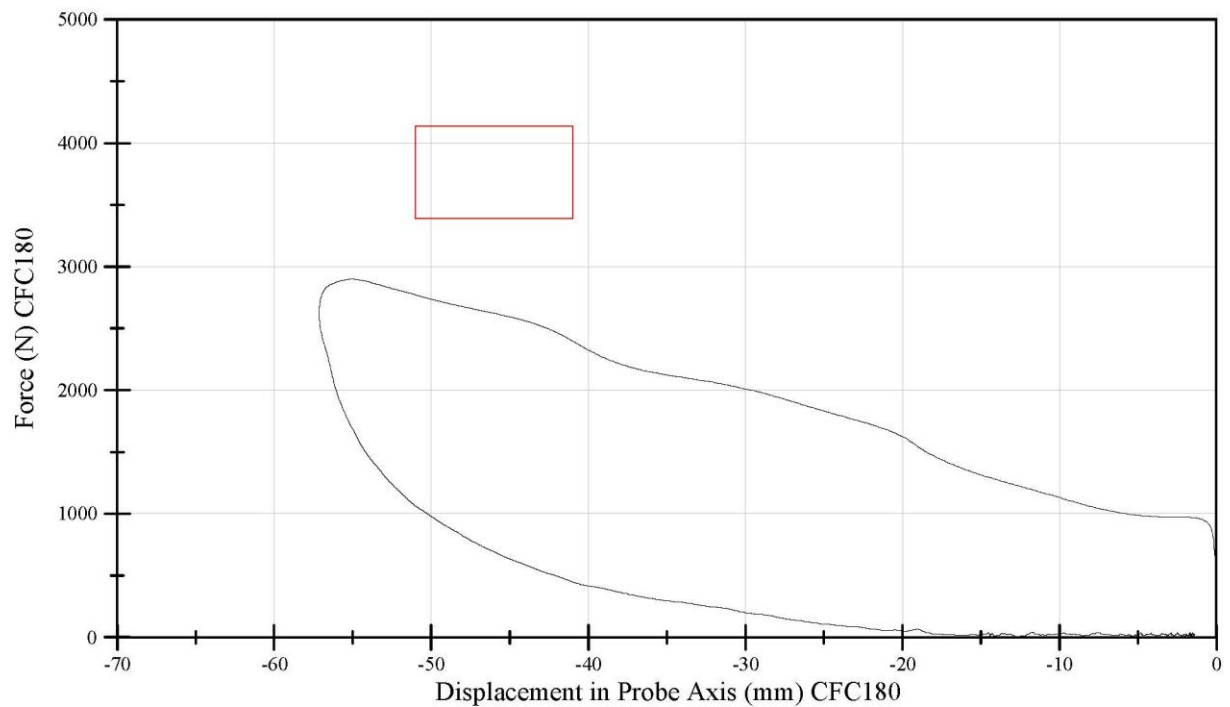


Software Version: 2.4

File Name: T015OBLE150710-01_pro
07/10/2015 14:01:12.0000

Test Temperature: 70.3 degrees
Relative Humidity: 51%
Test Velocity: 4.27 m/s

THOR Lower Right Oblique Thorax Certification
Thorax Displacement vs. Probe Force
Serial Number: T015



Software Version: 2.4

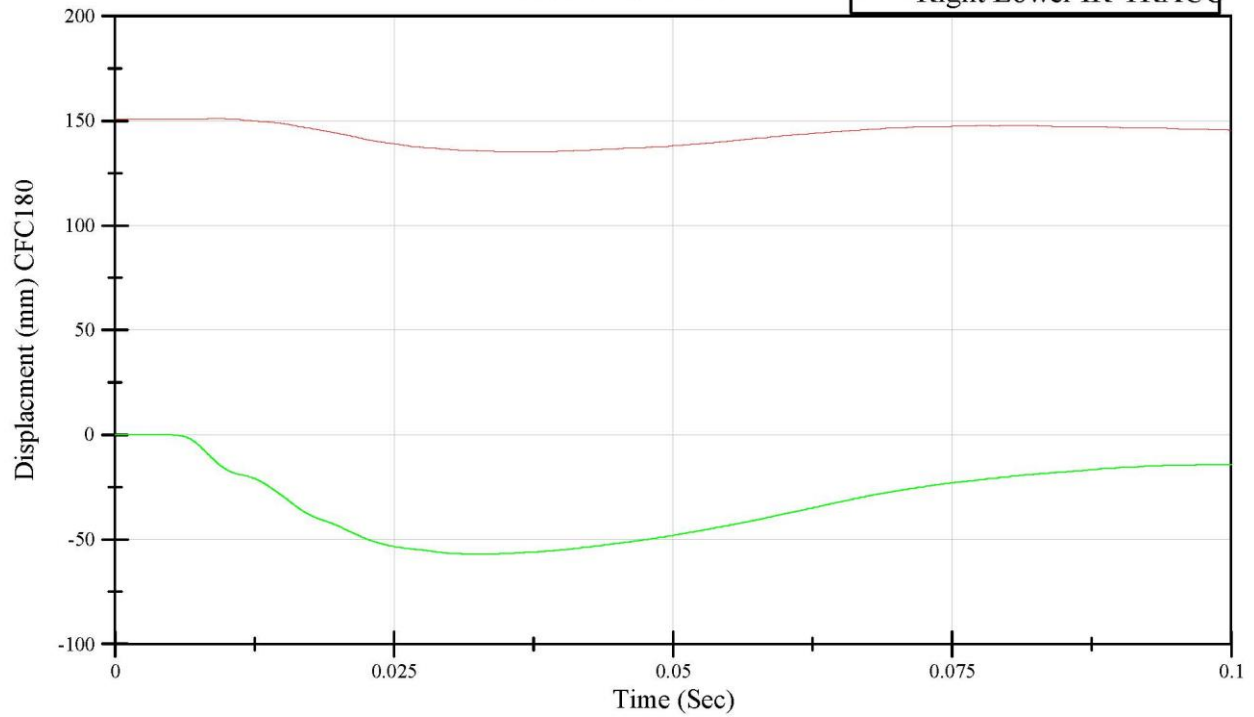
File Name: T015OBRI150710-01_pro
07/10/2015 12:55:35.0000

Test Temperature: 70.3 degrees
Relative Humidity: 51%
Test Velocity: 4.27 m/s

THOR Lower Right Oblique Thorax Certification

Scaled IR-TRACC
Serial Number: T015

Left Lower IR-TRACC
Right Lower IR-TRACC



Software Version: 2.4

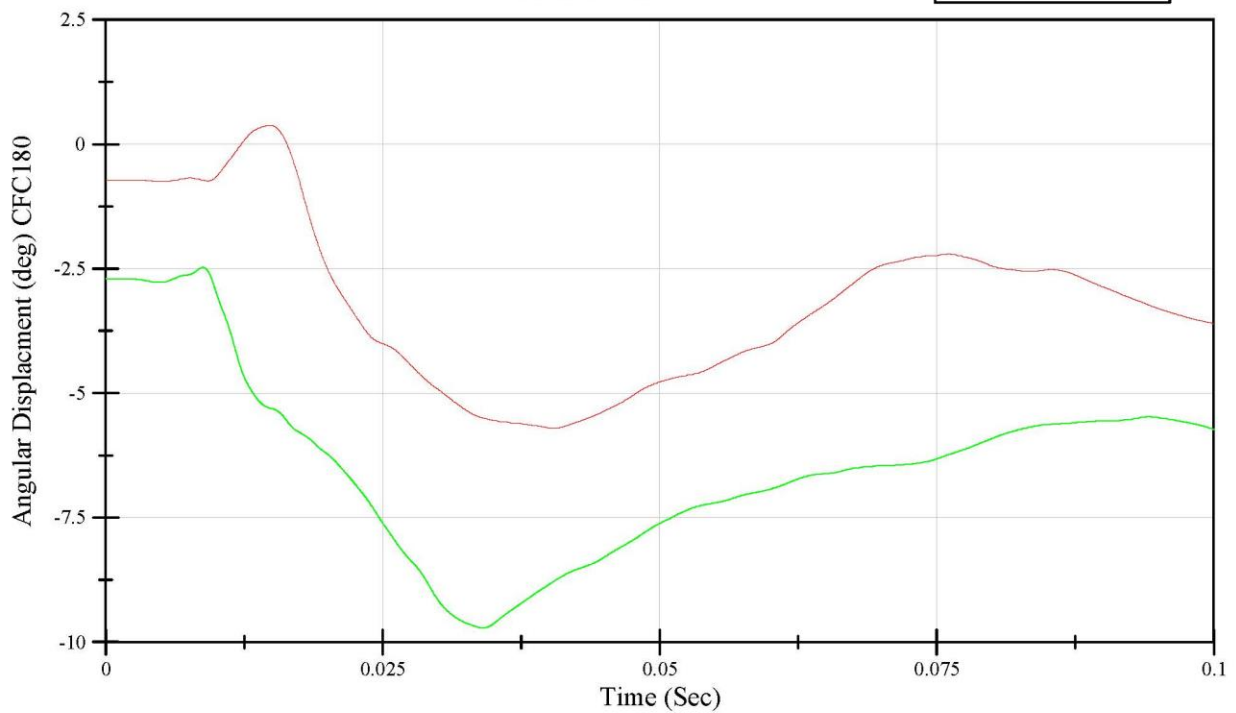
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Test Temperature: 70.3 degrees
Relative Humidity: 51%
Test Velocity: 4.27 m/s

THOR Lower Right Oblique Thorax Certification

Y-Potentiometer
Serial Number: T015

Left Lower
Right Lower

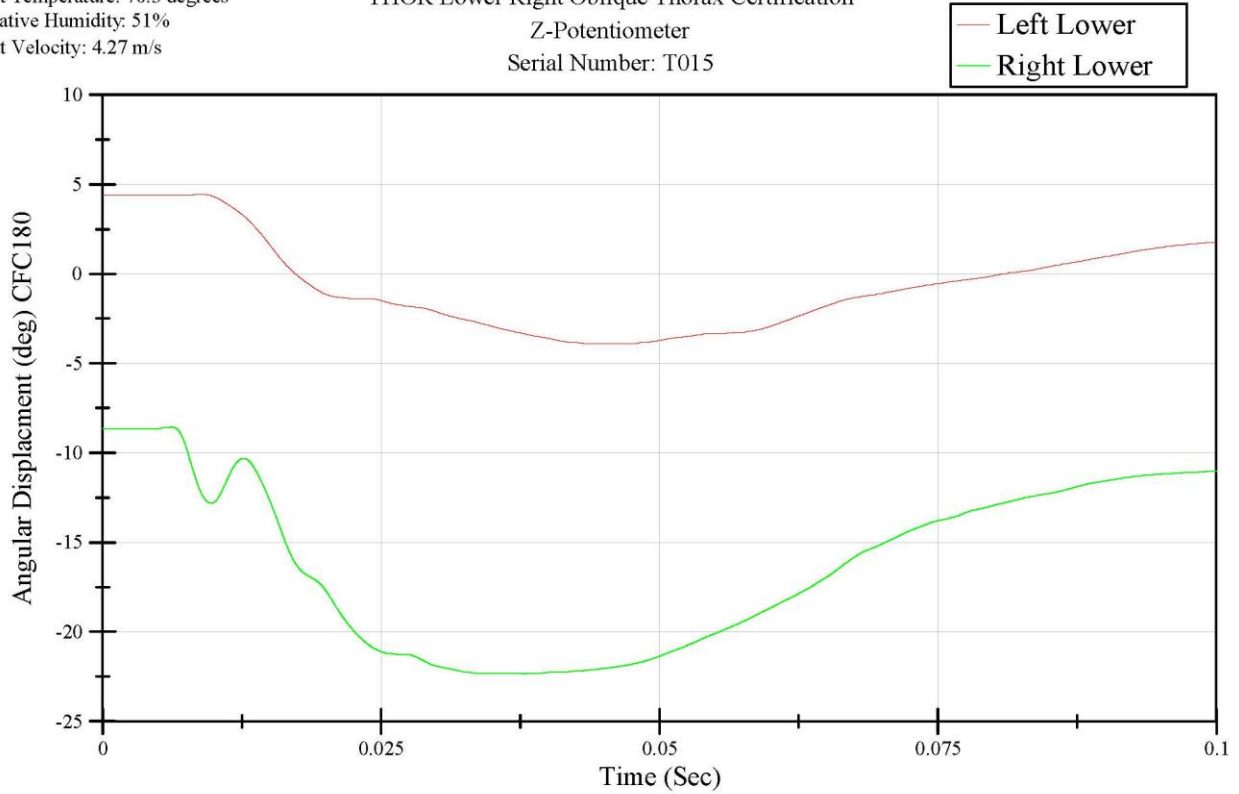


Software Version: 2.4

File Name: T015OBRI150710-01_pro
07/10/2015 12:55:35.0000

Test Temperature: 70.3 degrees
Relative Humidity: 51%
Test Velocity: 4.27 m/s

THOR Lower Right Oblique Thorax Certification
Z-Potentiometer
Serial Number: T015

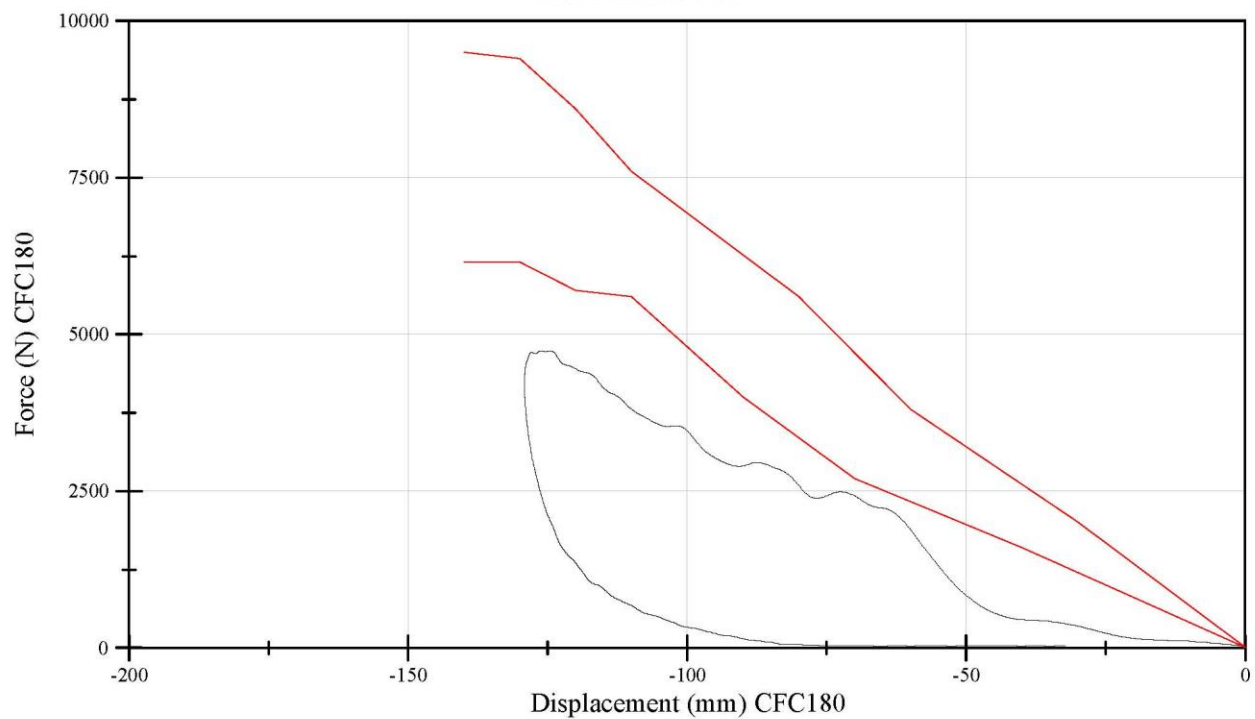


Software Version: 2.4

File Name: T015OBRI150710-01_pro
07/10/2015 12:55:35.0000

Test Temperature: 70.2 degrees
Relative Humidity: 51%
Test Velocity: 6.63 m/s

THOR Upper Abdomen Certification
Abdomen Displacement vs. Probe Force
Serial Number: T015

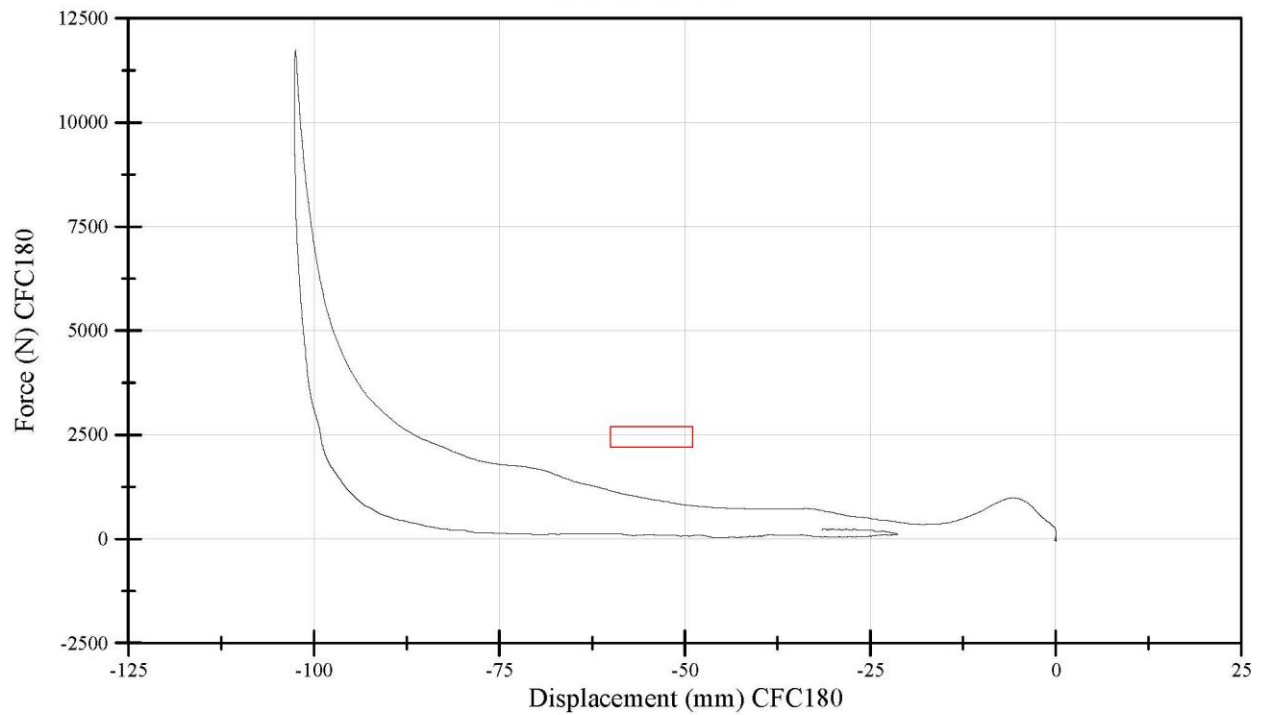


Software Version: 2.4

File Name: T015ABUP150709-01_pro
07/09/2015 15:52:54.0000

Test Temperature: 70.5 degrees
Relative Humidity: 52%
Test Velocity: 6.04 m/s

THOR Lower Abdomen Certification
Abdomen Displacement vs. Probe Force
Serial Number: T015

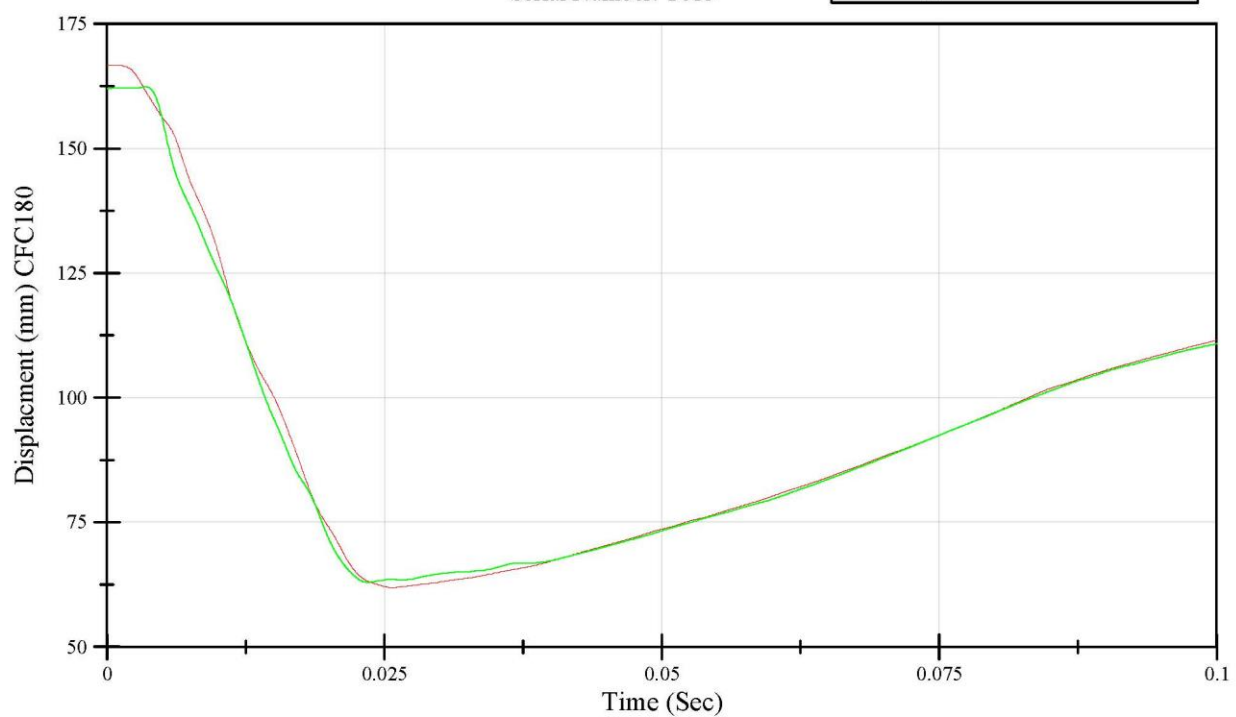


Software Version: 2.4

File Name: T015ABLR150709-04_pro
07/09/2015 14:46:27.0000

Test Temperature: 70.5 degrees
Relative Humidity: 52%
Test Velocity: 6.04 m/s

THOR Lower Abdomen Certification
IRTRACC Displacement
Serial Number: T015

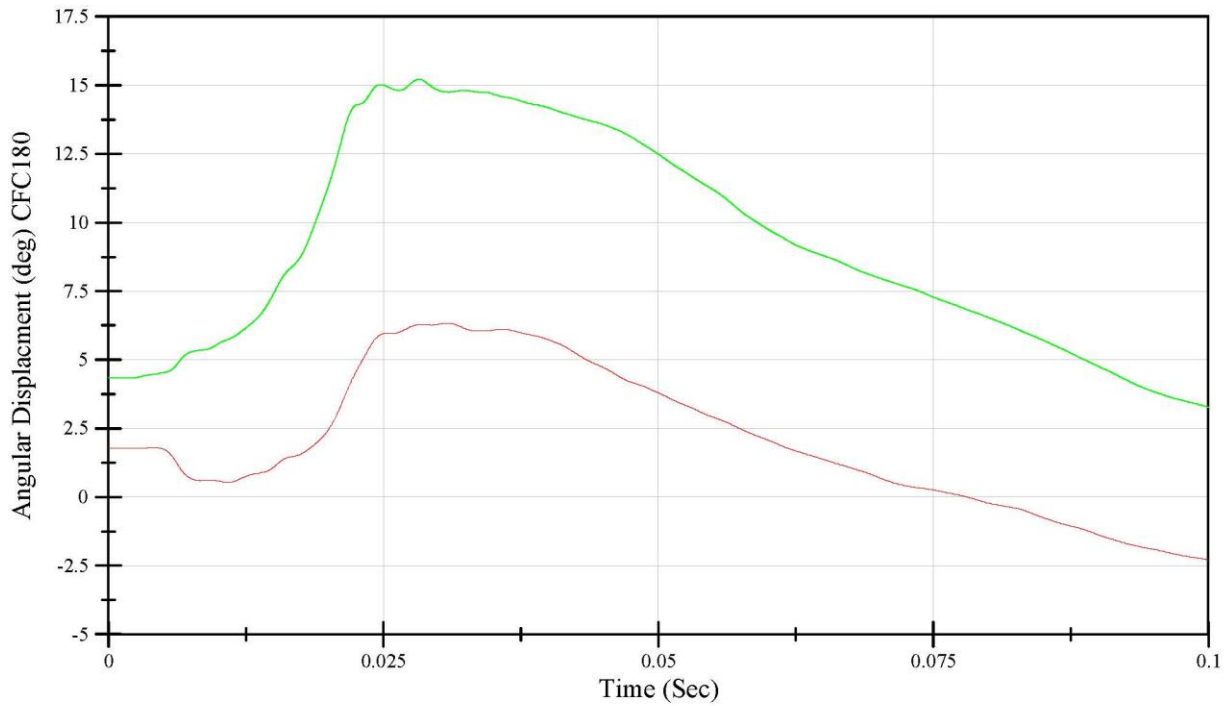


Software Version: 2.4

File Name: T015ABLR150709-04_pro
07/09/2015 14:46:27.0000

Test Temperature: 70.5 degrees
Relative Humidity: 52%
Test Velocity: 6.04 m/s

THOR Lower Abdomen Certification
Y-Pot Displacement
Serial Number: T015

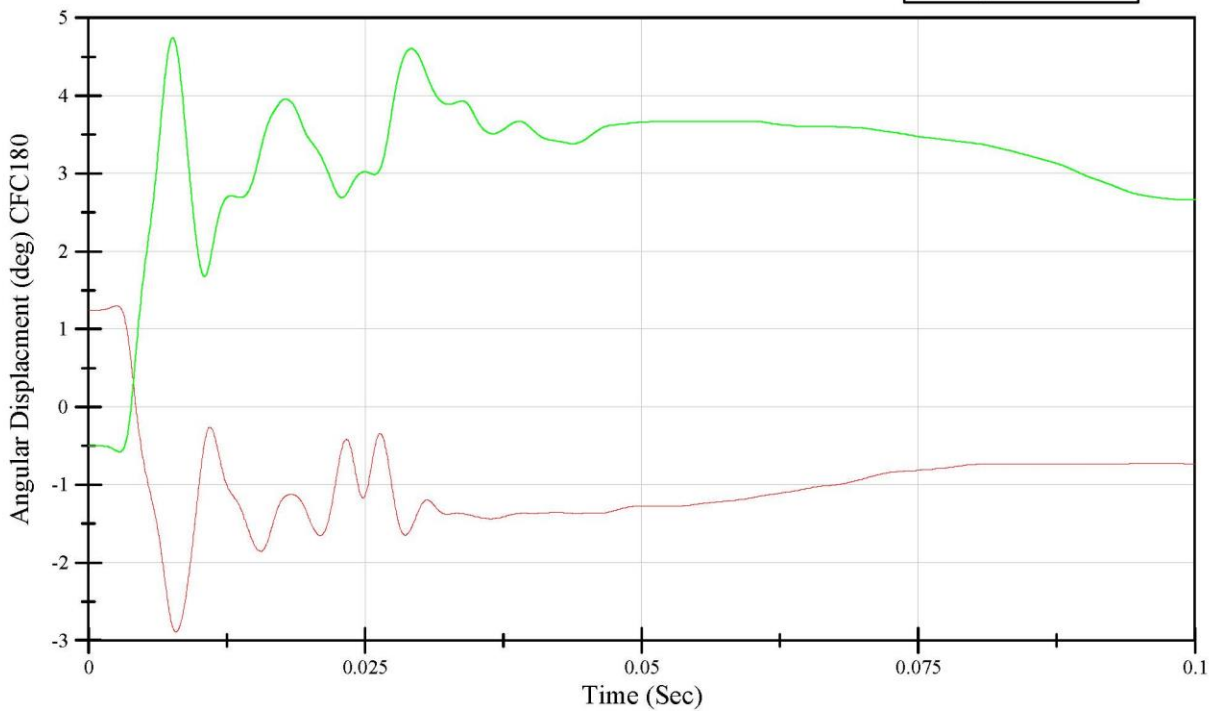


Software Version: 2.4

File Name: T015ABLR150709-04_pro
07/09/2015 14:46:27.0000

Test Temperature: 70.5 degrees
Relative Humidity: 52%
Test Velocity: 6.04 m/s

THOR Lower Abdomen Certification
Z-Potentiometer
Serial Number: T015

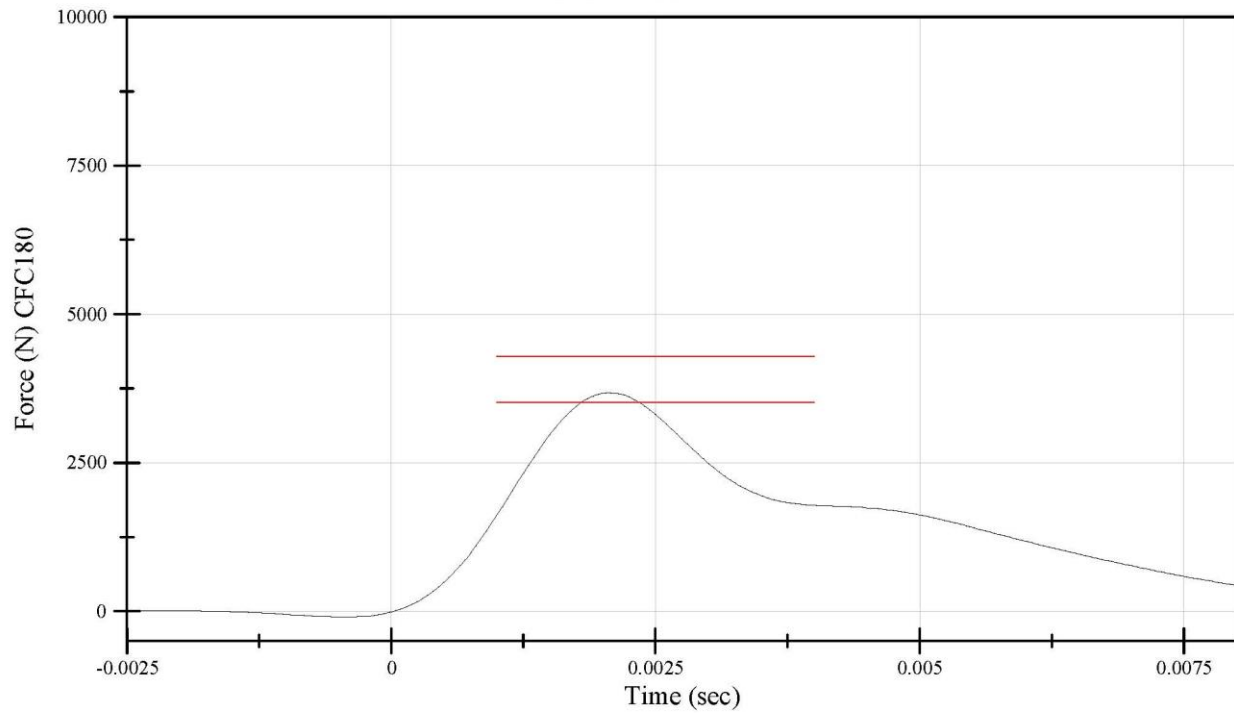


Software Version: 2.4

File Name: T015ABLR150709-04_pro
07/09/2015 14:46:27.0000

Test Temperature: 70 degrees
Relative Humidity: 52%
Test Velocity: 2.64 m/s

THOR Left Femur Certification
Probe Force
Serial Number: T015

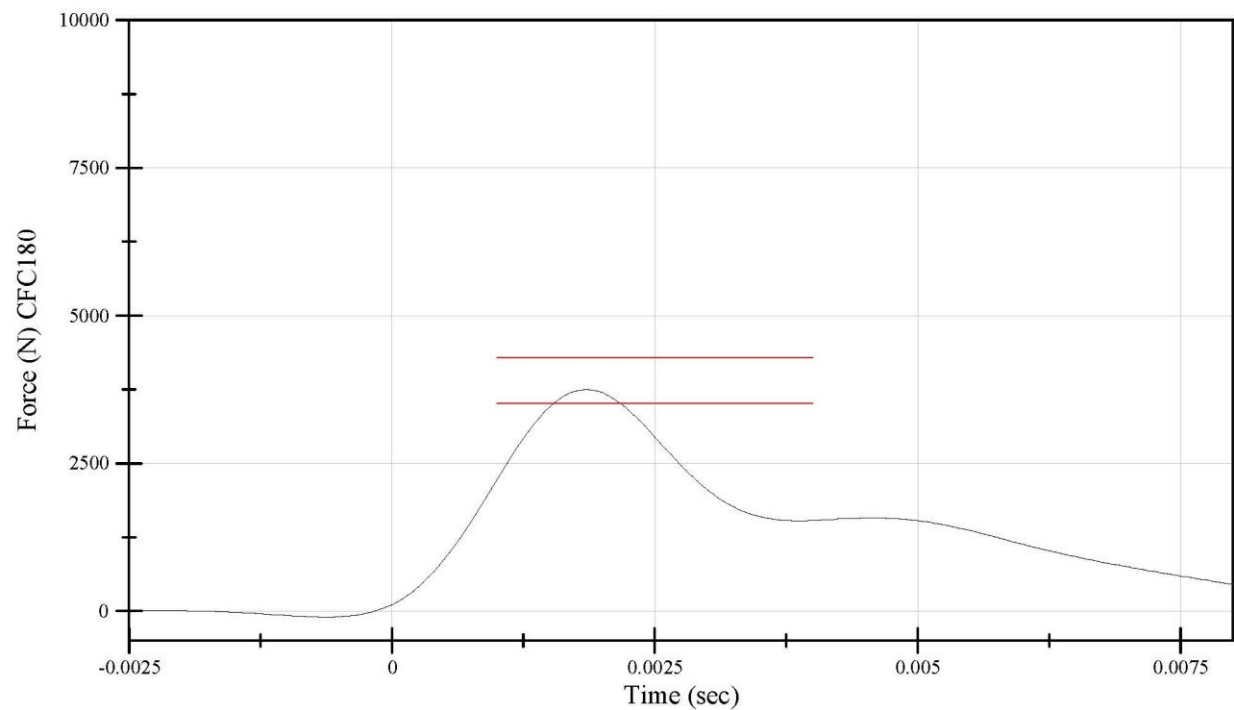


Software Version: 2.4

File Name: T015FELE150713-06_pro
07/13/2015 15:52:51.0000

Test Temperature: 69.9 degrees
Relative Humidity: 52%
Test Velocity: 2.64 m/s

THOR Right Femur Certification
Probe Force
Serial Number: T015

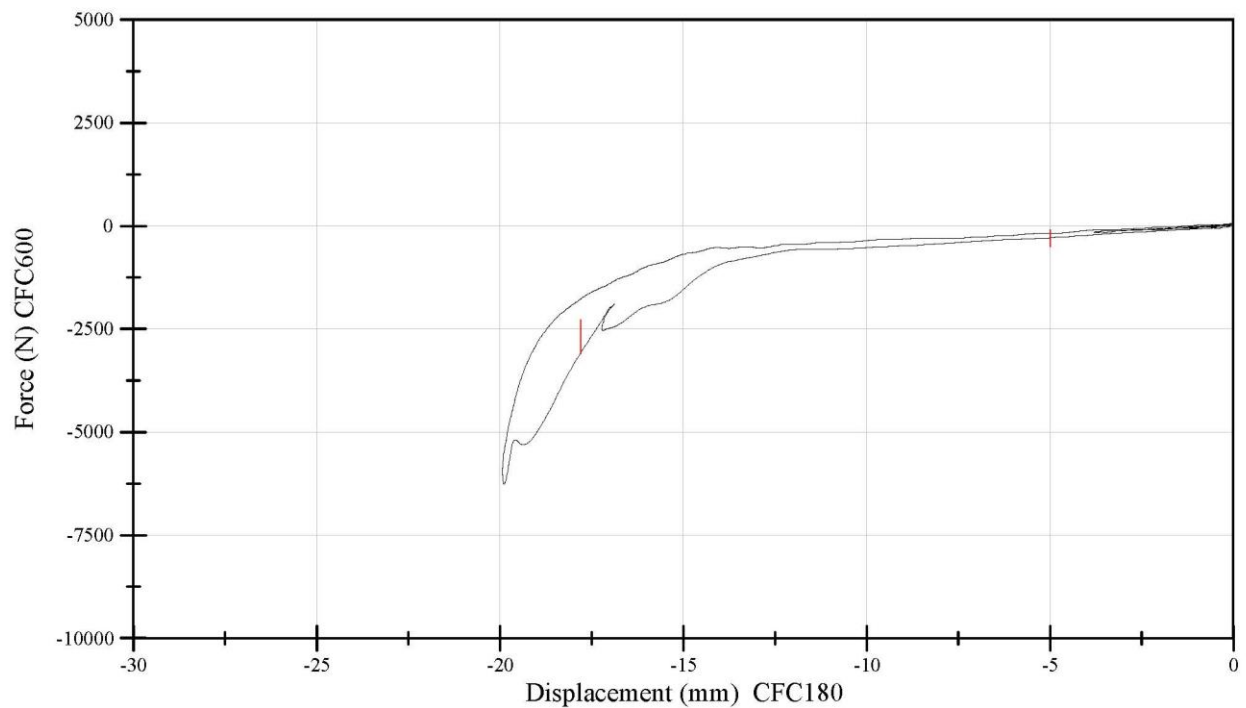


Software Version: 2.4

File Name: T015FERI150713-01_pro
07/13/2015 12:54:56.0000

Test Temperature: 70.2 degrees
Relative Humidity: 49%
Test Velocity: 2.77 m/s

THOR Left Knee Certification
Femur Force vs. Knee Displacement
Serial Number: D2103665B

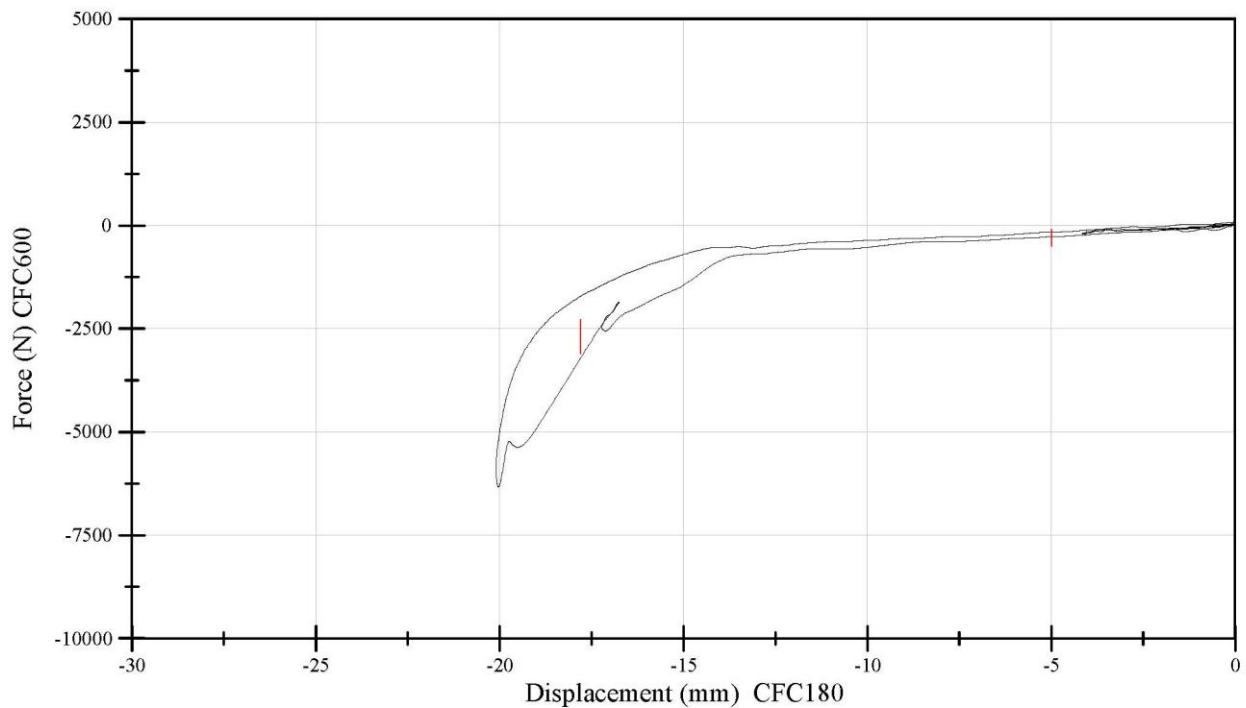


Software Version: 2.4

File Name: D2103665BKnee150407-01processed
04/07/2015 13:14:07.0000

Test Temperature: 71.4 degrees
Relative Humidity: 48%
Test Velocity: 2.77 m/s

THOR Right Knee Certification
Femur Force vs. Knee Displacement
Serial Number: D2103657B



Software Version: 2.4

File Name: D2103657BKnee150407-01
01/01/0000 00:00:00.0000

ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

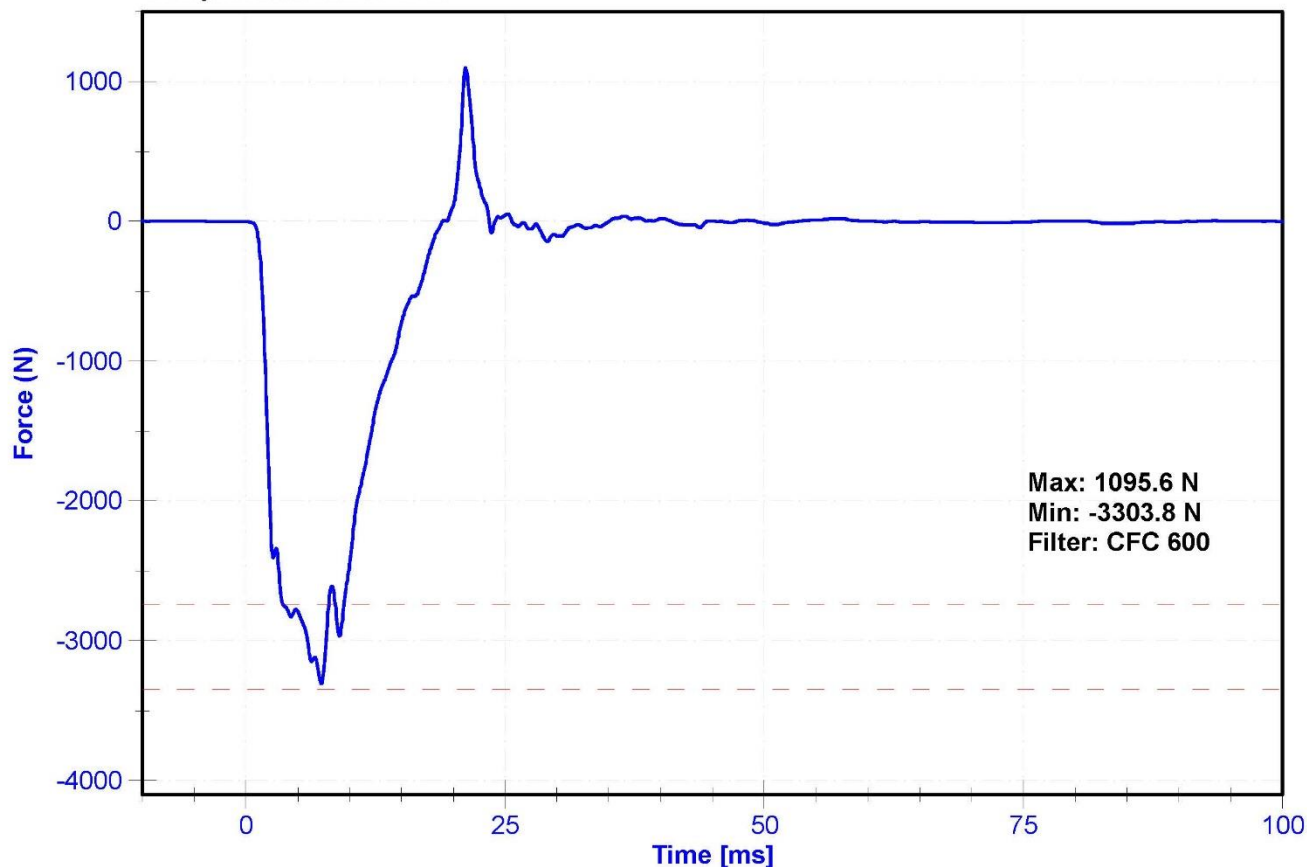
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	26.9	Pass
Velocity	3.9	4.1	m/s	4.071	Pass
Lower Tibia Compressive Force	-3346	-2738	N	-3303.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	8/27/2015	2/26/2016
Lower Tibia Load Cell	Denton 4929J	LC-78 Fz	2/20/2016	2/19/2017

Compressive Tibia Force





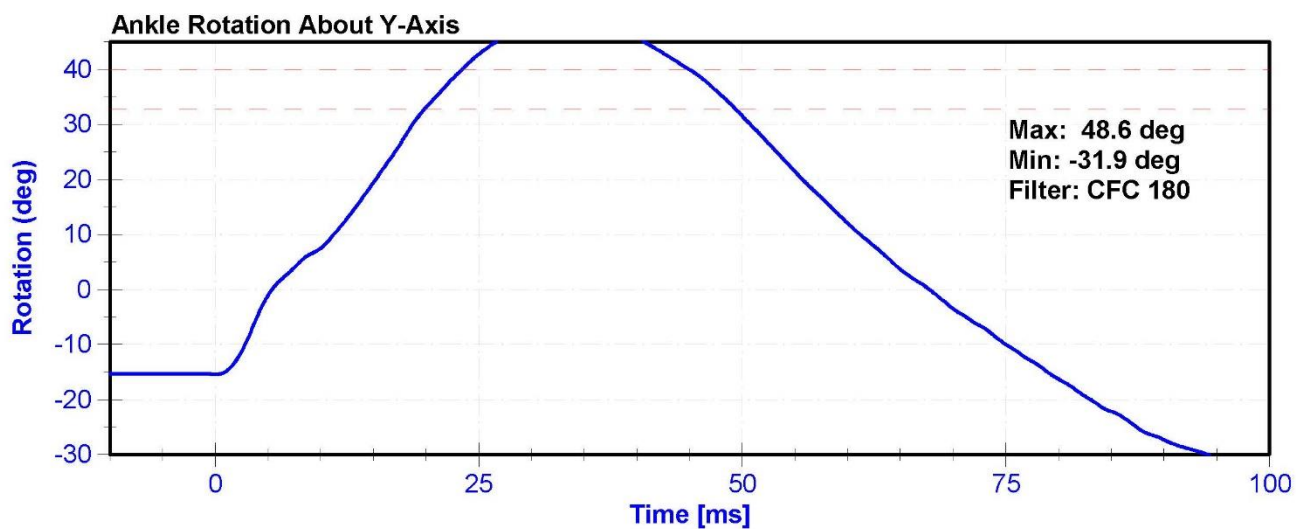
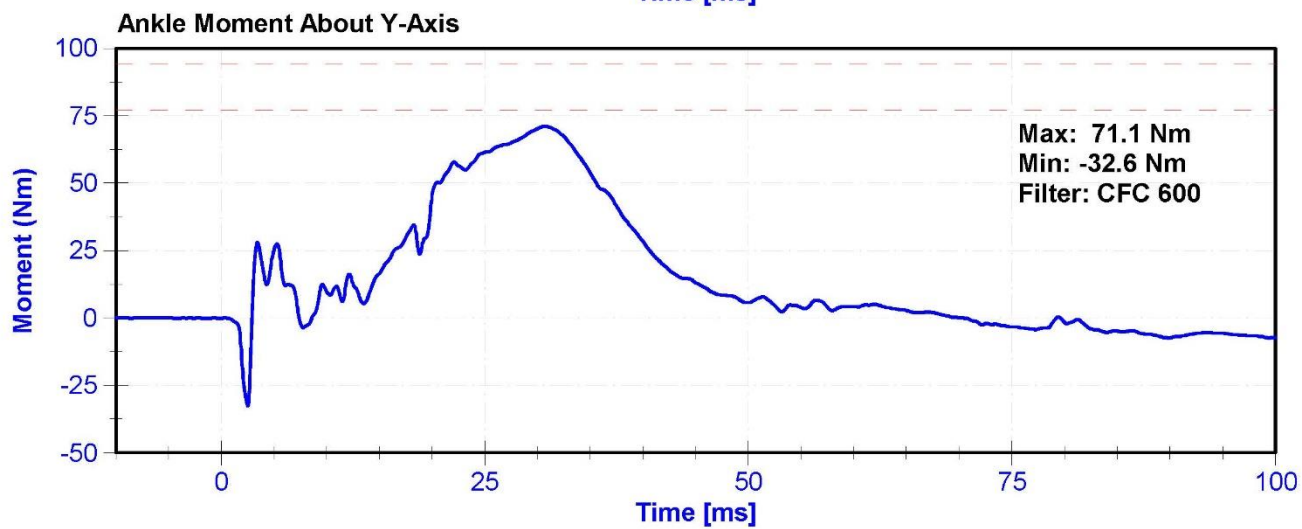
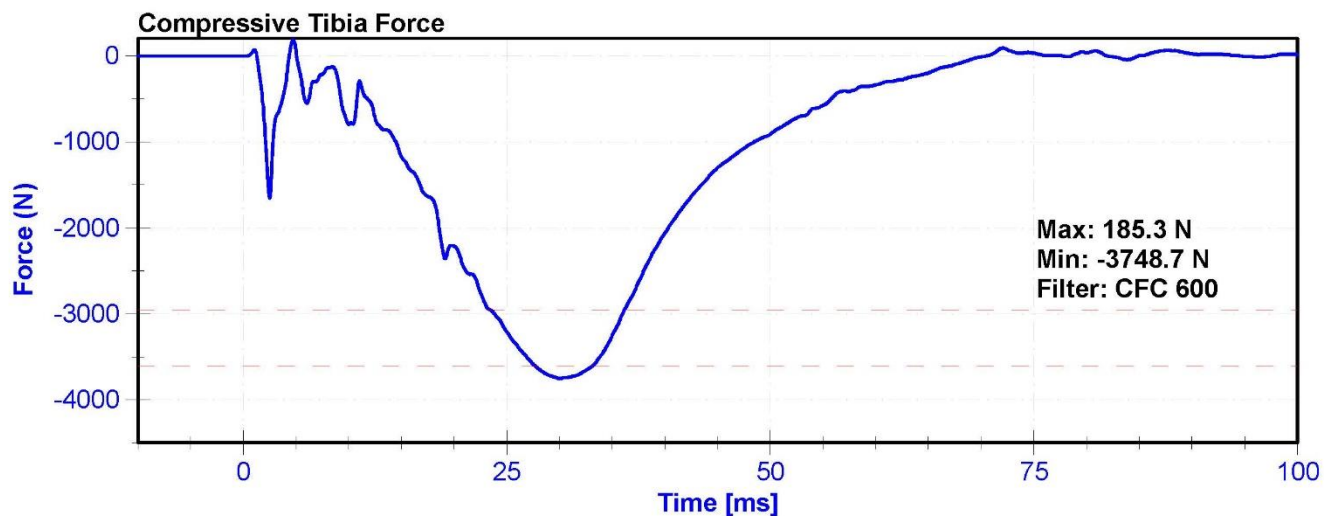
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	27.2	Pass
Velocity	4.9	5.1	m/s	4.961	Pass
Lower Tibia Compressive Force	-3613	-2956	N	-3748.7	Fail
Peak Moment about Y-Axis	77.1	94.2	Nm	71.07	Fail
Peak Rotation about Y-Axis	32.7	39.9	deg	48.60	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	8/27/2015	2/26/2016
Lower Tibia Load Cell	Denton 4929J	LC-78 Fz	2/20/2016	2/19/2017
Ankle Y Potentiometer	Contelec PD210-4B	DS-0386	3/2/2015	3/1/2016





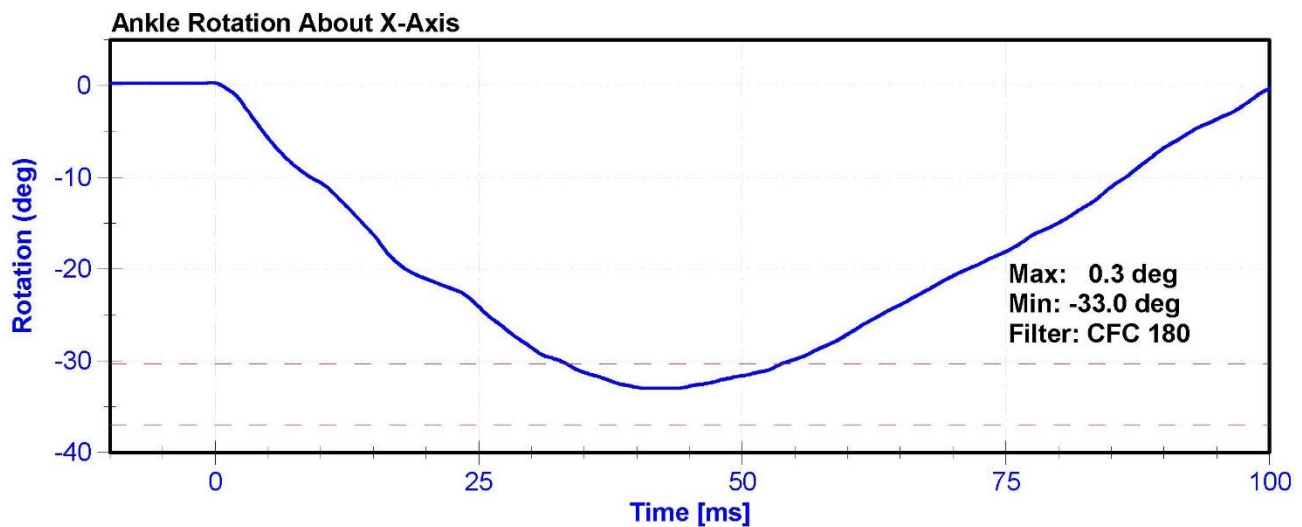
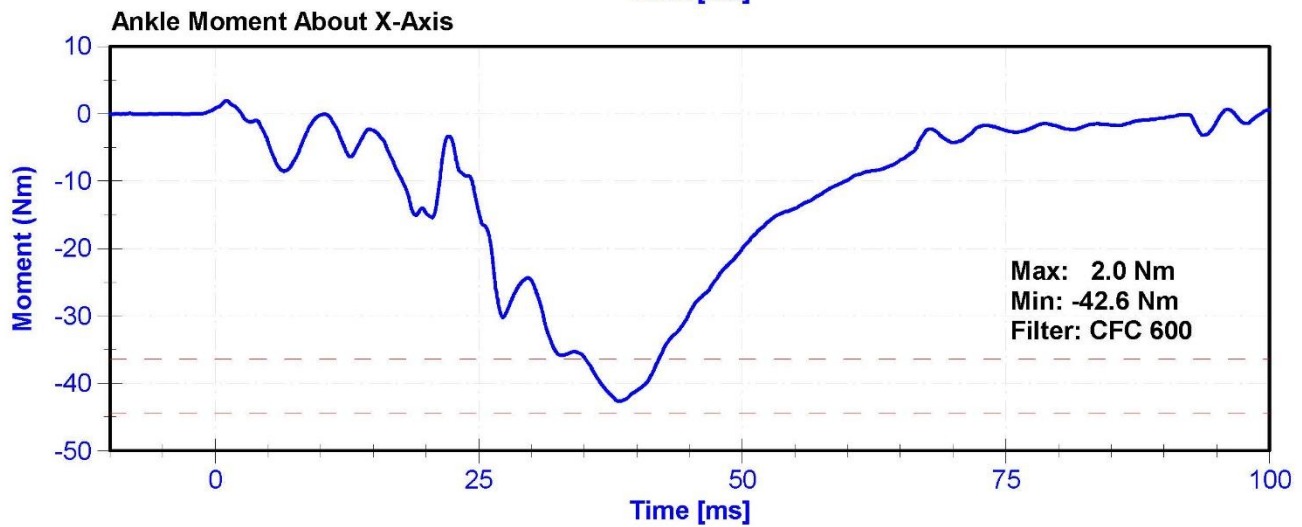
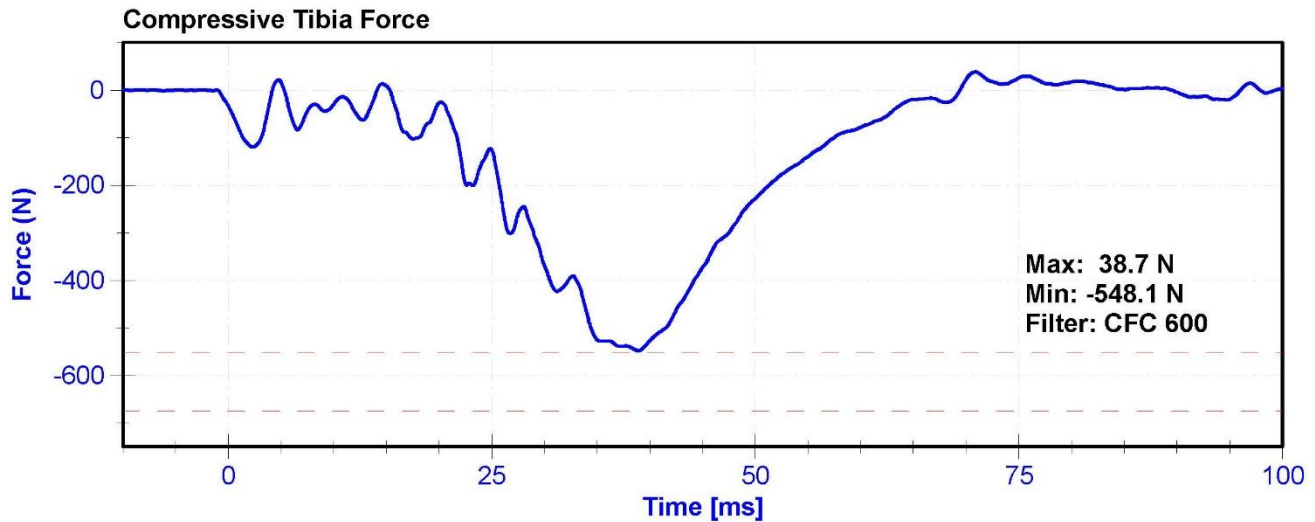
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	27.9	Pass
Velocity	1.9	2.1	m/s	1.907	Pass
Lower Tibia Compressive Force	-675	-552	N	-548.1	Fail
Peak Moment about X-Axis	-44.4	-36.3	Nm	-42.62	Pass
Peak Rotation about X-Axis	-37.0	-30.3	deg	-32.99	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	8/27/2015	2/26/2016
Lower Tibia Load Cell	Denton 4929J	LC-78 Fz	2/20/2016	2/19/2017
Ankle Y Potentiometer	Contelec PD210-4B	DS-0382	3/2/2015	3/1/2016





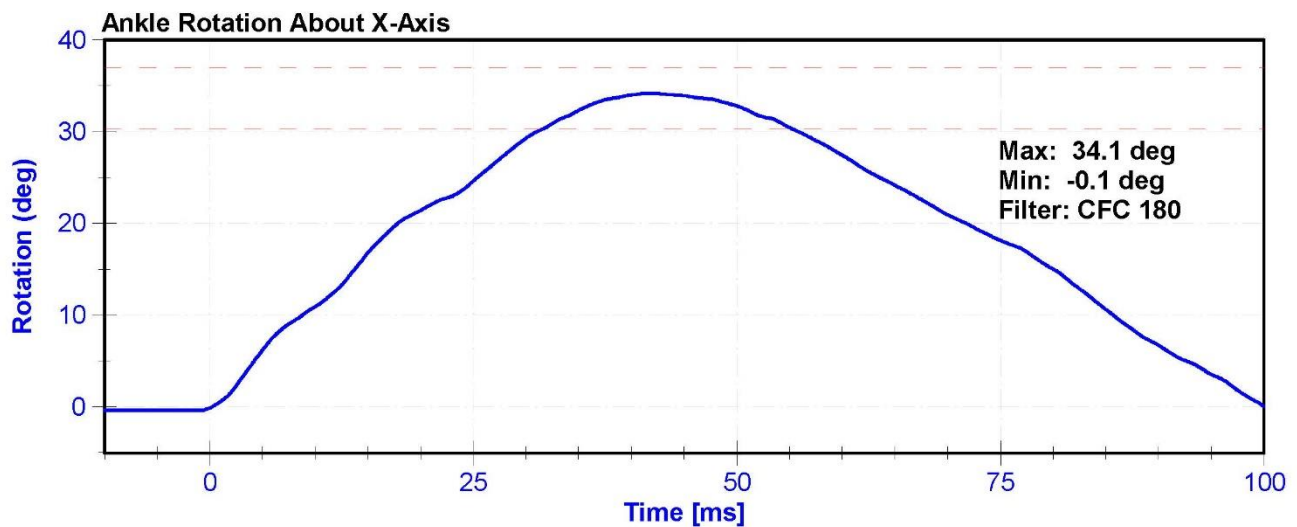
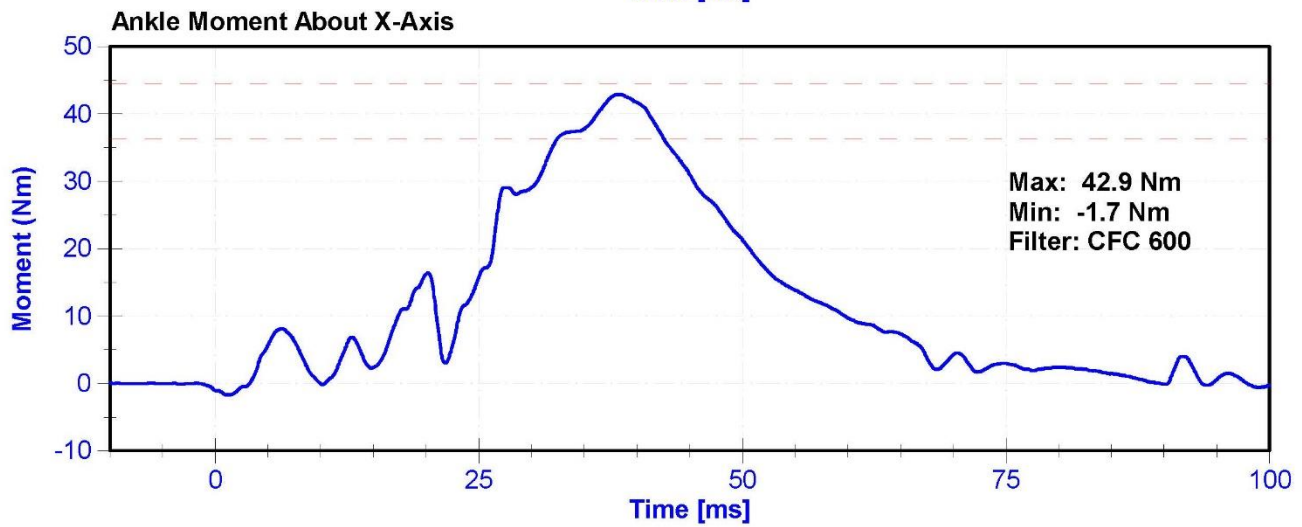
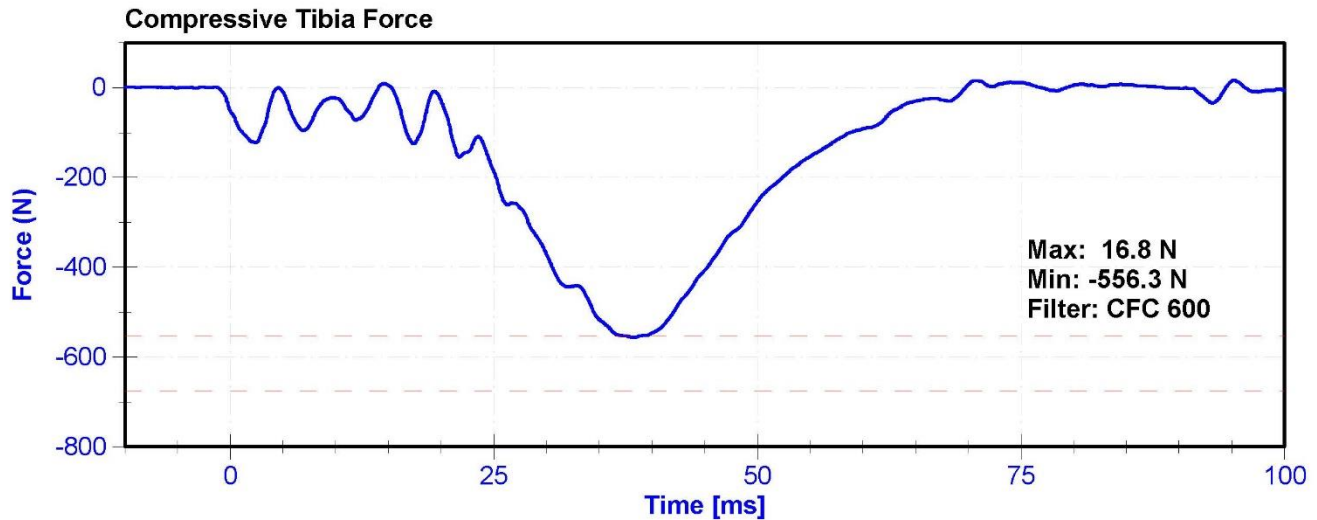
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	28.3	Pass
Velocity	1.9	2.1	m/s	1.936	Pass
Lower Tibia Compressive Force	-675	-552	N	-556.3	Pass
Peak Moment about X-Axis	36.3	44.4	Nm	42.90	Pass
Peak Rotation about X-Axis	30.3	37.0	deg	34.13	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	8/27/2015	2/26/2016
Lower Tibia Load Cell	Denton 4929J	LC-78 Fz	2/20/2016	2/19/2017
Ankle Y Potentiometer	Contelec PD210-4B	DS-0382	3/2/2015	3/1/2016





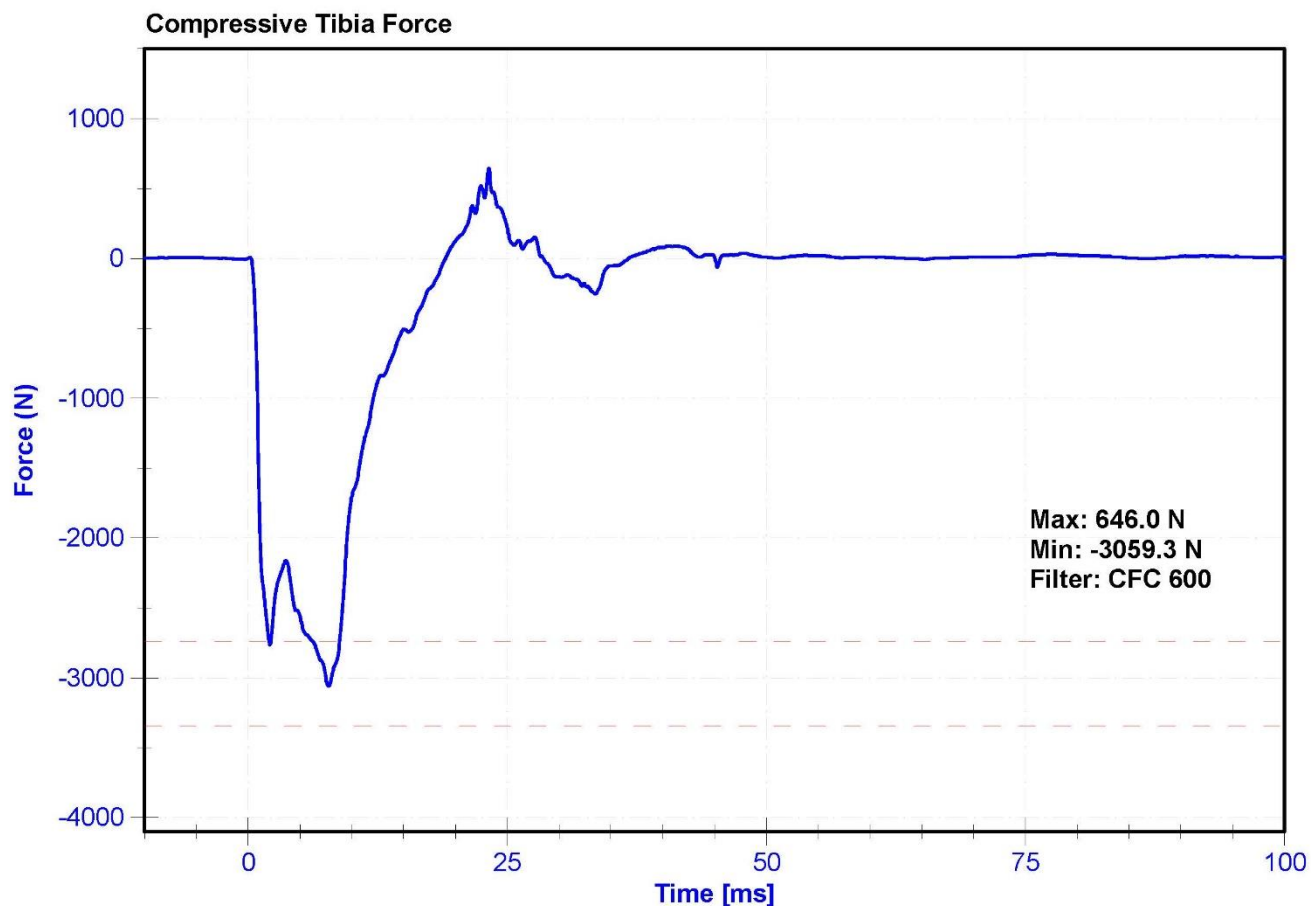
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	21.1	Pass
Velocity	3.9	4.1	m/s	4.045	Pass
Lower Tibia Compressive Force	-3346	-2738	N	-3059.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	8/27/2015	2/26/2016
Lower Tibia Load Cell	Denton 4929J	LC-77 Fz	2/20/2016	2/19/2017





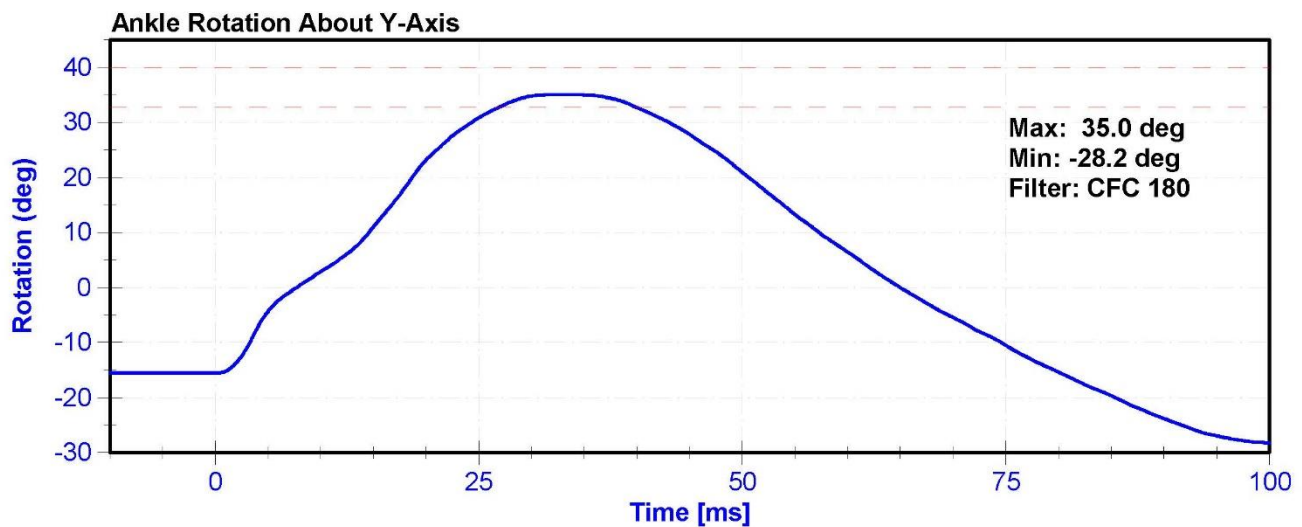
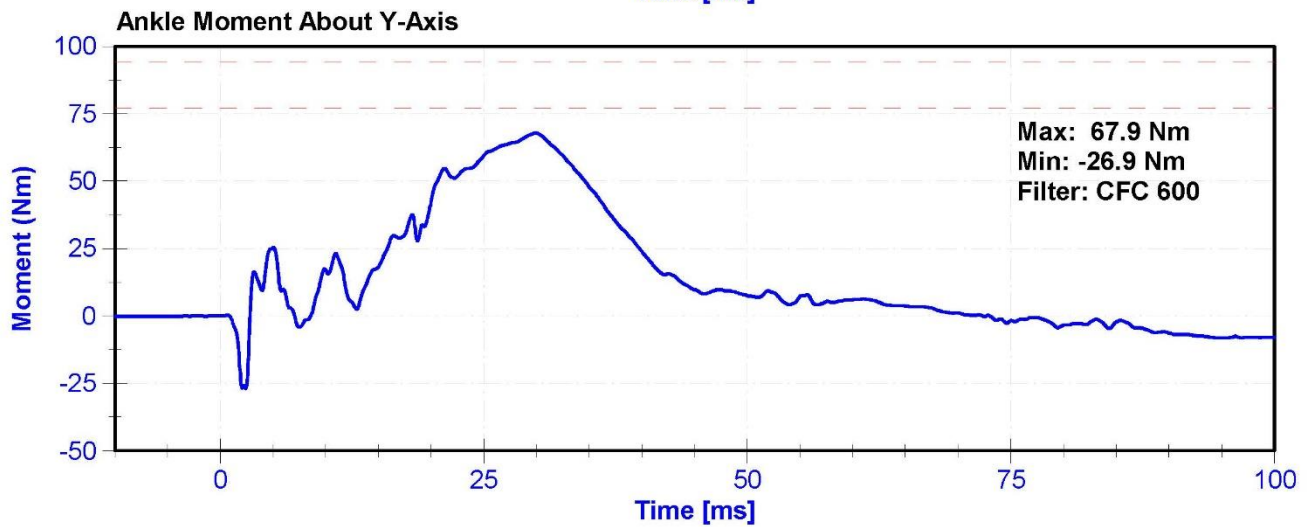
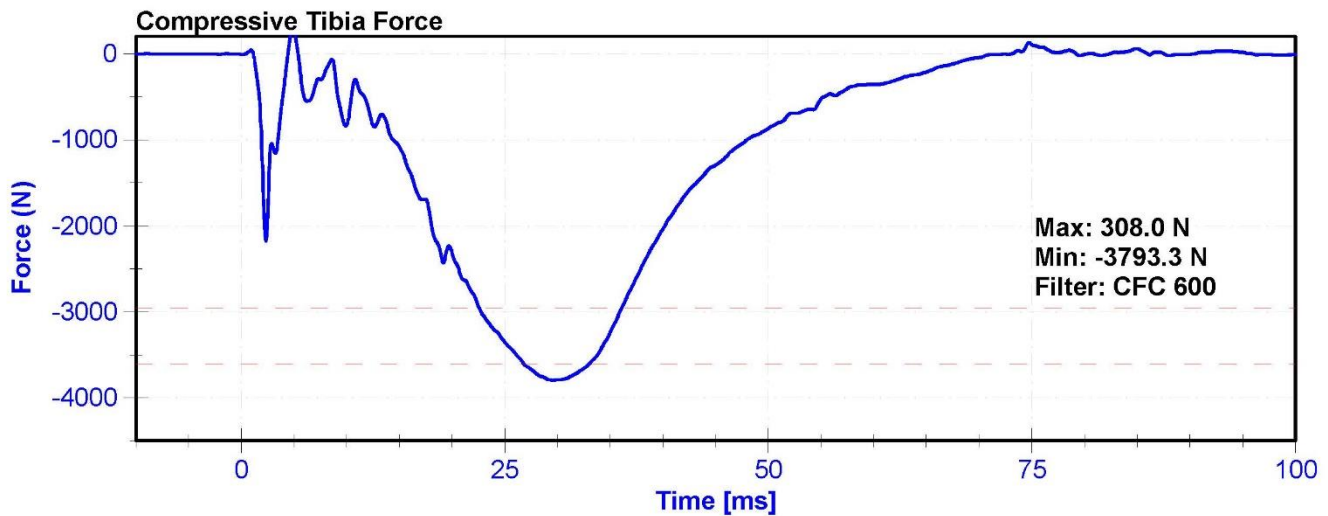
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	23.9	Pass
Velocity	4.9	5.1	m/s	4.961	Pass
Lower Tibia Compressive Force	-3613	-2956	N	-3793.3	Fail
Peak Moment about Y-Axis	77.1	94.2	Nm	67.86	Fail
Peak Rotation about Y-Axis	32.7	39.9	deg	35.03	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	8/27/2015	2/26/2016
Lower Tibia Load Cell	Denton 4929J	LC-77 Fz	2/20/2016	2/19/2017
Ankle Y Potentiometer	Contelec PD210-4B	DS-0383	2/27/2015	2/27/2016





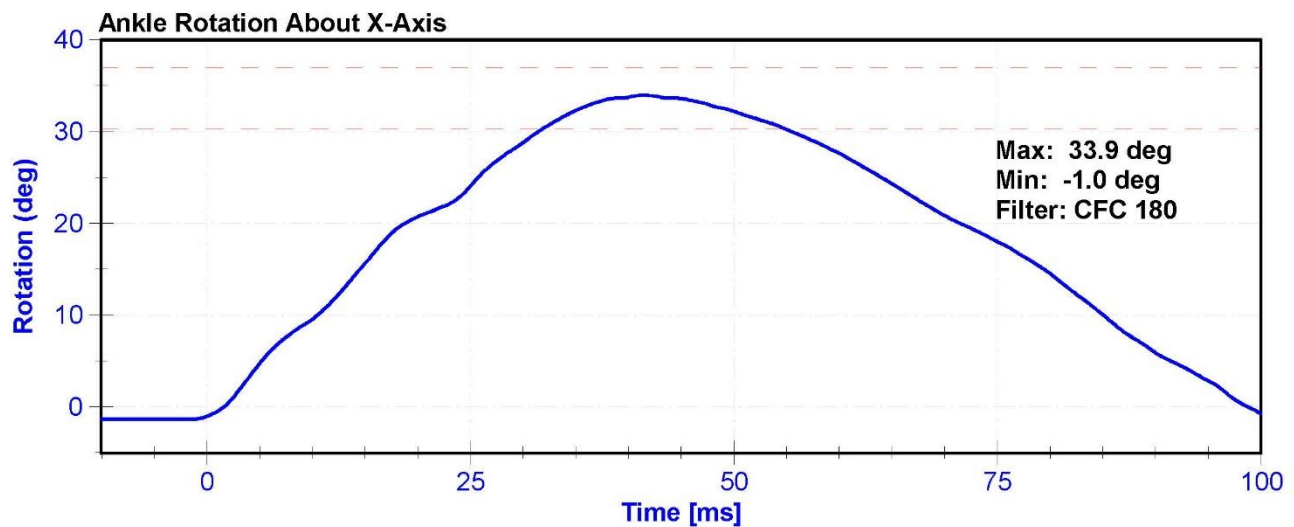
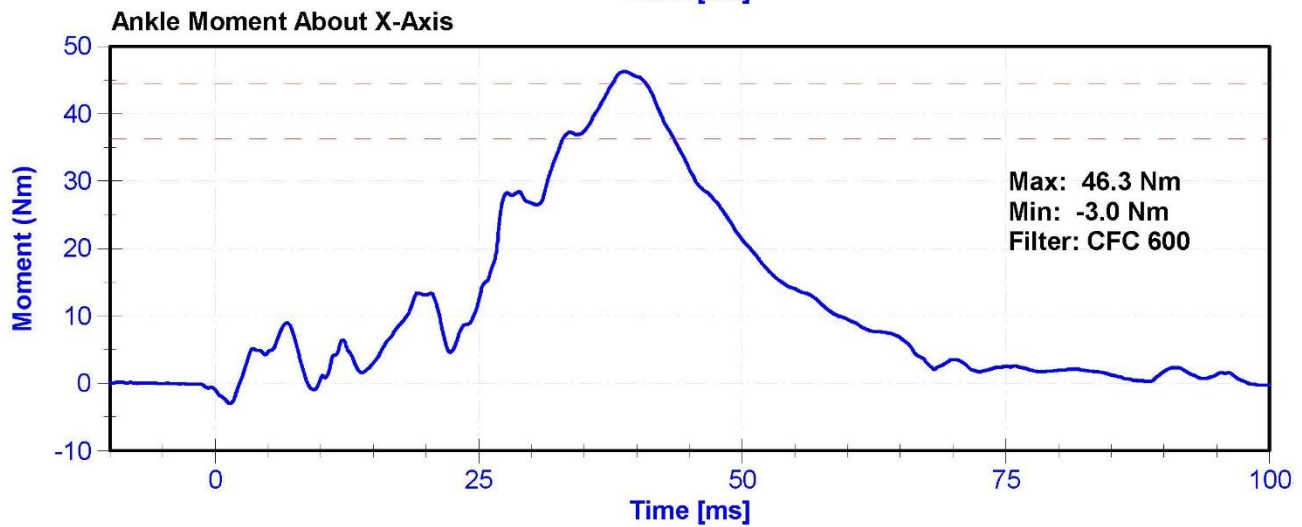
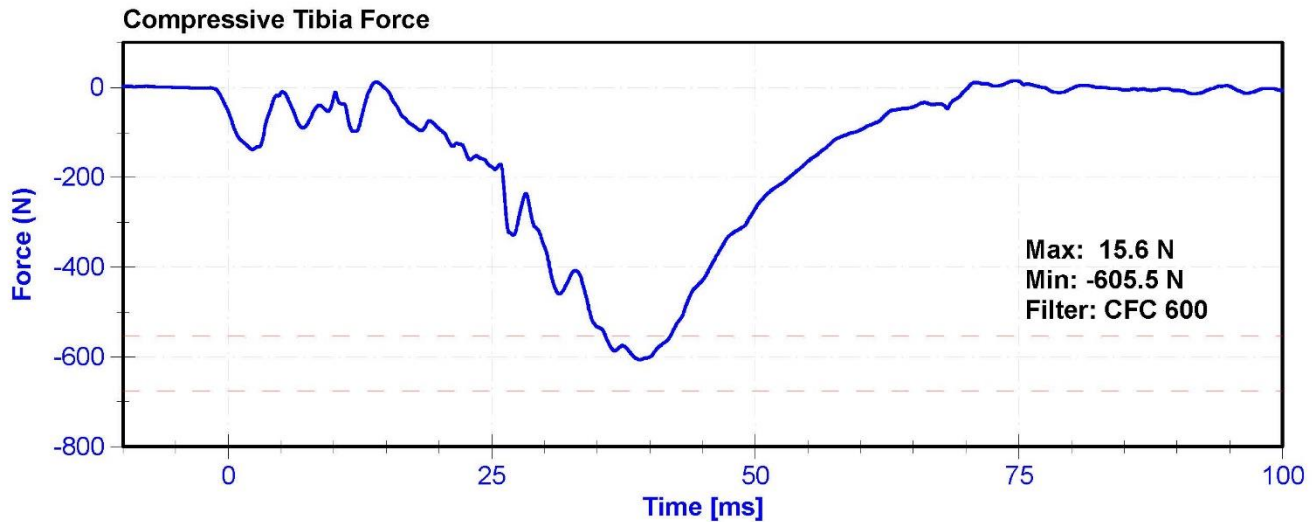
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	25.8	Pass
Velocity	1.9	2.1	m/s	1.924	Pass
Lower Tibia Compressive Force	-675	-552	N	-605.5	Pass
Peak Moment about X-Axis	36.3	44.4	Nm	46.29	Fail
Peak Rotation about X-Axis	30.3	37.0	deg	33.94	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	8/27/2015	2/26/2016
Lower Tibia Load Cell	Denton 4929J	LC-77 Fz	2/20/2016	2/19/2017
Ankle Y Potentiometer	Contelec PD210-4B	DS-0385	2/27/2015	2/27/2016





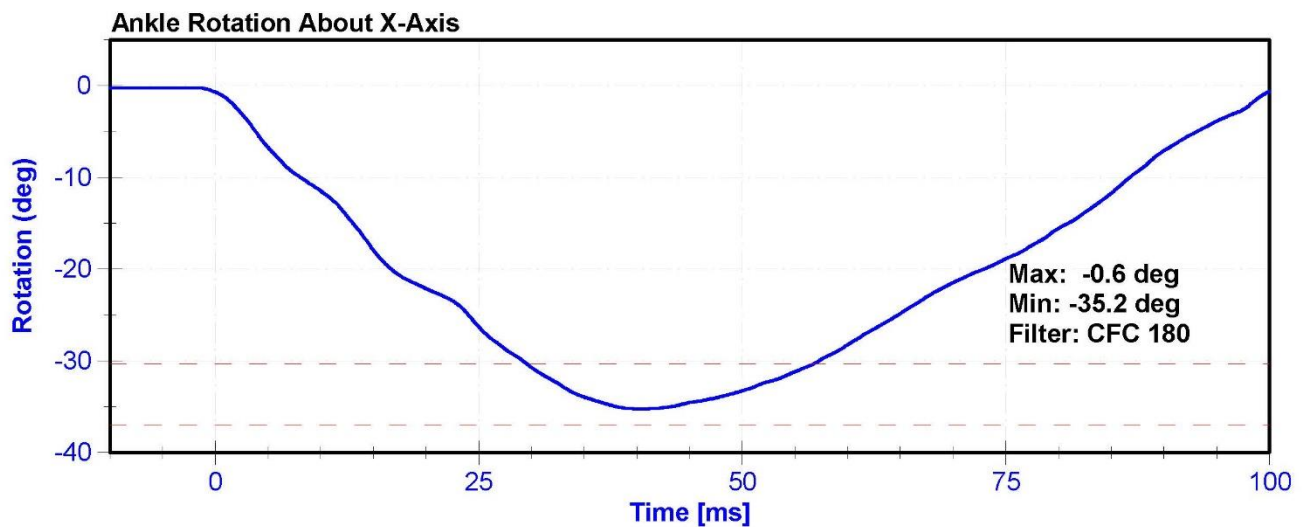
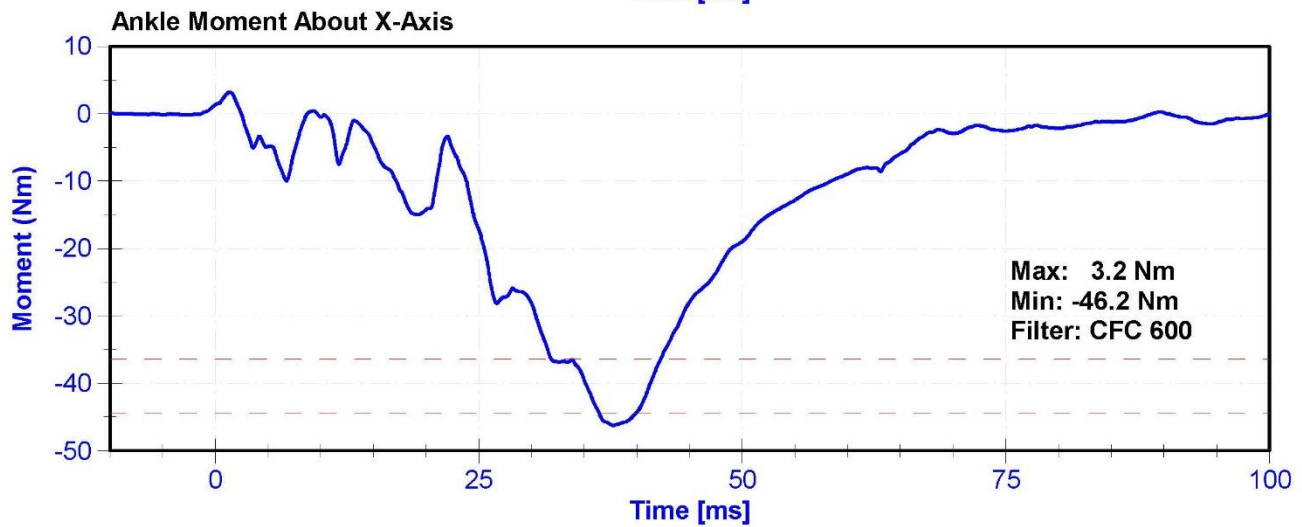
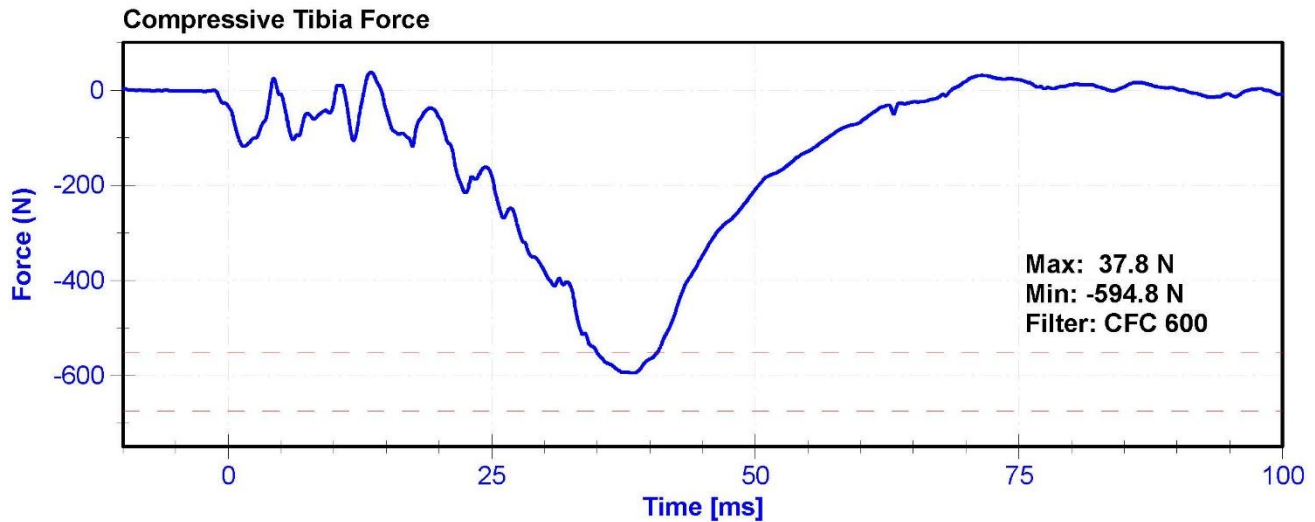
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	25.7	Pass
Velocity	1.9	2.1	m/s	1.936	Pass
Lower Tibia Compressive Force	-675	-552	N	-594.8	Pass
Peak Moment about X-Axis	-44.4	-36.3	Nm	-46.20	Fail
Peak Rotation about X-Axis	-37.0	-30.3	deg	-35.22	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	8/27/2015	2/26/2016
Lower Tibia Load Cell	Denton 4929J	LC-77 Fz	2/20/2016	2/19/2017
Ankle Y Potentiometer	Contelec PD210-4B	DS-0385	2/27/2015	2/27/2016

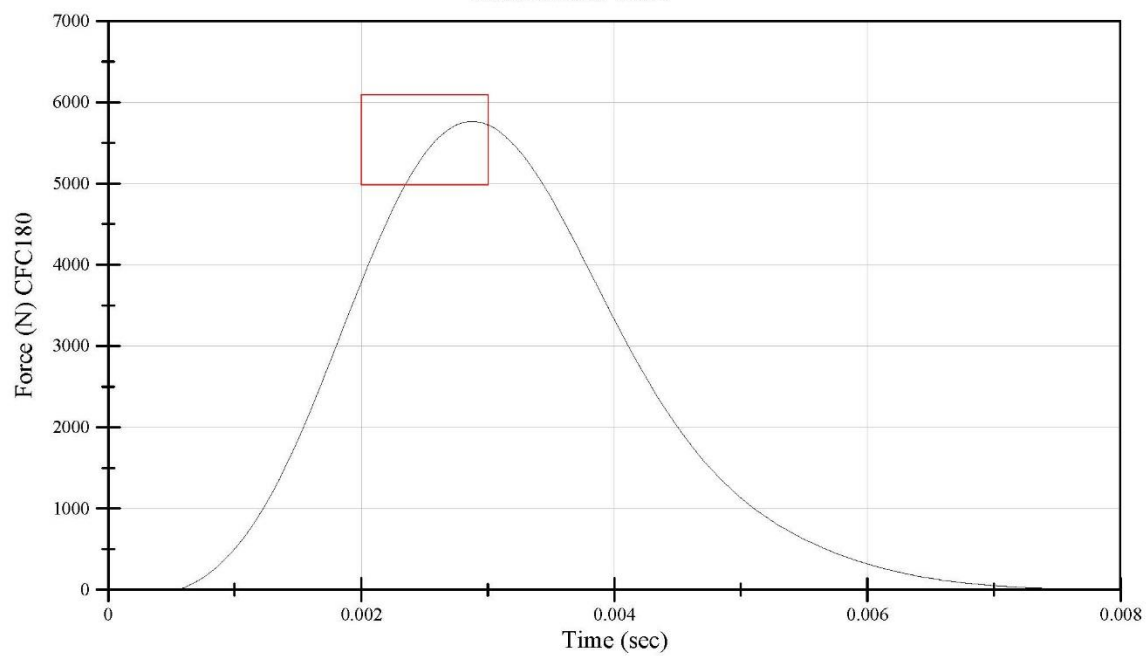


50% ADULT MALE THOR016 DUMMY CALIBRATIONS

Test Temperature: 69.8 degrees
Relative Humidity: 53%
Test Velocity: 1.98 m/s

THOR Head Impact Certification

Probe Force
Serial Number: T0016



Software Version: 2.4

File Name: T0016HEAD150813-03_pro tdms
08/13/2015 12:52:18.0000

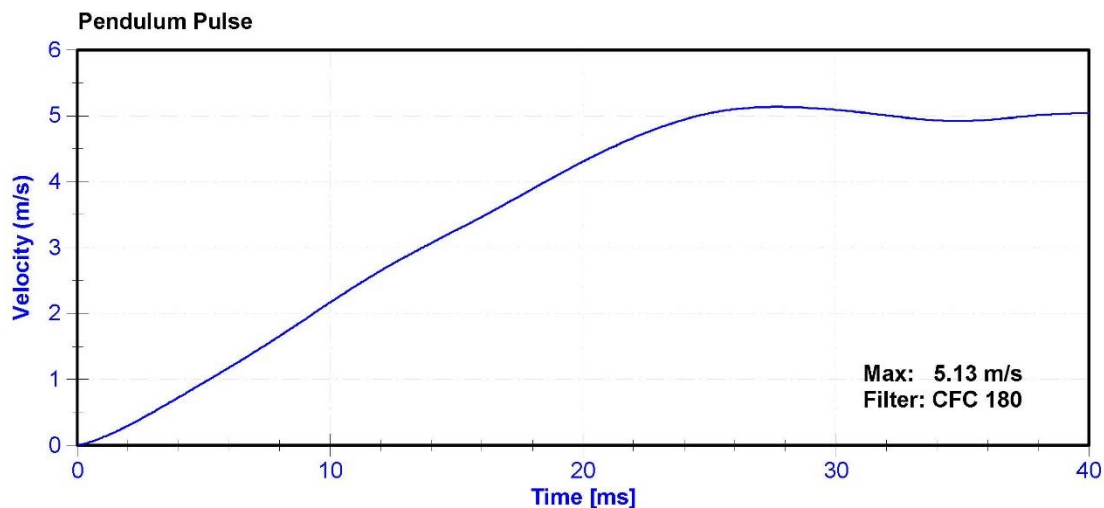
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	016	Laboratory Supervisor	M. Goehle

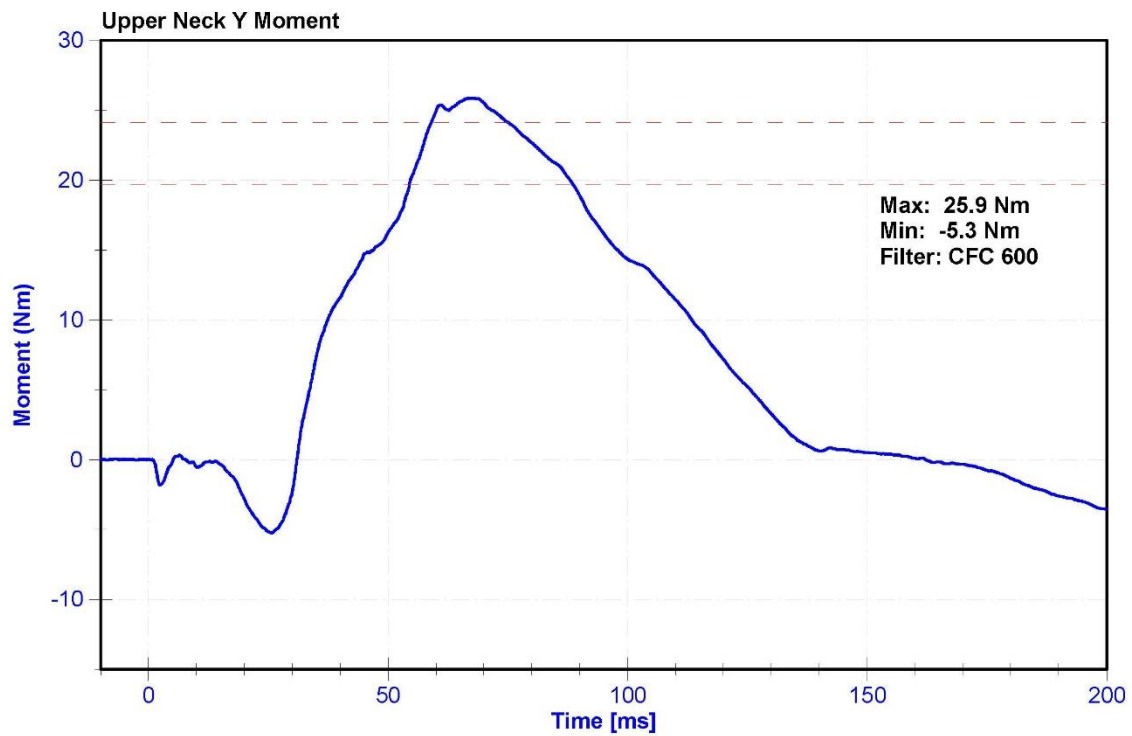
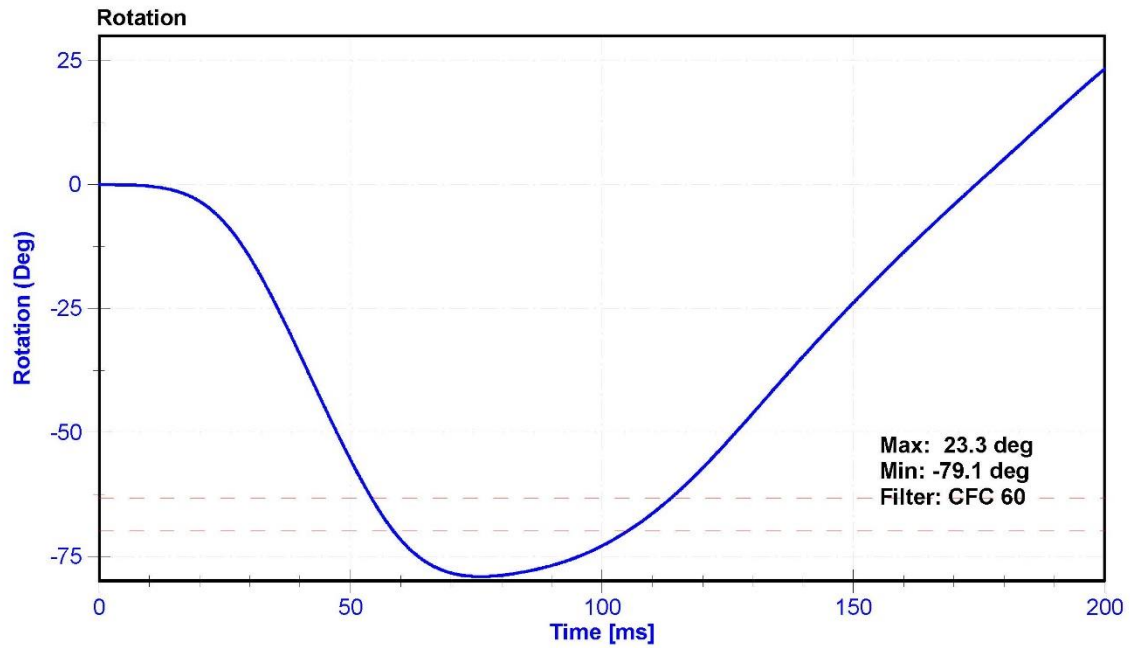
Results

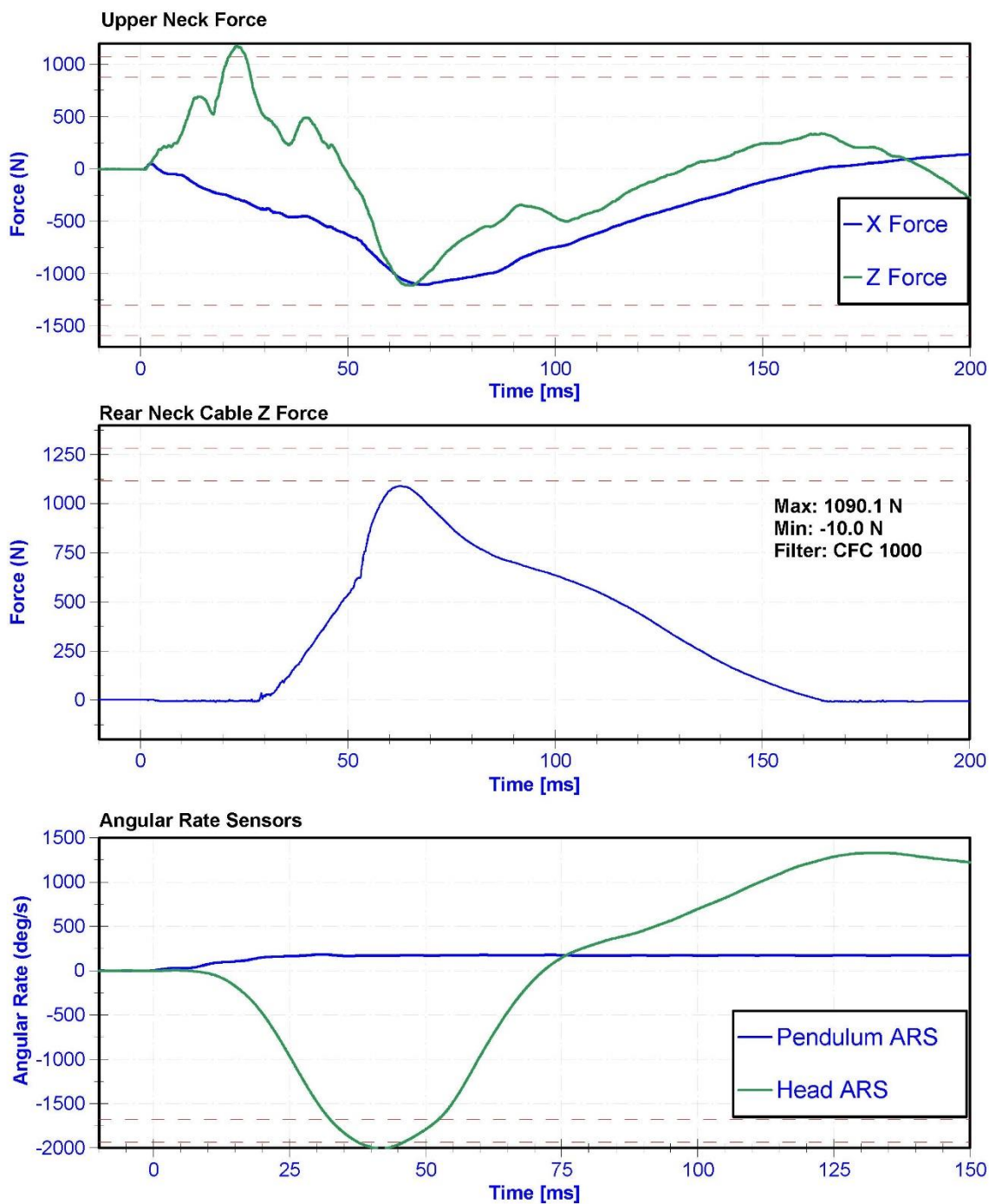
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	24.9	Pass
Velocity	4.95	5.05	m/s	4.955	Pass
Pendulum Impulse at 8ms	1.49	1.85	m/s	1.658	Pass
Pendulum Impulse at 16ms	3.08	3.86	m/s	3.467	Pass
Pendulum Impulse at 24ms	4.48	5.26	m/s	4.942	Pass
Peak Upper Neck Y Moment	19.7	24.1	Nm	25.89	Fail
Peak Upper Neck X Force	-1592	-1302	N	-1105.3	Fail
Maximum Upper Neck Z Force	877	1072	N	1178.1	Fail
First Peak Rear Neck Cable Force	1115	1282	N	1090.1	Fail
Peak Head Y Angular Rate	-1935	-1675	deg/s	-2002.9	Fail
Peak Head Y Rotation	-69.9	-63.3	deg	-79.10	Fail
Rotation Decay Time to Zero	83.0	86.2	ms	98.60	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Upper Neck Load Cell	Humanetics 3454J	LC-75Fx	2/24/2016	2/23/2017
Rear Neck Cable Load Cell	Humanetics 6005	LC-DM2829Fz	2/23/2016	2/22/2017
Pendulum ARS	DTS ARS-PRO-8K	ARS-6419	1/19/2016	1/18/2017
Head Y ARS	DTS ARS 18K	ARS-4735	2/24/2016	2/23/2017







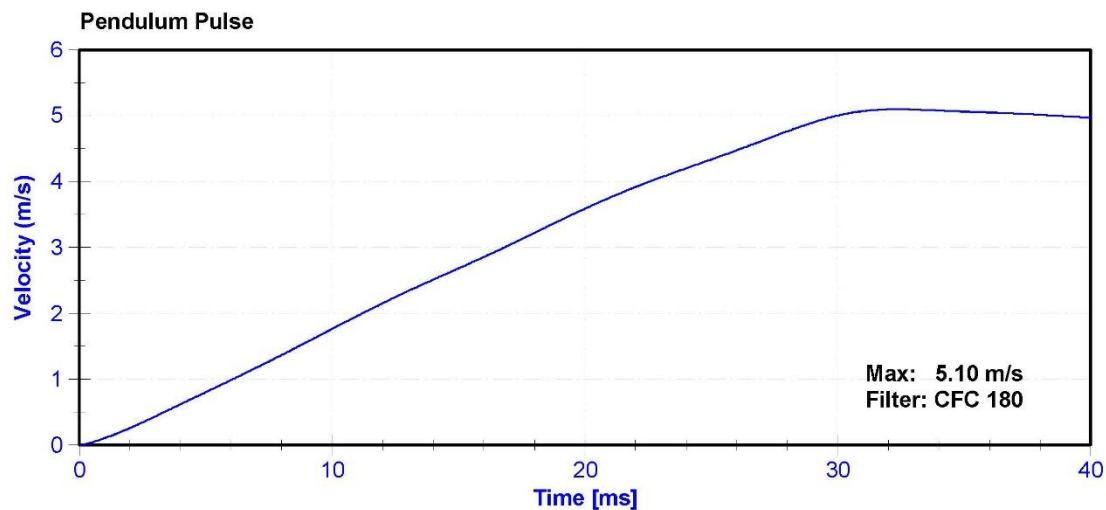
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	016	Laboratory Supervisor	M. Goehle

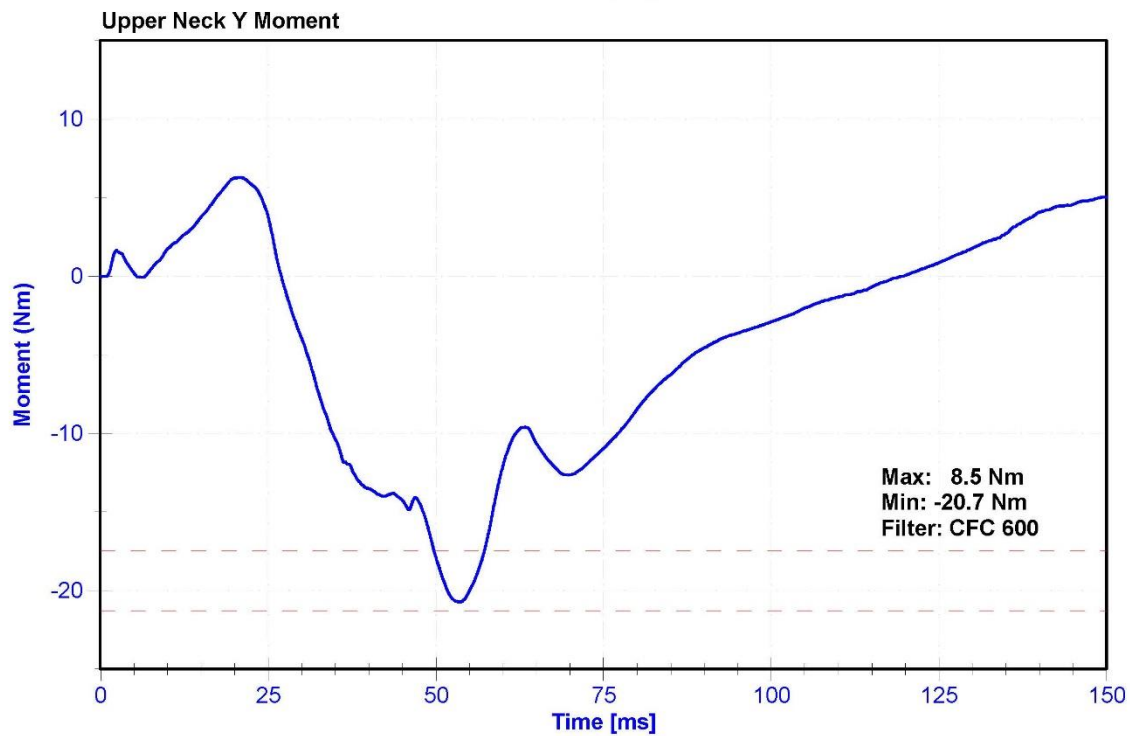
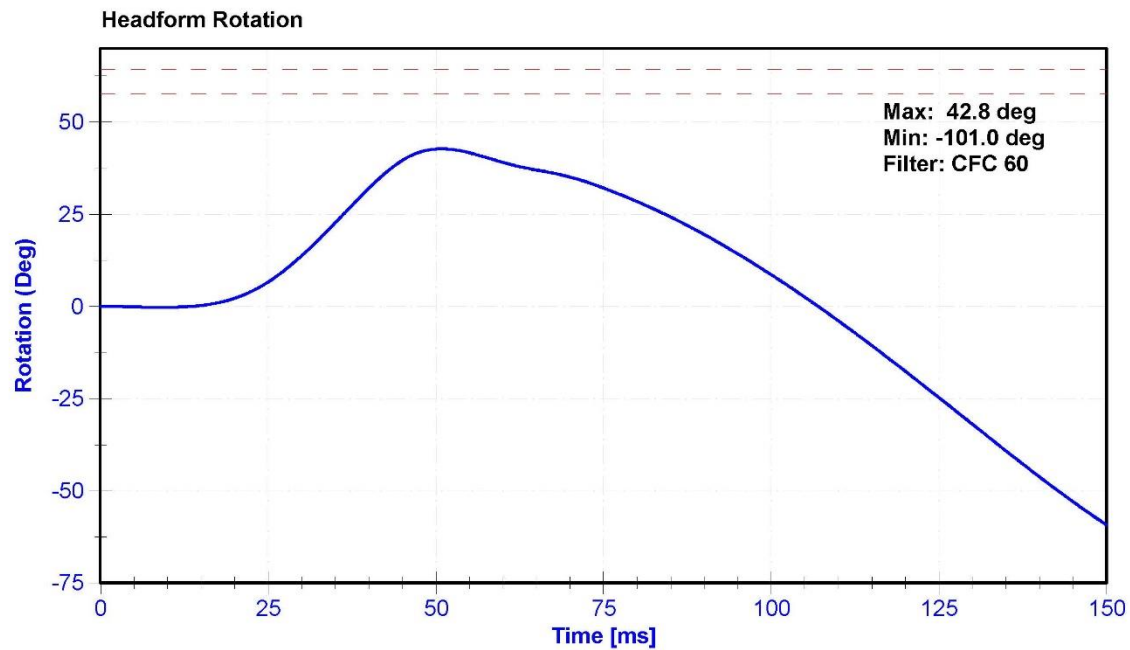
Results

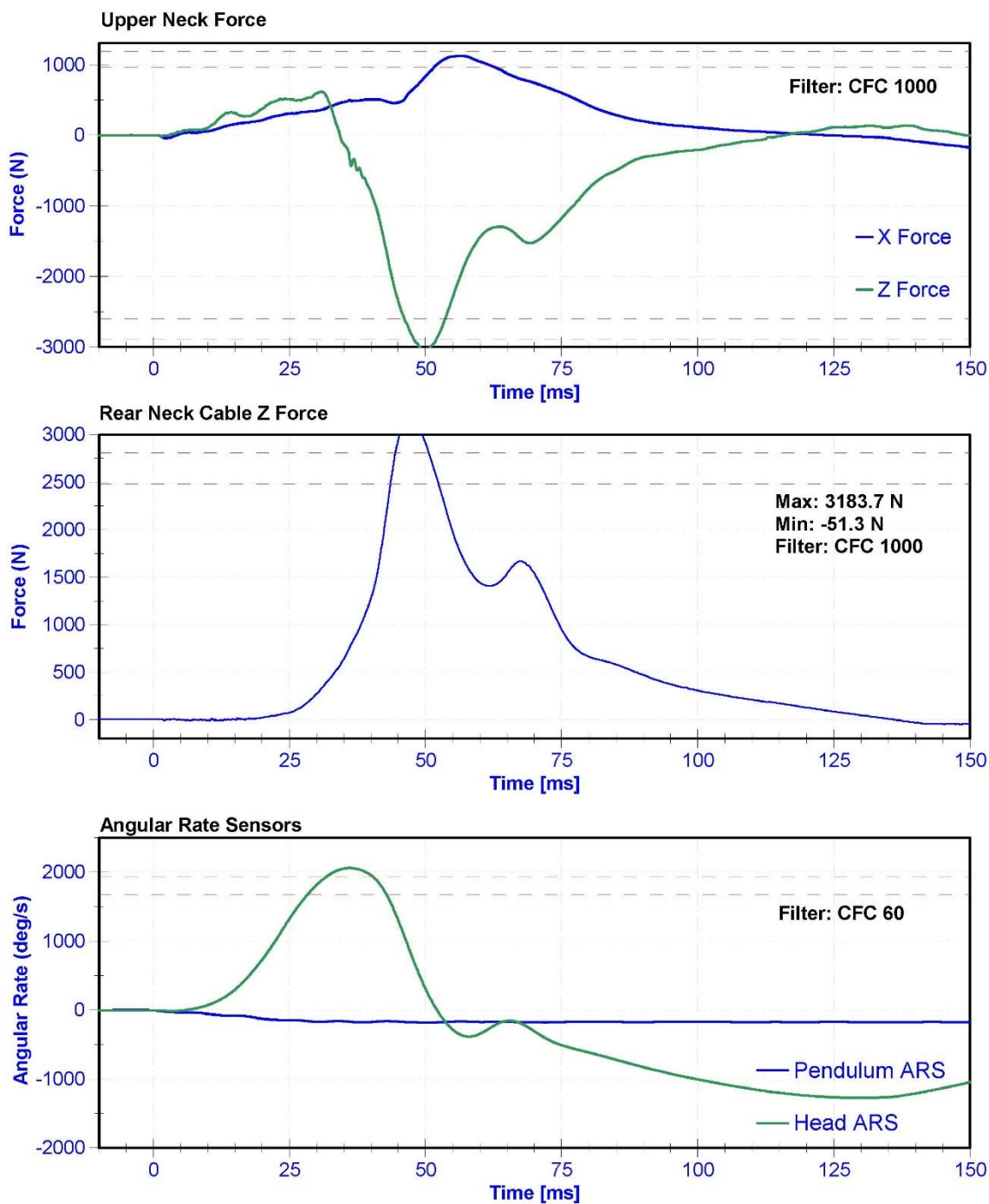
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	24.4	Pass
Velocity	4.95	5.05	m/s	4.985	Pass
Pendulum Impulse at 10ms	1.76	1.91	m/s	1.764	Pass
Pendulum Impulse at 20ms	3.50	3.75	m/s	3.588	Pass
Pendulum Impulse at 30ms	4.88	5.20	m/s	5.001	Pass
Peak Upper Neck Y Moment	-21.3	-17.5	Nm	-20.73	Pass
Peak Upper Neck X Force	967	1182	N	1123.1	Pass
Peak Upper Neck Z Force	-2893	-2603	N	-3030.1	Fail
Peak Front Neck Cable Force	2482	2809	N	3183.7	Fail
Peak Head Y Angular Rate	1907	2043	deg/s	2059.2	Fail
Peak Head Y Rotation	57.6	64.2	deg	42.76	Fail
Rotational Decay Time to Zero	79.3	82.5	ms	56.20	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Upper Neck Load Cell	Humanetics 3454J	LC-75Fx	2/24/2016	2/23/2017
Fr Neck Cable Load	Humanetics 6005	LC-130 Fz	2/23/2016	2/22/2017
Pendulum ARS	DTS ARS-PRO-8K	ARS-6419	1/19/2016	1/18/2017
Head ARS Y-Axis	DTS ARS 18K	ARS-4735	2/24/2016	2/23/2017







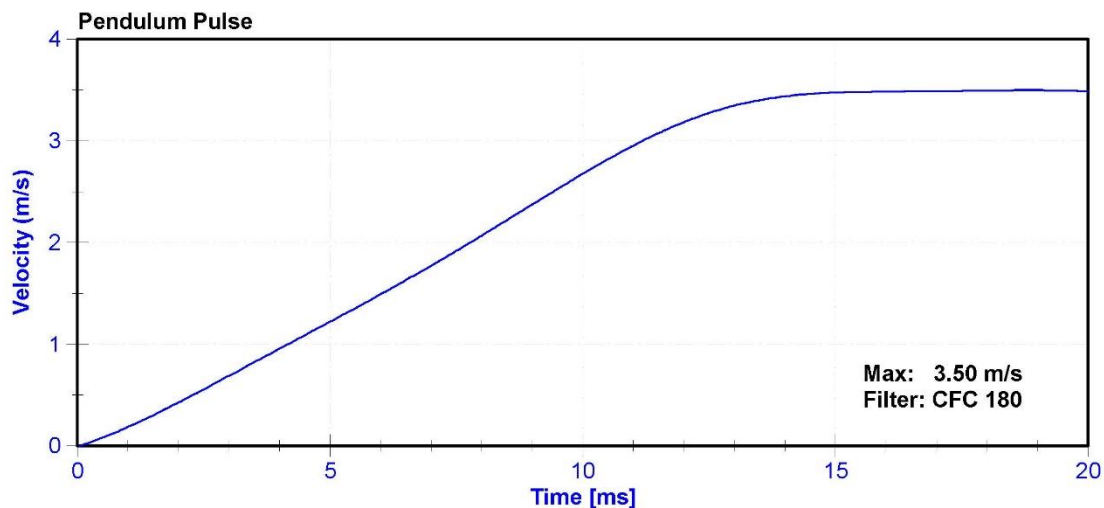
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	016	Laboratory Supervisor	M. Goehle

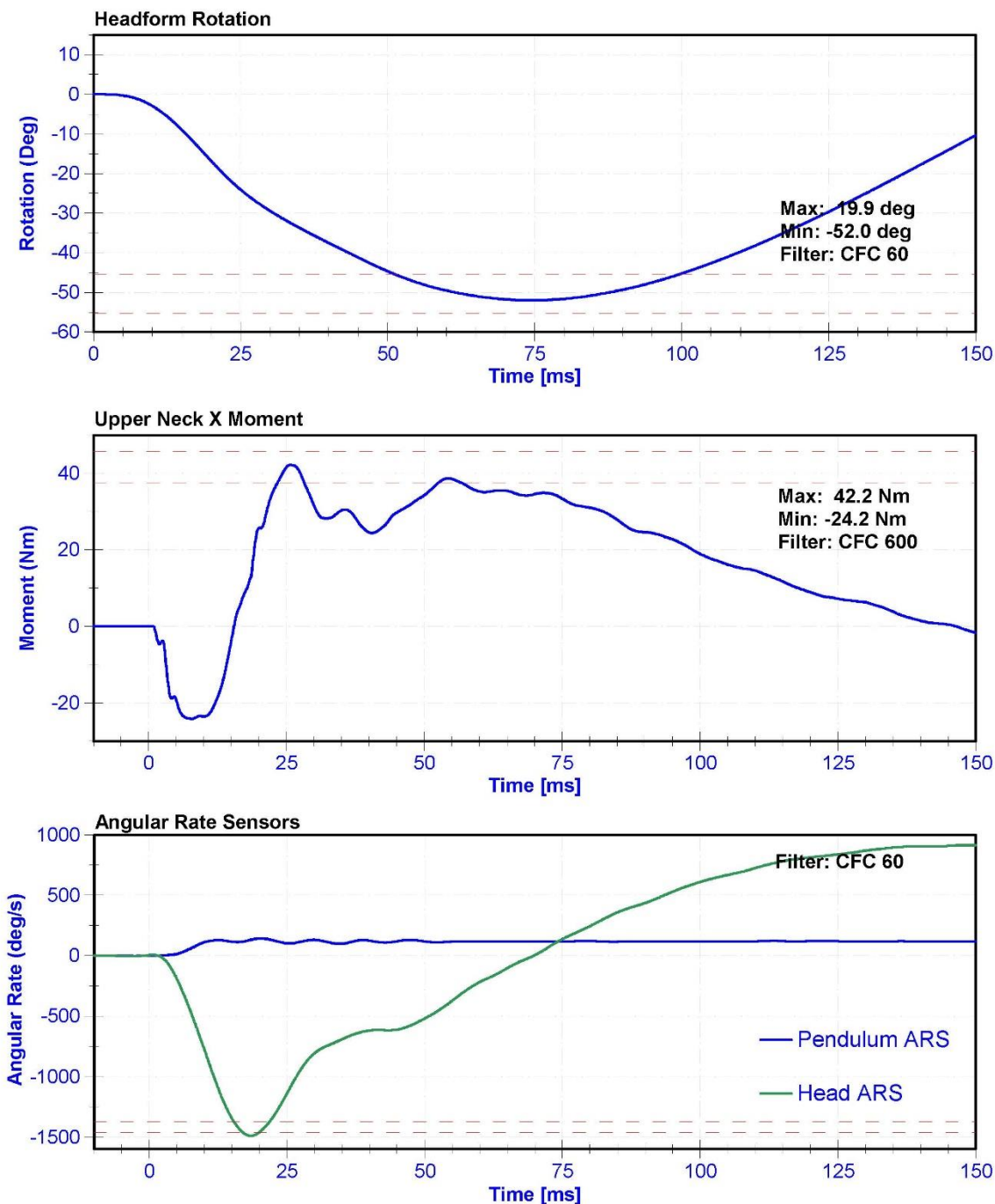
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.8	Pass
Humidity	10	70	%	25.5	Pass
Velocity	3.35	3.45	m/s	3.418	Pass
Pendulum Impulse at 4ms	0.89	1.08	m/s	0.956	Pass
Pendulum Impulse at 8ms	2.04	2.36	m/s	2.068	Pass
Pendulum Impulse at 12ms	3.21	3.46	m/s	3.184	Fail
Peak Upper Neck X Moment after 40ms	37.4	45.7	Nm	38.68	Pass
Peak Head X Angular Rate	-1462	-1375	deg/s	-1489.9	Fail
Peak Head X Rotation	-55.3	-45.4	deg	-52.00	Pass
Rotational Decay Time to Zero	83.7	90.9	ms	88.70	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Upper Neck Load Cell	Humanetics 3454J	LC-75Mx	2/24/2016	2/23/2017
Pendulum ARS	DTS ARS-PRO-8K	ARS-6419	1/19/2016	1/18/2017
Head X ARS	DTS ARS 18K	ARS-6629	2/24/2016	2/23/2017





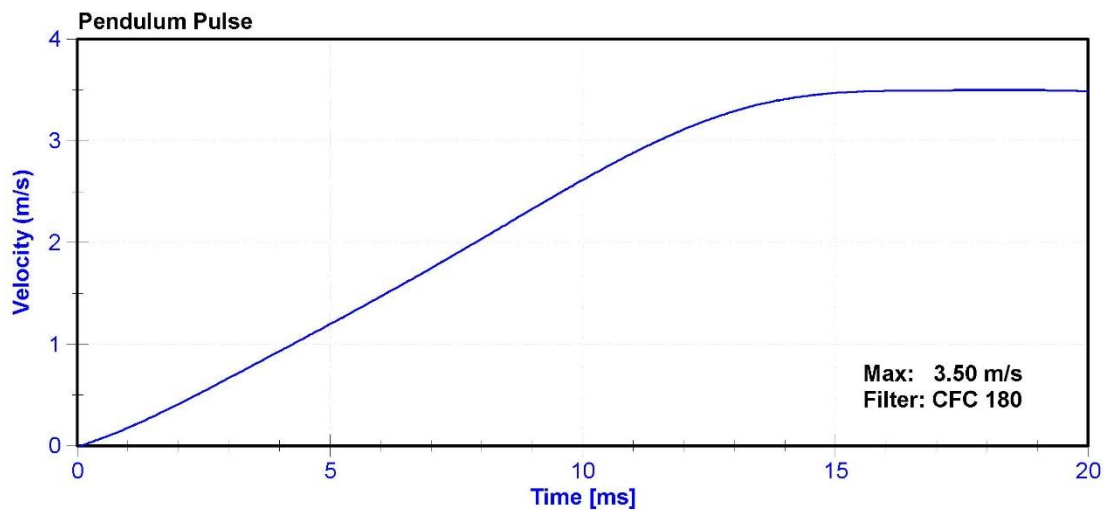
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	016	Laboratory Supervisor	M. Goehle

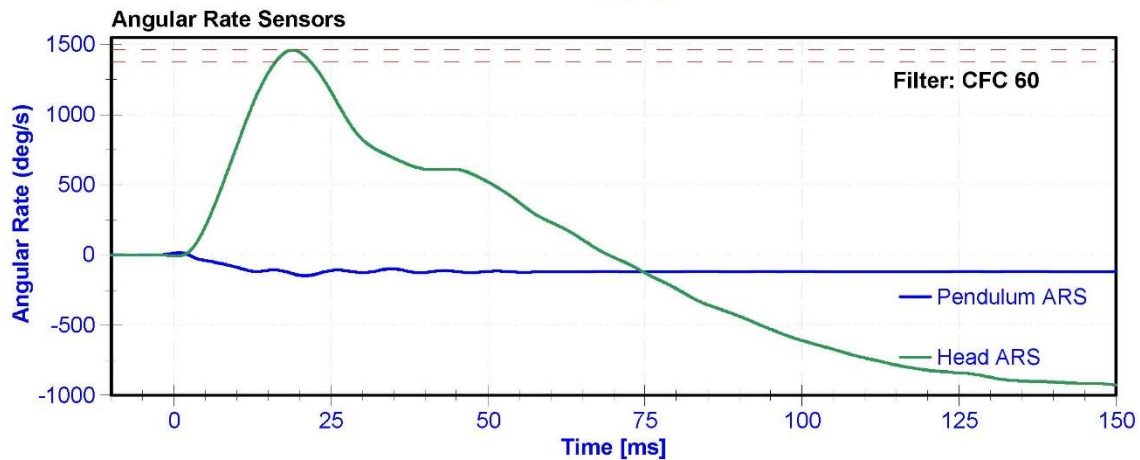
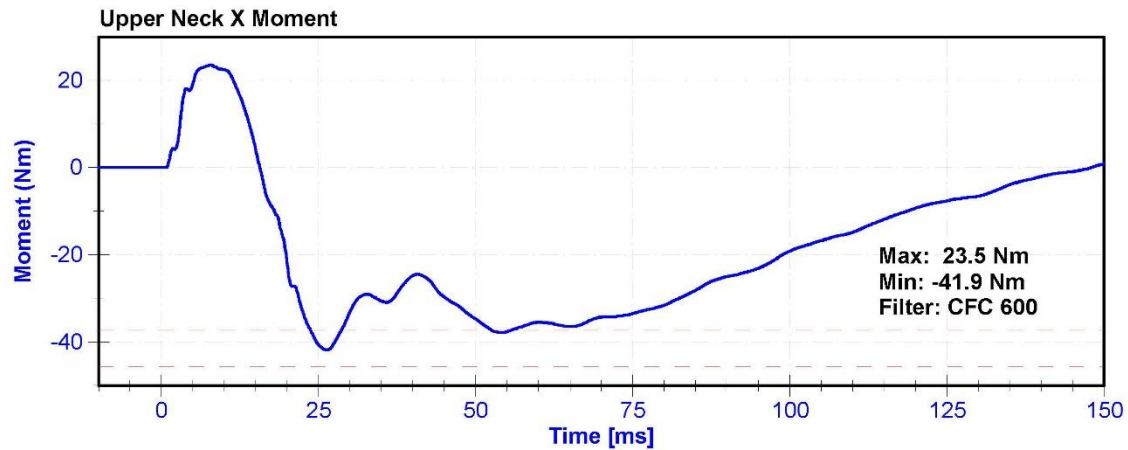
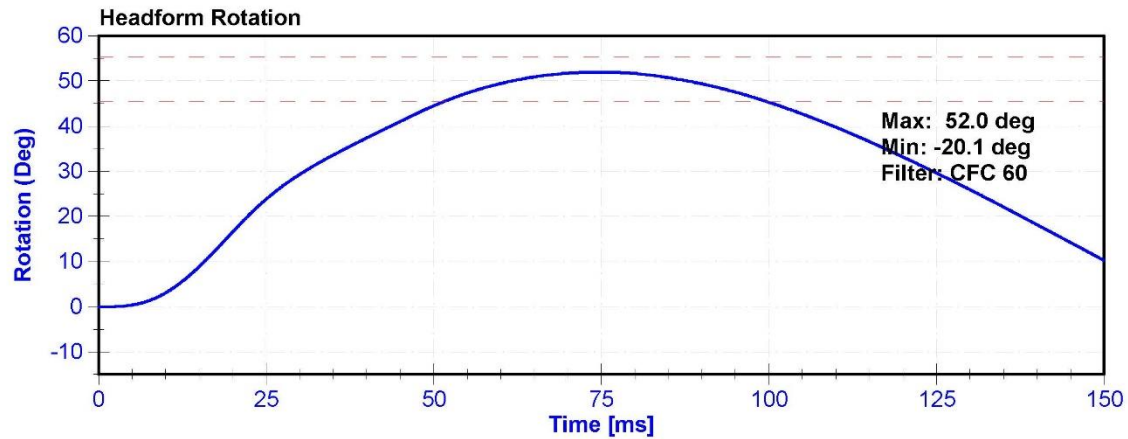
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	25.2	Pass
Velocity	3.35	3.45	m/s	3.42	Pass
Pendulum Impulse at 4ms	0.89	1.08	m/s	0.931	Pass
Pendulum Impulse at 8ms	2.04	2.36	m/s	2.037	Fail
Pendulum Impulse at 12ms	3.21	3.46	m/s	3.112	Fail
Peak Upper Neck X Moment after 40ms	-45.7	-37.4	Nm	-37.80	Pass
Peak Head X Angular Rate	1375	1462	deg/s	1460.3	Pass
Peak Head X Rotation	45.4	55.3	deg	51.96	Pass
Rotation Decay Time to Zero	83.7	90.9	ms	88.00	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Upper Neck Load Cell	Humanetics 3454J	LC-75Mx	2/24/2016	2/23/2017
Pendulum ARS	DTS ARS-PRO-8K	ARS-6419	1/19/2016	1/18/2017
Head X ARS	DTS ARS 18K	ARS-6629	2/24/2016	2/23/2017





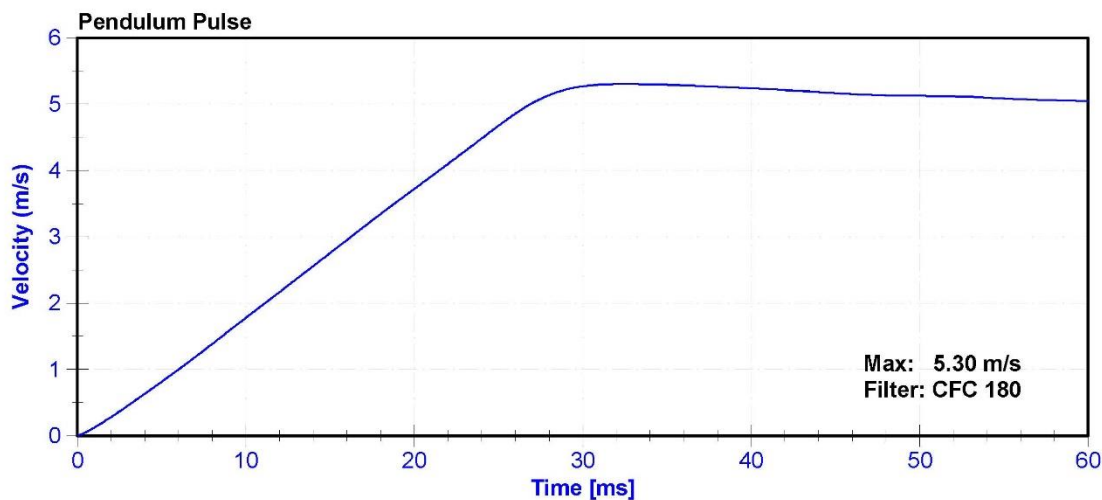
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

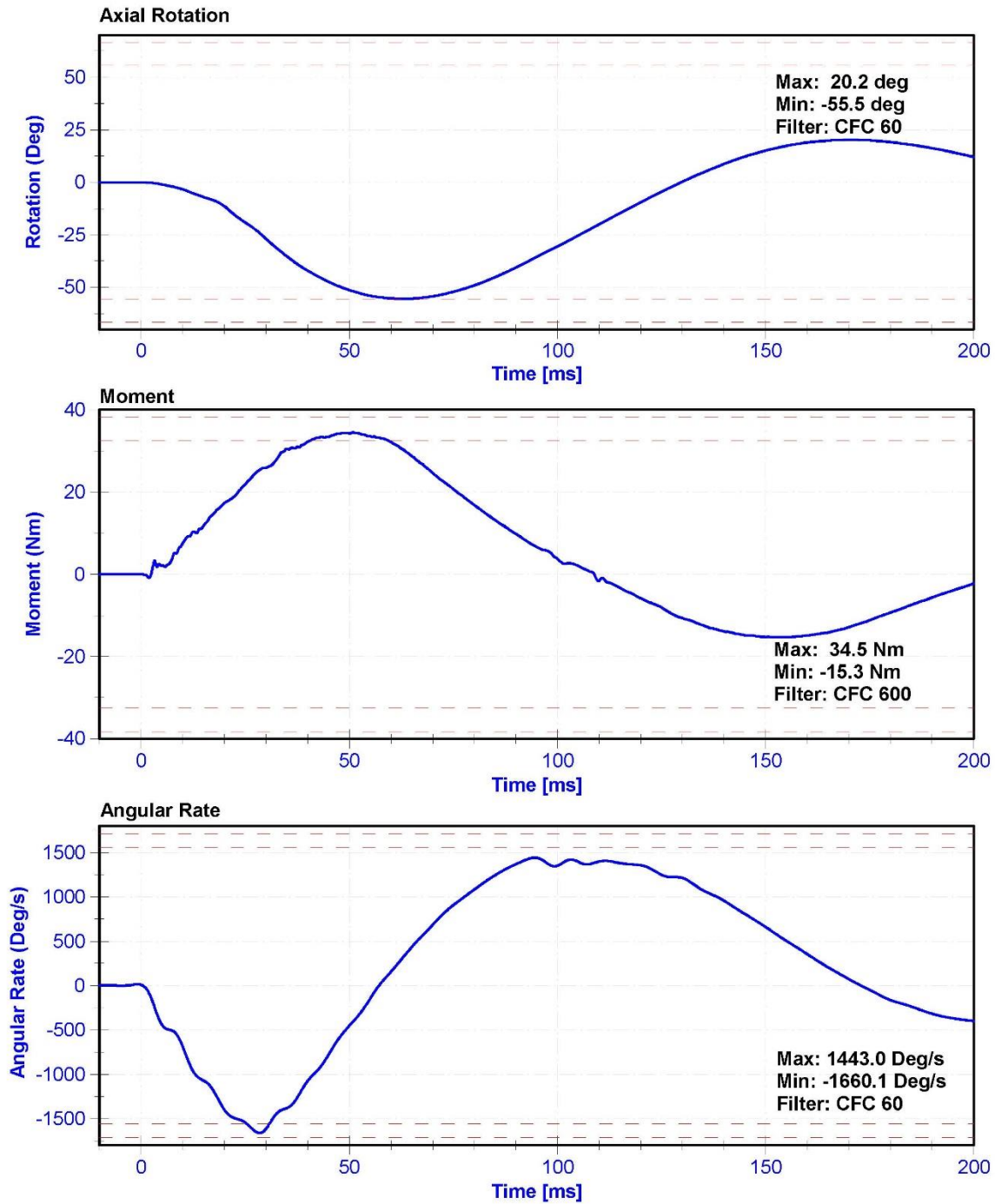
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	22.3	Pass
Velocity	4.95	5.05	m/s	5.045	Pass
Pendulum Impulse at 10ms	1.72	1.98	m/s	1.778	Pass
Pendulum Impulse at 15ms	2.67	2.97	m/s	2.755	Pass
Pendulum Impulse at 20ms	3.59	3.98	m/s	3.723	Pass
Pendulum Impulse at 25ms	4.43	4.92	m/s	4.675	Pass
Peak Upper Neck Z Moment	32.6	38.3	Nm	34.54	Pass
Peak Neck Axial Rotation	55.6	66.6	deg	55.54	Fail
Rotation Decay Time to Zero	58.0	61.6	ms	54.75	Fail
Peak Upper Neck Angular Velocity	1559	1709	deg/s	1660.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Neck Fixture Potentiometer	Servo 14CB1-3615	DS-0001	10/21/2015	10/20/2016
Upper Neck Load Cell	Humanetics 3454J	LC-75Mz	2/24/2016	2/23/2017
Upper Neck ARS	DTS ARS-PRO-8K	ARS-6424	1/19/2016	1/18/2017





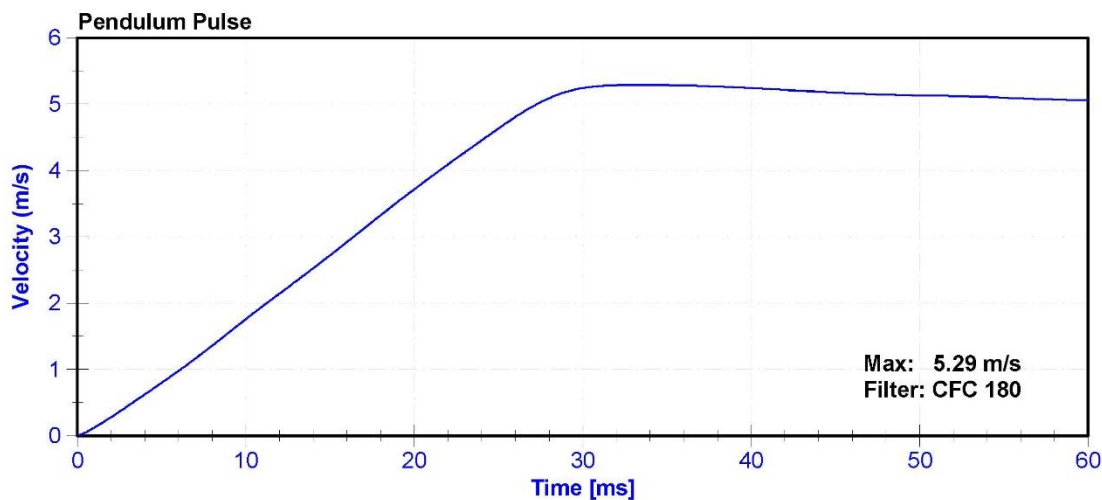
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	015	Laboratory Supervisor	M. Goehle

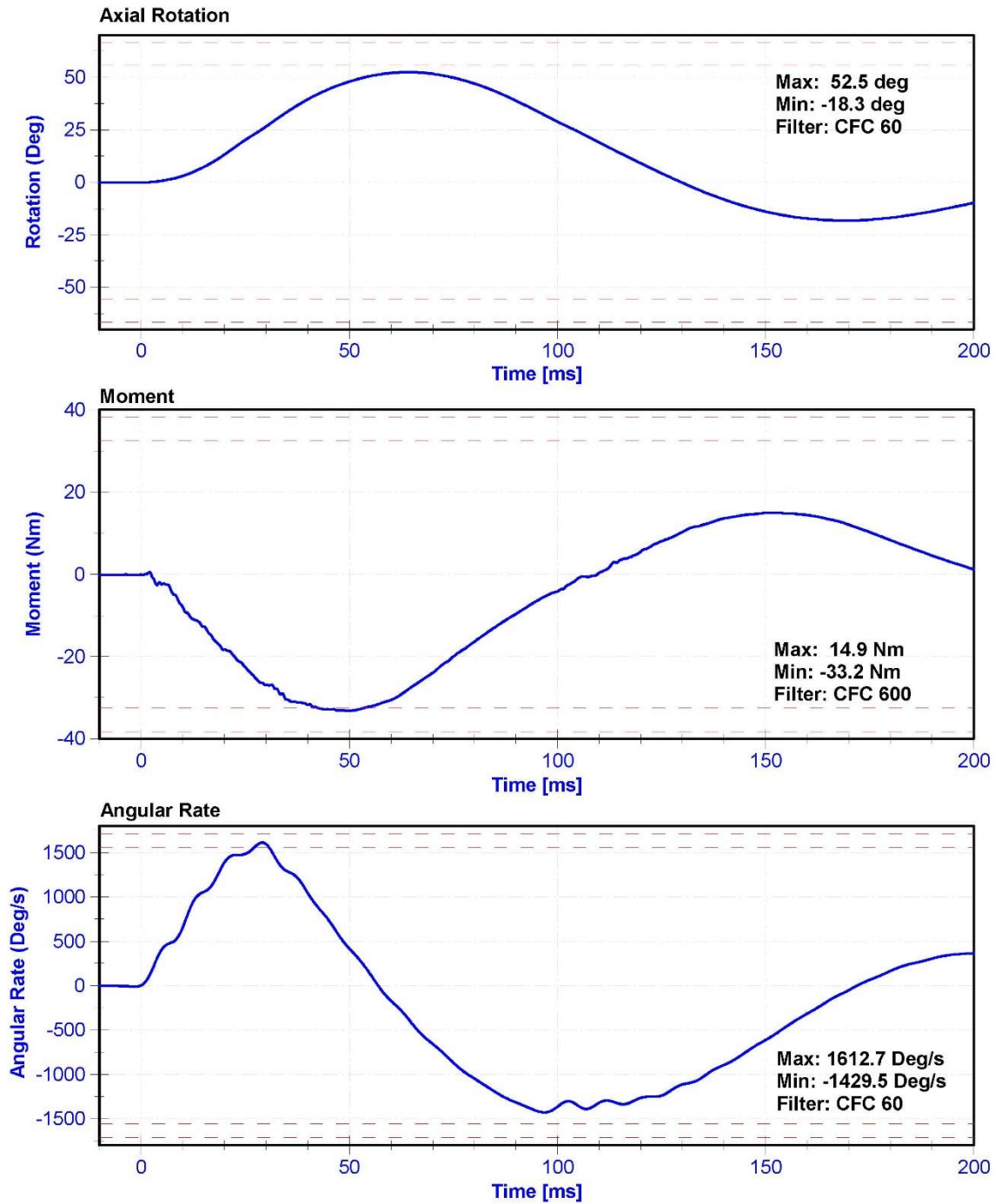
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	18.7	Pass
Velocity	4.95	5.05	m/s	5.045	Pass
Pendulum Impulse at 10ms	1.72	1.98	m/s	1.759	Pass
Pendulum Impulse at 15ms	2.67	2.97	m/s	2.721	Pass
Pendulum Impulse at 20ms	3.59	3.98	m/s	3.717	Pass
Pendulum Impulse at 25ms	4.43	4.92	m/s	4.634	Pass
Peak Upper Neck Z Moment	32.6	38.3	Nm	33.21	Pass
Peak Neck Axial Rotation	55.6	66.6	deg	52.47	Fail
Rotation Decay Time to Zero	58.0	61.6	ms	65.60	Fail
Peak Upper Neck Angular Velocity	1559	1709	deg/s	1612.7	Pass

Transducer Calibrations

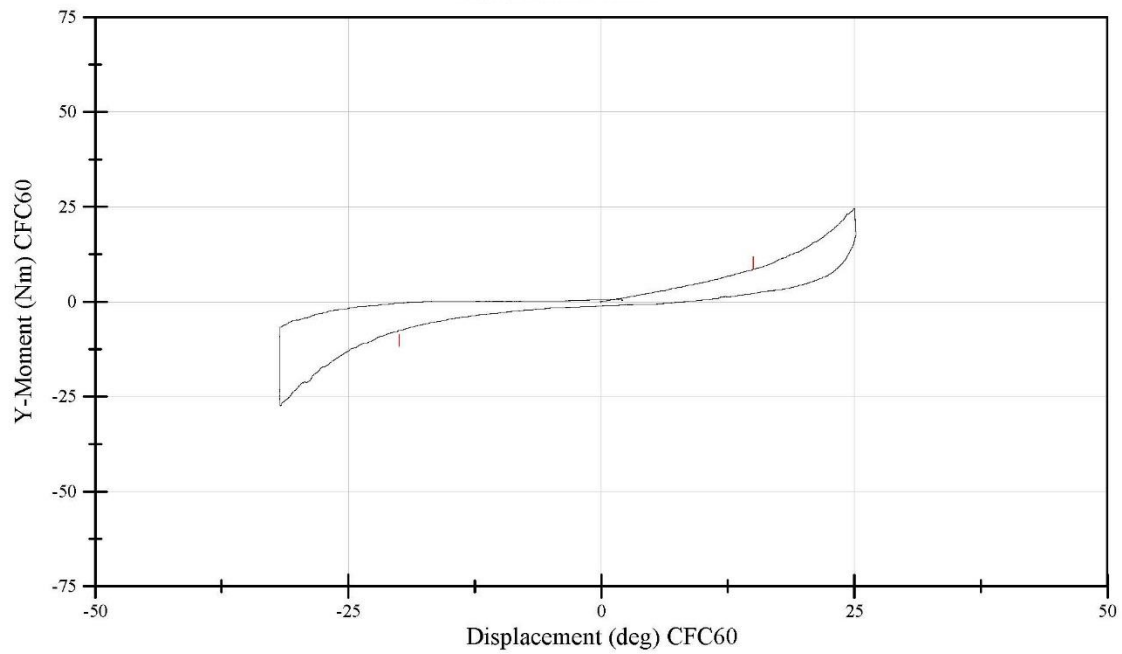
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Neck Fixture Potentiometer	Servo 14CB1-3615	DS-0001	10/21/2015	10/20/2016
Upper Neck Load Cell	Humanetics 3454J	LC-75Mz	2/24/2016	2/23/2017
Upper Neck ARS	DTS ARS-PRO-8K	ARS-6424	1/19/2016	1/18/2017





Test Temperature: 70.1 degrees
Relative Humidity: 53%
Test Velocity: NOVALUE m/s

THOR Occipital Condyle Quasi-Static Certification
Displacement vs. Torque
Serial Number: T0016

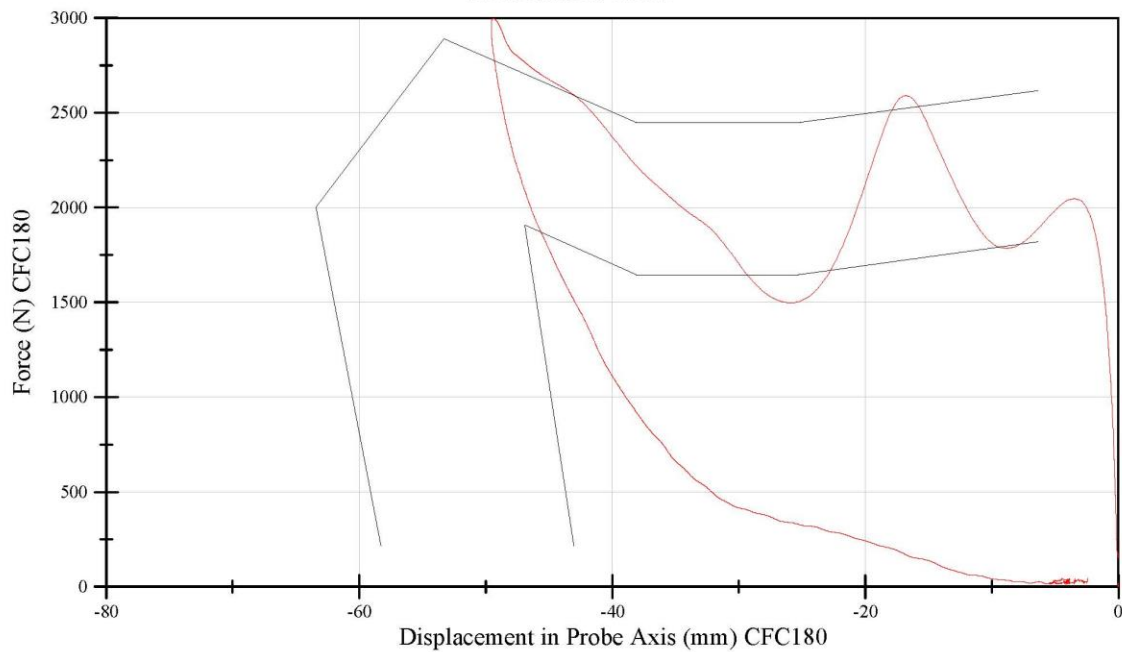


Software Version: 2.4

File Name: T0016OCPot150804-02_pro
08/04/2015 13:15:32.0000

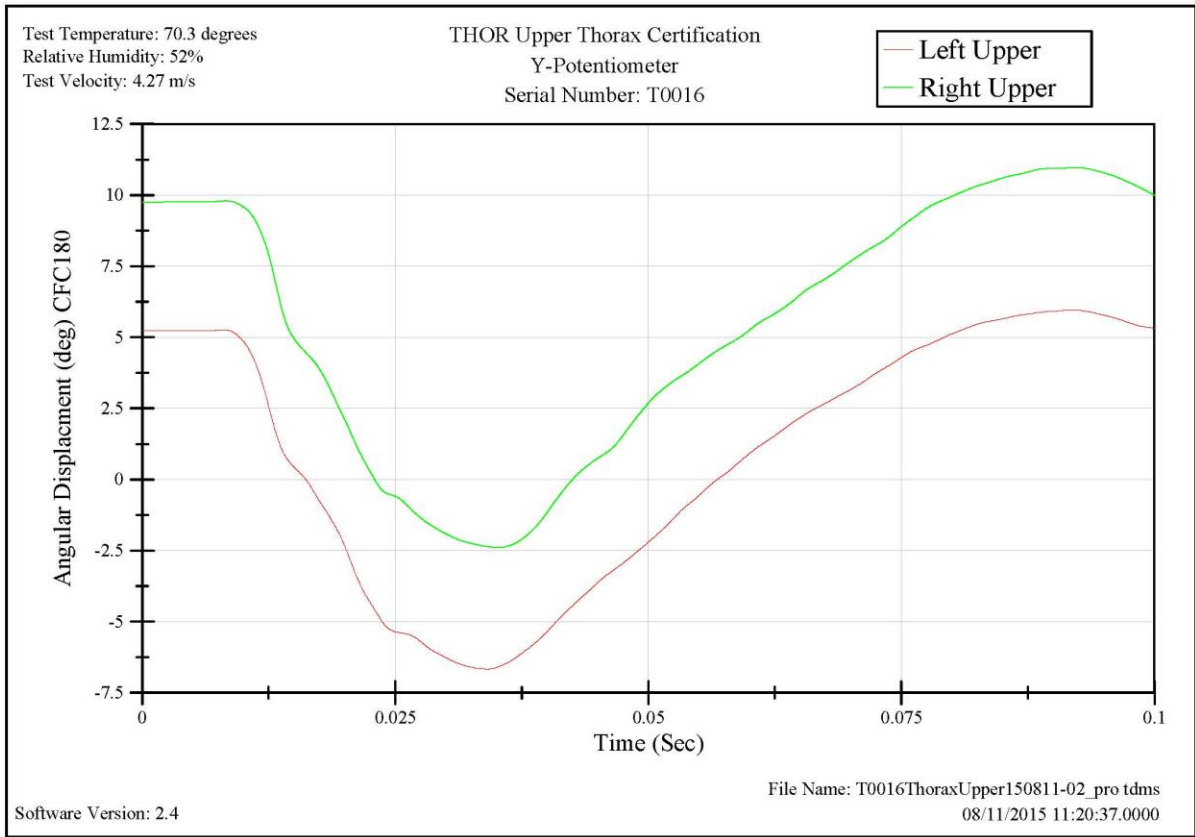
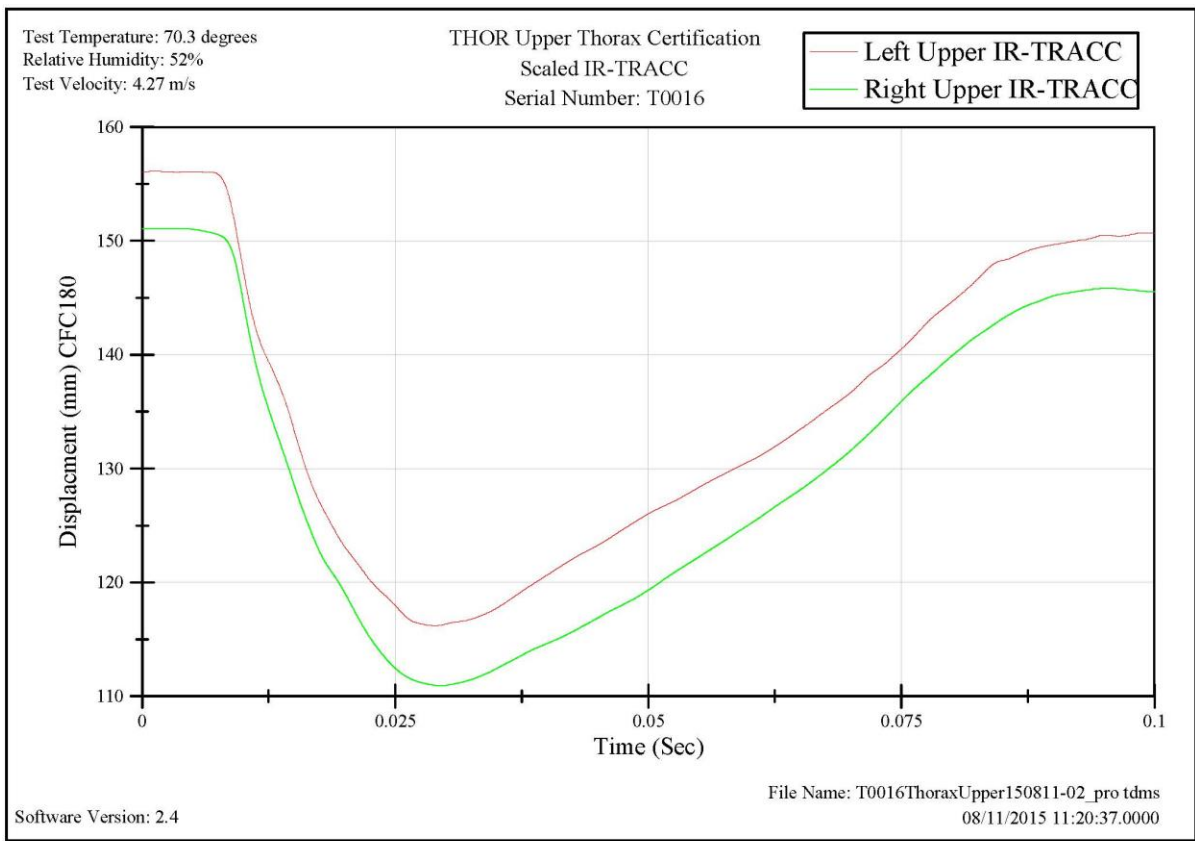
Test Temperature: 70.3 degrees
Relative Humidity: 52%
Test Velocity: 4.27 m/s

THOR Upper Thorax Certification
Thorax Response With Kroell Corridor
Serial Number: T0016



Software Version: 2.4

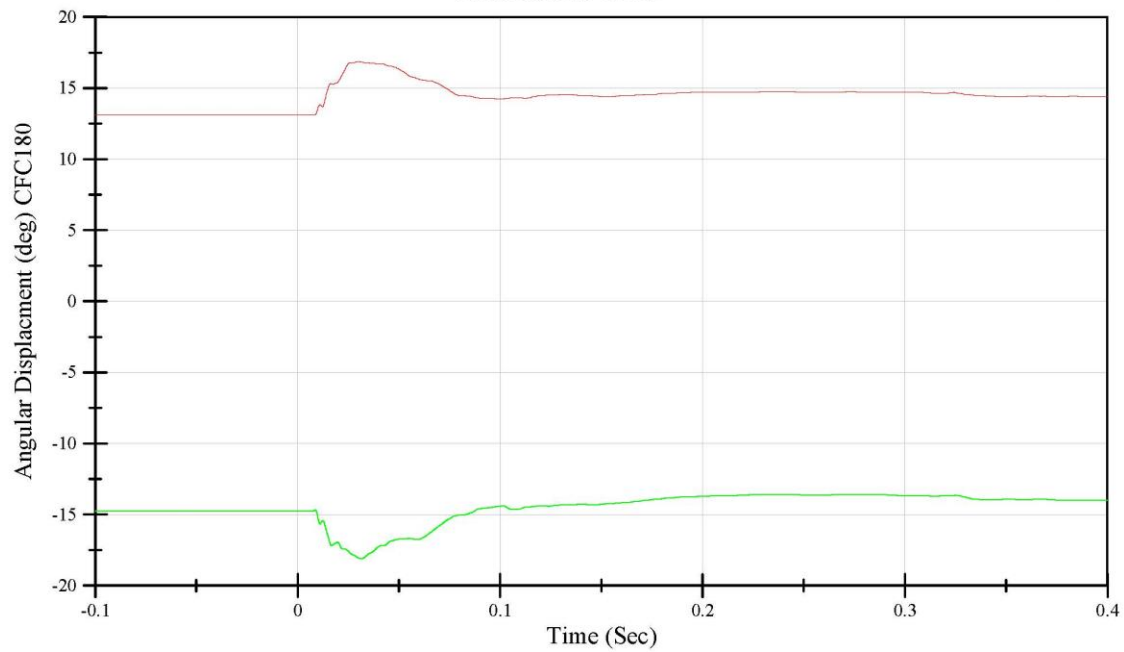
File Name: T0016ThoraxUpper150811-02_pro tdms
08/11/2015 11:20:37.0000



Test Temperature: 70.3 degrees
Relative Humidity: 52%
Test Velocity: 4.27 m/s

THOR Upper Thorax Certification
Z-Potentiometer
Serial Number: T0016

Left Upper
Right Upper

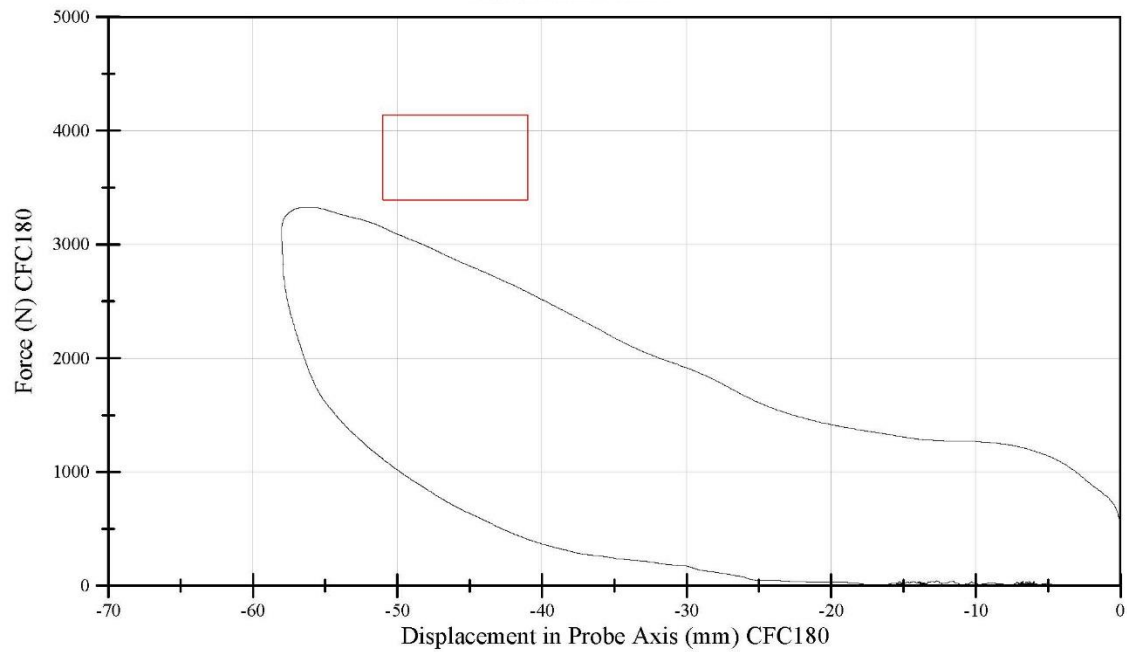


Software Version: 2.4

File Name: T0016ThoraxUpper150811-02_pro.tdms
08/11/2015 11:20:37.0000

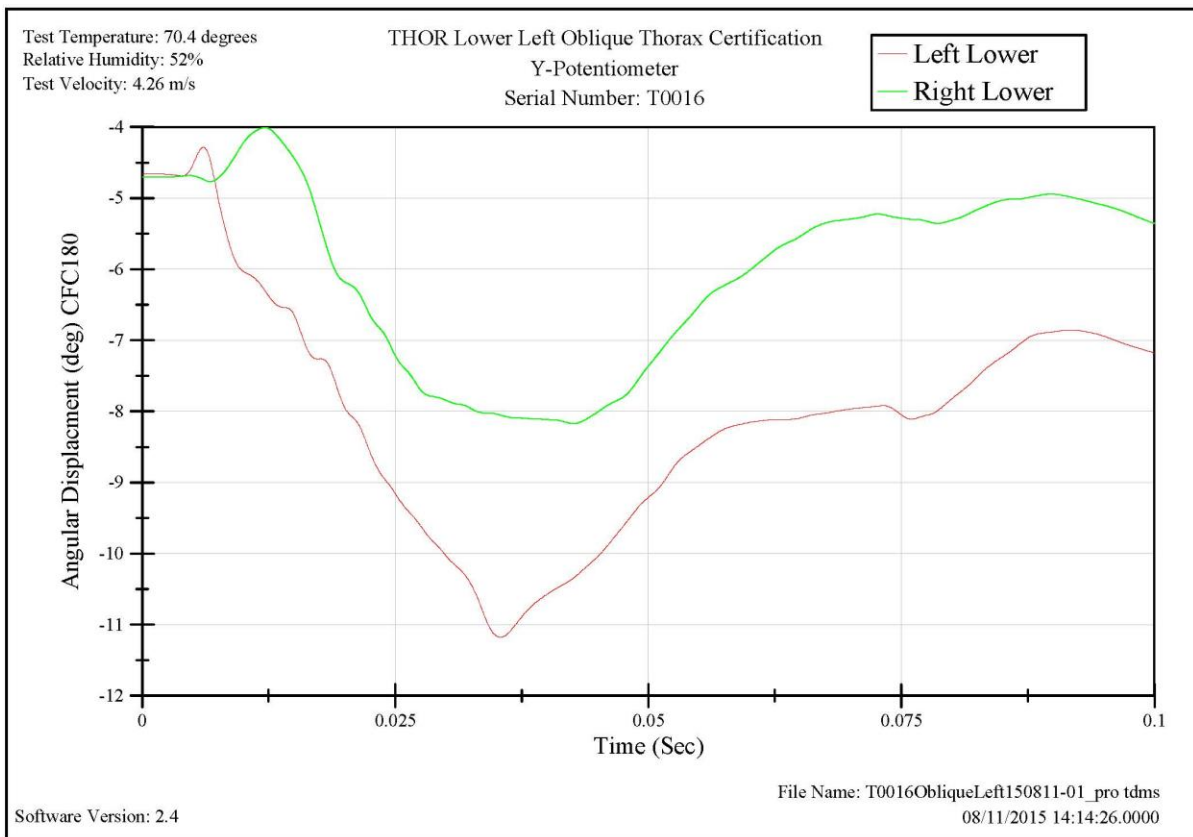
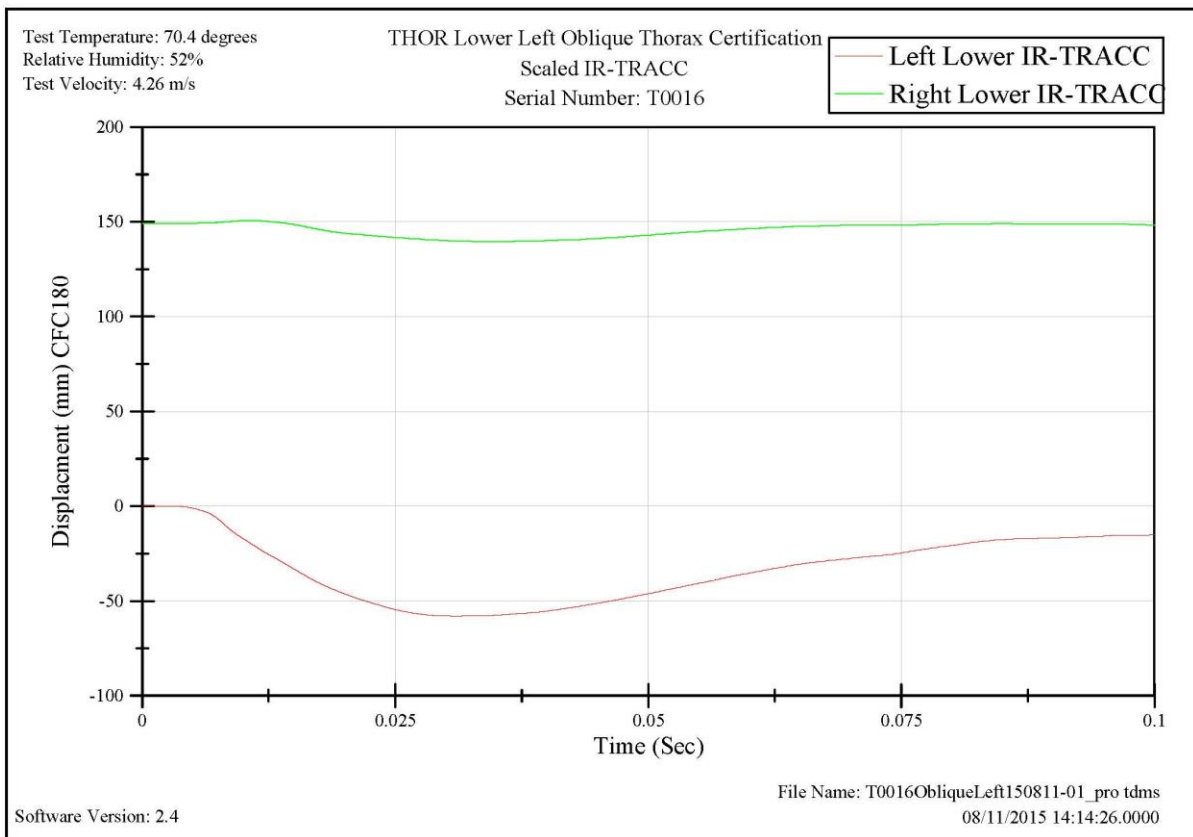
Test Temperature: 70.4 degrees
Relative Humidity: 52%
Test Velocity: 4.26 m/s

THOR Lower Left Oblique Thorax Certification
Thorax Displacement vs. Probe Force
Serial Number: T0016



Software Version: 2.4

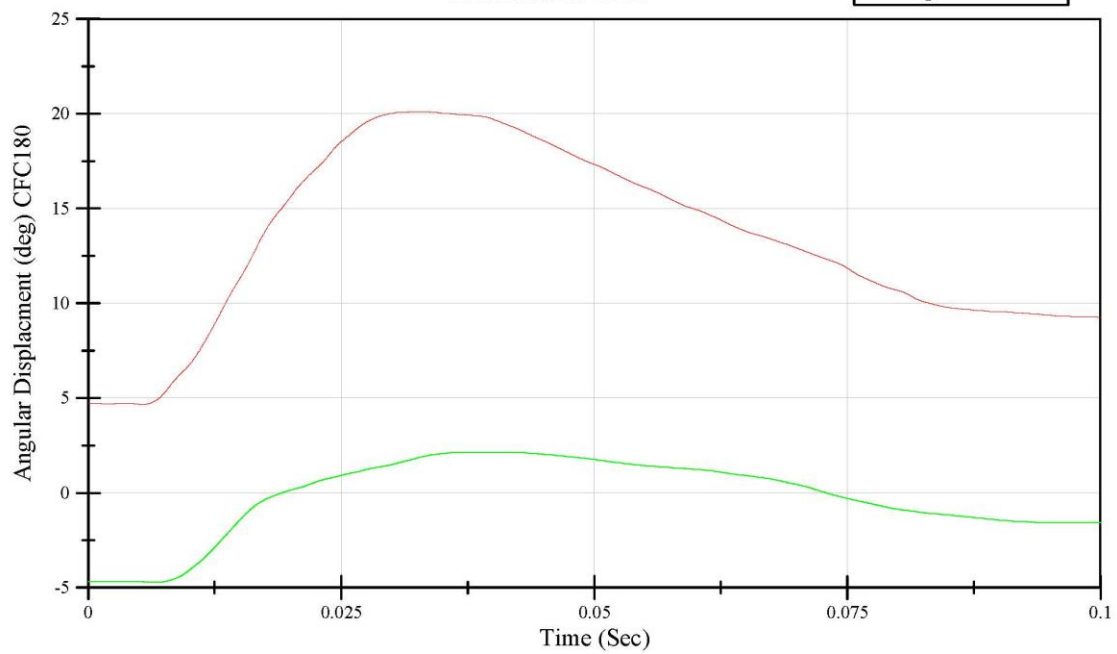
File Name: T0016ObliqueLeft150811-01_pro.tdms
08/11/2015 14:14:26.0000



Test Temperature: 70.4 degrees
Relative Humidity: 52%
Test Velocity: 4.26 m/s

THOR Lower Left Oblique Thorax Certification
Z-Potentiometer
Serial Number: T0016

Left Lower
Right Lower

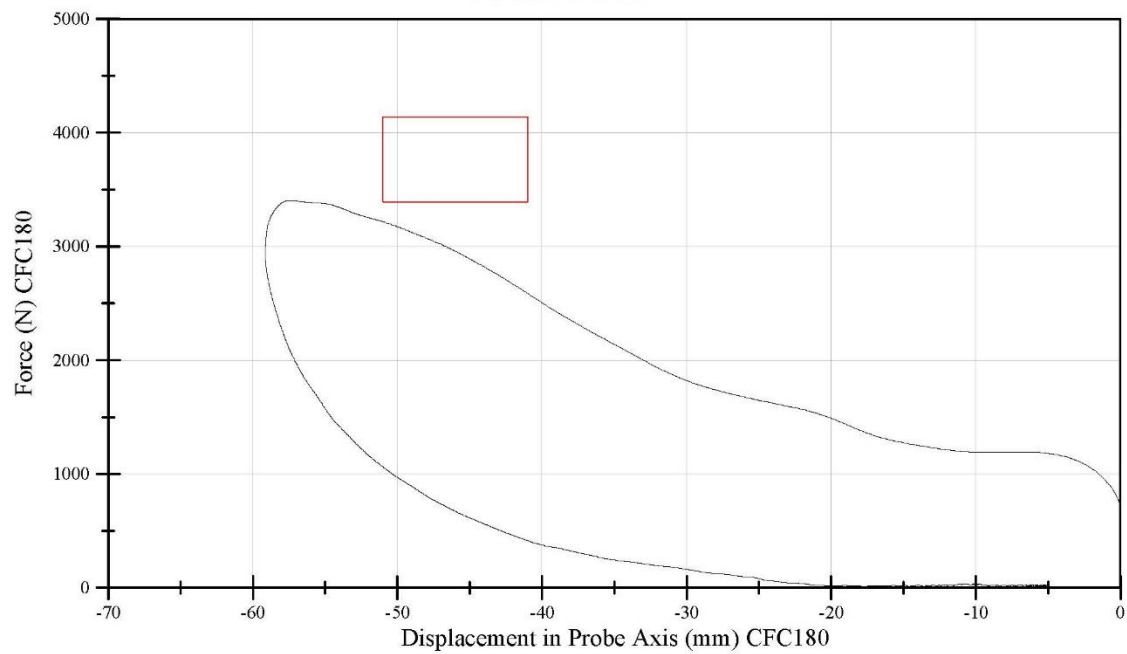


Software Version: 2.4

File Name: T0016ObliqueLeft150811-01_pro tdms
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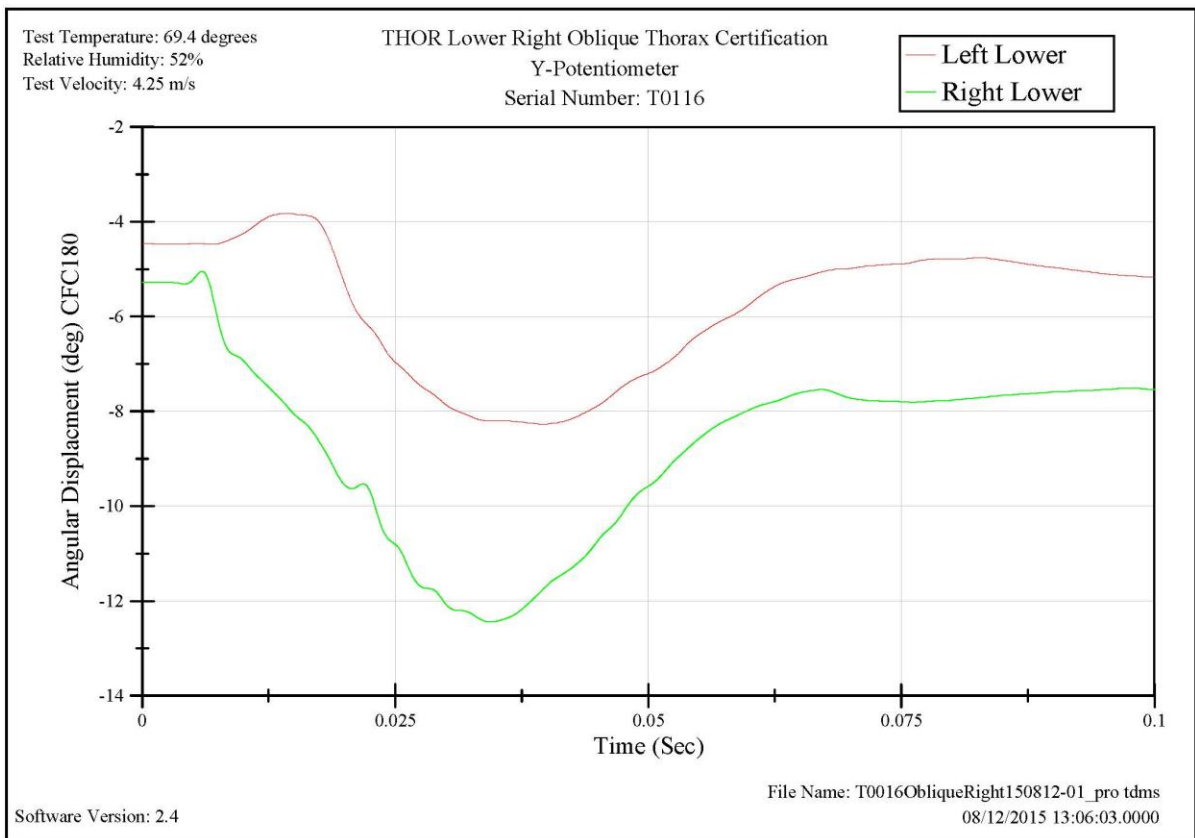
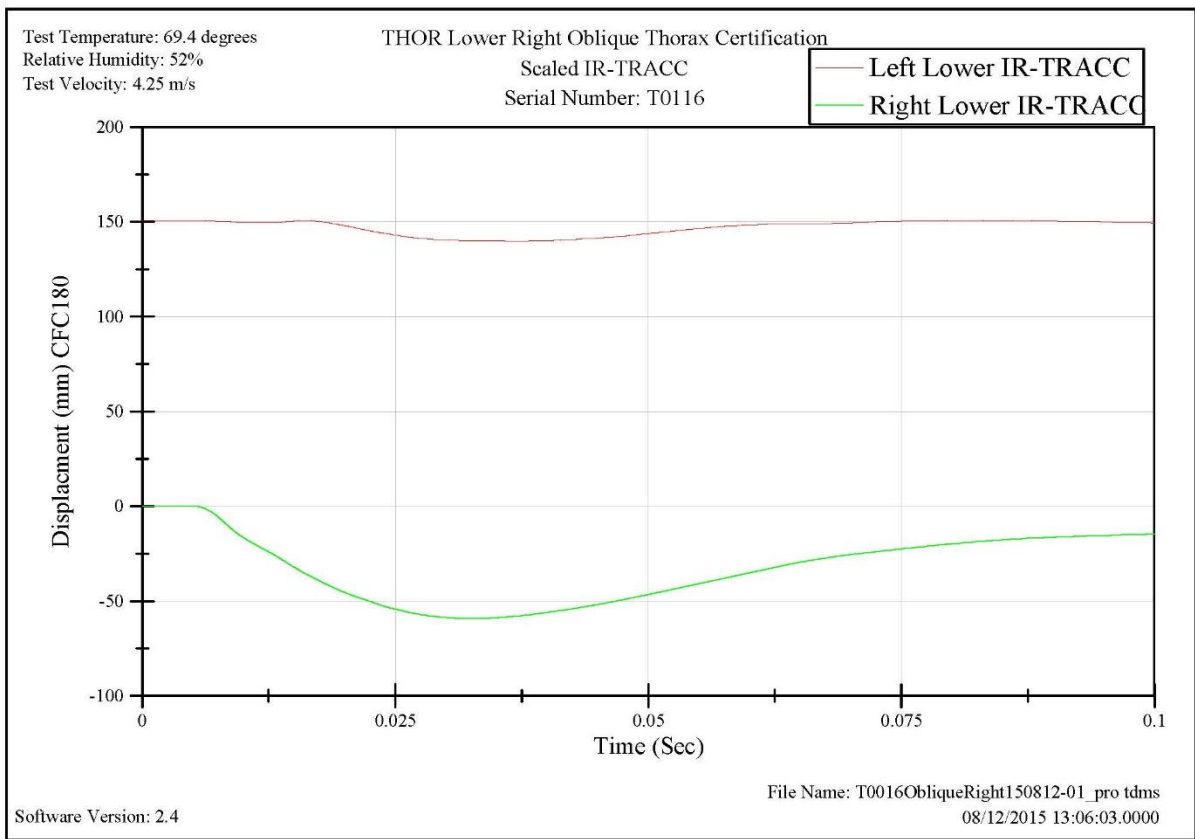
Test Temperature: 69.4 degrees
Relative Humidity: 52%
Test Velocity: 4.25 m/s

THOR Lower Right Oblique Thorax Certification
Thorax Displacement vs. Probe Force
Serial Number: T0116



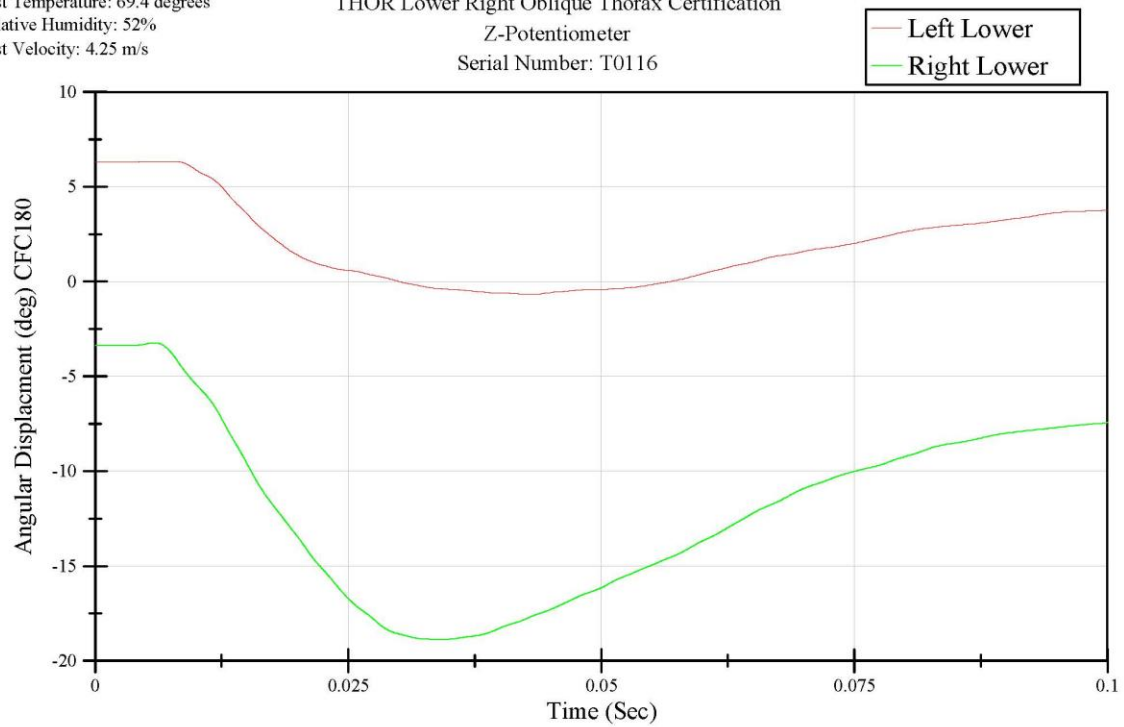
Software Version: 2.4

File Name: T0016ObliqueRight150812-01_pro tdms
08/12/2015 13:06:03.0000



Test Temperature: 69.4 degrees
Relative Humidity: 52%
Test Velocity: 4.25 m/s

THOR Lower Right Oblique Thorax Certification
Z-Potentiometer
Serial Number: T0116

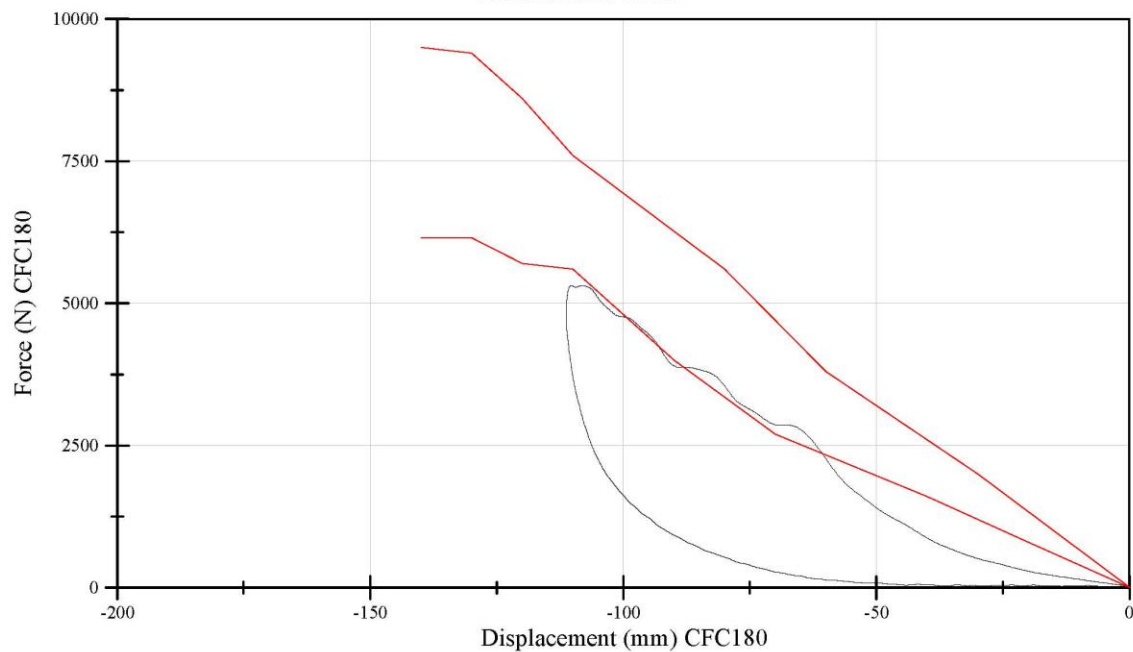


Software Version: 2.4

File Name: T0016ObliqueRight150812-01_pro tdms
08/12/2015 13:06:03.0000

Test Temperature: 70.6 degrees
Relative Humidity: 52%
Test Velocity: 6.57 m/s

THOR Upper Abdomen Certification
Abdomen Displacement vs. Probe Force
Serial Number: T0016

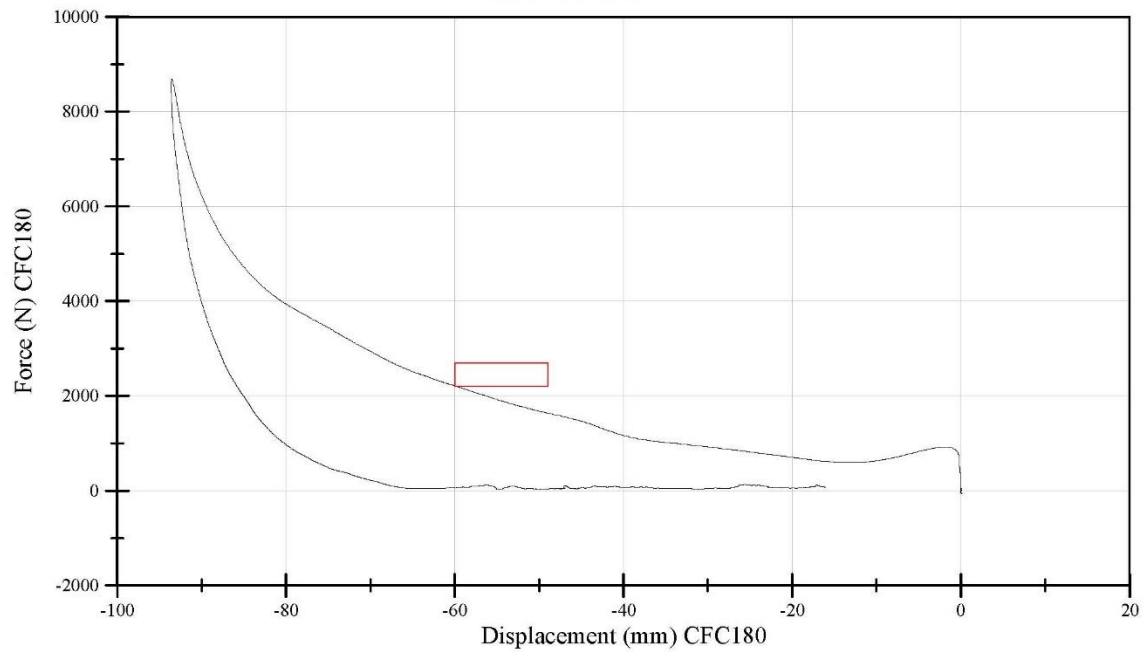


Software Version: 2.4

File Name: T0016ABUP150807-01_proTDM
08/07/2015 13:20:12.0000

Test Temperature: 70.6 degrees
Relative Humidity: 53%
Test Velocity: 6.04 m/s

THOR Lower Abdomen Certification
Abdomen Displacement vs. Probe Force
Serial Number: T0016

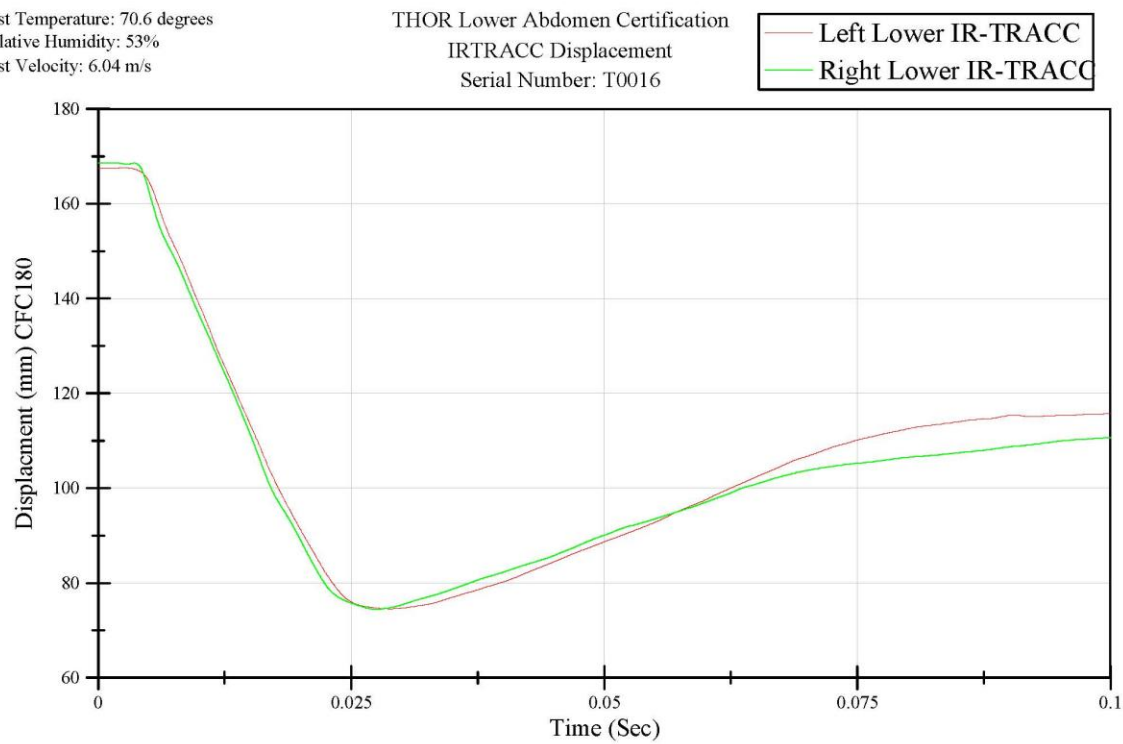


Software Version: 2.4

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08/07/2015 08:12:59.0000

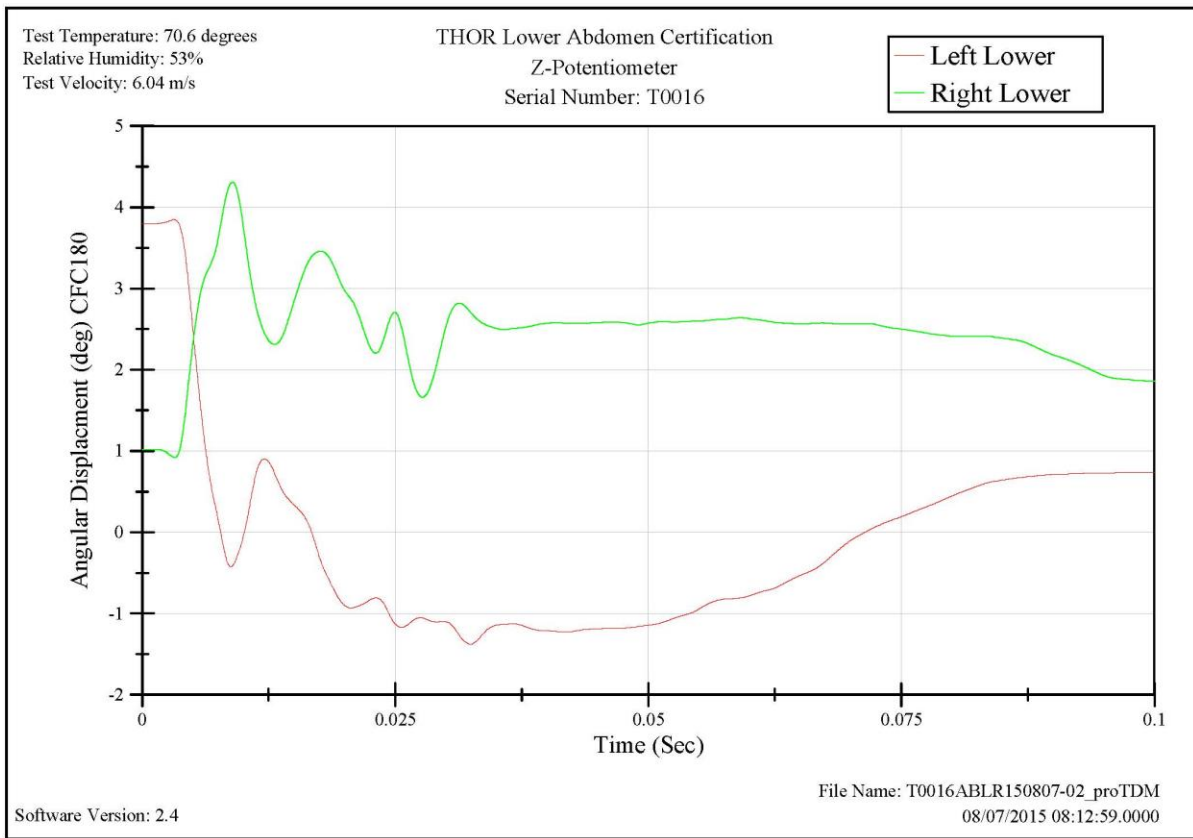
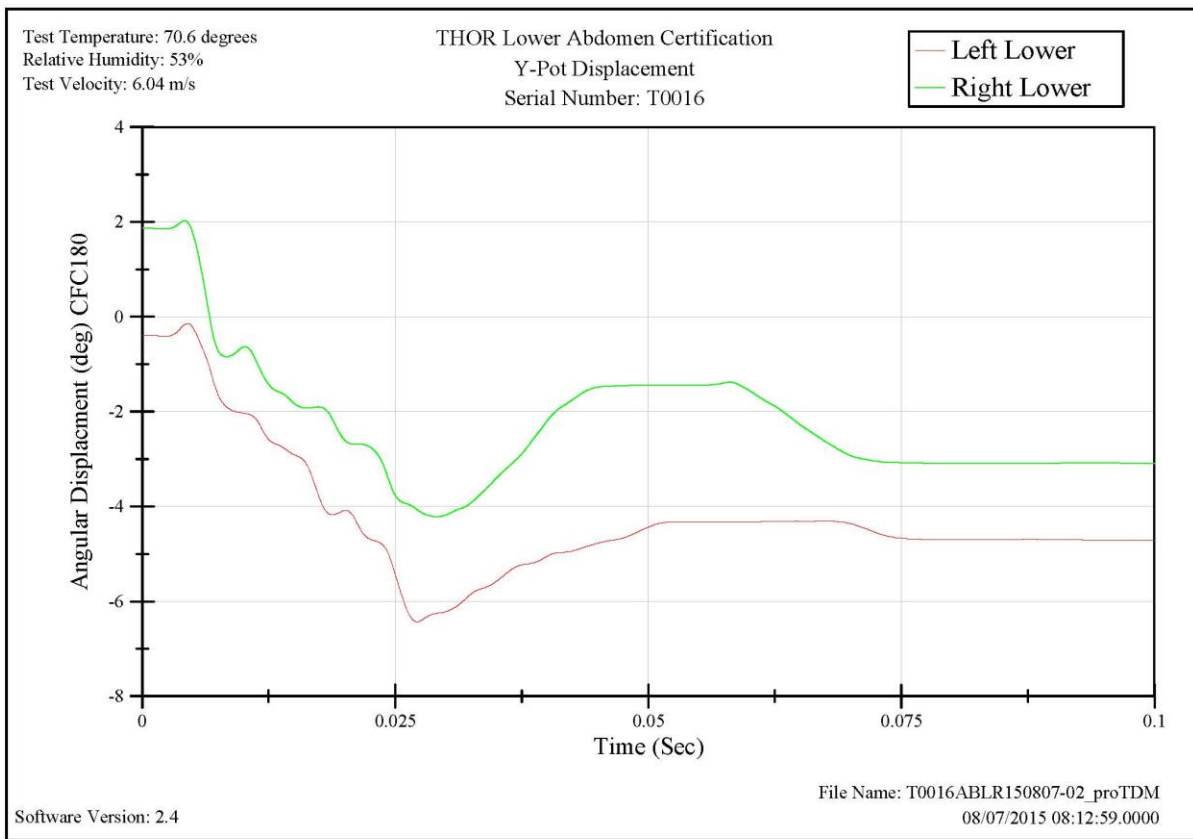
Test Temperature: 70.6 degrees
Relative Humidity: 53%
Test Velocity: 6.04 m/s

THOR Lower Abdomen Certification
IRTRACC Displacement
Serial Number: T0016



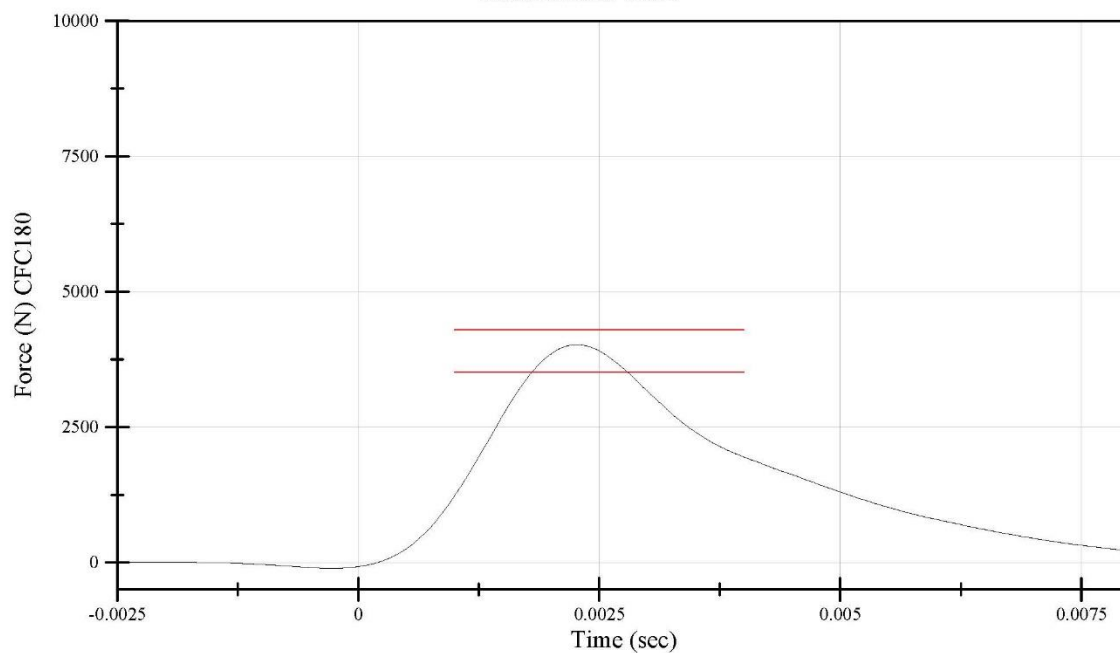
Software Version: 2.4

File Name: T0016ABLR150807-02_proTDM
08/07/2015 08:12:59.0000



Test Temperature: 70.2 degrees
Relative Humidity: 53%
Test Velocity: 2.63 m/s

THOR Left Femur Certification
Probe Force
Serial Number: T0016

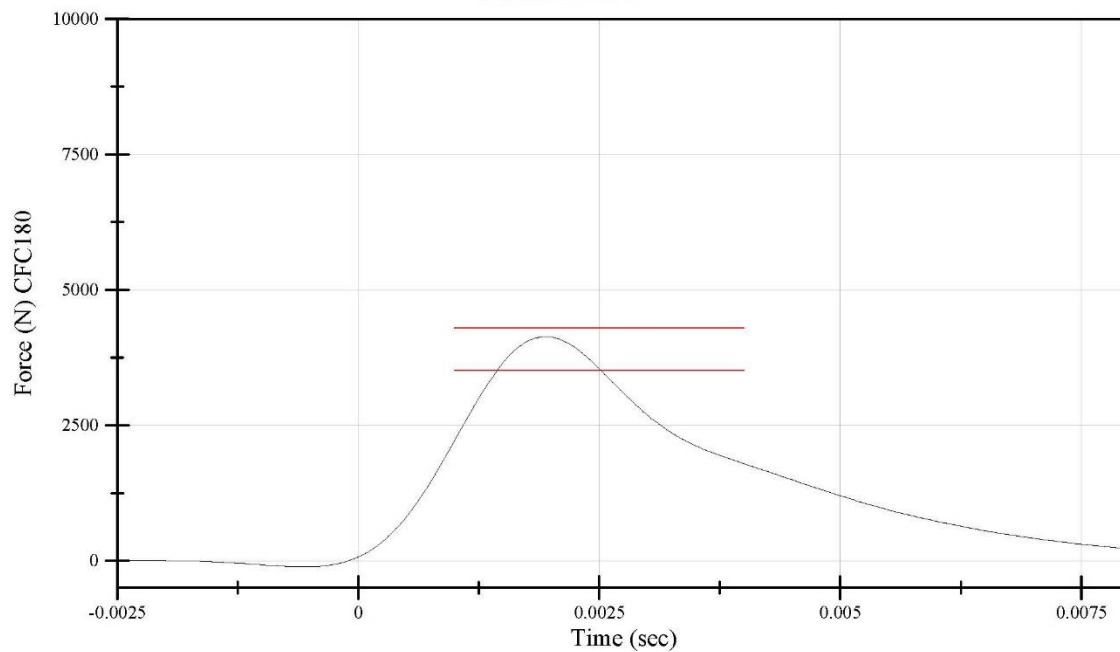


Software Version: 2.4

File Name: T0016LeftKnee150813-02_pro
08/14/2015 07:00:34.0000

Test Temperature: 69.7 degrees
Relative Humidity: 52%
Test Velocity: 2.63 m/s

THOR Right Femur Certification
Probe Force
Serial Number: T0016

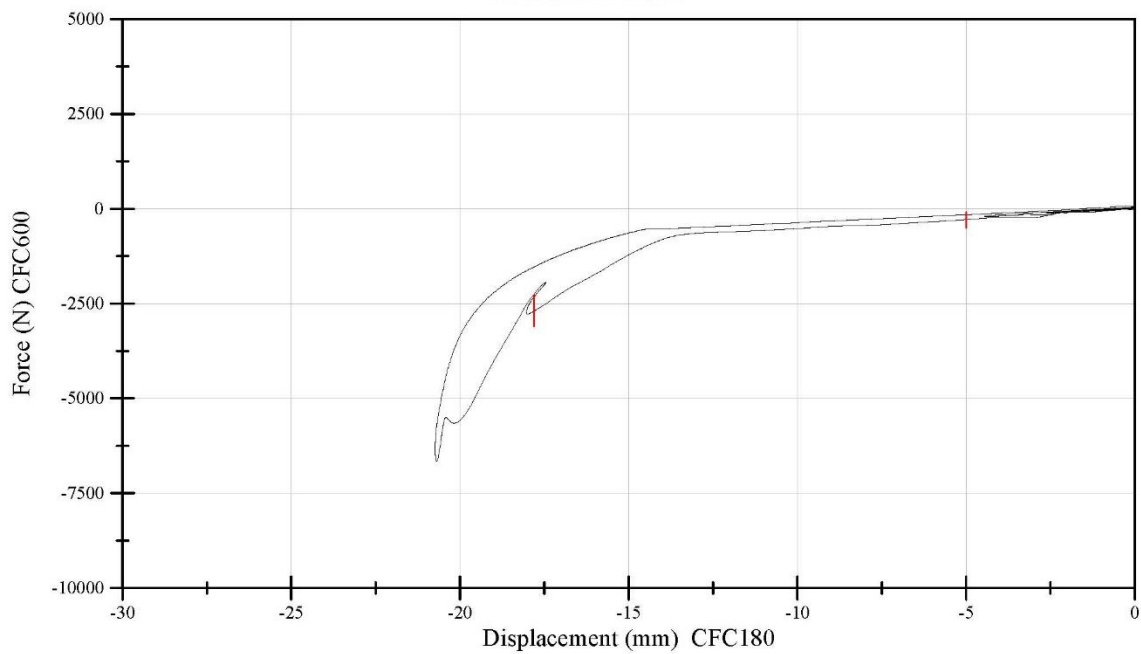


Software Version: 2.4

File Name: T0016RightKnee150814-01_pro
08/14/2015 07:48:52.0000

Test Temperature: 71 degrees
Relative Humidity: 51%
Test Velocity: 2.76 m/s

THOR Left Knee Certification
Femur Force vs. Knee Displacement
Serial Number: 017169

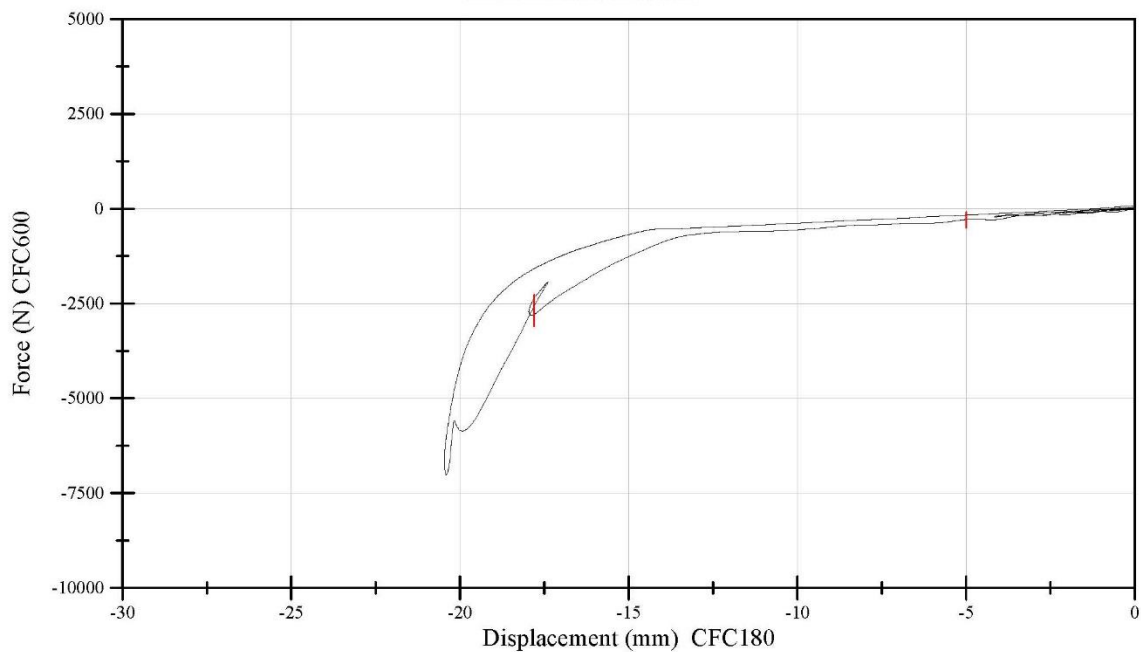


Software Version: 2.4

File Name: 017169Knee150708_01processed
07/08/2015 14:22:57.0000

Test Temperature: 71 degrees
Relative Humidity: 50%
Test Velocity: 2.75 m/s

THOR Right Knee Certification
Femur Force vs. Knee Displacement
Serial Number: 12070382



Software Version: 2.4

File Name: 12070382Knee150708_01renamedprocessed
07/09/2015 06:31:18.0000

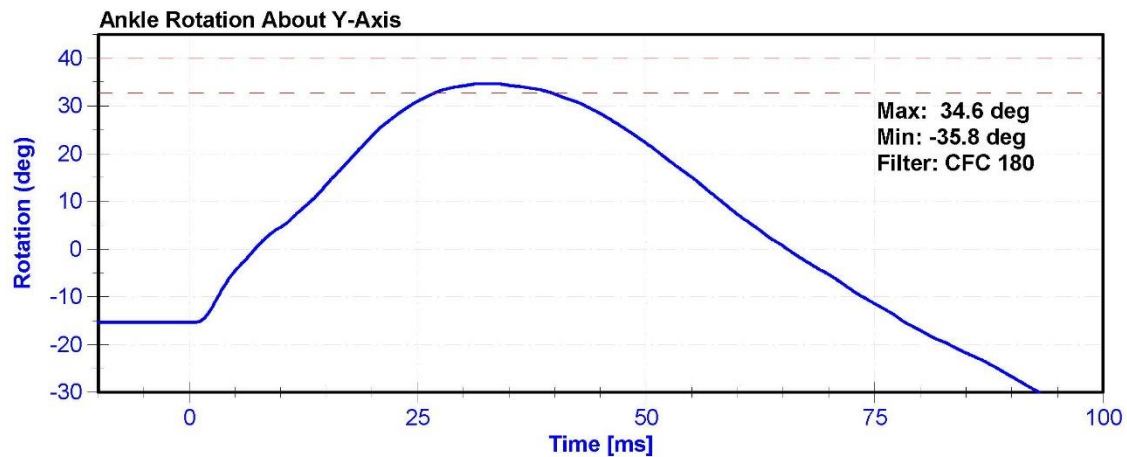
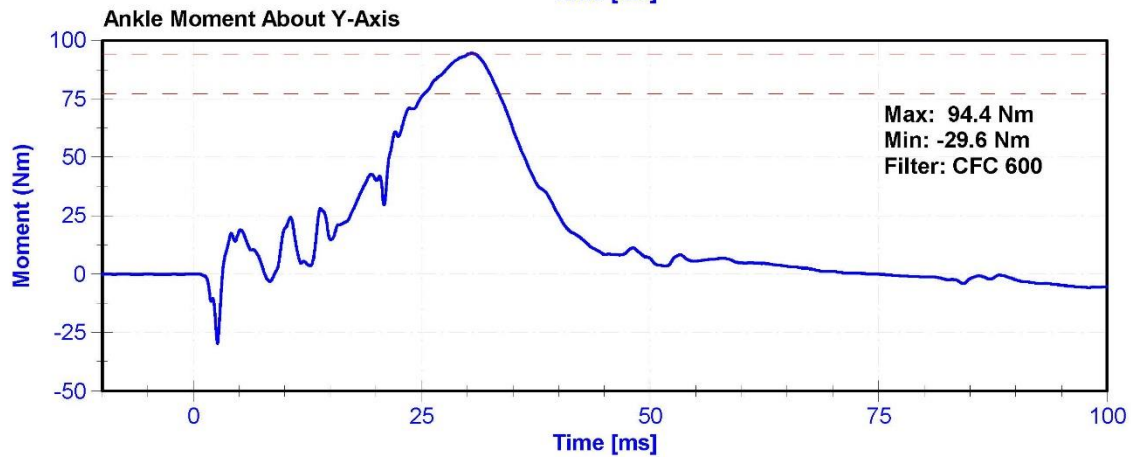
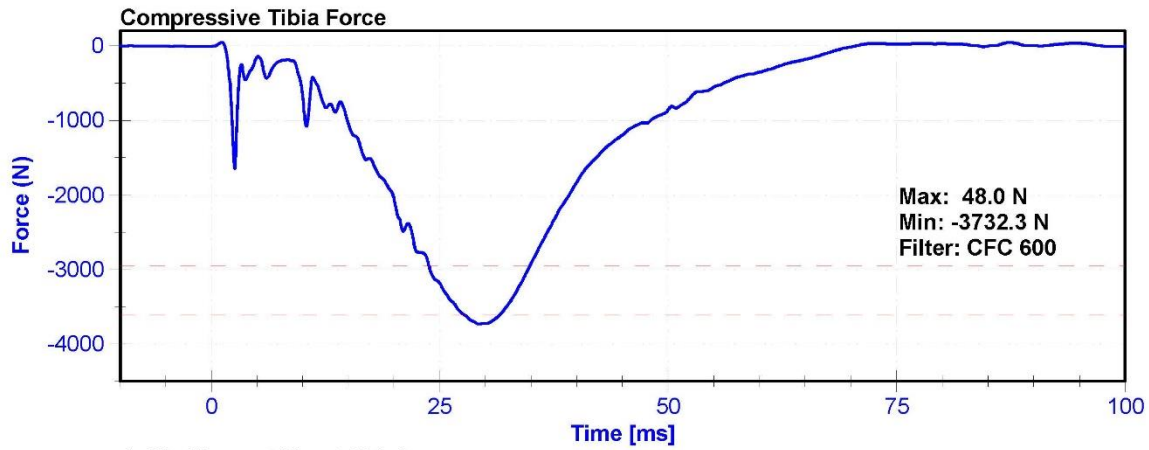
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	016	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	30.8	Pass
Velocity	4.9	5.1	m/s	4.961	Pass
Lower Tibia Compressive Force	-3613	-2956	N	-3732.3	Fail
Peak Moment about Y-Axis	77.1	94.2	Nm	94.44	Fail
Peak Rotation about Y-Axis	32.7	39.9	deg	34.64	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	8/27/2015	2/26/2016
Lower Tibia Load Cell	Denton 4929J	LC-139 Fz	6/16/2015	6/15/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0527	6/30/2015	6/29/2016



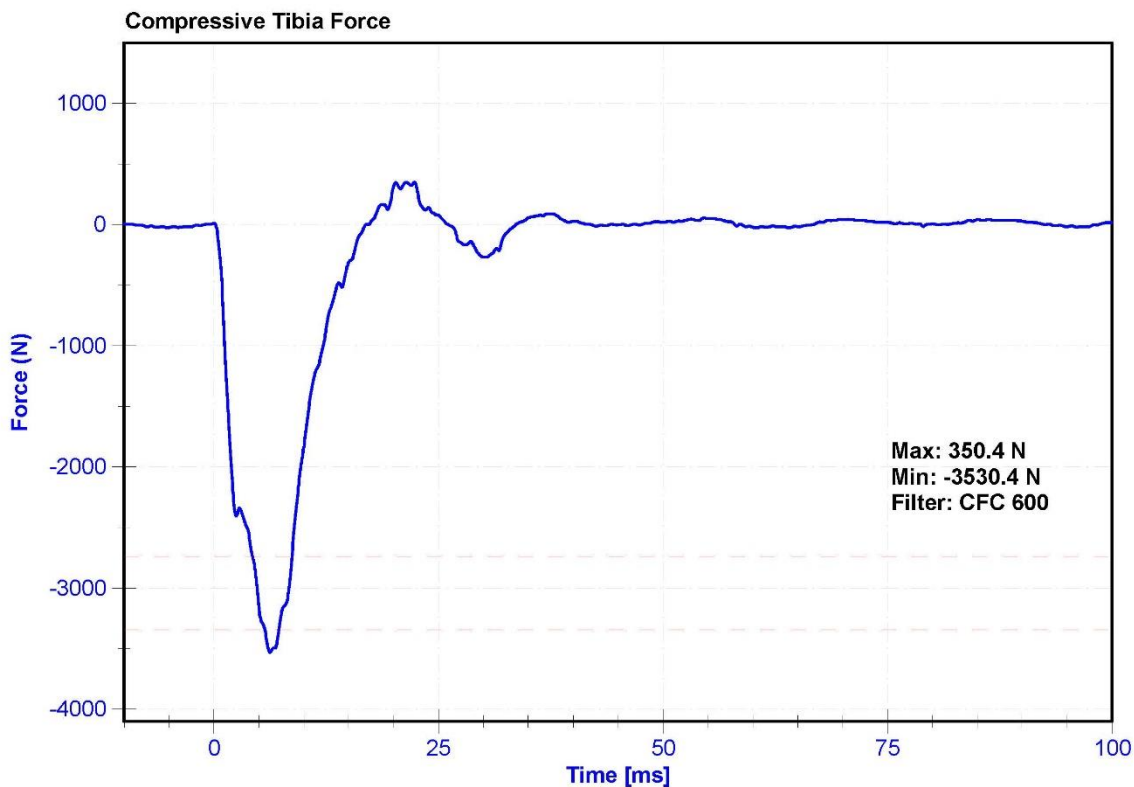
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	016	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	31	Pass
Velocity	3.9	4.1	m/s	3.944	Pass
Lower Tibia Compressive Force	-3346	-2738	N	-3530.4	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	8/27/2015	2/26/2016
Lower Tibia Load Cell	Denton 4929J	LC-139 Fz	6/16/2015	6/15/2016





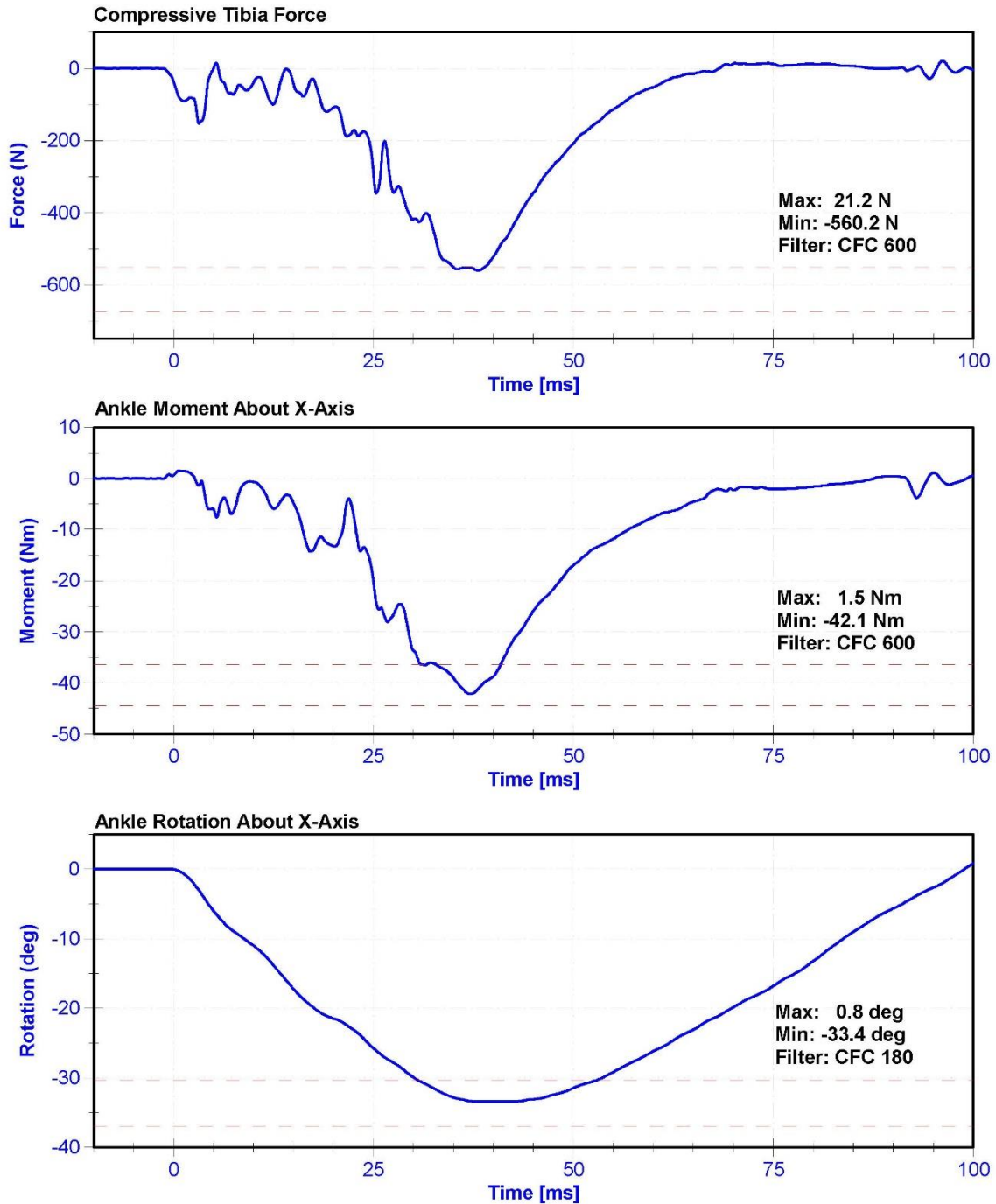
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	0016	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	42.7	Pass
Velocity	1.9	2.1	m/s	1.939	Pass
Lower Tibia Compressive Force	-675	-552	N	-560.2	Pass
Peak Moment about X-Axis	-44.4	-36.3	Nm	-42.14	Pass
Peak Rotation about X-Axis	-37.0	-30.3	deg	-33.40	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-139 Fz	6/16/2015	6/15/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0544	6/30/2015	6/29/2016





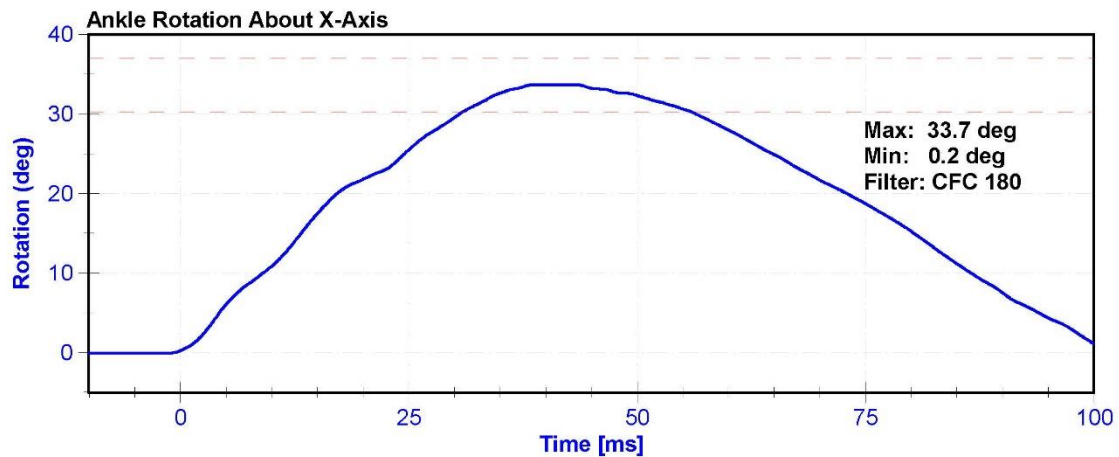
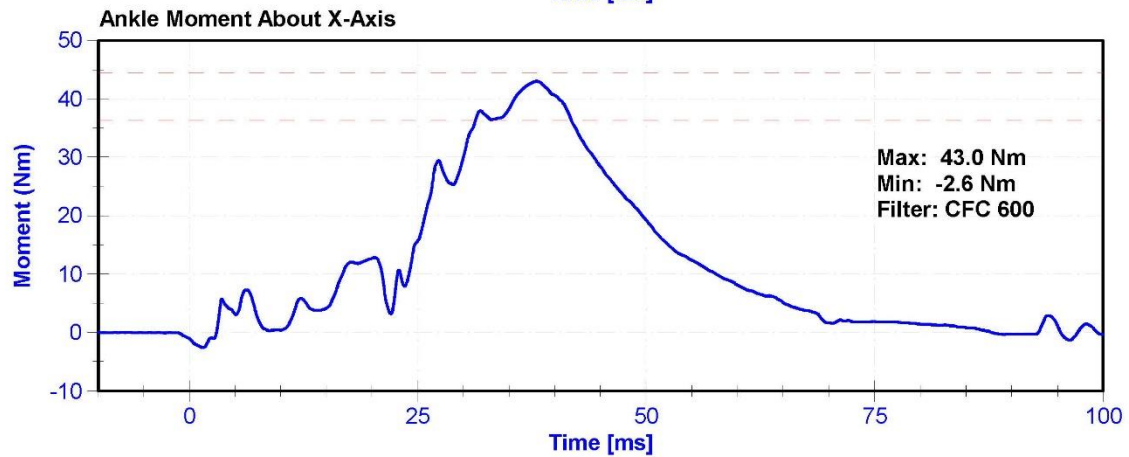
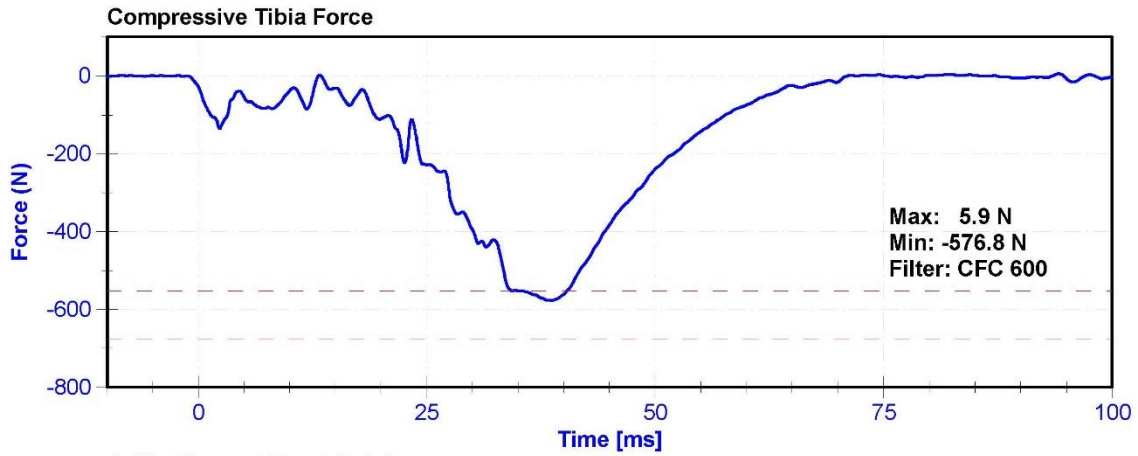
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	0016	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	40.6	Pass
Velocity	1.9	2.1	m/s	1.944	Pass
Lower Tibia Compressive Force	-675	-552	N	-576.8	Pass
Peak Moment about X-Axis	36.3	44.4	Nm	43.03	Pass
Peak Rotation about X-Axis	30.3	37.0	deg	33.69	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-139 Fz	6/16/2015	6/15/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0544	6/30/2015	6/29/2016





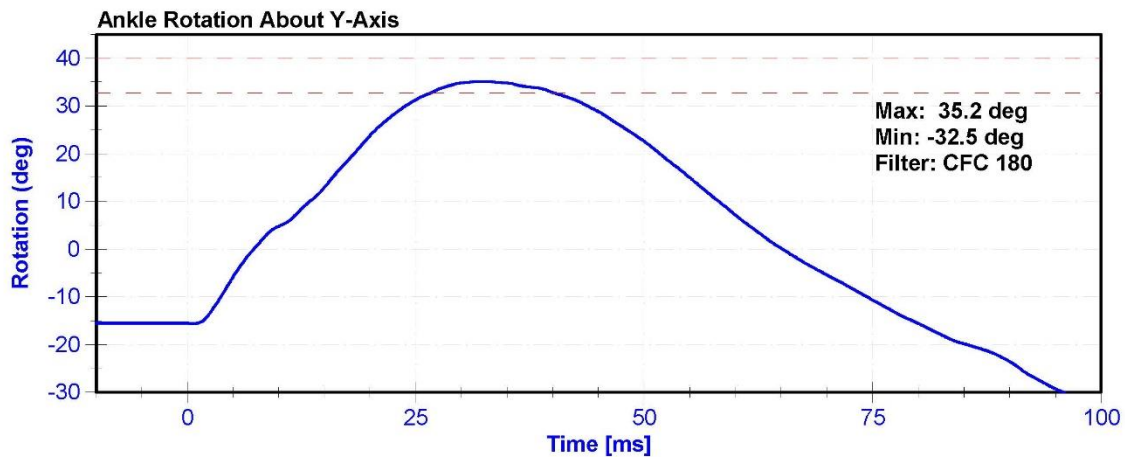
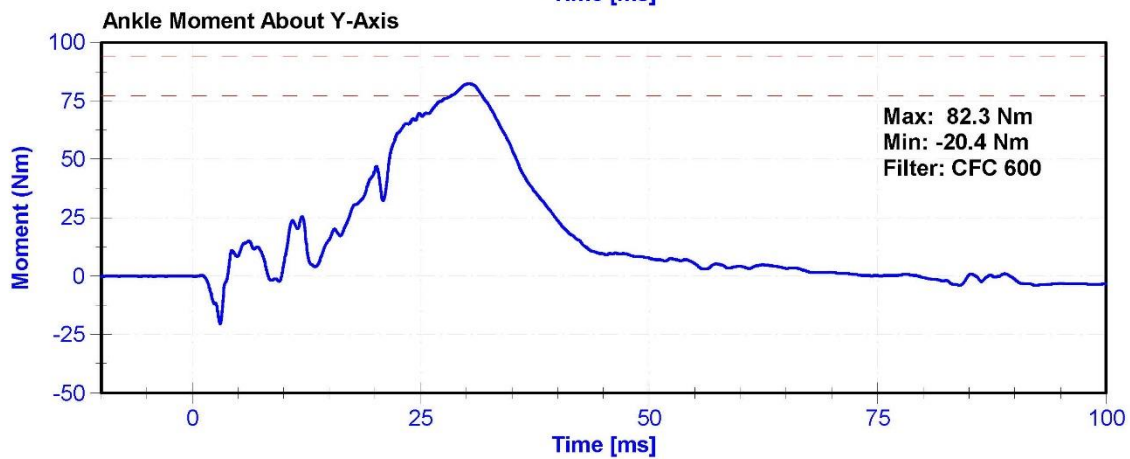
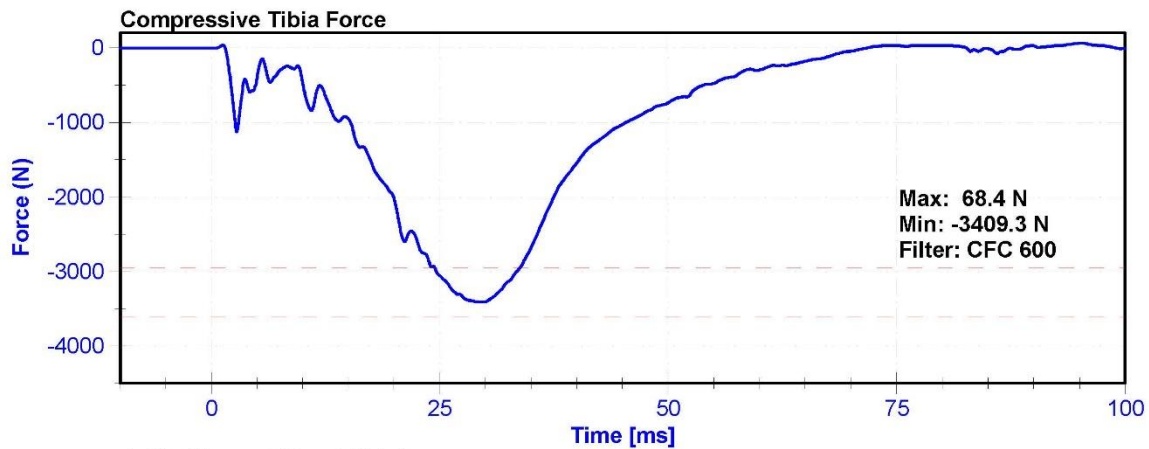
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	016	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	34.0	Pass
Velocity	4.9	5.1	m/s	5.040	Pass
Lower Tibia Compressive Force	-3613	-2956	N	-3409.3	Pass
Peak Moment about Y-Axis	77.1	94.2	Nm	82.34	Pass
Peak Rotation about Y-Axis	32.7	39.9	deg	35.19	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	8/27/2015	2/26/2016
Lower Tibia Load Cell	Denton 4929J	LC-140 Fz	3/3/2015	3/2/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0525-1	7/7/2015	7/6/2016



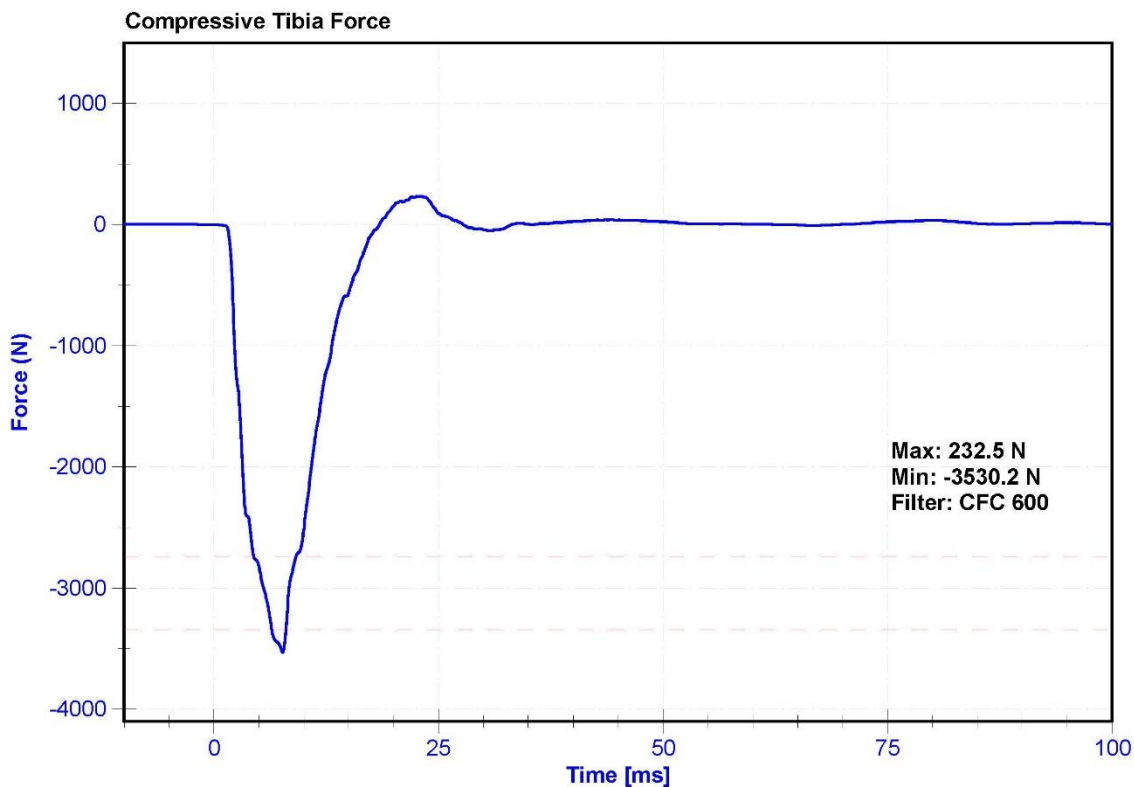
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	016	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	35	Pass
Velocity	3.9	4.1	m/s	3.969	Pass
Lower Tibia Compressive Force	-3346	-2738	N	-3530.2	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	8/27/2015	2/26/2016
Lower Tibia Load Cell	Denton 4929J	LC-140 Fz	3/3/2015	3/2/2016





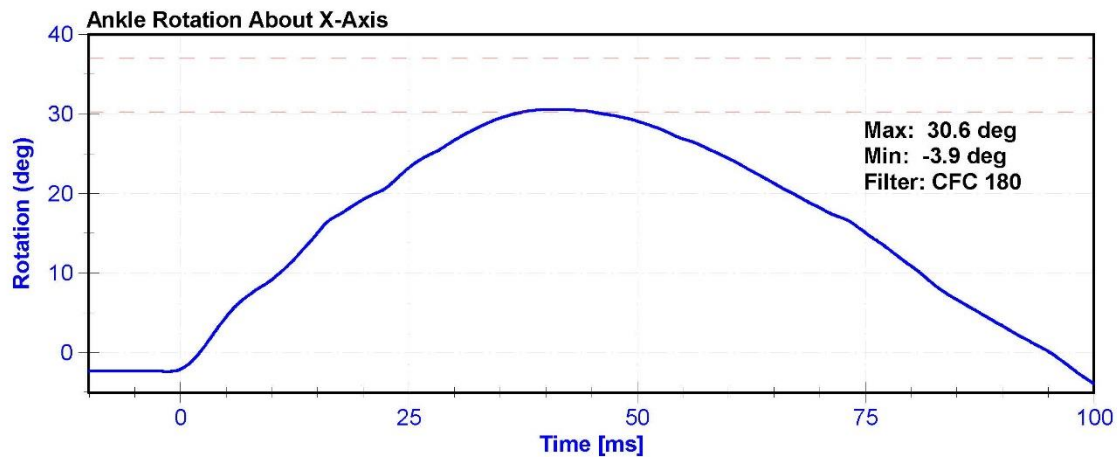
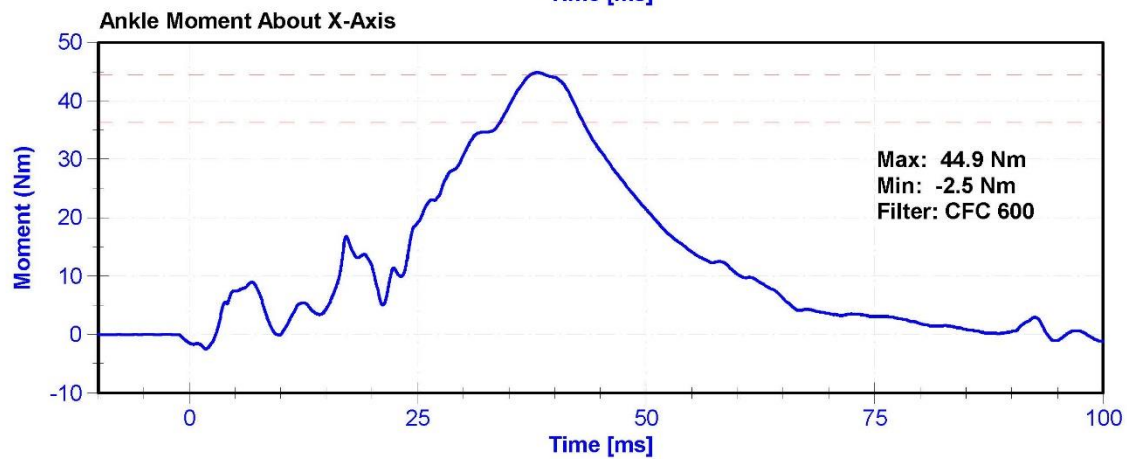
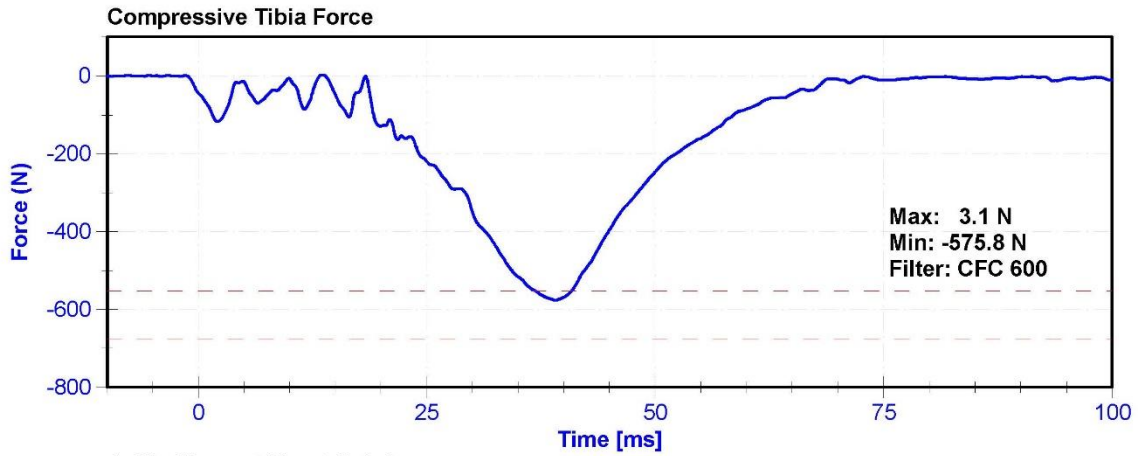
ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	016	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	33.0	Pass
Velocity	1.9	2.1	m/s	1.960	Pass
Lower Tibia Compressive Force	-675	-552	N	-575.8	Pass
Peak Moment about X-Axis	36.3	44.4	Nm	44.87	Fail
Peak Rotation about X-Axis	30.3	37.0	deg	30.59	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	8/27/2015	2/26/2016
Lower Tibia Load Cell	Denton 4929J	LC-140 Fz	3/3/2015	3/2/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0254	6/30/2015	6/29/2016





ATD Manufacturer	Humanetics	Test Technician	M.Hartung
ATD Serial Number	016	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	33.1	Pass
Velocity	1.9	2.1	m/s	1.954	Pass
Lower Tibia Compressive Force	-675	-552	N	-556.8	Pass
Peak Moment about X-Axis	-44.4	-36.3	Nm	-41.89	Pass
Peak Rotation about X-Axis	-37.0	-30.3	deg	-35.63	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32227	8/27/2015	2/26/2016
Lower Tibia Load Cell	Denton 4929J	LC-140 Fz	3/3/2015	3/2/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0254	6/30/2015	6/29/2016

