

REPORT NUMBER: R&D-CAL-14-002

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

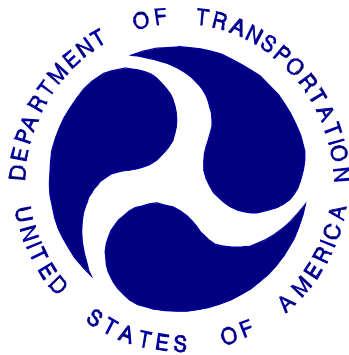
2014 MAZDA CX-5

90.1KPH, 15 DEGREE ANGLE, 35% OVERLAP

TEST DATE: 06/23/2014

NHTSA No: C20145401

**CALSPAN CORPORATION
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October 29, 2014

PREPARED FOR:

**U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Vehicle safety Research
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Date: _____

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NHTSA, Office of Structures and Restraints Research

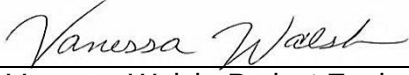
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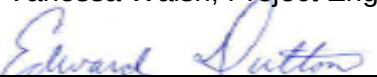
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16. Abstract A test was conducted in accordance with Task Order 0002 of Contract DTNH22-10-D-00155. The Test consisted of a Research Moving Deformable Barrier (RMDB) traveling at a target speed of 90.12 kph into a stationary 2014 Mazda CX-5 SUV. The struck vehicle was positioned 15 degrees relative to the moving barrier and impacted 35% of the left side of the vehicle. The test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The test was conducted at the Calspan Corporation's Transportation Test Operation's facility in Buffalo, New York on June 23, 2014. The RMDB impact velocity was 90.02 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 461 mm. The test vehicle's performance was as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD</th> <th colspan="2">Pass. ATD</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td>700</td> <td>217.79</td> <td>700</td> <td>113.25</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-43.56</td> <td>63</td> <td>-32.54</td> </tr> <tr> <td>Neck Injury Criteria (Nij)</td> <td>N/A</td> <td>1</td> <td>0.31</td> <td>1</td> <td>0.23</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4,170</td> <td>1967.81</td> <td>4,170</td> <td>1389.89</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4,000</td> <td>-75.48</td> <td>4,000</td> <td>-34.03</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10,008</td> <td>-2917.97</td> <td>10,008</td> <td>-3311.21</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10,008</td> <td>-1592.11</td> <td>10,008</td> <td>-1526.61</td> </tr> </tbody> </table>					Measurement Description	Units	Driver ATD		Pass. ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)	N/A	700	217.79	700	113.25	Maximum Chest Compression	mm	63	-43.56	63	-32.54	Neck Injury Criteria (Nij)	N/A	1	0.31	1	0.23	Neck Tension	N	4,170	1967.81	4,170	1389.89	Neck Compression	N	4,000	-75.48	4,000	-34.03	Left Femur Force	N	10,008	-2917.97	10,008	-3311.21	Right Femur Force	N	10,008	-1592.11	10,008	-1526.61
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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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Test Program:	<u>R&D 90.1kph, 15° / 35% Left Oblique Offset</u>	Test Date:	<u>6/23/2014</u>

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SECTION 1
PURPOSE OF TEST

Test Vehicle: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014

This 90.12 kph (56 mph) Moving Barrier into a test vehicle is part of the Frontal Offset Test outlined in Contract No. DTNH22-10-D-00155, Task Order 0002. The purpose of this test is to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

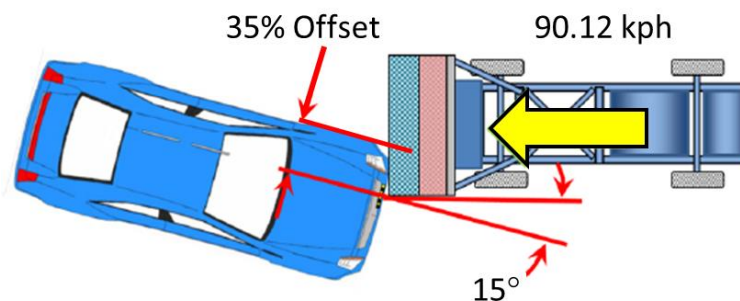
This test was conducted in accordance with the instructions set forth for a 15° angle, 35% offset moving barrier to vehicle impact, outlined in Contract No. DTNH22-10-D-00155, TO 0002. Data was obtained indicant of Federal Motor Vehicle Safety Standard FMVSS 208-Occupant Crash Protection, FMVSS 212 – Windshield Mounting, FMVSS 219 (partial) – Windshield Zone Intrusion, and FMVSS 301 – Fuel System Integrity, in addition to the requirements of Contract No. DTNH22-10-D-00155, TO 0002.

SECTION 2 SUMMARY OF TEST

Test Vehicle: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014

A 2014 Mazda CX-5 SUV was impacted on the left front corner by a research moving deformable barrier (RMDB). 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 RMDB. The RMDB 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 1,768.5 kg (3,896.7 lbs), and the RMDB's mass was 2490.2 kg (5490 lbs). The test was conducted by Calspan Corporation on June 23, 2014.



The test was documented by two (2) real time and fourteen (14) 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, RMDB, 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. 015) was seated in the left, front (P1 -Driver's) seating position and one 50% adult male THOR-NT adult male ATD (Serial No. 016) was seated in the right front passenger seating position (P2). The driver and passenger were positioned according to instructions specified in laboratory test procedures FMVSS 208-14, "Occupant Crash Protection", TP208-14, July 27, 2006.

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

SECTION 2 (CONTINUED)

SUMMARY OF TEST

Test Vehicle: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014

Two hundred and thirty six (236) channels of data from the two ATD's, test vehicle and RMDB were collected using Kayser – Threde and DTS data acquisition systems. Appendix B contains dummy data plots, as well as vehicle and RMDB response data plots.

There was 90.8% total windshield retention, with 81.7% and 100% retention on the left and right sides, respectively. There appeared to be no intrusion into the protected zone of the windshield during any portion of the impact event. The maximum static crush of the vehicle was 449 mm at C2 to the left of the vehicle's centerline. The maximum crush of the structural bumper beam was 461 mm at B3, to the left of the vehicle's centerline. Full vehicle measurements are presented in Section 3 of this report.

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

Structure observations include the following:

- Windshield had cracks throughout with minor separation
- Hood bent inwards and exposed part of the engine compartment

The driver ATD's visible contact points were:

- Head contacted the frontal and curtain airbag.
- Torso contacted the frontal airbag, torso airbag, and driver's shoulder contacted the side door
- Knees contacted the knee bolster

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

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

SECTION 2 (CONTINUED) CRASH VEHICLE SUMMARY

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

Primary Impact Data

Measured Parameter	Units	Value
RMDB Velocity at Impact	kph	90.02
RMDB Test Weight	kg	2490.2
RMDB Maximum Static Crush	mm	251
Vehicle Test Weight	kg	1768.5
Actual Vehicle Angle	degrees	15
Vehicle Maximum Static Crush	mm	461
Vertical Offset from Target Point (+ down / - up)*	mm	-13
Lateral Offset from Target Point (+ left / - right)*	mm	+25
Number of Data Channels		236
Number of Real-Time Cameras		2
Number of High-Speed Cameras		14

*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	Front & Curtain Airbag	A49-A51	Front Airbag	A70-A72
Left Shoulder Contact	Driver's Door	N/A	Center Instrument Panel	N/A
Upper Torso Contact	Front & Torso Airbags	N/A	Front Airbag	N/A
Lower Torso Contact	None	N/A	None	N/A
Left Knee Contact	Knee Bolster	A28	Glove Box	A52
Left Outside Leg Contact	None	N/A	None	N/A
Right Knee Contact	Knee Bolster	A28	Glove Box	A52

Data Anomalies:

- Driver Right Lower Thorax IRTACC Z Potentiometer -Questionable magnitude spike from 100ms to 122ms
- Driver Right Abdomen IRTACC Y Potentiometer - Data spikes throughout
- Driver Right Femur Y Moment - Data spikes throughout
- Passenger Lower Neck X Force - Extreme Spikes at 55 and 130ms.
- Passenger Left Acetabulum Y Force - Channel failed

PRELIMINARY INJURY SUMMARY: Driver

Test Vehicle: 2014 Mazda CX-5 NHTSA No.: R20145401
 Test Program: Research and Development Left Oblique Offset Test Date: 6/23/2014

Driver: Thor Serial No. 015 Injury Summary

	Nomenclature	Units	Source	Max	Min
Head	Head CG X	g	1000	10.95	-45.66
	Head CG Y	g	1000	38.19	-7.29
	Head CG Z	g	1000	35.09	-2.61
	Head Resultant	g	Compute	59.41	
	36 ms HIC		Compute	447.52	
	15 ms HIC		Compute	217.79	
	Head Resultant CG Acceleration, 3 ms Clip	g	Compute	53.57	
	Head Rotational Velocity X	deg/s	60	703.79	-561.93
	Head Rotational Velocity Y	deg/s	60	865.33	-1991.36
	Head Rotational Velocity Z	deg/s	60	548.98	-567.85
	Head Rotational Velocity Resultant	deg/s	Compute	2040.64	
	Brain Injury Criteria		Compute	0.68	
Neck	UNLC Transferred to OC, Neck System, FX	N	1000	94.52	-588.31
	UNLC Neck System Tension, FZ	N	1000	1967.81	
	UNLC Neck System Compression, FZ	N	1000		-75.48
	UNLC Transferred to OC, Neck System Flexion, MY	N-m	Thortest	0.42	
	UNLC Transferred to OC, Neck System Extension, MY	N-m	Thortest		-9.45
	NIJ		Compute	0.31	
	On head acting through total neck section, FX	N	Thortest	68.88	-528.21
	On head acting through total neck section, FY	N	Thortest	347.46	-73.74
	On head acting through total neck section, FZ	N	Thortest	1971.31	-59.42
	On head acting through total neck section, MX	N-m	Thortest	28.25	-14.21
	On head acting through total neck section, MY	N-m	Thortest	25.28	-14.62
	On head acting through total neck section, MZ	N-m	Thortest	9.68	-6.85
	On head acting through O.C. joint only, FX	N	Thortest	95.25	-630.25
	On head acting through O.C. joint only, FZ	N	Thortest	1938.46	-152.58
	On head acting through O.C. joint only, MY	N-m	Thortest	0.42	-9.45
Chest	Upper Left IR-TRACC X - deflection	mm	Thortest	0.14	-21.05
	Upper Left IR-TRACC Y - deflection	mm	Thortest	3.80	-7.73
	Upper Left IR-TRACC Z - deflection	mm	Thortest	10.75	-13.58
	Upper Left IR-TRACC D - deflection	mm	Thortest	0.15	-19.58
	Upper Right IR-TRACC X - deflection	mm	Thortest	0.59	-44.59
	Upper Right IR-TRACC Y - deflection	mm	Thortest	6.92	-7.08
	Upper Right IR-TRACC Z - deflection	mm	Thortest	22.51	-8.75
	Upper Right IR-TRACC D - deflection	mm	Thortest	0.58	-43.56
	Lower Left IR-TRACC X - deflection	mm	Thortest	11.07	-1.59
	Lower Left IR-TRACC Y - deflection	mm	Thortest	5.75	-9.40

PRELIMINARY INJURY SUMMARY: Driver

Test Vehicle: 2014 Mazda CX-5 NHTSA No.: R20145401
 Test Program: Research and Development Left Oblique Offset Test Date: 6/23/2014

Driver: Thor Serial No. 015 Injury Summary

	Nomenclature	Units	Source	Max	Min
Chest (Con't)	Lower Left IR-TRACC Z - deflection	mm	Thortest	6.78	-6.37
	Lower Left IR-TRACC D - deflection	mm	Thortest	10.96	-2.77
	Lower Right IR-TRACC X - deflection	mm	Thortest	0.19 ⁽¹⁾	-228.93 ⁽¹⁾
	Lower Right IR-TRACC Y - deflection	mm	Thortest	0.10 ⁽¹⁾	-112.75 ⁽¹⁾
	Lower Right IR-TRACC Z - deflection	mm	Thortest	13.00 ⁽¹⁾	-0.56 ⁽¹⁾
	Lower Right IR-TRACC D - deflection	mm	Thortest	0.21 ⁽¹⁾	-36.39 ⁽¹⁾
	Chest CG Acceleration, 3 ms clip	g	Compute	N/A	
Abdomen	Lower Left IR-TRACC X - deflection	mm	Thortest	0.33	-50.81
	Lower Left IR-TRACC Y - deflection	mm	Thortest	0.09	-14.63
	Lower Left IR-TRACC Z - deflection	mm	Thortest	15.00	-4.53
	Lower Left IR-TRACC D - deflection	mm	Thortest	0.32	-51.31
	Left Viscous Criterion Based on X - deflection		Compute	1.27	
	Lower Right IR-TRACC X - deflection	mm	Thortest	8.04 ⁽²⁾	-52.26 ⁽²⁾
	Lower Right IR-TRACC Y - deflection	mm	Thortest	3.70 ⁽²⁾	-4.16 ⁽²⁾
	Lower Right IR-TRACC Z - deflection	mm	Thortest	94.71 ⁽²⁾	-0.65 ⁽²⁾
	Lower Right IR-TRACC D - deflection	mm	Thortest	8.03 ⁽²⁾	-53.52 ⁽²⁾
	Right Viscous Criterion Based on X - deflection		Compute	2.67	
Spine	Upper Spine (T1) AX	g	180	9.86	-45.04
	Upper Spine (T1) AY	g	180	5.82	-25.14
	Upper Spine (T1) AZ	g	180	21.66	-4.34
	Upper Spine (T1) Resultant	g	Compute	50.65	
	Middle Spine (T6) AX	g	180	8.38	-32.26
	Middle Spine (T6) AY	g	180	23.44	-4.53
	Middle Spine (T6) AZ	g	180	4.50	-15.08
	Middle Spine (T6) Resultant	g	Compute	34.82	
Pelvis	Pelvis CG Resultant Acceleration	g	Compute	54.74	
Acetabulum	Left FX force	N	600	749.42	-981.90
	Left FY force	N	600	163.02	-918.08
	Left FZ force	N	600	761.75	-848.06
	Left Acetabulum Resultant	N	Compute	1259.04	
	Right FX force	N	600	1934.45	-1163.57
	Right FY force	N	600	442.07	-1773.02
	Right FZ force	N	600	852.79	-634.26
	Right Acetabulum Resultant	N	Compute	2152.95	

Anomalies

- (1) Questionable magnitude from 100 to 124 ms
- (2) Questionable spikes throughout

PRELIMINARY INJURY SUMMARY: Driver Legs

Test Vehicle: 2014 Mazda CX-5 NHTSA No.: R20145401
 Test Program: Research and Development Left Oblique Offset Test Date: 6/23/2014

Driver: Thor Serial No. 015 Injury Summary

	Nomenclature	Units	Source	Max	Min
Knee	Left Knee Displacement, DX	mm	180	2.11	-4.66
	Right Knee Displacement, DX	mm	180	1.59	-8.20
Femur	Left Femur Force, FZ	N	600	426.95	-2917.97
	Left Femur Moment, MX	N-m	600	15.61	-189.19
	Left Femur Moment, MY	N-m	600	60.64	-70.78
	Left Femur Res (MX / MY only, not MZ)	N-m	Compute	197.04	
	Right Femur Force, FZ	N	600	537.69	-1592.11
	Right Femur Moment, MX	N-m	600	23.31	-284.45
	Right Femur Moment, MY	N-m	600	94.14 ⁽³⁾	-266.67 ⁽³⁾
	Right Femur Res (MX / MY only, not MZ)	N-m	Compute	285.45 ⁽³⁾	
	Left Upper Tibia, FZ	N	600	121.12	-1345.12
	Left Upper Tibia, MY	N-m	600	38.17	-86.29
Tibia	Left Upper Tibia, Index		Compute	0.52	
	Right Upper Tibia, FZ	N	600	200.08	-1706.22
	Right Upper Tibia, MY	N-m	600	97.13	-51.45
	Right Upper Tibia, Index		Compute	0.46	
	Left Lower Tibia, FZ	N	600	276.86	-2518.85
	Left Lower Tibia, MY	N-m	600	26.40	-60.06
	Left Lower Tibia, Index		Compute	0.54	
	Right Lower Tibia, FZ	N	600	149.73	-2590.00
	Right Lower Tibia, MY	N-m	600	58.04	-56.98
	Right Lower Tibia, Index		Compute	0.46	
Ankle	Left Ankle Rotation, RX	Deg	180	20.91	-27.14
	Left Ankle Rotation, RY	Deg	180	23.23	-21.54
	Right Ankle Rotation, RX	Deg	180	18.30	-30.21
	Right Ankle Rotation, RY	Deg	180	9.32	-14.29
Anomalies					
(3) Questionable spikes throughout					

PRELIMINARY INJURY SUMMARY: Right Front Passenger

Test Vehicle: 2014 Mazda CX-5 NHTSA No.: R20145401
 Test Program: Research and Development Left Oblique Offset Test Date: 6/23/2014

Right Front Passenger: Thor Serial No. 016 Injury Summary

	Nomenclature	Units	Source	Max	Min
Head	Head CG X	g	1000	10.81	-27.68
	Head CG Y	g	1000	23.03	-13.36
	Head CG Z	g	1000	33.86	-1.63
	Head Resultant	g	Compute	40.89	
	36 ms HIC		Compute	215.42	
	15 ms HIC		Compute	113.25	
	Head Resultant CG Acceleration, 3 ms Clip	g	Compute	38.54	
	Head Rotational Velocity X	deg/s	60	946.52	
	Head Rotational Velocity Y	deg/s	60	393.95	-986.92
	Head Rotational Velocity Z	deg/s	60	1642.69	-766.06
	Head Rotational Velocity Resultant	deg/s	Compute	2733.33	
	Brain Injury Criteria		Compute	0.91	
	Neck	UNLC Transferred to OC, Neck System, FX	N	1000	249.12
UNLC Neck System Tension, FZ		N	1000	1389.89	
UNLC Neck System Compression, FZ		N	1000		-34.03
UNLC Transferred to OC, Neck System Flexion, MY		N-m	Thortest	9.81	
UNLC Transferred to OC, Neck System Extension, MY		N-m	Thortest		-14.23
NIJ			Compute	0.23	
On head acting through total neck section, FX		N	Thortest	268.55	-288.46
On head acting through total neck section, FY		N	Thortest	461.65	-54.84
On head acting through total neck section, FZ		N	Thortest	1534.73	-25.47
On head acting through total neck section, MX		N-m	Thortest	35.29	-33.12
On head acting through total neck section, MY		N-m	Thortest	10.90	-29.33
On head acting through total neck section, MZ		N-m	Thortest	6.33	-20.01
On head acting through O.C. joint only, FX		N	Thortest	256.85	-235.22
On head acting through O.C. joint only, FZ		N	Thortest	1378.59	-40.25
On head acting through O.C. joint only, MY		N-m	Thortest	9.81	-14.23
Chest	Upper Left IR-TRACC X - deflection	mm	Thortest	0.10	-33.18
	Upper Left IR-TRACC Y - deflection	mm	Thortest	8.29	-1.43
	Upper Left IR-TRACC Z - deflection	mm	Thortest	16.70	-13.50
	Upper Left IR-TRACC D - deflection	mm	Thortest	0.10	-32.54
	Upper Right IR-TRACC X - deflection	mm	Thortest	2.67	-8.27
	Upper Right IR-TRACC Y - deflection	mm	Thortest	9.24	-4.83
	Upper Right IR-TRACC Z - deflection	mm	Thortest	4.77	-16.04
	Upper Right IR-TRACC D - deflection	mm	Thortest	1.48	-8.87
	Lower Left IR-TRACC X - deflection	mm	Thortest	0.01	-33.74
	Lower Left IR-TRACC Y - deflection	mm	Thortest	22.13	-0.22

PRELIMINARY INJURY SUMMARY: Right Front Passenger

Test Vehicle: 2014 Mazda CX-5 NHTSA No.: R20145401
 Test Program: Research and Development Left Oblique Offset Test Date: 6/23/2014

Right Front Passenger: Thor Serial No. 016 Injury Summary

	Nomenclature	Units	Source	Max	Min
Chest (Con't)	Lower Left IR-TRACC Z - deflection	mm	Thortest	8.01	-12.42
	Lower Left IR-TRACC D - deflection	mm	Thortest	3.45	-29.90
	Lower Right IR-TRACC X - deflection	mm	Thortest	7.55	-5.82
	Lower Right IR-TRACC Y - deflection	mm	Thortest	7.47	-8.38
	Lower Right IR-TRACC Z - deflection	mm	Thortest	20.78	-8.62
	Lower Right IR-TRACC D - deflection	mm	Thortest	7.72	-5.77
	Chest CG Acceleration, 3 ms clip	g	Compute	N/A	
Abdomen	Lower Left IR-TRACC X - deflection	mm	Thortest	0.43	-55.99
	Lower Left IR-TRACC Y - deflection	mm	Thortest	5.03	-6.22
	Lower Left IR-TRACC Z - deflection	mm	Thortest	2.77	-10.54
	Lower Left IR-TRACC D - deflection	mm	Thortest	0.43	-55.33
	Left Viscous Criterion Based on X - deflection		Compute	0.89	
	Lower Right IR-TRACC X - deflection	mm	Thortest	0.03	-56.45
	Lower Right IR-TRACC Y - deflection	mm	Thortest	14.44	-0.14
	Lower Right IR-TRACC Z - deflection	mm	Thortest	2.96	-10.29
	Lower Right IR-TRACC D - deflection	mm	Thortest	0.03	-55.52
	Right Viscous Criterion Based on X - deflection		Compute	0.94	
Spine	Upper Spine (T1) AX	g	180	6.85	-31.01
	Upper Spine (T1) AY	g	180	30.93	-7.44
	Upper Spine (T1) AZ	g	180	21.95	-3.32
	Upper Spine (T1) Resultant	g	Compute	40.03	
	Middle Spine (T6) AX	g	180	6.50	-27.16
	Middle Spine (T6) AY	g	180	11.24	-2.16
	Middle Spine (T6) AZ	g	180	13.30	-9.72
	Middle Spine (T6) Resultant	g	Compute	28.98	
Pelvis	Pelvis CG Resultant Acceleration	g	Compute	59.42	
Acetabulum	Left FX force	N	600	882.20	-1968.35
	Left FY force	N	600	5440.64 ⁽⁴⁾	-7127.39 ⁽⁴⁾
	Left FZ force	N	600	818.38	-552.32
	Left Acetabulum Resultant	N	Compute	7150.78 ⁽⁴⁾	
	Right FX force	N	600	2676.46	-465.43
	Right FY force	N	600	483.31	-1262.33
	Right FZ force	N	600	1975.78	-266.67
	Right Acetabulum Resultant	N	Compute	2811.34	
Anomalies (4) Channel failed.					

PRELIMINARY INJURY SUMMARY: Right Front Passenger Legs

Test Vehicle: 2014 Mazda CX-5 NHTSA No.: R20145401
 Test Program: Research and Development Left Oblique Offset Test Date: 6/23/2014

Right Front Passenger: Thor Serial No. 016 Injury Summary

	Nomenclature	Units	Source	Max	Min
Knee	Left Knee Displacement, DX	mm	180	1.13	-2.03
	Right Knee Displacement, DX	mm	180	1.18	-5.27
Femur	Left Femur Force, FZ	N	600	302.30	-3311.21
	Left Femur Moment, MX	N-m	600	59.92	-193.04
	Left Femur Moment, MY	N-m	600	45.95	-43.02
	Left Femur Res (MX / MY only, not MZ)	N-m	Compute	196.55	
	Right Femur Force, FZ	N	600	549.00	-1526.61
	Right Femur Moment, MX	N-m	600	135.51	-223.22
	Right Femur Moment, MY	N-m	600	137.66	-49.75
	Right Femur Res (MX / MY only, not MZ)	N-m	Compute	223.32	
Tibia	Left Upper Tibia, FZ	N	600	122.04	-3017.83
	Left Upper Tibia, MY	N-m	600	9.07	-69.97
	Left Upper Tibia, Index		Compute	0.74	
	Right Upper Tibia, FZ	N	600	213.77	-3000.89
	Right Upper Tibia, MY	N-m	600	17.38	-71.81
	Right Upper Tibia, Index		Compute	0.73	
	Left Lower Tibia, FZ	N	600	50.63	-2262.65
	Left Lower Tibia, MY	N-m	600	22.93	-73.08
	Left Lower Tibia, Index		Compute	0.69	
	Right Lower Tibia, FZ	N	600	246.00	-1973.78
	Right Lower Tibia, MY	N-m	600	53.47	-90.32
	Right Lower Tibia, Index		Compute	0.64	
Ankle	Left Ankle Rotation, RX	Deg	180	23.84	-34.27
	Left Ankle Rotation, RY	Deg	180	9.18	-28.11
	Right Ankle Rotation, RX	Deg	180	25.62	-36.07
	Right Ankle Rotation, RY	Deg	180	-4.59	-27.04
Anomalies					
None					

SECTION 3 DATA SHEETS

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

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6	High-Speed Camera Locations and Data	3-12
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DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

VEHICLE INFORMATION

NHTSA No.	R20145401
Model Year	2014
Make	Mazda
Model	CX-5
Body Style	SUV
VIN	JM3KE4BE7E0421562
Body Color	Gray
Odometer Reading (km/mi)	178 km / 111 mi
Engine Displacement. (L)	2.0
Type/No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	All 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)	Yes
Traction Control System (TCS)	Yes

VEHICLE OPTIONS

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

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

Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Mazda Motor Corporation
Date of Manufacture	12/13

GWR (kg)	2043
GAWR Front (kg)	1026
GAWR Rear (kg)	1020

VEHICLE SEATING AND WEIGHT CAPACITY

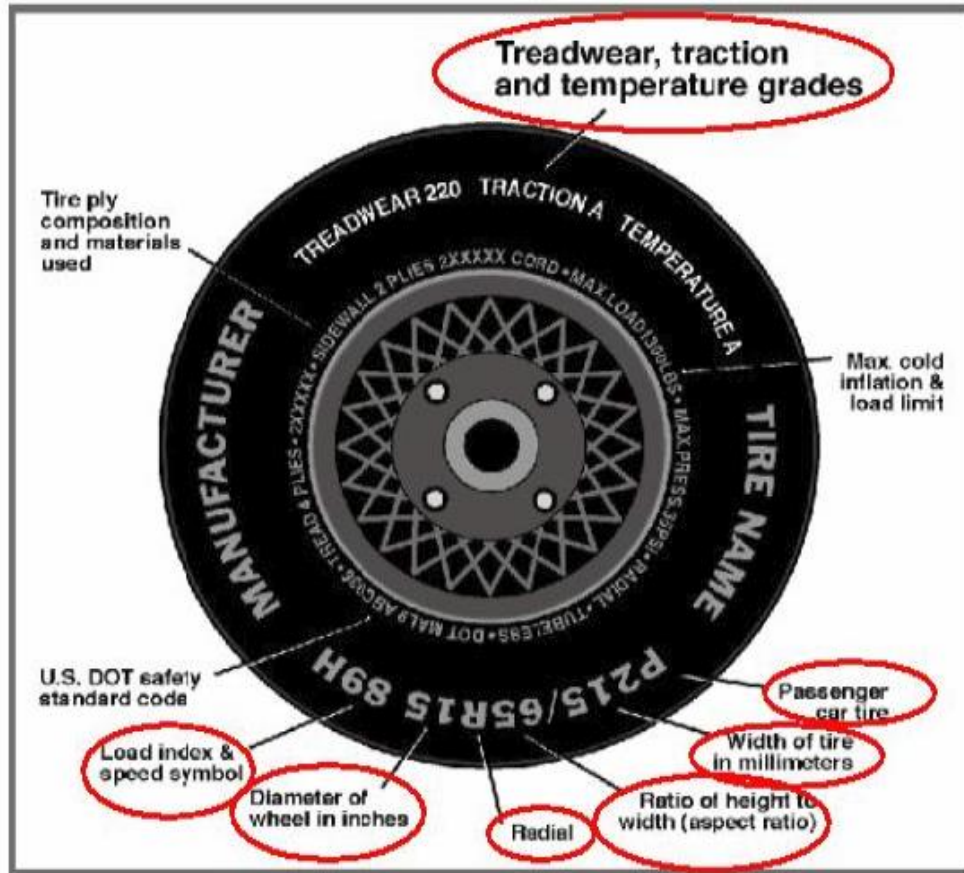
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	--	
Number of Occupants	2	3	--	5
Capacity Wt. (VCW) (kg)				385
Cargo Wt. (RCLW) (kg)				44.8

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

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

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



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	230	230
Recommended Tire Size	P225/65R17	P225/65R17
Tire Size on Vehicle	P225/65R17	P225/65R17
Tire Manufacturer	Yokohama	Yokohama
Tire Model	Geolander G91	Geolander G91
Treadwear	280	280
Traction	B	B
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Nylon	2 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	100H	100H
Tire Material	Rubber	Rubber
DOT Safety Code Right	FDF5PCS4613	FDF5PCS4613
DOT Safety Code Left	FDF5PCS4613	FDF5PCS4613

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

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	441	327		484.5	418	
Right	kg	425.5	316		468.5	397.5	
Ratio	%	57.4%	42.6%		54%	46	
Totals	kg	866.5	643	1509.5	953	815.5	1768.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1509.5
Weight of 2 P572E ATDs	kg	197.8
Rated Cargo/Luggage Weight (RCLW)	kg	44.8
Calculated Vehicle Target Weight (TVTW)	kg	1752.1

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	823	825	833	840	1149
As Tested	mm	801	805	802	806	1244
Post Test	mm	870	779	760	879	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2697
Total Vehicle Length at Left Side	mm	4400
Total Vehicle Length at Centerline	mm	4540
Total Vehicle Length at Right Side	mm	4399
Weight of Ballast in Cargo Area	kg	0
Weight of Vehicle Components Removed	kg	84
Amount of Stoddard Solvent in Fuel Tank	L	53.9

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

Muffler, trunk carpeting, spare tire, jack, tail light, underbody panels and rear seats.

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

Test Vehicle: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements		Pre-Test
1	Total Length	mm	4540
2	Total Width	mm	1845
3*	Bumper Top Height	mm	649
4*	Bumper Bottom Height	mm	491
5*	Longitudinal Member Top Height	mm	634
6	Distance Between Longitudinal Members	mm	1085
7	Longitudinal Member Width	mm	99
8*	Engine Top Height	mm	958
9*	Engine Bottom Height	mm	258
10	Engine and Gearbox Width	mm	546
11	Front Bumper-Engine Distance	mm	574
12*	Front Shock Absorber Fixing Height	mm	1021
13*	Bonnet Leading Edge Height	mm	899
14	Front Shock Absorber Fixing Width	mm	1182
15	Front Bumper – Front Axle Distance	mm	934
16	Front Axle – A Pillar Distance	mm	510
17	A-Pillar – B-Pillar Distance	mm	1125
18	B-Pillar – Rear Axle Distance	mm	1060
19	B-Pillar – C-Pillar Distance	mm	919
20*	Roof Sill Bottom Height	mm	1543
21*	Roof Sill Top Height	mm	1655
22*	Floor Sill Bottom Height	mm	350
23*	Floor Sill Top Height	mm	478

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

DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

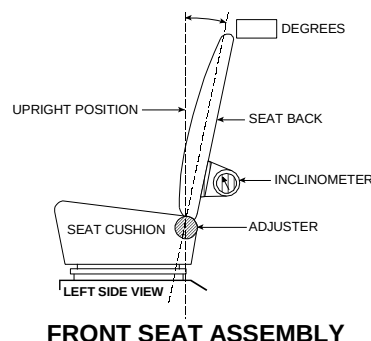
NHTSA No.: R20145401
 Test Date: 6/23/2014

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

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



	Deg.
Driver Seat Back Angle	7.5
Passenger Seat Back Angle	6.2

SEAT FORE/AFT POSITIONS

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

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

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

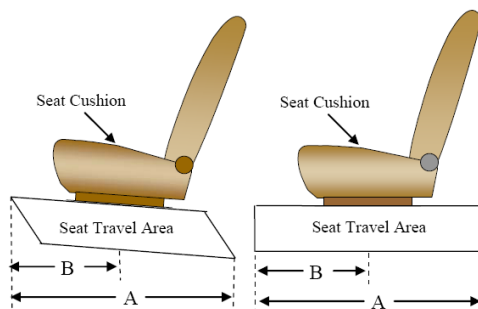
	Total Fore/Aft Travel	Placed in Position #
Driver Seat	27 (0-26)	10
Passenger Seat	27 (0-26)	13

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	4	0
Passenger Seat	4	0



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

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

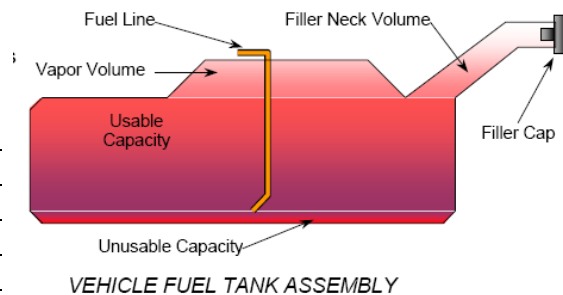
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	58.0
Usable Capacity of "Optional Tank"	
93% of Usable Capacity	53.9
Actual Amount of Solvent Used	53.9
1/3 of Usable Capacity	19.3

FUEL PUMP

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

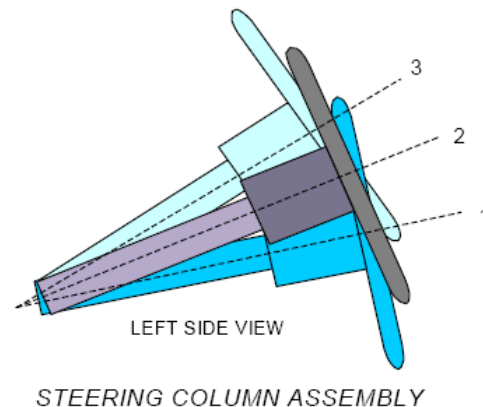
Fuel evacuated according to the specifications provided by the manufacturer in Form 1. Electric fuel pump operates when the ignition is in the 'on' position and the engine is running. The fuel filler neck is located above the left rear wheel.



STEERING COLUMN ADJUSTMENT

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

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



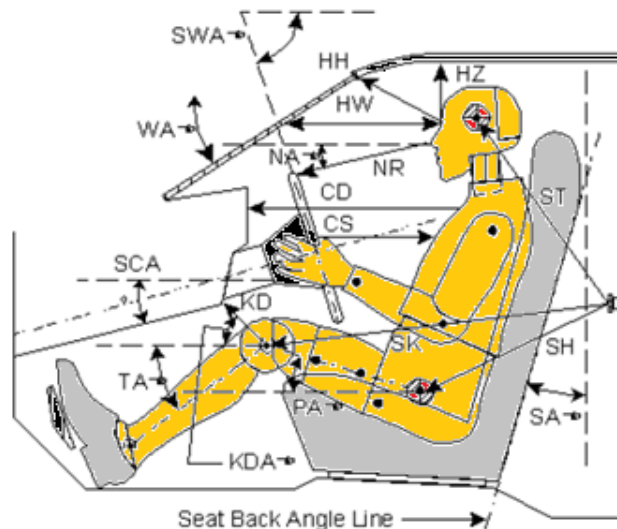
STEERING COLUMN POSITIONS

	Tilt (degrees)	Fore/Aft Position (mm)
Lowermost position No. 1	23.5	
Geometric center position No. 2	26.0	
Uppermost position No. 3	28.5	
Telescoping Steering Wheel Travel		48
Test Position	26.0	24

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014



Code	Measurement Description	Driver (Serial # THOR 015)		Passenger (Serial # THOR 016)	
		Length (mm)	Angle(°)	Length (mm)	Angle (°)
WA°	Windshield Angle		-30.7		
SWA°	Steering Wheel Angle		26		
SCA°	Steering Column Angle		64		
SA°	Seat Back Angle (on headrest post)		7.8		5.9
HZ	Head to Roof (Z)	231	90	189	90
HH	Head to Header	435	18.1	447	12.9
HW	Head to Windshield	710	0	613	0
NR	Nose to Rim	516	-19.1	727	-33.6
CD	Chest to Dash	579		557	
CS	Chest to Steering Hub	358	-3.7		
RA	Rim to Abdomen	185	0		
KDL	Left Knee to Dash	125	11.5	97	28.9
KDR	Right Knee to Dash	90	34.9	117	28.2
PA°	Pelvic Angle		24.8		24.8
TA°	Tibia Angle		-51.2		-46.2
SK	Striker to Knee	626	-3.0	648	-5.6
ST	Striker to Head	502	-88.1	550	-89.0
SH	Striker to H-Point	293	-35.3	265	-29.4
HAX°	Head Angle (X)		-0.1		-0.1
HAY°	Head Angle (Y)		0.2		0.3
NAX°	Neck Angle (X)		N/A		N/A
NAY°	Neck Angle (Y)		N/A		N/A
TAX°	T6 Angle (X)		0.0		-0.1
TAY°	T6 Angle (Y)		20.8		17.8
LAX°	T1 (X)		-0.3		3.6
LAY°	T1 (Y)		3.1		0.4

DATA SHEET NO.3 (CONTINUED)
DUMMY CMM MEASUREMENTS

Test Vehicle: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014

Description	Units	Driver			Passenger		
		X	Y	Z	X	Y	Z
Striker	mm	1247	-798	754	1247	802	758
Head CG	mm	1296	-442	267	1289	455	225
Bridge of Nose	mm	1387	-362	255	1378	372	215
Tip of Nose	mm	1387	-363	291	1379	370	253
Shoulder Bolt	mm	1332	-553	517	1373	562	489
Tip of Chin	mm	1385	-363	392	1375	371	353
H-Point	mm	1518	-612	938	1512	623	905
Left Knee	mm	1904	-585	803	1926	319	840
Right Knee	mm	1923	-292	818	1925	543	839
Left Ankle	mm	2165	-585	1132	2224	317	1135
Right Ankle	mm	2193	-268	1138	2221	533	1138
Left Heel	mm	2174	-572	1272	2193	280	1268
Right Heel	mm	2191	-235	1274	2193	488	1271
Head Bolt 1 – Top Left	mm	1227	-400	219	1214	340	182
Head Bolt 2 – Lower Left	mm	1234	-391	302	1220	352	265
Head Bolt 3 – Top Right	mm	1226	-330	222	1216	412	183
Head Bolt 4 – Lower Right	mm	1232	-343	302	1221	403	264
Driver's Outboard Seat Anchor Bolt	mm	1751	-609	1172	1753	613	1176
Outboard Head Restraint Post	mm	1115	-444	419	1119	456	382
Top of Head Restraint	mm	1156	-364	151	1178	370	113
Center of Steering Wheel	mm	1799	-365	554			

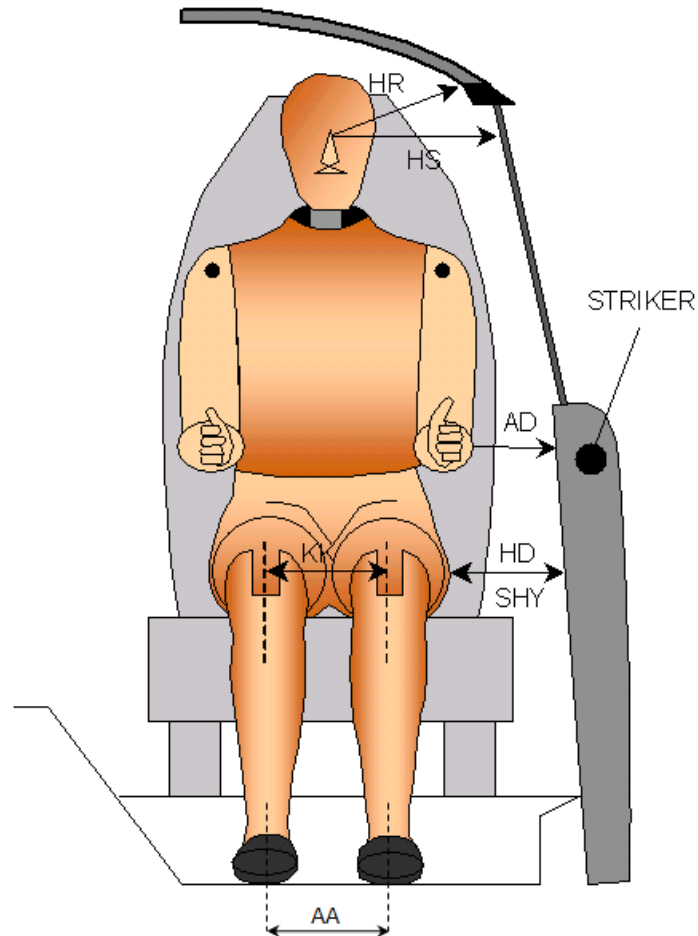
Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +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: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

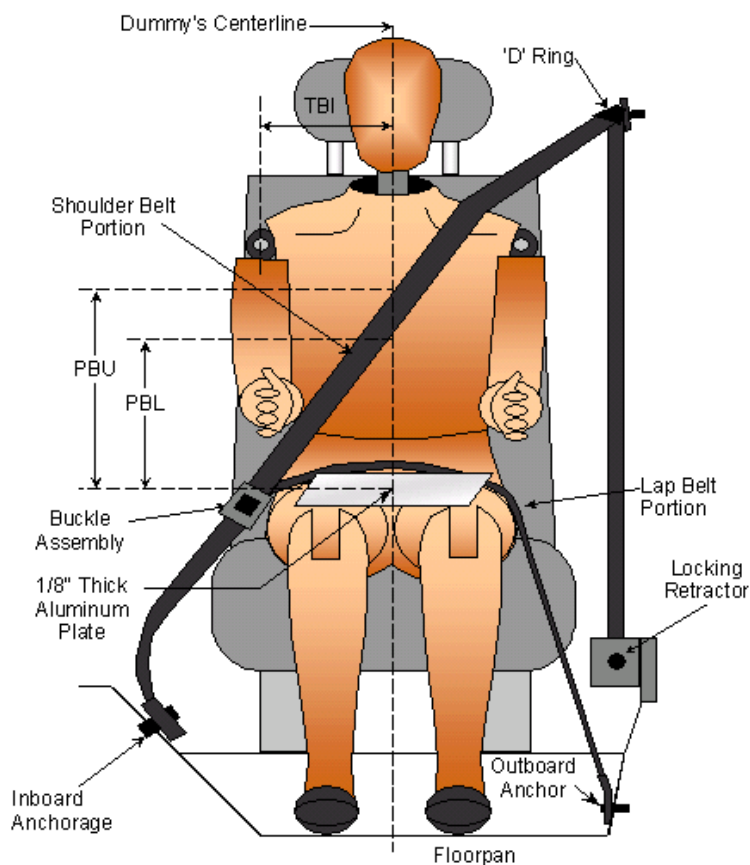


Code	Description	Units	Driver	Passenger
AD	Arm to Door	mm	142	56
HD	H-Point to Door	mm	135	134
HR	Head to Side Header	mm	248	214
HS	Head to Side Window	mm	353	322
KK	Knee to Knee	mm	340	270
SHY	Striker to H-Point (Y Direction)	mm	230	235
AA	Ankle to Ankle	mm	320	214

DATA SHEET NO. 5 SEAT BELT POSITIONING DATA

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU — Top surface of reference to belt upper edge	mm	385	420
PBL — Top surface of reference to belt lower edge	mm	305	345

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	890	920
Lap Belt Length as measured on ATD	mm	795	850
Remainder of belt on reel	mm	915	830
Total belt length for continuous webbing systems	mm	2600	2600

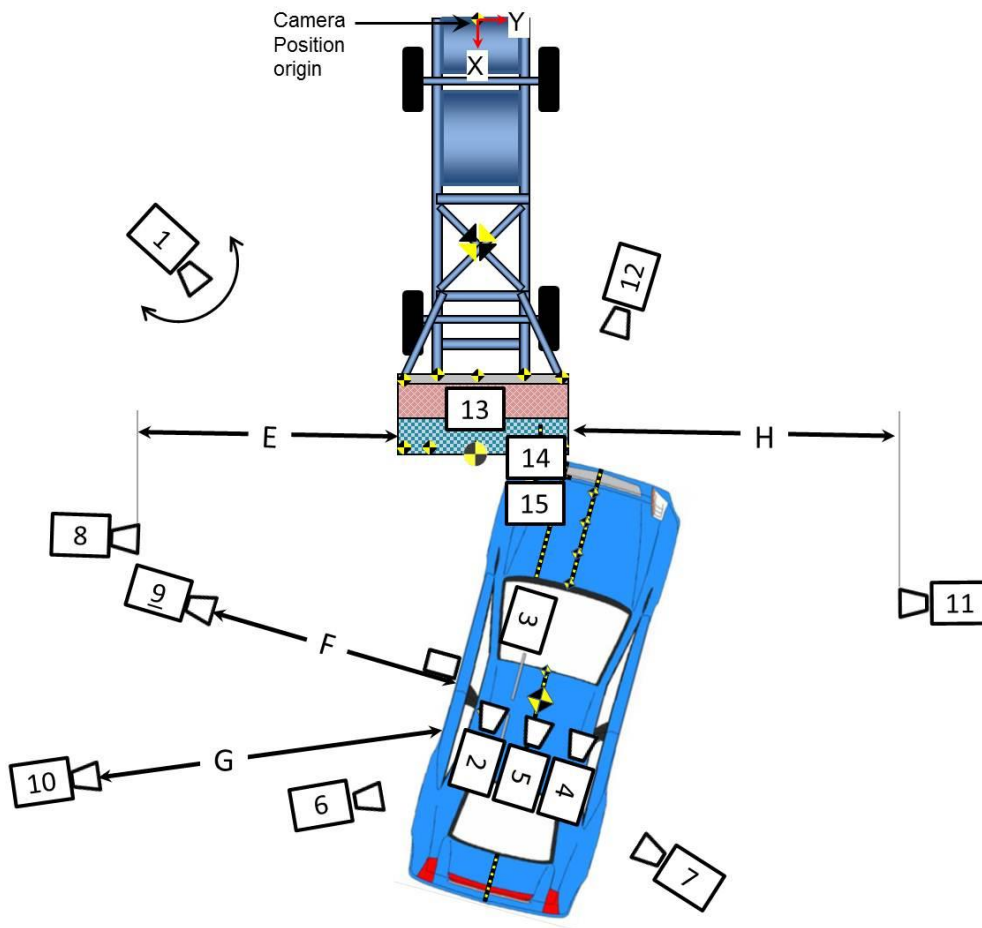
DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle:	2014 Mazda CX-5 SUV
Test Program:	R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014

HORIZONTAL LOCATION



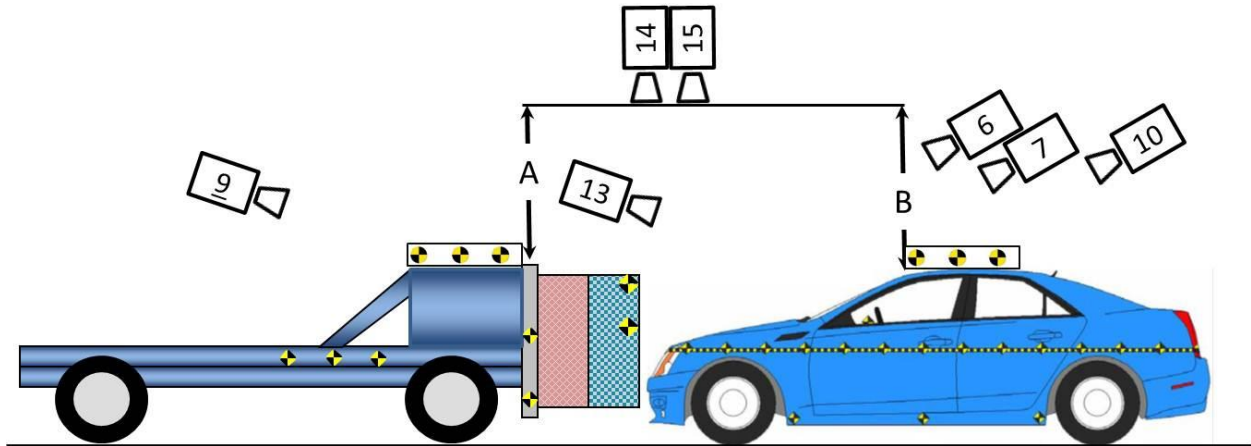
E	mm	6830
F	mm	7520
G	mm	9537
H	mm	6371

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

Test Vehicle: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014

VERTICAL LOCATION



A	mm	4069
B	mm	3591

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

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

CAMERA LOCATIONS

No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side	--	--	--	Zoom	30
2	Onboard Passenger Movement	7769	-75	1506	12.5	1000
3	Onboard Driver Lower Leg	4789	-529	322	6.5	1000
4	Onboard Driver Movement	7809	-848	1506	12.5	1000
5	Onboard Centerline	7775	-529	1506	8	1000
6	Driver Interaction	7875	2641	3417	24	1000
7	Passenger Interaction	10922	-8924	2524	24-70	1000
8	Target Vehicle Left Side Perpendicular (High)	4527	7799	1092	24	1000
9	Target Vehicle Driver Motion	6235	7545	1183	24	1000
10	Target Vehicle Passenger Motion	10268	8904	2968	24-70	1000
11	Target Vehicle Right Side	4706	-7422	1253	24	1000
12	Target Vehicle Left Side (High)	754	-2486	1149	28	1000
13	RMDB/Target Vehicle Interaction	4824	-993	4685	28	1000
14	Close-up Impact Point	6950	-561	5246	15	1000
15	Overall Impact	4501	-150	5246	15	1000

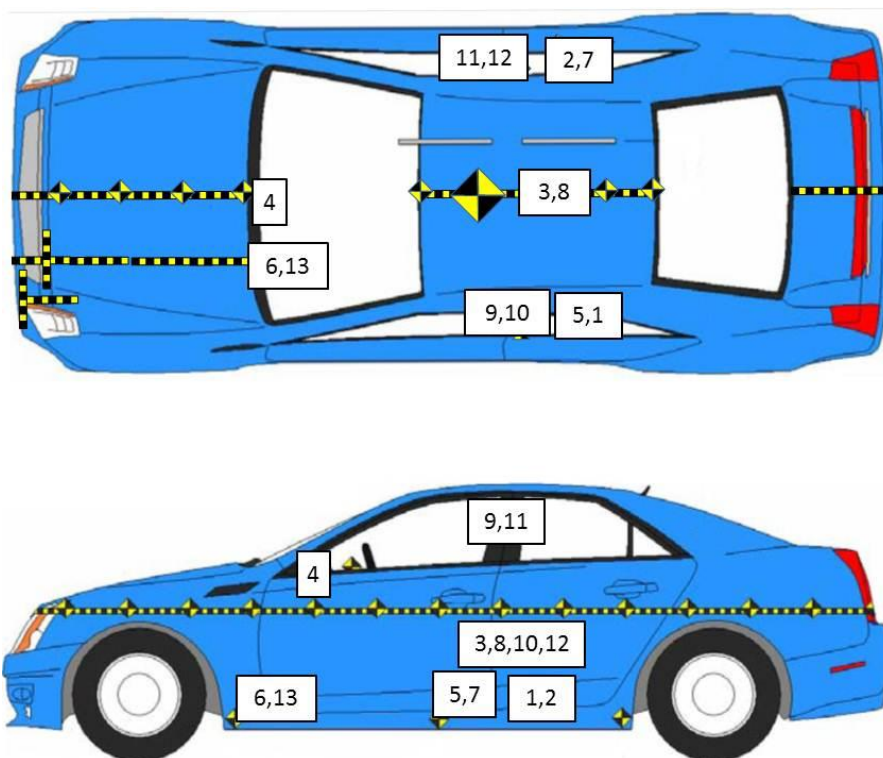
Reference Point: Center most rearward point of the RMDB when in contact with the target vehicle:

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

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

Test Vehicle: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Axes	Units	Measurements (mm)		
				X	Y	Z
1	Left Rear Sill	X,Y	mm	974	-690	1198
2	Right Rear Sill	X,Y	mm	981	705	1203
3	Vehicle CG	X,Y,Z	mm	979	-1	1136
4	Instrument Panel	X	mm	2008	8	588
5	Driver Seat Track	X,Y,Z	mm	1273	-607	1253
6	Behind Brake Pedal	X,Y,Z	mm	2547	-382	1000
7	Passenger Seat Track	X,Y,Z	mm	1274	607	1257
8	Angular Rate Sensors	X	mm	989	0	1144
		Y	mm	979	10	1144
		Z,	mm	979	-1	1136

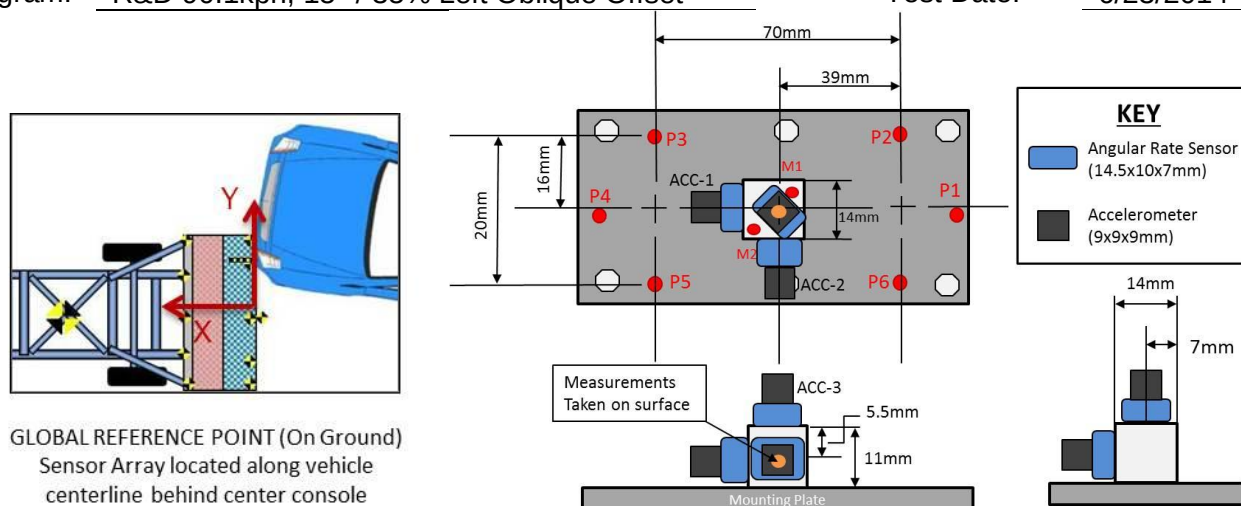
Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +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 VEHICLE INSTRUMENTATION DATA

Test Vehicle: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014



VEHICLE COORDINATE SYSTEM					
No.	Accelerometer Location	Units	Measurements (mm)		
			X	Y	Z
ACC-1	Accelerometer CG – X Direction	mm	989	0	1144
ACC-2	Accelerometer CG – Y Direction	mm	979	10	1144
ACC-3	Accelerometer CG – Z Direction	mm	979	-1	1136
M1	Mounting Bolt 1	mm	987	7	1136
M2	Mounting Bolt 2	mm	971	-8	1137
P1	Plate Point 1	mm	1024	-3	1151
P2	Plate Point 2	mm	1012	-23	1151
P3	Plate Point 3	mm	943	-19	1151
P4	Plate Point 4	mm	932	1	1151
P5	Plate Point 5	mm	944	22	1151
P6	Plate Point 6	mm	1014	18	1151

GLOBAL COORDINATE SYSTEM*					
No.	Accelerometer Location	Units	Measurements (mm)		
			X	Y	Z
ACC-1	Accelerometer CG – X Direction	mm	-2477	1332	-450
ACC-2	Accelerometer CG – Y Direction	mm	-2487	1342	-450
ACC-3	Accelerometer CG – Z Direction	mm	-2487	1331	-458
M1	Mounting Bolt 1	mm	-2479	1339	-457
M2	Mounting Bolt 2	mm	-2495	1324	-457
P1	Plate Point 1	mm	-2442	1329	-443
P2	Plate Point 2	mm	-2454	1309	-442
P3	Plate Point 3	mm	-2523	1313	-442
P4	Plate Point 4	mm	-2534	1333	-442
P5	Plate Point 5	mm	-2522	1354	-443
P6	Plate Point 6	mm	-2452	1350	-443

*Global coordinate system is located at the front center of RMDB on the ground

DATA SHEET NO. 7 (CONTINUED)
VEHICLE INSTRUMENTATION DATA

Test Vehicle: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014

VEHICLE INSTRUMENTATION DATA

Loc.	Description	Axes	Units	Positive Direction		Negative Direction	
				Max	Time (ms)	Max	Time (ms)
1	Left Rear Sill	X	g	2.17	122.65	-33.41	43.95
		Y	g	17.25	57.00	-5.02	65.95
2	Right Rear Sill	X	g	3.63	115.15	-50.57	45.95
		Y	g	18.58	37.65	-4.26	10.85
3	Vehicle CG	X	g	3.16	19.15	-40.25	45.85
		Y	g	18.47	37.30	-4.17	11.10
		Z	g	22.74	37.25	-20.52	42.90
4	Instrument Panel	X	g	17.21	72.90	-95.73	59.25
5	Driver Seat Track	X	g	2.28	123.70	-34.00	49.20
		Y	g	23.94	56.45	-5.61	67.20
		Z	g	15.97	36.95	-16.40	73.90
6	Behind Brake Pedal	X	g	13.93	68.15	-109.64	36.90
		Y	g	42.16	46.30	-23.80	40.05
		Z	g	42.01	36.60	-20.81	64.65
7	Passenger Seat Track	X	g	3.59	114.45	-47.11	46.05
		Y	g	25.17	38.15	-5.09	76.30
		Z	g	7.97	36.35	-10.77	48.65
8	Angular Rate Sensors	X	Deg/s	92.87	62.75	-254.44	42.90
		Y	Deg/s	251.30	47.60	-215.12	64.20
		Z	Deg/s	20.12	10.40	-127.69	43.85
9	Driver Shoulder Belt		N	4576.06	66.55	-32.53	7.75
10	Driver Lap Belt		N	4876.21	60.30	-15.35	11.40
11	Passenger Shoulder Belt		N	3622.45	47.90	-30.38	7.70
12	Passenger Lap Belt		N	6488.56	63.70	-22.74	11.80
13	Driver Floor Pan String Pot		mm	69.78	285.50	-21.44	55.55

Note: See Appendix B for all additional vehicle channel data

TIME TO FIRE RESTRAINT TIMING

Loc.	Description	Axes	Units	Time to Fire (ms)
1	Driver Air Bag Squib 1	*	A	8.25
2	Driver Air Bag Squib 2	*	A	13.30
3	Driver Curtain Airbag	*	A	40.50
4	Driver Torso Airbag	*	A	39.80
5	Driver Knee Airbag	*	A	N/A
6	Driver Pretensioner	*	A	8.25
7	Passenger Air Bag Squib 1	*	A	8.25
8	Passenger Air Bag Squib 2	*	A	13.30
9	Passenger Curtain Airbag	*	A	Did not fire
10	Passenger Torso Airbag	*	A	Did not fire
11	Passenger Knee Airbag	*	A	N/A
12	Passenger Pretensioner	*	A	8.25

* The measurement indicates the time the voltage changed

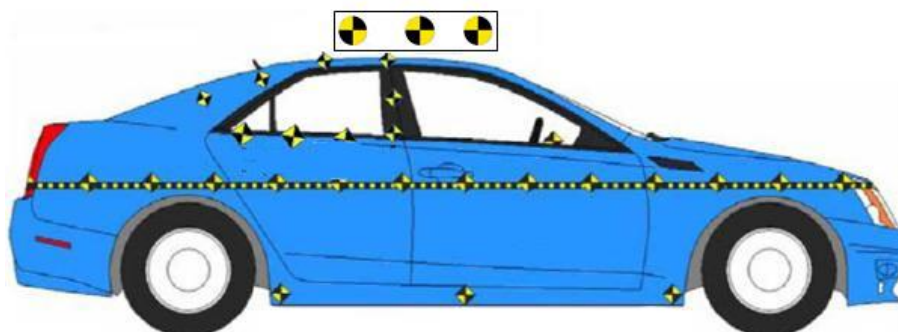
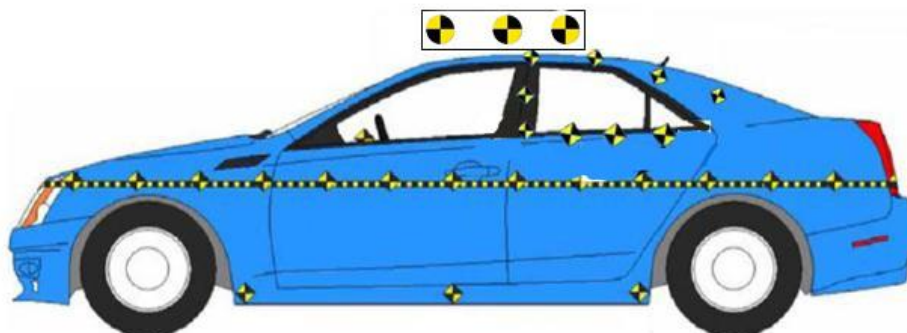
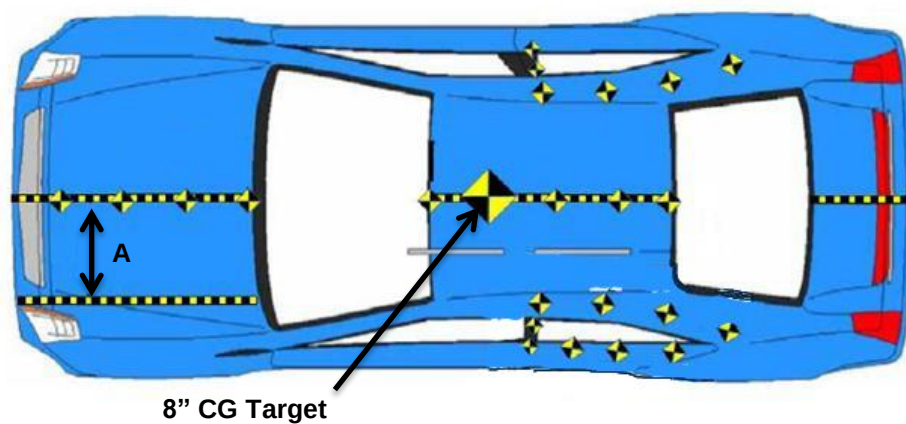
DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014

Item	Units	Value
A	mm	277

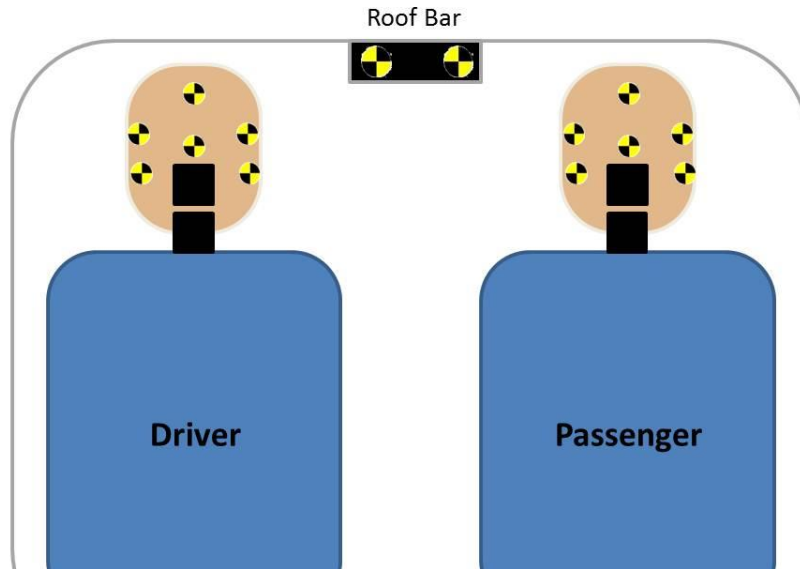
Note: All 6" targets on vehicle are 450 mm apart.



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

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014



Point	Pre-Test		
	X	Y	Z
Roof Bar Driver	1732	-60	146
Roof Bar Passenger	1729	63	147

Reference point: 50mm above the center of the rear windshield (See appendix D for procedure to create coordinate system).

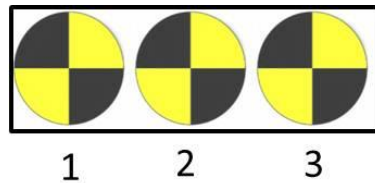
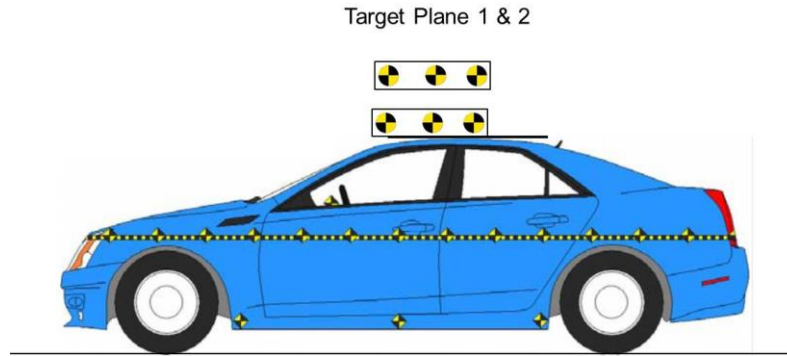
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

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

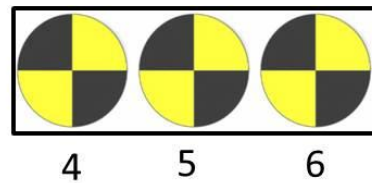
Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

OVERHEAD TARGET BARS



Vertical Target
Plane 1
(Driver's Side)



Vertical Target
Plane 2
(Passenger Side)

Target	Units	X	Y	Z
1	mm	1569	-343	-378
2	mm	1117	-347	-374
3	mm	665	-357	-373
4	mm	1580	364	-382
5	mm	1130	356	-378
6	mm	675	336	-369

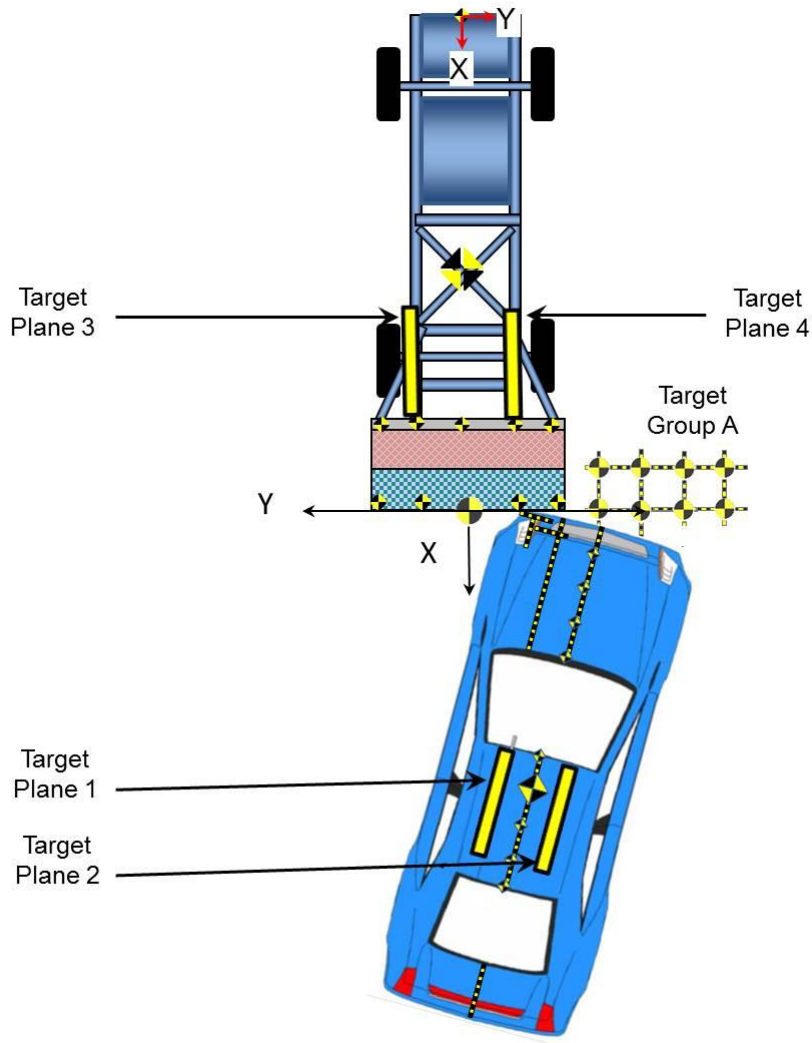
Reference point: 50mm above the center of the rear windshield (See appendix D for procedure to create coordinate system).

- +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: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014



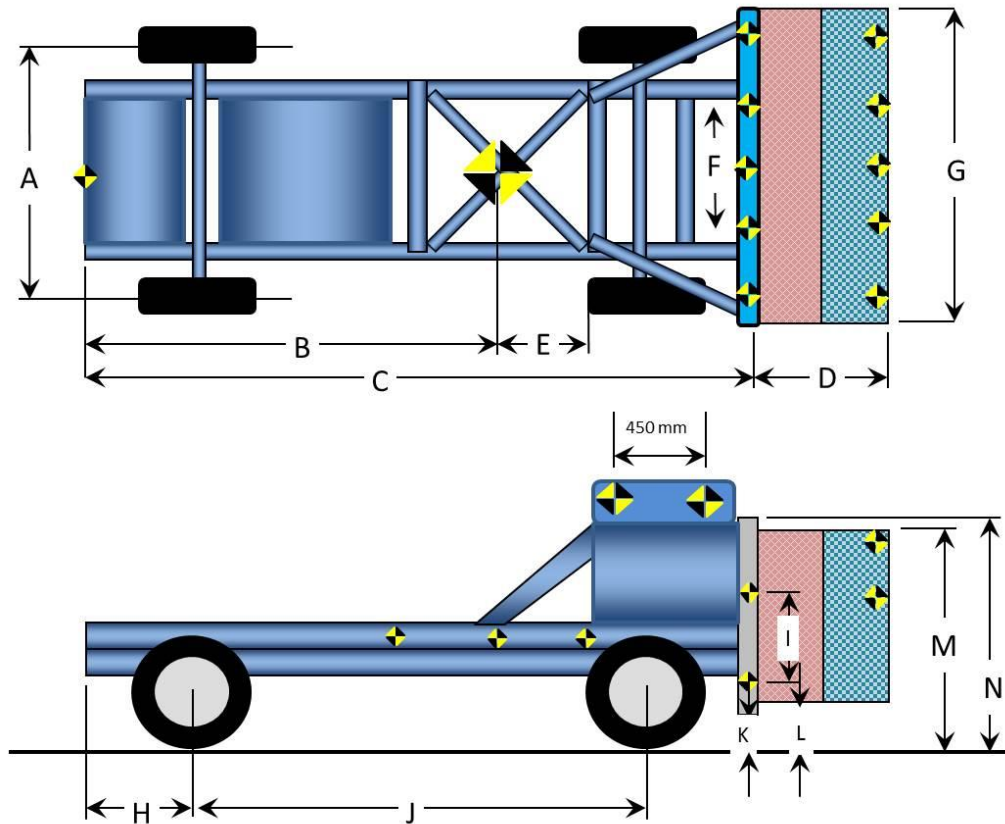
GROUND TARGET LOCATIONS

Target	Units	X	Y
1	mm	0	1411
2	mm	0	1861
3	mm	0	2311
4	mm	-450	1411
5	mm	-450	1861
6	mm	-450	2311

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

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014



Item	Units	Value	Item	Units	Value
A	mm	1930	H	mm	800
B	mm	2449	I	mm	450
C	mm	3995	J	mm	2555
D	mm	605	K	mm	77
E	mm	907	L	mm	71
F	mm	900	M	mm	1024
G	mm	2205	N	mm	1177

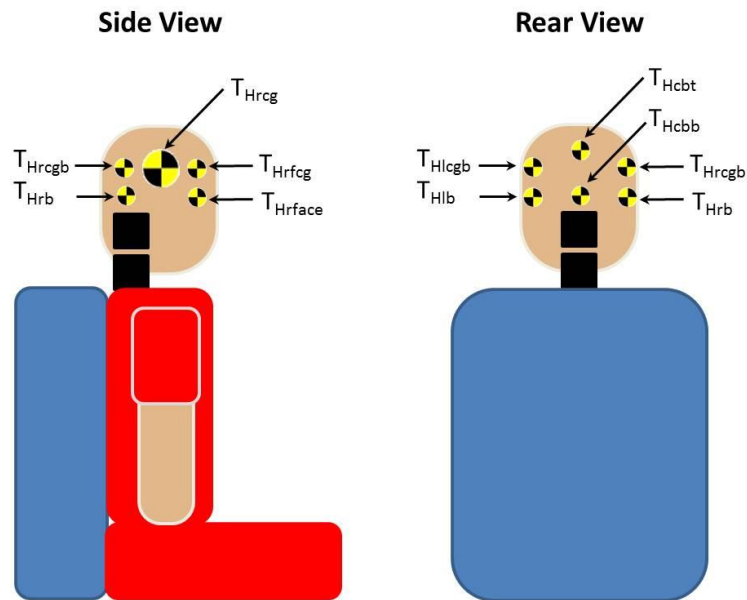
	Units	Front Axle	Rear Axle	Total
Left	kg	804.2	435	1239.2
Right	kg	801.5	449.5	1251
Ratio	%	64.5	35.5	100
Total	kg	1605.7	884.5	2490.2
CG Aft of Front Axle	mm			907

Note: All targets on the RMDB honeycomb are 450mm apart unless otherwise noted.

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

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014



Driver Dummy Head Targets (S/N 016)

Measurement	Units	Value
Distance between T _{Hrcg} & T _{Hrfcg}	mm	38
Distance between T _{Hrcg} & T _{Hrcgb}	mm	38
Distance between T _{Hrcgb} & T _{Hrb}	mm	70
Distance between T _{Hrfcg} & T _{Hrface}	mm	70
Distance between T _{Hlcbg} & T _{Hlfcg}	mm	38
Distance between T _{Hlcbg} & T _{Hlcb}	mm	38
Distance between T _{Hlcbg} & T _{Hlfb}	mm	70
Distance between T _{Hlfcg} & T _{Hlfb}	mm	70
Distance between T _{Hcgt} & T _{Hcbb}	mm	72

Passenger Dummy Head Targets (S/N 015)

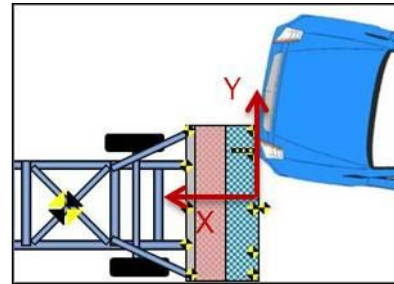
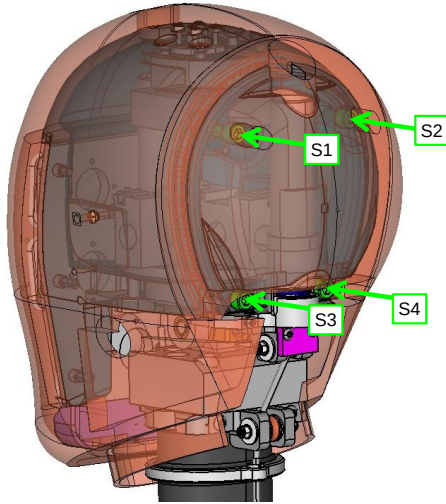
Measurement	Units	Value
Distance between T _{Hrcg} & T _{Hrfcg}	mm	38
Distance between T _{Hrcg} & T _{Hrcgb}	mm	38
Distance between T _{Hrcgb} & T _{Hrb}	mm	70
Distance between T _{Hrfcg} & T _{Hrface}	mm	70
Distance between T _{Hlcbg} & T _{Hlfcg}	mm	38
Distance between T _{Hlcbg} & T _{Hlcb}	mm	38
Distance between T _{Hlcbg} & T _{Hlfb}	mm	70
Distance between T _{Hlfcg} & T _{Hlfb}	mm	70
Distance between T _{Hcgt} & T _{Hcbb}	mm	72

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

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

THOR HEAD BOLT MEASUREMENTS
GLOBAL COORDINATE SYSTEM
Front of RMDB is the Origin



GLOBAL REFERENCE POINT (On Ground)
 Sensor Array located along vehicle
 centerline behind center console

BOLT POINTS RELATIVE TO HEAD CG

Target	X	Y	Z
S1	-65.32	-35.43	-45.75
S2	-65.32	35.43	-45.75
S3	-60.16	-25.40	36.90
S4	-60.16	25.40	36.90

DRIVER'S HEAD BOLT POINTS

Target	X	Y	Z
S1	-2239	932	-1375
S3	-2232	941	-1292
S2	-2240	1001	-1372
S4	-2234	989	-1292

FRONT PASSENGER HEAD BOLT POINTS

Target	X	Y	Z
S1	-2252	1672	-1412
S3	-2246	1684	-1328
S2	-2250	1744	-1411
S4	-2245	1735	-1329

**See Datasheet 3 for head bolt locations in reference to the vehicle coordinate system.*

DATA SHEET NO. 9
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	93
Passenger Dummy Accelerometers	93
Vehicle Structure Accelerometers	44
RMDB Cart Accelerometers	6
Total	236

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	4
High-Speed Off-board	10
Real-Time Panning	2
Total	16

DATA SHEET NO. 10
POST TEST OBSERVATIONS

Test Vehicle: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Right Front Passenger
Dummy Type/Serial No.	THOR015	THOR016
Lower Leg Type	LX	LX
Lower Leg Serial No.	LX0038/LX0039	LX0018/ LX0019
Head Contact	Front & Curtain Airbags	Front Airbag
Upper Torso Contact	Front & Torso Airbags, shoulder contacted the driver's door	Front Airbag, and Shoulder Contacted Center Instrument Panel
Lower Torso Contact	None	None
Left Knee Contact	Knee Bolster	Glove Box
Right Knee Contact	Knee Bolster	Glove Box

DOOR OPENING AND SEAT TRACK INFORMATION

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

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions	Photo Taken (Y/N)
Pillar Performance	Remained in good condition	Y
Windshield Damage	Cracks throughout with minor separation	Y
Window Damage	None	Y
Other Notable Effects	None	--

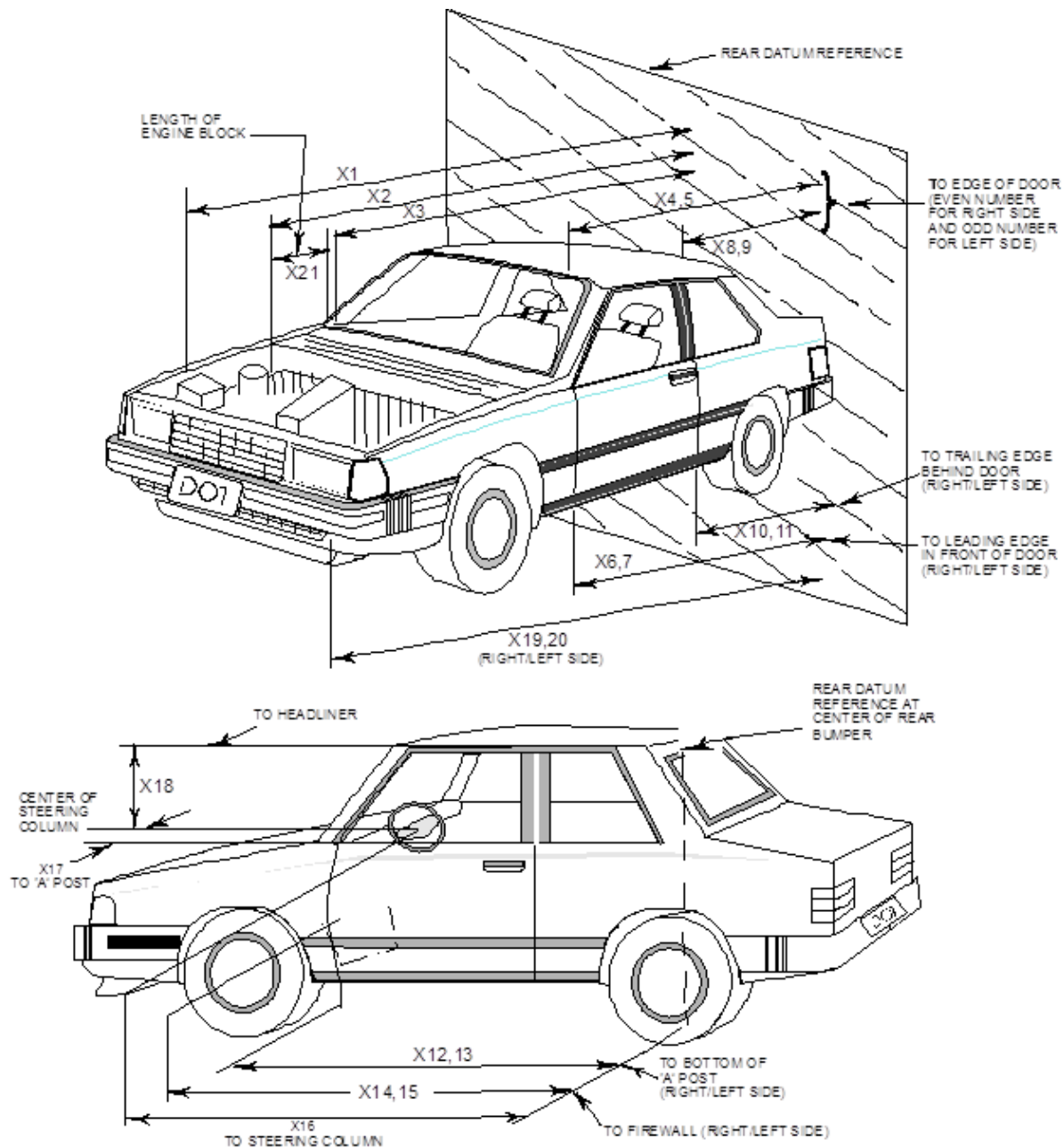
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver (Occupant 1)		Right Front Passenger (Occupant 2)	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	Yes	Yes	Yes
Curtain Airbag	Yes	Yes	Yes	Disabled
Torso Airbag	Yes	Yes	Yes	Disabled
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 **VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014



DATA SHEET NO. 11 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	3735	3478	257
2	Rear Surface of Vehicle (RSOV) to Front of Engine	mm	3161	3003	157
3	RSOV to Firewall	mm	2772	2661	111
4	RSOV to Upper Leading Edge of Right Door	mm	2257	2254	3
5	RSOV to Upper Leading Edge of Left Door	mm	2258	2255	3
6	RSOV to Lower Leading Edge of Right Door	mm	2273	2274	-1
7	RSOV to Lower Leading Edge of Left Door	mm	2277	2268	8
8	RSOV to Upper Trailing Edge of Right Door	mm	1170	1167	3
9	RSOV to Upper Trailing Edge of Left Door	mm	1169	1166	2
10	RSOV to Lower Trailing Edge of Right Door	mm	1223	1222	0
11	RSOV to Lower Trailing Edge of Left Door	mm	1224	1221	3
12	RSOV to Bottom of "A" Post of Right Side	mm	2280	2277	3
13	RSOV to Bottom of "A" Post of Left Side	mm	2283	2280	3
14	RSOV to Firewall, Right Side	mm	2805	2808	-4
15	RSOV to Firewall, Left Side	mm	2805	2540	264
16	RSOV to Steering Column	mm	1799	1798	2
17	Center of Steering Column to "A" Post	mm	291	255	36
18	Center of Steering Column to Headliner	mm	440	419	22
19	RSOV to Right Side of Front Bumper	mm	3665	3631	34
20	RSOV to Left Side of Front Bumper	mm	3666	3205	460
21	Length of Engine Block	mm	332	330	1
RD	RSOV to Right Side of Dash Panel	mm	2016	2017	-1
CD	RSOV to Center of Dash Panel	mm	1923	1928	-5
LD	RSOV to Left Side of Dash Panel	mm	2014	2000	14

UR* = Unrecoverable Data Point

DATA SHEET NO. 12
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

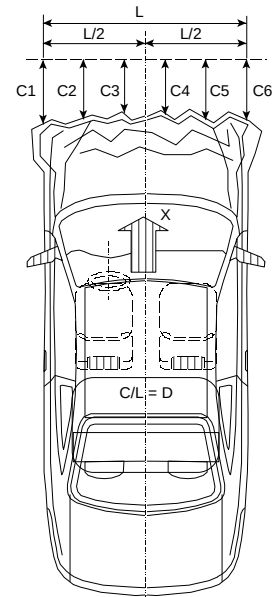
NHTSA No.: R20145401
Test Date: 6/23/2014

VEHICLE INFORMATION

VIN: JM3KE4BE7E0421562 Wheelbase (mm): 2697
Vehicle Size Category: Passenger Test Weight (kg): 1768.5

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): 90.02
Velocity Change (kph): 90.02



CRUSH PROFILE

Collision Deformation Classification: 12FYEW02
Midpoint of Damage: C2
Damage Region Length (mm): 1085
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	3623	3191	432
C2	Crush zone 2 at left side	mm	3686	3237	449
C3	Crush zone 3 at left side	mm	3722	3321	401
C4	Crush zone 4 at right side	mm	3721	3454	267
C5	Crush zone 5 at right side	mm	3686	3551	135
C6	Crush zone 6 at right side	mm	3624	3605	19
L	C1 to C6	mm	1085	946	139

Crush Measurements: Bumper Cover Removed

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
B1	Bumper Beam 1 at left side	mm	3563	3197	-366
B2	Bumper Beam 2 at left side	mm	3588	3160	-428
B3	Bumper Beam 3 at left side	mm	3609	3148	-461
B4	Bumper Beam 4 at left side	mm	3620	3226	-394
B5	Bumper Beam 5 at right side	mm	3624	3308	-316
B6	Bumper Beam 6 at right side	mm	3620	3380	-240
B7	Bumper Beam 7 at right side	mm	3610	3446	-164
B8	Bumper Beam 8 at right side	mm	3588	3508	-80
B9	Bumper Beam 9 at right side	mm	3563	3563	0
L	B1 to B9	mm	959	778	181

DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

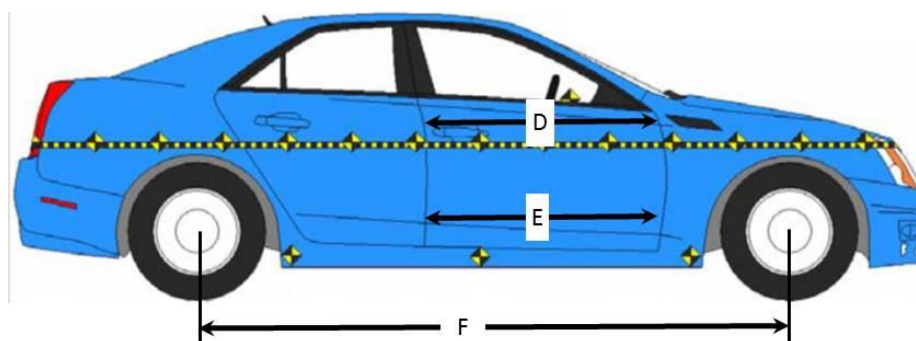
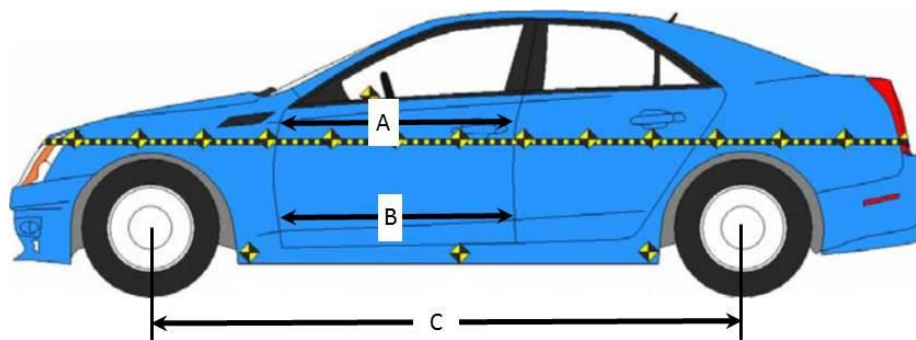
NHTSA No.: R20145401
 Test Date: 6/23/2014

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	979	974	-5
B	Left Side Lower	mm	847	845	-2
D	Right Side Upper	mm	982	980	-2
E	Right Side Lower	mm	847	847	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2697	2500	-197
F	Right Side Wheelbase	mm	2697	2812	115



DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

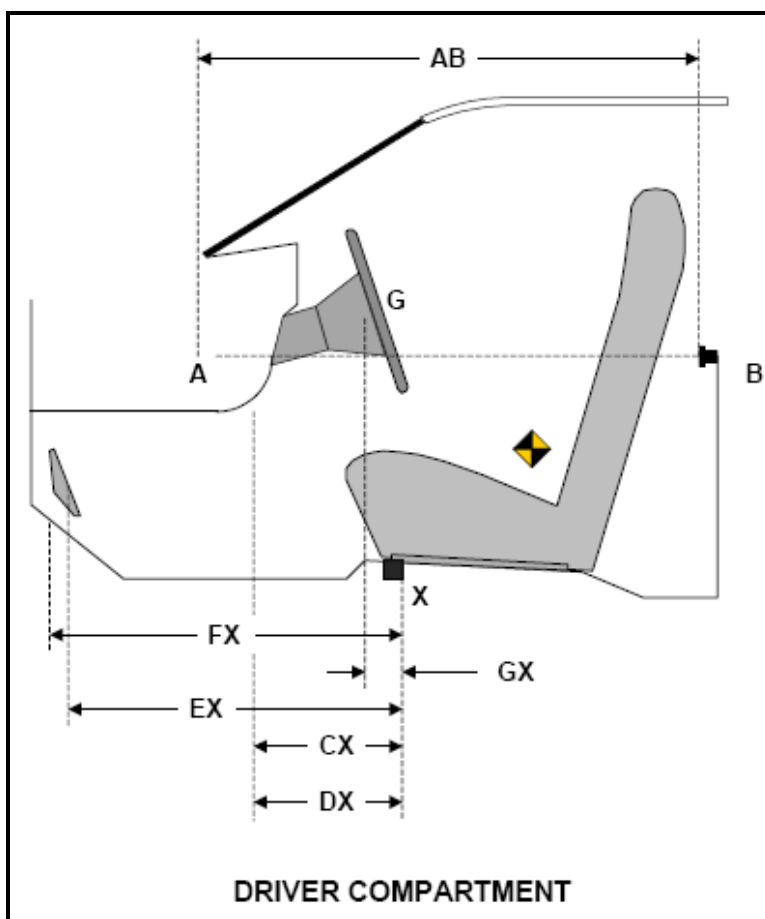
Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	780	780	0
CX	Left Knee Bolster to X	mm	282	280	-2
DX	Right Knee Bolster to X	mm	280	271	-9
EX	Brake Pedal to X	mm	527	566	39
FX	Foot Rest to X	mm	582	563	-19
GX	Center of Steering Column Wheel Hub to X	mm	49	49	0

X = Front of Seat Track (Stationary)

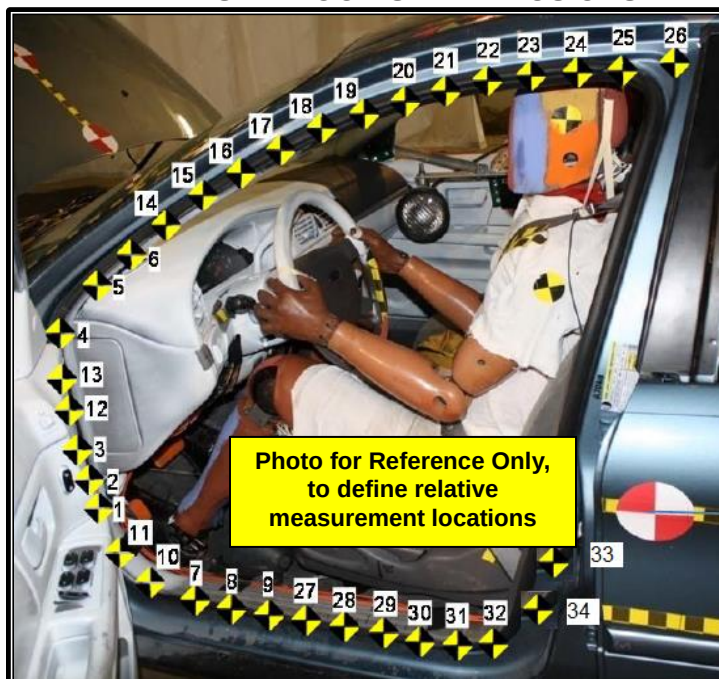


DATA SHEET NO.13 (CONTINUED) **VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014

DRIVER SIDE DOOR SILL INTRUSIONS



Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +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	2150	-754	1107	2147	-738	1102	-3	16	-5
2	2162	-748	1034	2158	-734	1029	-4	14	-5
3	2158	-745	960	2153	-736	954	-5	9	-6
4	2136	-742	657	2128	-745	651	-8	-3	-6
5	2129	-745	583	2123	-751	577	-6	-6	-6
6	2121	-746	506	2114	-752	500	-7	-6	-6
7	2076	-756	1165	2075	-741	1160	-1	15	-5
8	1929	-756	1170	1928	-744	1166	-1	12	-4
9	1778	-757	1168	1777	-750	1165	-1	7	-3
10	2107	-756	1153	2105	-740	1149	-2	16	-4
11	2131	-755	1135	2129	-739	1130	-2	16	-5
12	2150	-741	860	2144	-738	853	-6	3	-7
13	2142	-739	757	2135	-740	749	-7	-1	-8
14	2083	-736	436	2077	-740	429	-6	-4	-7
15	2021	-722	391	2016	-726	384	-5	-4	-7
16	1960	-708	347	1954	-712	340	-6	-4	-7

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
17	1896	-694	305	1891	-697	299	-5	-3	-6
18	1831	-678	266	1825	-680	260	-6	-2	-6
19	1764	-663	230	1758	-664	224	-6	-1	-6
20	1695	-648	198	1689	-648	193	-6	0	-5
21	1623	-635	169	1617	-635	164	-6	0	-5
22	1549	-622	147	1543	-623	142	-6	-1	-5
23	1472	-613	129	1465	-613	125	-7	0	-4
24	1395	-606	116	1389	-607	112	-6	-1	-4
25	1316	-601	106	1310	-603	103	-6	-2	-3
26	1226	-601	108	1219	-603	107	-7	-2	-1
27	1733	-758	1168	1732	-750	1165	-1	8	-3
28	1687	-758	1168	1686	-752	1166	-1	6	-2
29	1641	-758	1168	1639	-752	1165	-2	6	-3
30	1597	-758	1165	1596	-752	1163	-1	6	-2
31	1557	-759	1158	1554	-752	1156	-3	7	-2
32	1518	-758	1146	1515	-753	1143	-3	5	-3
33	1366	-752	957	1364	-749	956	-2	3	-1
34	1453	-757	1105	1452	-753	1104	-1	4	-1

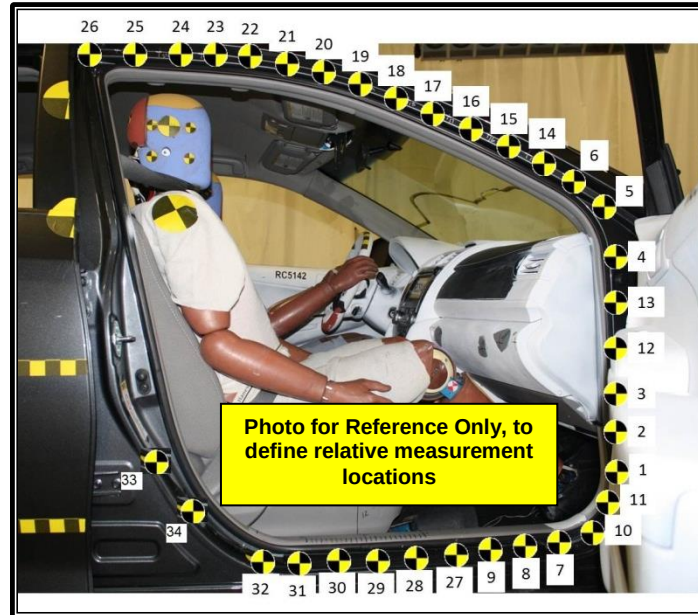
Note: See Appendix D for detailed procedure on how to measure the required door sill intrusions.

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

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

PASSENGER SIDE DOOR SILL INTRUSIONS



Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +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	2152	761	1107	2152	768	1108	0	7	1
2	2162	756	1032	2162	762	1033	0	6	1
3	2158	753	958	2157	758	960	-1	5	2
4	2134	752	658	2134	756	659	0	4	1
5	2129	755	582	2128	759	583	-1	4	1
6	2120	756	507	2119	760	510	-1	4	3
7	2080	762	1169	2079	767	1171	-1	5	2
8	1929	762	1175	1929	767	1177	0	5	2
9	1780	763	1174	1780	766	1175	0	3	1
10	2108	763	1159	2108	767	1160	0	4	1
11	2133	762	1139	2133	766	1141	0	4	2
12	2149	749	853	2149	753	854	0	4	1
13	2142	748	756	2141	753	757	-1	5	1
14	2080	745	440	2079	746	442	-1	1	2
15	2020	732	395	2020	732	398	0	0	3
16	1958	718	352	1958	718	354	0	0	2

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
17	1895	703	311	1895	702	313	0	-1	2
18	1829	687	271	1830	684	274	1	-3	3
19	1760	673	234	1760	668	237	0	-5	3
20	1690	657	201	1690	653	204	0	-4	3
21	1617	644	172	1616	639	175	-1	-5	3
22	1543	632	149	1542	627	152	-1	-5	3
23	1467	622	132	1467	618	134	0	-4	2
24	1390	616	119	1390	612	121	0	-4	2
25	1310	609	110	1310	605	112	0	-4	2
26	1225	609	113	1225	606	115	0	-3	2
27	1740	762	1174	1739	766	1175	-1	4	1
28	1694	762	1174	1694	766	1175	0	4	1
29	1650	763	1174	1649	766	1175	-1	3	1
30	1605	762	1171	1604	765	1172	-1	3	1
31	1561	762	1165	1561	765	1166	0	3	1
32	1519	762	1151	1519	765	1153	0	3	2
33	1365	755	958	1364	756	959	-1	1	1
34	1447	760	1104	1446	761	1105	-2	1	1

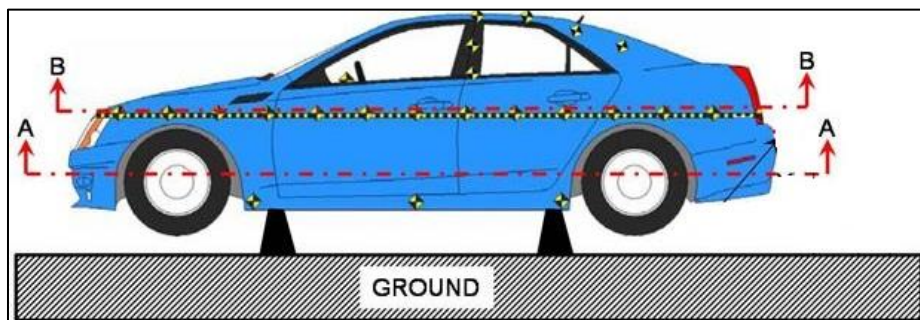
Note: See Appendix D for detailed procedure on how to measure the required door sill intrusions.

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A



Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +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	3217	-909	1077	1	2978	-717	1077
2	3260	-899	1077	2	2928	-605	1077
3	3288	-892	1077	3	2836	-516	1077
4	3343	-876	1077	4	2833	-429	1077
5	3411	-844	1077	5	2904	-434	1077
6	3435	-819	1078	6	3030	-445	1077
7	3523	-650	1078	7	3125	-463	1077
8	3572	-607	1078	8	3247	-455	1077
9	3616	-555	1078	9	3262	-454	1077
10	3645	-480	1078	10	3273	-413	1077
11	3672	-384	1078	11	3099	-377	1077
12	3690	-306	1078	12	3053	-327	1077
13	3708	-198	1078	13	3139	-256	1077
14	3721	-103	1078	14	3156	-169	1077
15	3733	-3	1078	15	3159	-75	1077
16	3733	14	1078	16	3235	24	1077
17	3716	148	1078	17	3342	178	1077
18	3693	291	1078	18	3425	293	1076
19	3658	446	1079	19	3458	333	1077
20	3623	547	1078	20	3492	392	1076
21	3567	615	1078	21	3452	405	1077
22	3525	646	1078	22	3355	436	1076
23	3433	825	1078	23	3354	499	1077
24	3400	853	1078	24	3386	564	1077
25	3339	879	1078	25	3386	639	1077

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A (Continued)

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
26	3258	900	1078	26	3330	699	1077
27	3213	910	1078	27	3337	770	1076
28	2391	915	1078	28	3262	781	1077
29	2348	913	1078	29	3274	875	1077
30	2243	906	1078	30	3232	977	1077
31	1980	908	1078	31	3081	968	1077
32	1820	909	1078	32	2892	929	1077
33	1633	912	1078	33	2742	900	1077
34	1448	914	1078	34	2658	894	1077
35	1328	915	1078	35	2607	858	1077
36	1226	912	1078	36	2397	932	1077
37	1183	911	1078	37	2348	931	1077
38	1007	906	1078	38	2257	924	1077
39	844	902	1078	39	2105	921	1077
40	698	904	1078	40	1992	921	1077
41	557	912	1078	41	1788	921	1077
42	506	913	1078	42	1628	921	1077
43	-309	905	1077	43	1433	922	1077
44	-375	883	1078	44	1237	919	1077
45	-502	831	1078	45	1122	915	1077
46	-564	799	1078	46	923	909	1077
47	-651	701	1078	47	776	907	1077
48	-707	577	1078	48	646	913	1077
49	-745	430	1078	49	571	915	1076
50	-774	265	1078	50	504	917	1077
51	-787	124	1078	51	-305	908	1078
52	-791	-12	1077	52	-346	893	1077
53	-781	-195	1077	53	-375	885	1077
54	-764	-321	1077	54	-447	861	1077
55	-739	-451	1077	55	-515	822	1077
56	-734	-468	1078	56	-552	806	1078
57	-696	-601	1077	57	-601	764	1078
58	-632	-731	1077	58	-670	658	1078
59	-557	-808	1077	59	-710	553	1078
60	-482	-846	1077	60	-747	402	1078
61	-375	-887	1078	61	-769	275	1078
62	-309	-908	1077	62	-783	124	1078
63	508	-912	1078	63	-787	6	1078
64	577	-909	1077	64	-785	-83	1078
65	739	-901	1078	65	-771	-254	1078
66	914	-902	1077	66	-746	-403	1078

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A (Continued)

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
67	1075	-906	1078	67	-708	-554	1078
68	1212	-910	1077	68	-650	-697	1078
69	1261	-912	1078	69	-578	-788	1078
70	1437	-915	1077	70	-519	-820	1078
71	1625	-912	1077	71	-403	-876	1078
72	1842	-909	1078	72	-370	-885	1078
73	2062	-906	1078	73	-307	-906	1078
74	2215	-903	1077	74	504	-910	1077
75	2323	-907	1077	75	553	-911	1077
76	2393	-911	1077	76	654	-904	1077
77	3217	-909	1077	77	882	-898	1077
				78	1050	-902	1077
				79	1213	-907	1078
				80	1335	-907	1077
				81	1511	-906	1077
				82	1647	-906	1078
				83	1737	-906	1077
				84	1915	-907	1077
				85	2102	-903	1077
				86	2254	-899	1077
				87	2274	-915	1077
				88	2292	-996	1077
				89	2353	-1025	1077
				90	2420	-920	1077
				91	2542	-856	1077
				92	2674	-782	1077
				93	2776	-724	1077
				94	2873	-712	1077
				95	2959	-813	1077

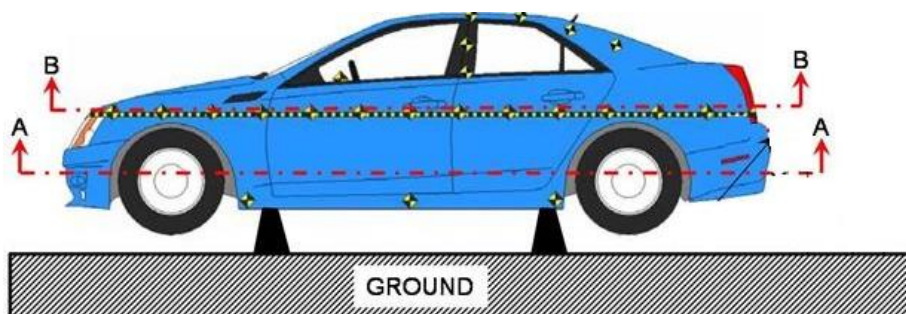
Note: See Appendix D for detailed procedure on how to measure vehicle exterior crush profile

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

VEHICLE EXTERIOR CRUSH PROFILE
SECTION B-B



Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +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	2613	-919	780	1	2688	-501	779
2	2723	-919	780	2	2734	-441	779
3	2874	-916	779	3	2838	-309	778
4	2995	-908	780	4	2999	-333	779
5	3137	-896	779	5	3073	-285	778
6	3228	-874	780	6	3128	-238	778
7	3334	-842	780	7	3261	-131	779
8	3418	-784	779	8	3357	-25	779
9	3486	-690	779	9	3436	105	778
10	3541	-588	779	10	3484	223	778
11	3582	-504	779	11	3529	284	779
12	3630	-438	779	12	3554	454	779
13	3672	-313	780	13	3571	529	779
14	3697	-146	780	14	3213	868	778
15	3704	-62	780	15	3109	909	779
16	3728	-3	779	16	2974	920	779
17	3702	68	780	17	2815	934	779
18	3688	198	780	18	2691	935	779
19	3659	343	780	19	2555	933	779
20	3623	444	780	20	2411	929	779
21	3559	553	780	21	2336	927	778
22	3486	688	780	22	2240	926	779
23	3401	800	780	23	2004	923	779
24	3310	853	780	24	1784	922	779
25	3158	891	780	25	1564	920	779

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

VEHICLE EXTERIOR CRUSH PROFILE
SECTION B-B (Continued)

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
26	3020	909	780	26	1414	919	779
27	2808	919	780	27	1238	918	779
28	2706	920	780	28	1125	916	779
29	2651	921	780	29	932	913	779
30	2533	918	780	30	764	910	779
31	2402	913	780	31	585	911	779
32	2257	909	780	32	428	924	779
33	2054	909	780	33	290	924	779
34	1829	910	780	34	202	922	779
35	1604	911	780	35	66	922	779
36	1380	912	781	36	-47	921	779
37	1222	911	780	37	-173	914	780
38	1115	911	780	38	-255	907	779
39	914	908	780	39	-359	868	779
40	723	905	780	40	-470	820	779
41	521	912	780	41	-555	759	779
42	369	920	780	42	-614	673	779
43	154	922	780	43	-649	616	779
44	-65	920	780	44	-688	515	779
45	-213	911	780	45	-713	430	780
46	-301	893	780	46	-707	354	780
47	-370	863	780	47	-723	204	780
48	-480	814	780	48	-723	90	780
49	-560	757	779	49	-724	1	780
50	-618	672	779	50	-722	-90	780
51	-657	588	779	51	-722	-189	780
52	-708	435	780	52	-710	-308	780
53	-713	289	779	53	-700	-388	780
54	-724	121	780	54	-708	-428	780
55	-721	-32	780	55	-666	-558	780
56	-723	-137	779	56	-632	-636	780
57	-712	-284	780	57	-600	-698	780
58	-699	-373	780	58	-520	-788	780
59	-708	-426	779	59	-411	-844	780
60	-693	-478	780	60	-260	-903	780
61	-655	-586	779	61	-123	-911	780
62	-632	-638	780	62	-8	-918	780
63	-589	-721	779	63	153	-919	780
64	-496	-806	779	64	209	-920	780
65	-383	-859	779	65	258	-916	780
66	-277	-901	780	66	391	-918	779
67	-148	-913	779	67	544	-906	779

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

VEHICLE EXTERIOR CRUSH PROFILE
SECTION B-B (Continued)

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
68	-38	-919	780	68	740	-901	779
69	99	-919	779	69	949	-904	779
70	292	-917	779	70	1081	-906	779
71	452	-915	779	71	1205	-906	780
72	474	-914	779	72	1430	-909	779
73	610	-904	779	73	1553	-910	780
74	772	-903	779	74	1671	-910	779
75	978	-907	780	75	1835	-911	780
76	1128	-908	779	76	1985	-912	780
77	1228	-909	780	77	2123	-912	779
78	1328	-909	780	78	2201	-912	779
79	1487	-909	779	79	2199	-988	779
80	1715	-907	779	80	2268	-1018	779
81	1927	-906	780	81	2299	-1022	780
82	2109	-905	780	82	2324	-988	779
83	2285	-906	779	83	2339	-820	779
84	2410	-910	779	84	2399	-812	779
85	2548	-914	779	85	2434	-768	779
86	2592	-913	779	86	2632	-724	779
87	2613	-919	780	87	2650	-644	779
				88	2681	-564	779

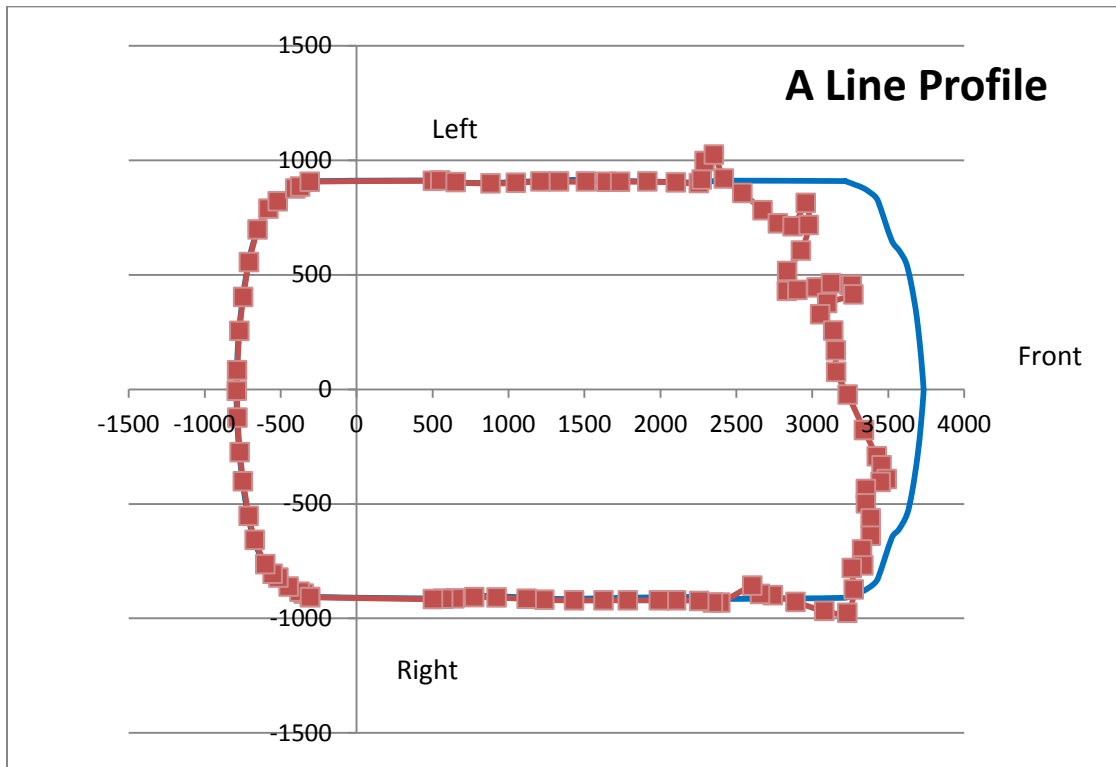
Note: See Appendix D for detailed procedure on how to measure vehicle exterior crush profile

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

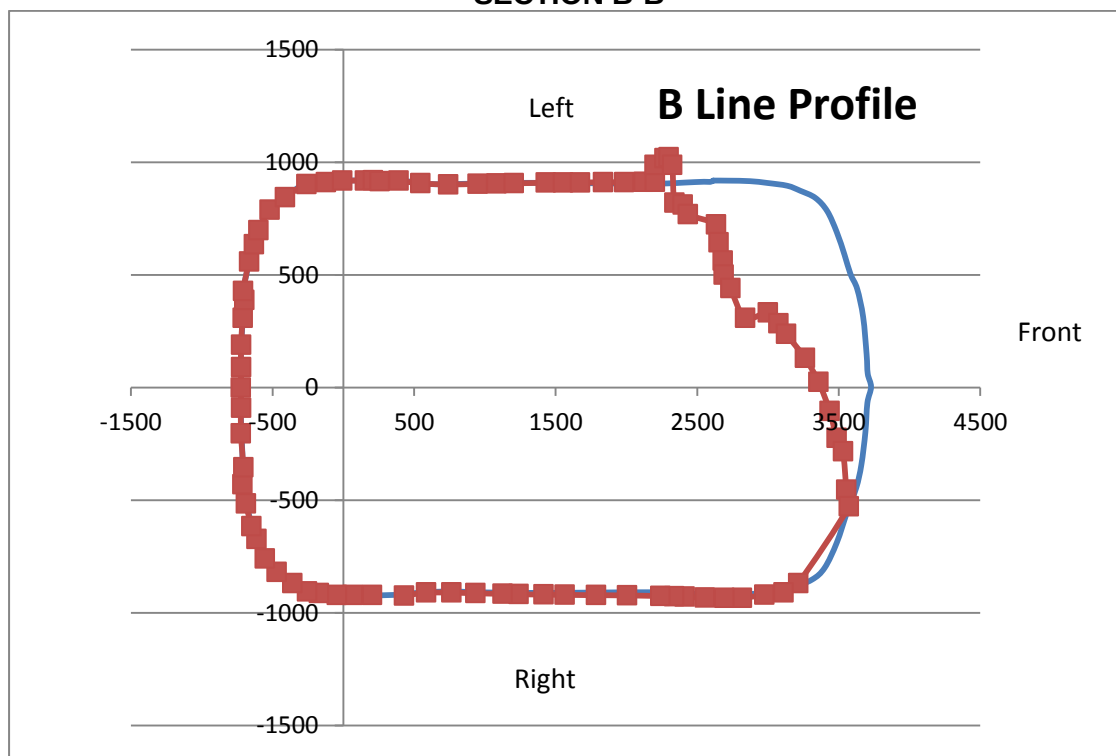
Test Vehicle: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A



SECTION B-B



DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

STRUCTURAL BUMPER BEAM POINTS

	Point	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
		X	Y	Z	X	Y	Z	X	Y	Z
Redundant Structural Bumper Beam	B1	3563	-479	1052	3200	-354	875	-363	125	-177
	B2	3587	-362	1050	3163	-243	894	-424	119	-156
	B3	3609	-240	1053	3153	-147	897	-456	93	-156
	B4	3621	-122	1051	3231	-77	902	-390	45	-149
	B5	3625	0	1050	3312	13	916	-313	13	-134
	B6	3621	120	1053	3383	106	935	-238	-14	-118
	B7	3609	241	1054	3451	206	952	-158	-35	-102
	B8	3588	362	1053	3510	313	966	-78	-49	-87
	B9	3563	480	1053	3565	419	981	2	-61	-72
Center Structural Bumper Beam	B1	3563	-480	1078	3197	-361	900	-366	119	-178
	B2	3588	-362	1076	3160	-247	919	-428	115	-157
	B3	3609	-240	1075	3148	-139	916	-461	101	-159
	B4	3620	-122	1078	3226	-78	928	-394	44	-150
	B5	3624	0	1079	3308	10	946	-316	10	-133
	B6	3620	120	1078	3380	105	960	-240	-15	-118
	B7	3610	237	1078	3446	201	975	-164	-36	-103
	B8	3588	362	1078	3508	311	992	-80	-51	-86
	B9	3563	479	1078	3563	417	1006	0	-62	-72
Upper Radiator Support	1	3489	-424	766	2912	-232	644	-577	192	-122
	2	3534	-318	768	3003	-167	665	-531	151	-103
	3	3536	-210	769	3078	-97	647	-458	113	-122
	4	3588	-104	774	3192	-66	638	-396	38	-136
	5	3596	-1	779	3274	-1	636	-322	0	-143
	6	3587	107	774	3344	79	624	-243	-28	-150
	7	3535	215	770	3377	194	617	-158	-21	-153
	8	3534	322	771	3444	279	618	-90	-43	-153
	9	3487	431	766	3433	395	643	-54	-36	-123

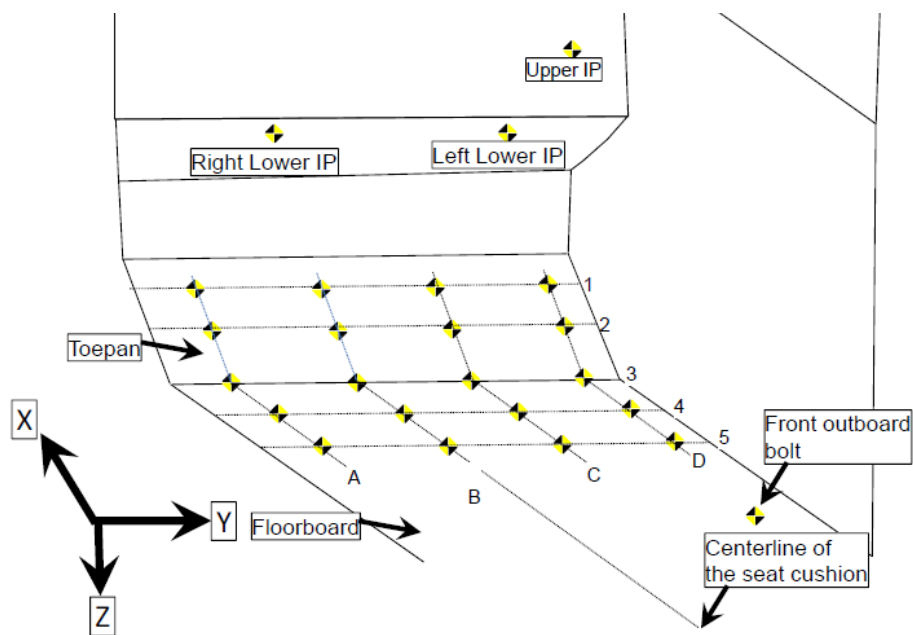
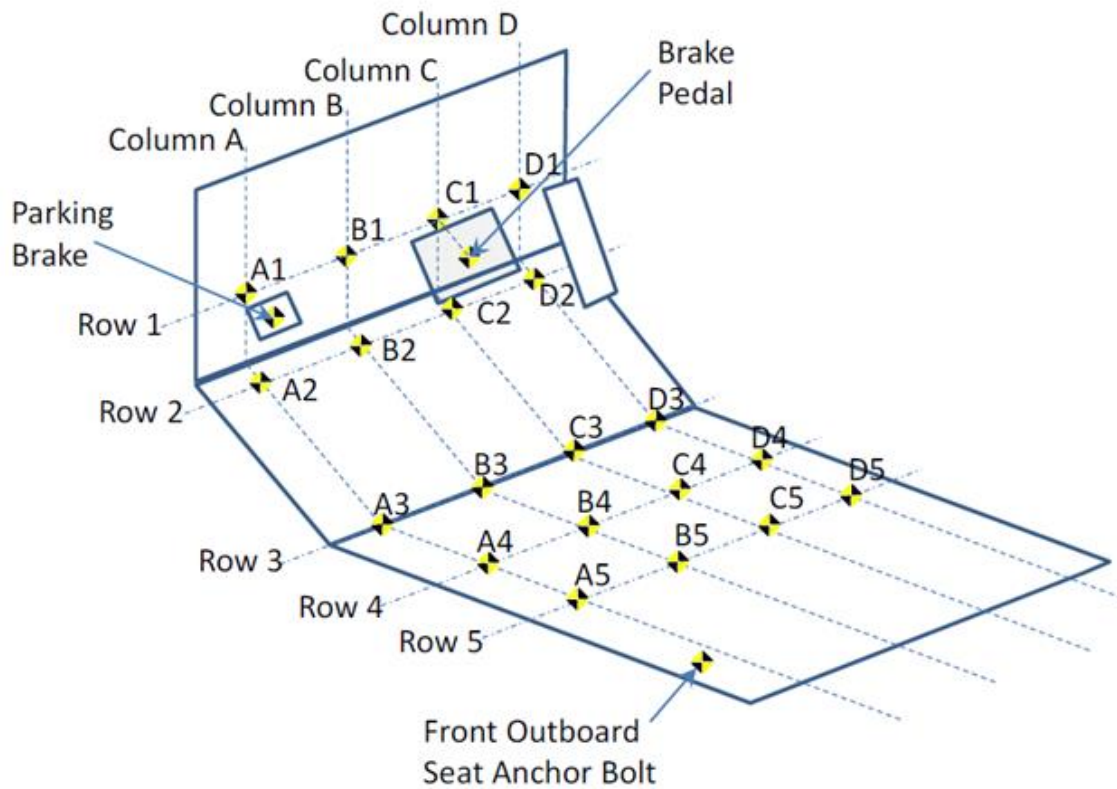
Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +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: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014



Note: See Appendix D for toe pan measuring procedure

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

DRIVER FLOOR PAN MEASUREMENTS

Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	2421	-577	1105	2388	-541	1089	-33	36	-16
B1	2512	-477	1106	2455	-427	1078	-57	50	-28
C1	2563	-328	1108	2483	-296	1072	-80	32	-36
D1	2562	-181	1107	2504	-147	1082	-58	34	-25
A2	2408	-579	1182	2386	-545	1165	-22	34	-17
B2	2485	-477	1181	2452	-441	1155	-33	36	-26
C2	2483	-327	1182	2454	-294	1173	-29	33	-9
D2	2488	-181	1183	2460	-148	1176	-28	33	-7
A3	2354	-577	1267	2346	-549	1255	-8	28	-12
B3	2341	-479	1267	2329	-452	1254	-12	27	-13
C3	2346	-327	1267	2330	-299	1263	-16	28	-4
D3	2341	-174	1269	2321	-147	1270	-20	27	1
A4	2241	-576	1298	2235	-553	1290	-6	23	-8
B4	2241	-478	1300	2231	-454	1294	-10	24	-6
C4	2242	-327	1303	2228	-304	1302	-14	23	-1
D4	2241	-176	1299	2223	-153	1308	-18	23	9
A5	2142	-580	1303	2136	-561	1300	-6	19	-3
B5	2143	-478	1303	2132	-457	1299	-11	21	-4
C5	2143	-327	1305	2129	-307	1307	-14	20	2
D5	2141	-175	1303	2125	-158	1307	-16	17	4
Brake Pedal	2277	-328	1106	2314	-323	1140	37	5	34
Driver IP Left	2033	-515	806	2028	-519	788	-5	-4	-18
Driver IP Right	2031	-216	808	2019	-222	799	-12	-6	-9
DOLP	2046	-616	805	2036	-620	792	-10	-4	-13
Steering Column	1799	-365	554	1798	-405	534	-1	-40	-20
Front Outboard Bolt	1751	-609	1172	1748	-601	1170	-3	8	-2
Emergency Brake									

Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +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: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

PASSENGER FLOOR PAN MEASUREMENTS

Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	2551	226	1103	2457	295	1064	-94	69	-39
B1	2569	373	1107	2562	381	1102	-7	8	-5
C1	2461	527	1103	2464	534	1105	3	7	2
D1	2407	627	1105	2409	635	1107	2	8	2
A2	2483	225	1181	2441	257	1157	-42	32	-24
B2	2489	376	1182	2490	384	1184	1	8	2
C2	2446	525	1180	2447	532	1182	1	7	2
D2	2384	625	1181	2386	631	1183	2	6	2
A3	2351	228	1267	2352	234	1270	1	6	3
B3	2338	375	1268	2339	382	1270	1	7	2
C3	2361	525	1268	2361	532	1270	0	7	2
D3	2351	626	1267	2350	632	1269	-1	6	2
A4	2251	224	1303	2253	230	1305	2	6	2
B4	2251	377	1303	2253	383	1305	2	6	2
C4	2251	526	1303	2252	532	1306	1	6	3
D4	2249	626	1304	2249	632	1306	0	6	2
A5	2154	225	1304	2155	231	1307	1	6	3
B5	2151	375	1305	2153	380	1308	2	5	3
C5	2151	524	1306	2150	529	1309	-1	5	3
D5	2151	627	1306	2151	632	1307	0	5	1
Pass IP Left	2013	224	821	2056	205	819	43	-19	-2
Pass IP Right	2050	525	820	2069	507	825	19	-18	5
PORP	2056	627	804	2067	610	812	11	-17	8
Front Outboard Bolt	1753	613	1176	1753	616	1178	0	3	2

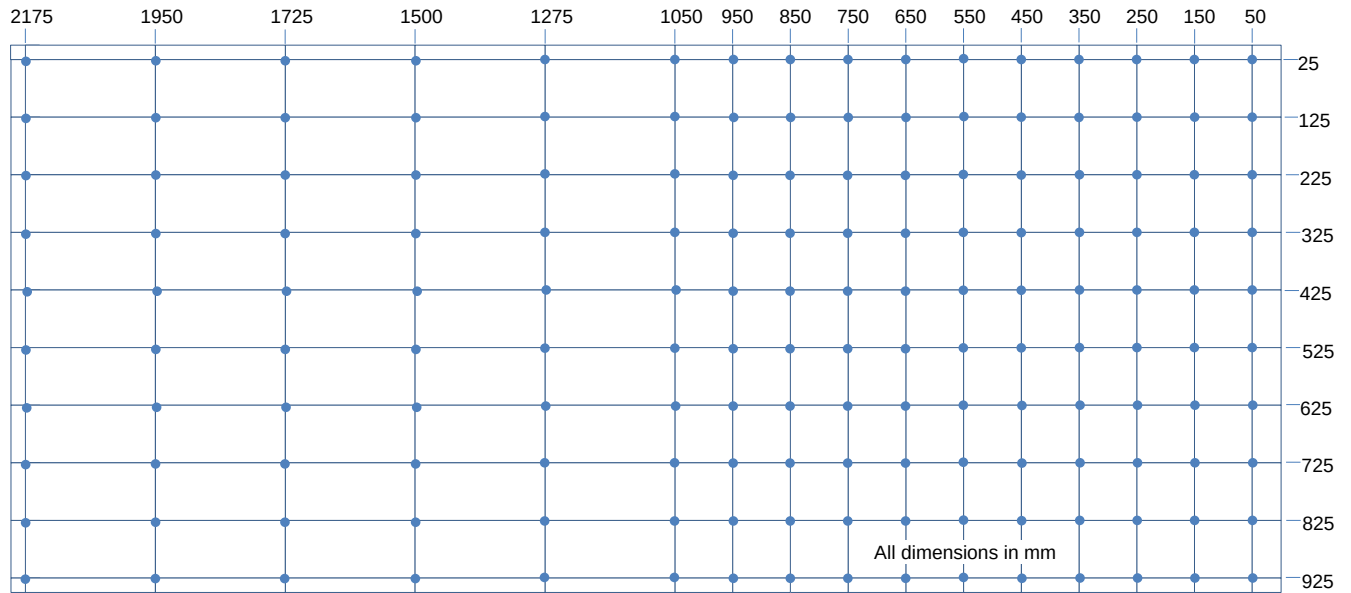
Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +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 **RMDB CRUSH MEASUREMENTS**

Test Vehicle: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014



	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
R10	-1.0	-1.1	-1.3	-1.5	-1.8	0.5	-2.0	-2.1	0.9	-2.1	-2.9	-1.4	1.3	-1.6	0.6	18.1
R9	-0.8	-1.0	-1.1	-1.3	-1.5	-1.5	-1.4	1.3	25.7	17.1	13.8	3.0	2.9	3.1	9.1	46.7
R8	-0.5	-0.5	-0.8	-0.9	-1.1	-1.1	7.7	6.5	5.6	18.9	26.9	18.6	15.4	12.6	44.8	99.3
R7	0.1	-0.1	-0.5	-0.5	-0.8	-1.0	-0.8	-0.7	-0.9	2.8	24.3	46.0	48.3	36.6	77.1	144.0
R6	0.2	0.0	-0.3	-0.4	-0.5	-0.5	-0.6	0.8	2.1	0.9	15.9	60.2	99.4	78.4	129.6	176.7
R5	0.5	0.2	0.5	0.3	0.1	-0.1	0.1	25.5	44.8	10.5	-48.1	-126.4	-104.5	192.1	227.8	243.2
R4	1.7	1.6	1.3	1.0	0.5	0.4	3.4	54.8	75.2	26.4	-34.8	-129.7	-123.3	180.2	251.5	236.6
R3	1.2	1.1	1.2	1.0	1.0	0.8	33.0	80.4	107.2	47.5	-23.4	-116.1	-111.8	224.9	214.4	208.4
R2	2.0	1.9	1.8	1.7	1.5	5.1	56.7	106.4	134.5	62.6	-10.4	-81.1	25.1	154.3	146.1	166.5
R1	2.5	2.5	2.3	2.3						78.4	62.4	32.0	24.3	30.9	102.4	145.2

*Barrier was cut to accommodate the rail, therefore these points were un-measurable.

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

Test Vehicle: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014

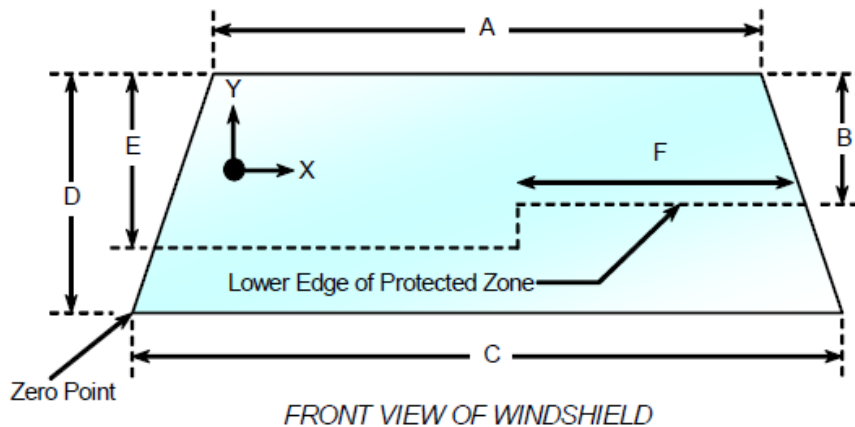
Please provide windshield mounting details. A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

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	2235	1825	81.7%
Right Side	2235	2235	100%
Total	4470	4060	90.8%



Item	Units	Value
A	mm	1255
B	mm	503
C	mm	1505
D	mm	855
E	mm	528
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: 2014 Mazda CX-5 SUV
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
Test Date: 6/23/2014

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Ambient Temperature at Test Vehicle Time of Impact: 20° C

Test Time: 11:23 AM

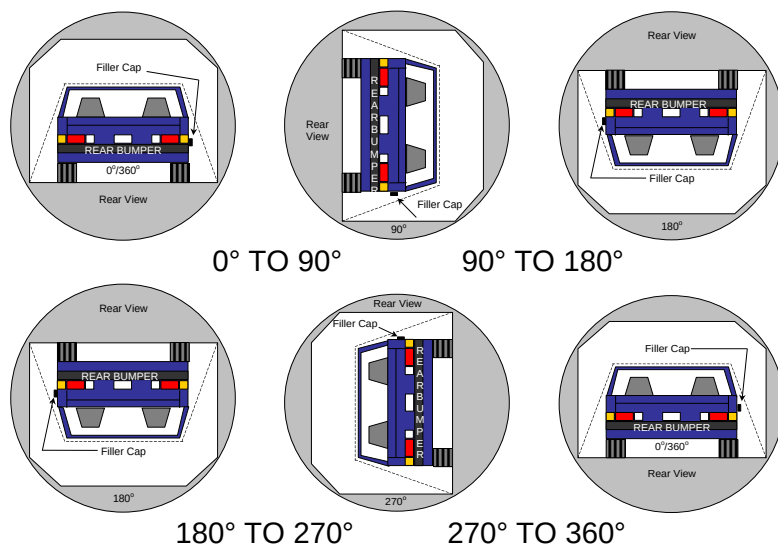
Stoddard Solvent Spillage Measurements

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: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014



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°	67	300	367
90° to 180°	65	300	365
180° to 270°	63	300	363
270° to 360°	69	300	369

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	

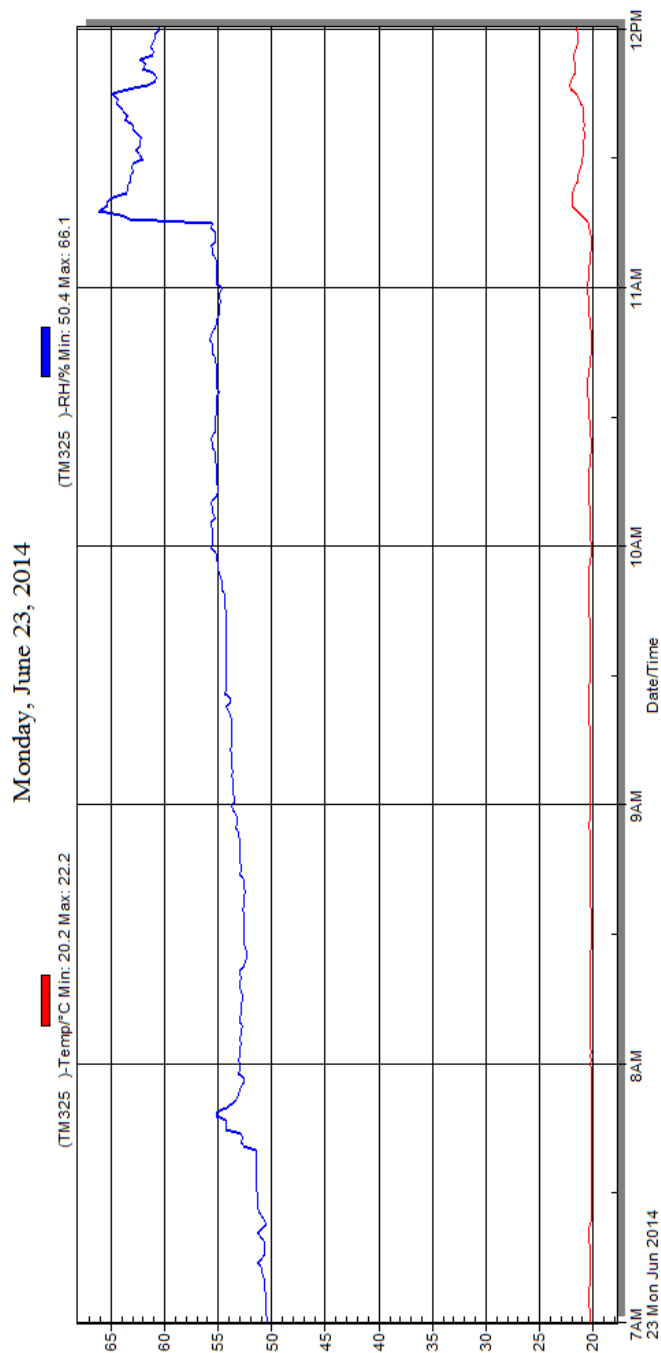
SOLVENT SPILLAGE LOCATION TABLE

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: 2014 Mazda CX-5 SUV
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145401
 Test Date: 6/23/2014



Temperature Stabilization Chart/Data

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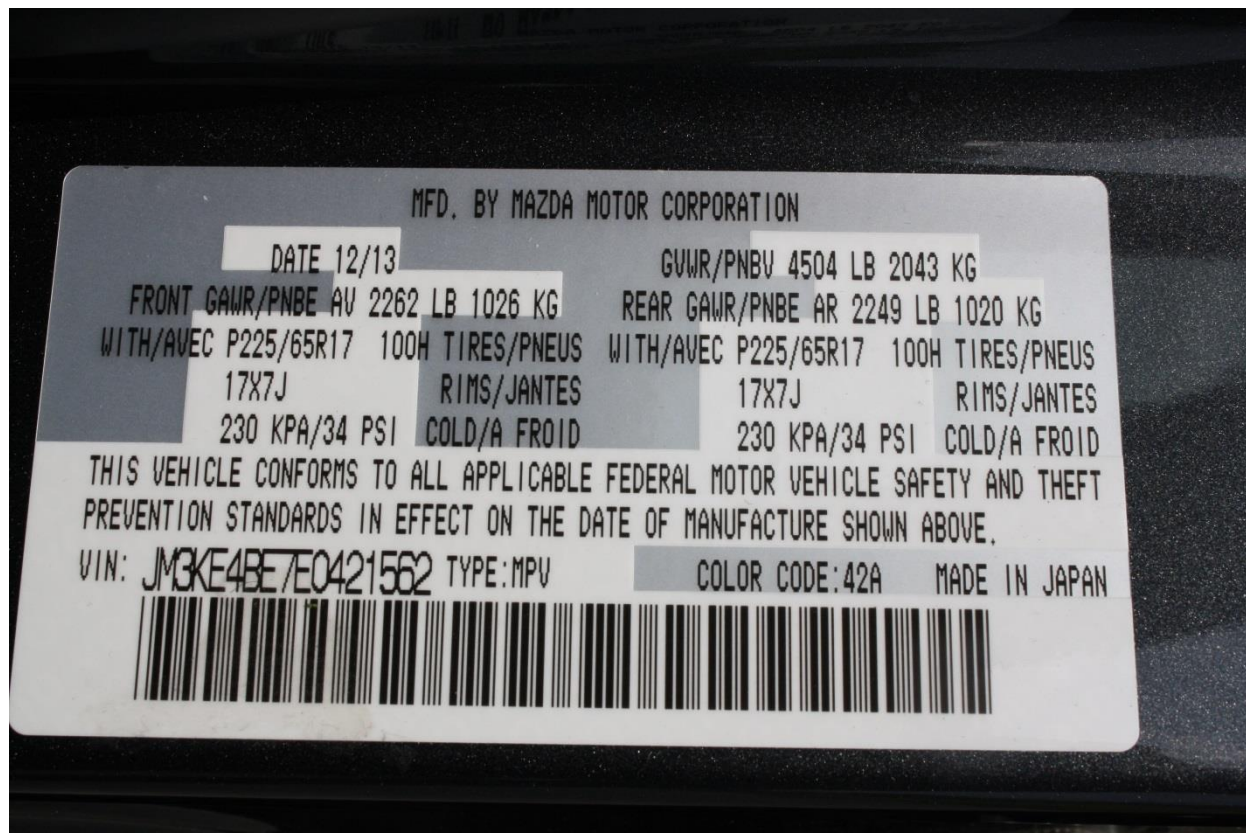
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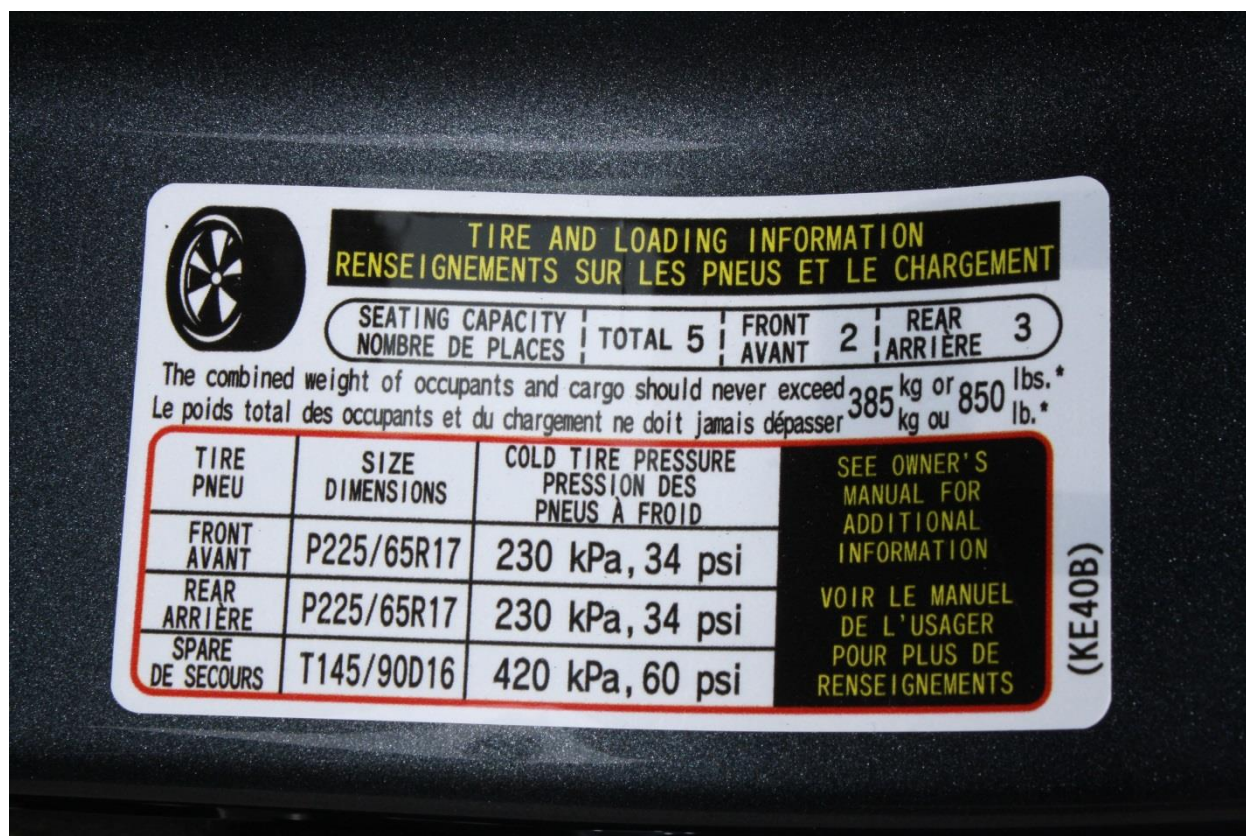
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No. 002 As Delivered Left Rear 3-4 View of Test Vehicle



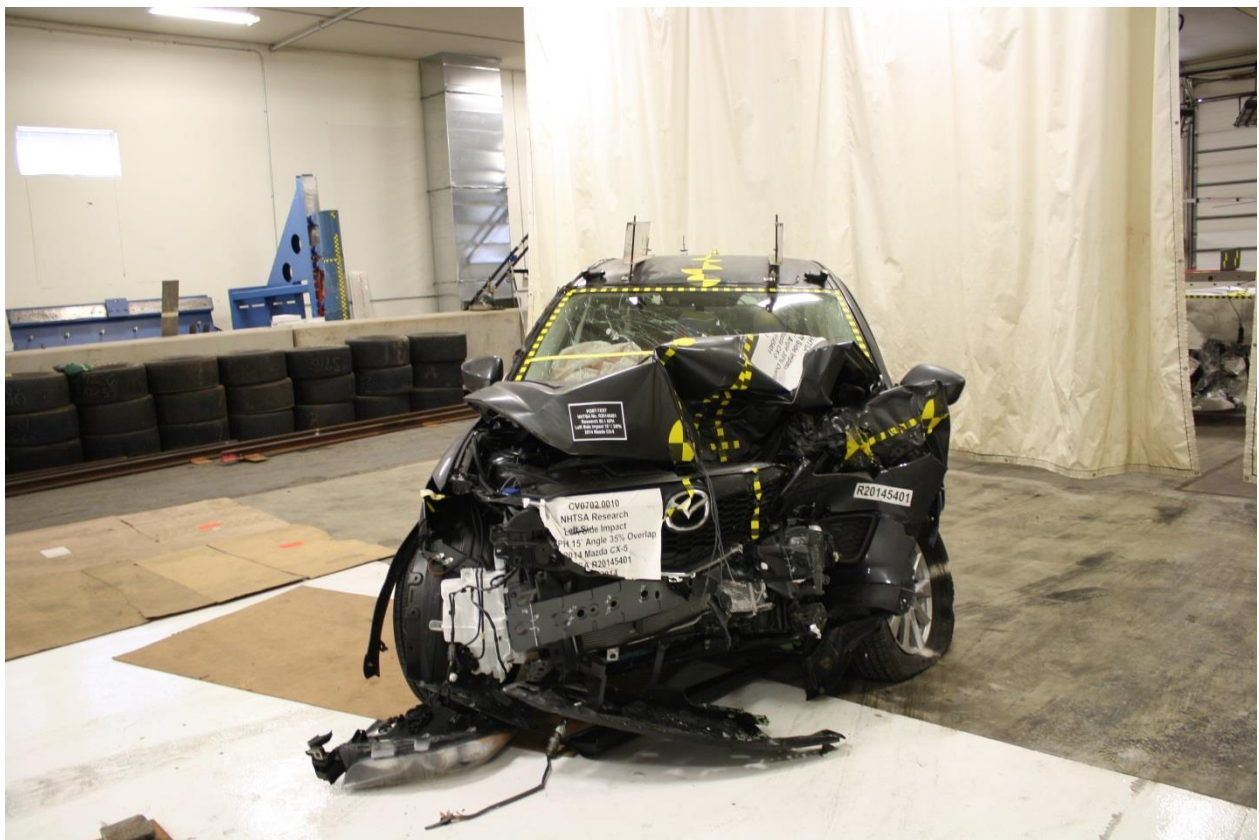
No. 003 Test Vehicle Certification Label



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



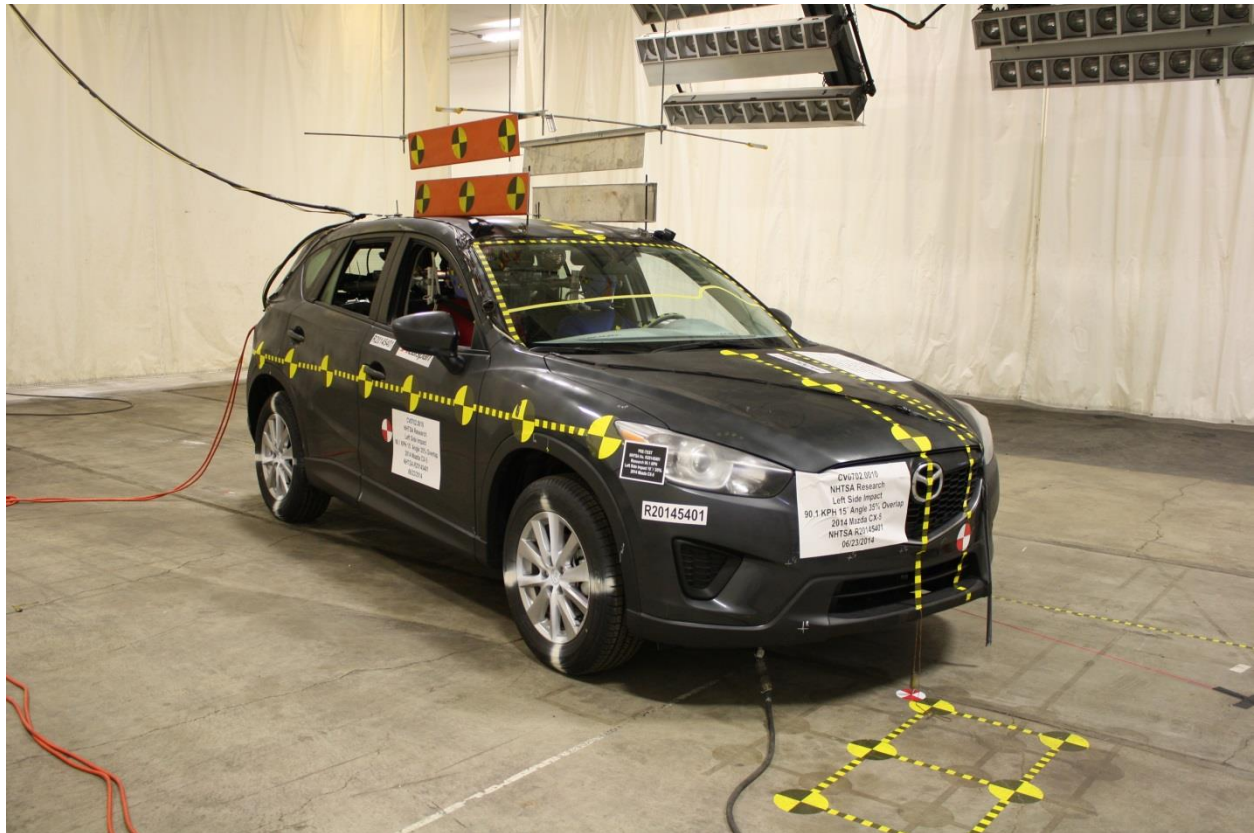
No. 016 Post-Test Right Rear 3-4 View of Test Vehicle



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







Scan for Vehicle Info and offers

EPA DOT Fuel Economy and Environment

Fuel Economy

28 MPG
combined city/hwy

25 city 31 highway

3.6 gallons per 100 miles

You Save \$2,000
in fuel costs over 5 years compared to the average new vehicle.

Annual fuel Cost \$1,900

Fuel Economy & Greenhouse Gas Rating

Best 10 Worst

1 2 3 4 5 6 7 8 9 10

7

Smog Rating (Japan only)

1 2 3 4 5 6 7 8 9 10

5

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 23 MPG and costs \$1,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.50 per gallon. MPGe is miles per gallon gasoline equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuel economy.gov
Calculate personalized estimates and compare vehicles

GOVERNMENT 5-STAR SAFETY RATINGS

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

Frontal Crash
Driver ★★★★★
Passenger ★★★★★
Based on the risk of injury in a frontal impact.

Side Crash
Front seat ★★★★★
Rear seat ★★★★★
Based on the risk of injury in a side impact.

Rollover ★★★★★
Based on the risk of rollover in a single vehicle crash.

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

PARTS CONTENT INFORMATION:

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 0%
MAJOR SOURCES OF FOREIGN PARTS CONTENT: JAPAN 90%

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

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT: HIROSHIMA, JAPAN
COUNTRY OF ORIGIN: JAPAN
ENGINE: JAPAN
TRANSMISSION: JAPAN

This label is affixed pursuant to the Federal Automobile Theft Act. Cloning, Lenses and Tint, Sales and Local taxes, and Dealer installed options are not included.

2014 CX-5

Model: 2014 CX-5 SPORT ALL WHEEL DRIVE
Exterior Color: METEOR GRAY MICA
Interior Color: BLACK

STANDARD EQUIPMENT

ENGINE/MECHANICAL FEATURES

- SKYACTIV-G 2.0L ENGINE
- SKYACTIV-DRIVE 6-SPEED SPORT A/T
- 185 HORSEPOWER, 150 LB-FT TORQUE
- ALL-WHEEL DRIVE

EXTERIOR FEATURES

- 17-INCH ALLOY WHEELS
- 225/55 R17 ALL-SEASON TIRES
- VARIABLE INTERMITTENT WIPERS
- FIXED-INTERMITTENT REAR WIPER
- POWER MIRRORS W/TURN LAMPS

INTERIOR FEATURES

- 6-PASSENGER SEATING
- TILT & TELESCOPIC STEERING COLUMN
- STEERING WHEEL W/ AUDIO/CRUISE CONTROLS
- POWER AUTOMATIC DOOR LOCKS
- POWER WINDOWS W/Driver ONE-TOUCH
- CLOTH TRIMMED SPORT SEATS
- 6-WAY MANUAL DRIVER'S SEAT
- MID WTRIP COMPUTER

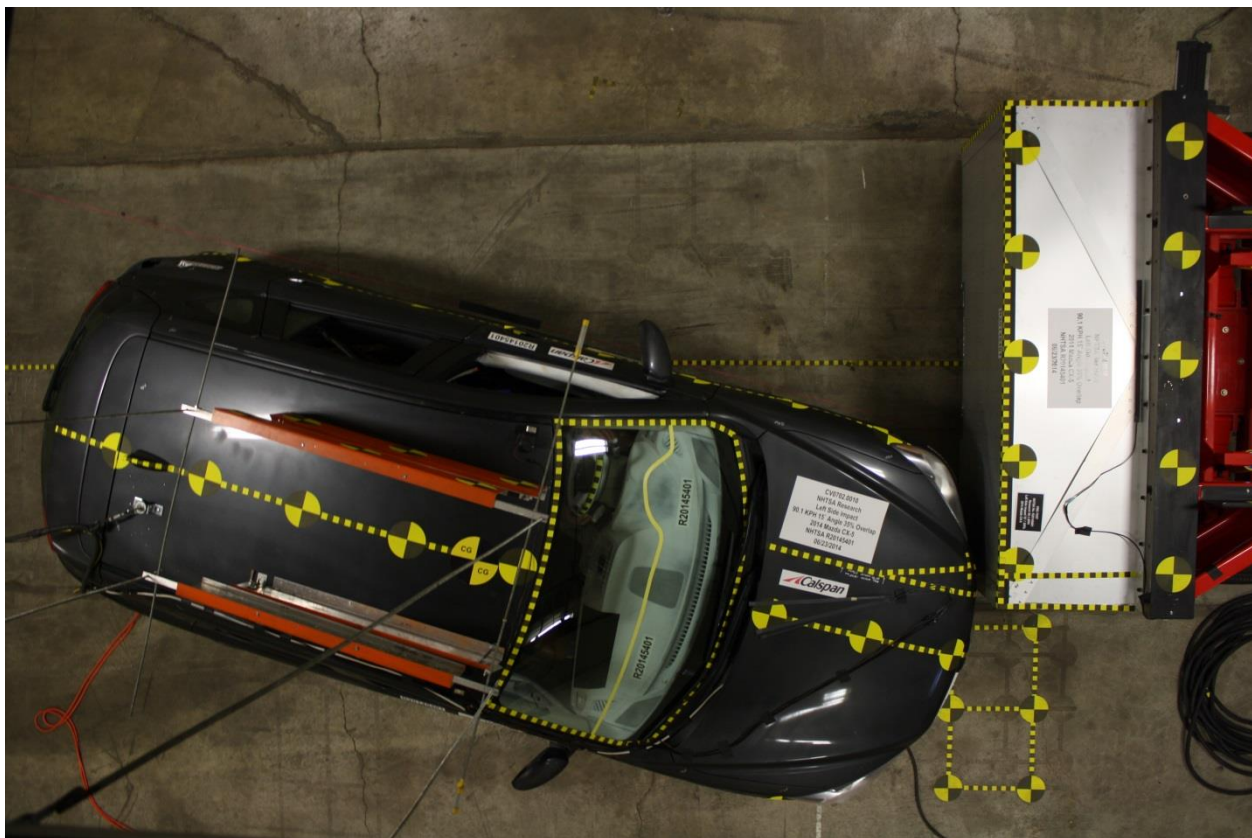
SAFETY AND SECURITY FEATURES

- 36-MONTH/100,000 MILE BUMPER-TO-BUMPER WARRANTY
- 60-MONTH/100,000 MILE POWERTRAIN WARRANTY
- 24-HOUR ROADSIDE ASSISTANCE
- 5-PASSENGER 3-POINT SAFETY BELTS
- LATCH CHILD SAFETY SEAT ANCHORS
- ANTI-THIEF ENGINE IMMOBILIZER
- TIRE PRESSURE MONITORING SYSTEM

OPTIONAL EQUIPMENT

R80	REAR BUMPER GUARD	\$100
RCC	RETRACTABLE CARGO COVER	\$200
WLK	WHEEL LOCKS	\$65
CE1	ULEV EMISSIONS EQUIPMENT	NO CHARGE
Total Vehicle and Options		\$24,400
Delivery, Processing and Handling Fee		\$795
Total MSRP		\$25,195

No. 021 Monroney Label Photograph



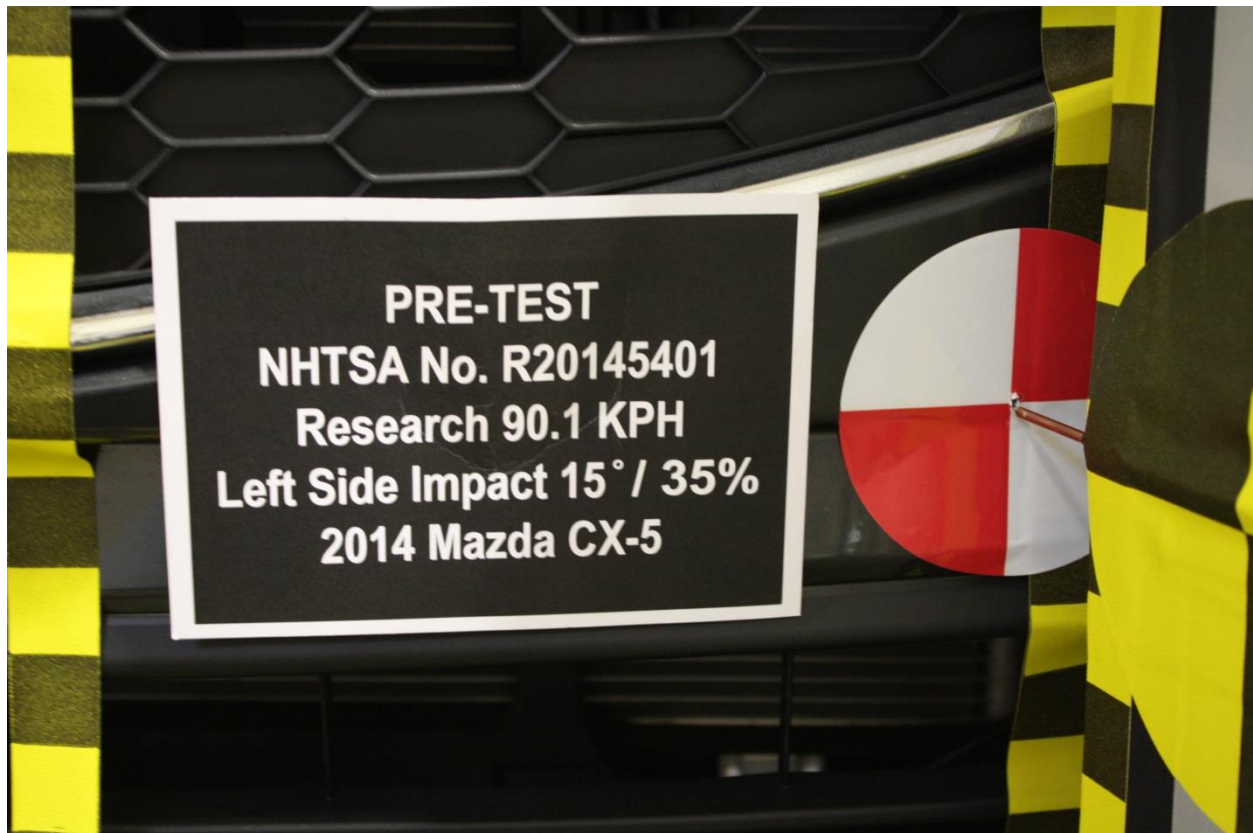
No. 022 Pre-Test Overhead View of RMDB against target vehicle at ideal Impact Point



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



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



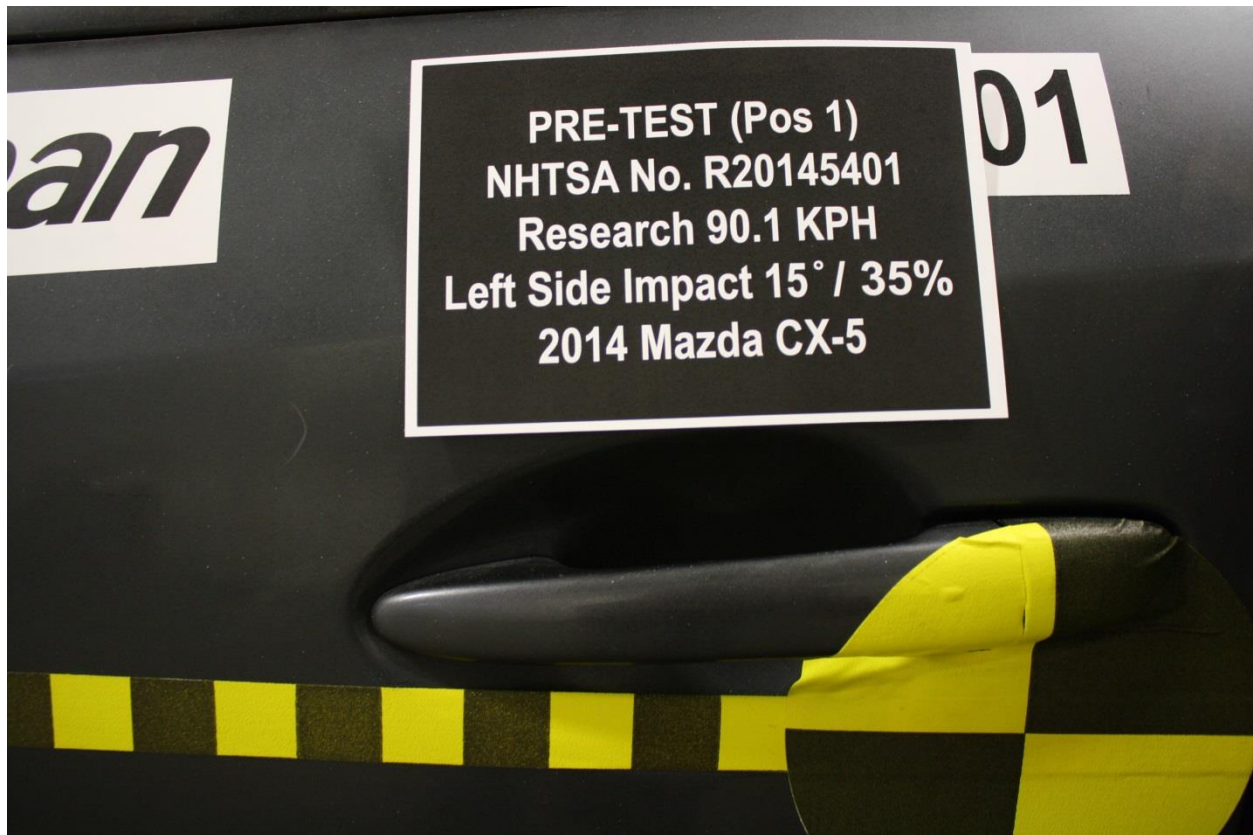
No. 025 Pre-Test Close-up View of Impact Point



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



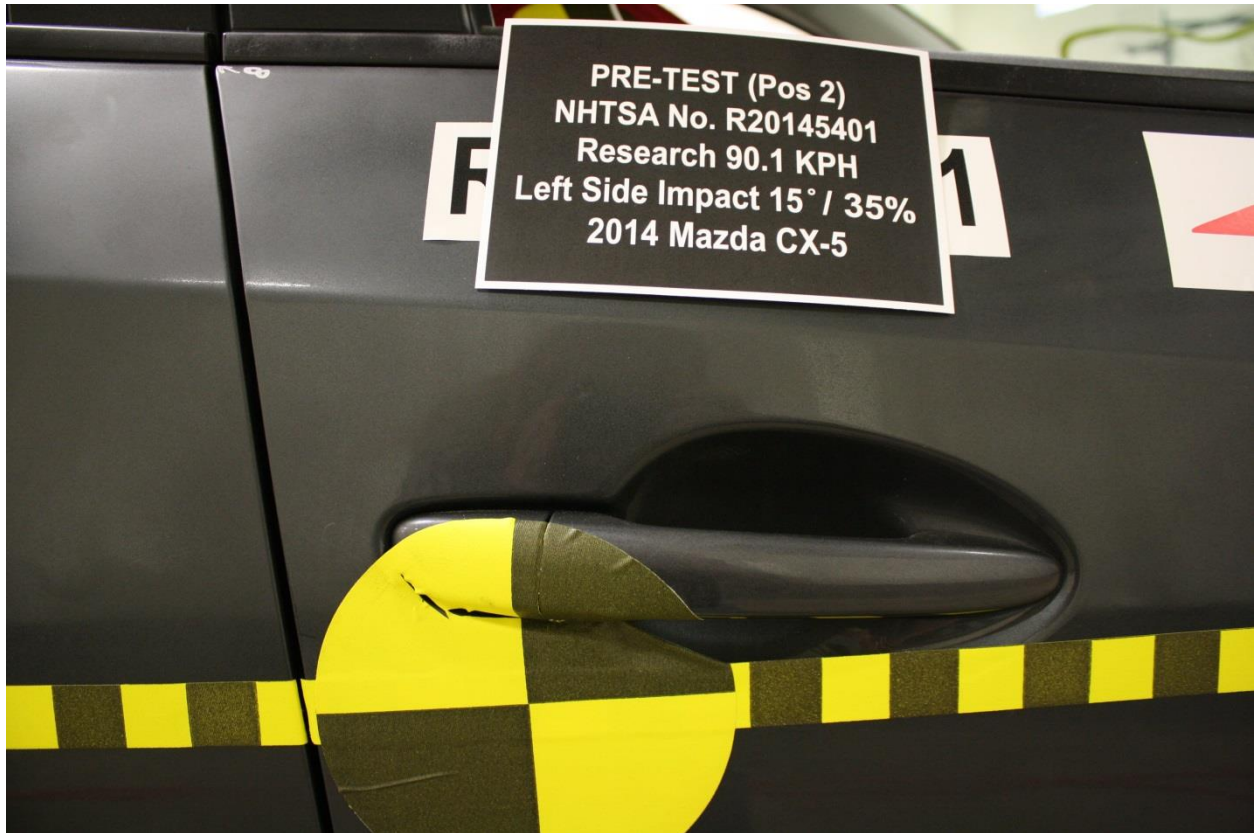
No. 027 Post-Test Vehicle Overhead View



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



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



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



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



No. 032 Pre-Test Windshield View



No. 033 Post-Test Windshield View



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



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



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



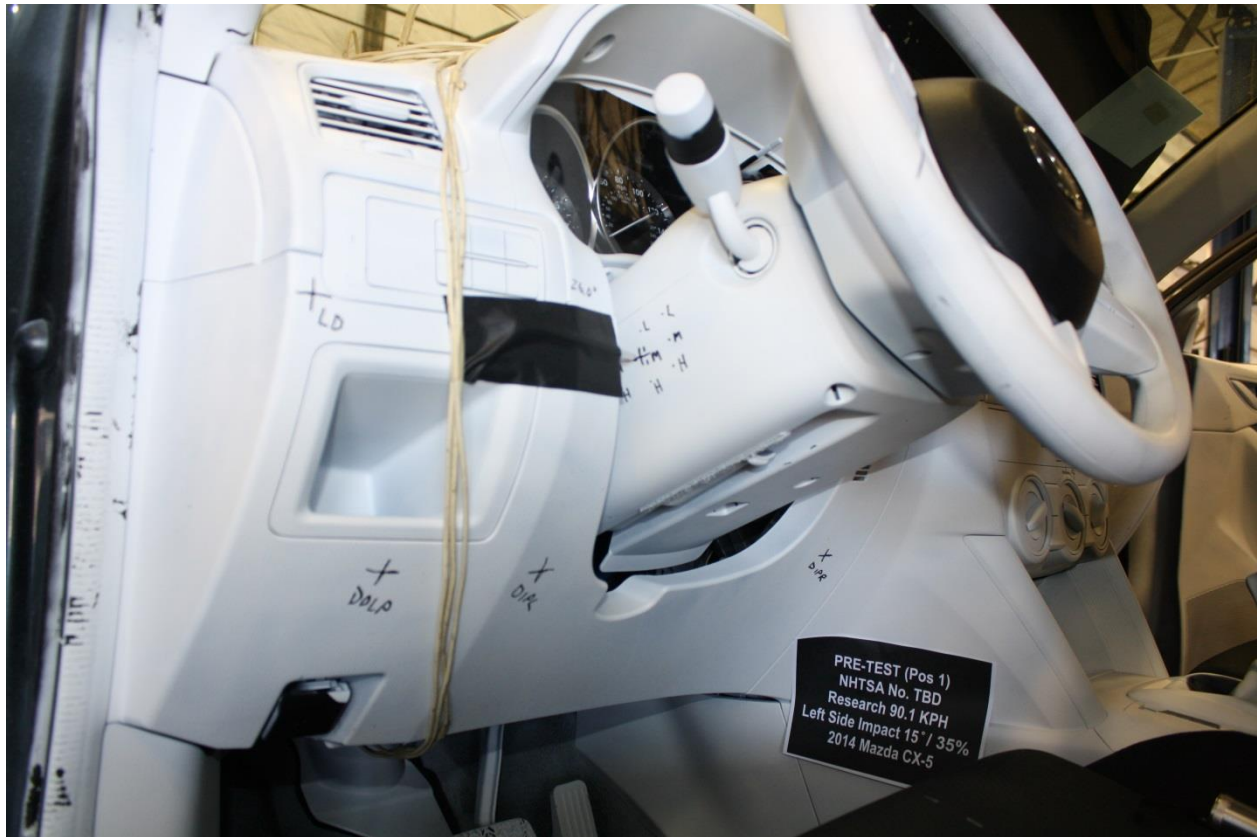
No. 037 Post-Test View of Passenger Inner Door Panel



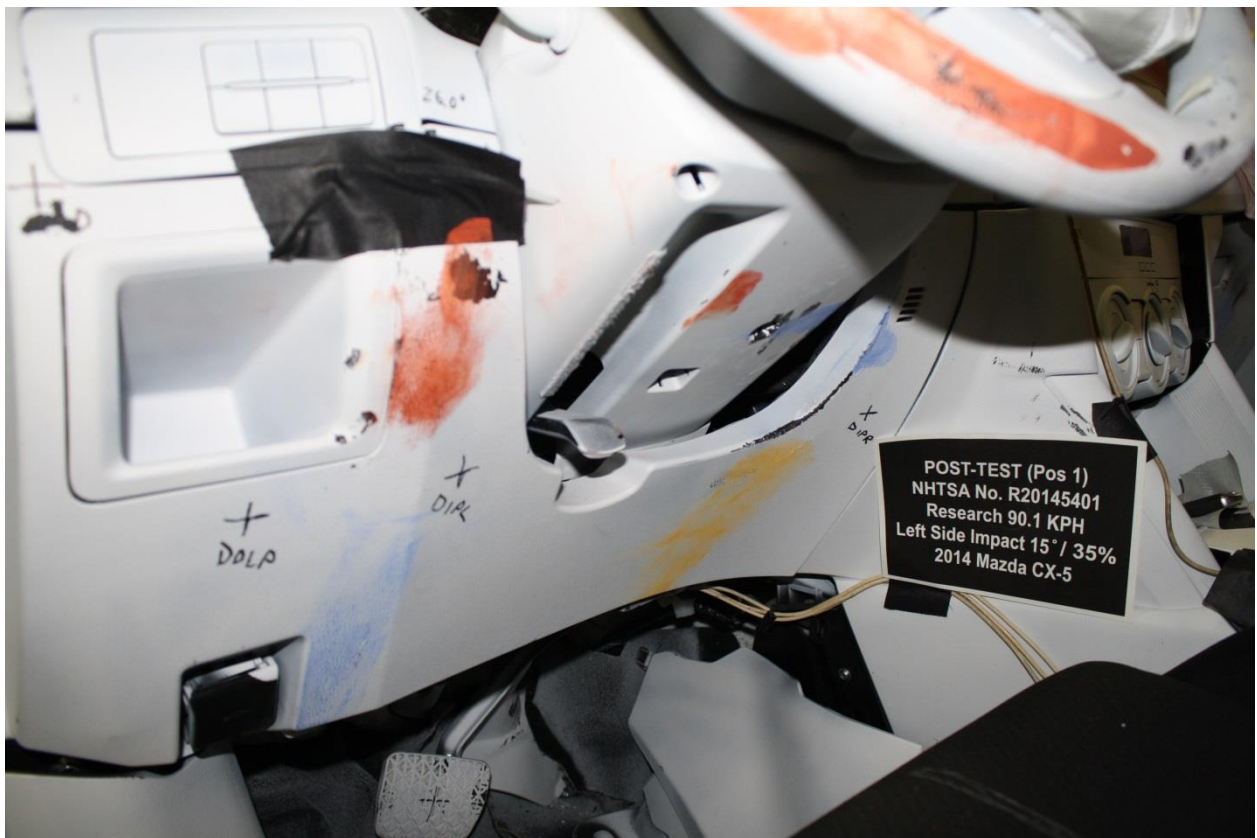
No. 038 Pre-Test Overall View of Driver Knee Bolsters



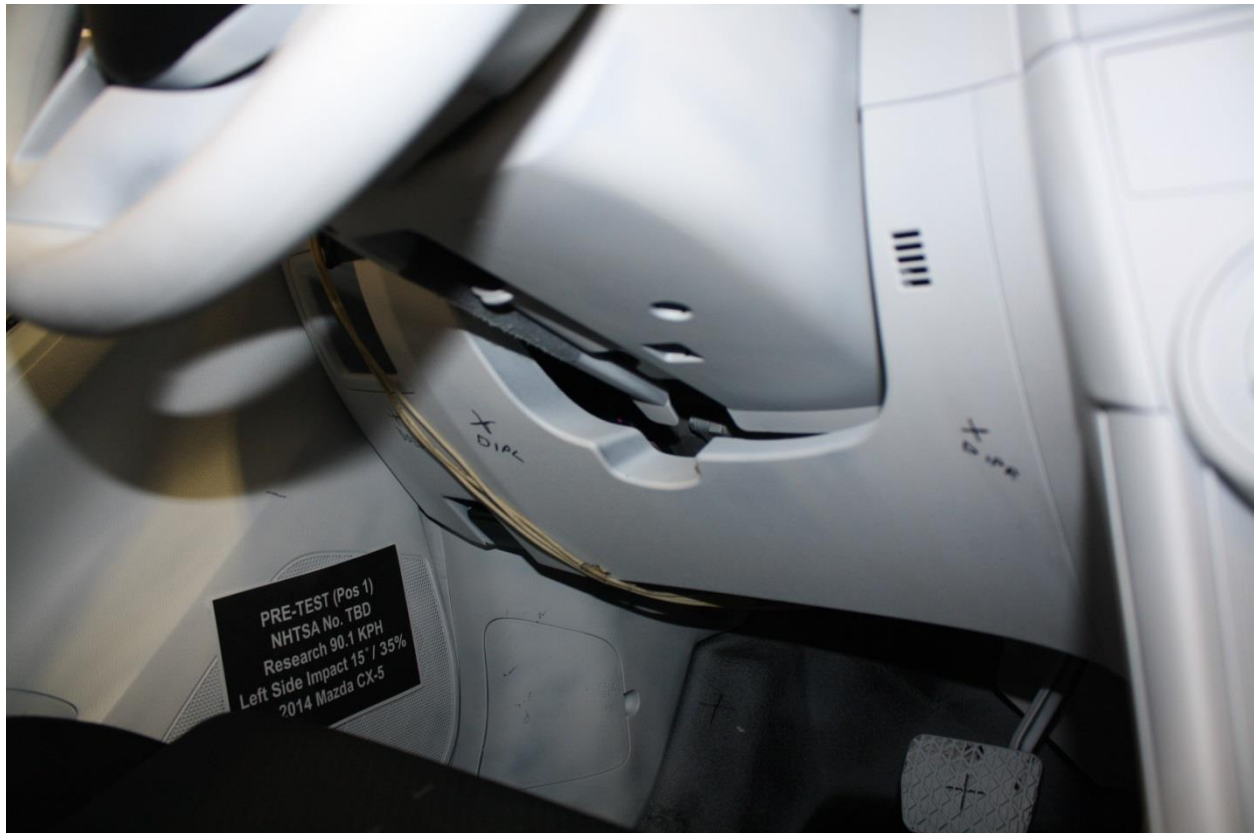
No. 039 Post-Test Overall View of Driver Knee Bolsters



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



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



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



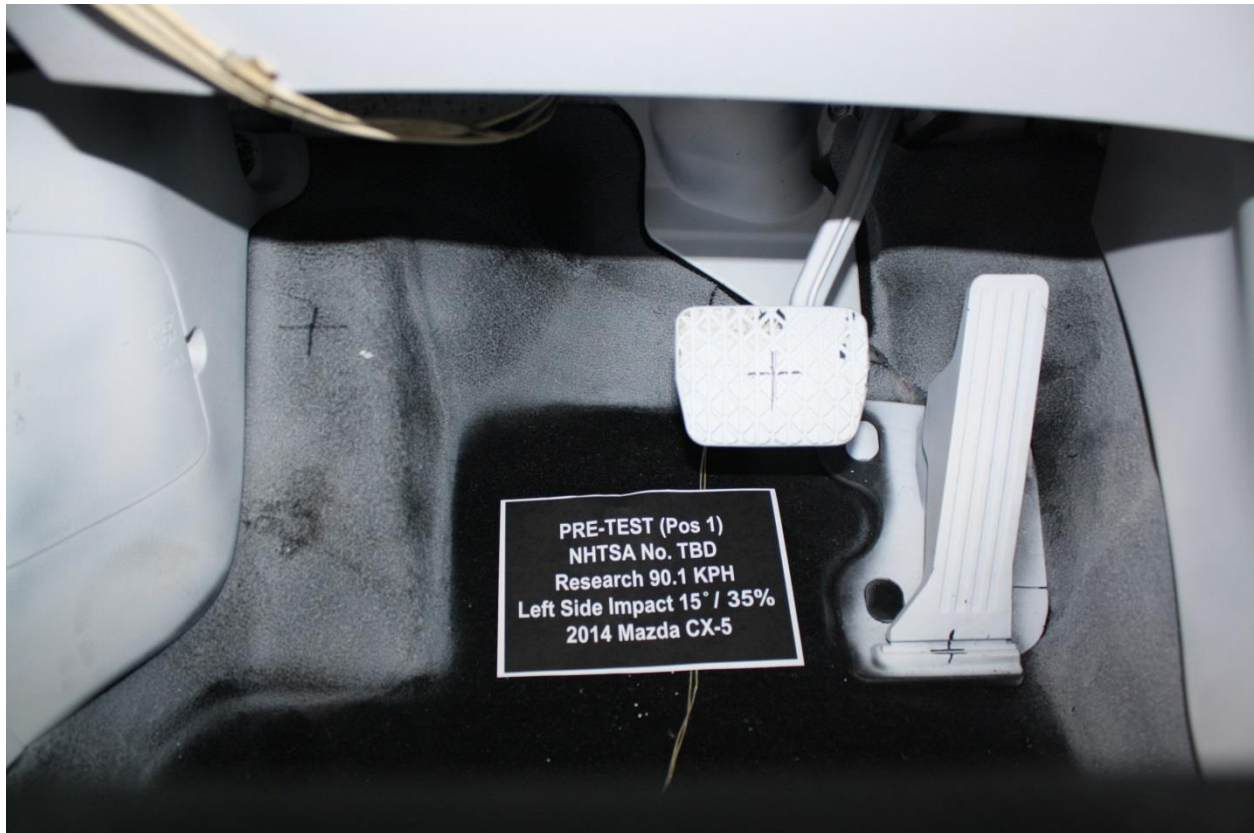
No. 043 Post-Test Right Side View of Driver Knee Bolsters



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



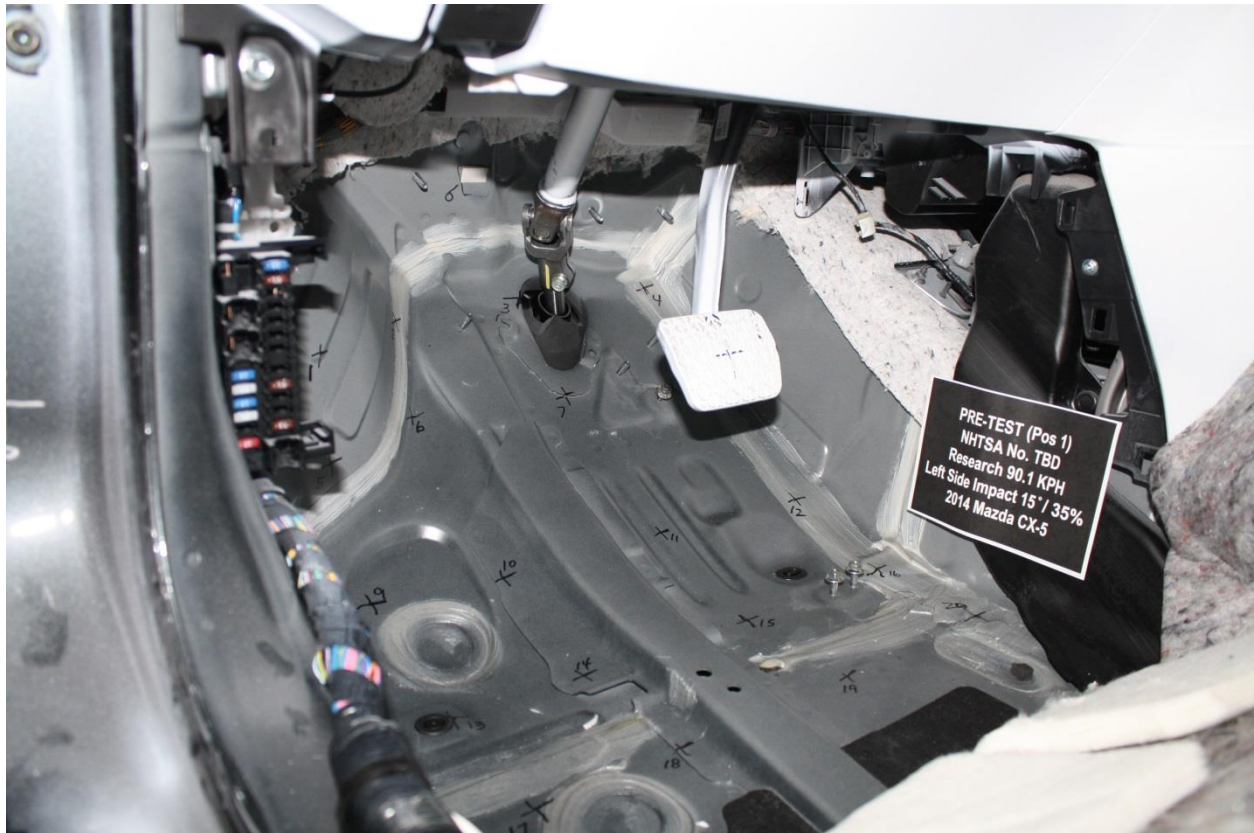
No. 045 Post-Test View of Driver Floor pan at Left sill level, w/carpet



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



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



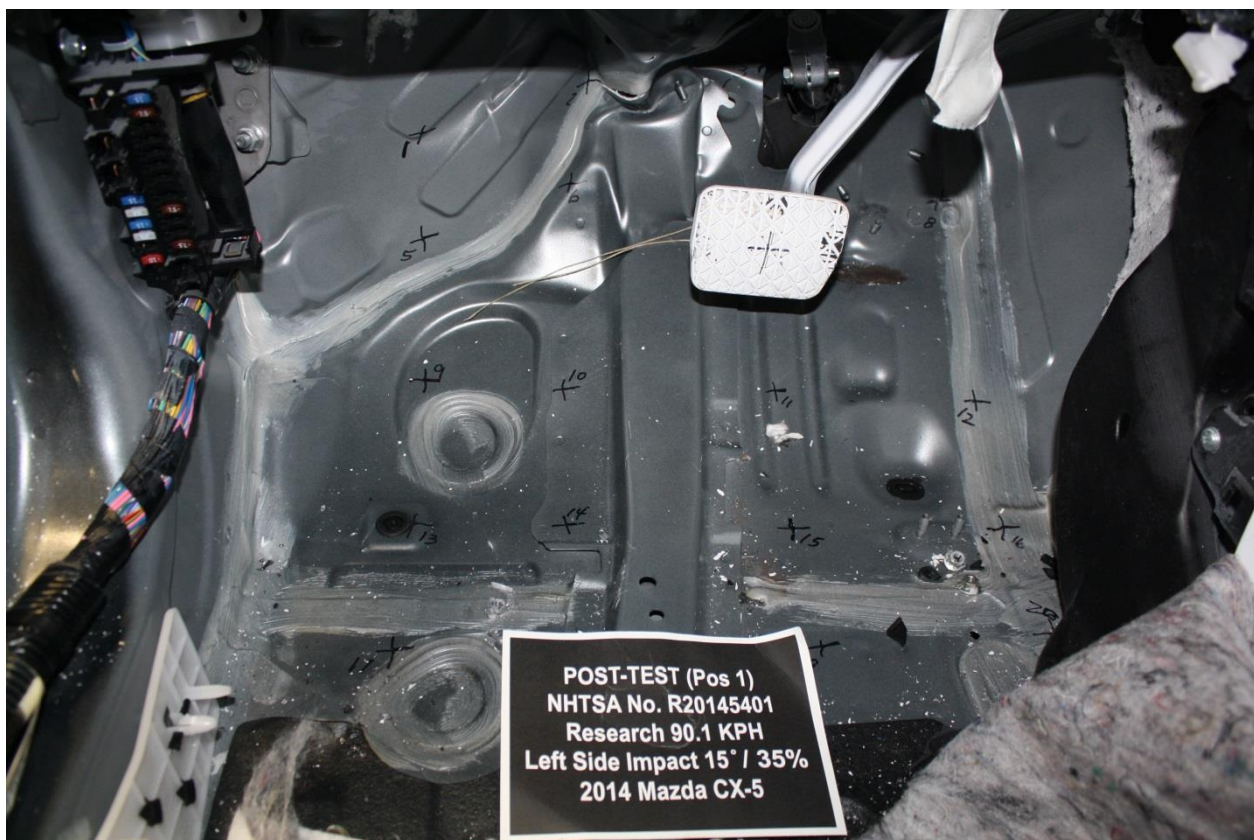
No. 048 Pre-Test View of Driver Floor pan at Left sill level, w/o carpet



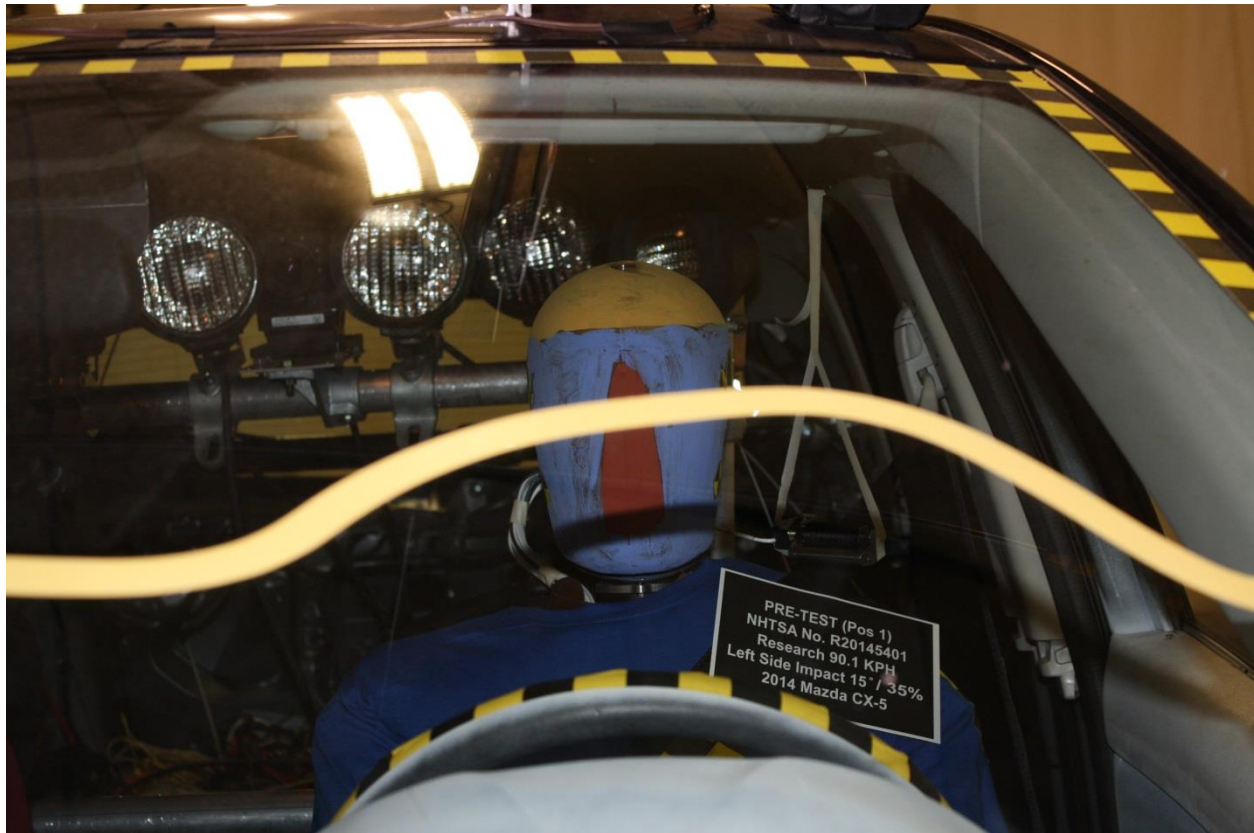
No. 049 Post-Test View of Driver Floor pan at Left sill level, w/o carpet



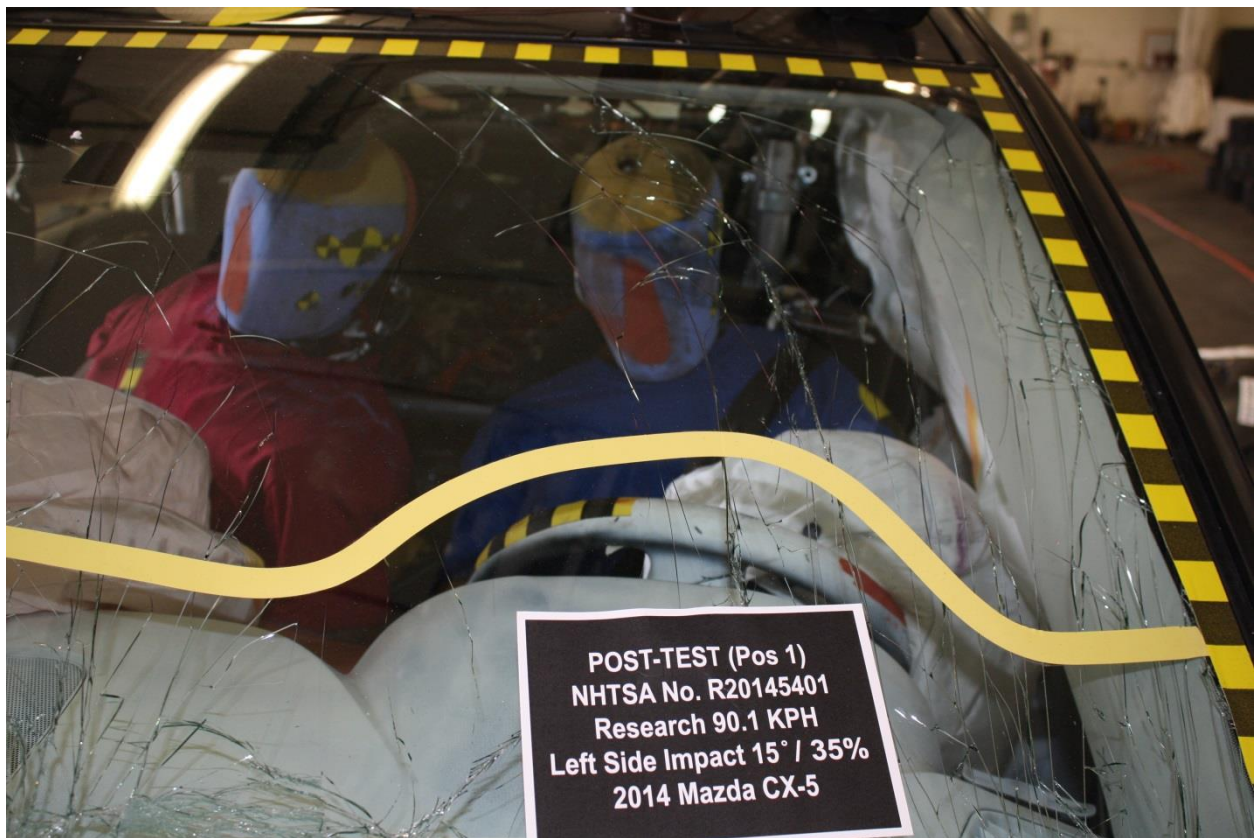
No. 050 Pre-Test View of Driver Floor pan at Mid seat level, w/o carpet



No. 051 Post-Test view of Driver Floor pan at Mid seat level, w/o carpet



No. 052 Pre-Test Driver Front Windshield View



No. 053 Post-Test Driver Front Windshield View



No. 054 Pre-Test Left Side View of Driver and Interior



No. 055 Post-Test Left Side View of Driver and Interior



No. 056 Pre-Test Left Side Driver Window View



No. 057 Post-Test Left Side Driver Window View



No. 058 Pre-Test Right Side View of Driver and Interior



No. 059 Post-Test Right Side View of Driver and Interior



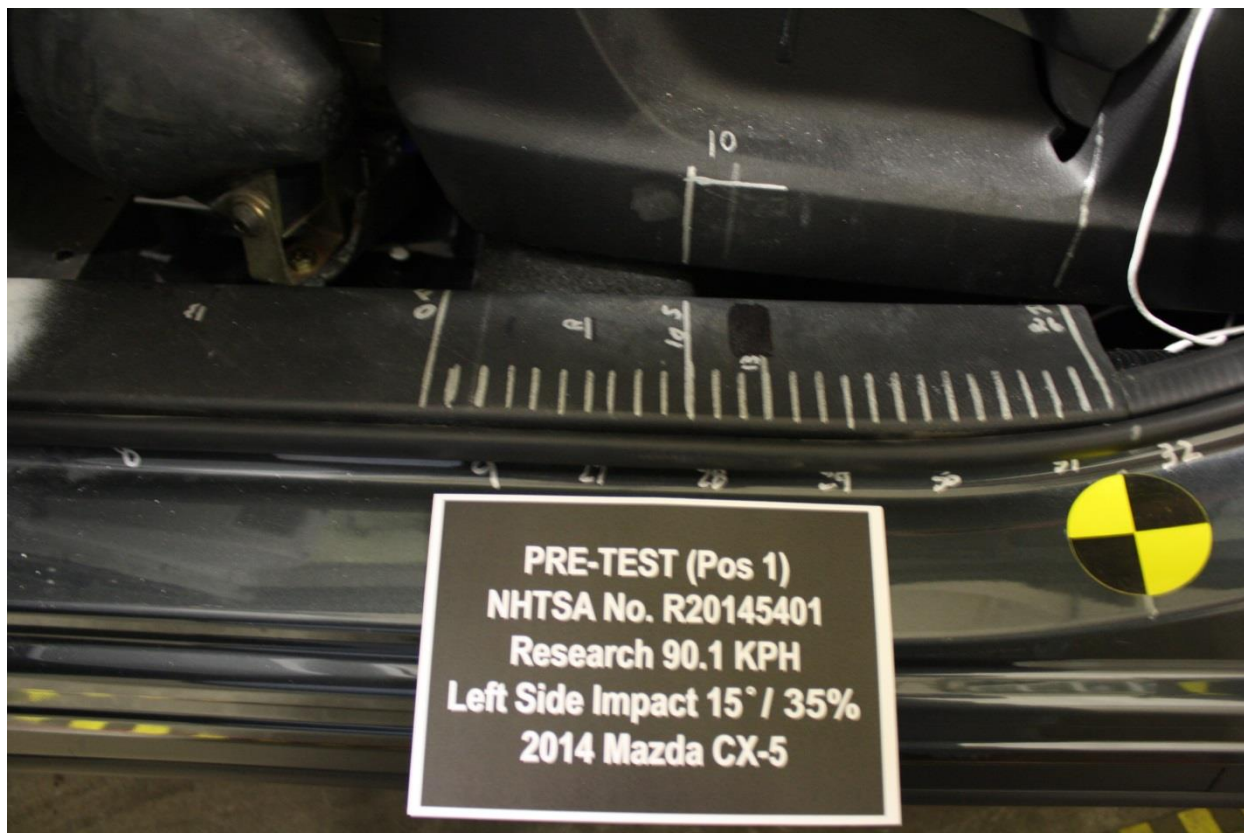
No. 060 Pre-Test View of Driver Door Clearance



No. 061 Post-Test View of Driver Door Clearance



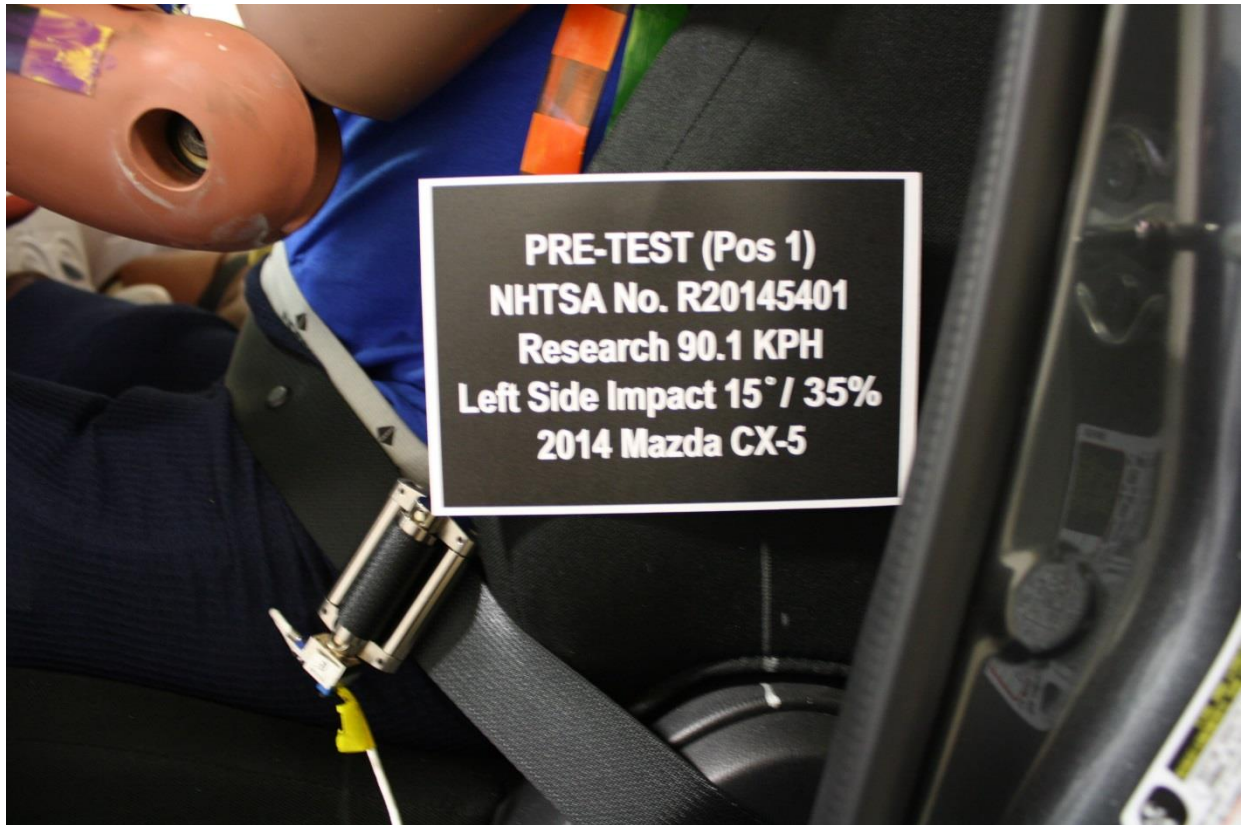
No. 062 Pre-Test View of Parking Brake



No. 063 Pre-Test Driver Seat Fore Aft Markings



No. 064 Post-Test Driver Seat Fore Aft Markings



No. 065 Pre-Test Driver Seat Back Markings



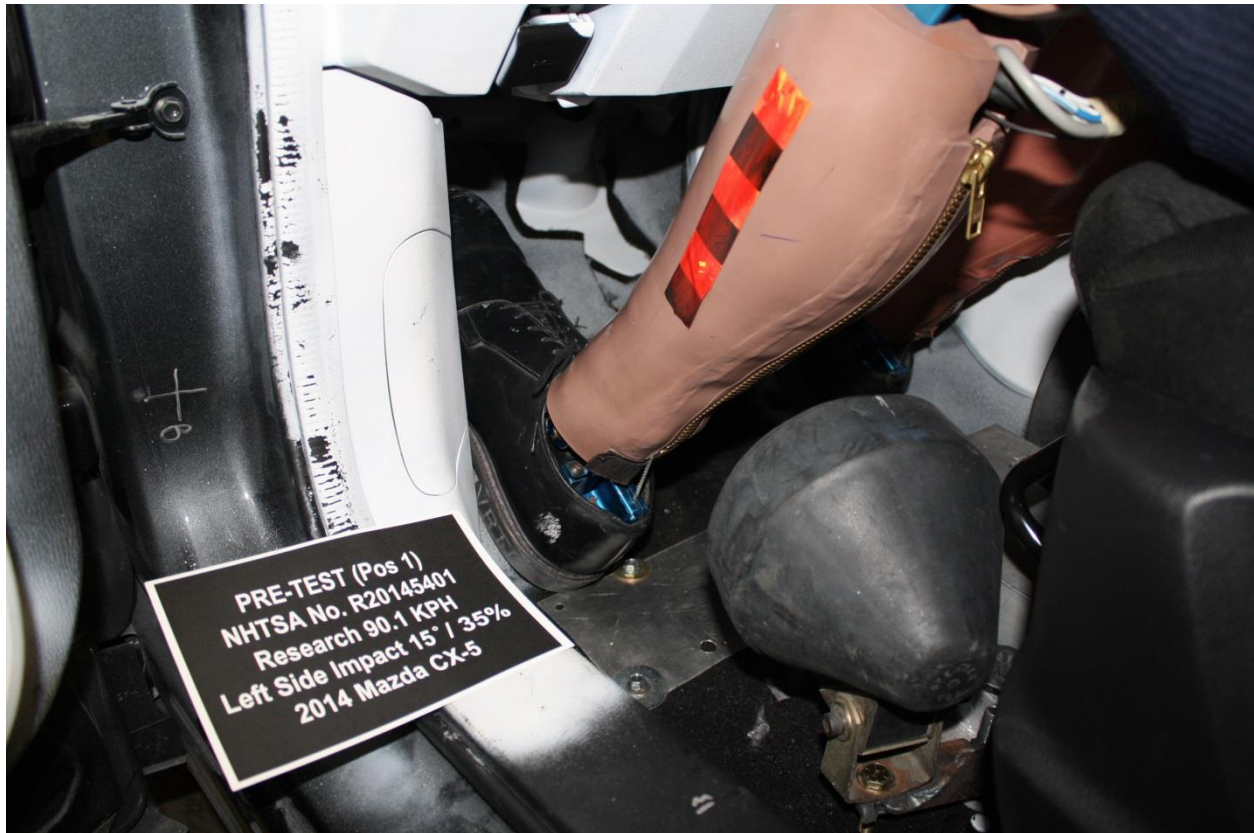
No. 066 Pre-Test Overhead View of Driver Thighs on Seat



No. 067 Pre-Test Driver Adjustable D-Ring



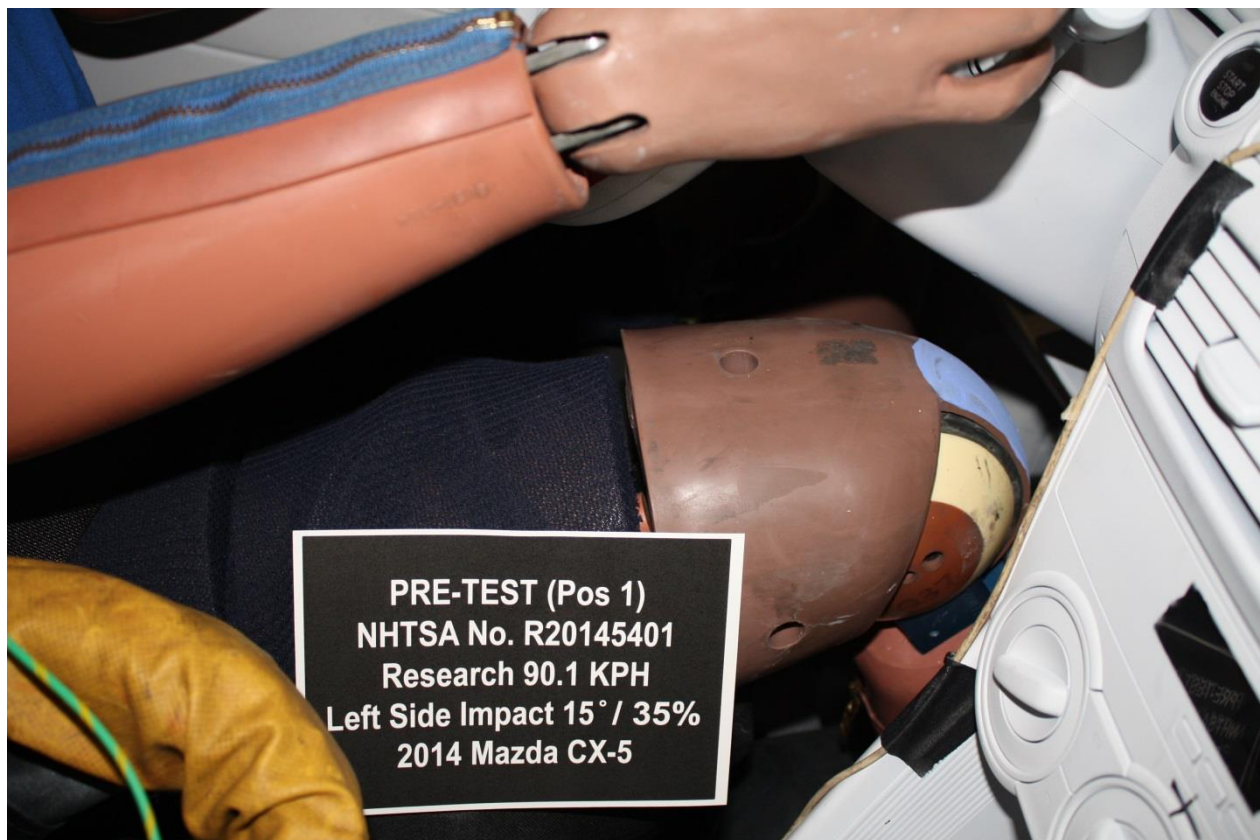
No. 068 Post-Test Driver Adjustable D-Ring



No. 069 Pre-Test Driver Feet



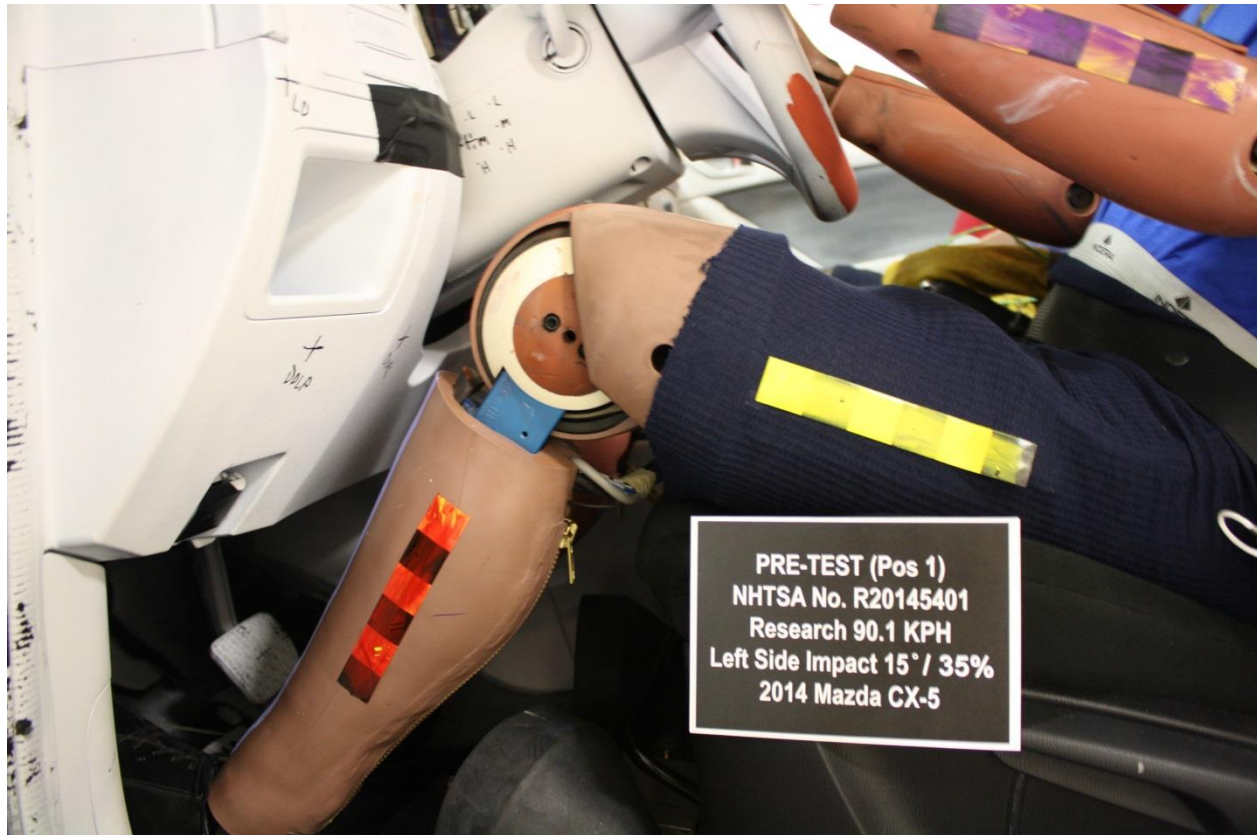
No. 070 Post-Test Driver Feet



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



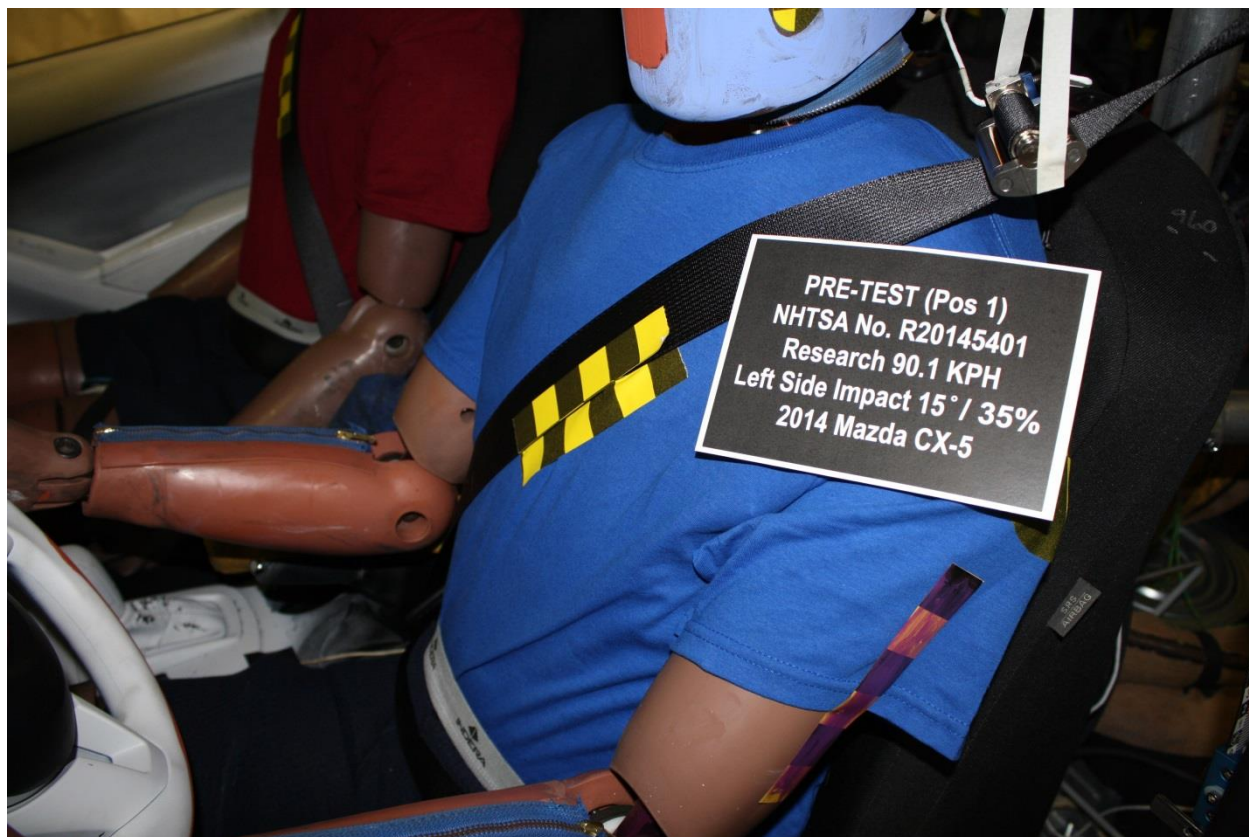
No. 072 Post-Test View of Driver Right Knee and Bolster



No. 073 Pre-Test View of Driver Left Knee and Bolster



No. 074 Post-Test View of Driver Left Knee and Bolster



No. 075 Pre-Test View of Driver Abdomen



No. 076 Post-Test View of Driver Abdomen



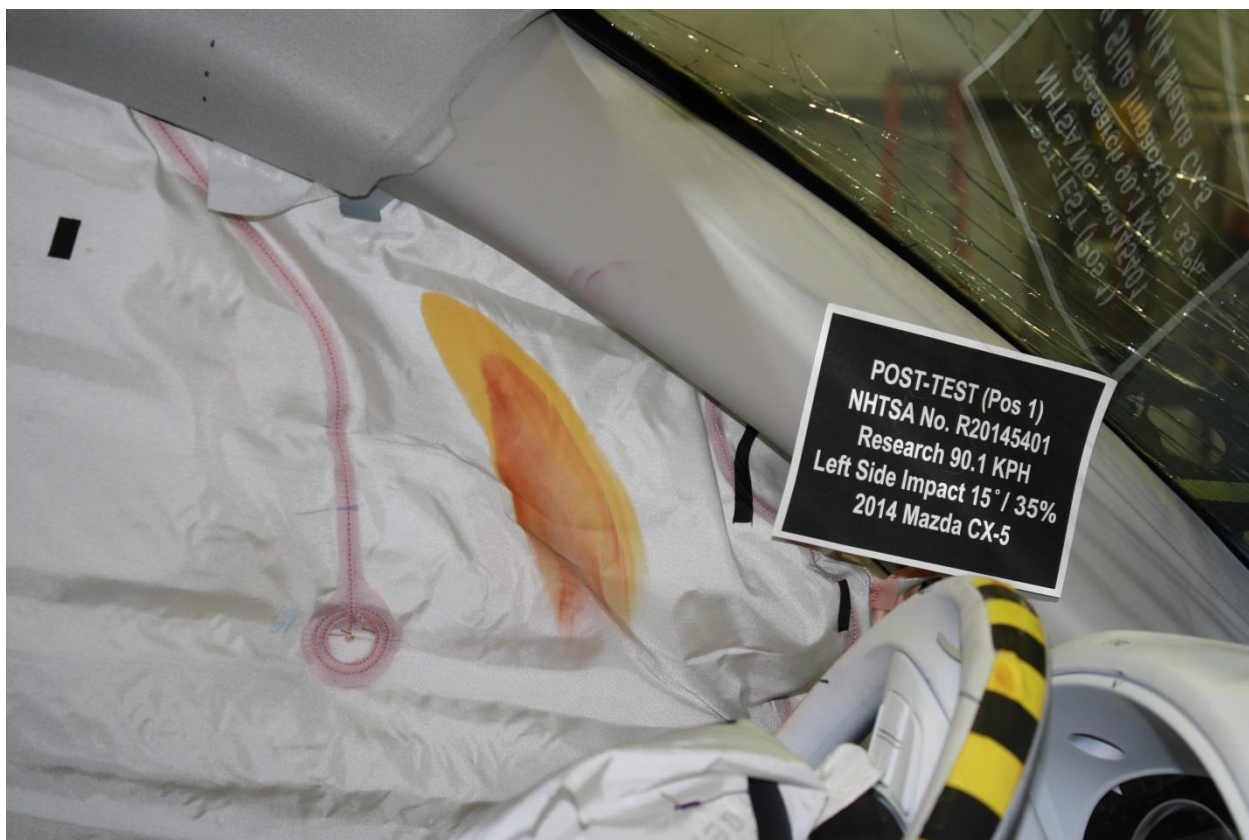
No. 077 Pre-Test Left Side View of Steering Wheel set position



No. 078 Post-Test Left Side View of Steering Wheel set position



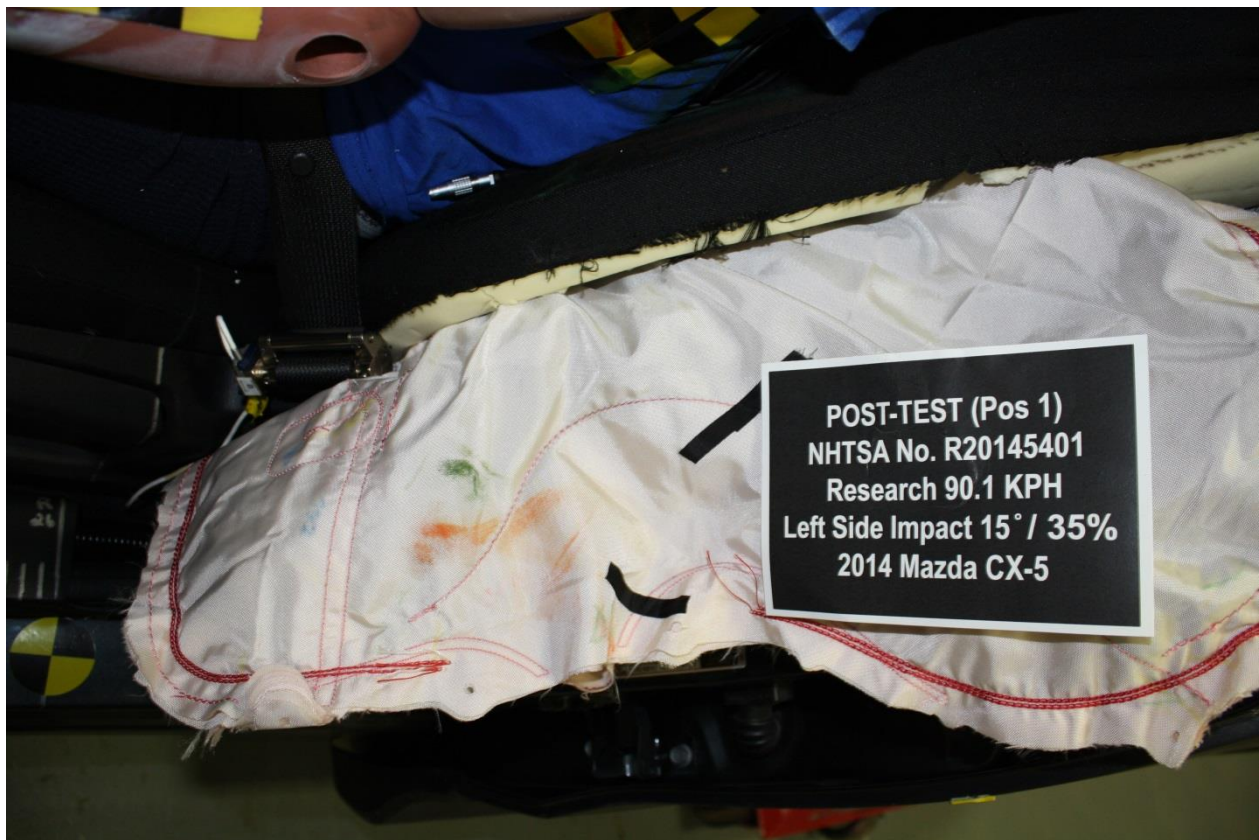
No. 079 Post-Test View of Driver Head Contact with Front Airbag



No. 080 Post-Test View of Driver Head Contact with Curtain Airbag

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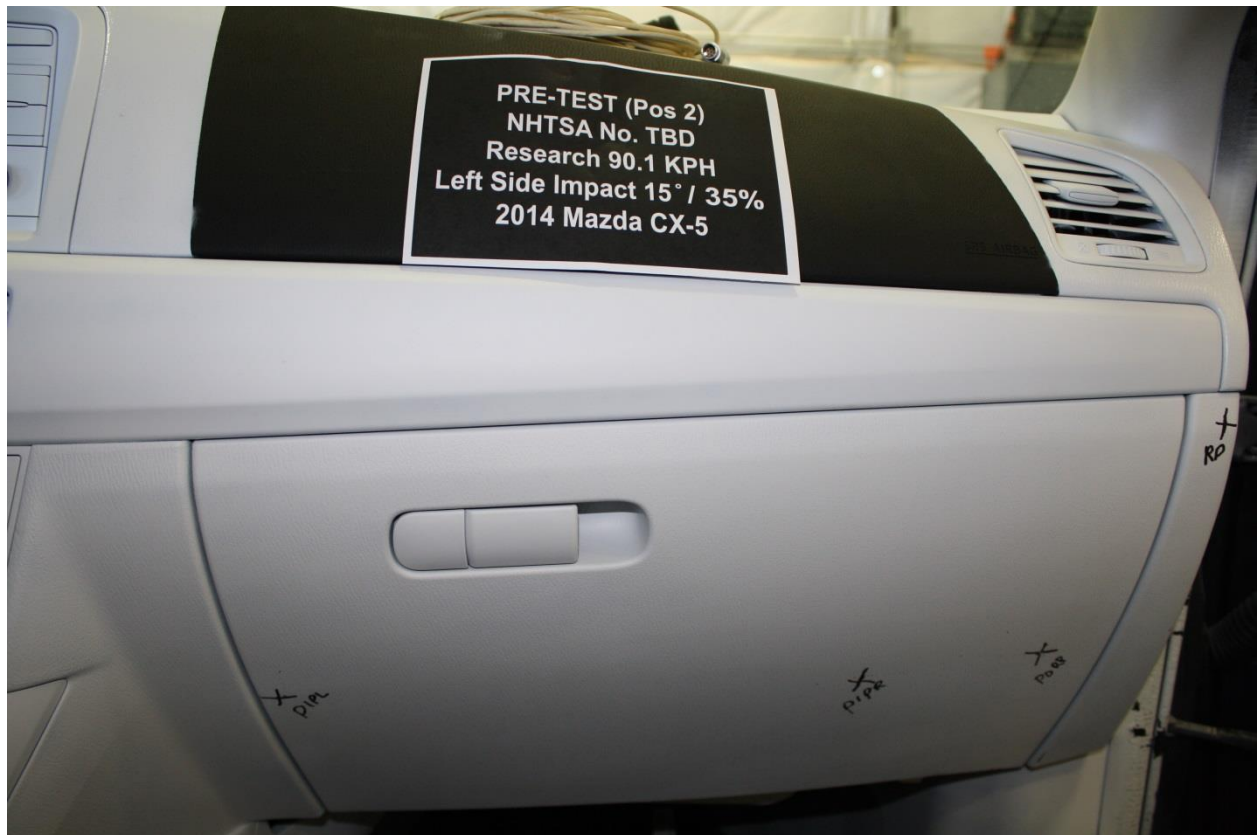
No. 081 Post-Test View of Driver Head Contact with Vehicle Interior – A



No. 081a Post-Test View of Driver Body Contact with Vehicle Interior - B



No. 081b 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



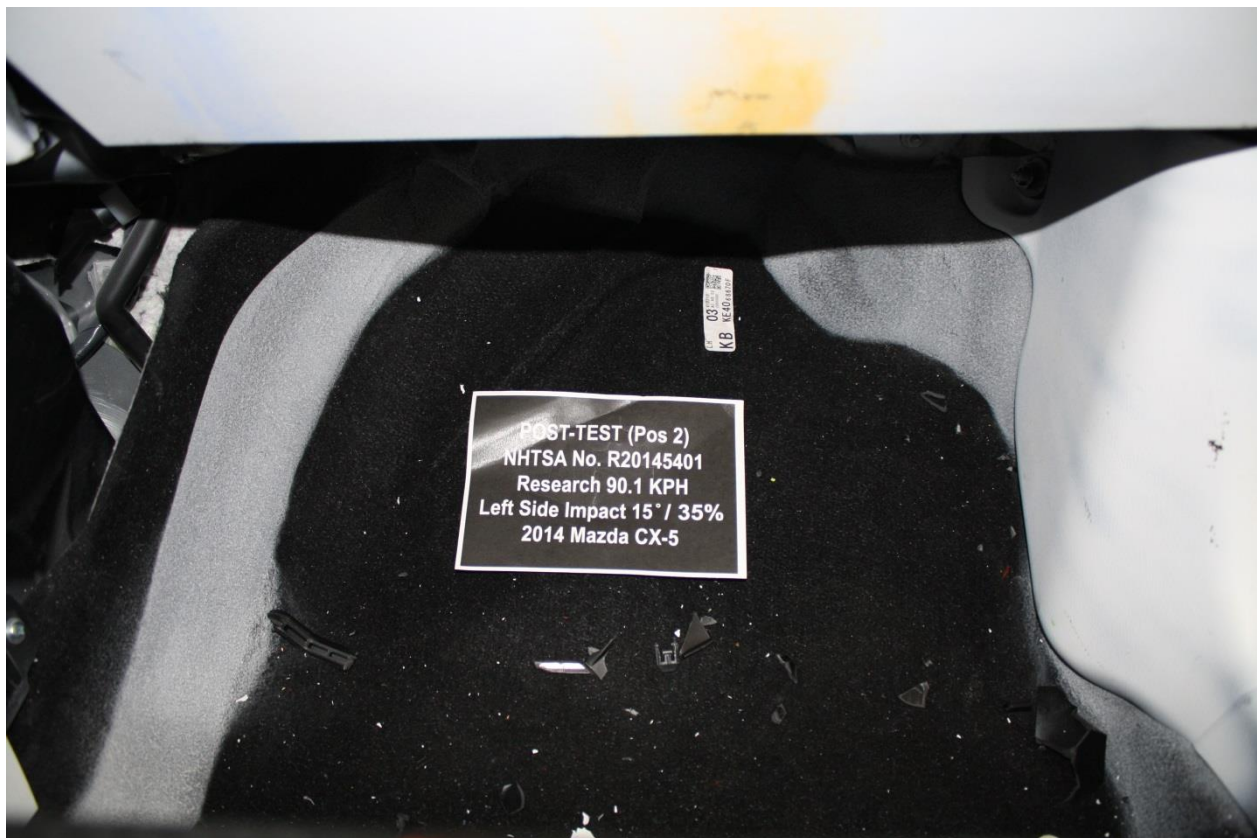
No. 088 Pre-Test View of Passenger Floor pan at Left sill level, w/carpet



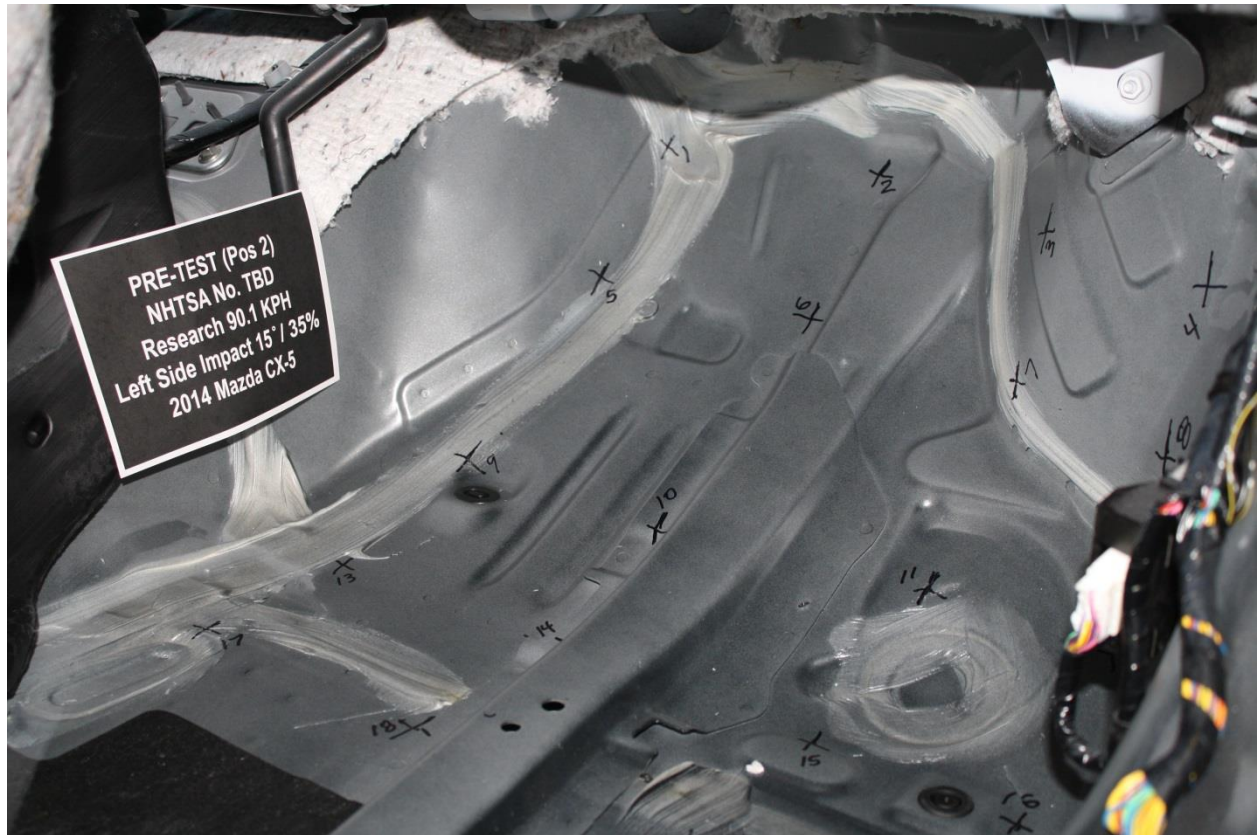
No. 089 Post-Test View of Passenger Floor pan at Left sill level, w/carpet



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



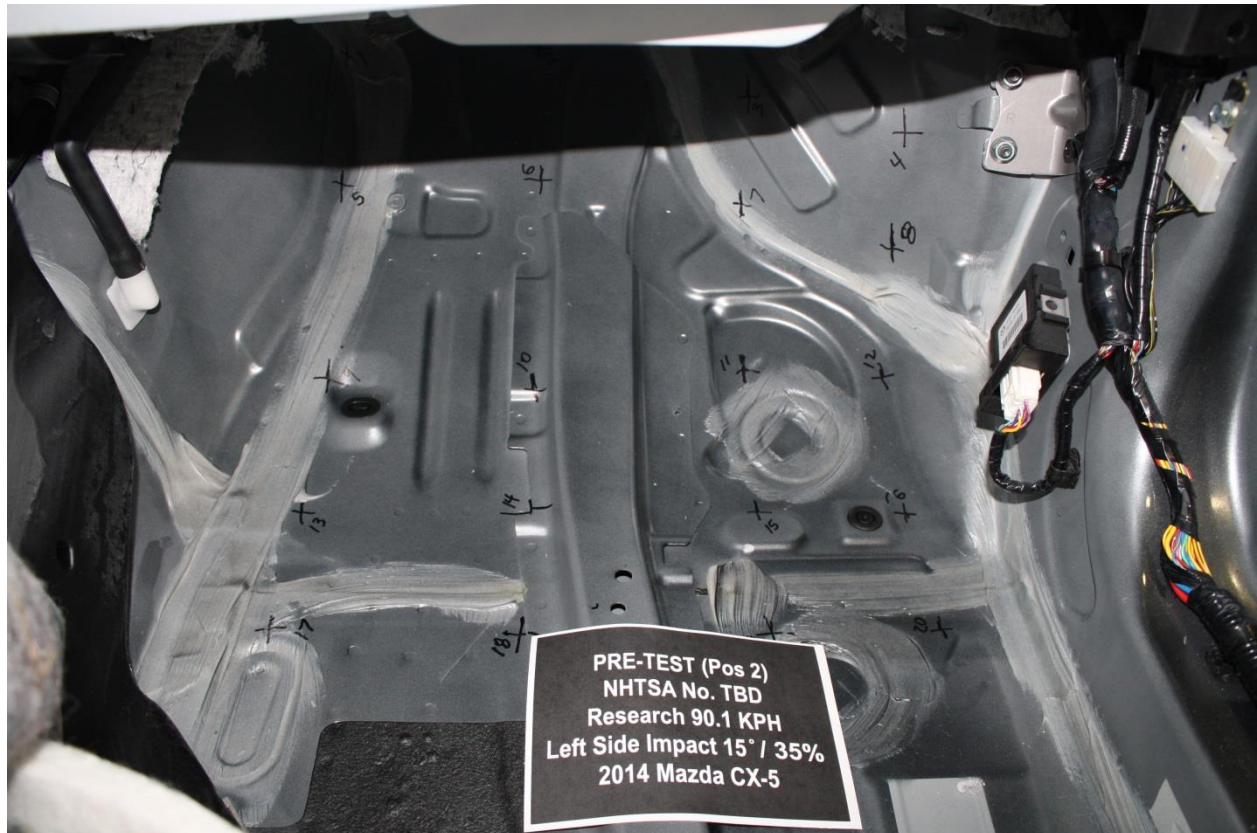
No. 091 Post-Test view of Passenger Floor pan at Mid seat level, w/carpet



No. 092 Pre-Test View of Passenger Floor pan at Left sill level, w/o carpet



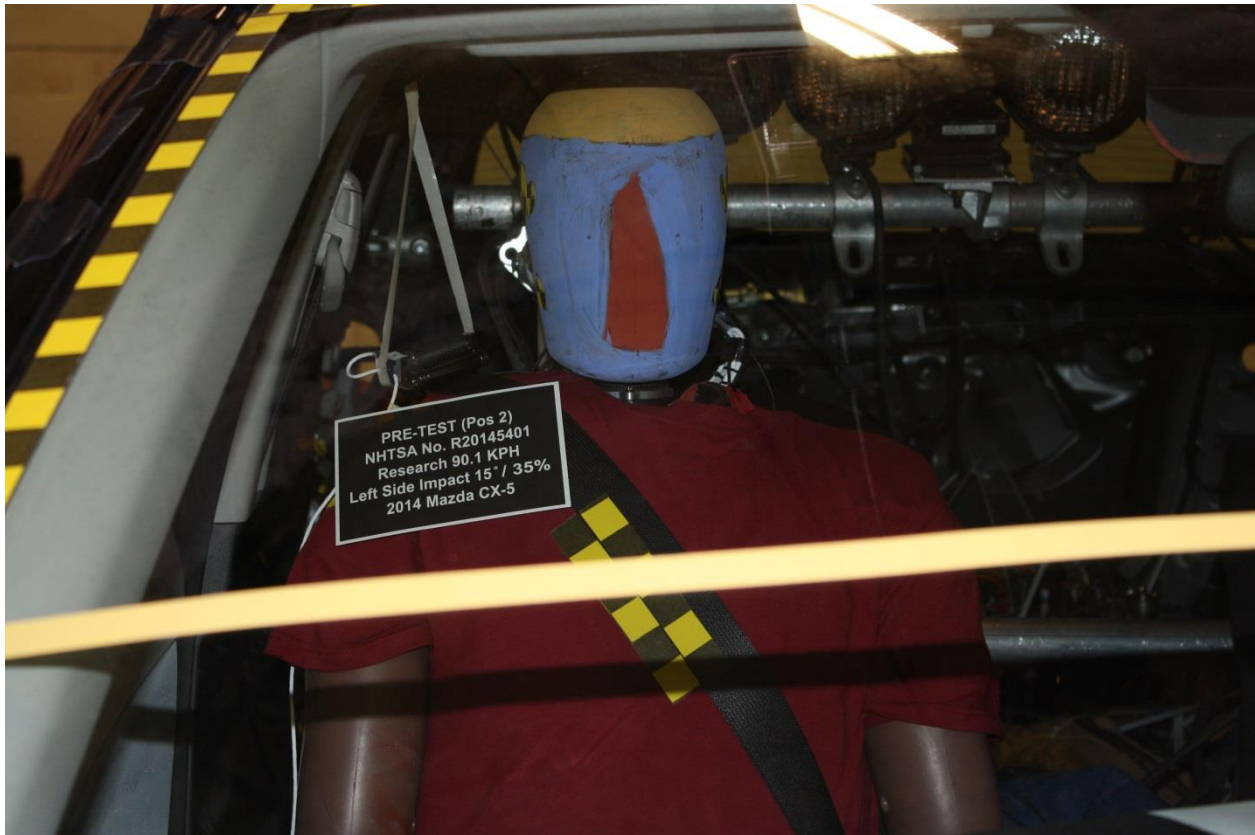
No. 093 Post-Test View of Passenger Floor pan at Left sill level, w/o carpet



No. 094 Pre-Test View of Passenger Floor pan at Mid seat level, without carpet



No. 095 Post-Test view of Passenger Floor pan at Mid seat level, wo carpet



No. 096 Pre-Test Passenger Front Close-up View, Windshield



No. 097 Post-Test Passenger Front Close-up View, Windshield



No. 098 Pre-Test Left Side Passenger and Interior View



No. 099 Post-Test Left Side Passenger and Interior View



No. 100 Pre-Test Right Side Passenger Window View



No. 101 Post-Test Right Side Passenger Window View



No. 102 Pre-Test Right Side Passenger and Interior View



No. 103 Post-Test Right Side Passenger and Interior View



No. 104 Pre-Test View of Passenger Door Clearance



No. 105 Post-Test View of Passenger Door Clearance



No. 106 Pre-Test Passenger Seat Fore-Aft Markings



No. 107 Post-Test Passenger Seat Fore-Aft Markings



No. 108 Pre-Test Passenger Seat Back Markings



No. 109 Pre-Test Overhead View of Passenger Thighs on seat



No. 110 Pre-Test Passenger Adjustable D-ring



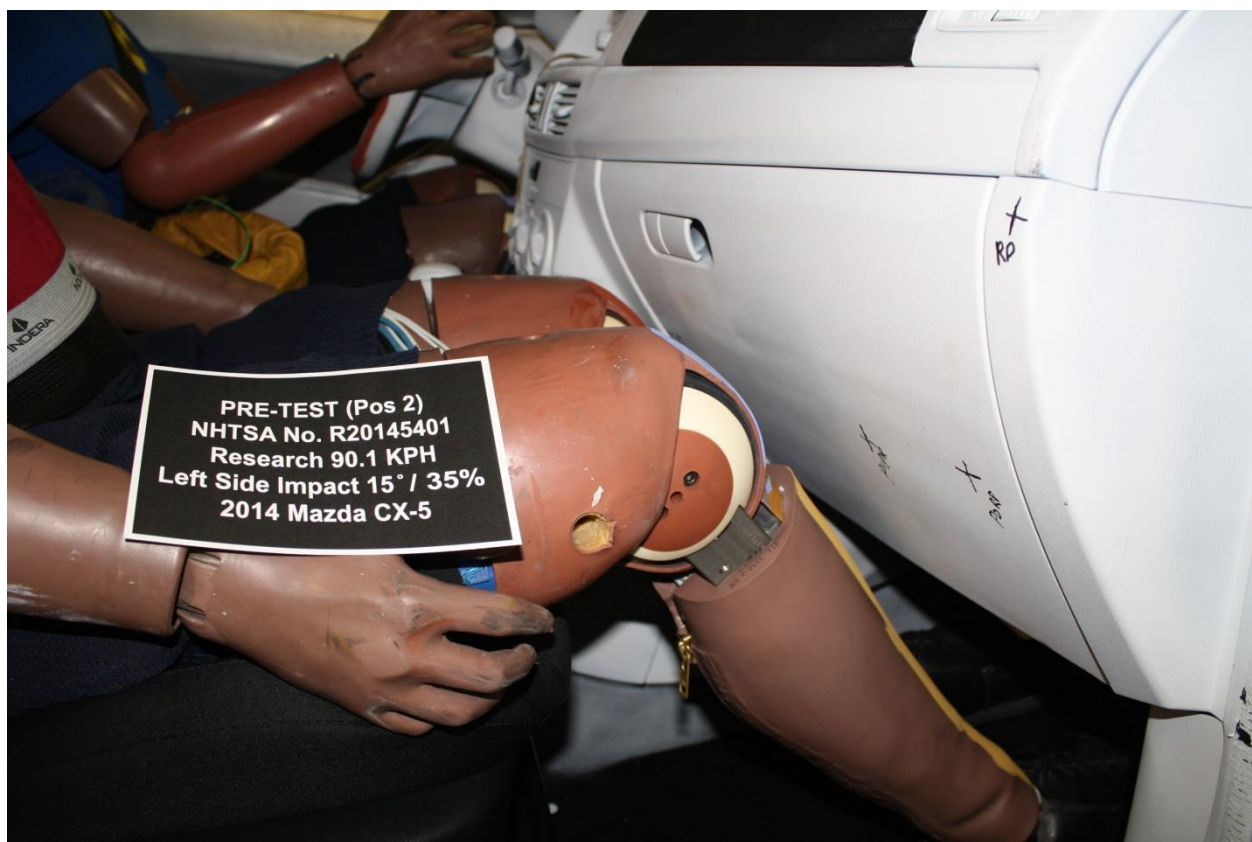
No. 111 Post-Test Passenger Adjustable D-ring



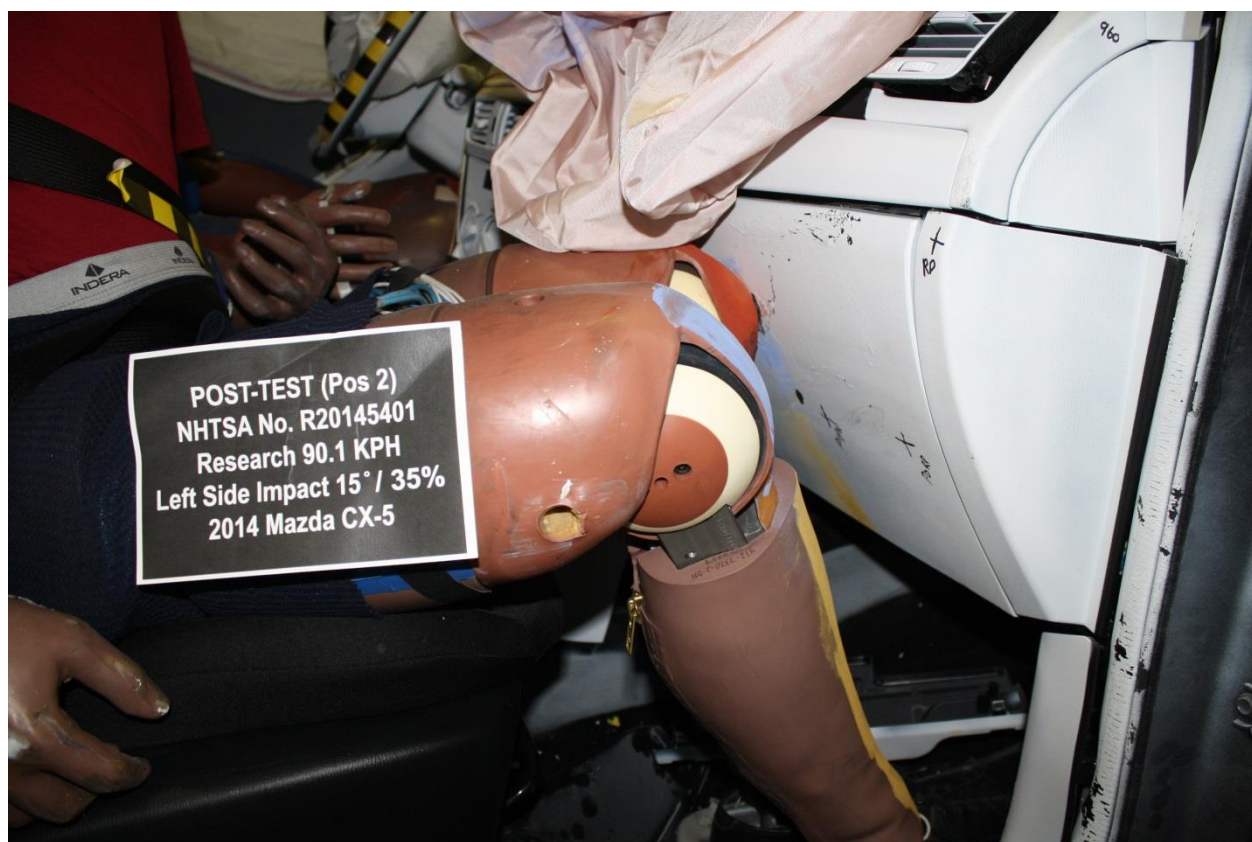
No. 112 Pre-Test View of Passenger Feet



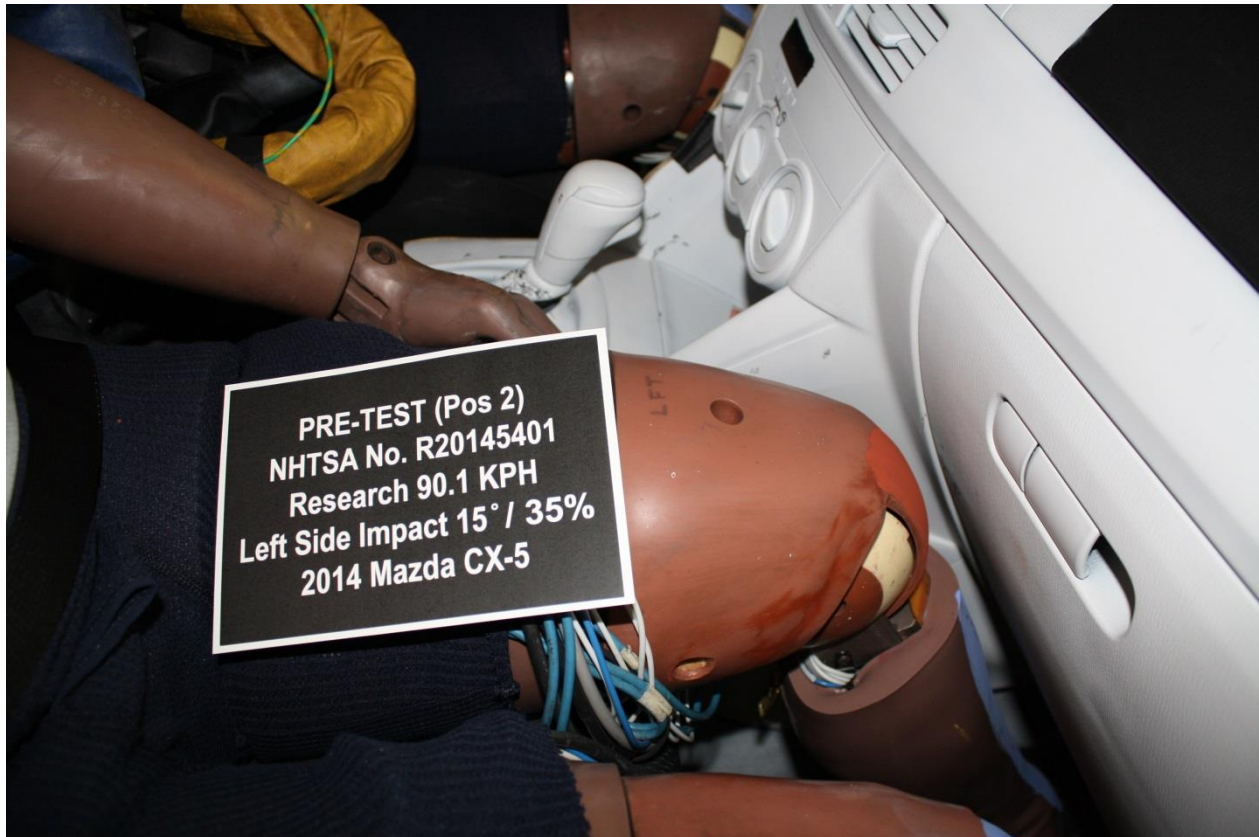
No. 113 Post-Test View of Passenger Feet



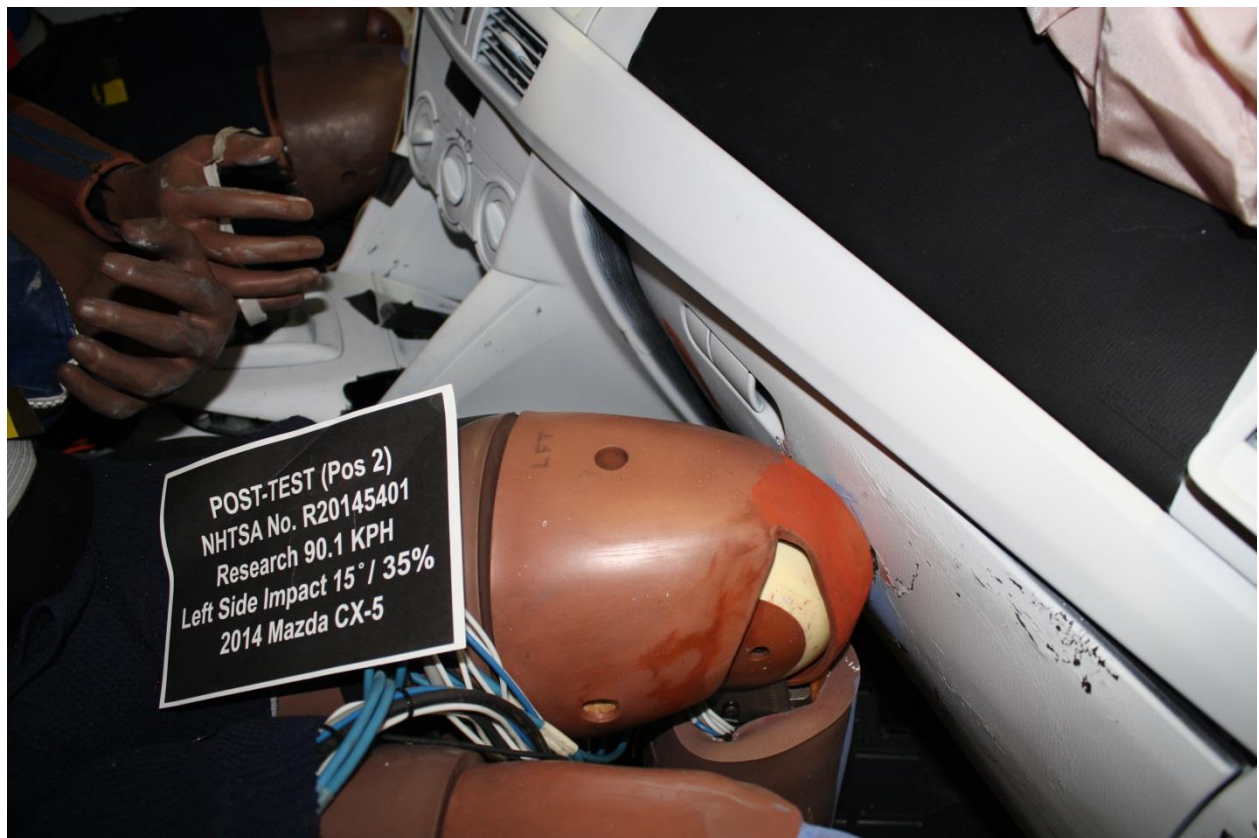
No. 114 Pre-Test View of Passenger Right Knee and Bolster



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



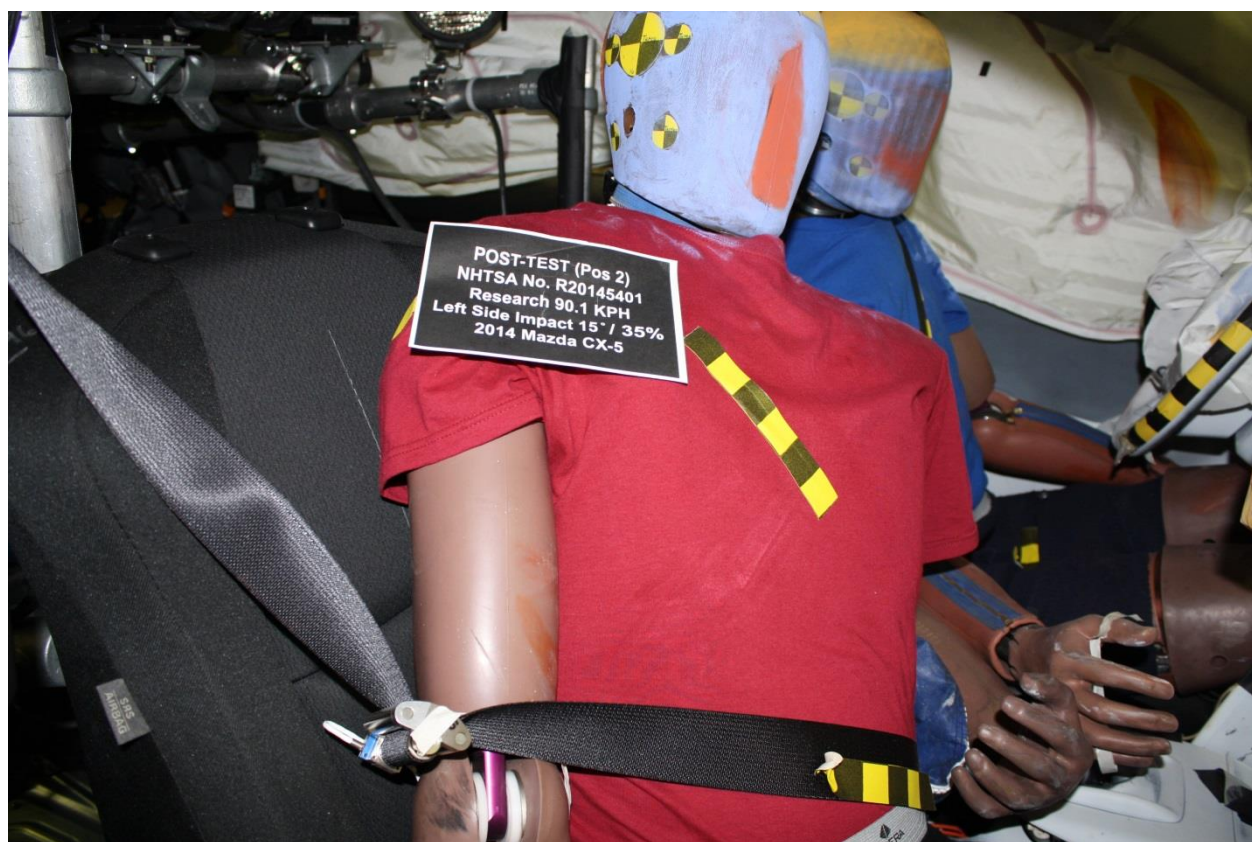
No. 116 Pre-Test View of Passenger Left Knee and Bolster



No. 117 Post-Test View of Passenger Left Knee and Bolster



No. 118 Pre-Test View of Passenger Abdomen



No. 119 Post-Test View of Passenger Abdomen



No. 120 Post-Test View of Passenger Head contact with Airbag – Front

Photo Not Applicable

No. 120a Post-Test View of Passenger Head contact with Airbag - Curtain

Photo Not Applicable

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

Photo Not Applicable

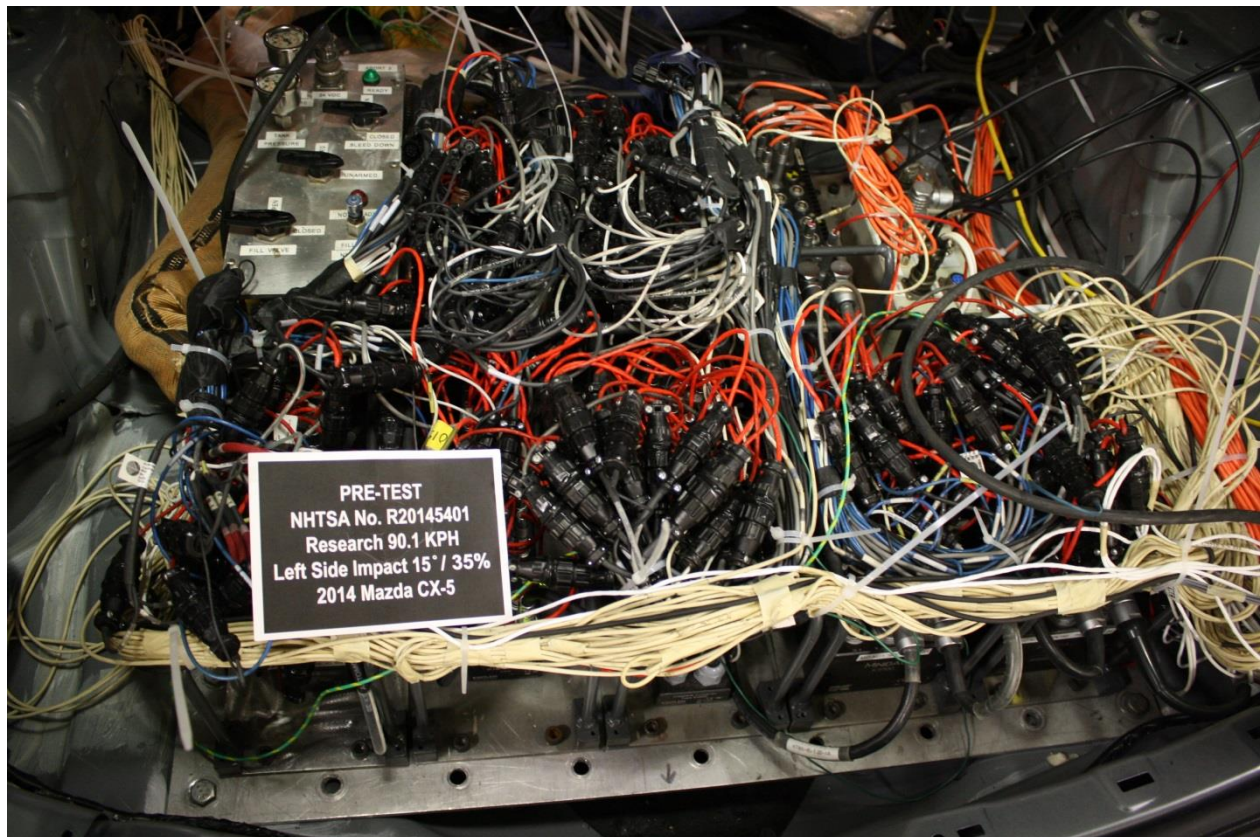
No. 121a Post-Test View of Passenger Head contact with Interior

Photo Not Applicable

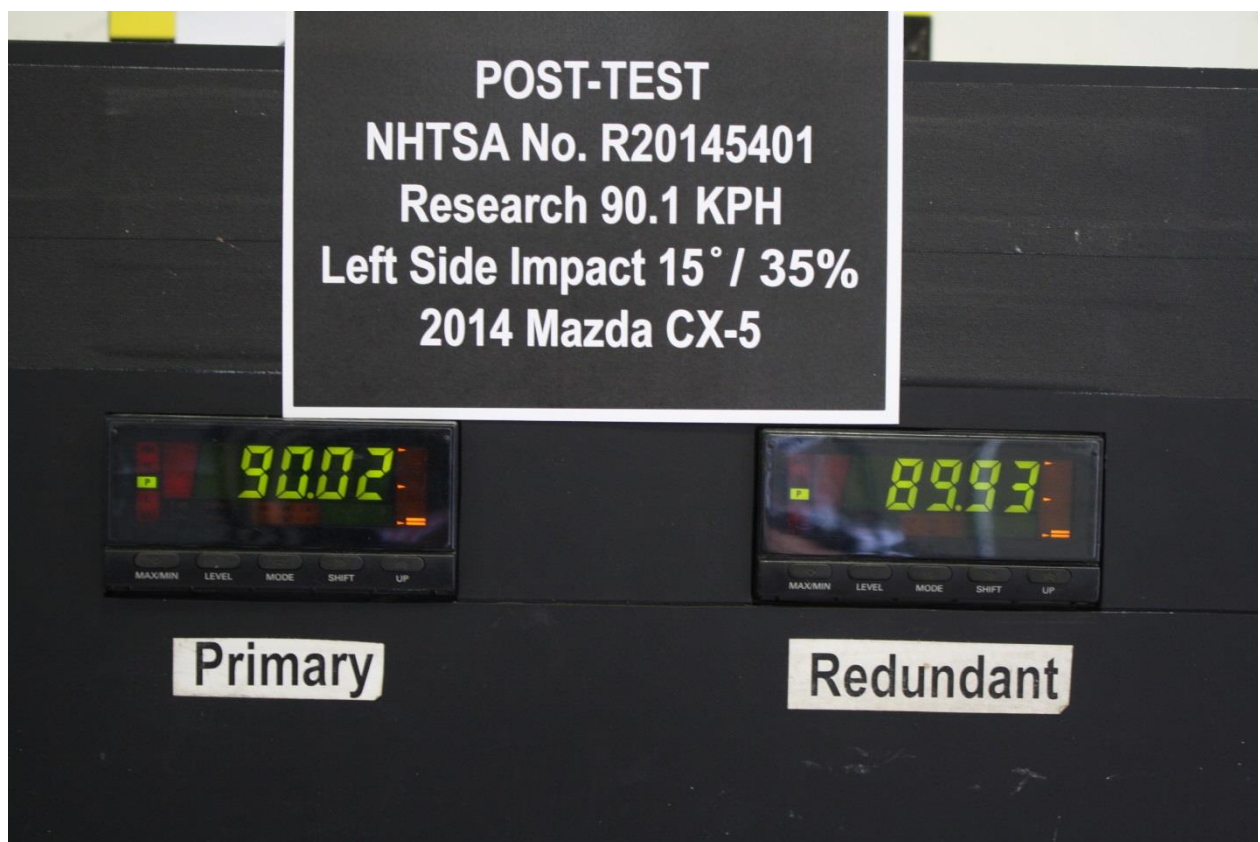
No. 121b Post-Test View of Passenger Head contact with Interior



No. 122 Post-Test Passenger Contact With Glovebox



No. 123 Pre-Test Ballast Locations



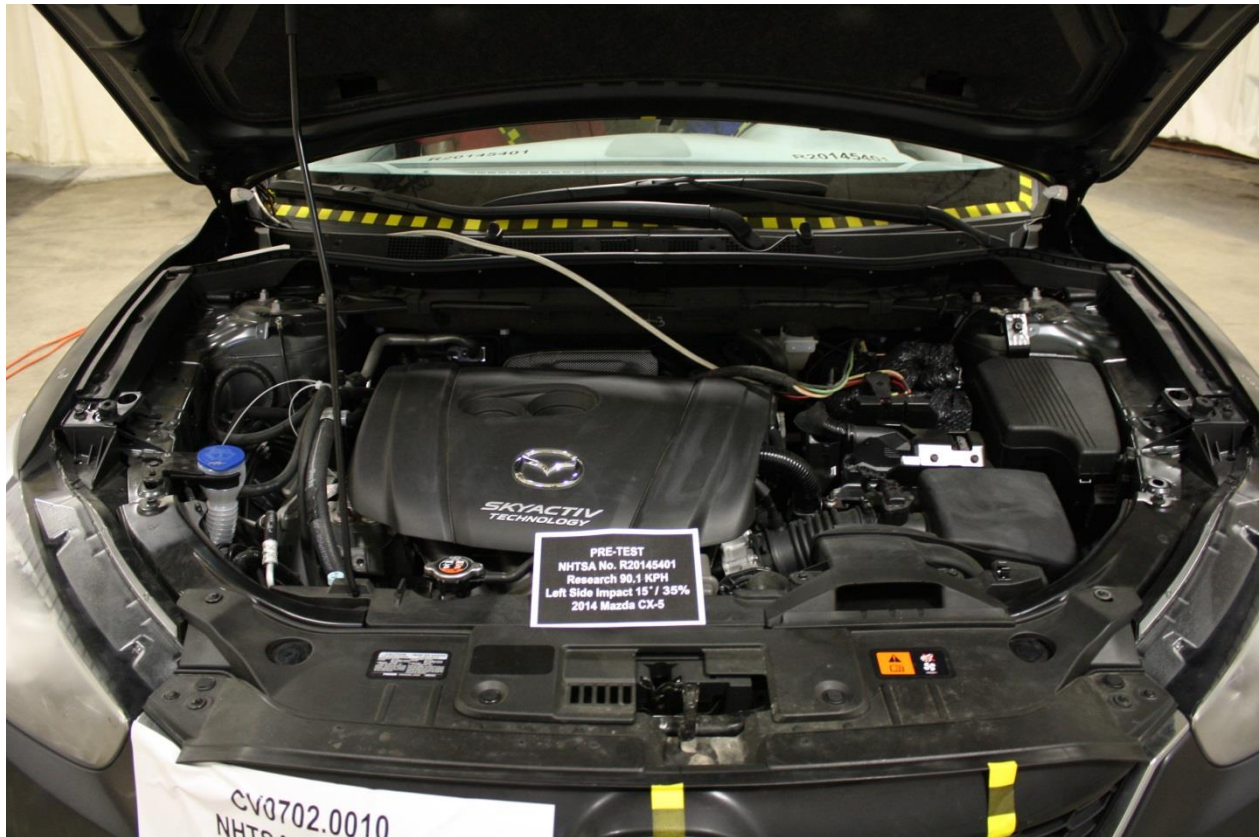
No. 124 Post-Test Speed Trap Readout



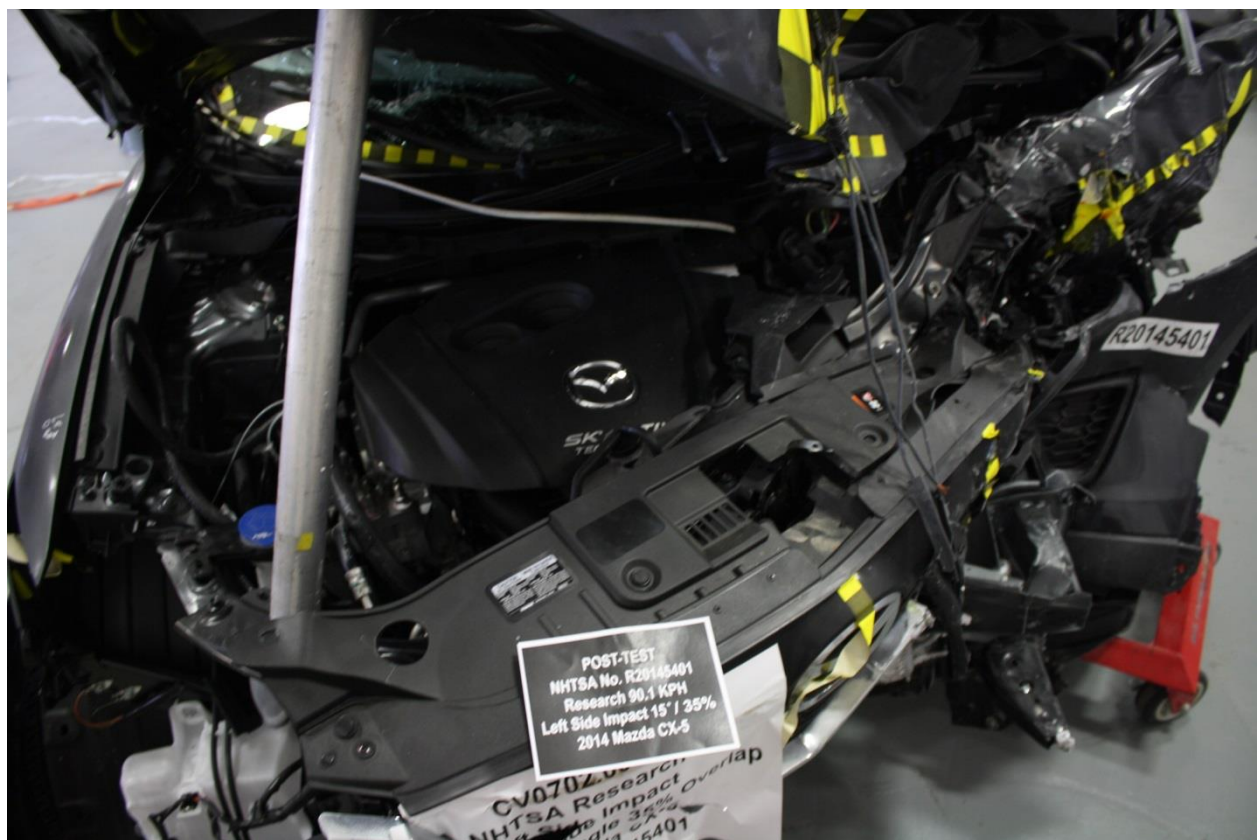
No. 125 Pre-Test View of Fuel Filler Cap



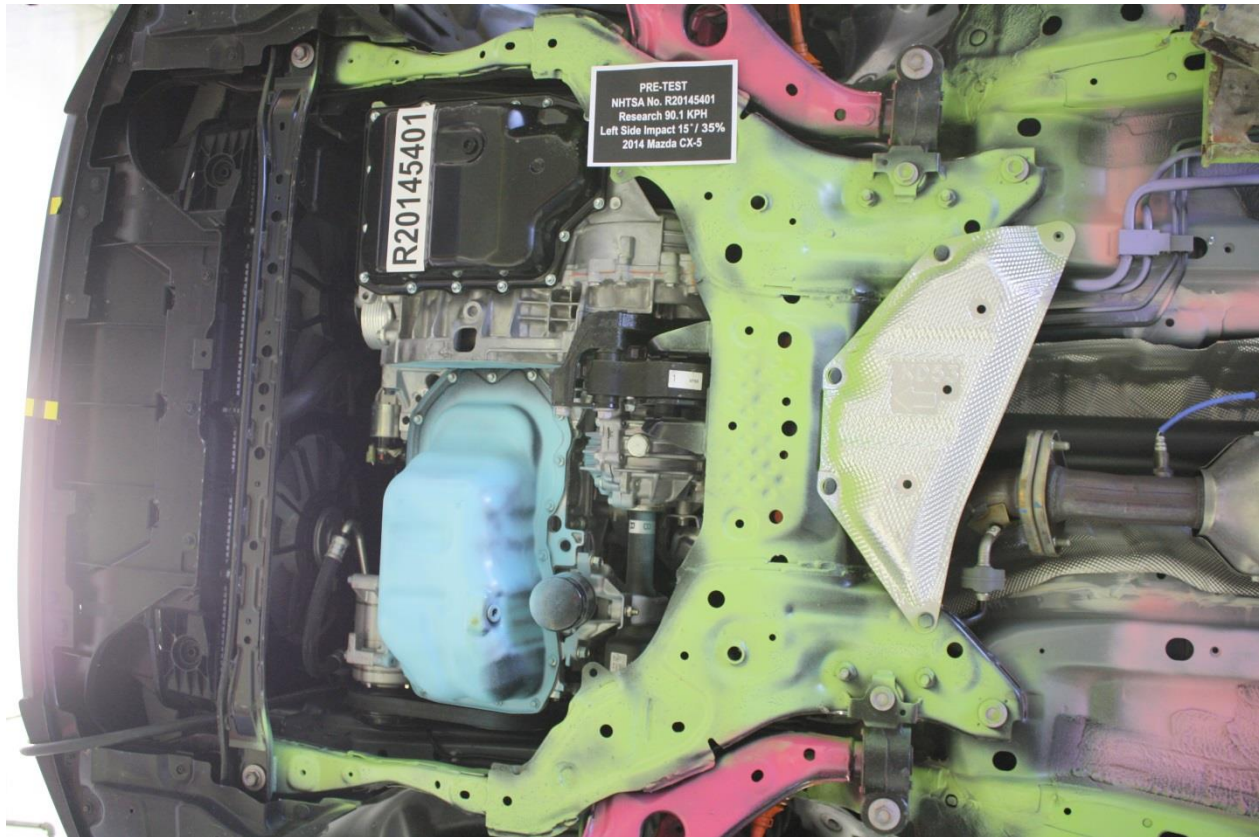
No. 126 Post-Test View of Fuel Filler Cap



No. 127 Pre-Test Engine Compartment View



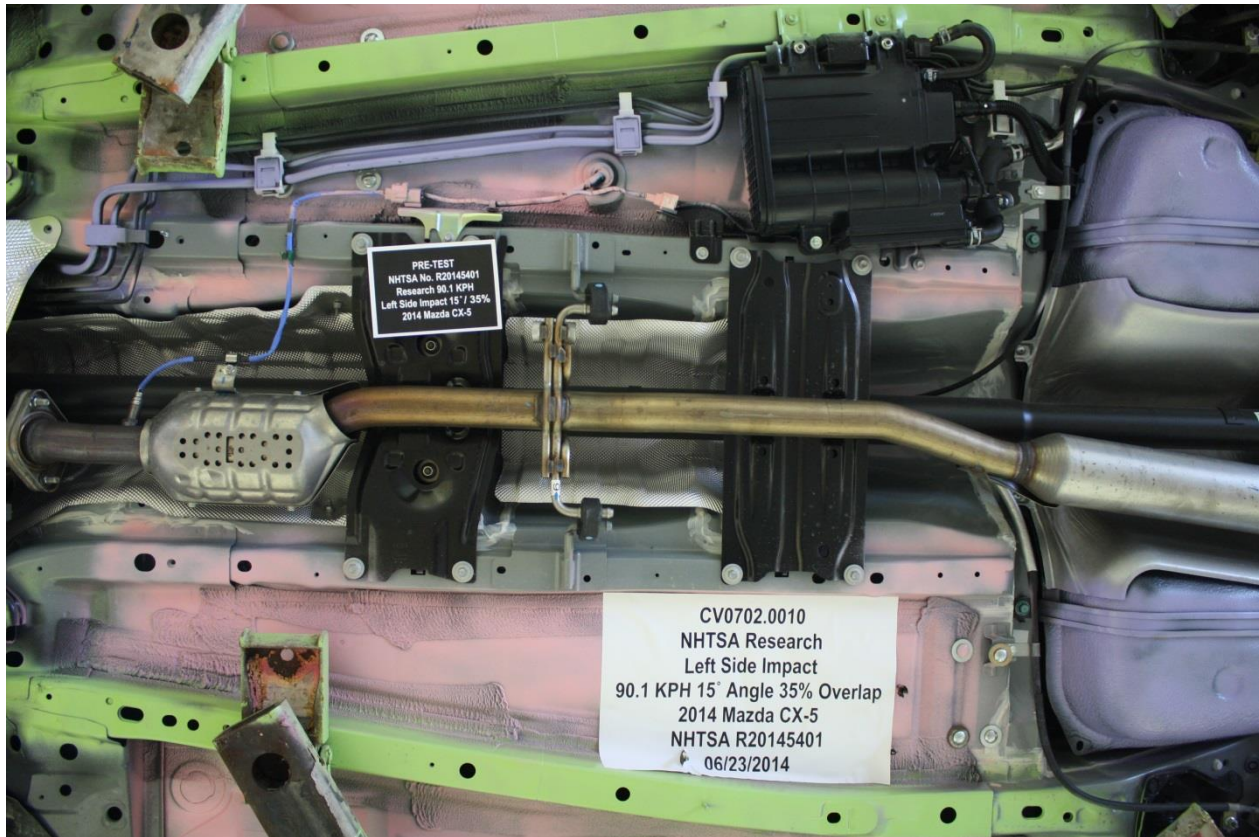
No. 128 Post-Test Engine Compartment View



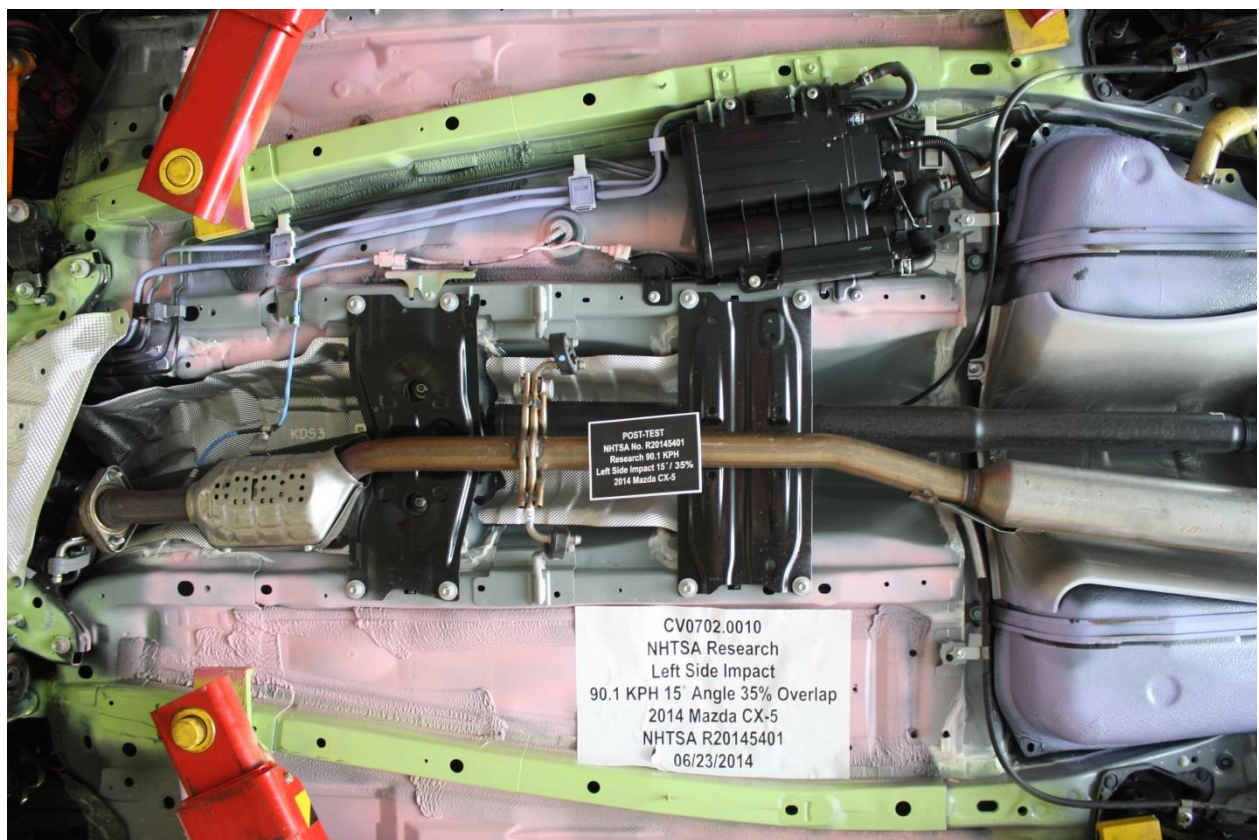
No. 129 Pre-Test View of Front Underbody (perpendicular to vehicle)



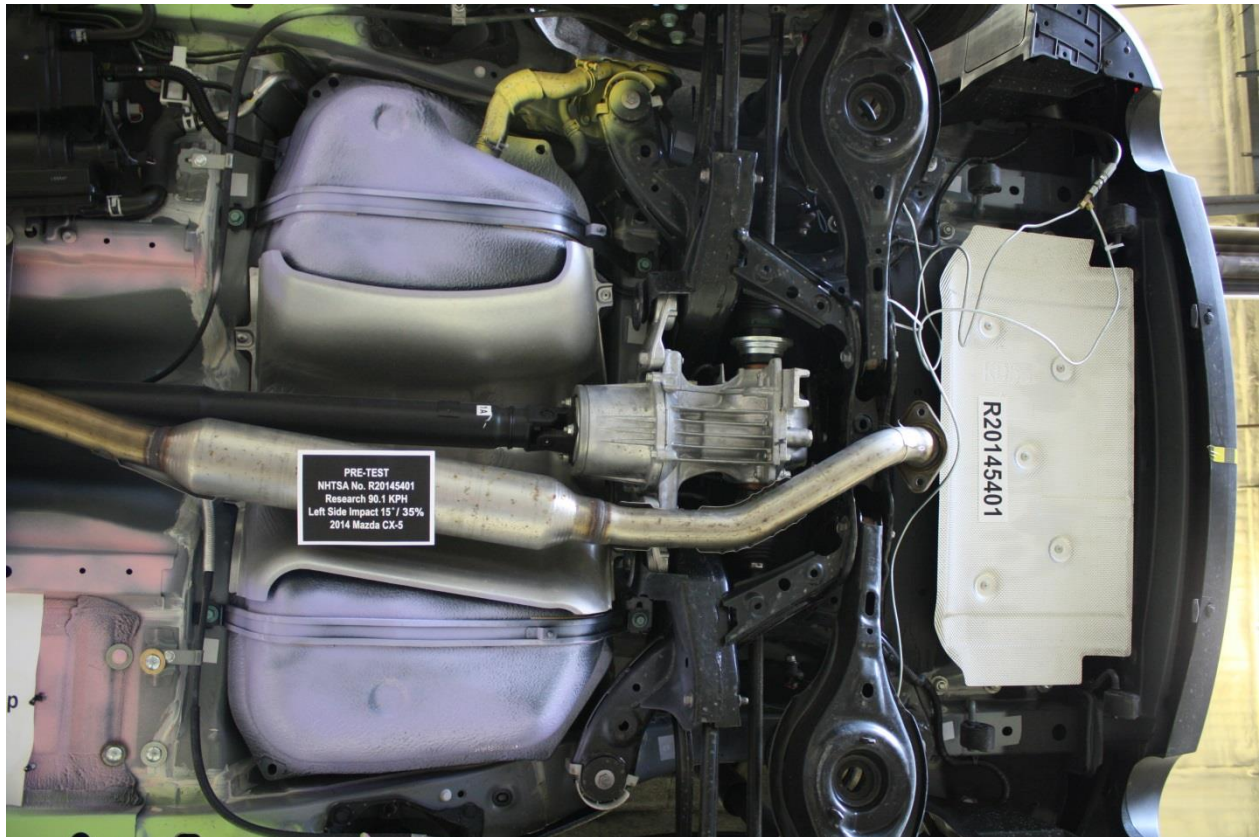
No. 130 Post-Test View of Front Underbody (perpendicular to vehicle)



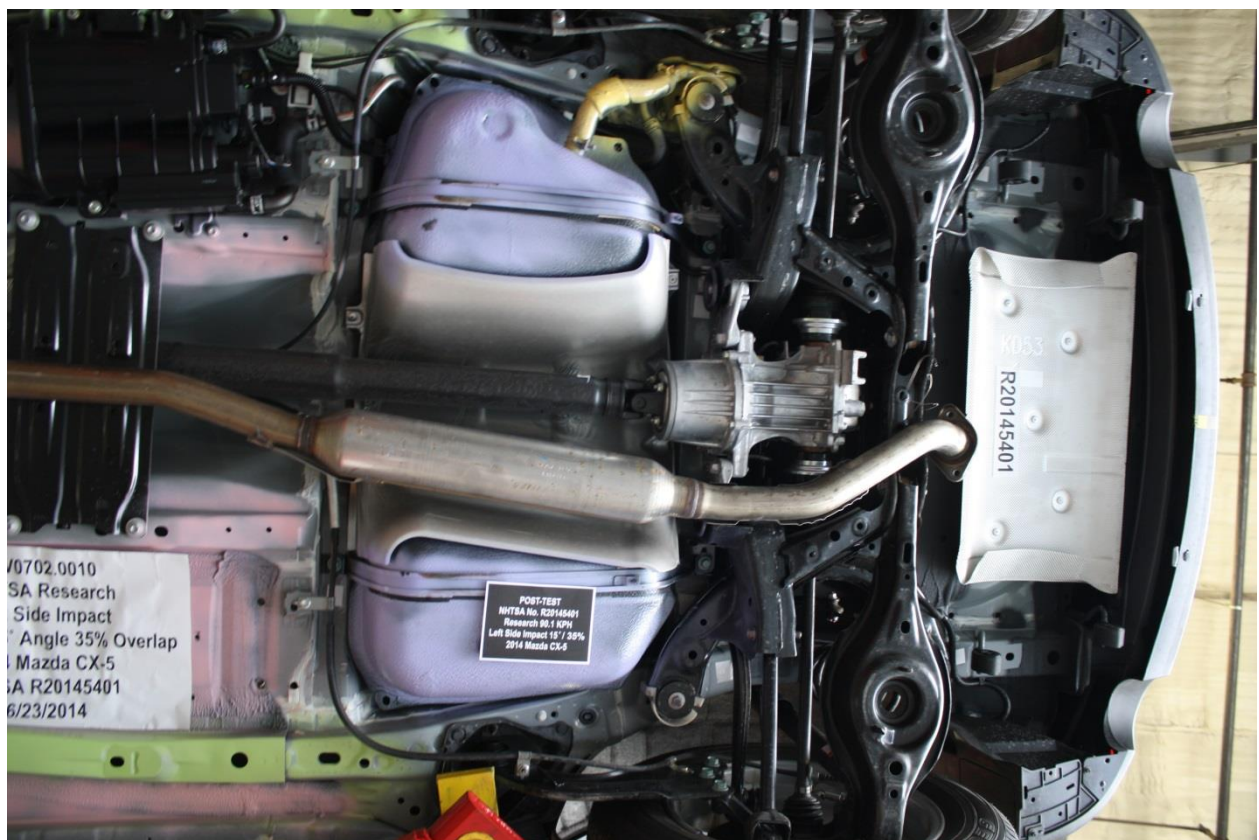
No. 131 Pre-Test View of Mid Underbody (perpendicular to vehicle)



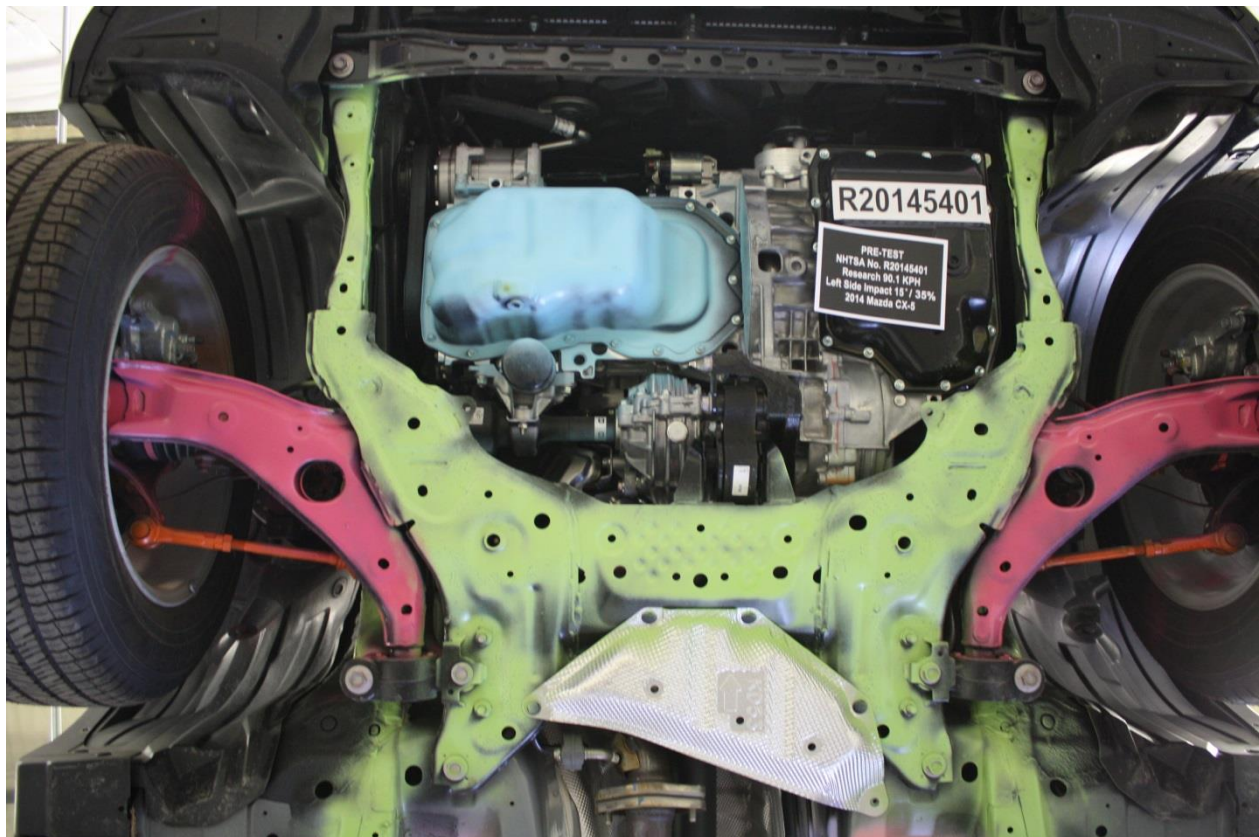
No. 132 Post-Test View of Mid Underbody (perpendicular to vehicle)



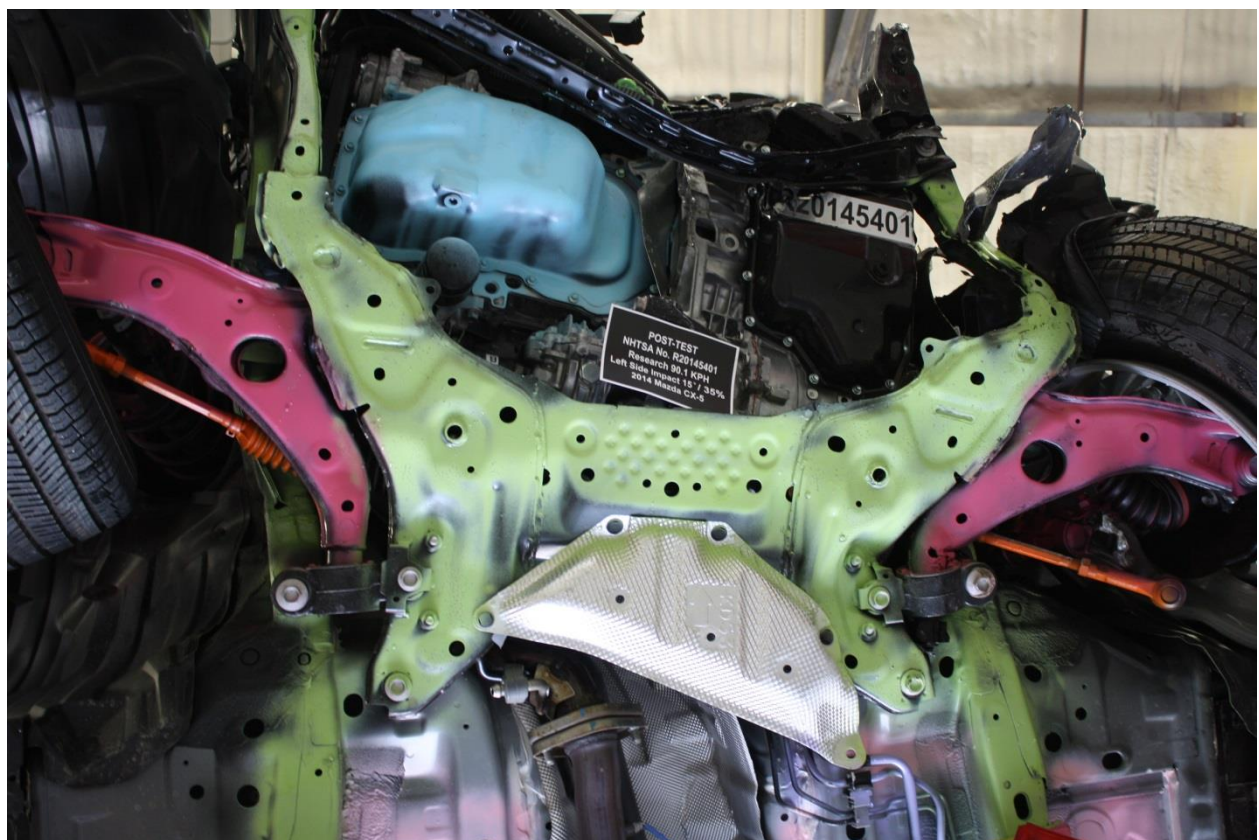
No. 133 Pre-Test View of Rear Underbody (perpendicular to vehicle)



No. 134 Post-Test View of Rear Underbody (perpendicular to vehicle)



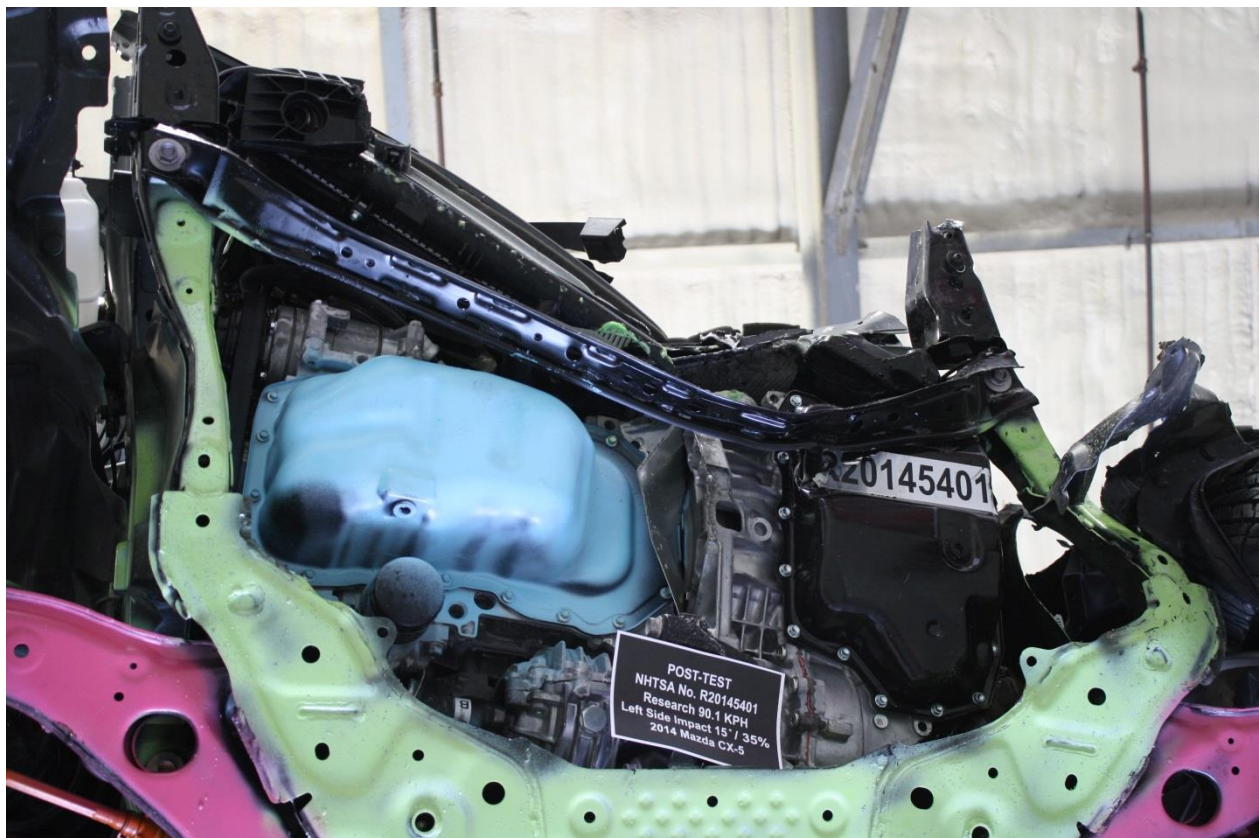
No. 135 Pre-Test View of Steering rack and or sway bar



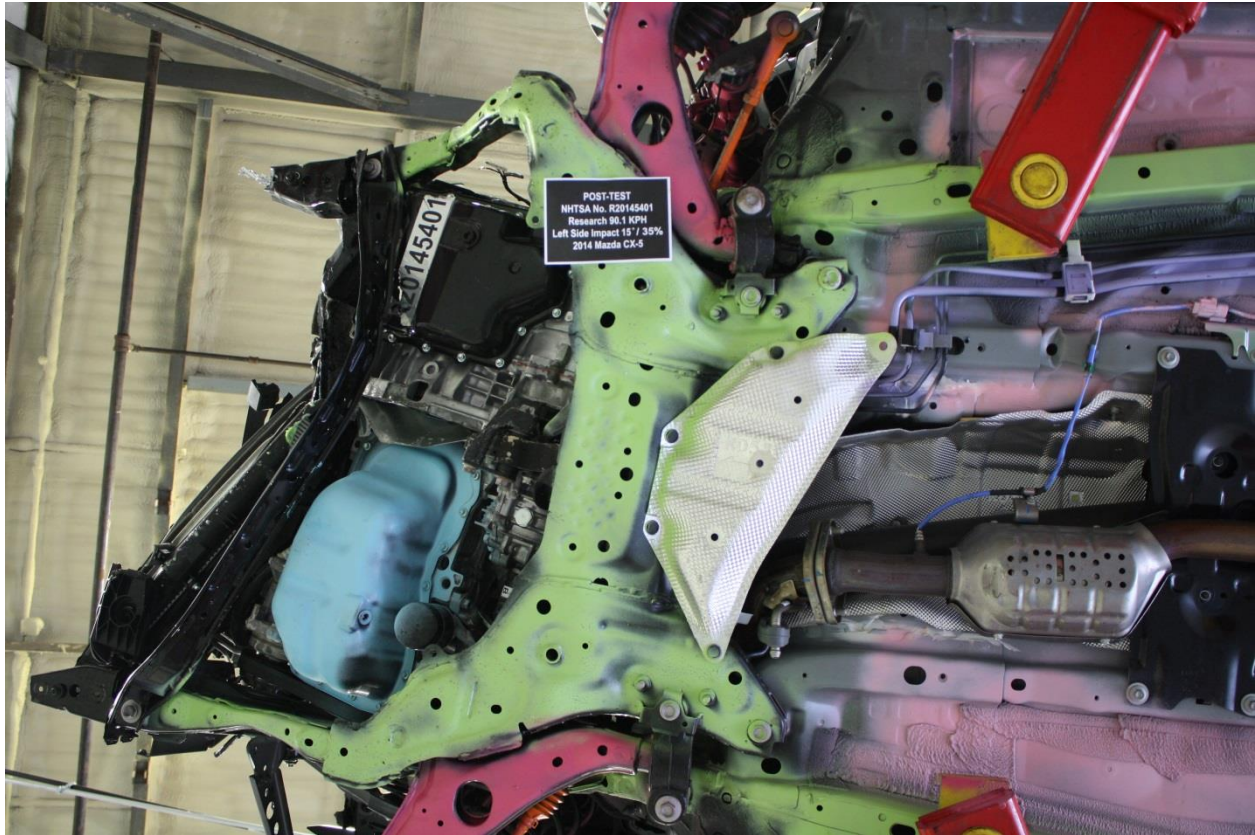
No. 136 Post-Test View of Steering rack and or sway bar



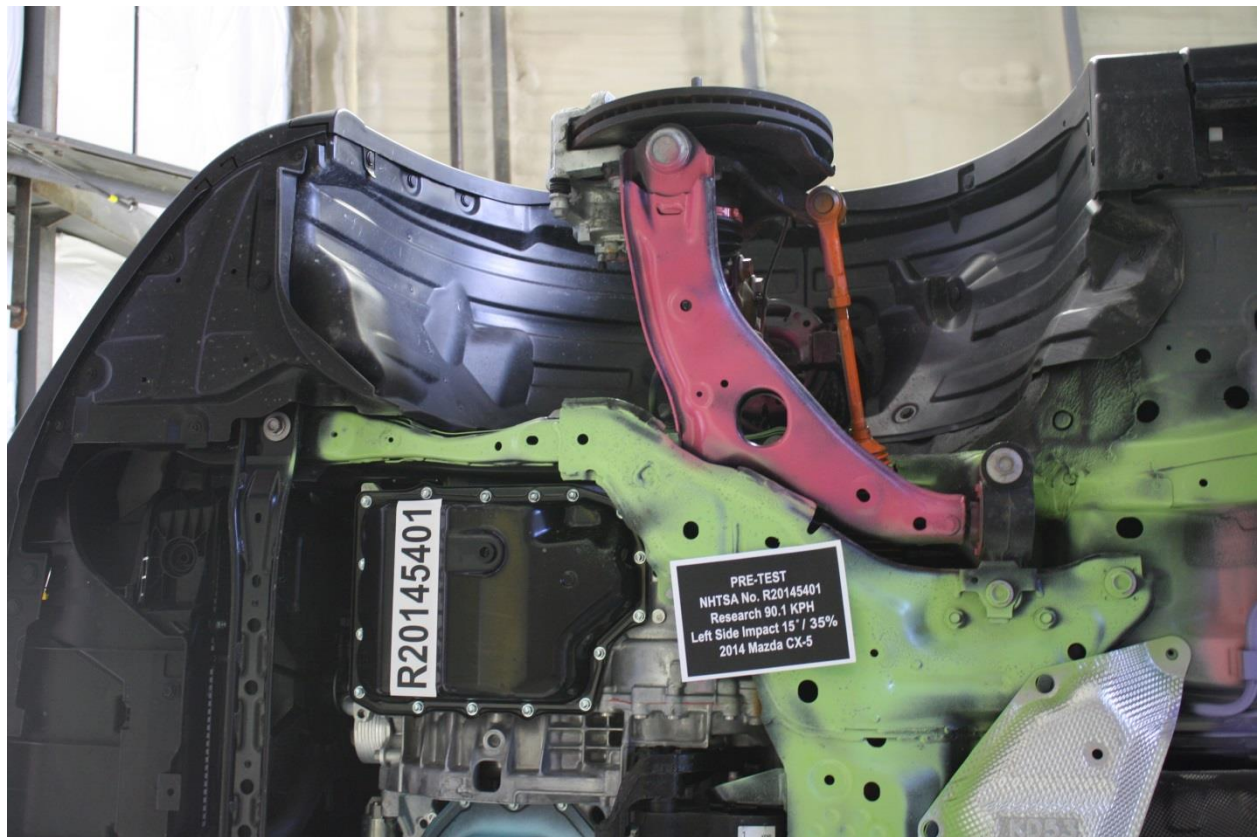
No. 137 Pre-Test Bumper to Rail Attachments and Crush Initiators



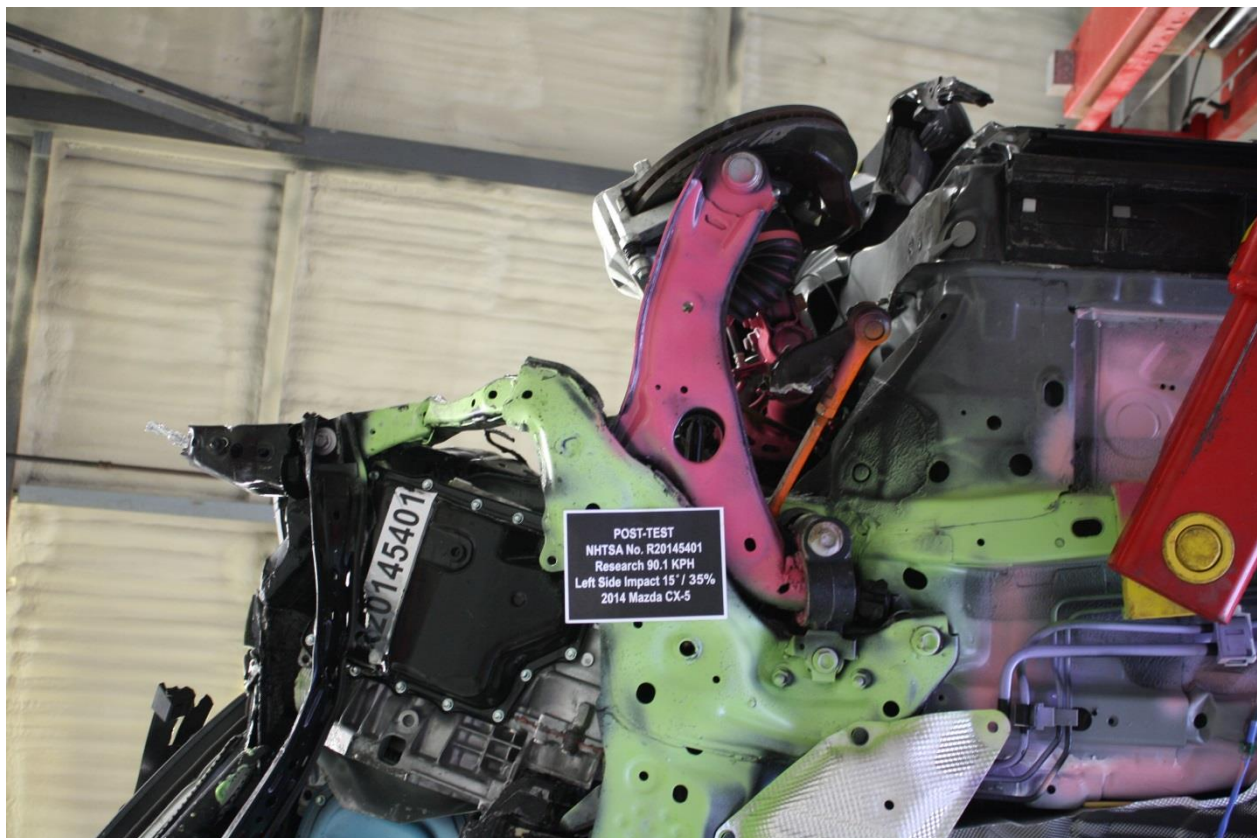
No. 138 Post-Test Bumper to Rail Attachments and Crush Initiators



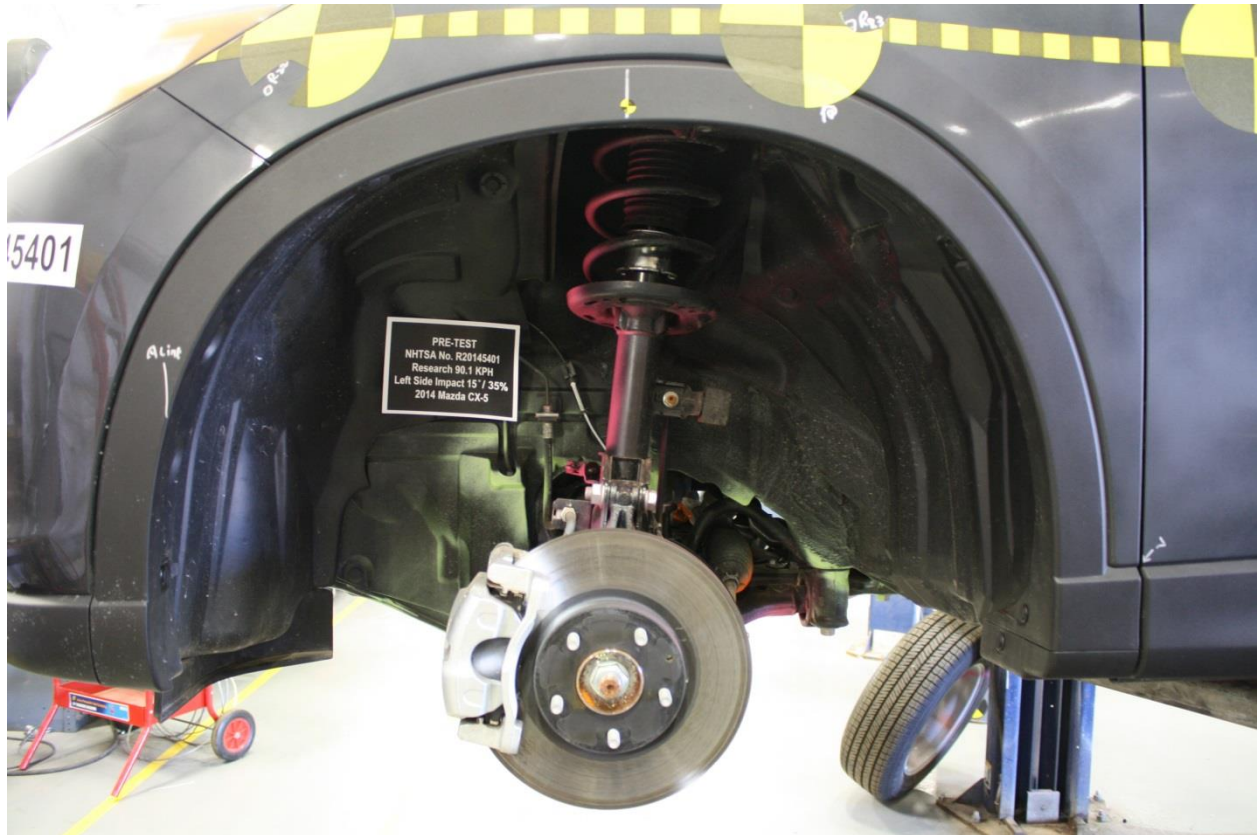
No. 139 Post-Test View of Front Sub-Frame Deformation



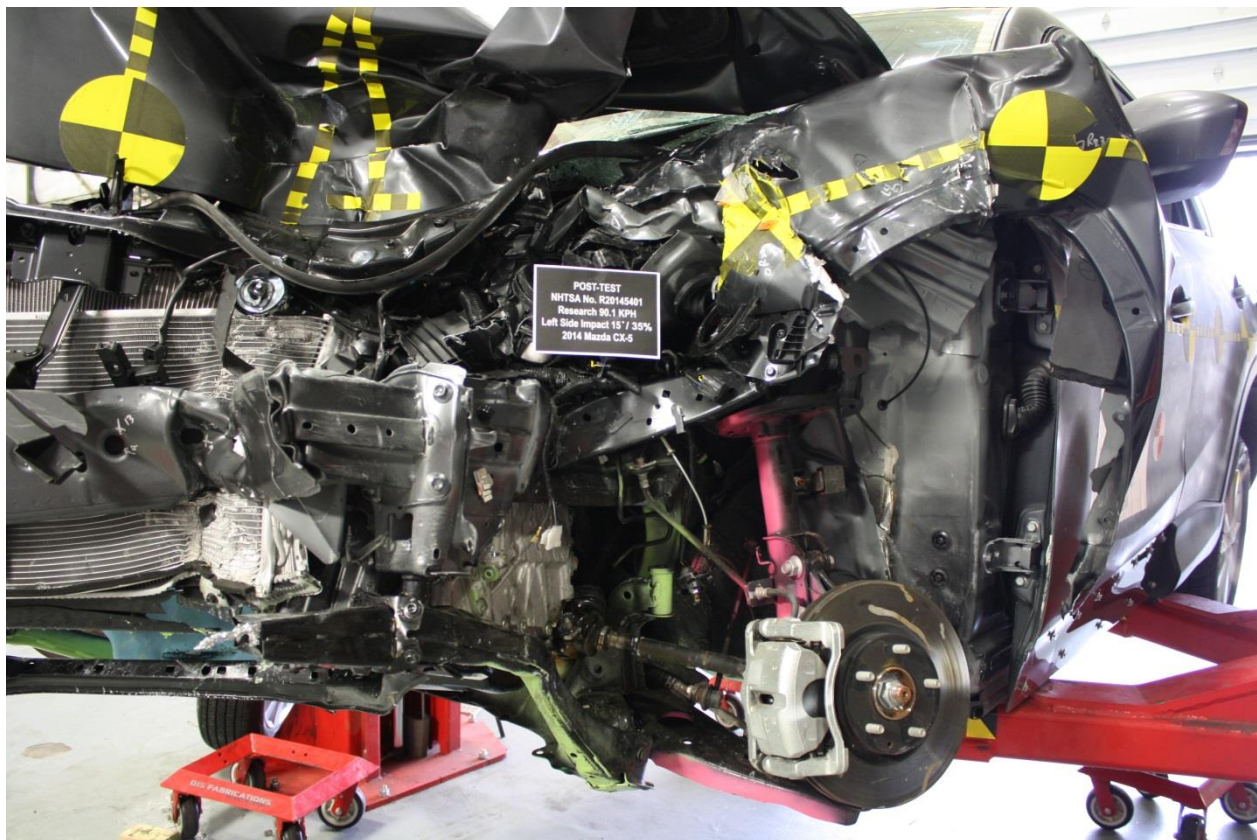
No. 140 Pre-Test Frame Rail with tire removed



No. 141 Post-Test Frame Rail with tire removed



No. 142 Pre-Test View of Front Driver Wheel Well w/ Tire Removed



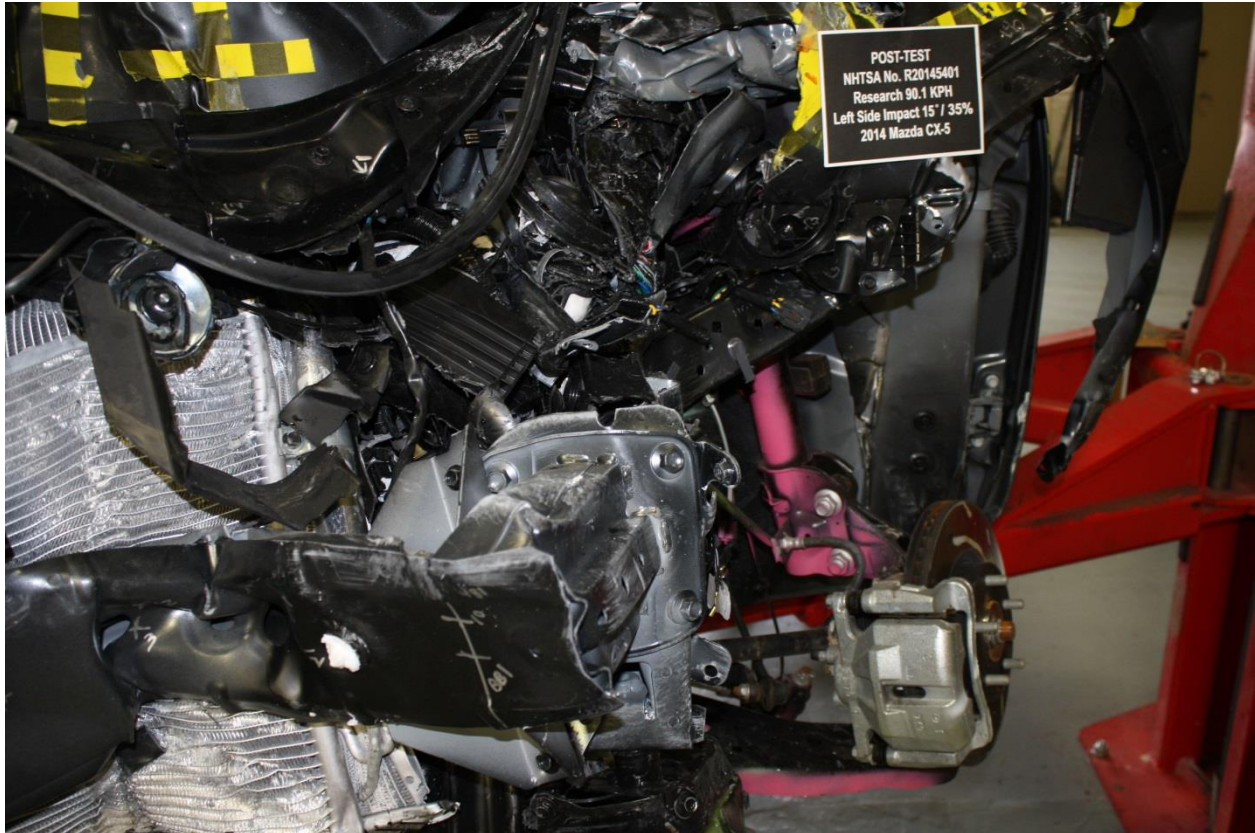
No. 143 Post-Test $\frac{3}{4}$ View of Front Driver Wheel Well w/ Tire Removed



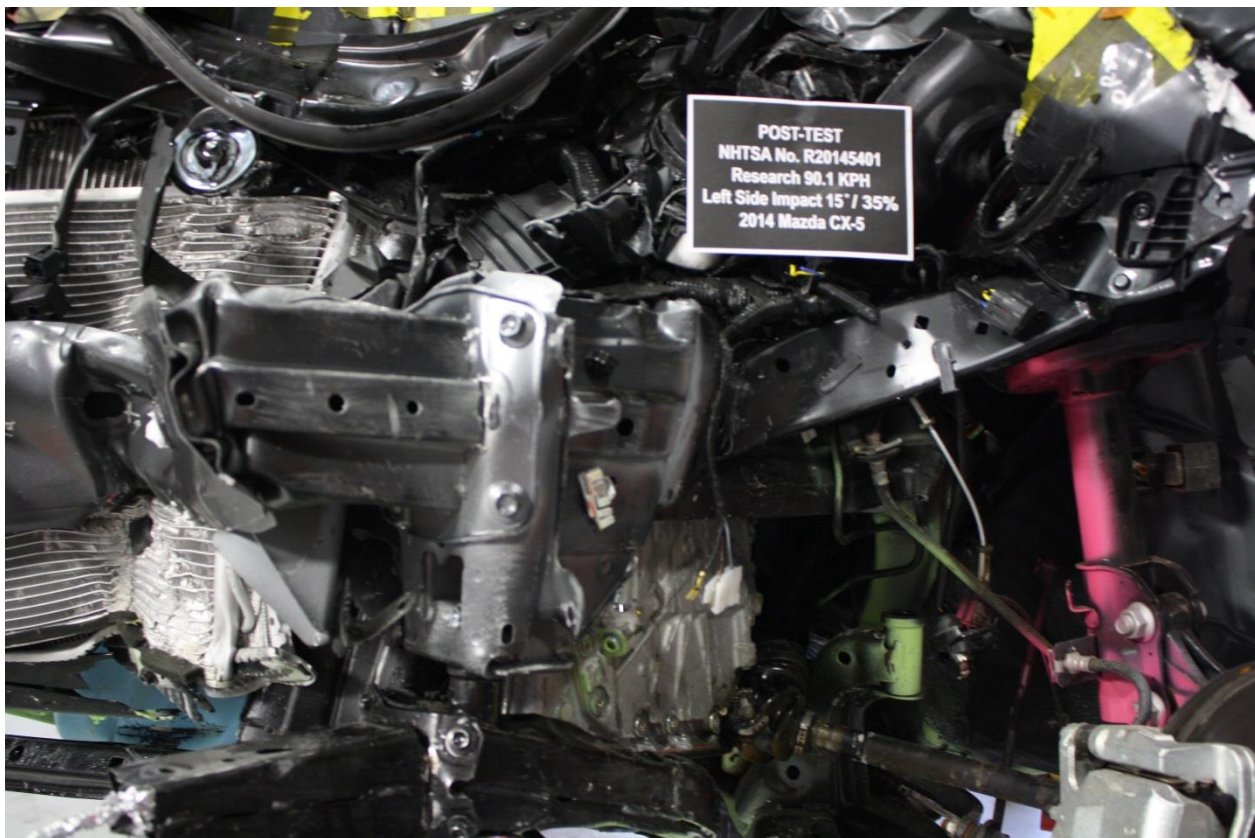
No. 144 Post-Test Side View of Front Driver Wheel Well w/ Tire Removed



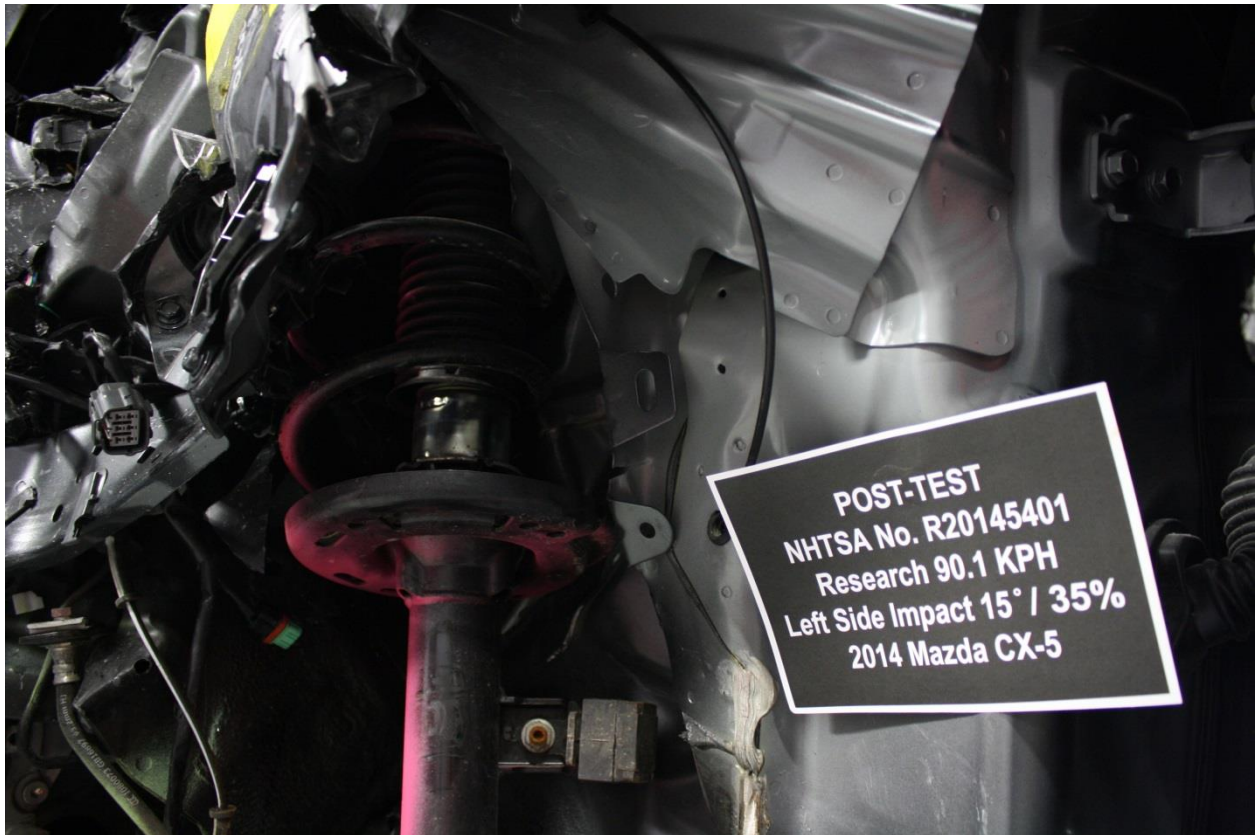
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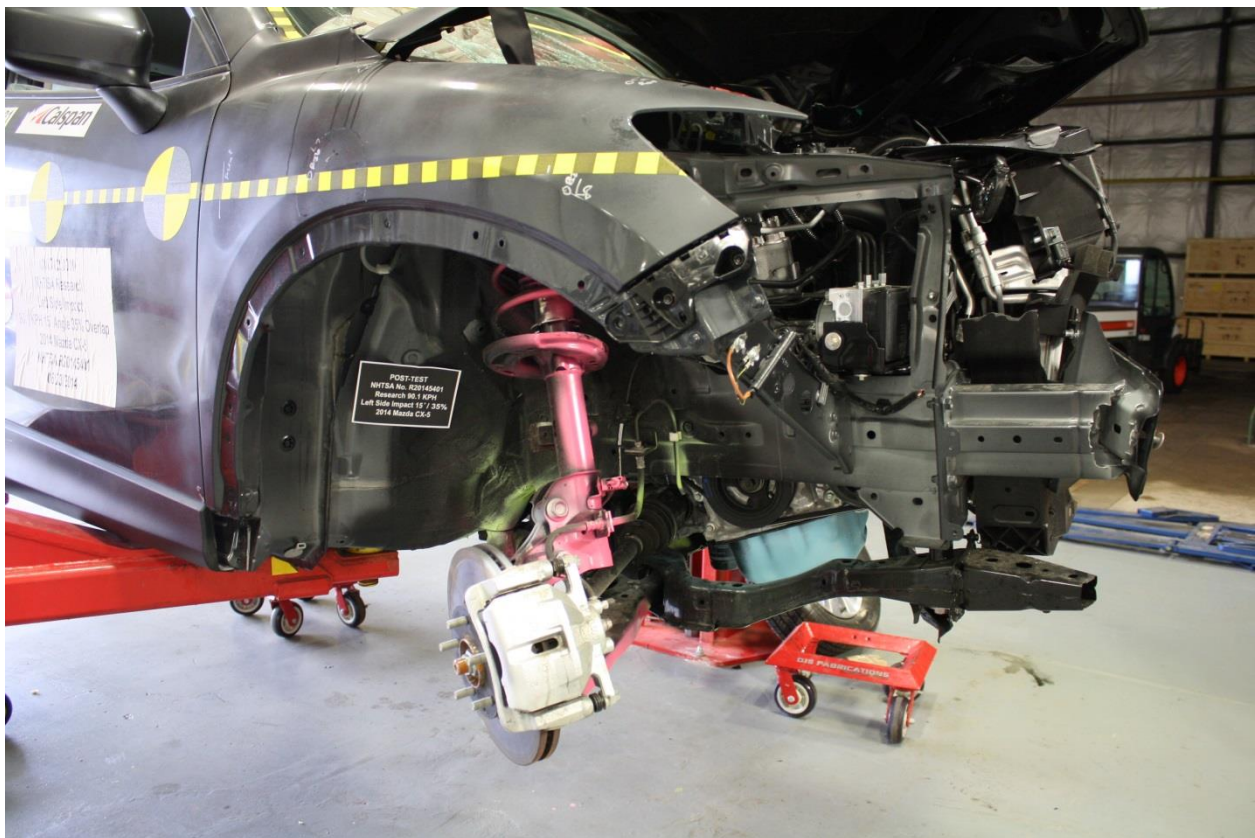
No. 146 Post-Test Looking Down at the Front Driver Shotgun



No. 147 Post-Test Right Side $\frac{3}{4}$ View of Front Driver Shotgun



No. 148 Post-Test Front Driver Close up View of Suspension w/ Tire Removed



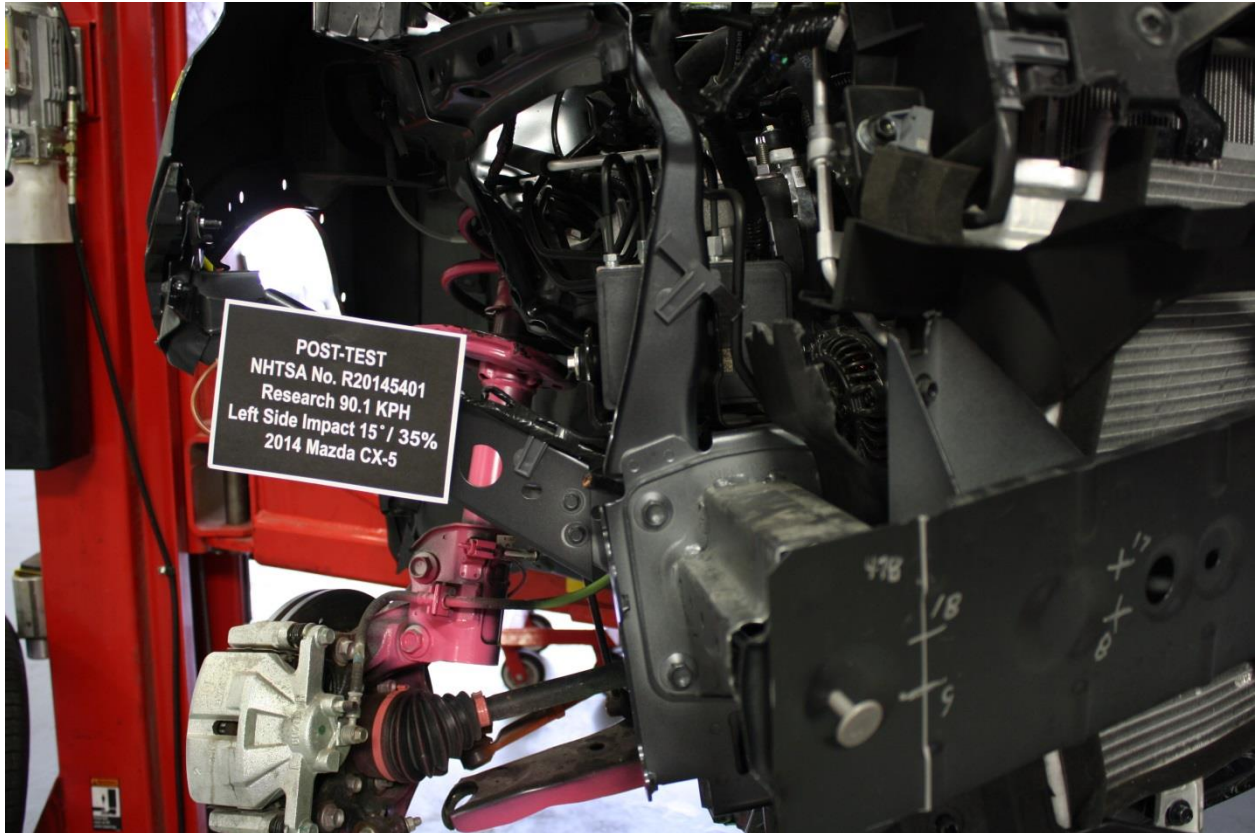
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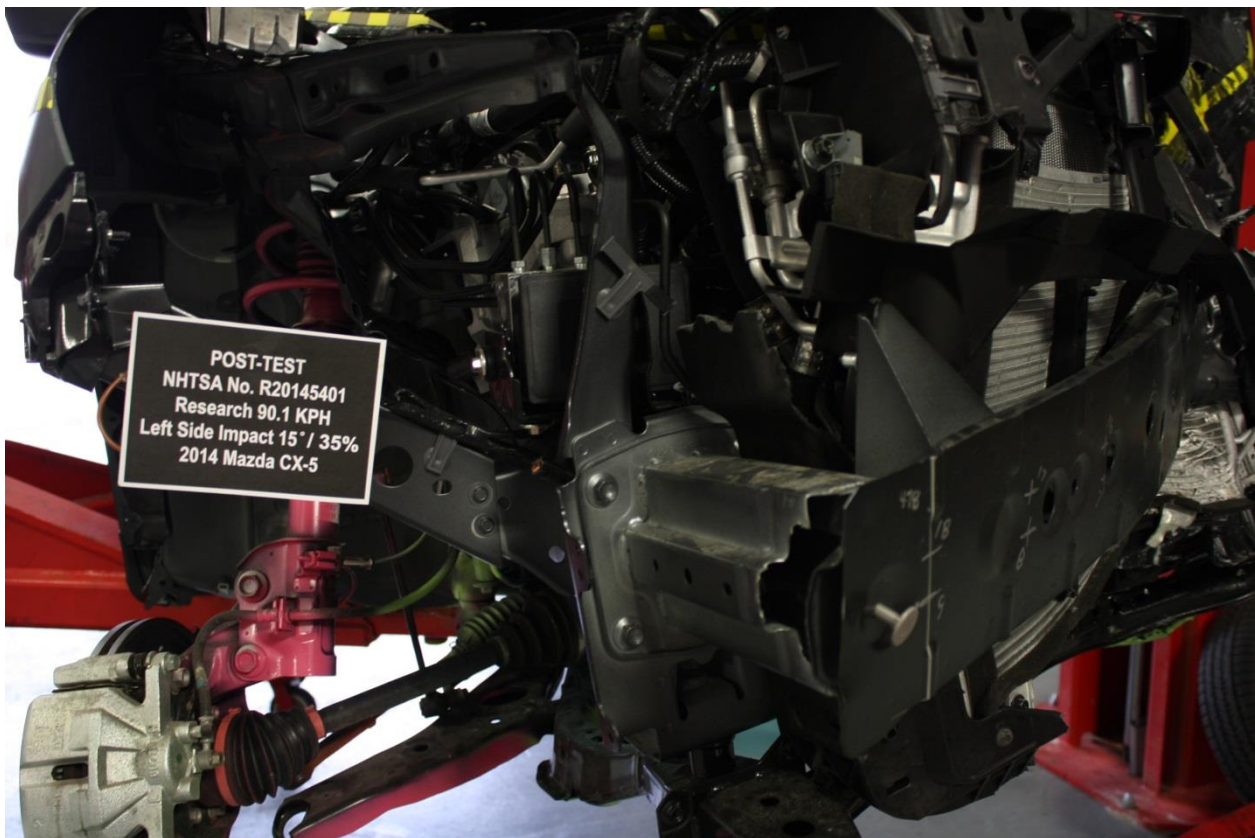
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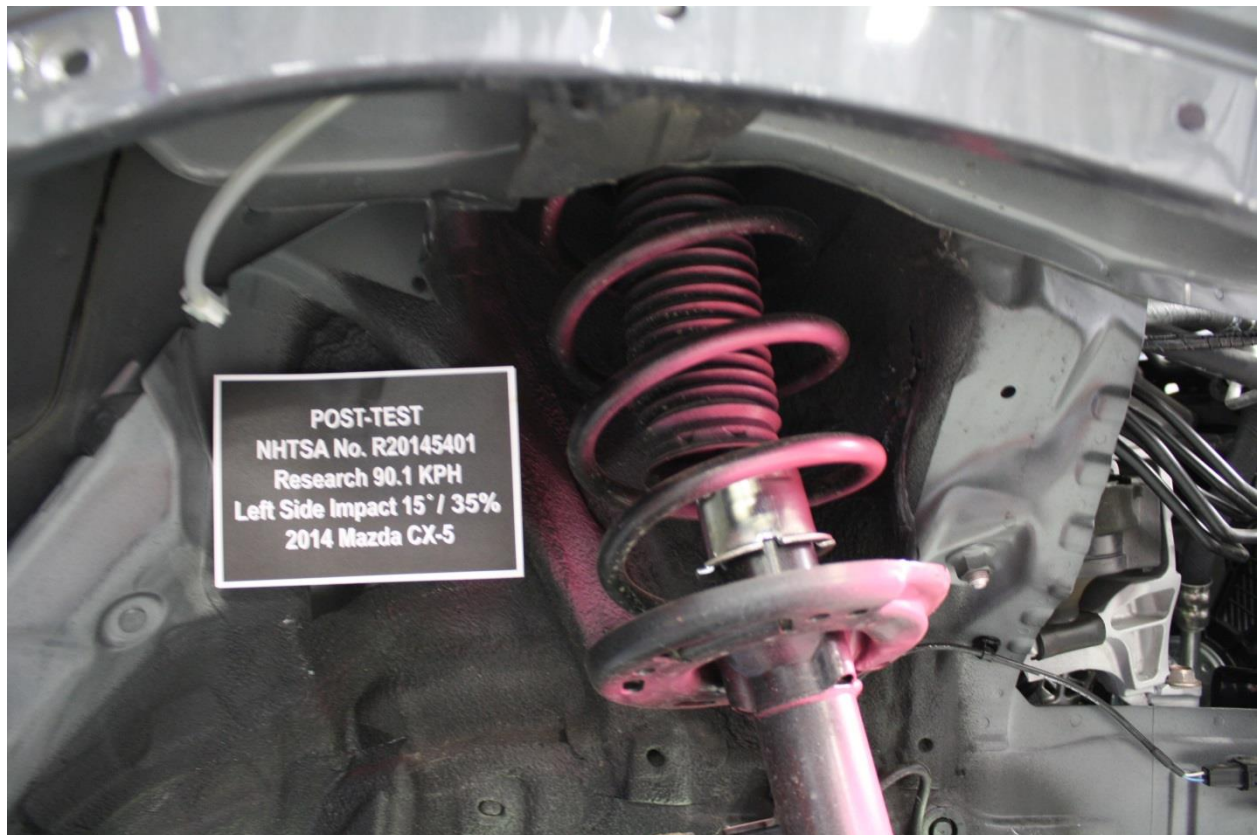
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No. 152 Post-Test Looking Down at the Front Passenger Shotgun



No. 153 Post-Test Right Side $\frac{3}{4}$ View of Front Passenger Shotgun



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No. 156 Post-Test View of Deformation of A pillar-Struck Side



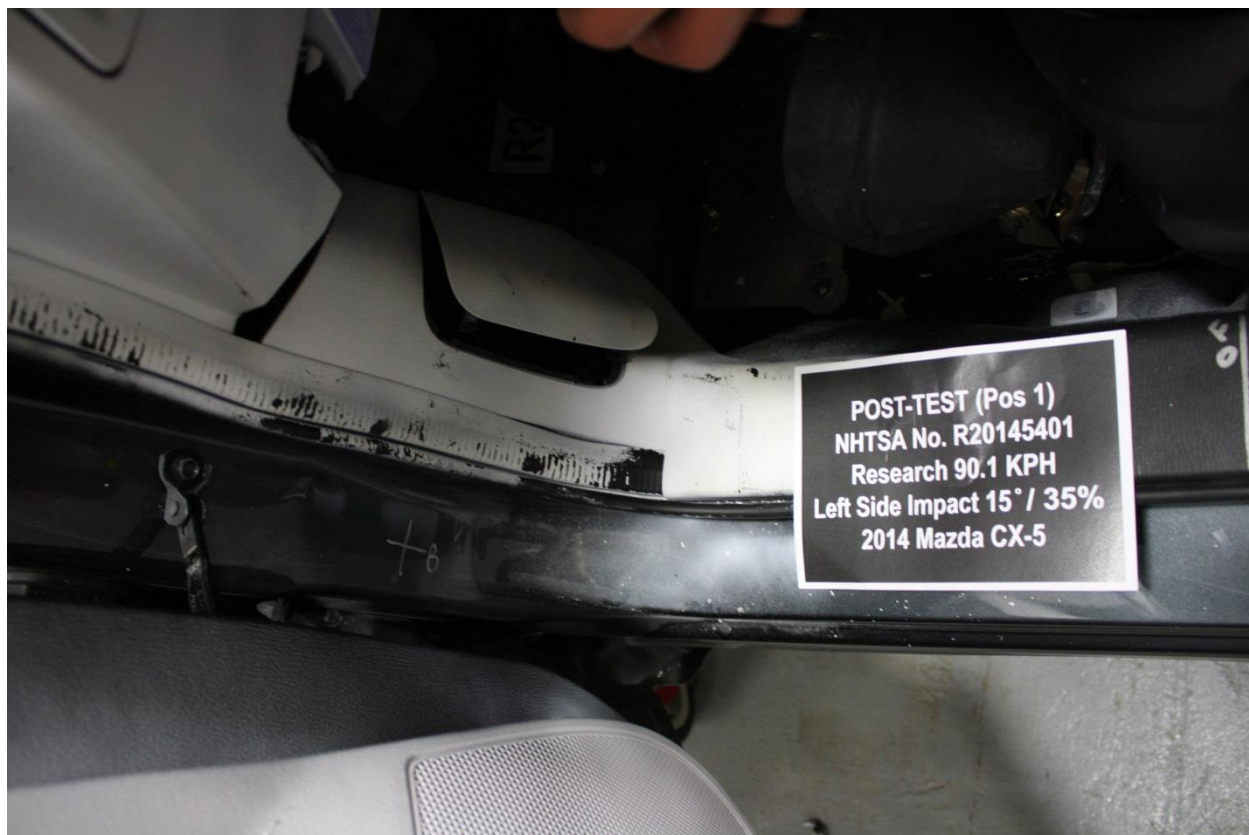
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No. 159 Post-Test View of Wheel and/or Tire Deformation-Struck Side



No. 160 Post-Test View of Deformation of Rocker or Post-Struck Side



No. 161 Post-Test View of Windshield Separation



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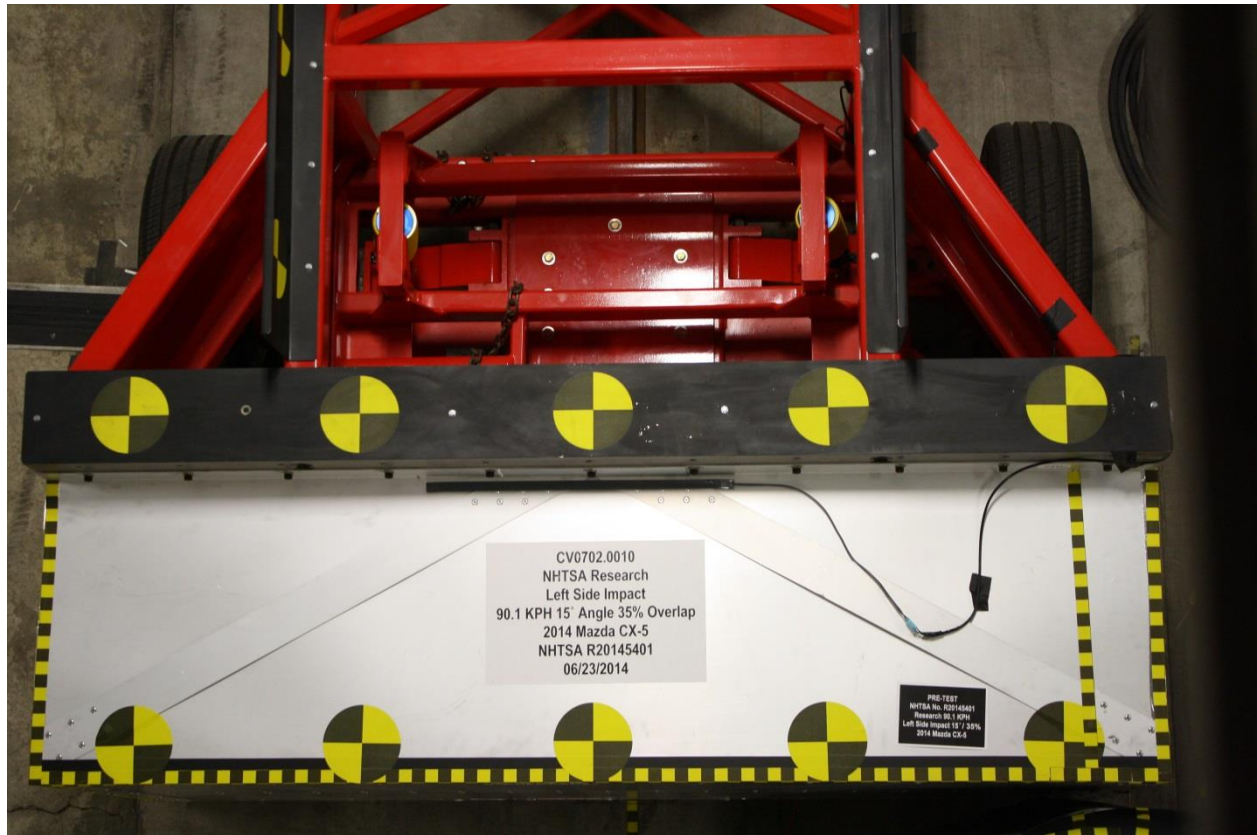
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No. 166 Pre-Test Top View of RMDB



No. 167 Post-Test Top View of RMDB



No. 168 Pre-Test Front View of RMDB



No. 169 Post-Test Front View of RMDB



No. 170 Pre-Test RMDB & Vehicle, Right Side



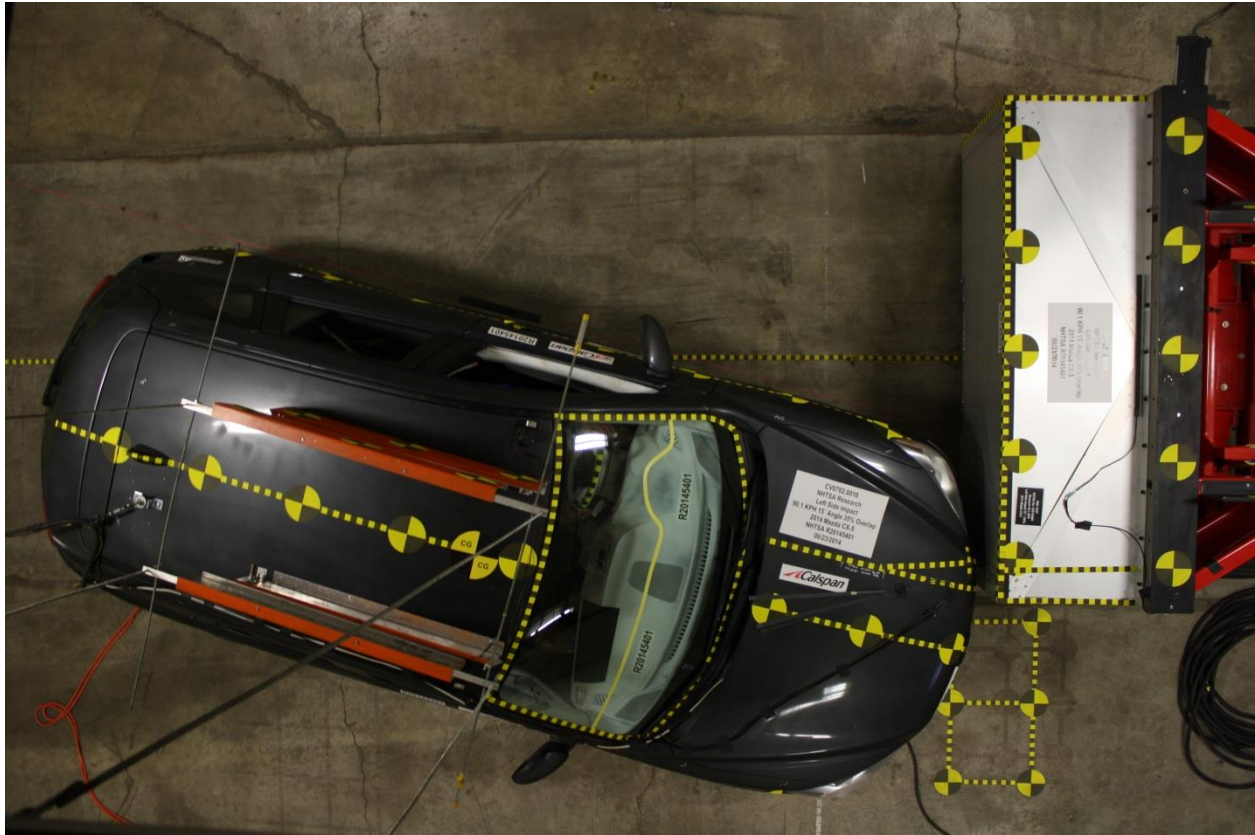
No. 171 Post-Test RMDB & Vehicle, Right Side



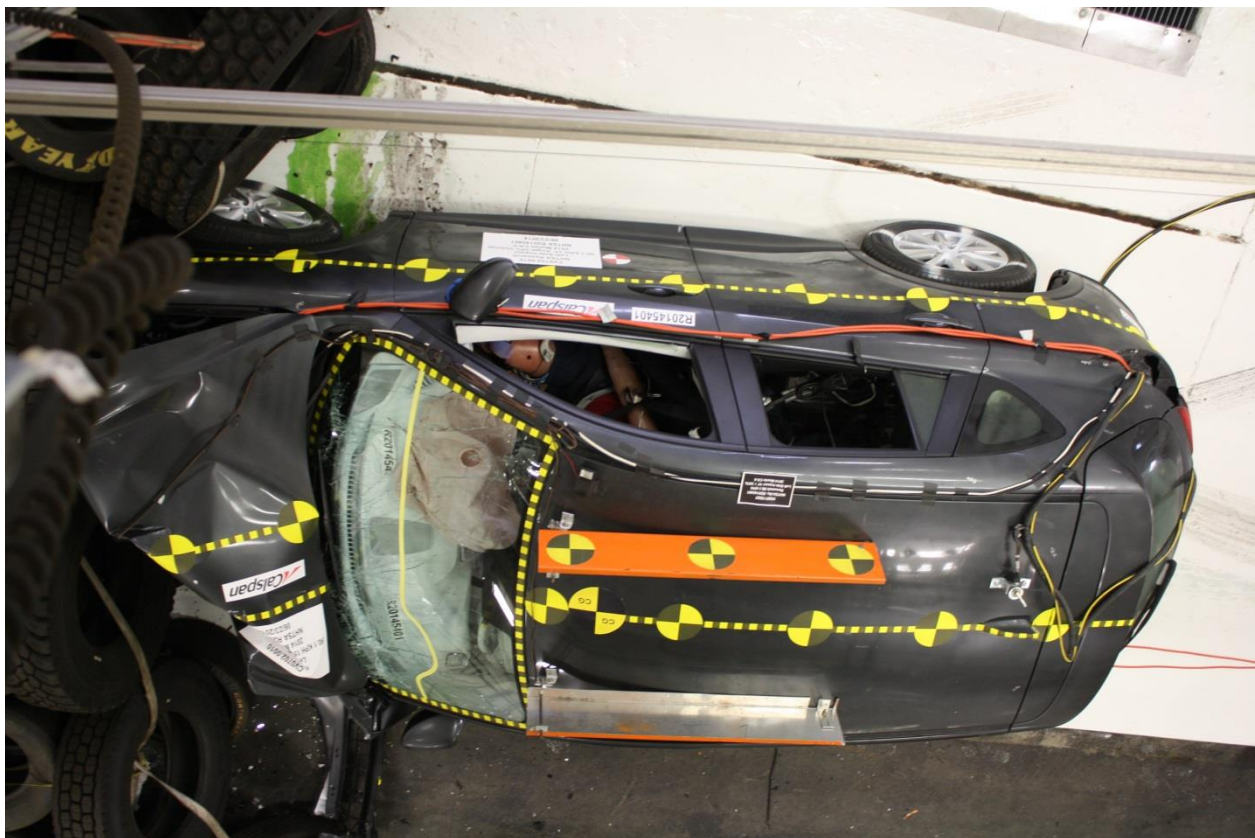
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No. 173 Post-Test RMDB & Vehicle, Left Side



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No. 175 Post-Test RMDB & Vehicle, Top View



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No. 177 Post-Test RMDB & Vehicle, Rear View



No. 178 Pre-Test RMDB & Vehicle, Front View



No. 179 Post-Test RMDB & Vehicle, Front View



No. 180 Vehicle at 0 Degrees on Static Rollover Device



No. 181 Vehicle at 90 Degrees on Static Rollover Device



No. 182 Vehicle at 180 Degrees on Static Rollover Device



No. 183 Vehicle at 270 Degrees on Static Rollover Device



No. 184 Vehicle at 360 Degrees on Static Rollover Device



No. 185 Impact Photo

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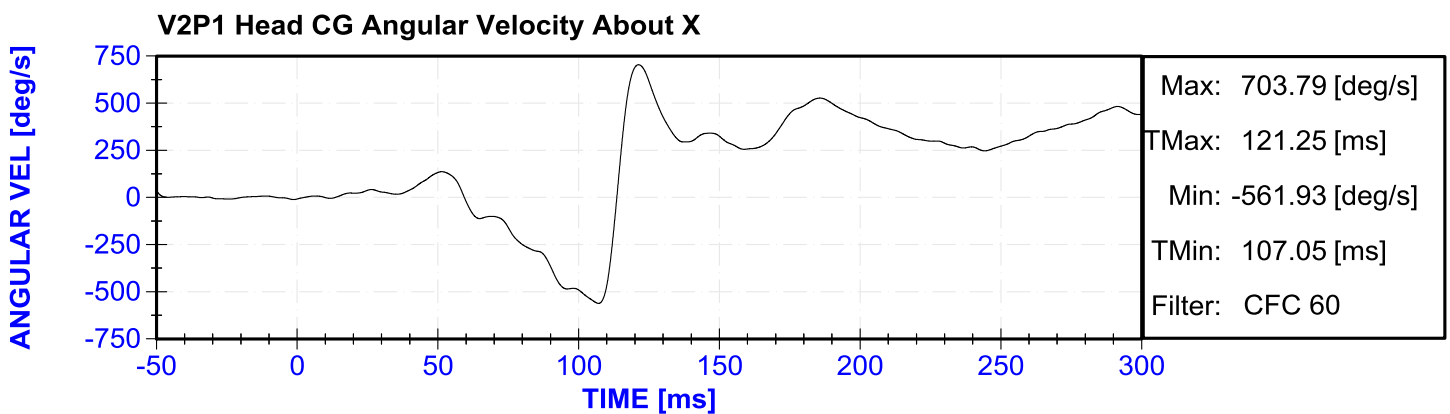
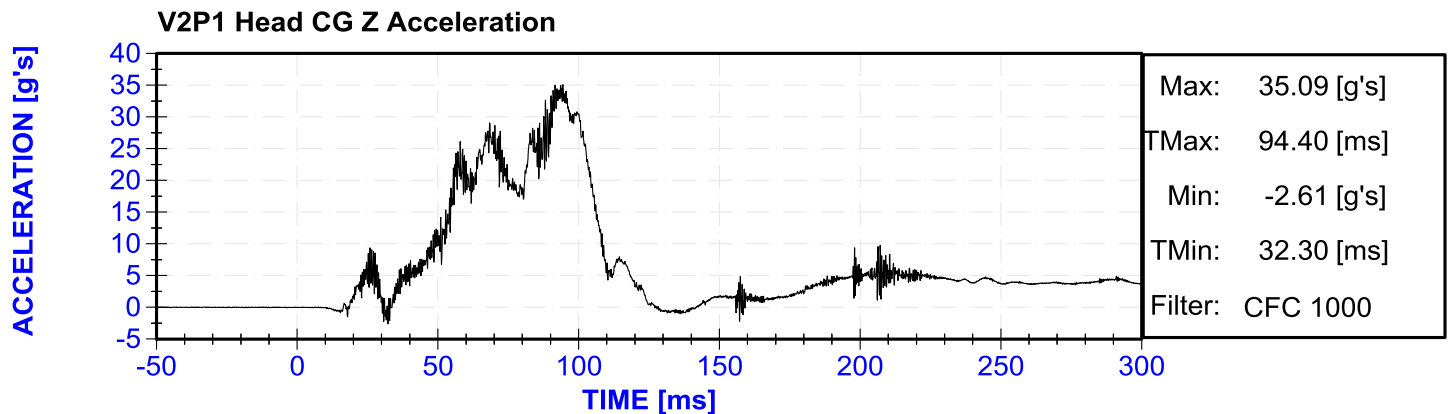
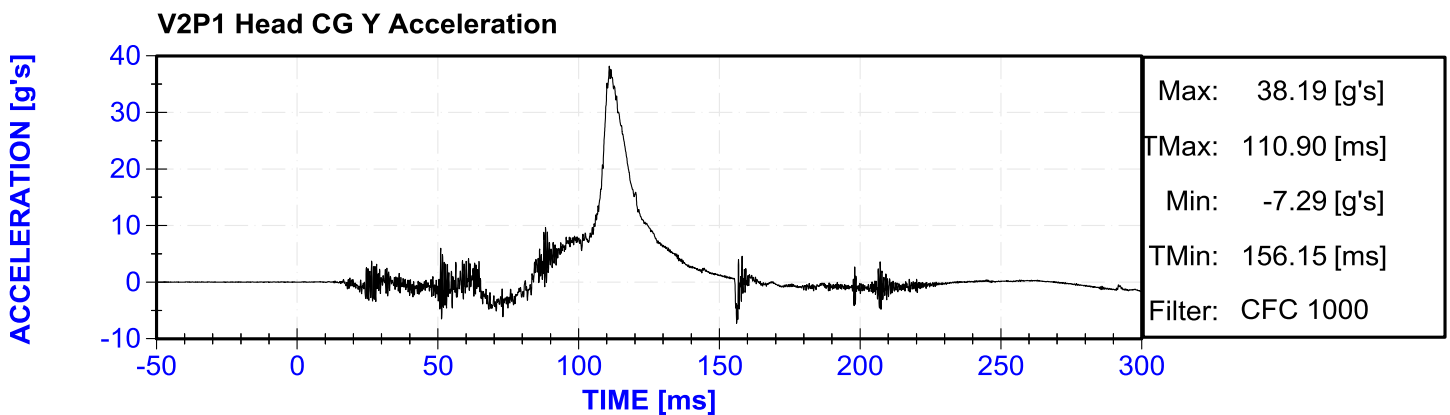
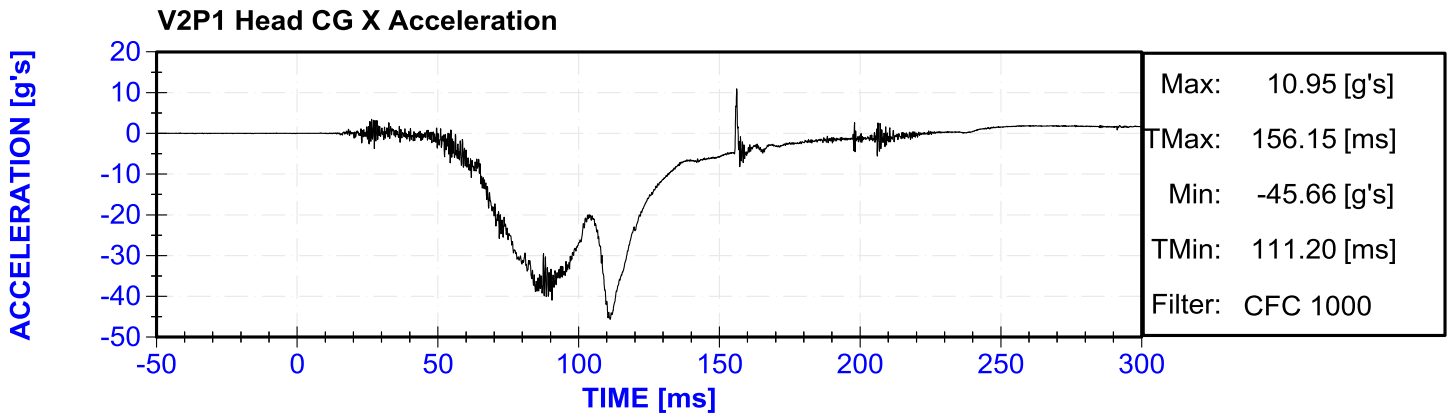
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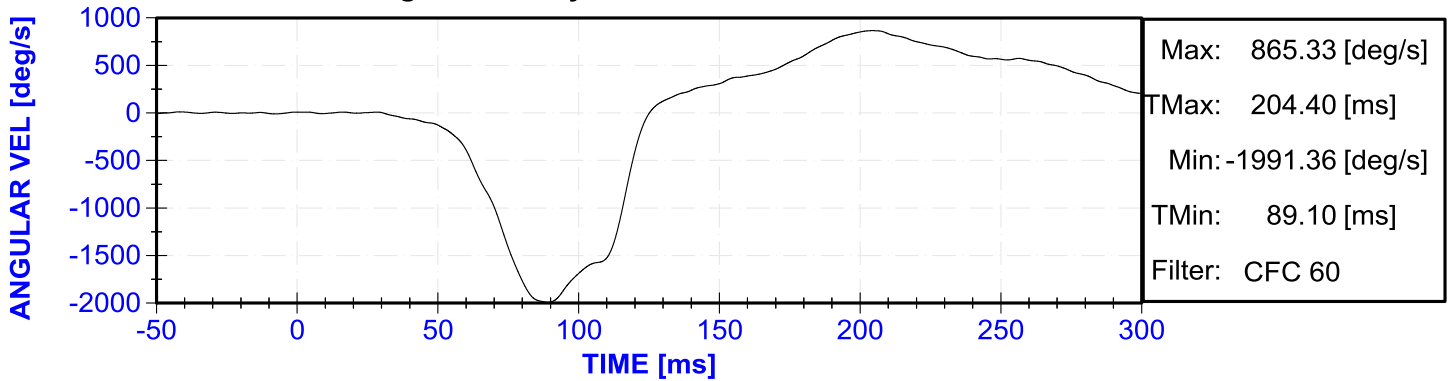
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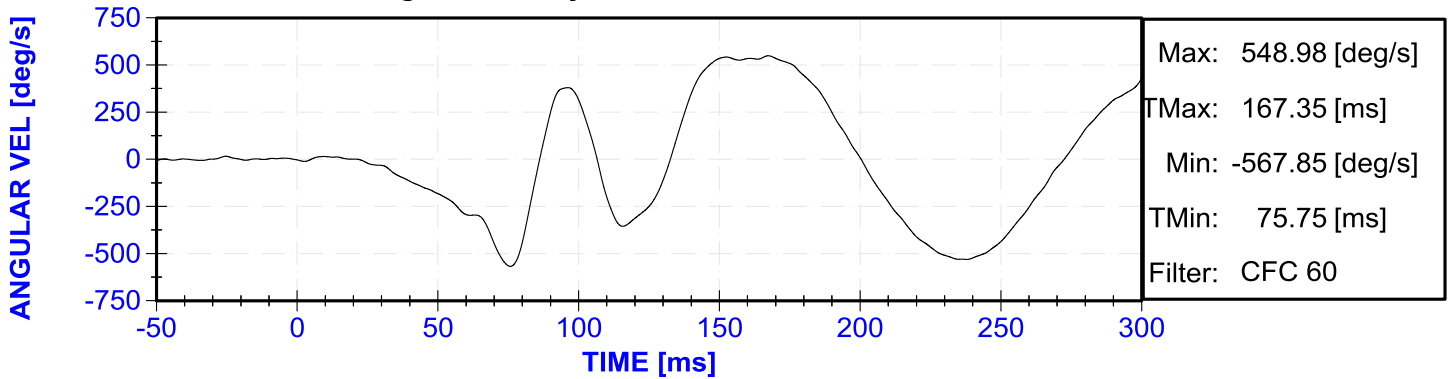
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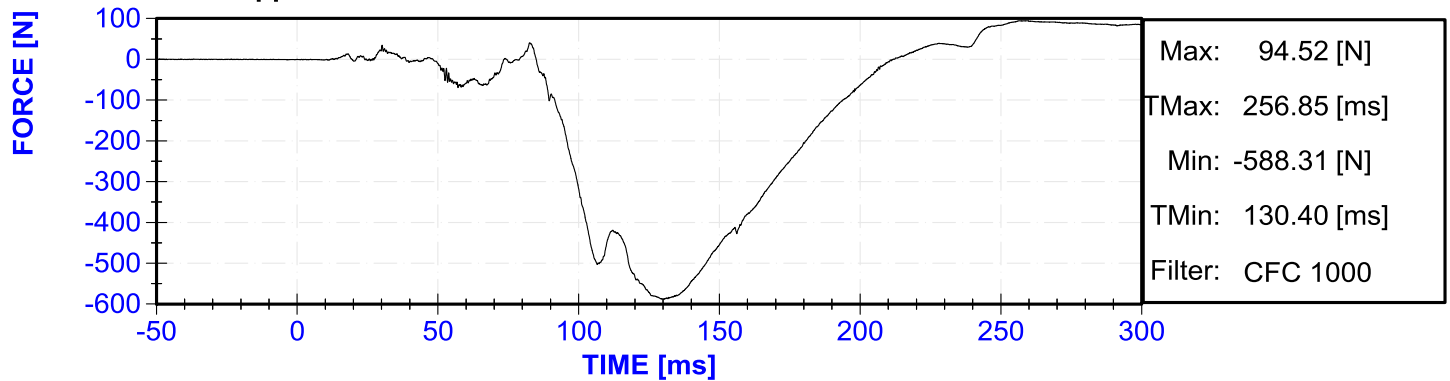
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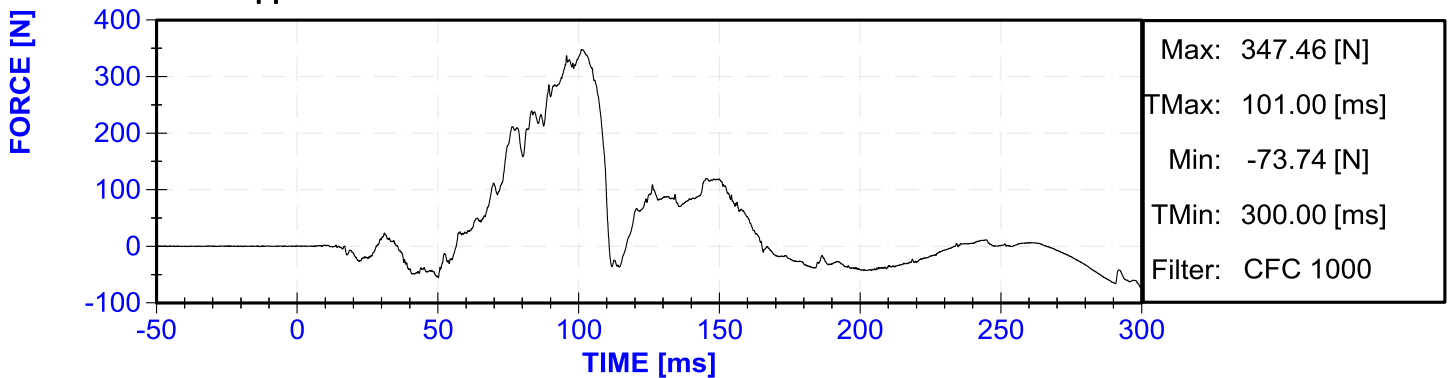
V2P1 Head CG Angular Velocity About Z

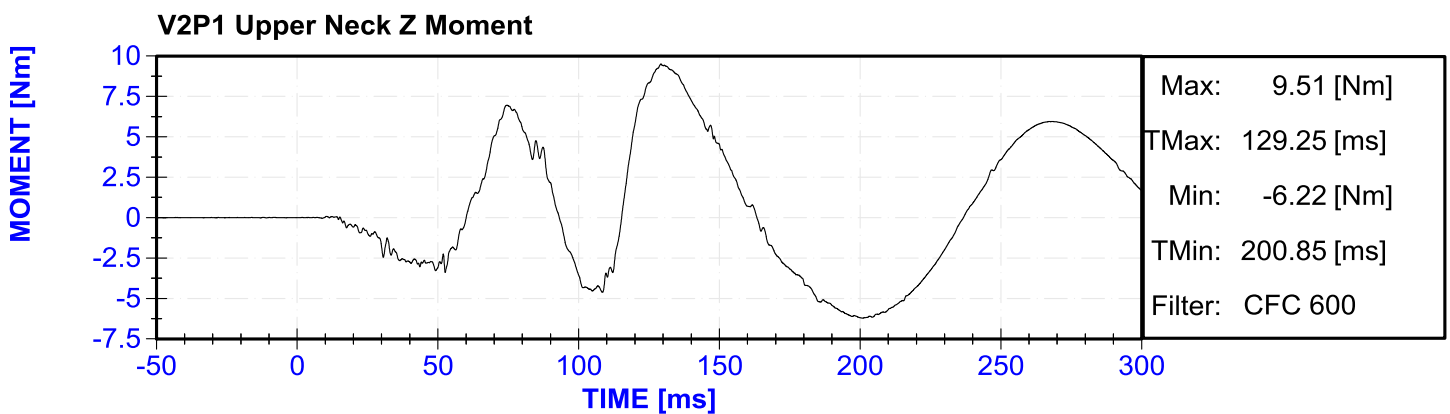
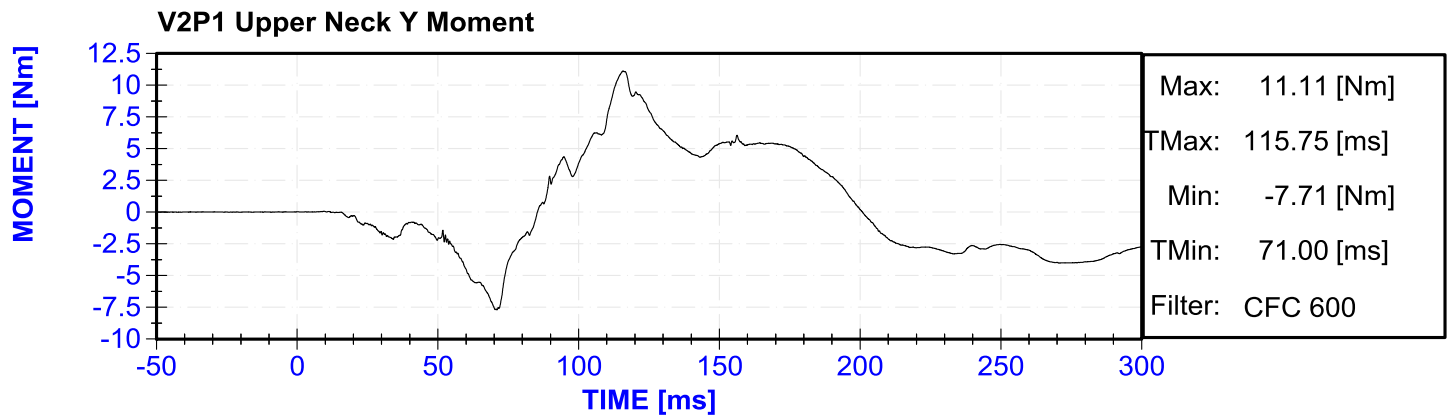
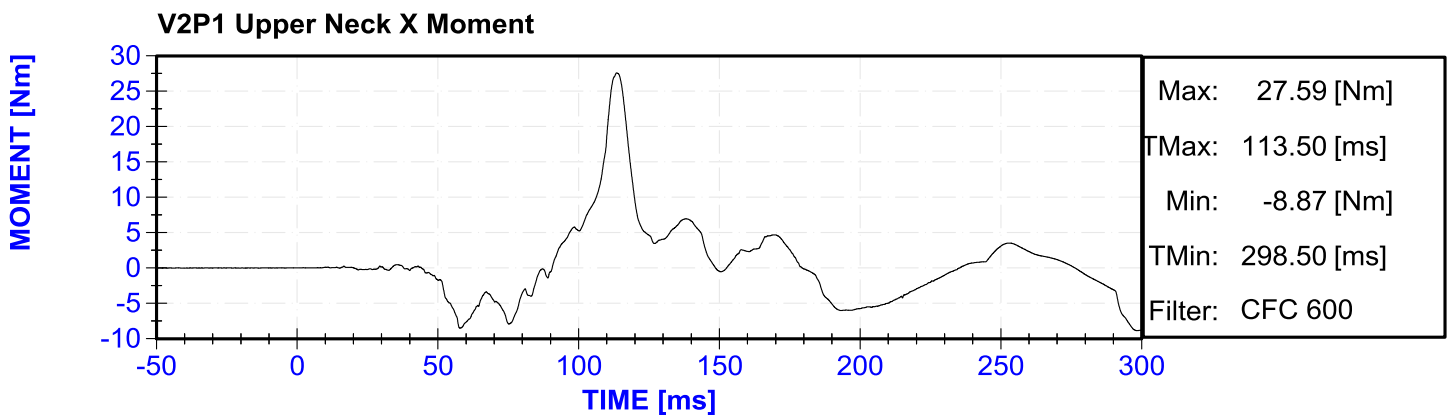
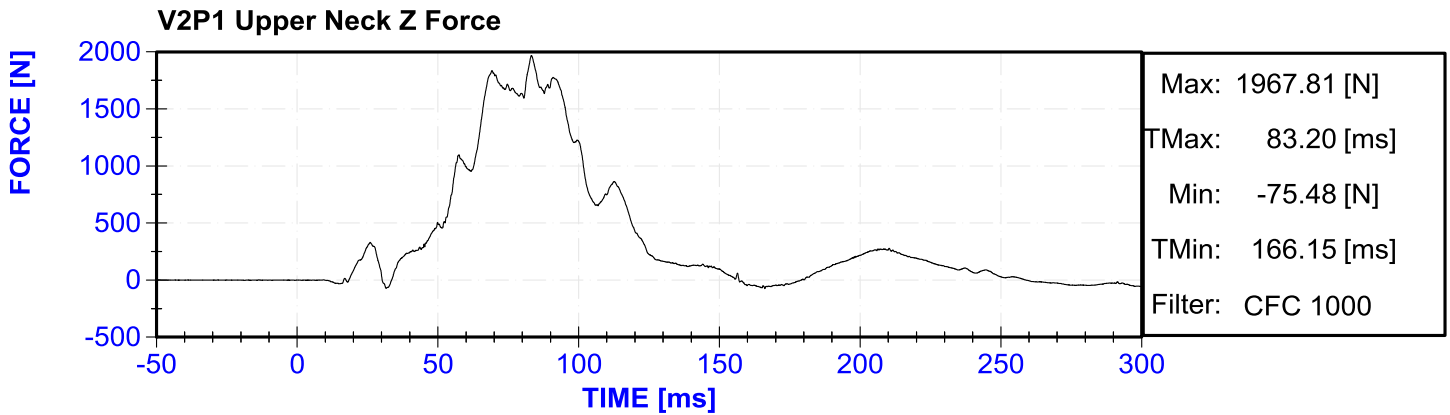


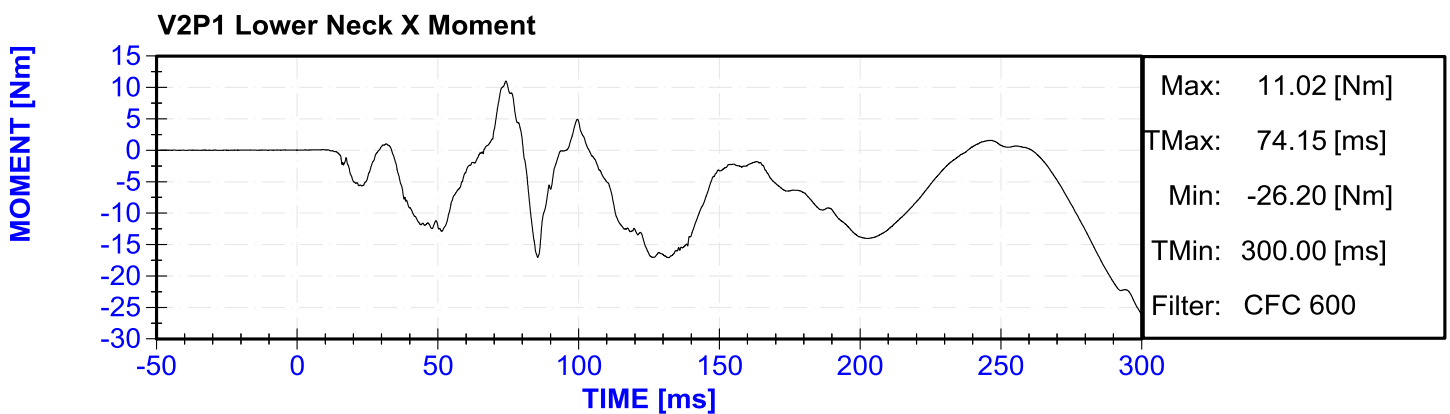
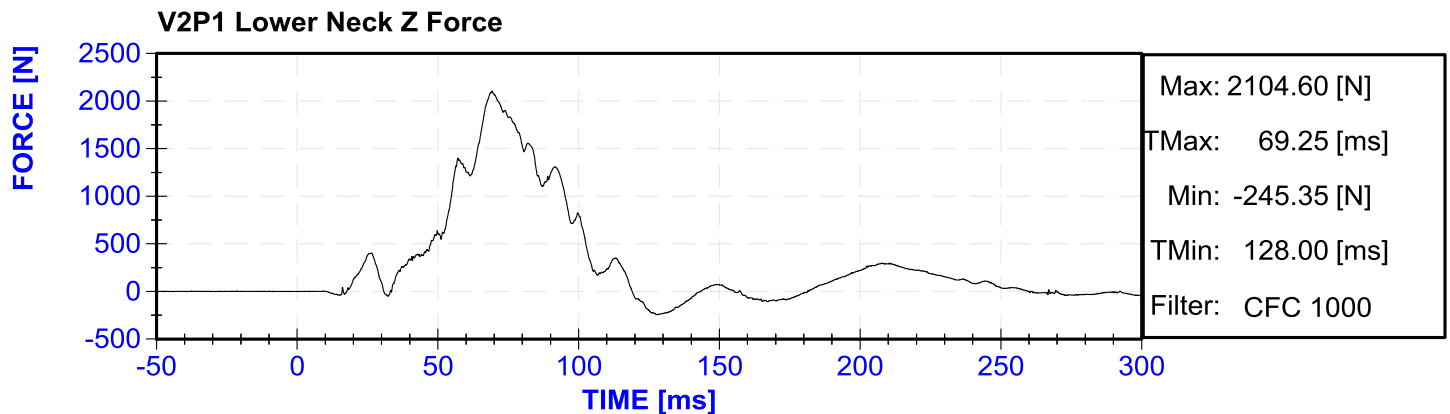
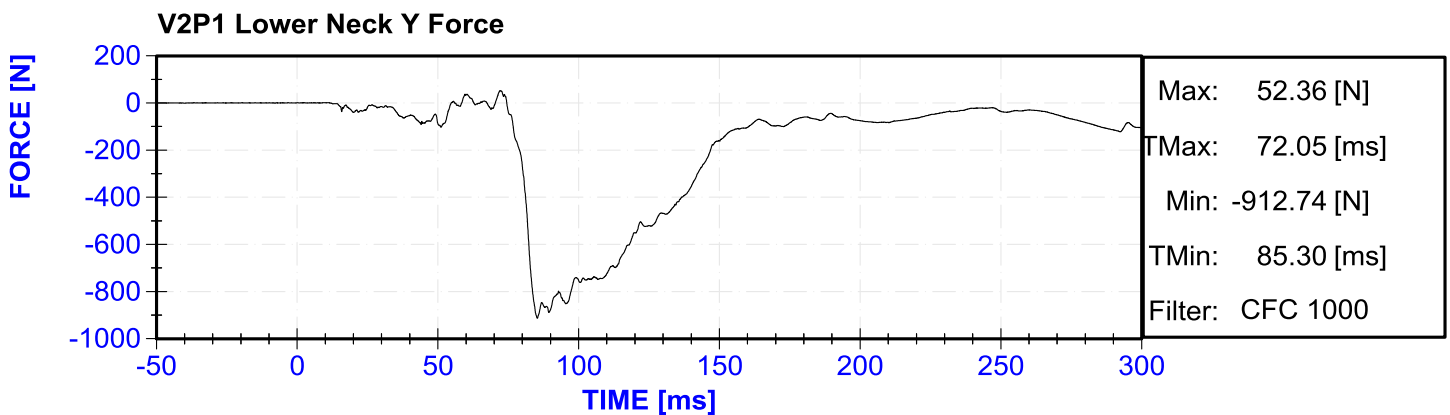
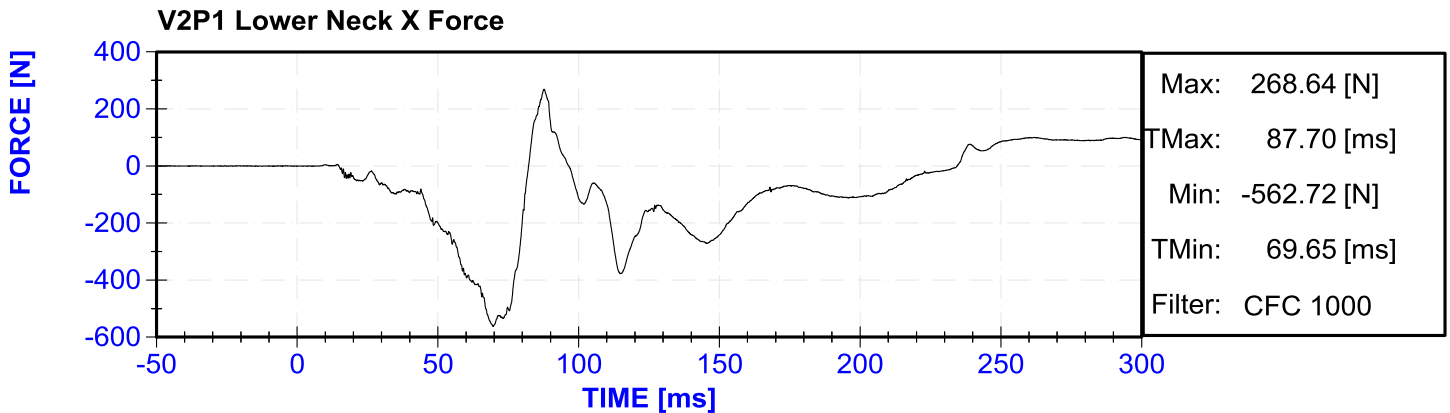
V2P1 Upper Neck X Force

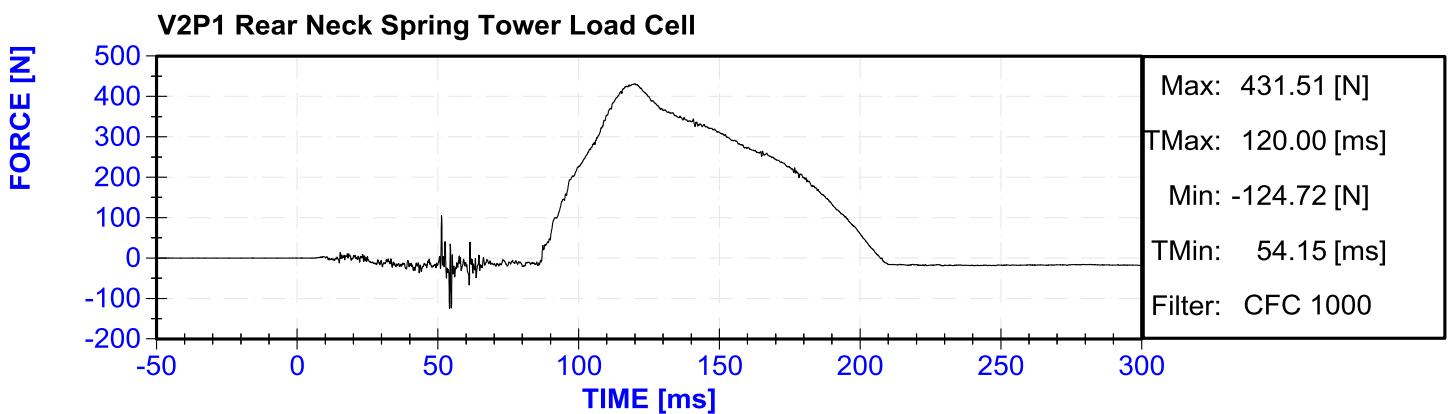
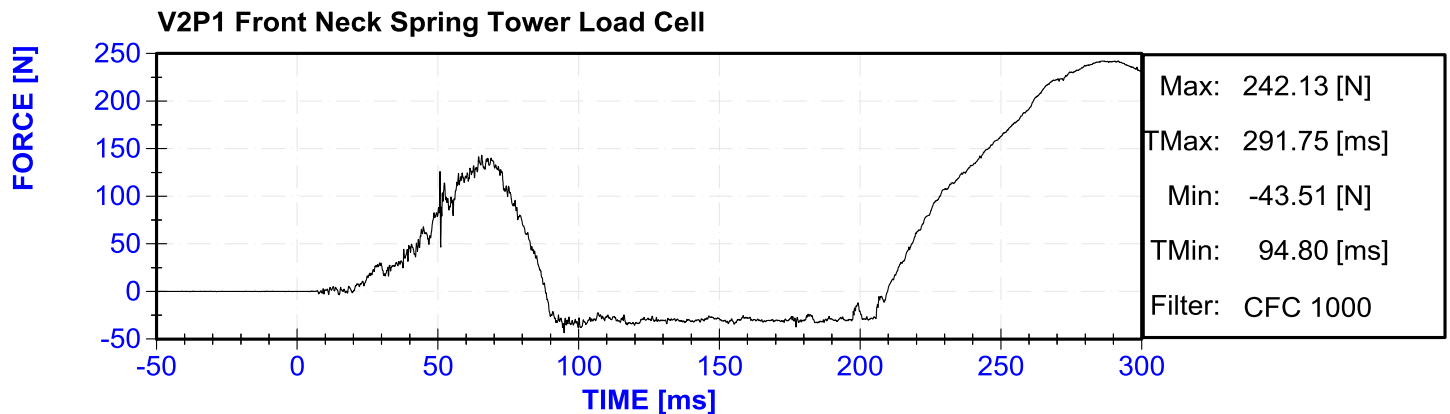
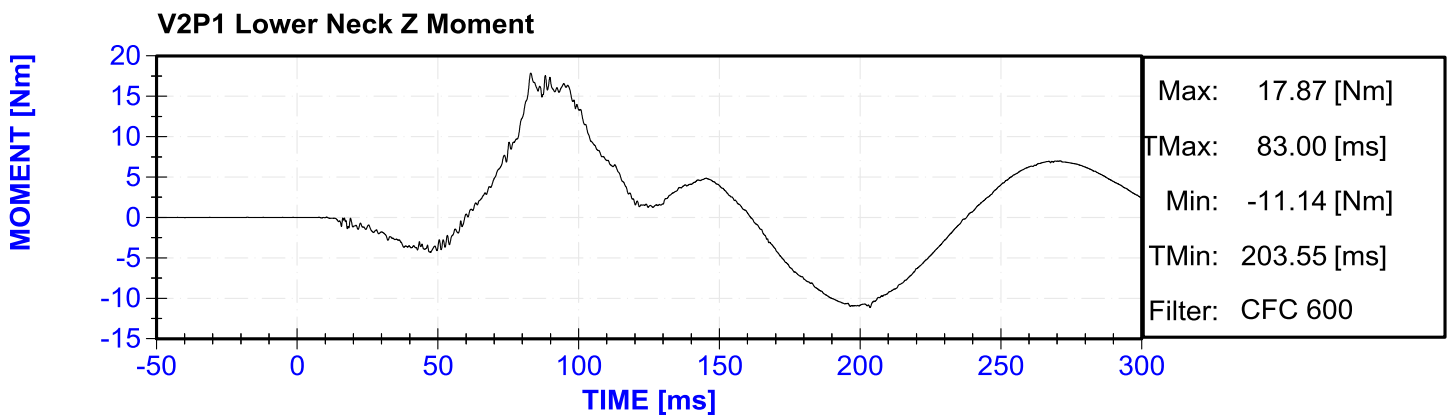
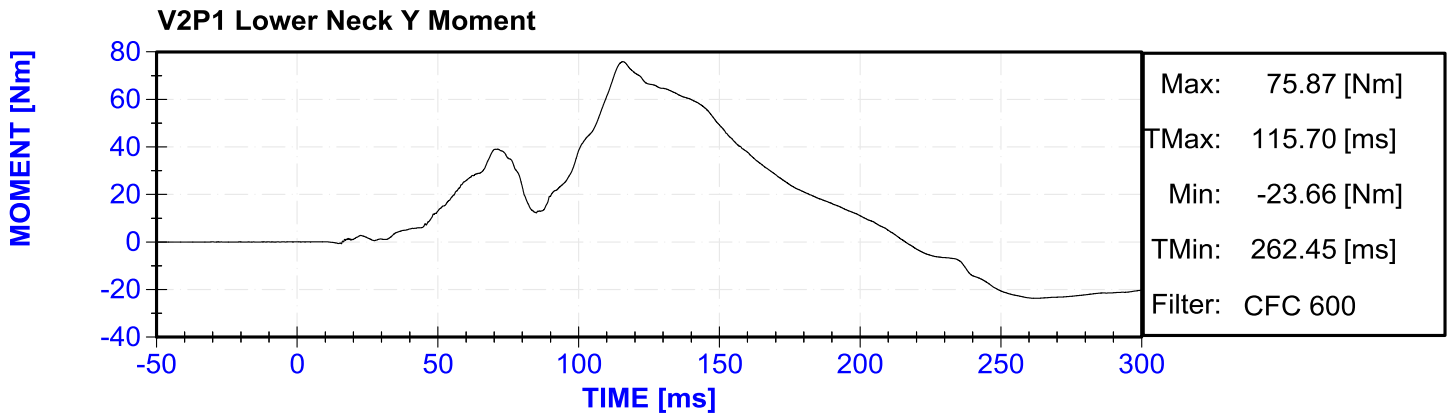


V2P1 Upper Neck Y Force

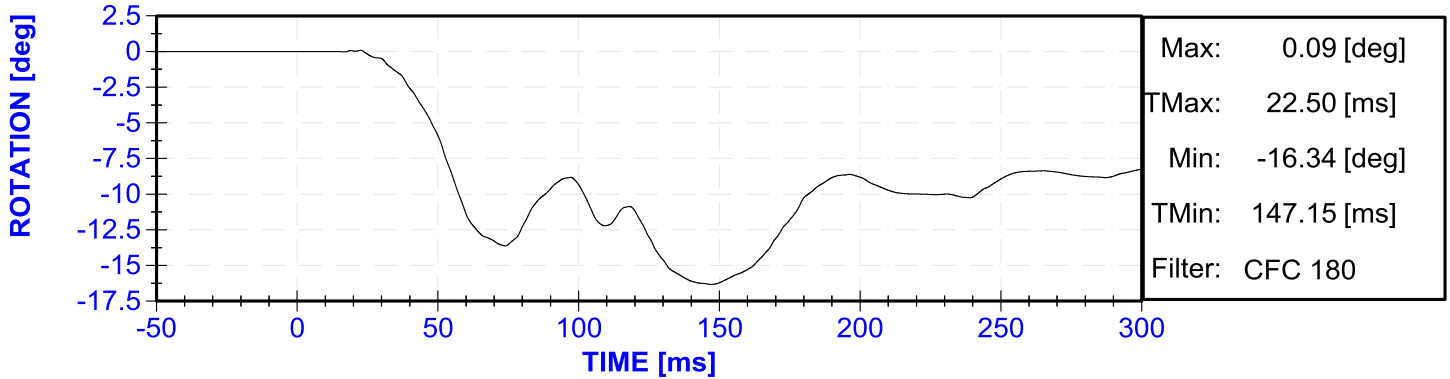




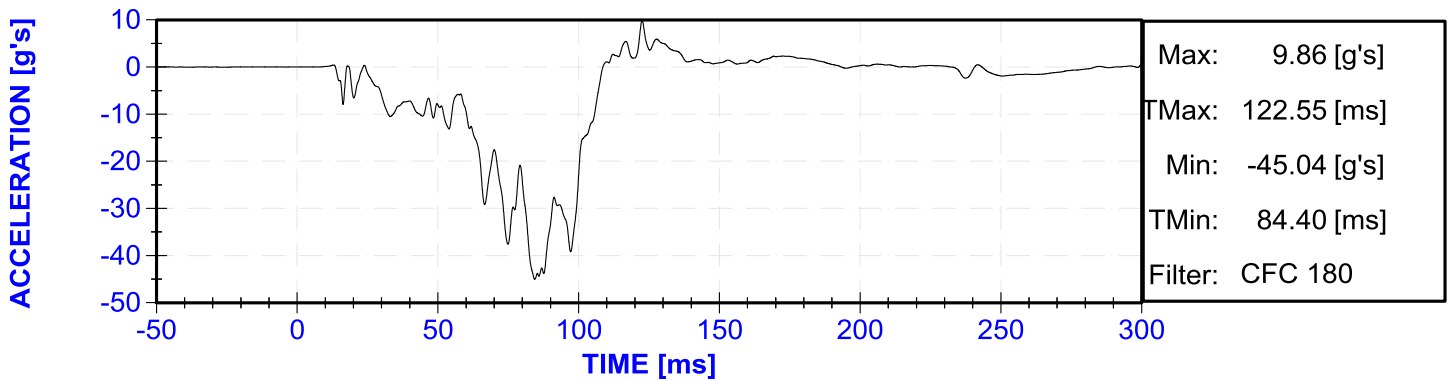




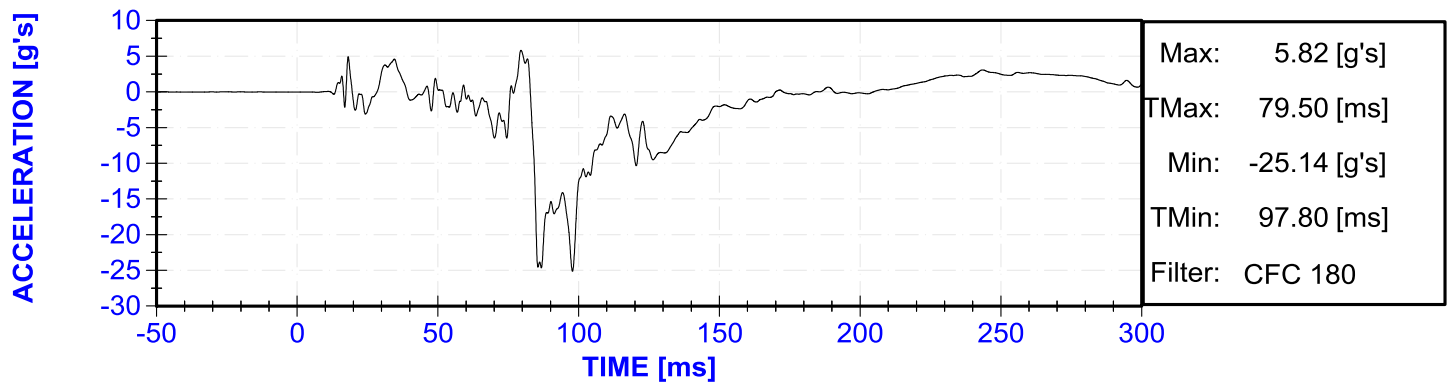
V2P1 Occipital Condyle Rotation Potentiometer



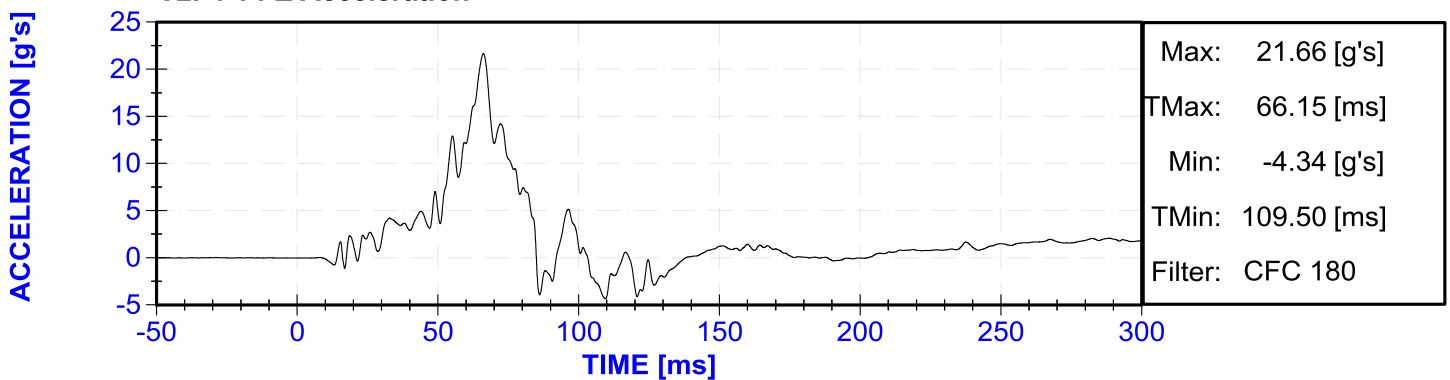
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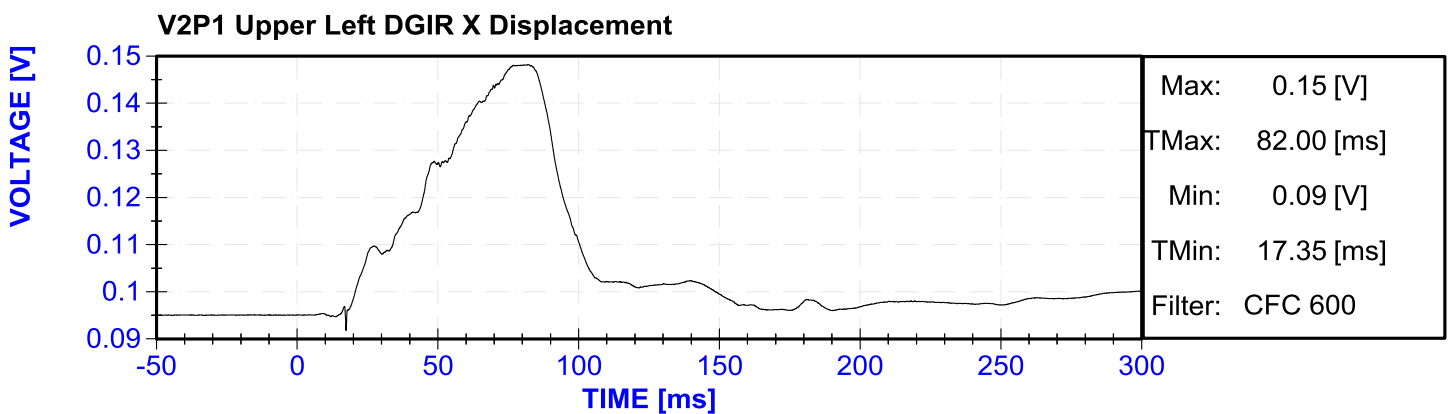
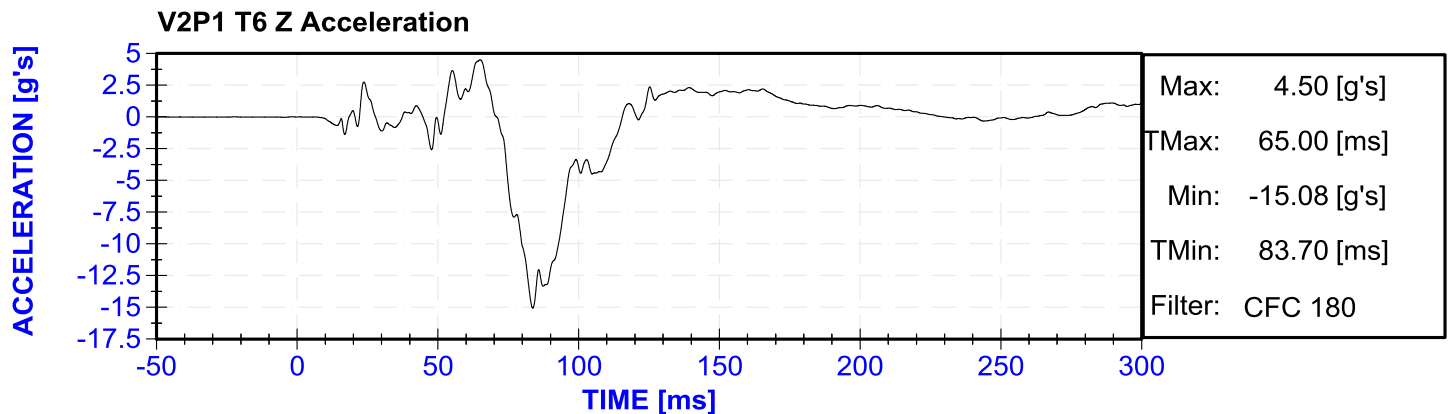
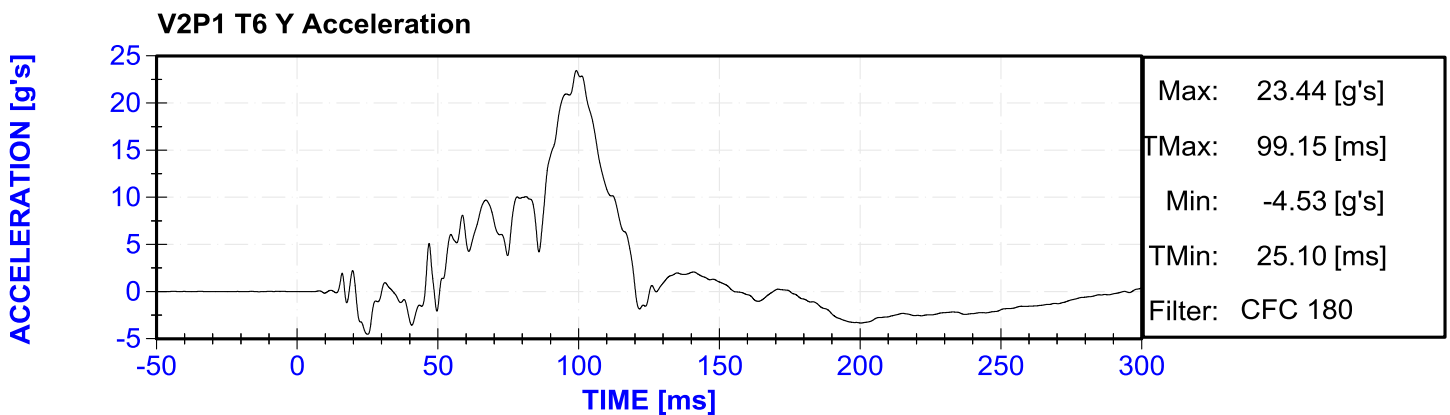
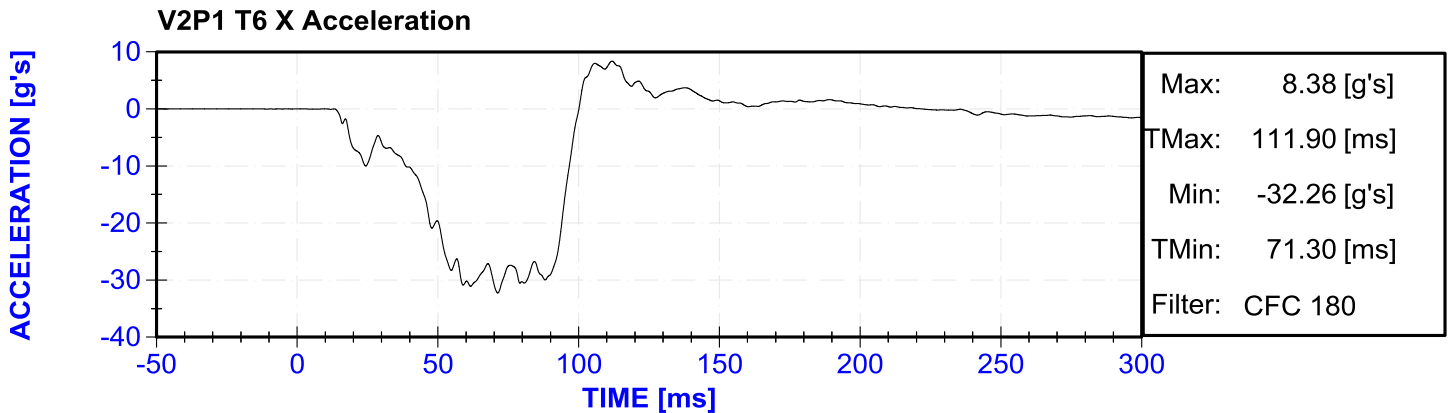


V2P1 T1 Y Acceleration

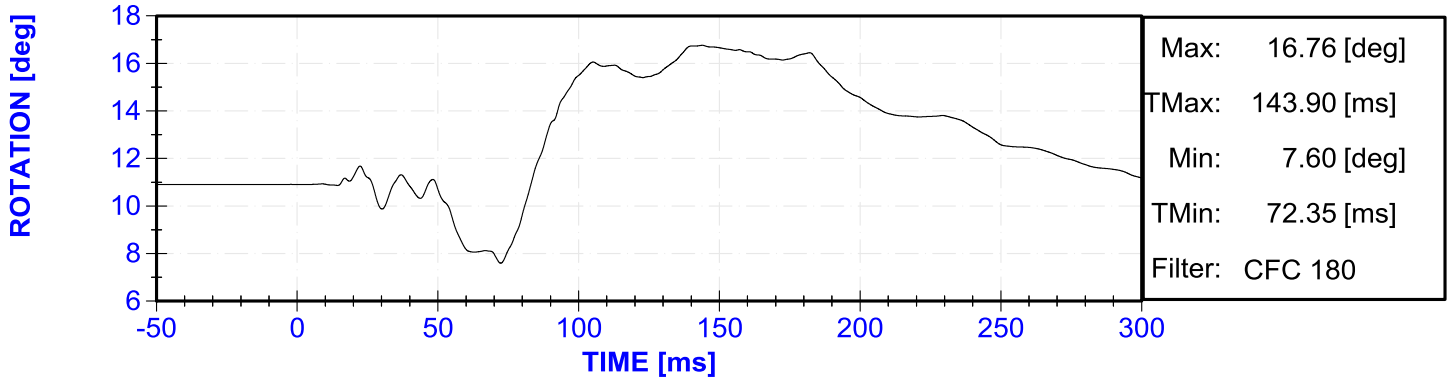


V2P1 T1 Z Acceleration

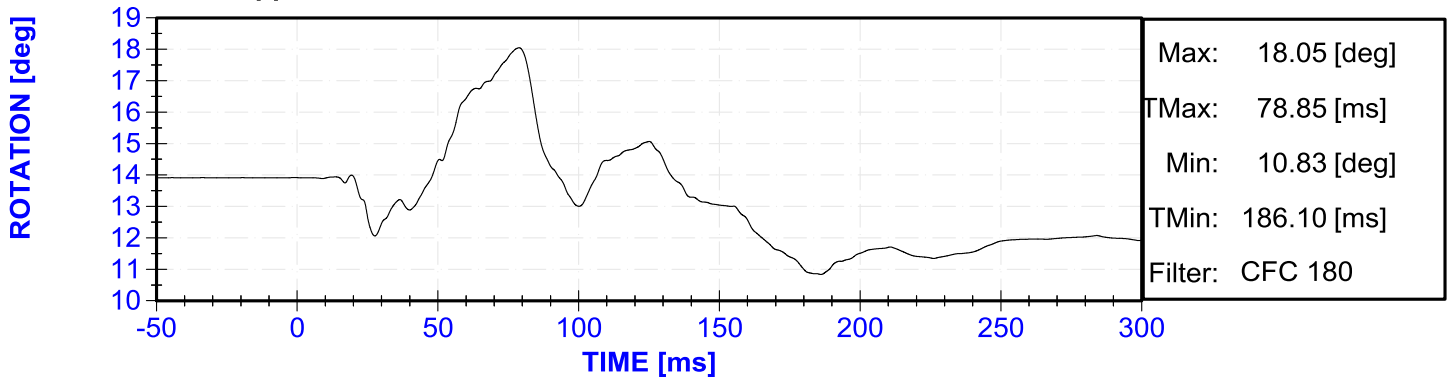




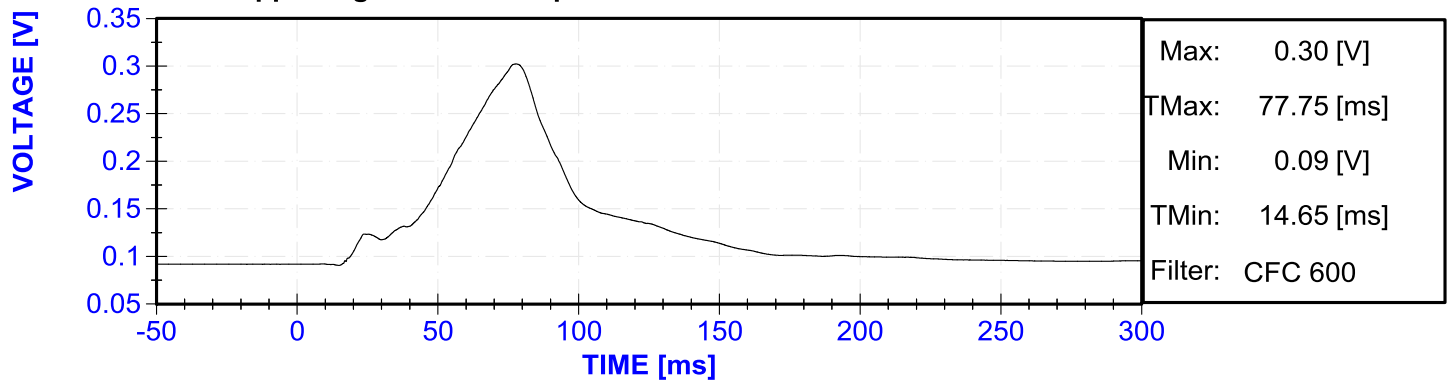
V2P1 Upper Left DGIR Y Rotation



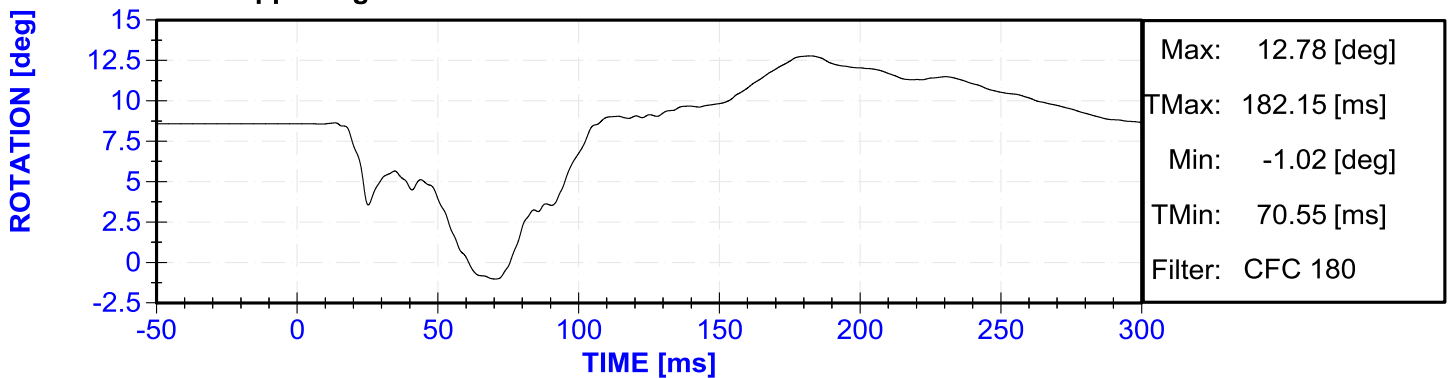
V2P1 Upper Left DGIR Z Rotation



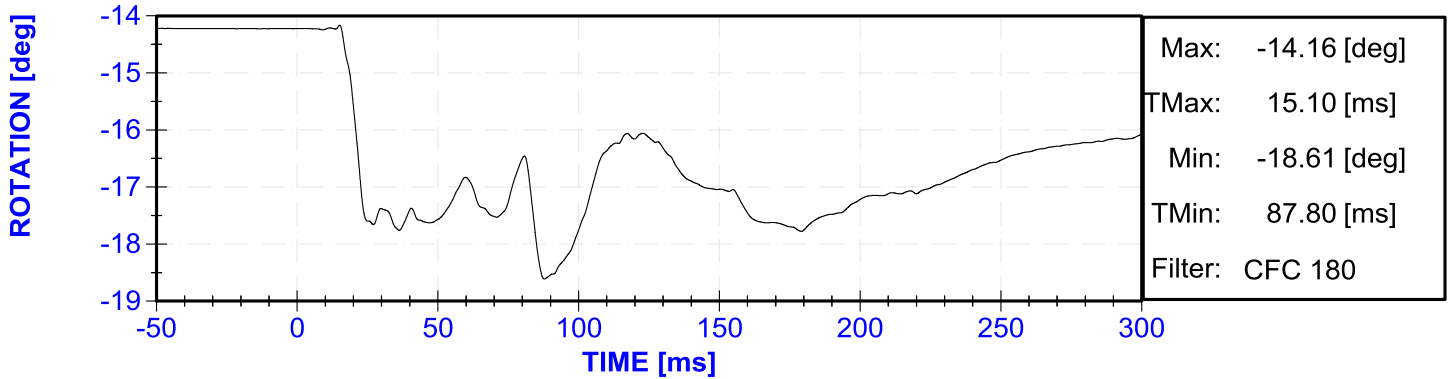
V2P1 Upper Right DGIR X Displacement



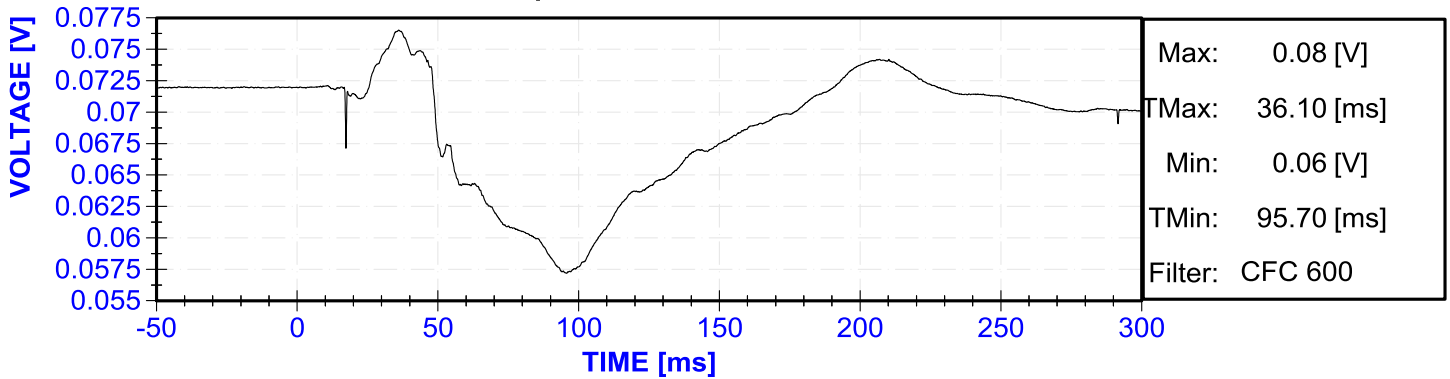
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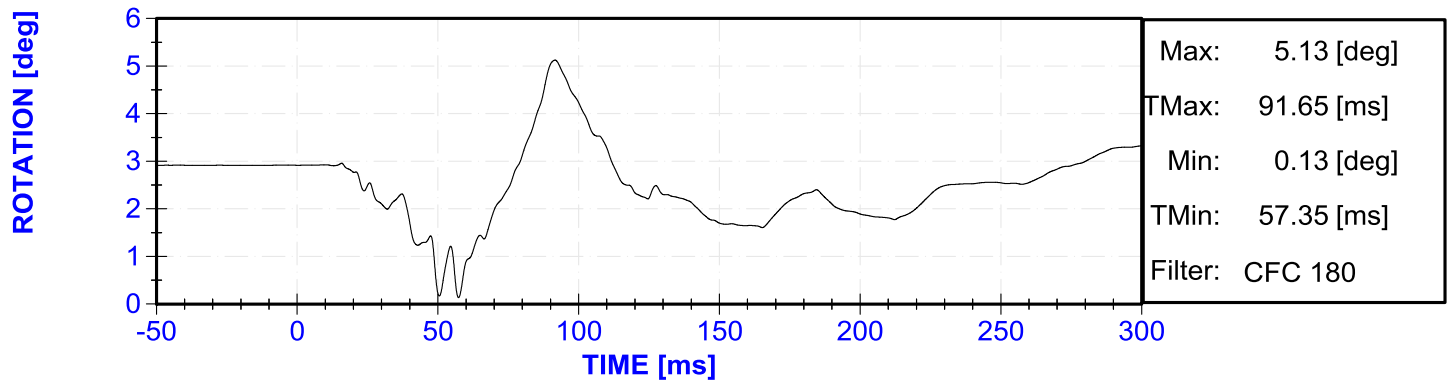
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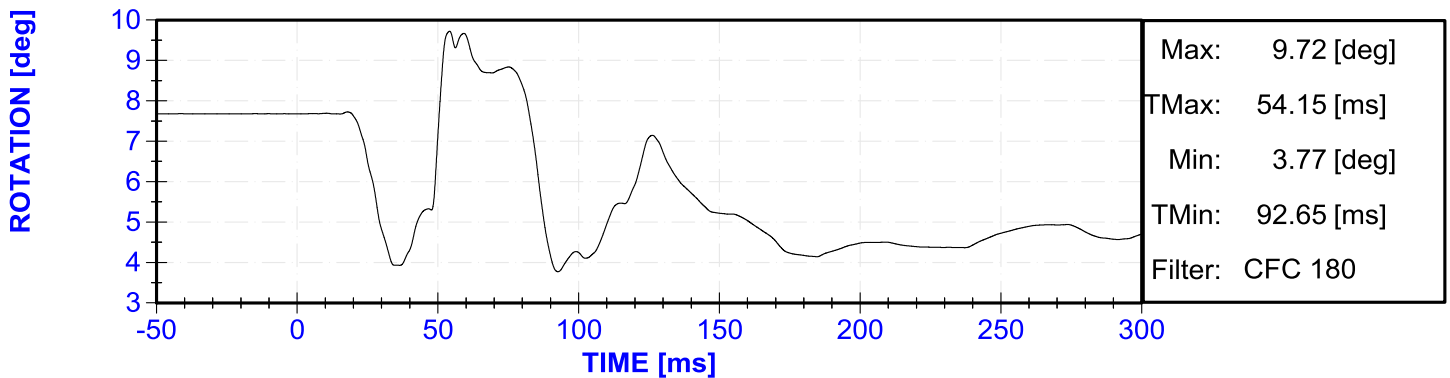
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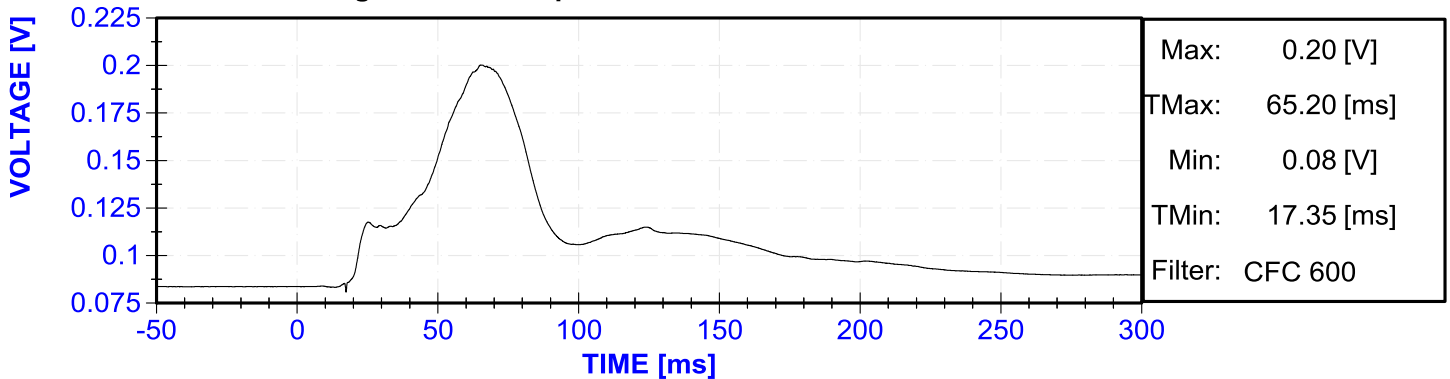
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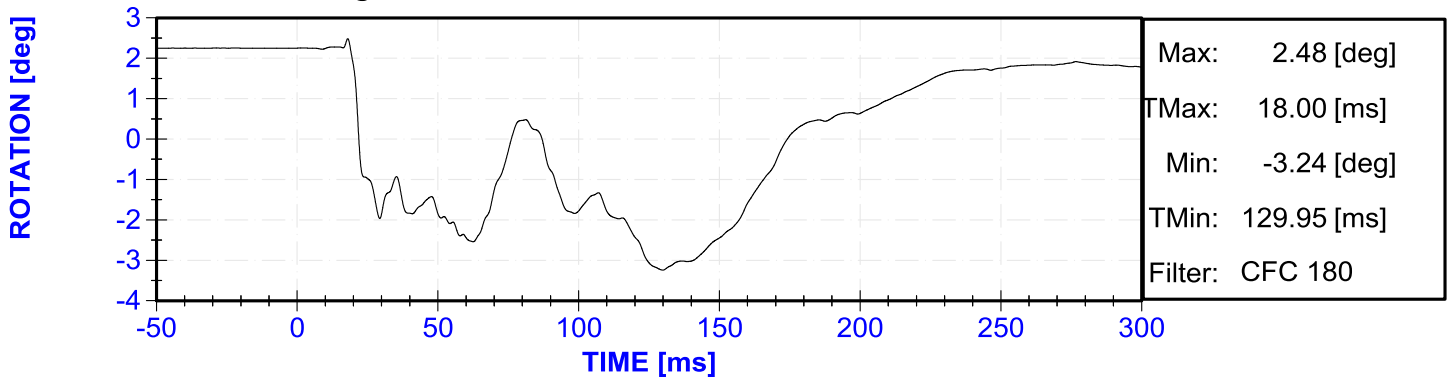
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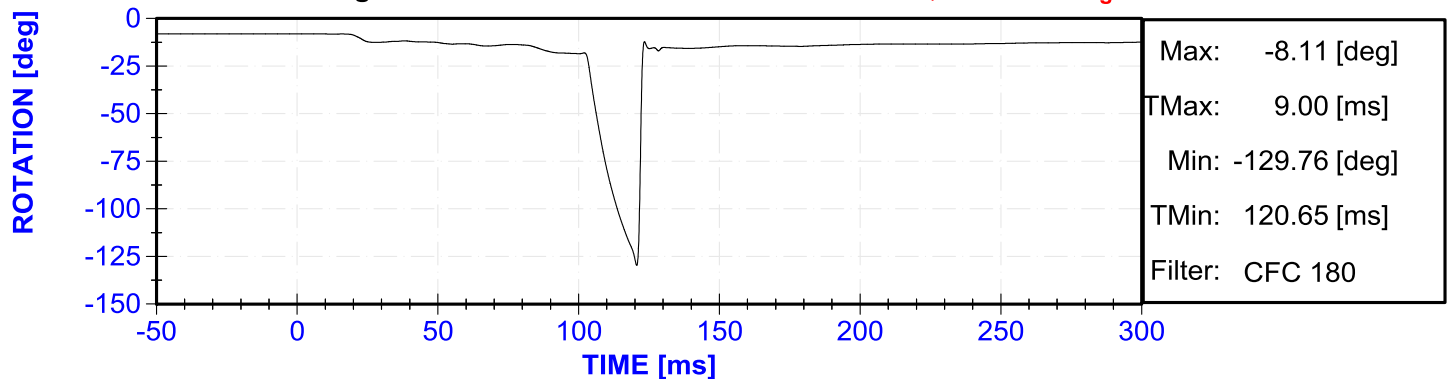
V2P1 Lower Right DGIR X Displacement



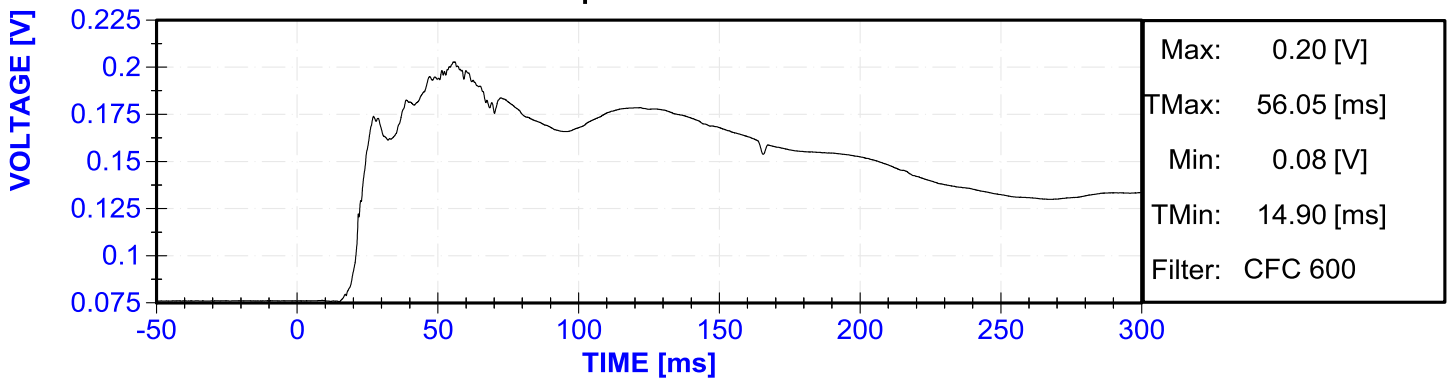
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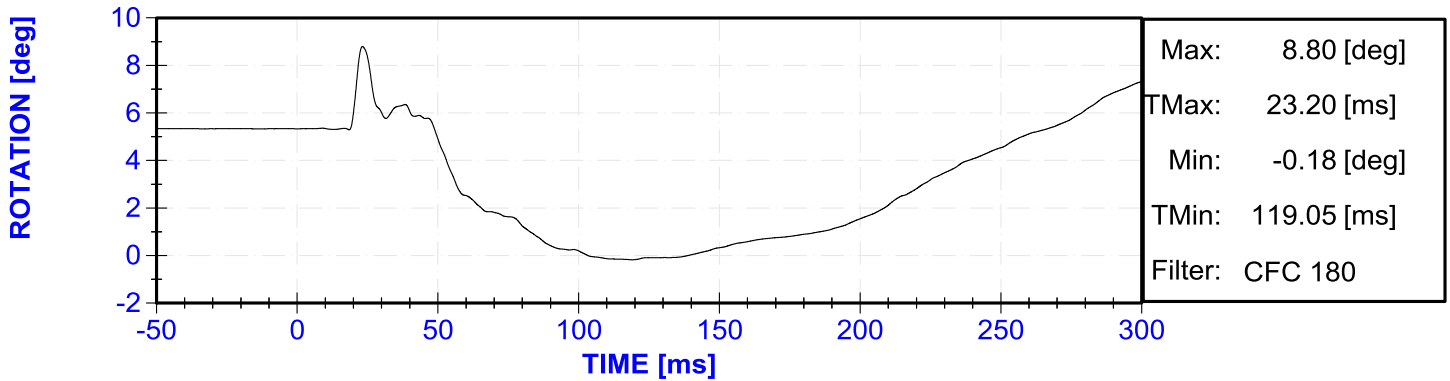
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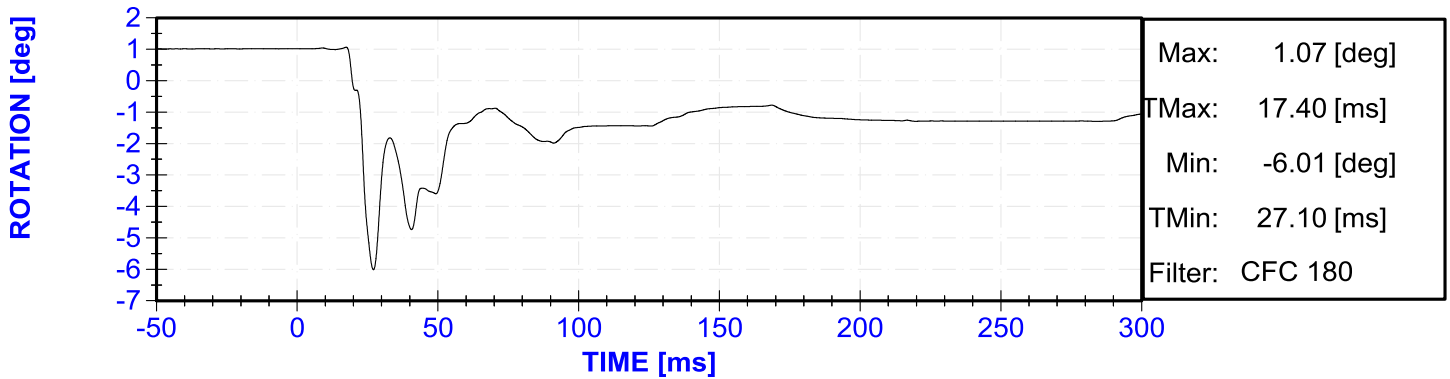
V2P1 Abdomen Left DGIR X Displacement



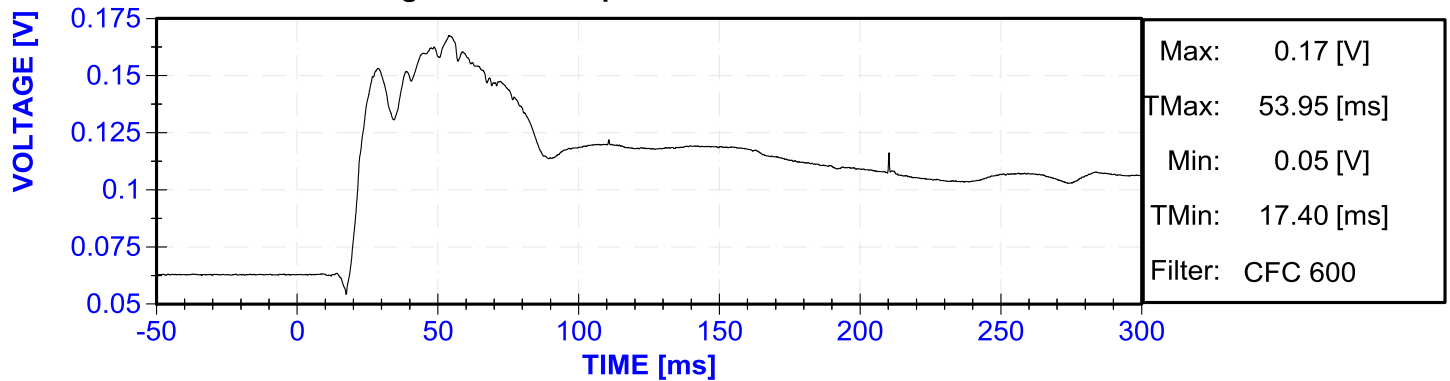
V2P1 Abdomen Left DGIR Y Rotation



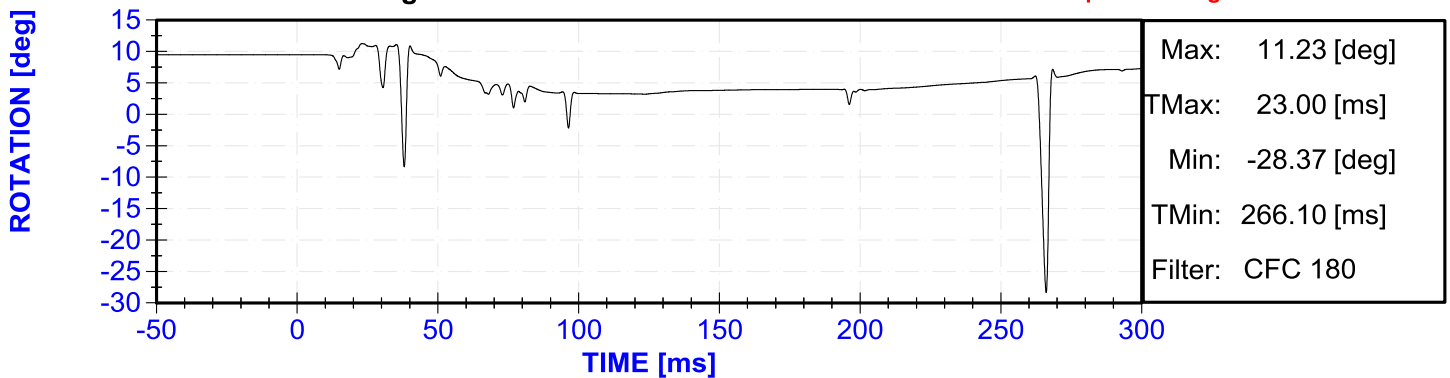
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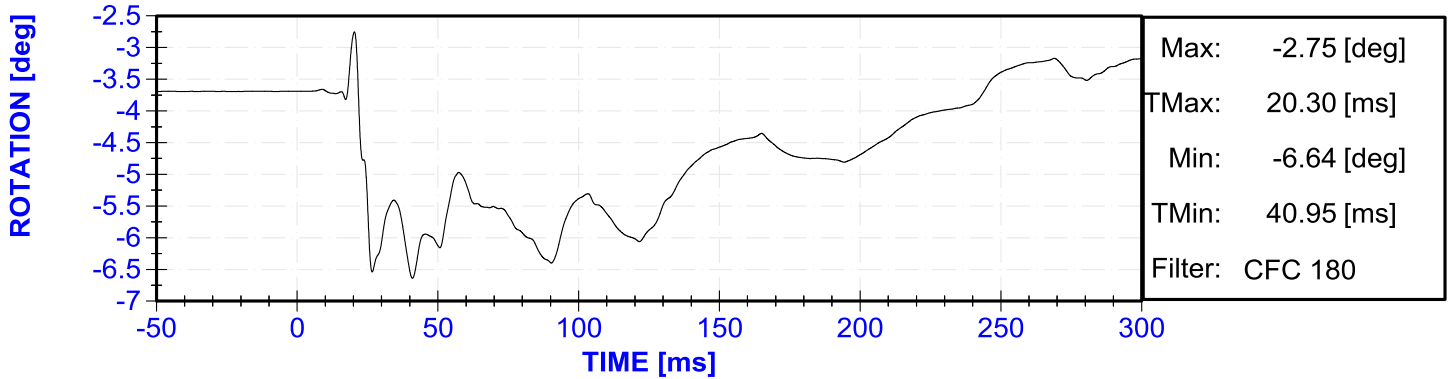
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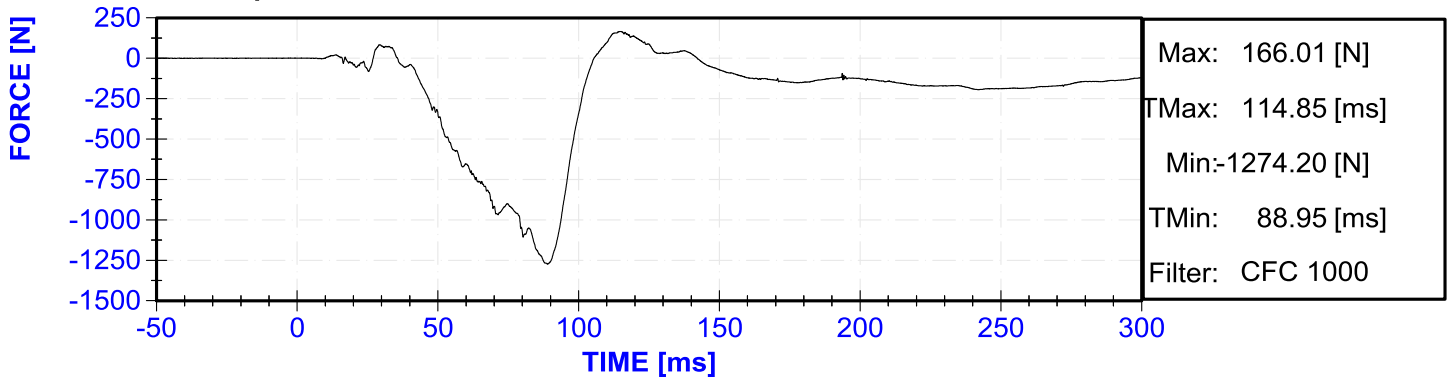
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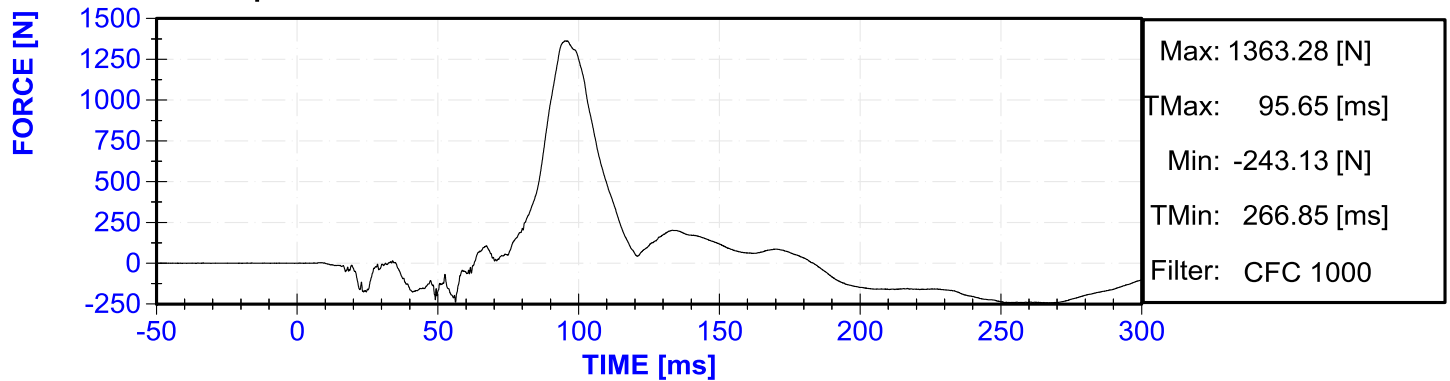
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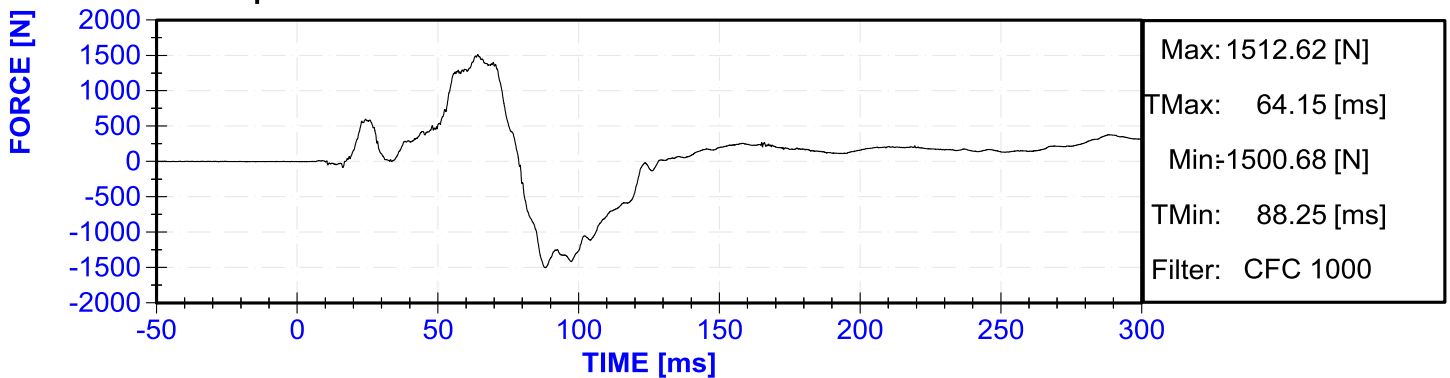
V2P1 Spine Force X

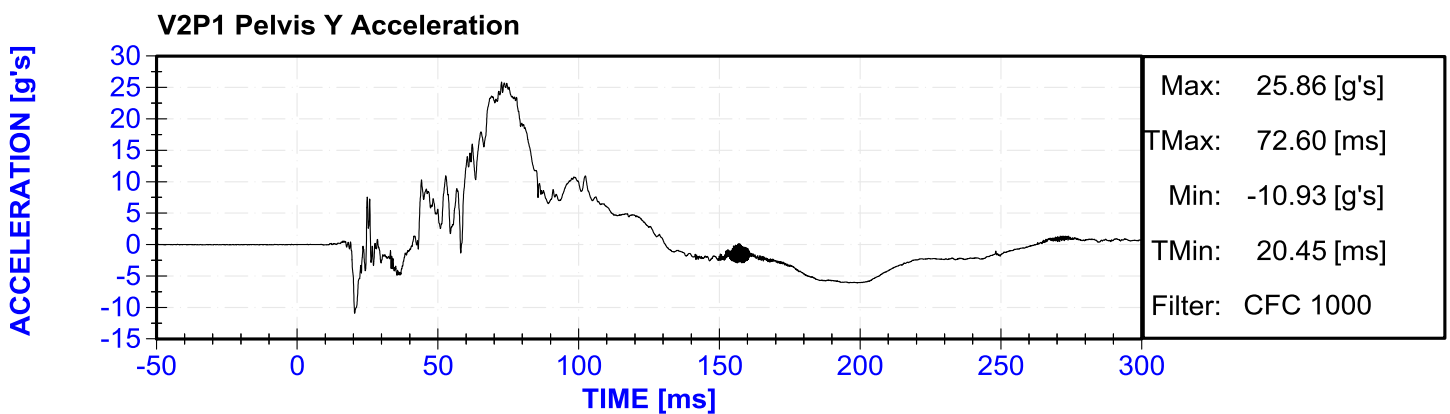
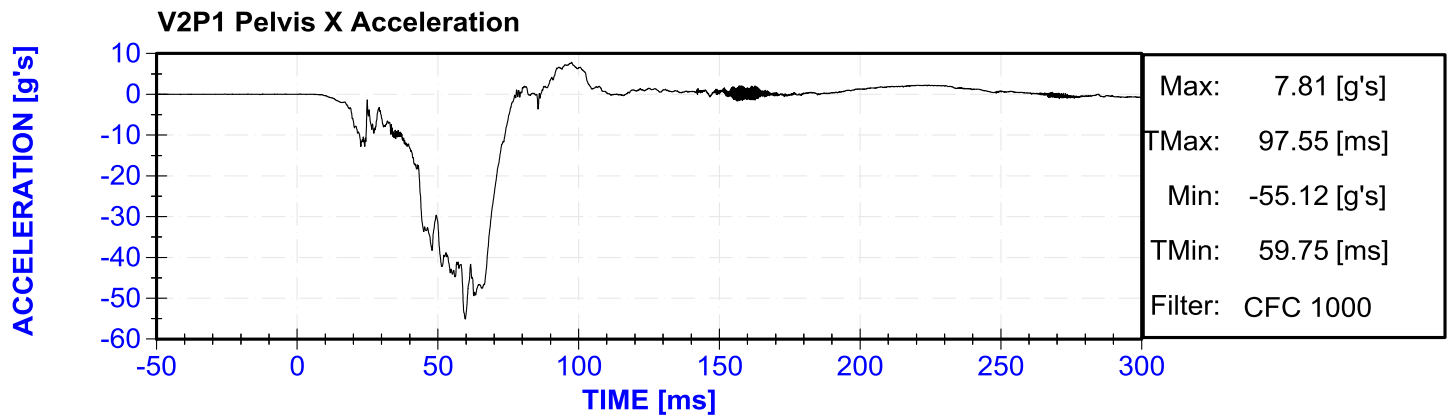
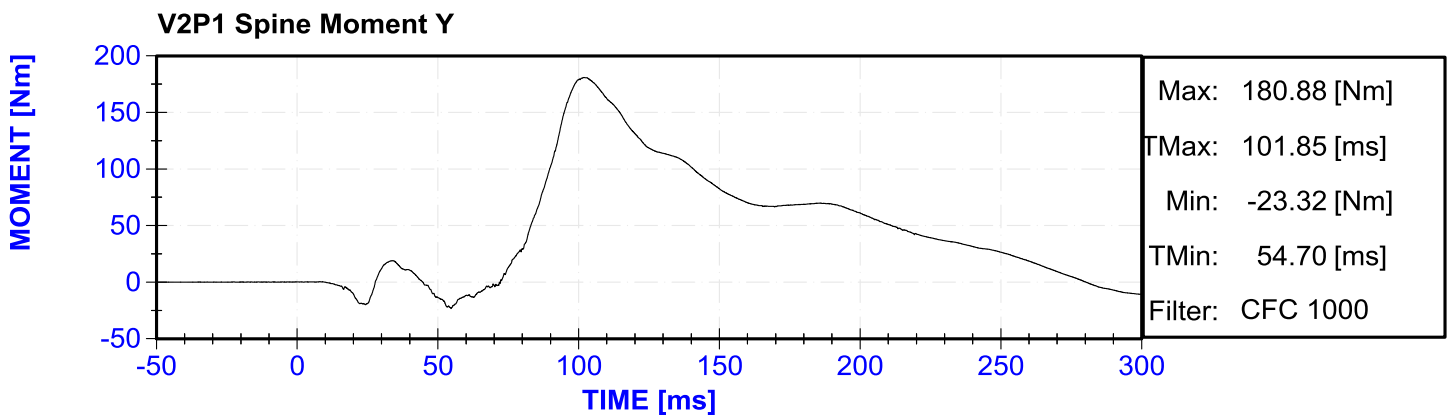
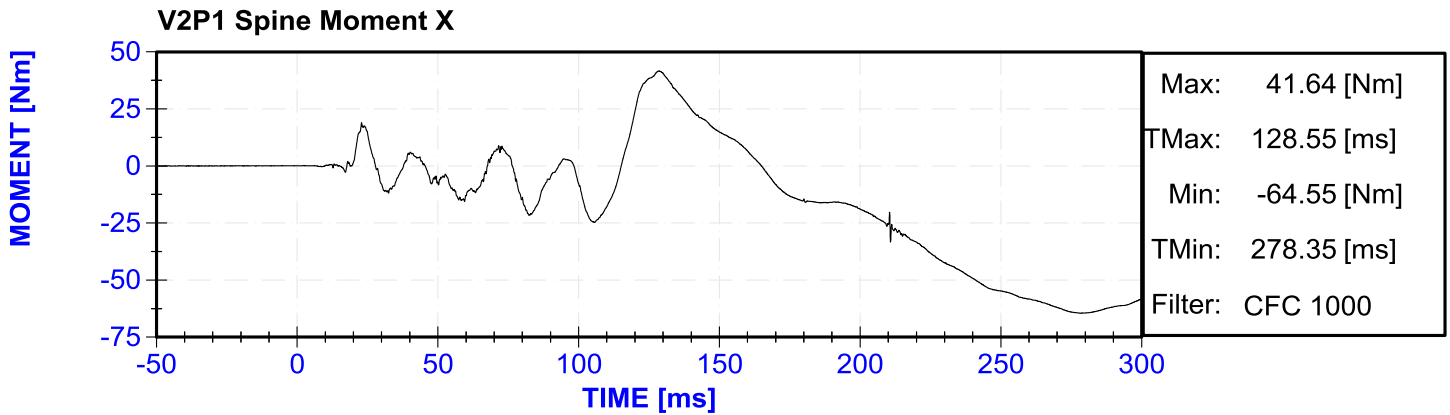


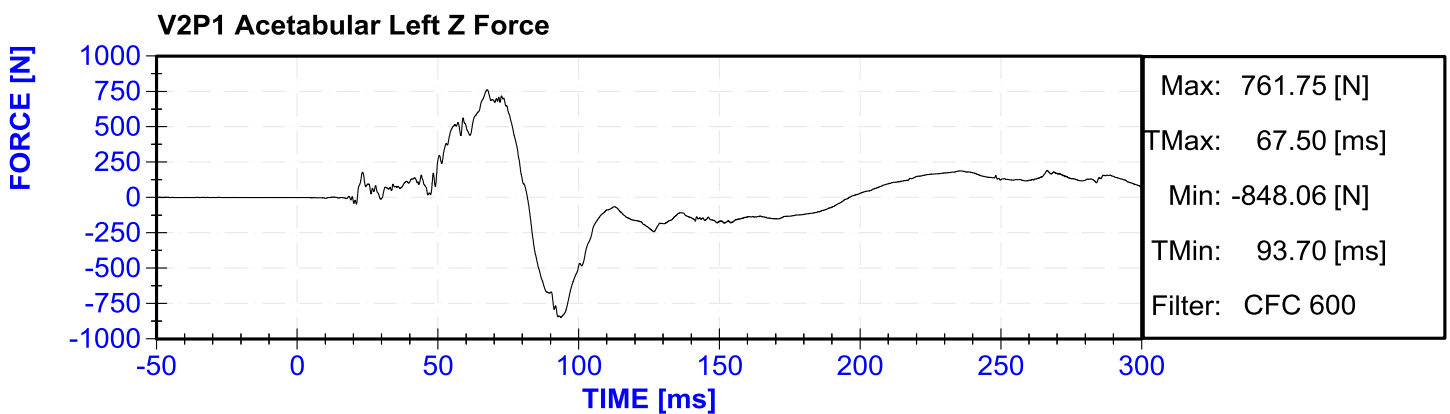
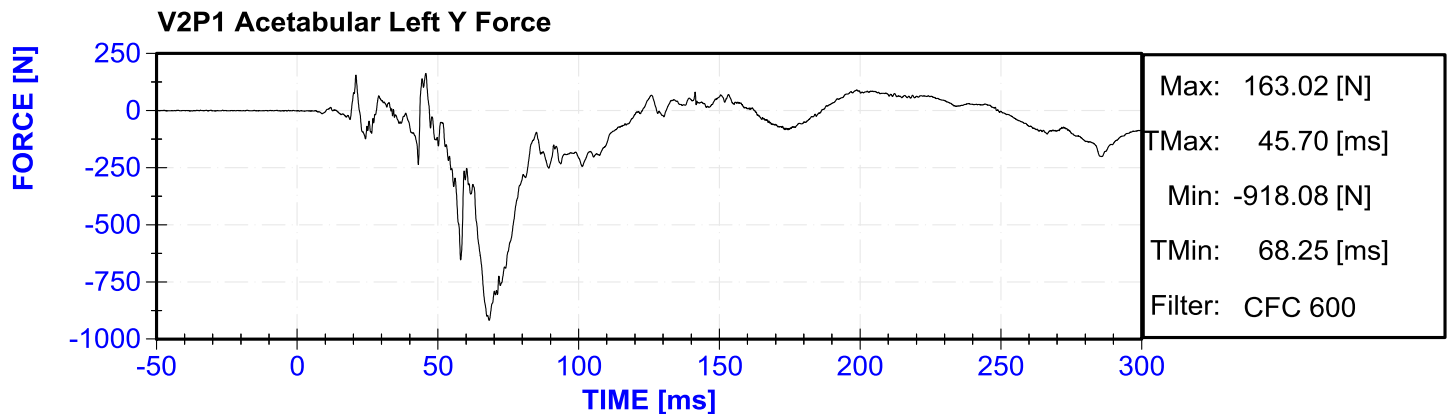
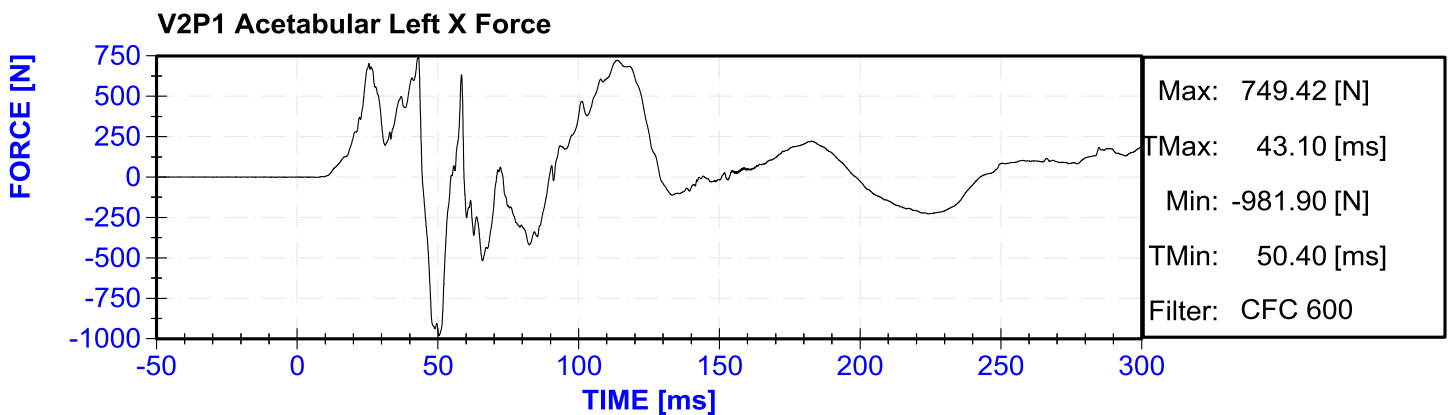
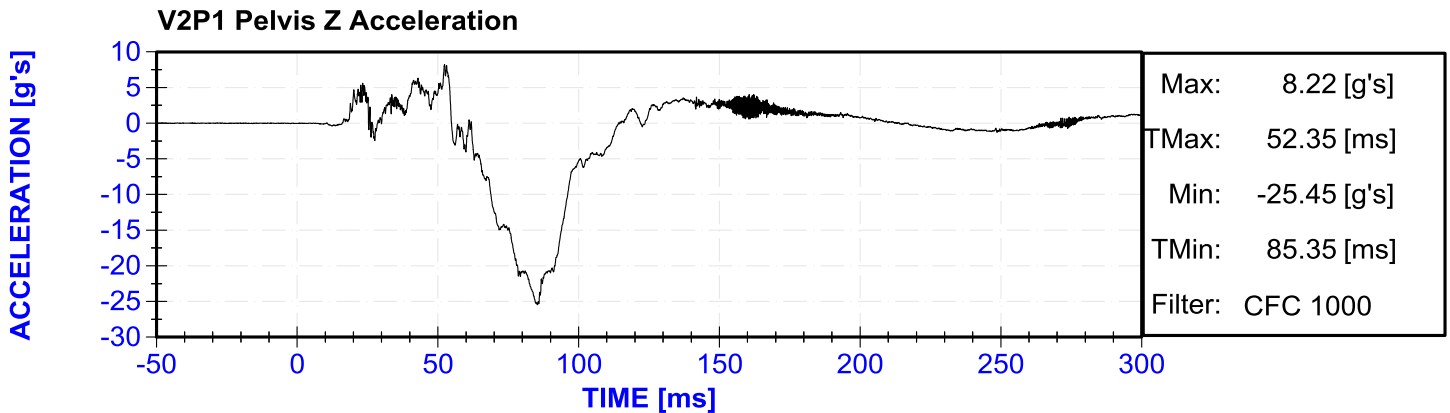
V2P1 Spine Force Y

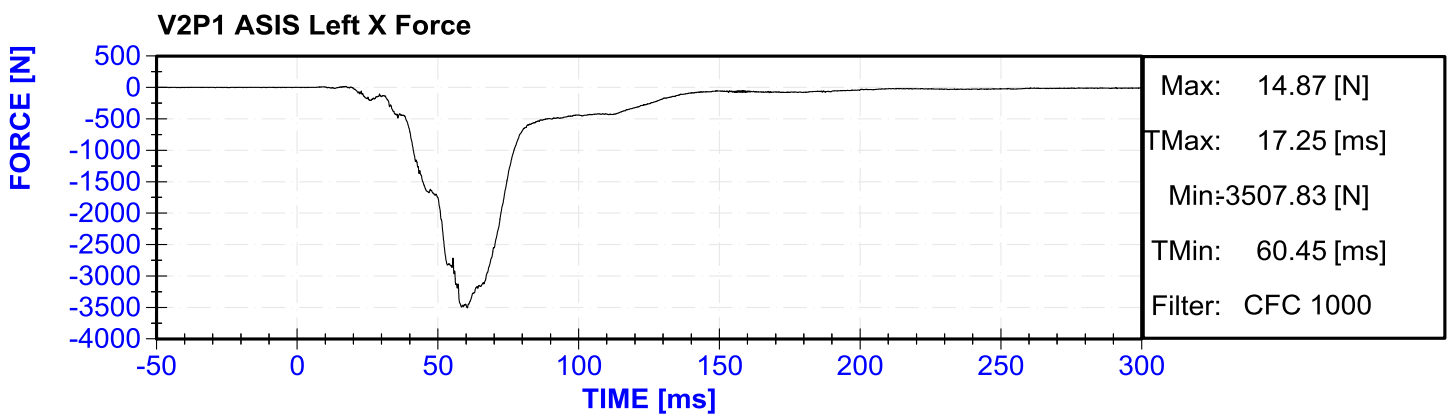
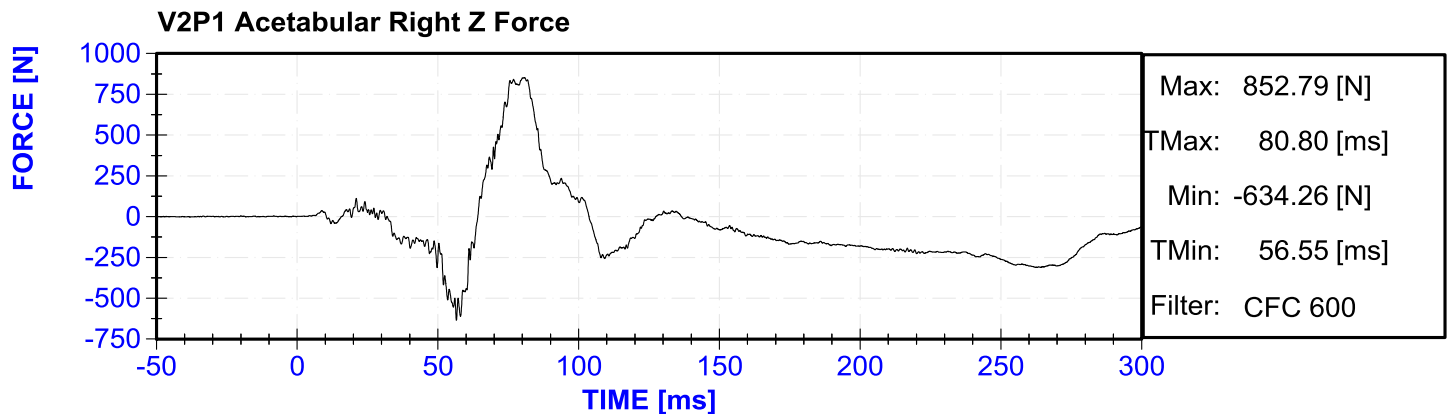
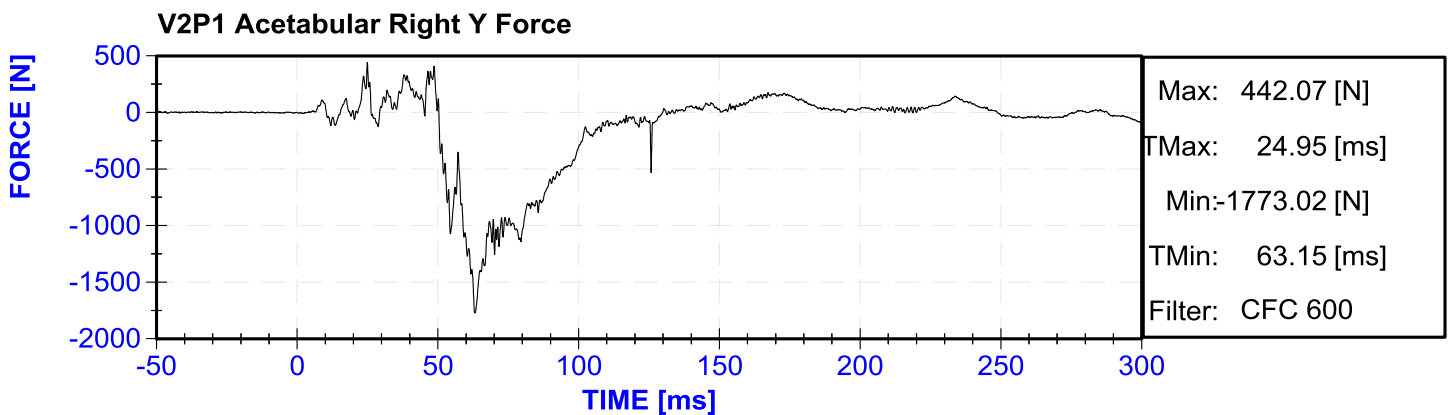
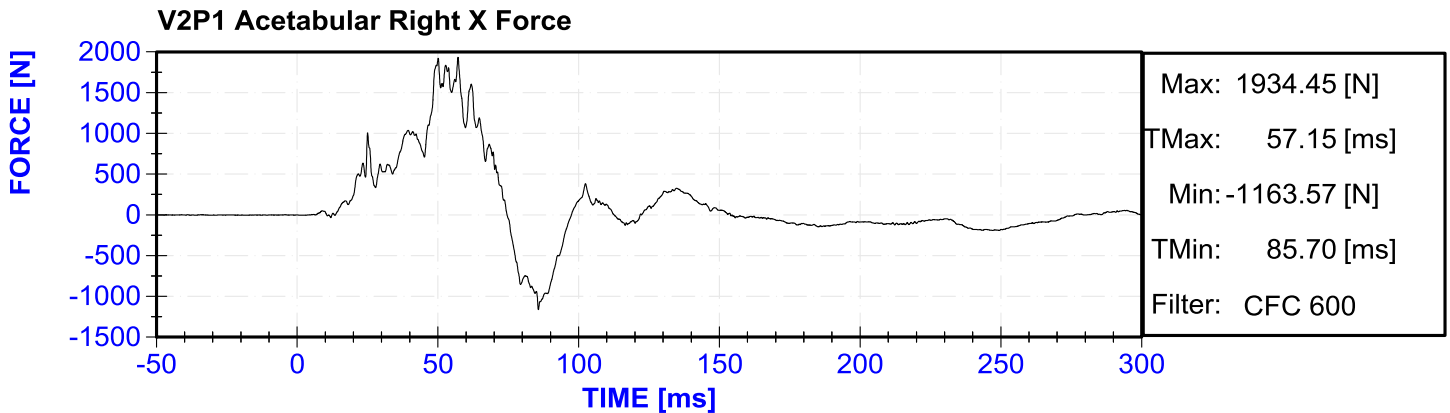


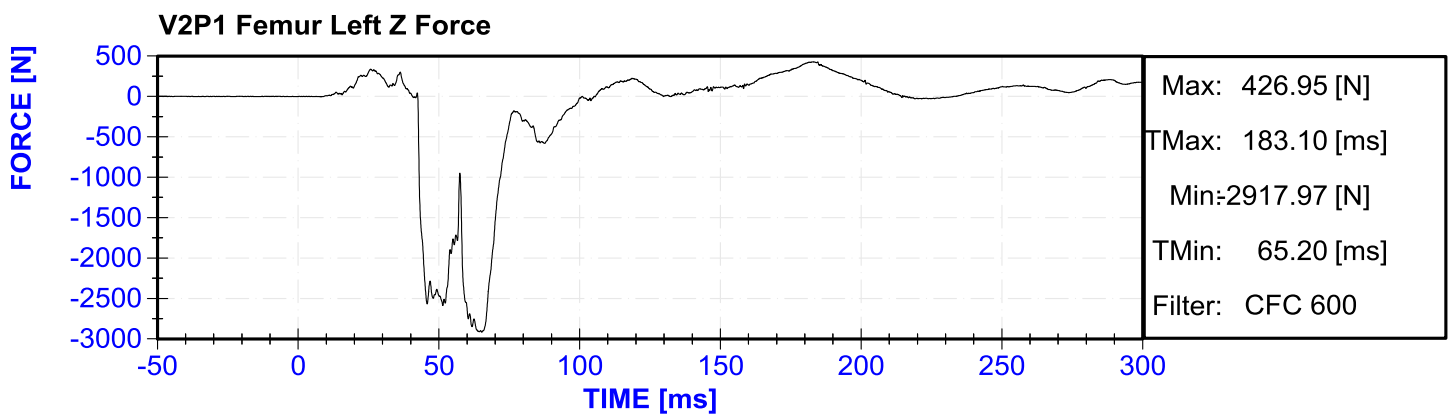
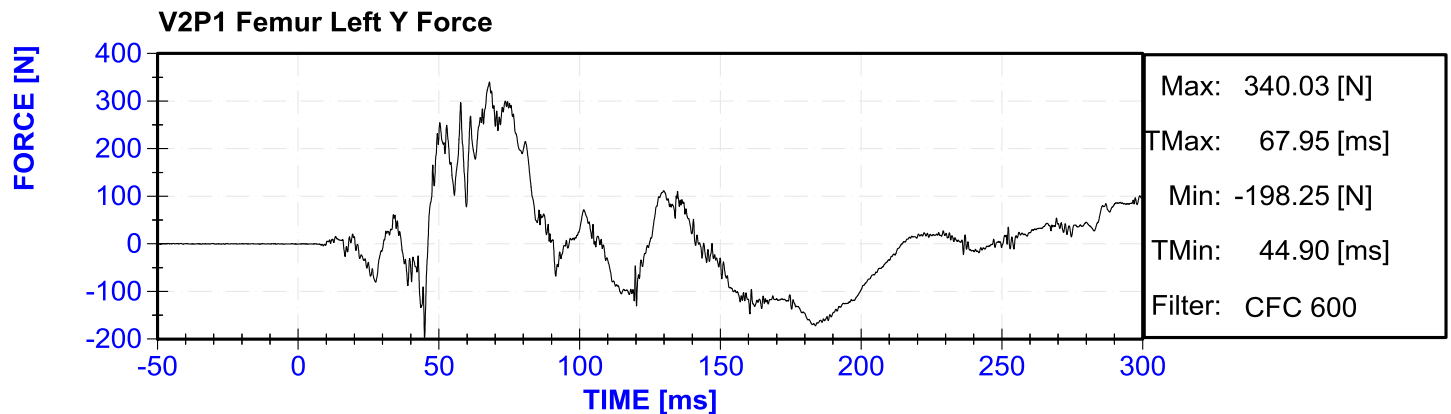
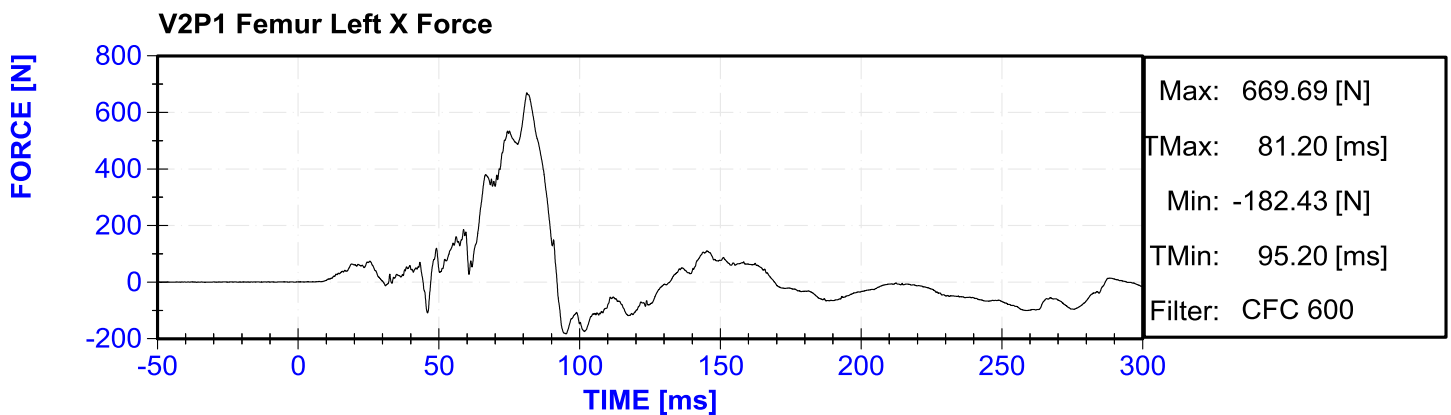
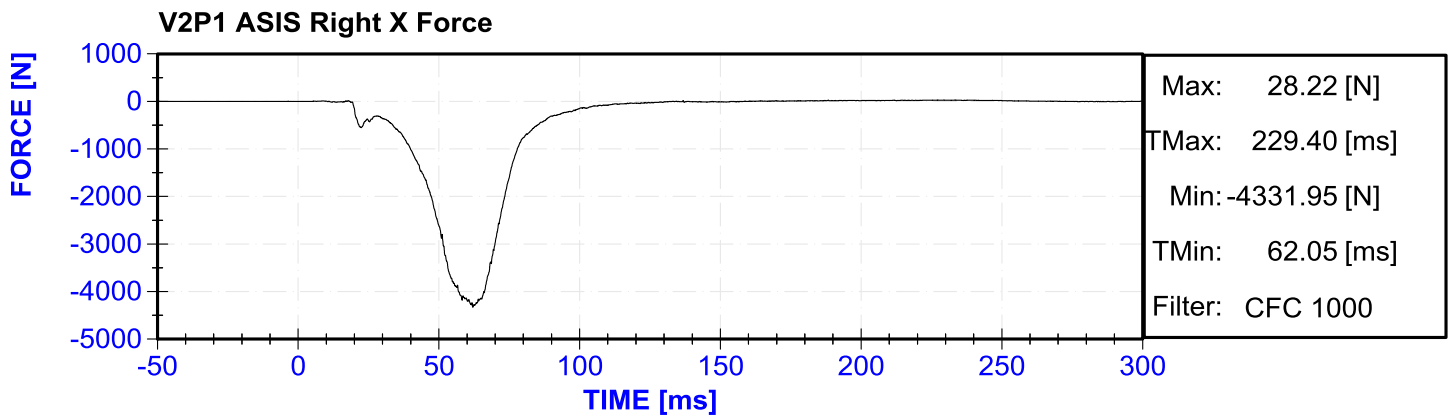
V2P1 Spine Force Z

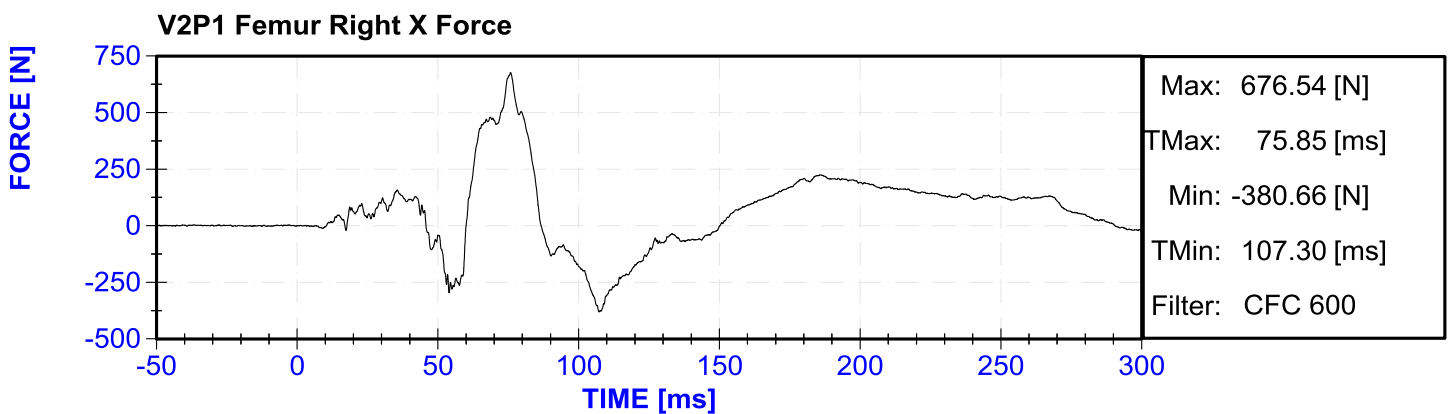
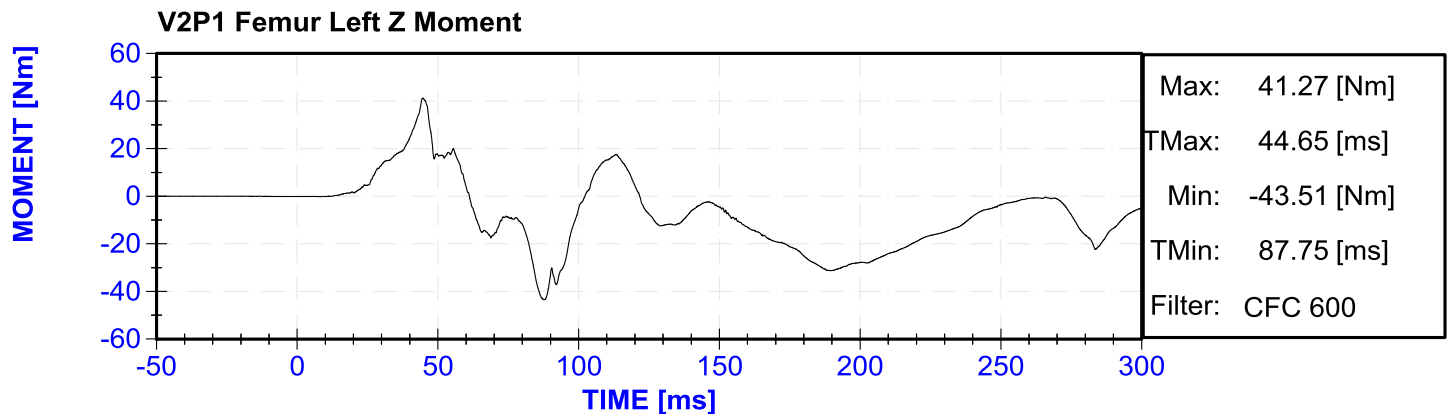
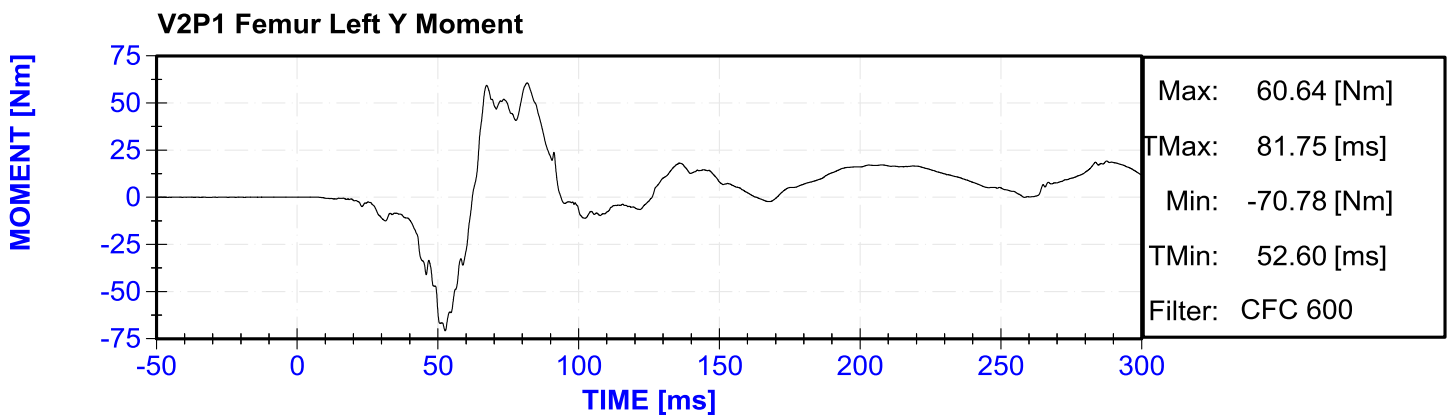
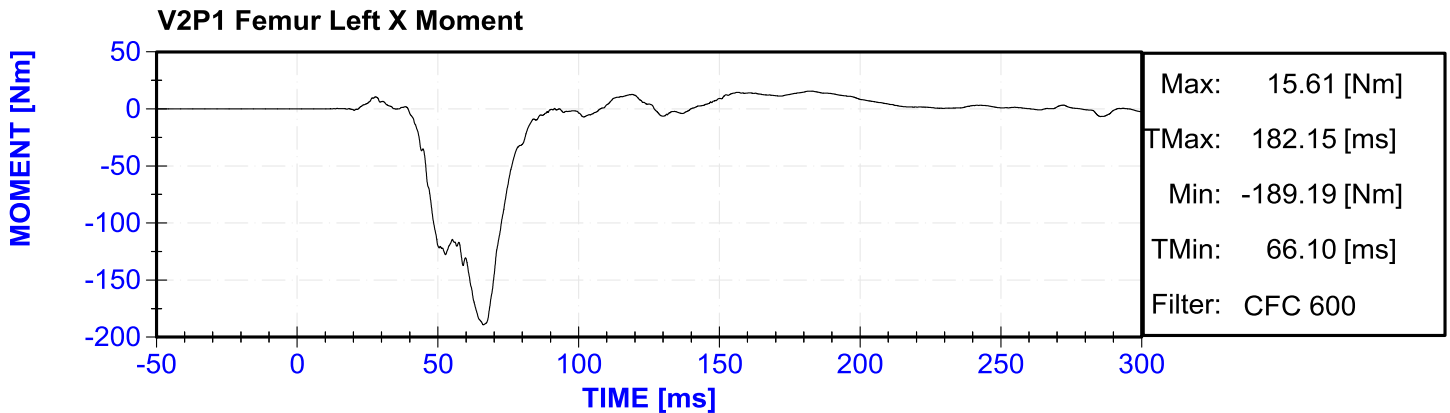


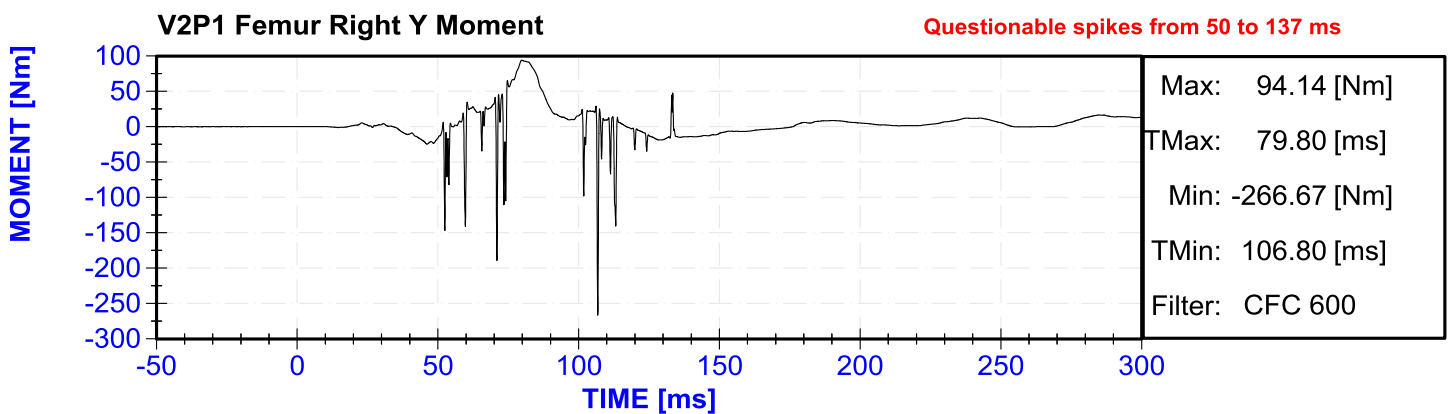
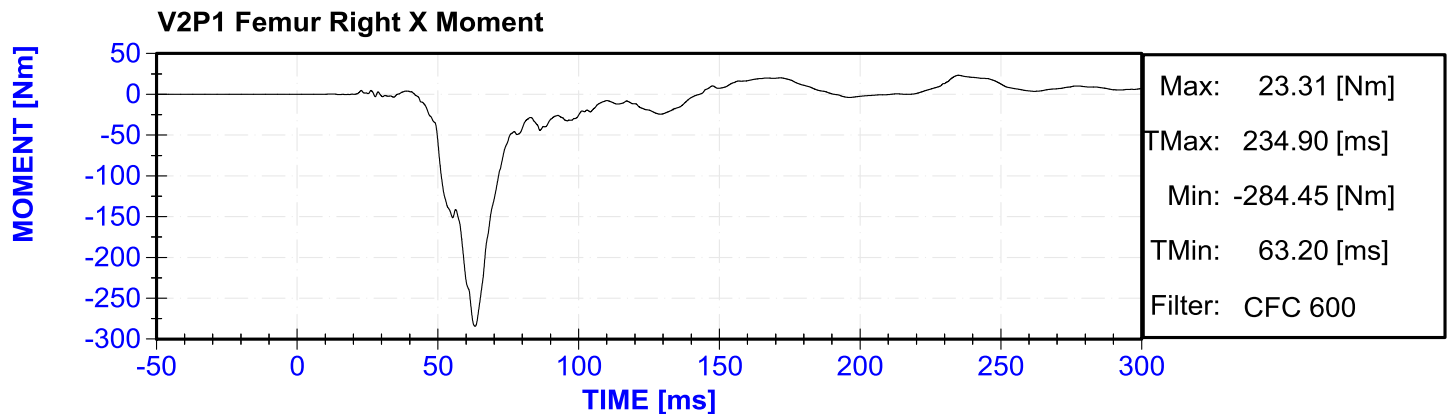
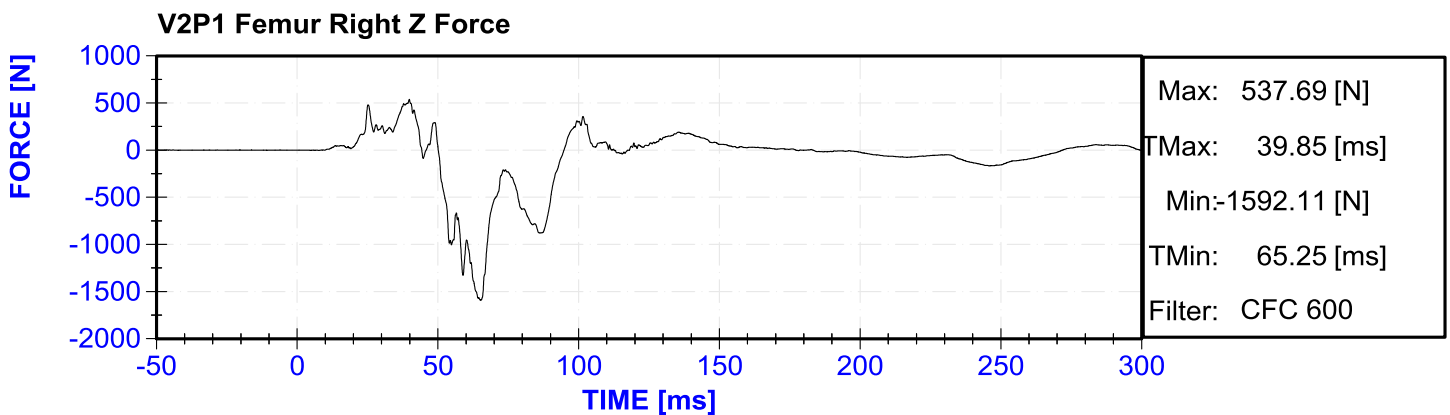
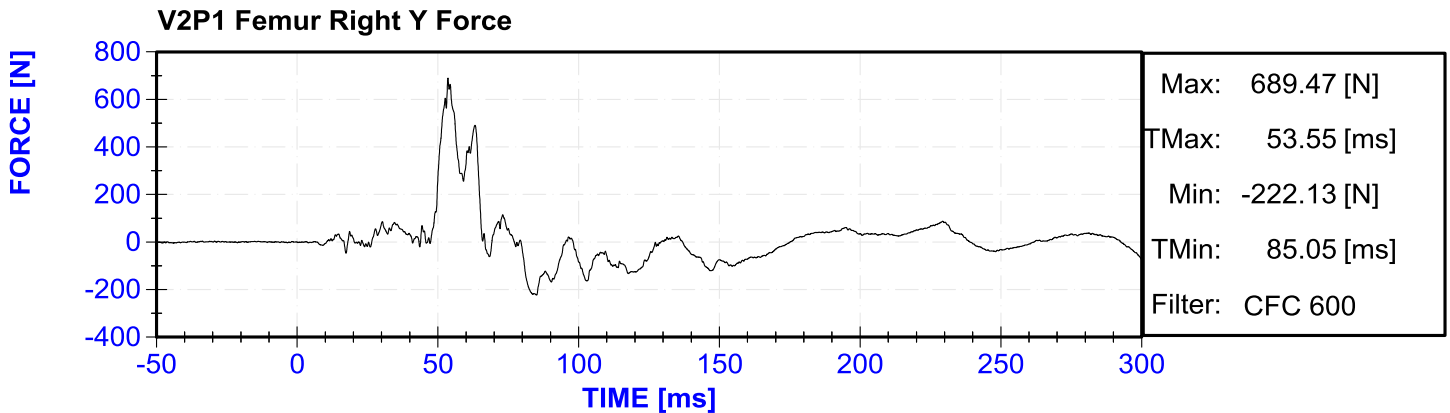




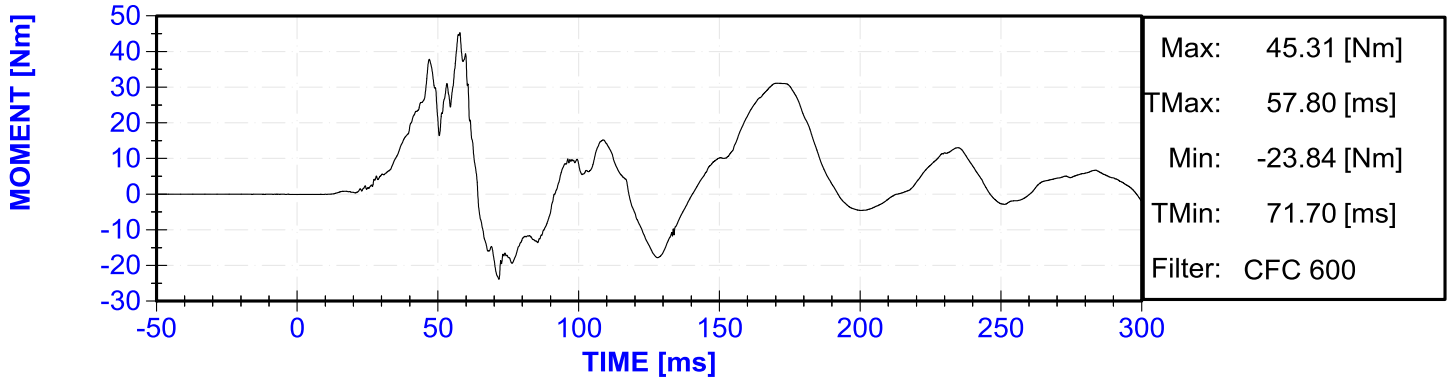




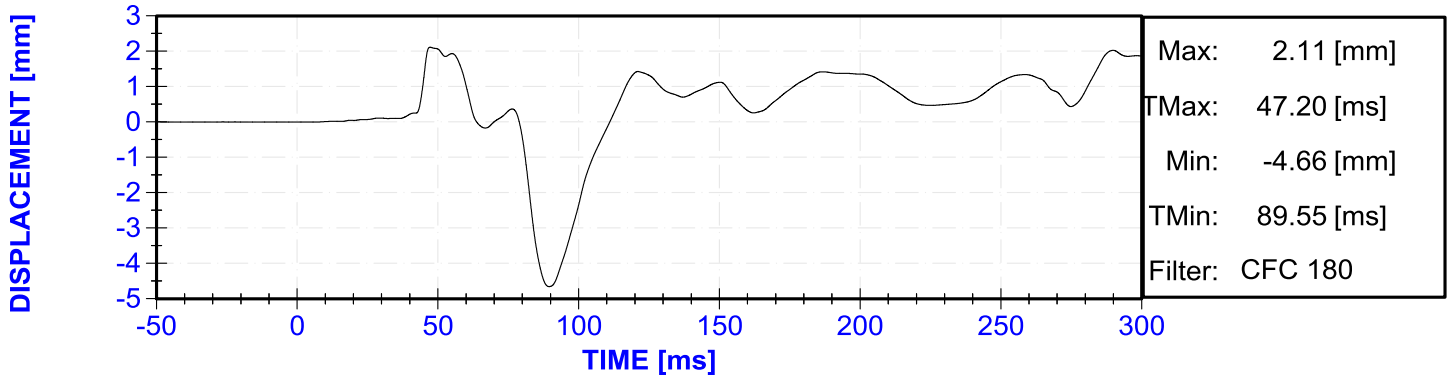




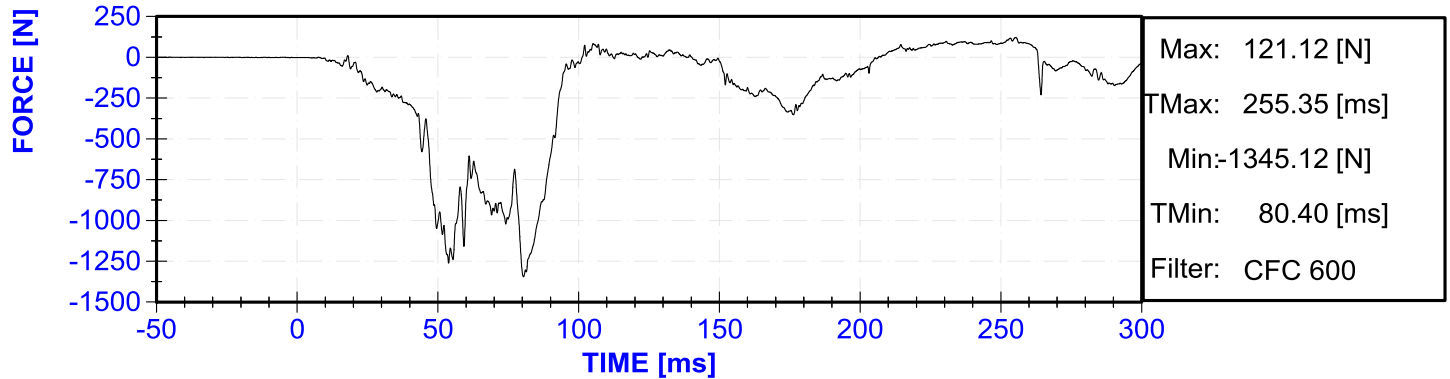
V2P1 Femur Right Z Moment



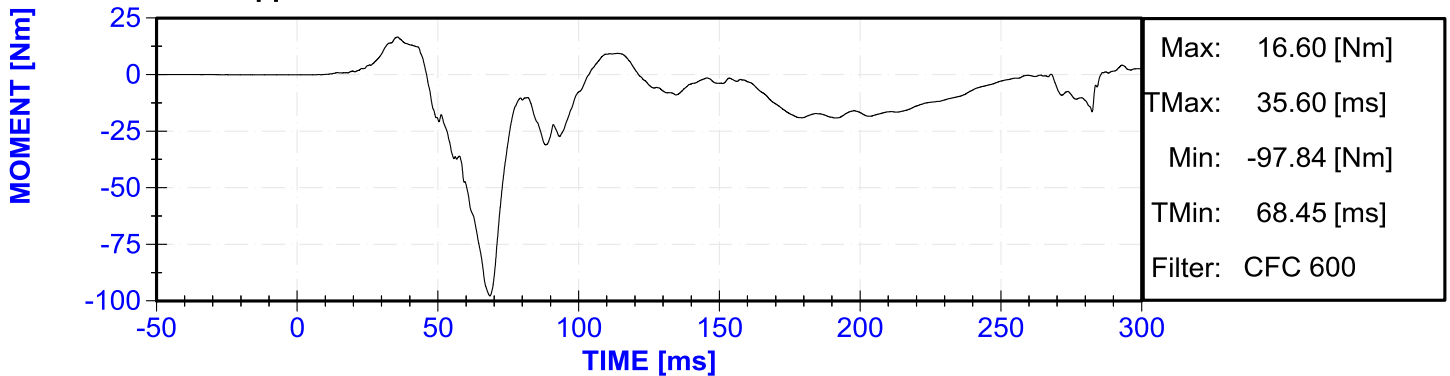
V2P1 Knee Left X Displacement



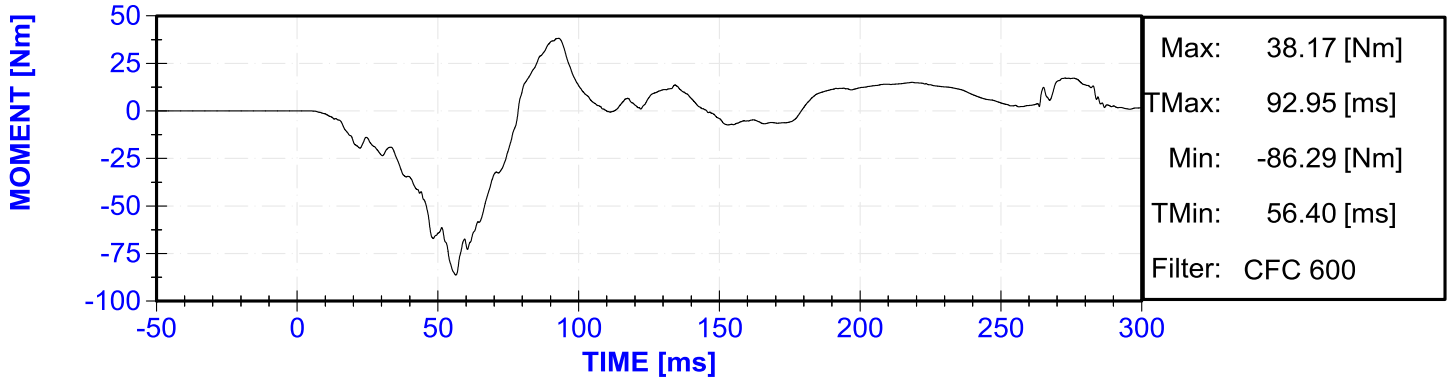
V2P1 Upper Tibia Left Z Force



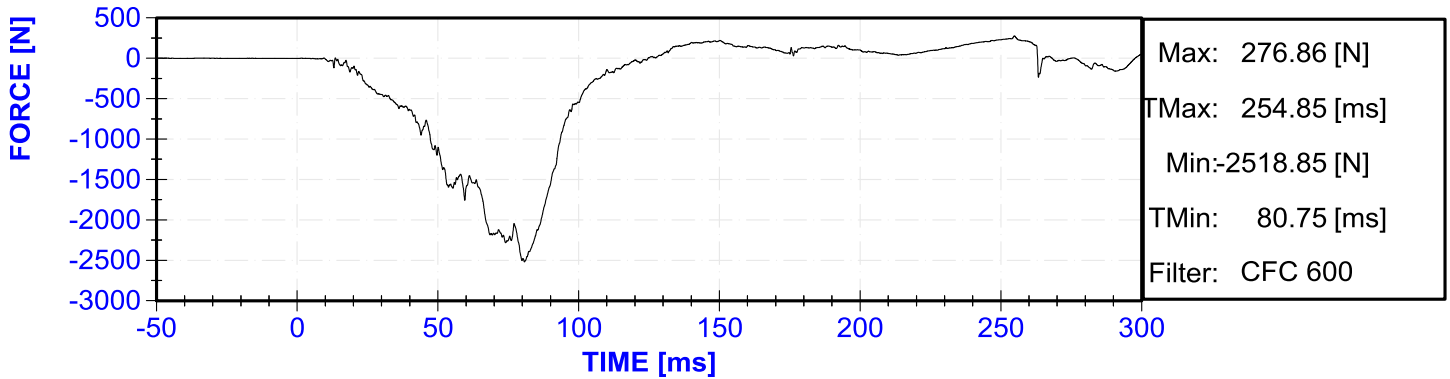
V2P1 Upper Tibia Left X Moment



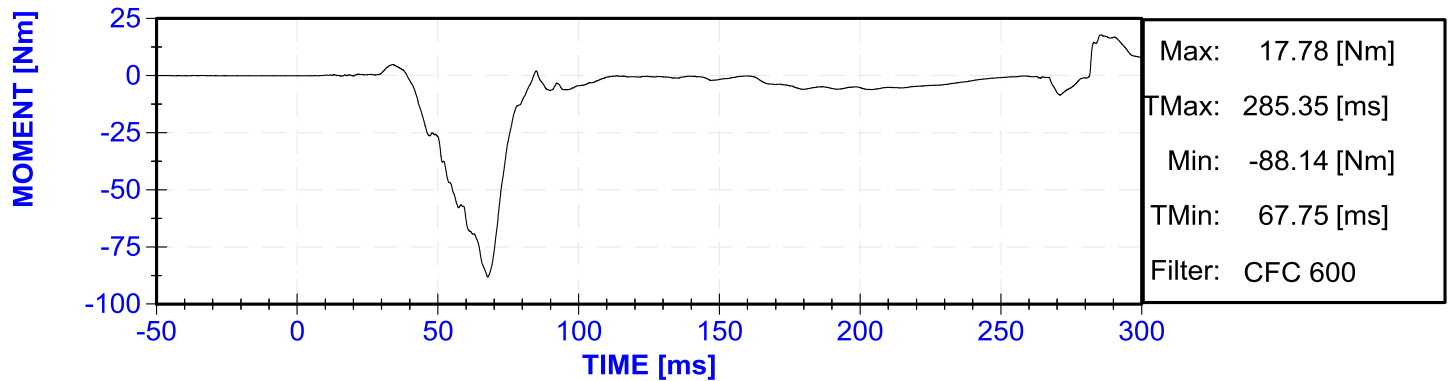
V2P1 Upper Tibia Left Y Moment



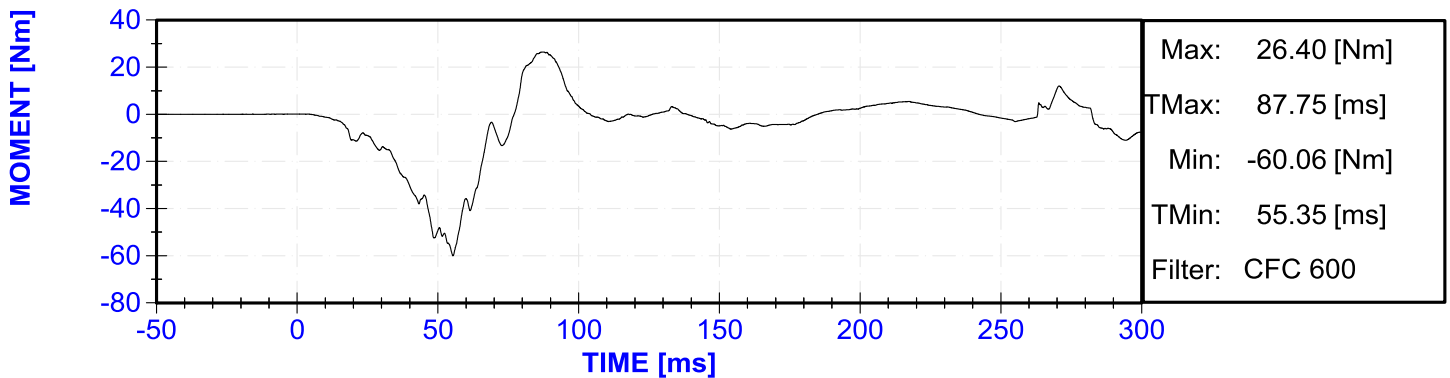
V2P1 Lower Tibia Left Z Force

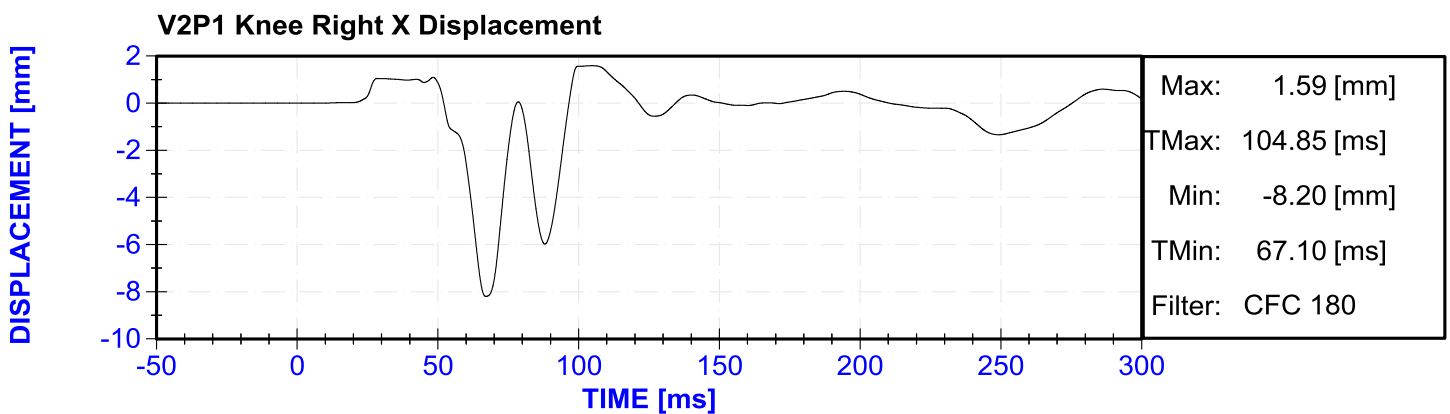
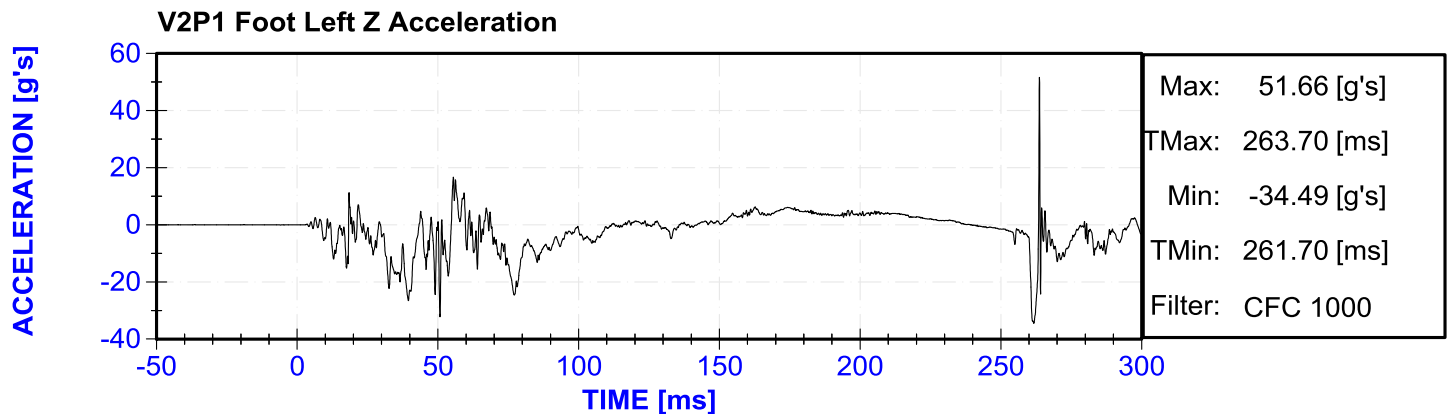
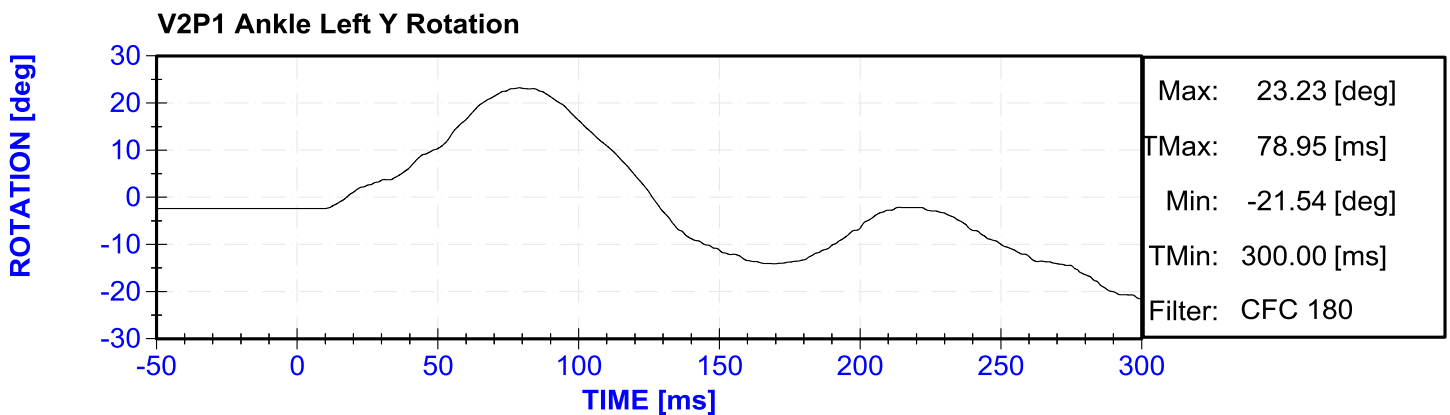
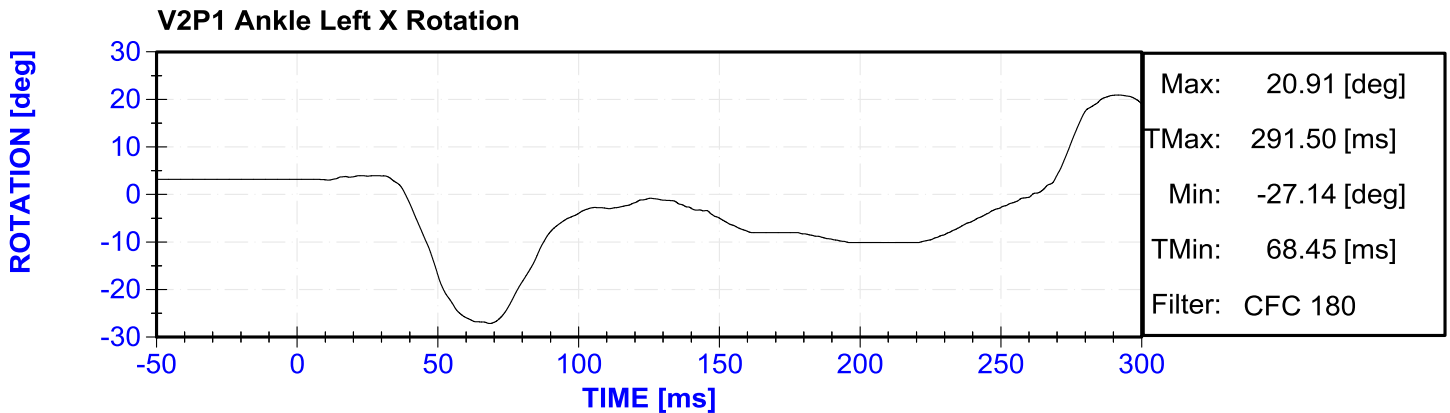


V2P1 Lower Tibia Left X Moment

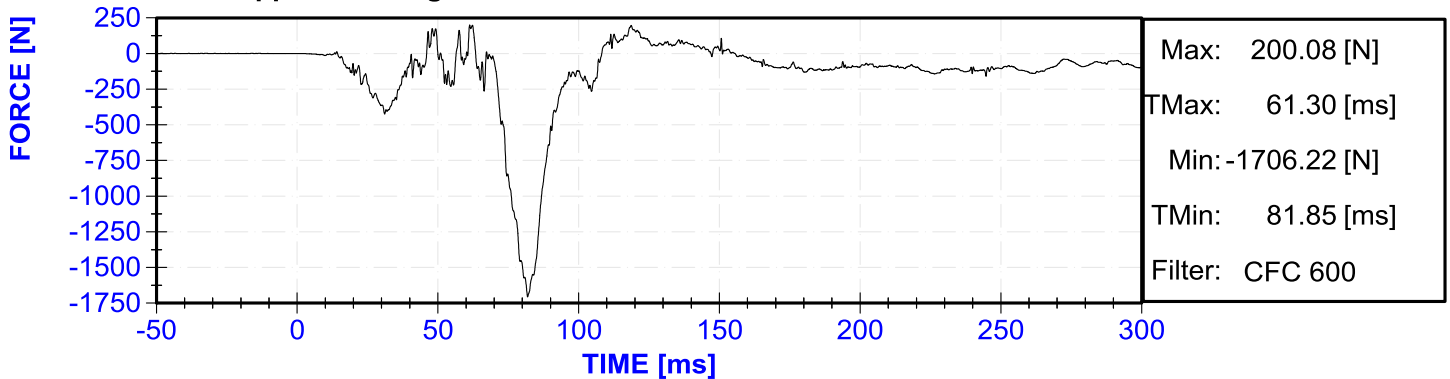


V2P1 Lower Tibia Left Y Moment

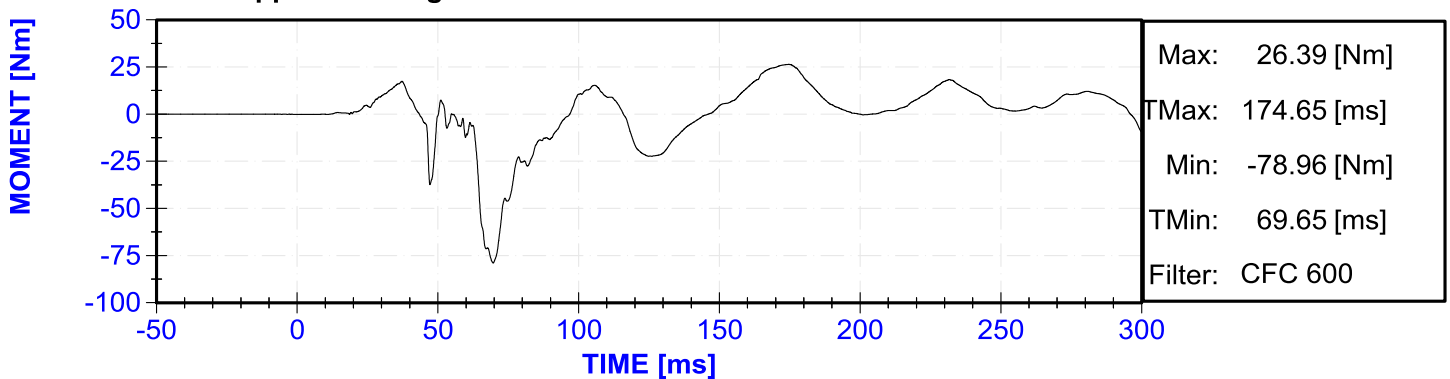




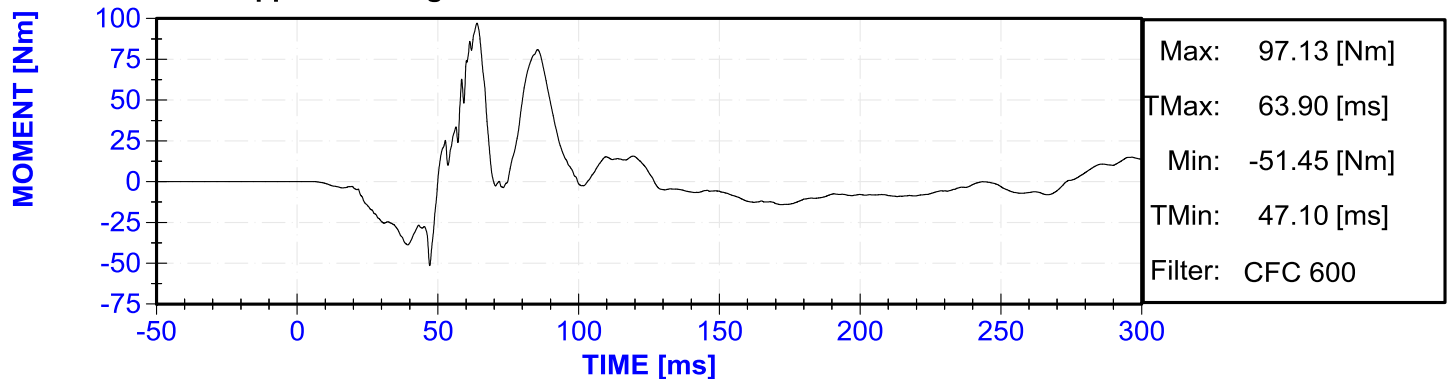
V2P1 Upper Tibia Right Z Force



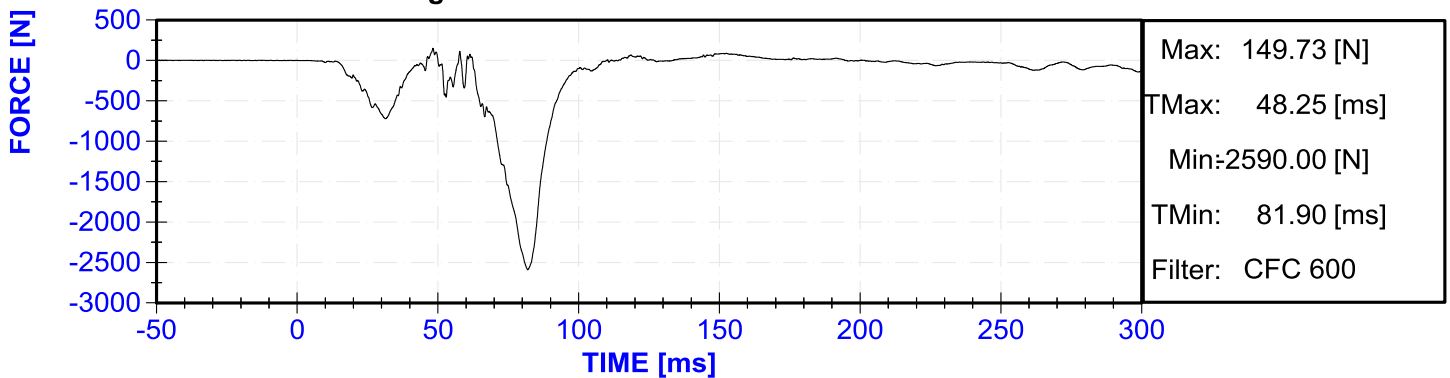
V2P1 Upper Tibia Right X Moment



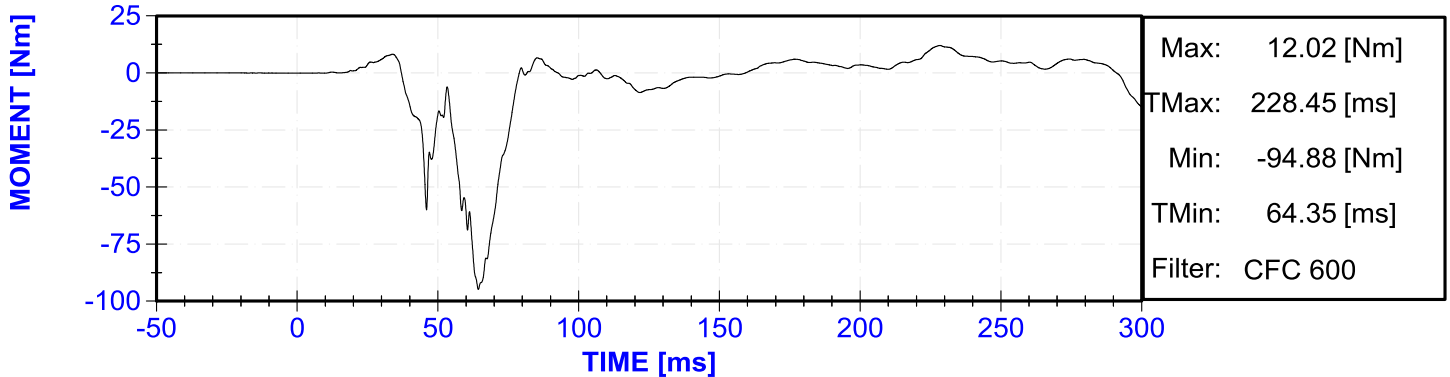
V2P1 Upper Tibia Right Y Moment



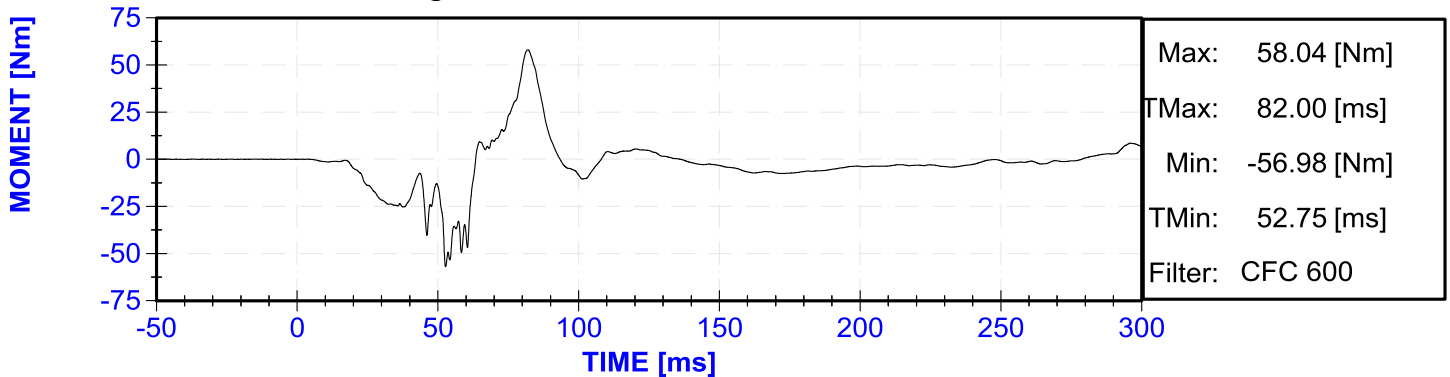
V2P1 Lower Tibia Right Z Force



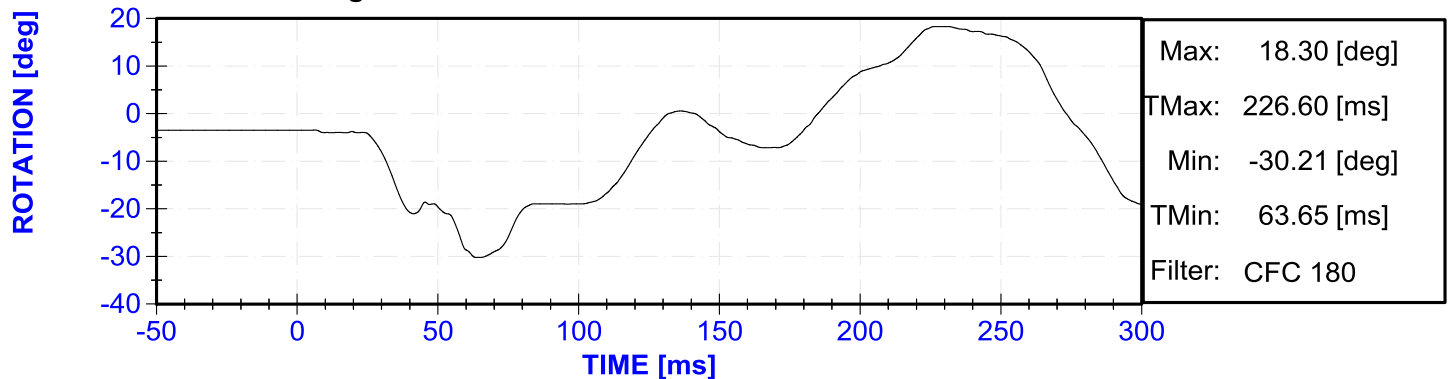
V2P1 Lower Tibia Right X Moment



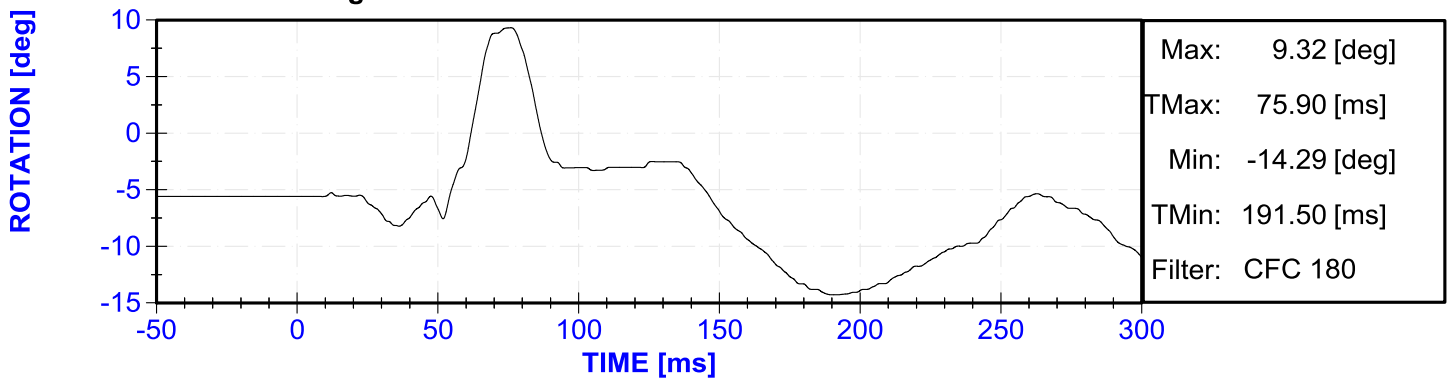
V2P1 Lower Tibia Right Y Moment



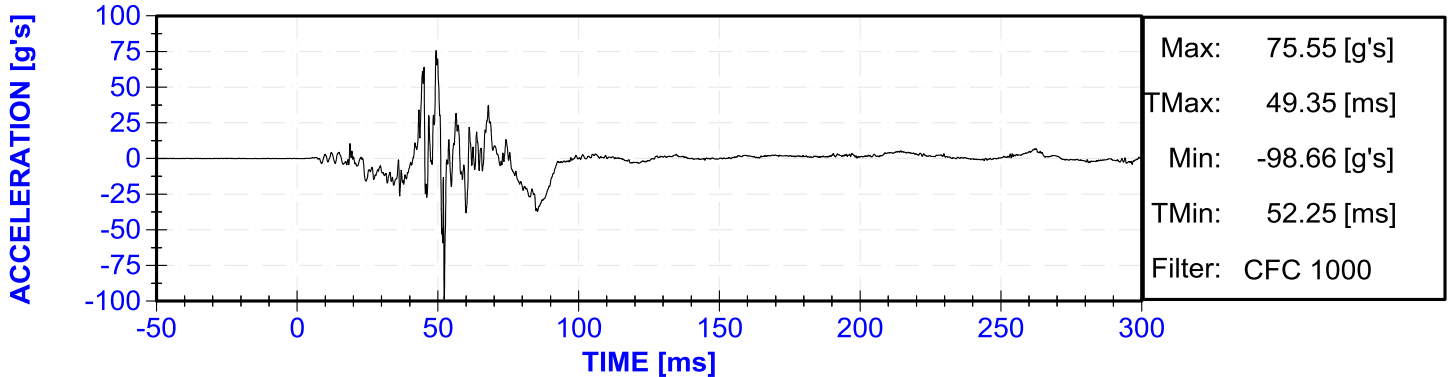
V2P1 Ankle Right X Rotation



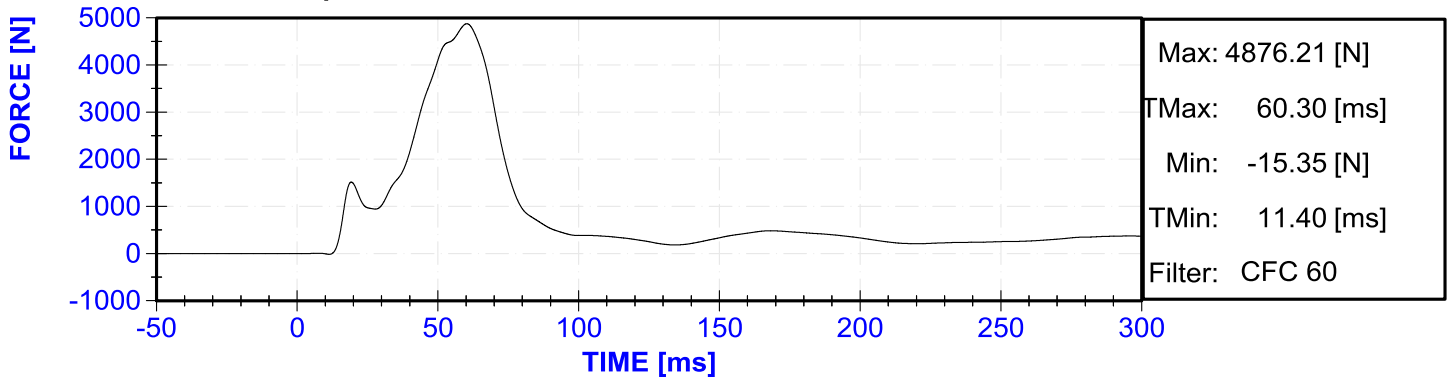
V2P1 Ankle Right Y Rotation



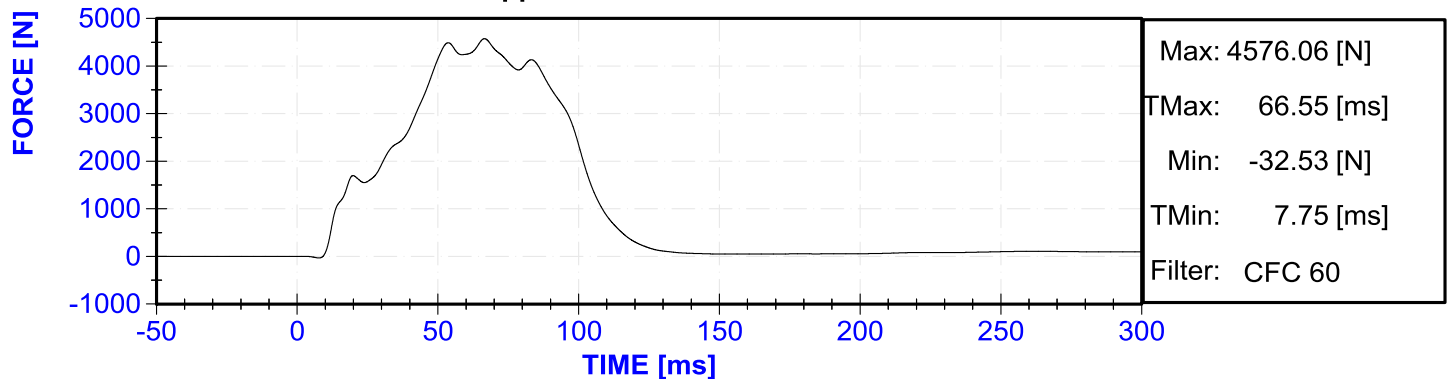
V2P1 Foot Right Z Acceleration



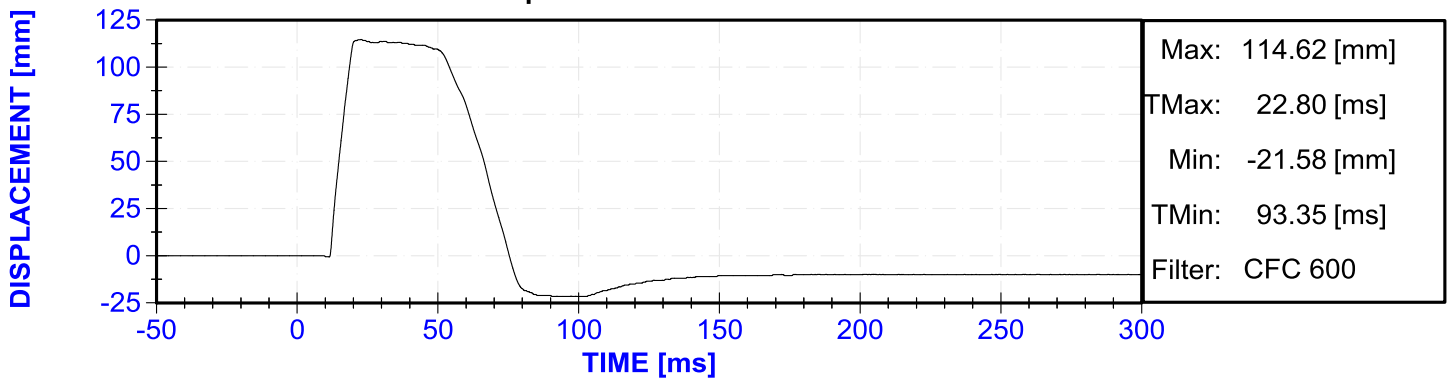
V2 Driver Lap Belt Force

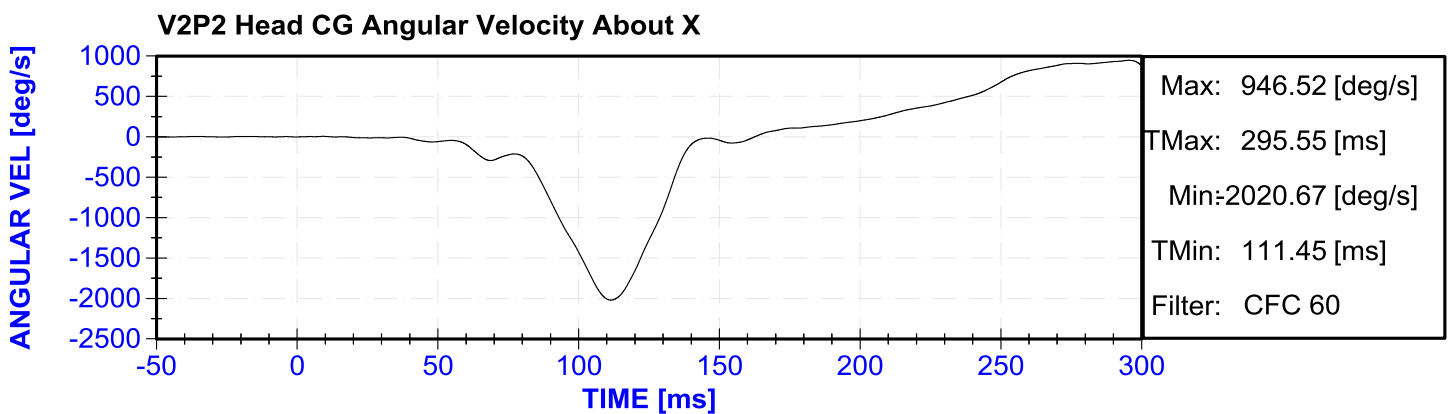
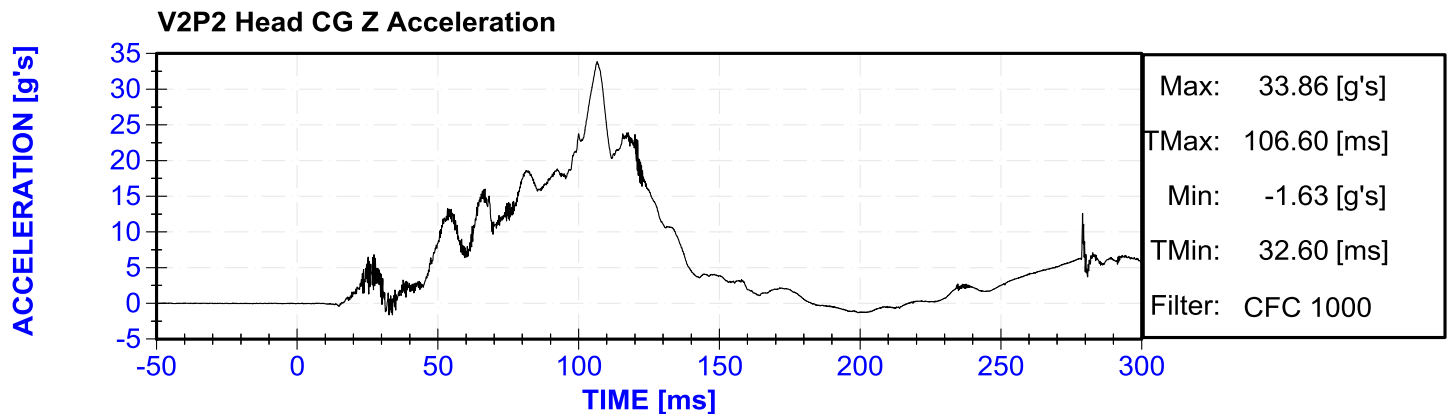
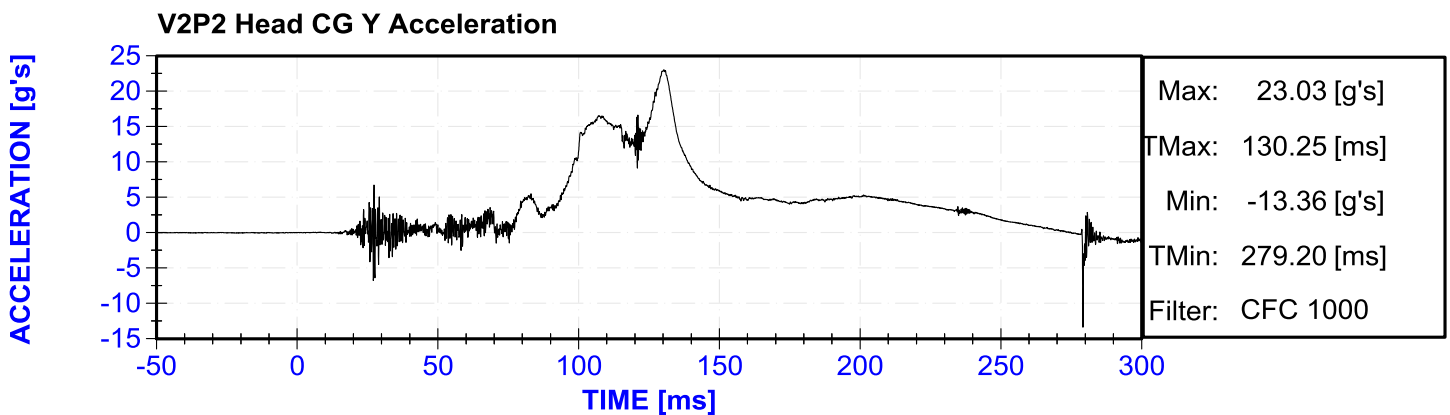
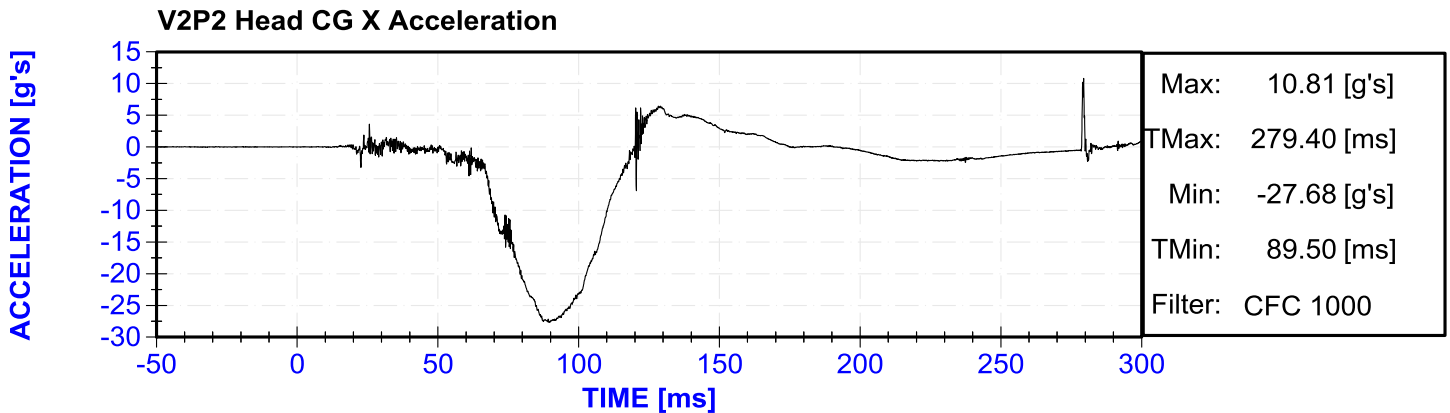


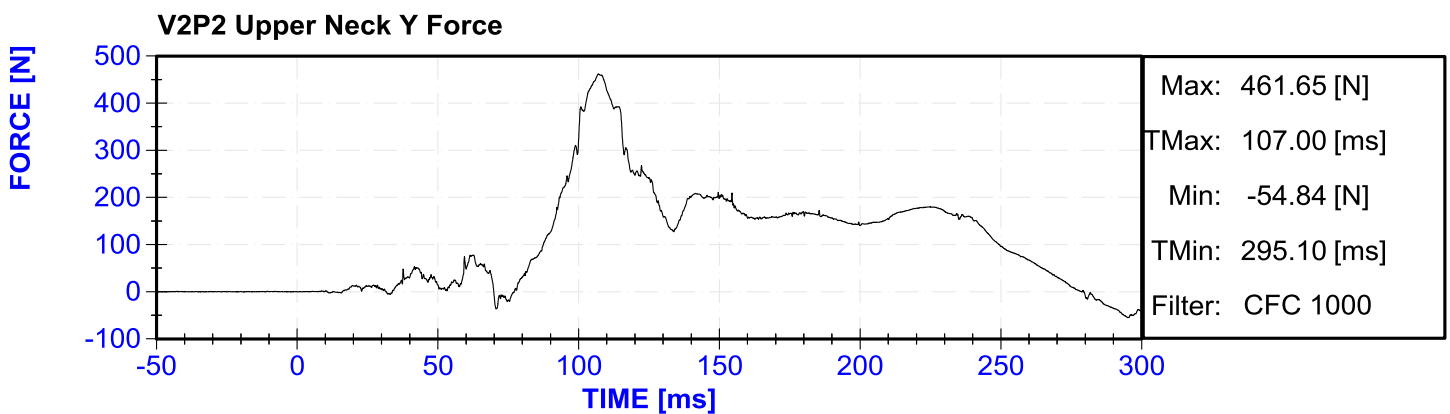
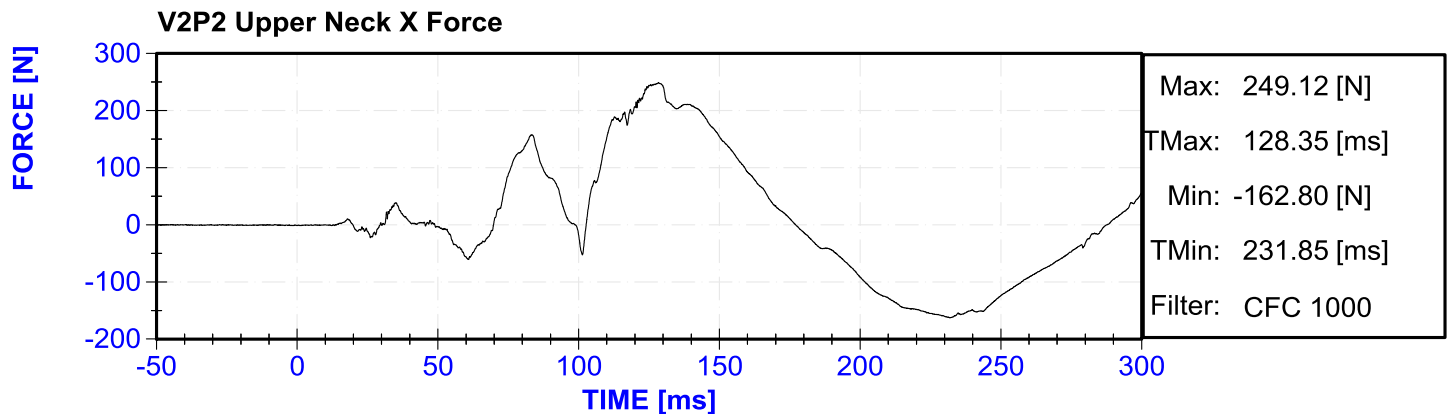
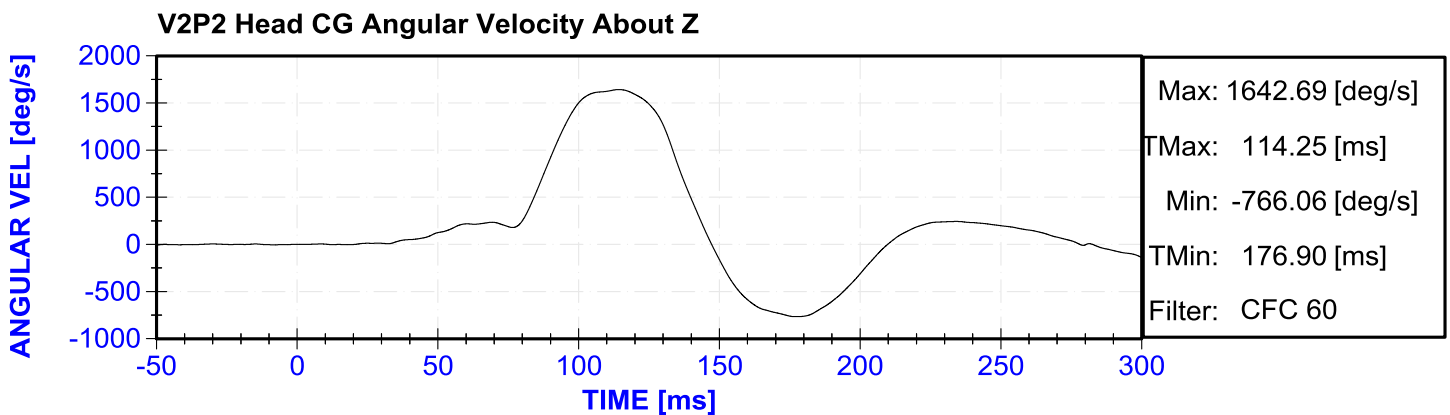
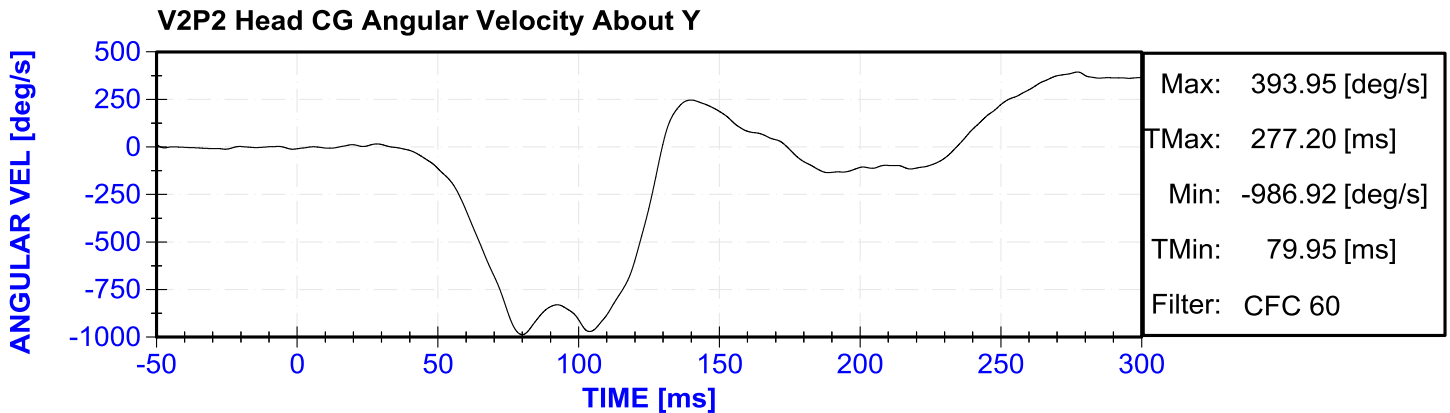
V2 Driver Shoulder Belt Upper Force

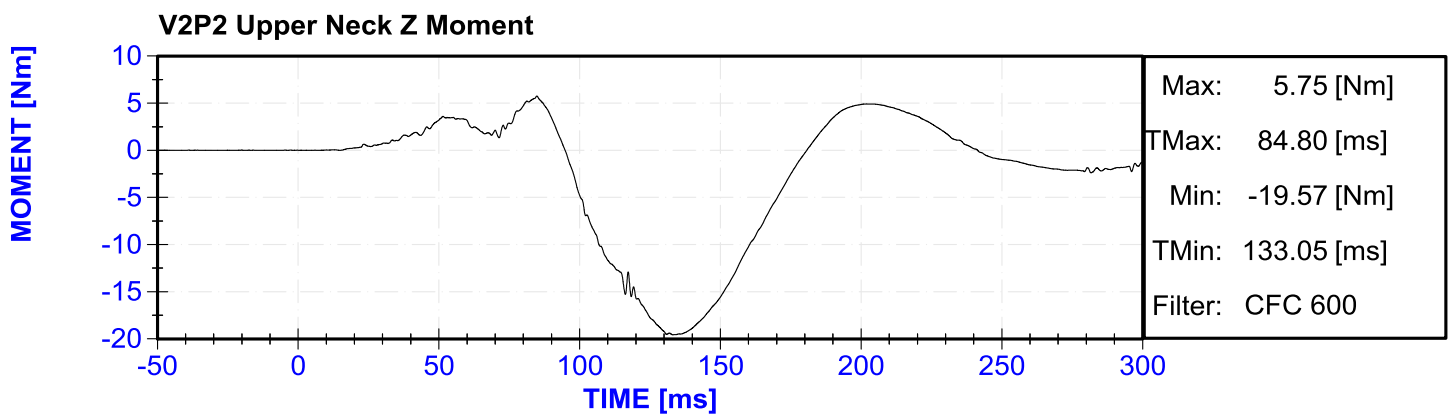
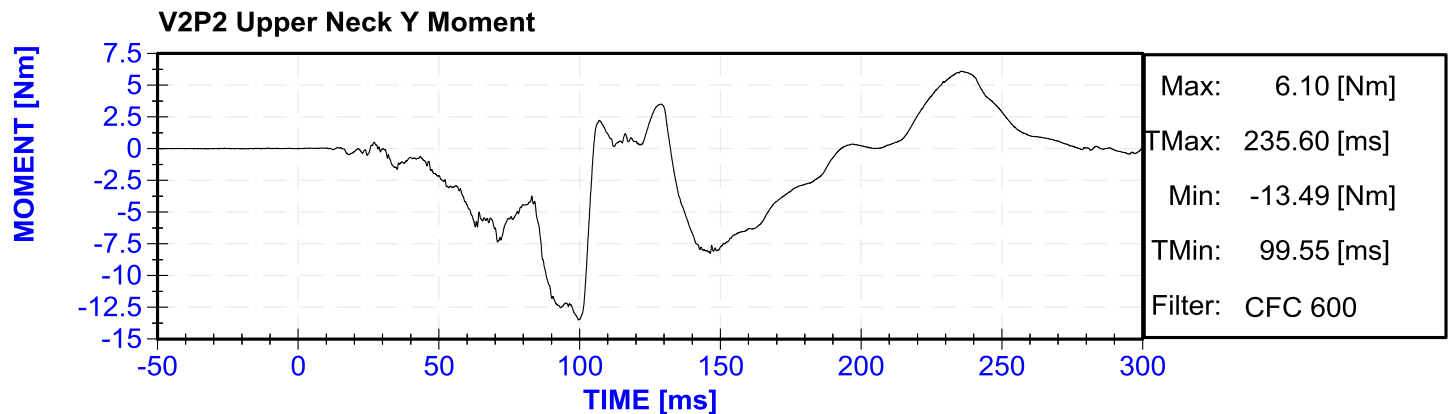
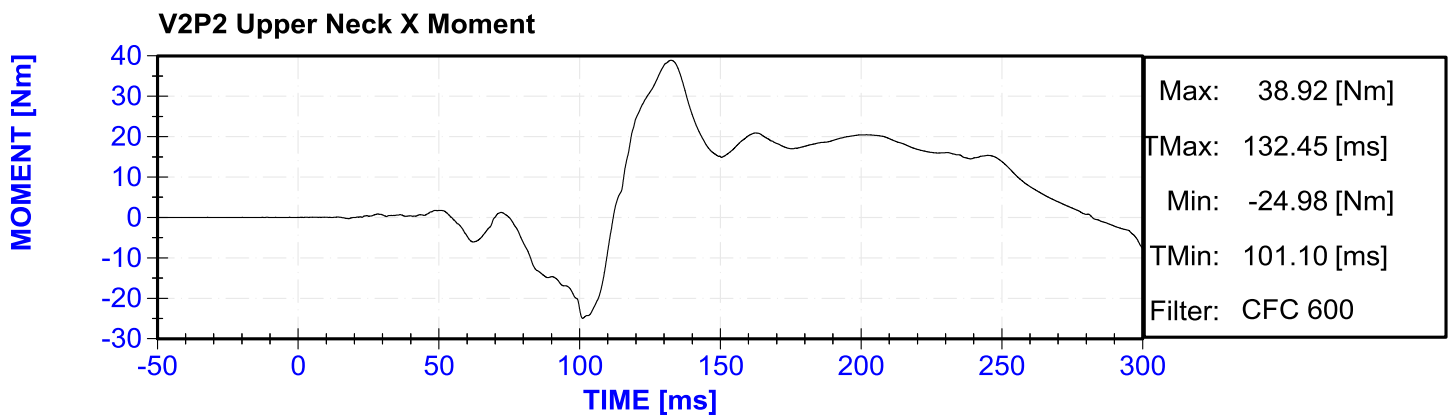
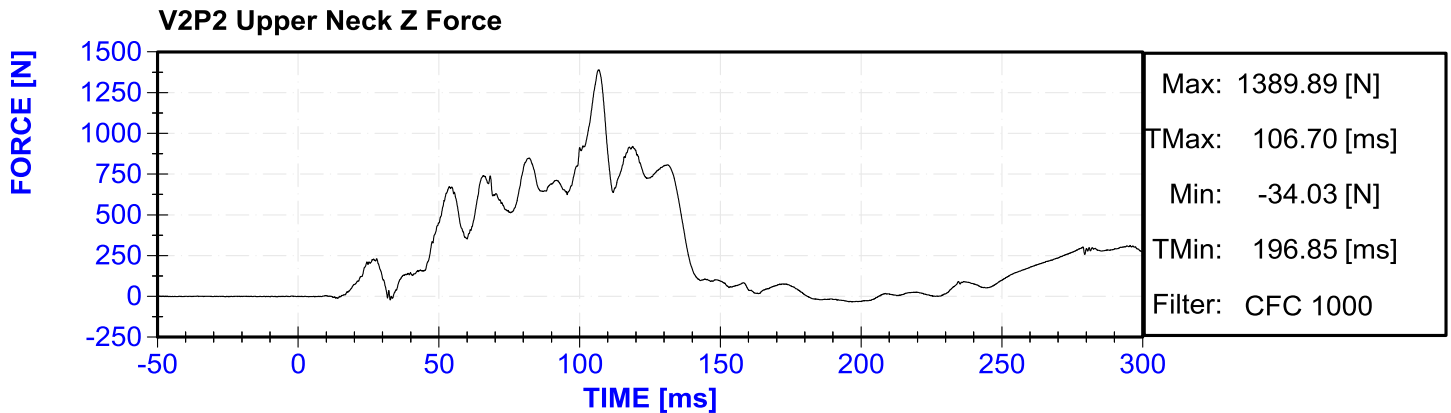


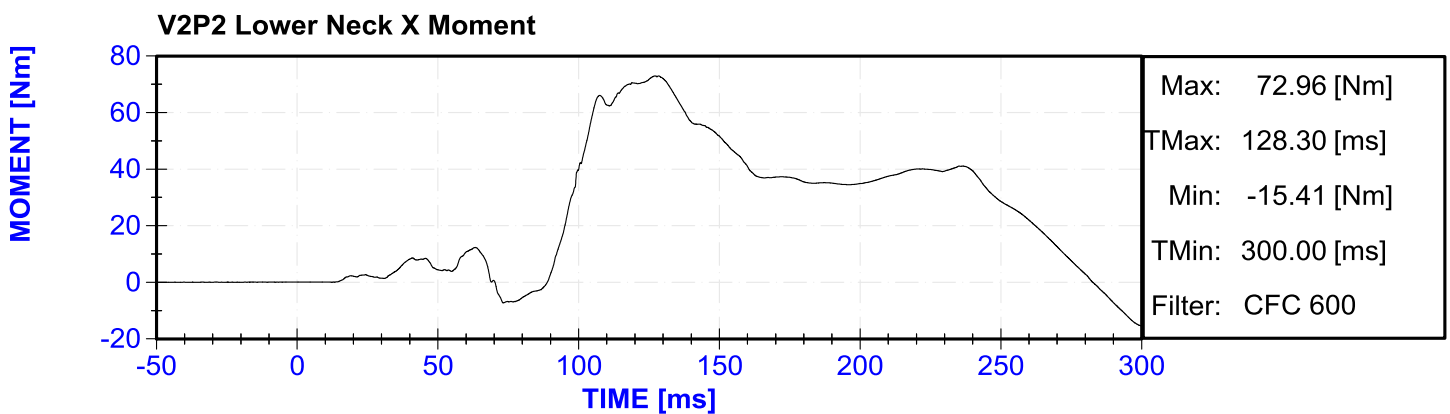
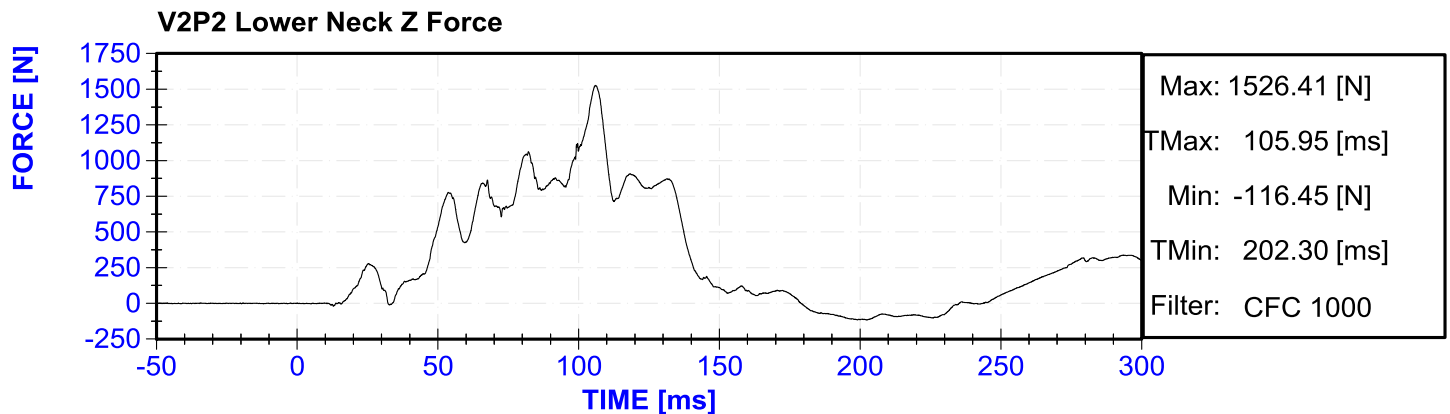
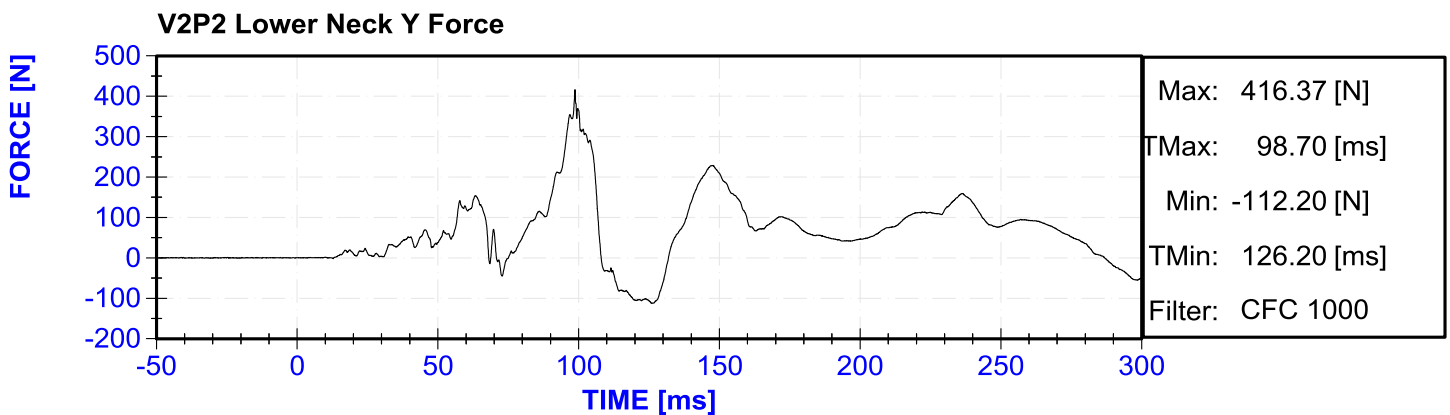
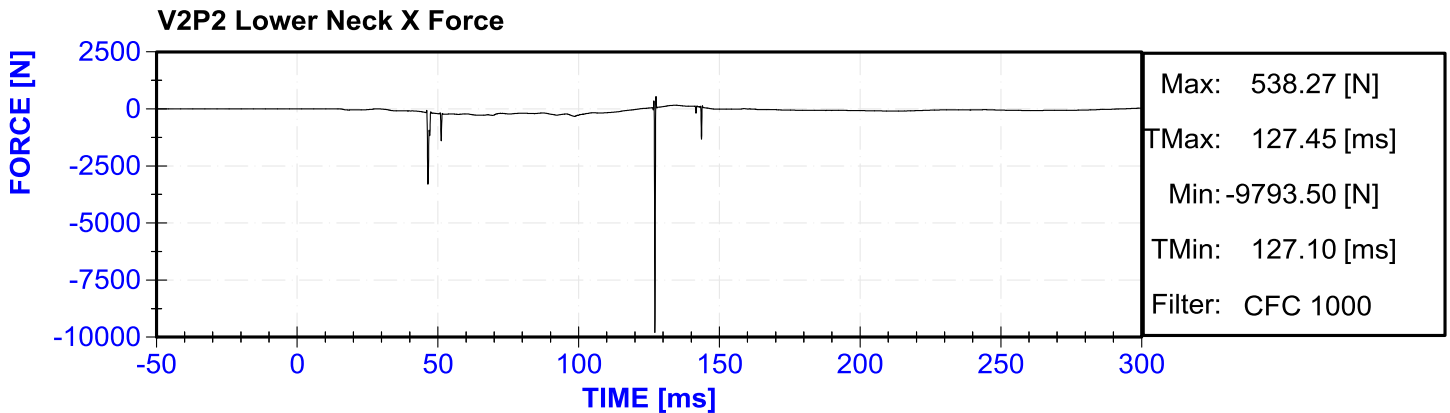
V2 Driver Shoulder Belt Displacement

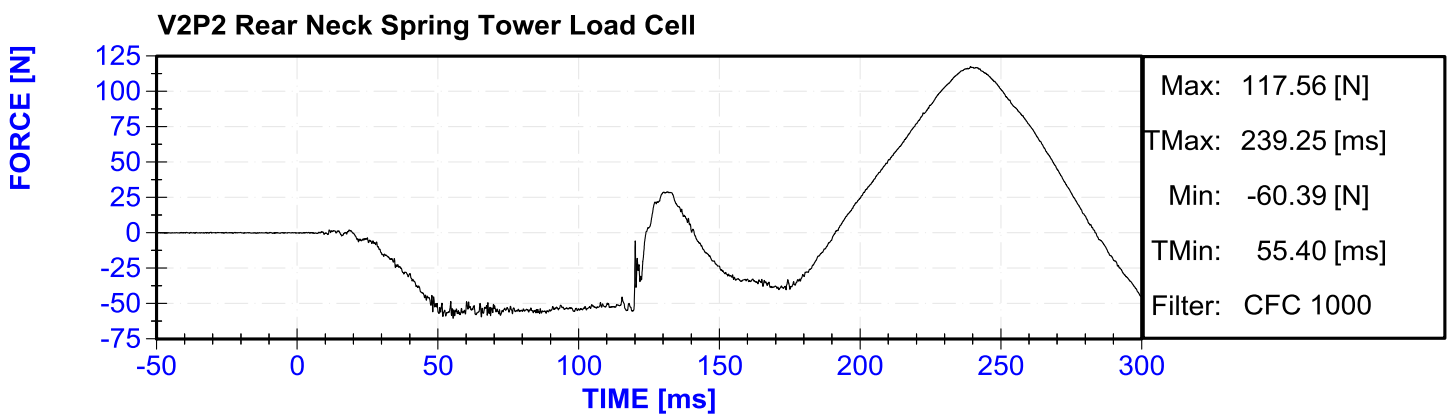
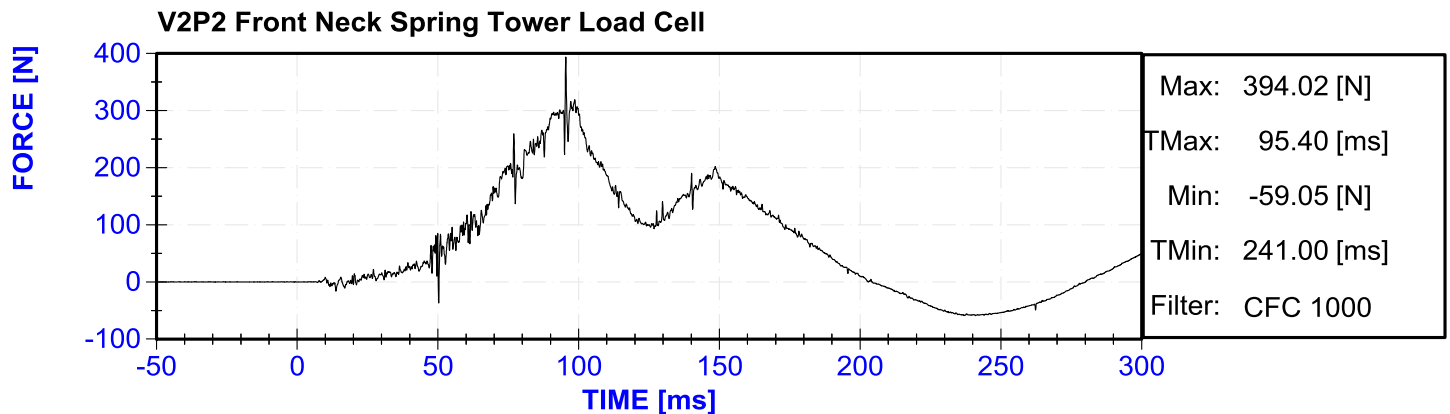
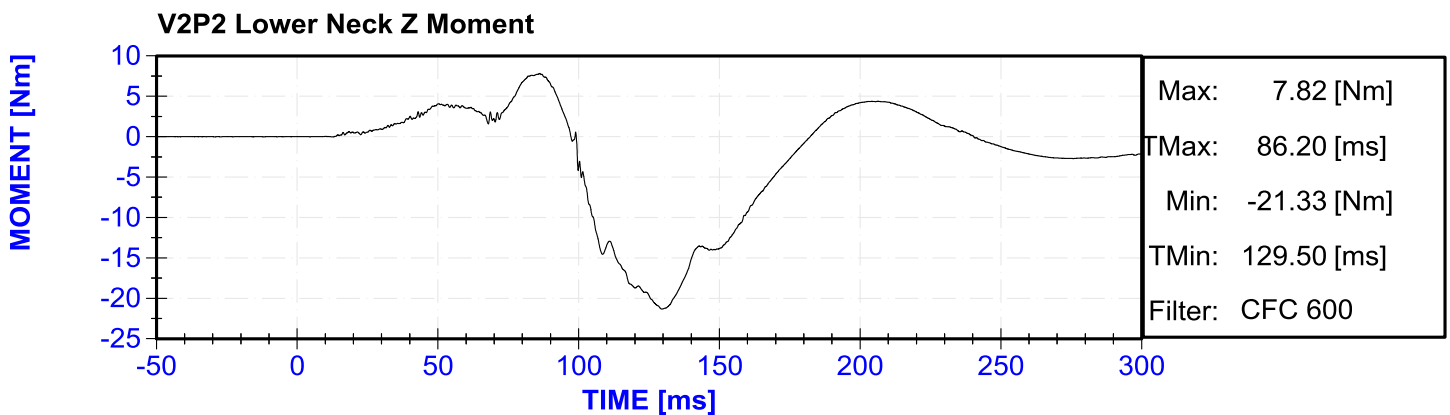
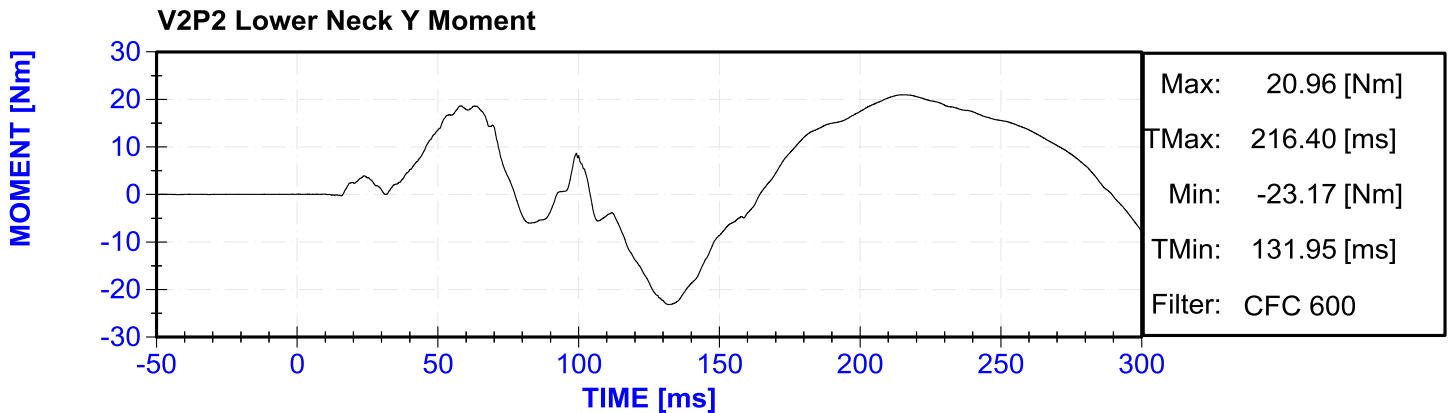




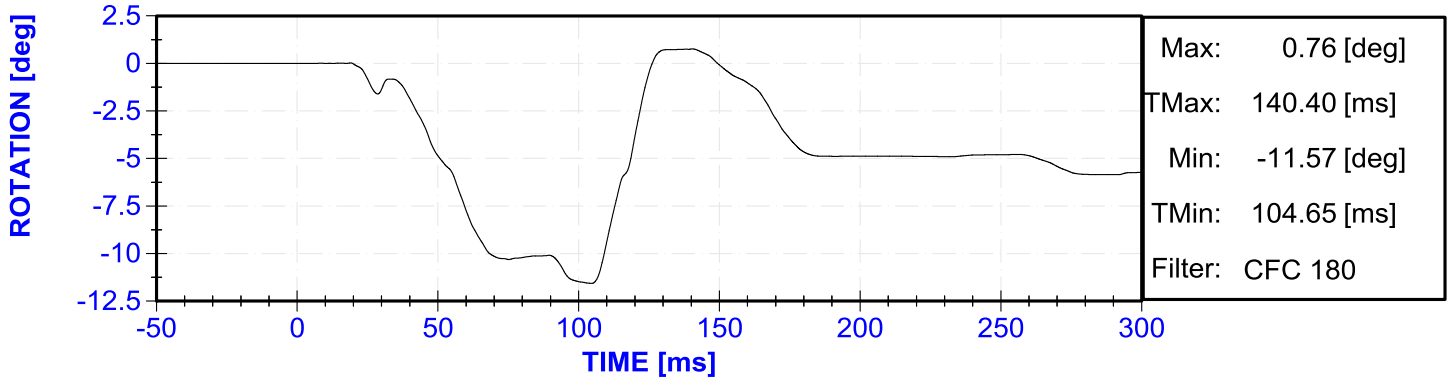




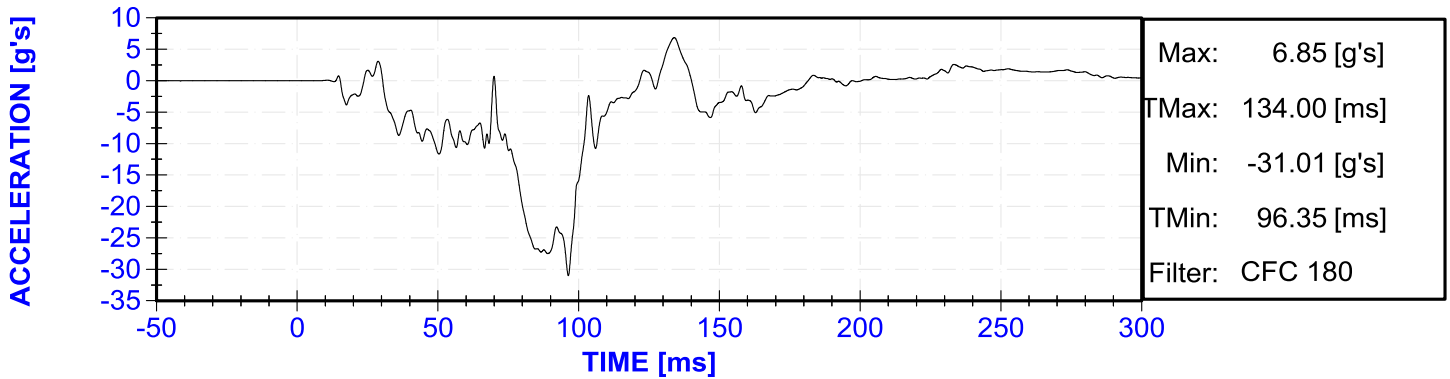




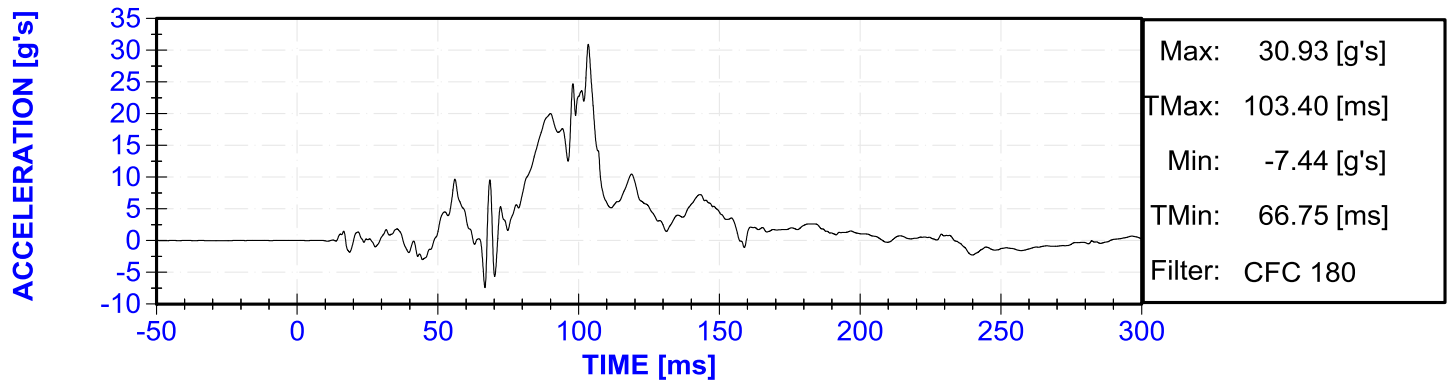
V2P2 Occipital Condyle Rotation Potentiometer



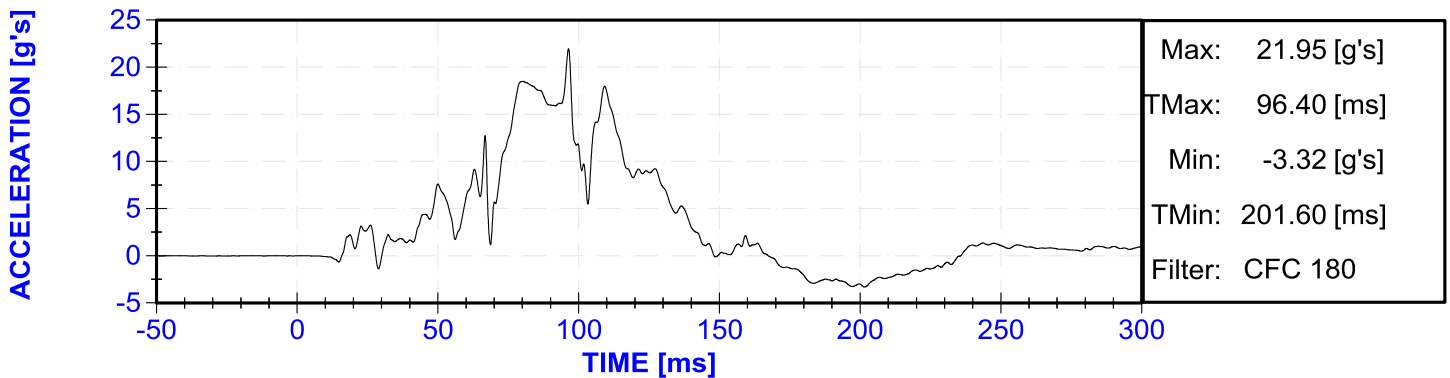
V2P2 T1 X Acceleration

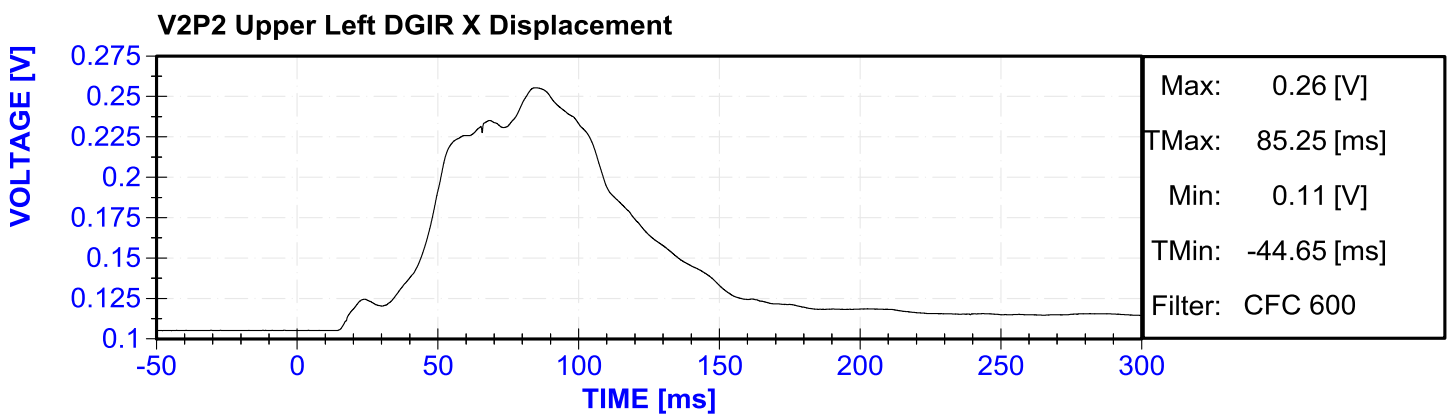
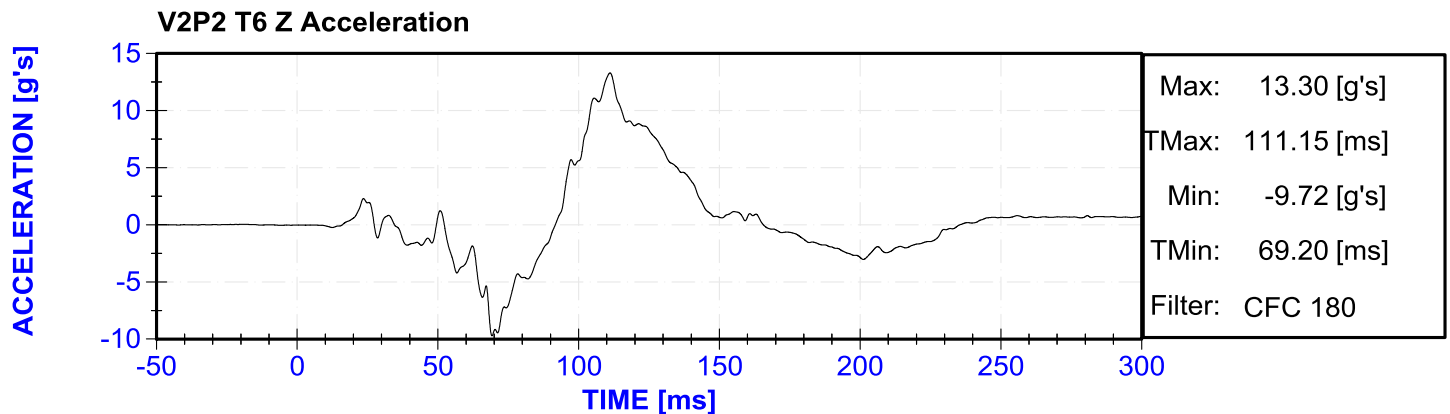
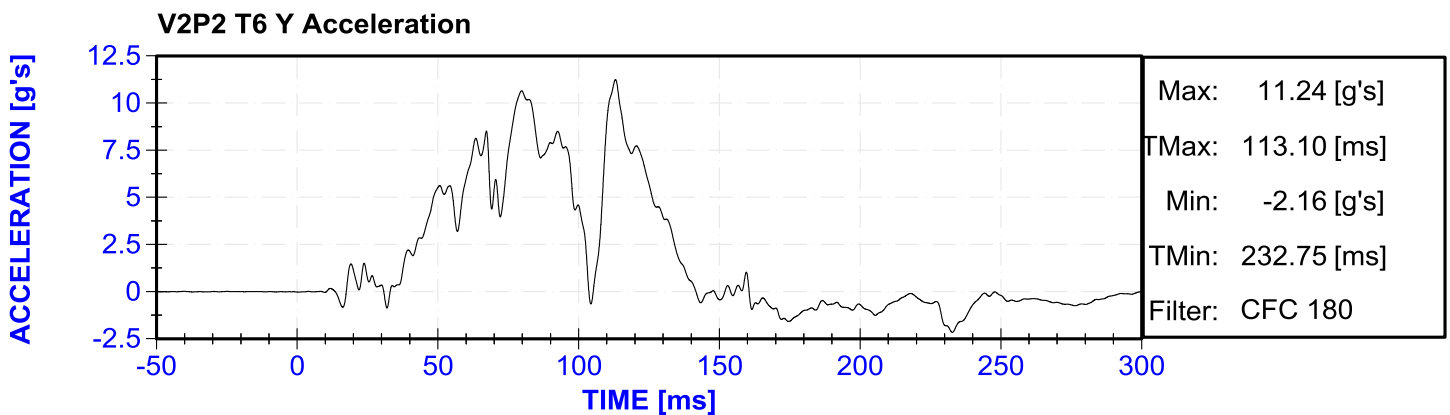
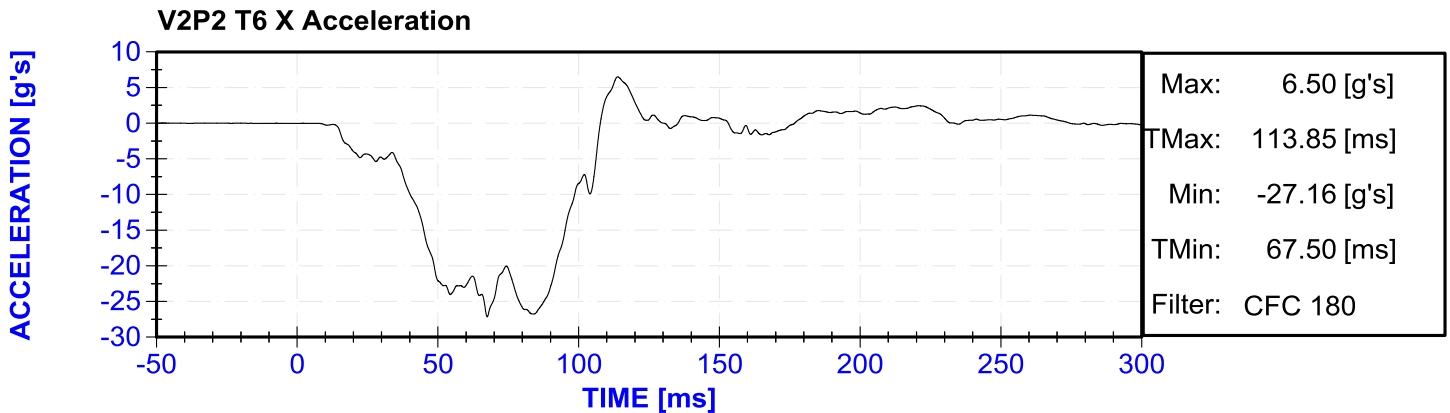


V2P2 T1 Y Acceleration

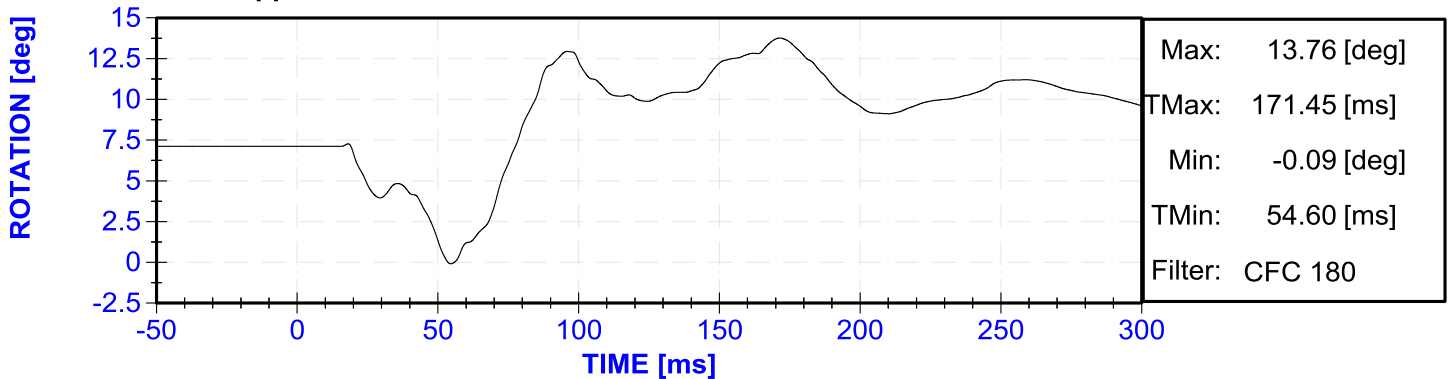


V2P2 T1 Z Acceleration

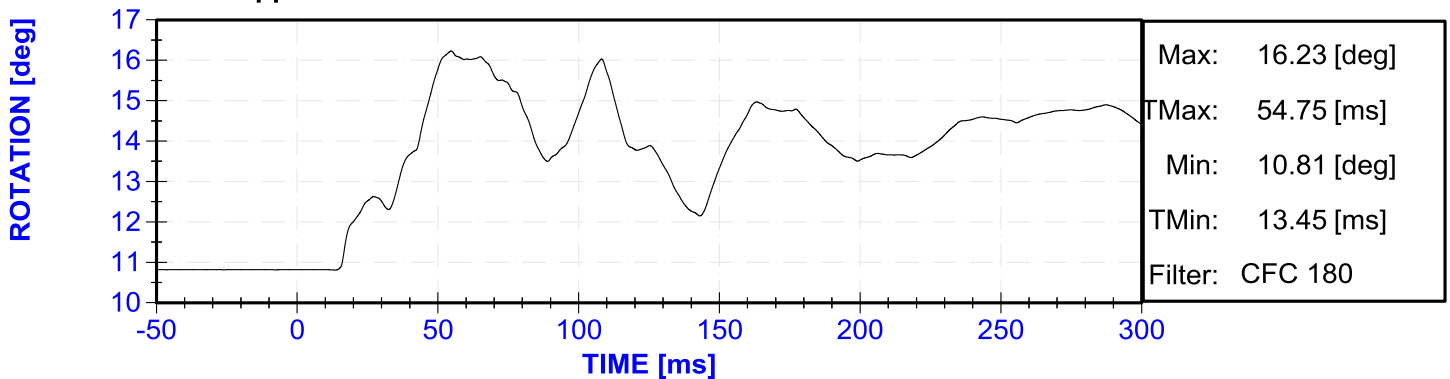




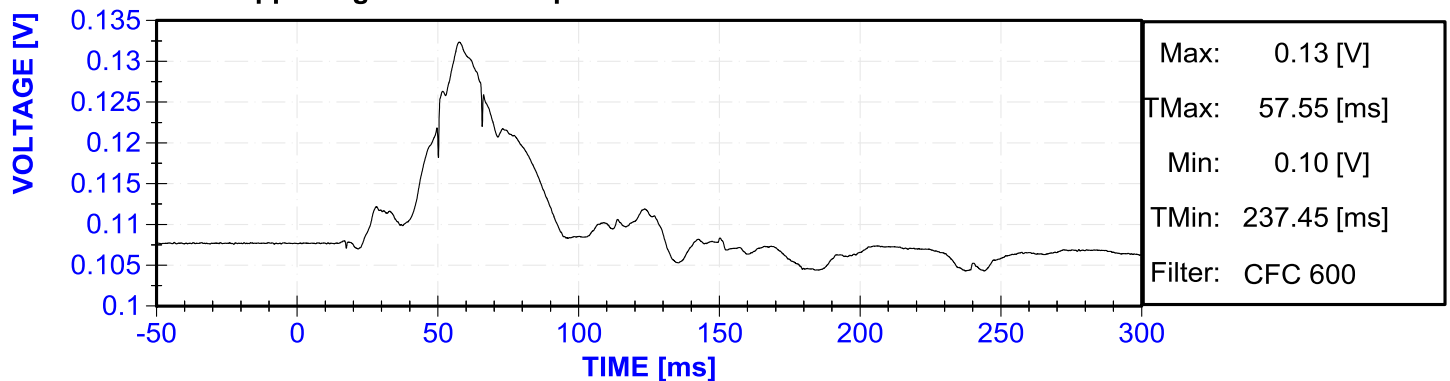
V2P2 Upper Left DGIR Y Rotation



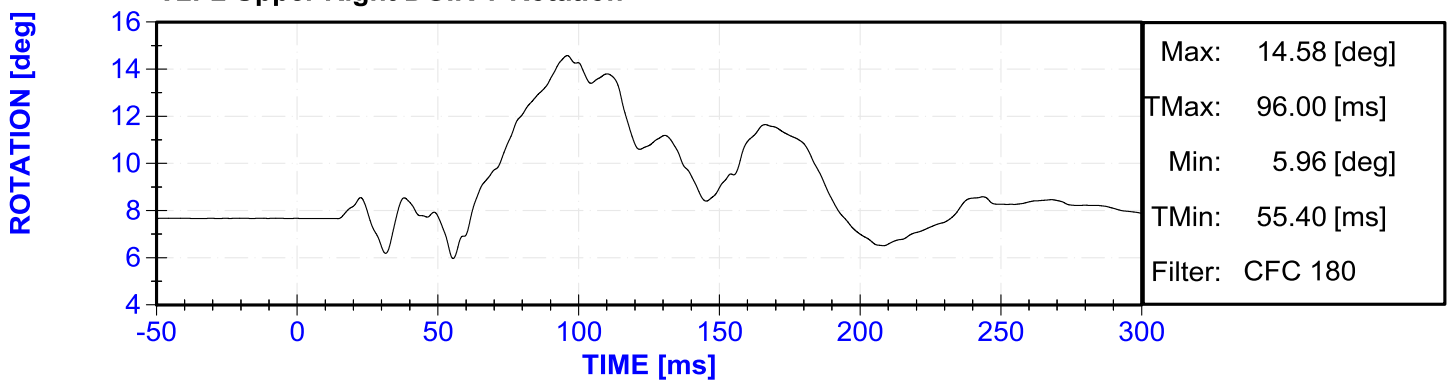
V2P2 Upper Left DGIR Z Rotation



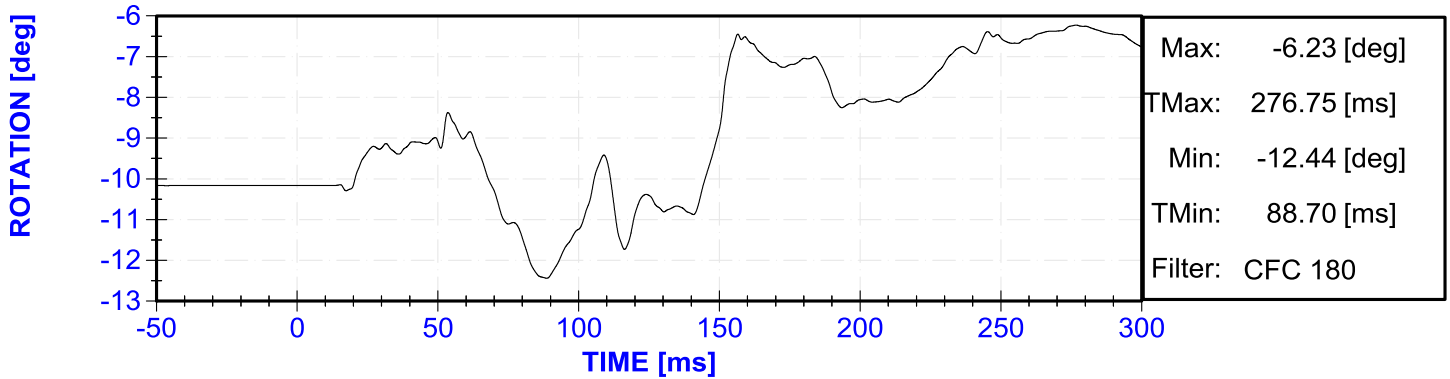
V2P2 Upper Right DGIR X Displacement



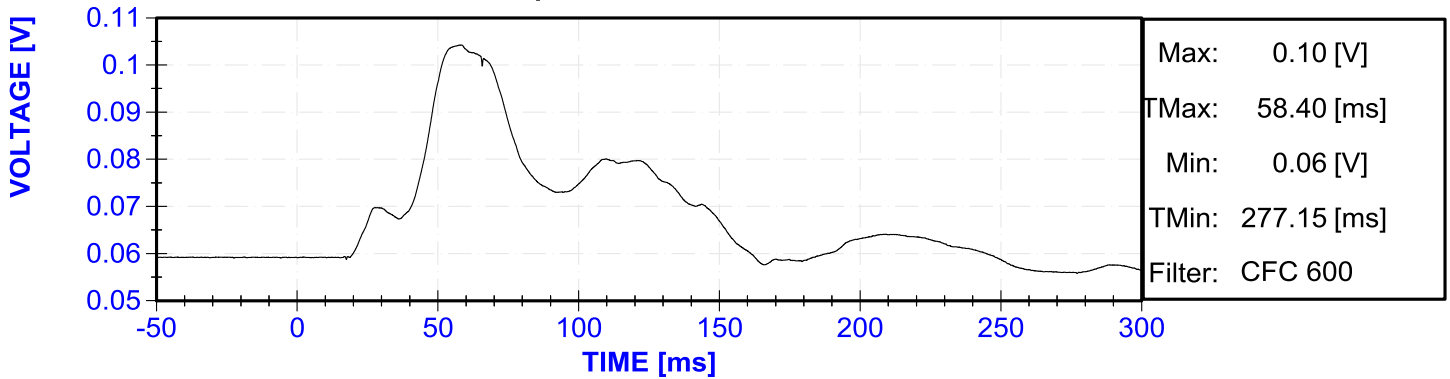
V2P2 Upper Right DGIR Y Rotation



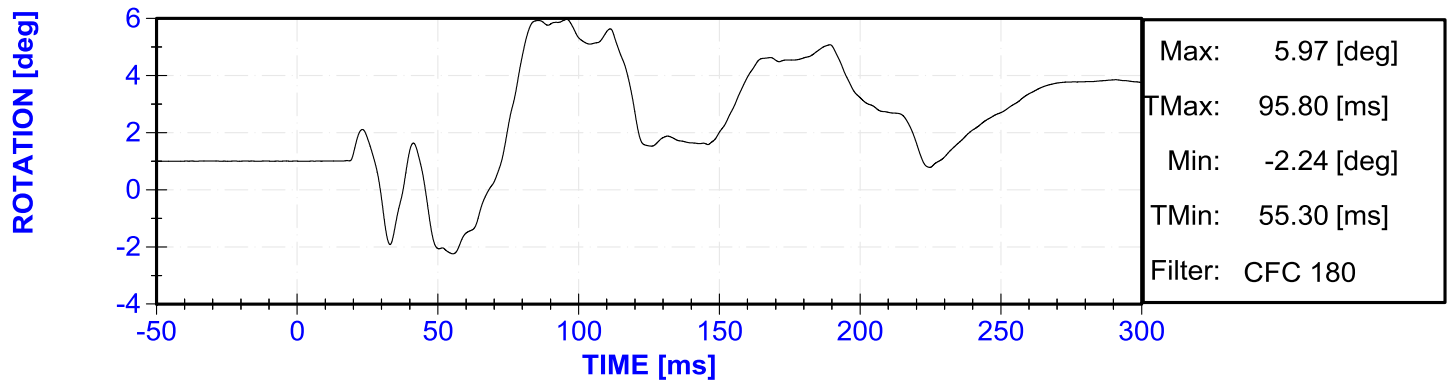
V2P2 Upper Right DGIR Z Rotation



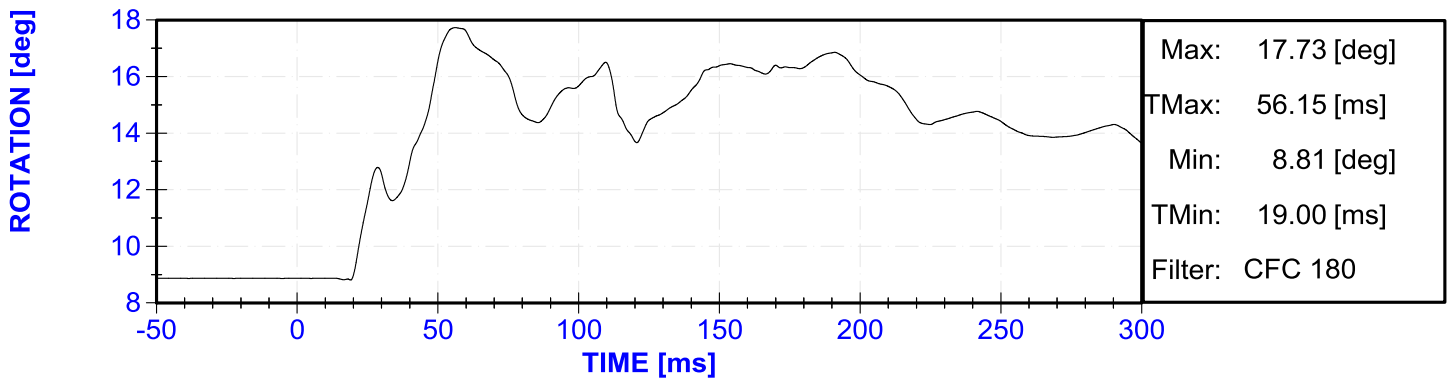
V2P2 Lower Left DGIR X Displacement



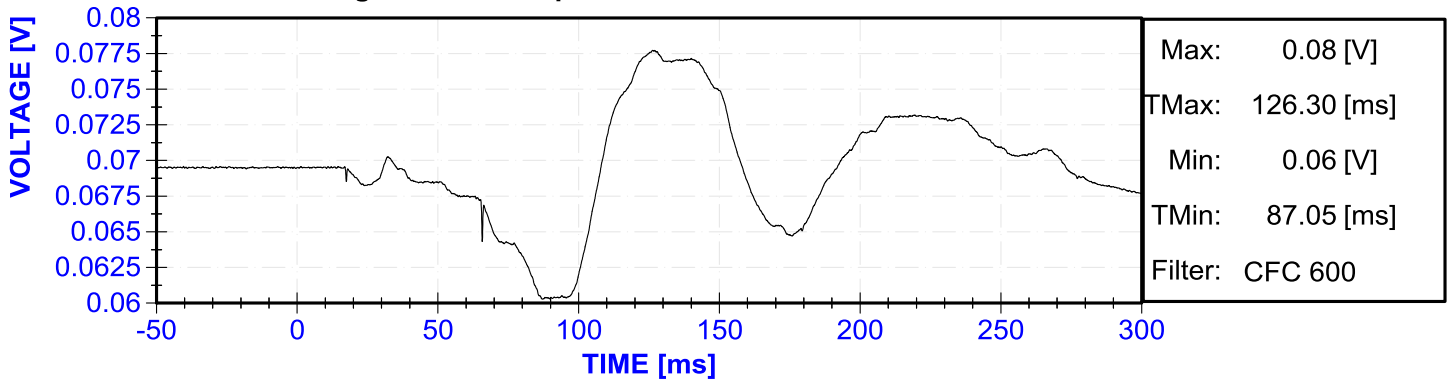
V2P2 Lower Left DGIR Y Rotation



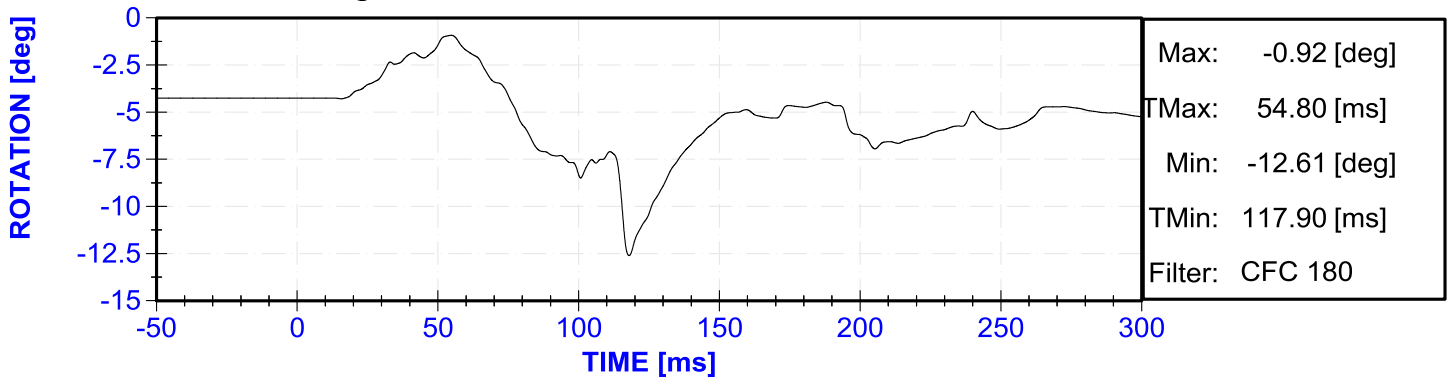
V2P2 Lower Left DGIR Z Rotation



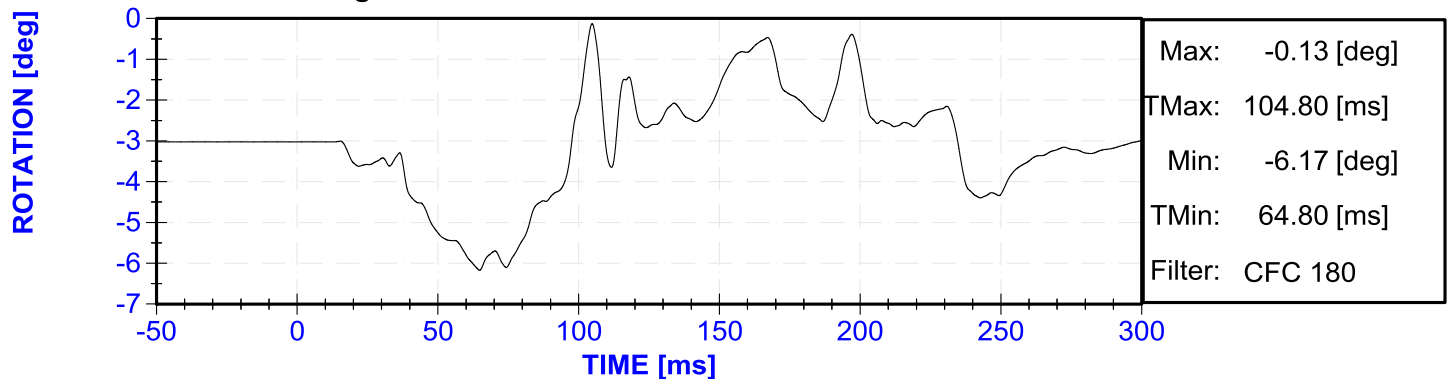
V2P2 Lower Right DGIR X Displacement



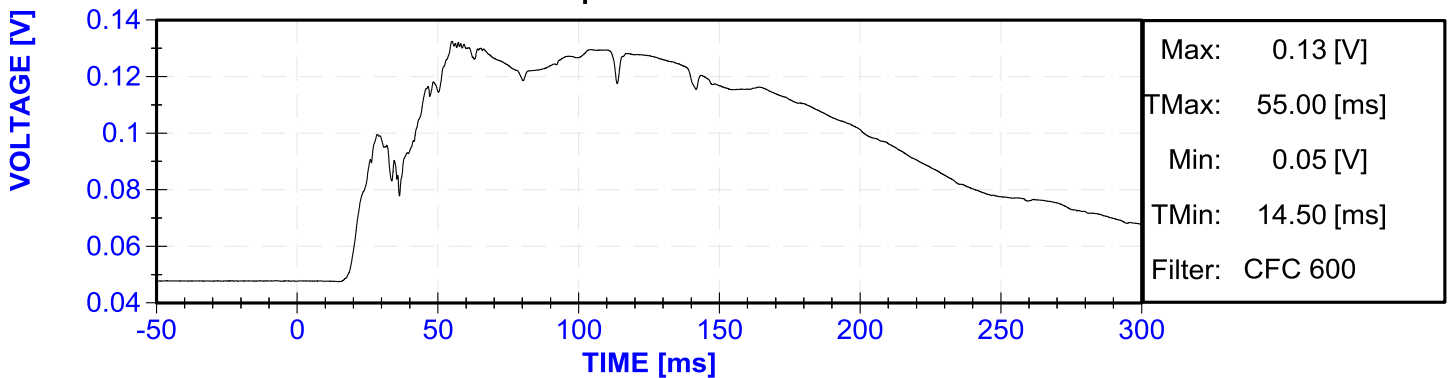
V2P2 Lower Right DGIR Y Rotation



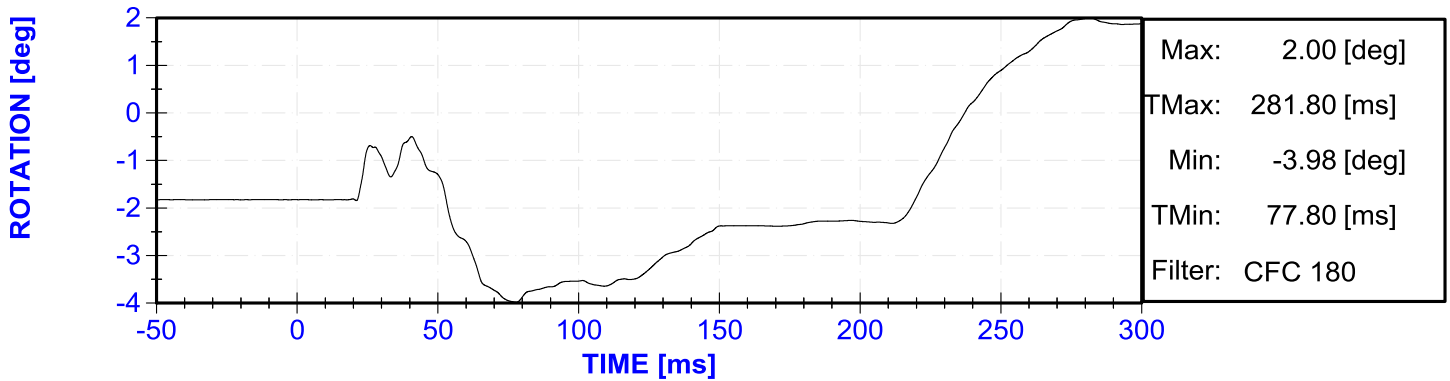
V2P2 Lower Right DGIR Z Rotation



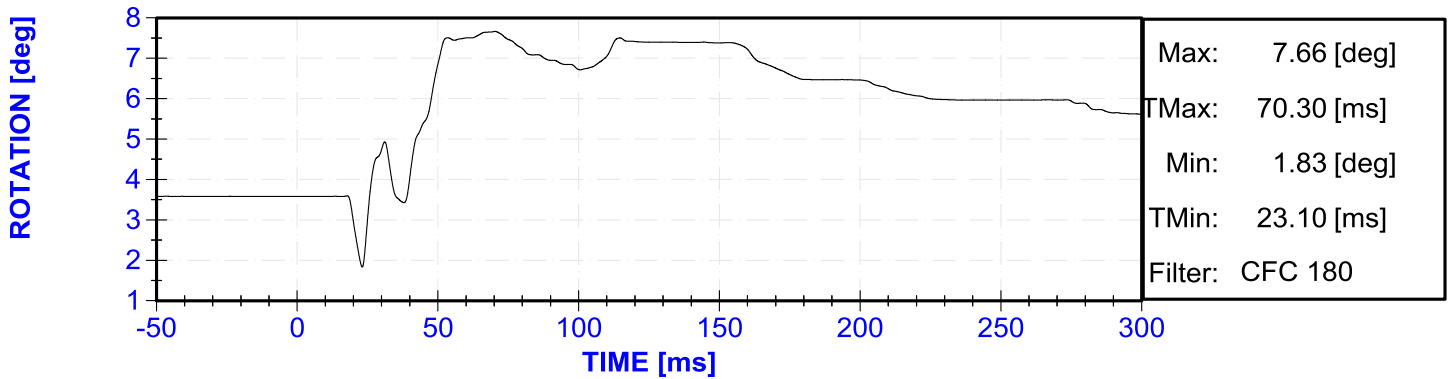
V2P2 Abdomen Left DGIR X Displacement



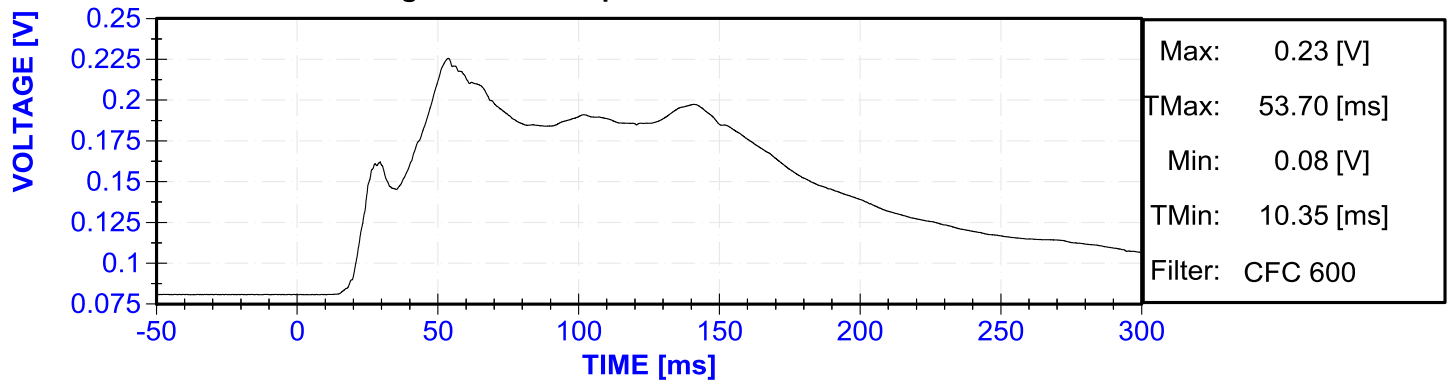
V2P2 Abdomen Left DGIR Y Rotation



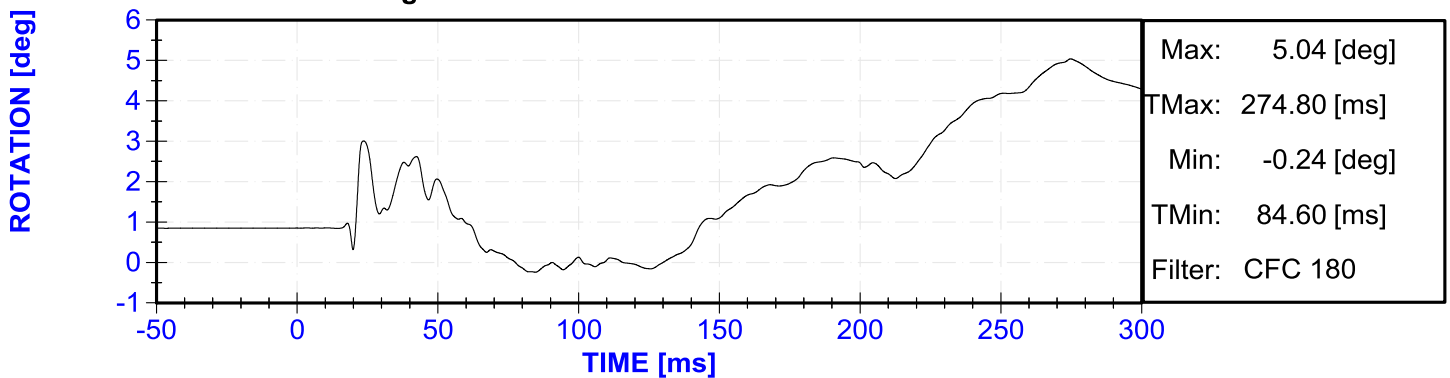
V2P2 Abdomen Left DGIR Z Rotation



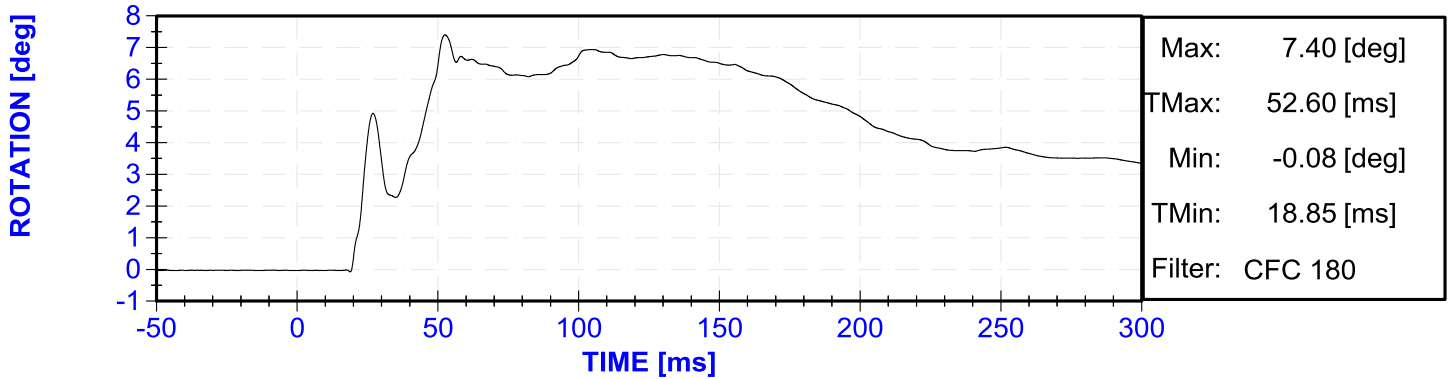
V2P2 Abdomen Right DGIR X Displacement



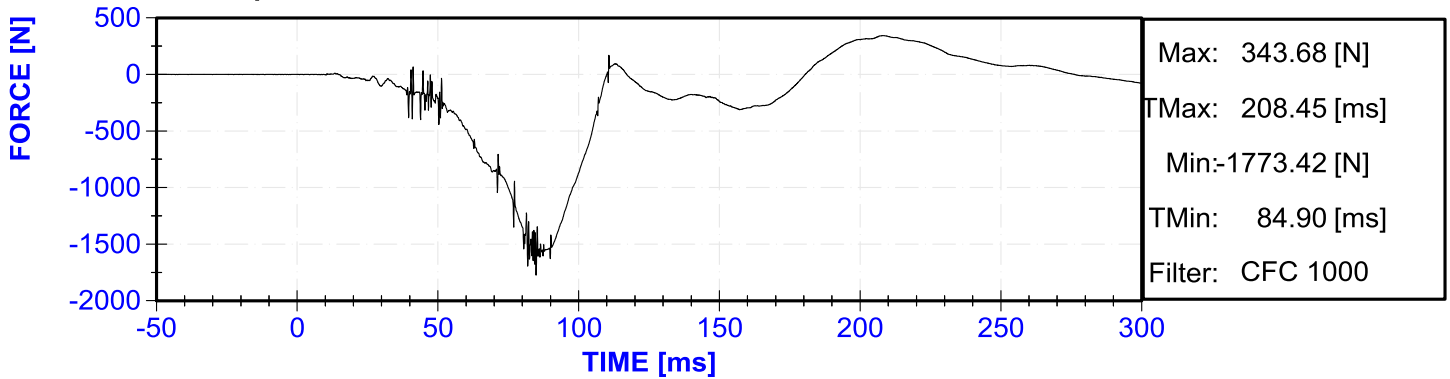
V2P2 Abdomen Right DGIR Y Rotation



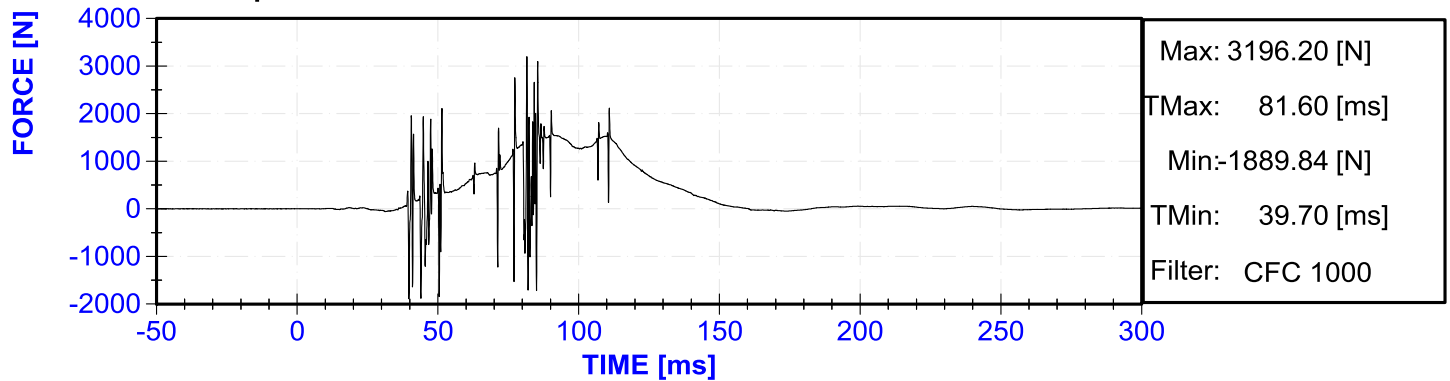
V2P2 Abdomen Right DGIR Z Rotation



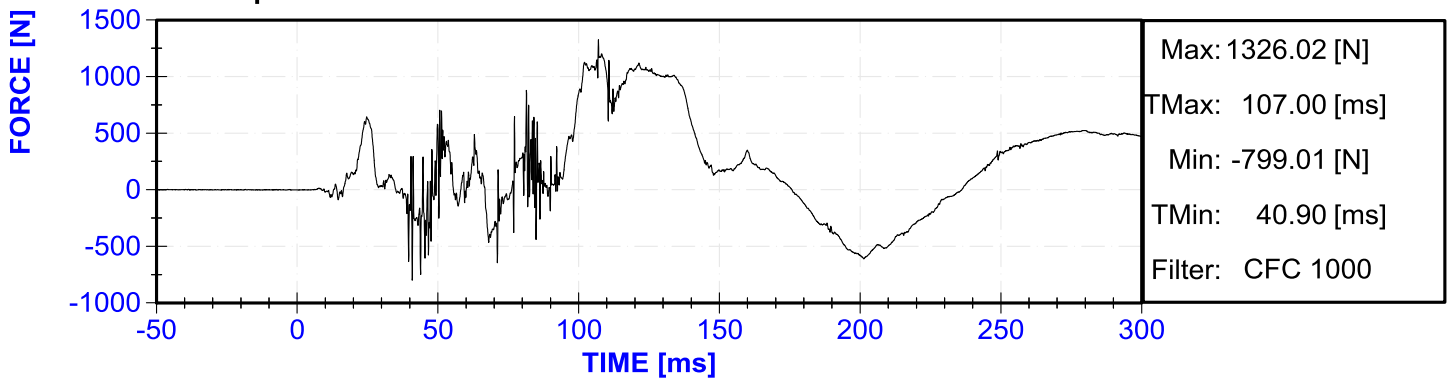
V2P2 Spine Force X

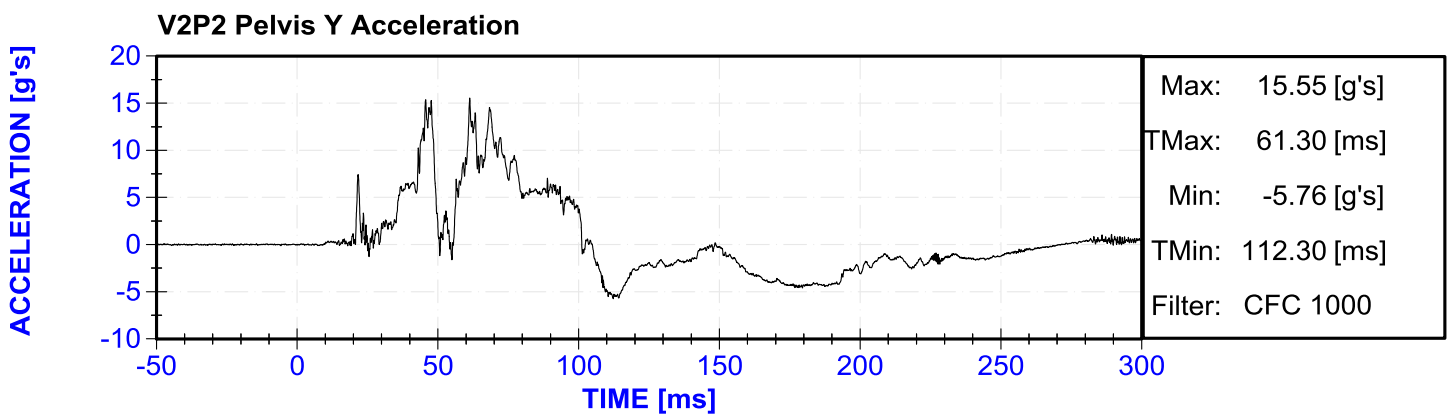
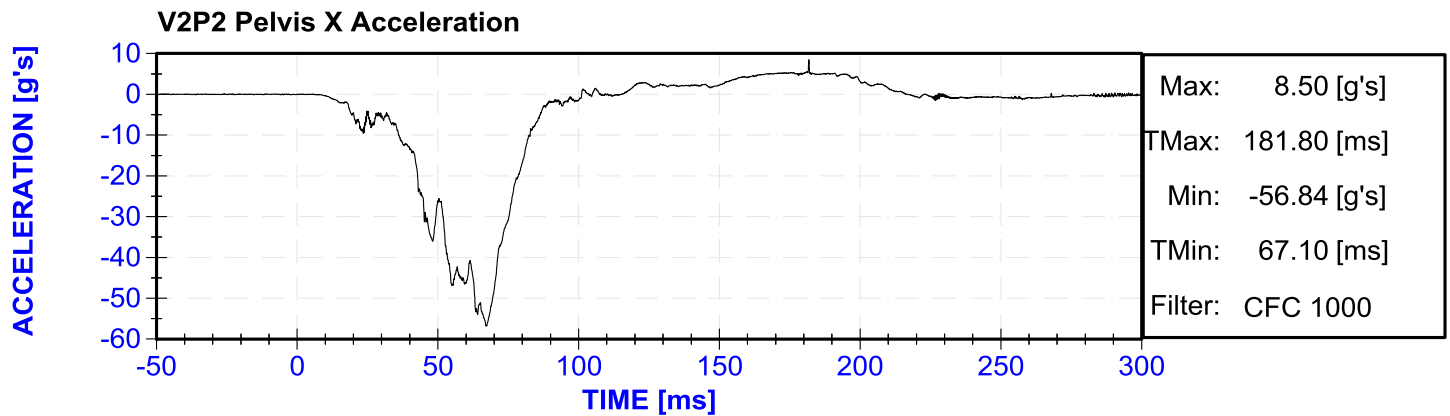
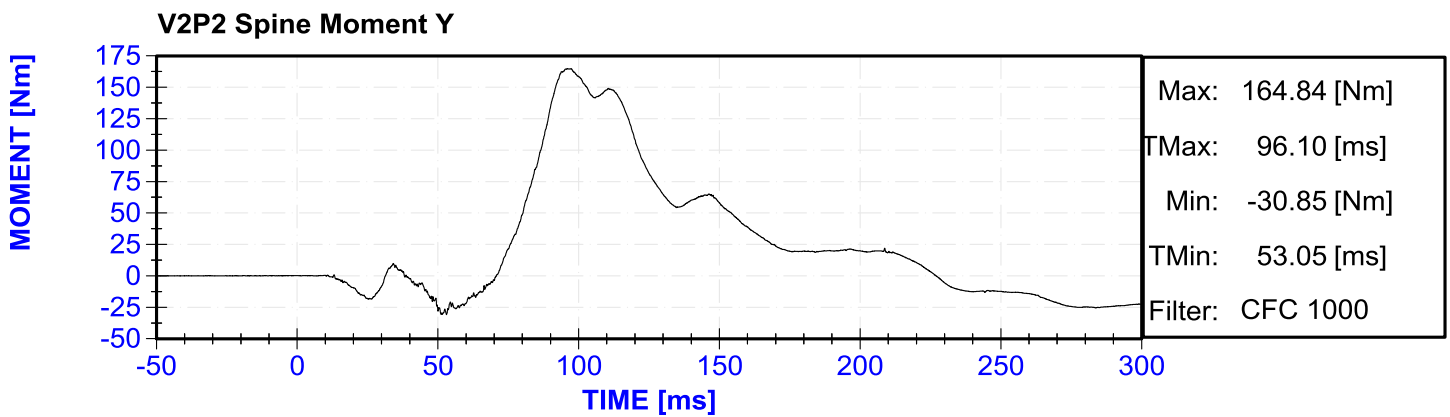
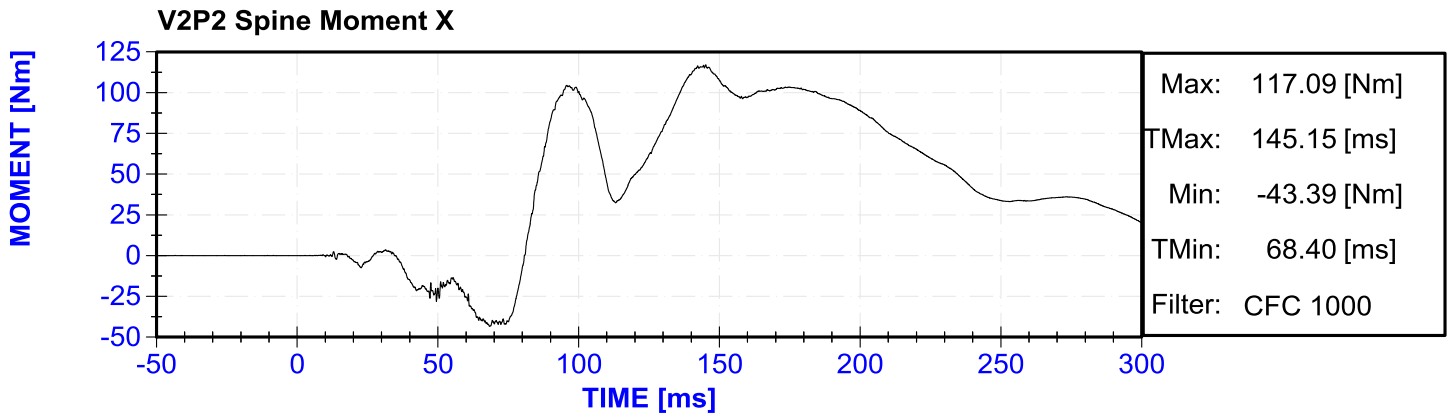


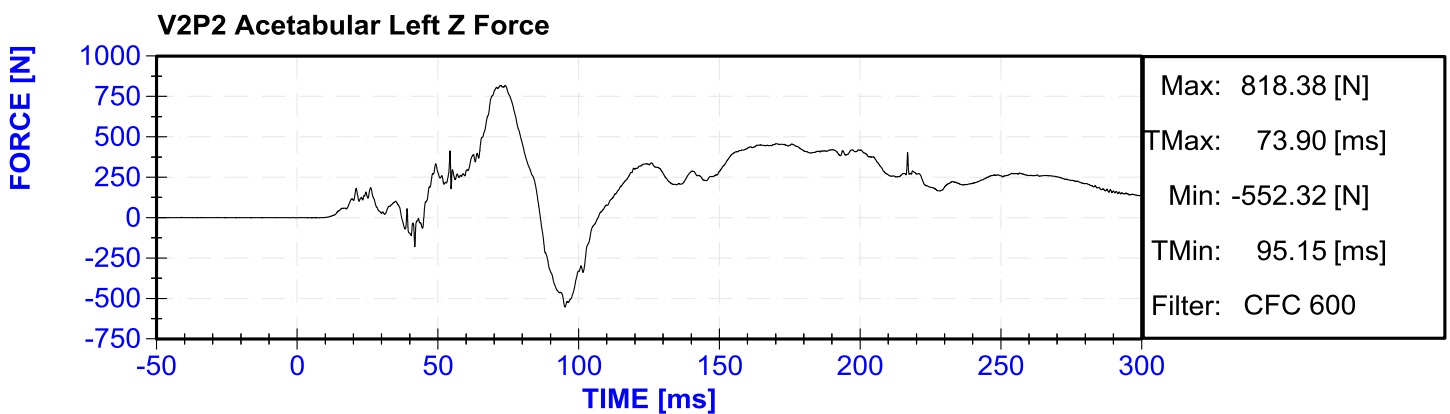
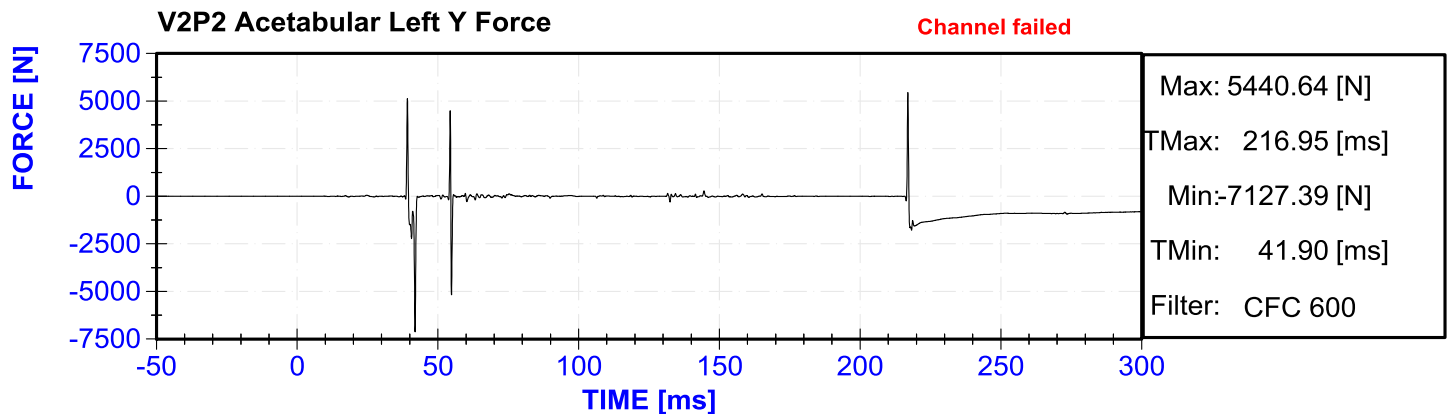
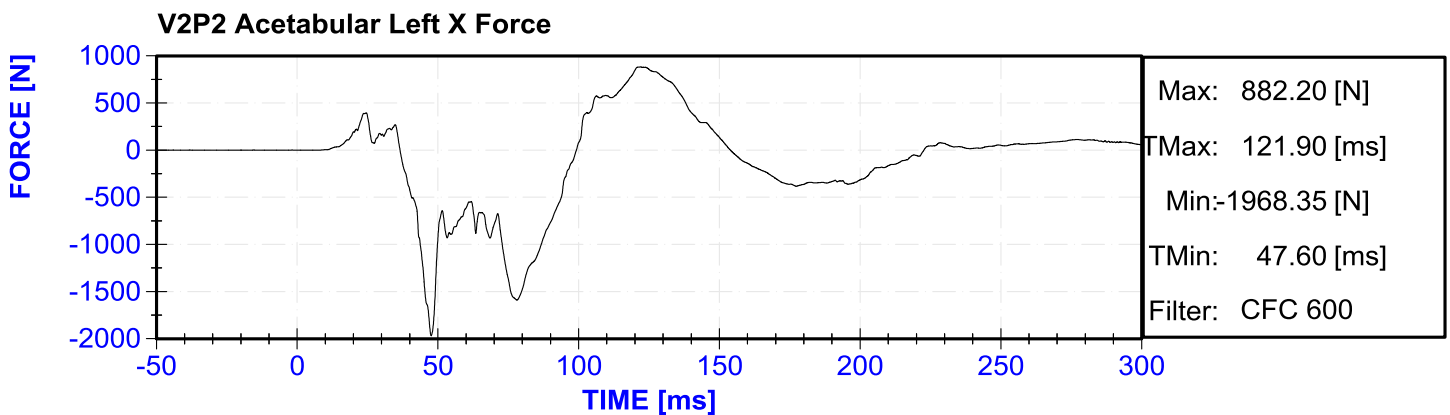
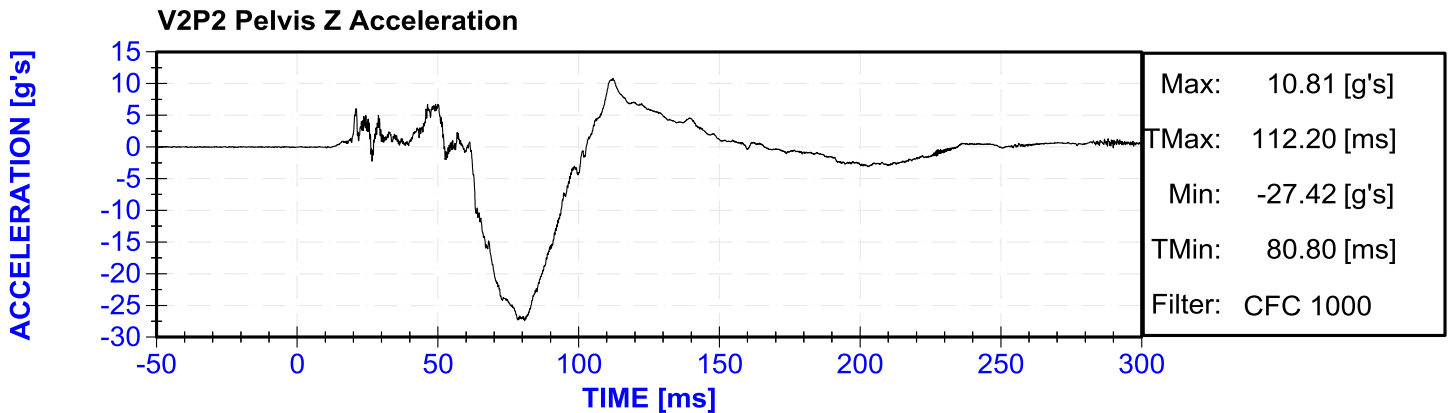
V2P2 Spine Force Y



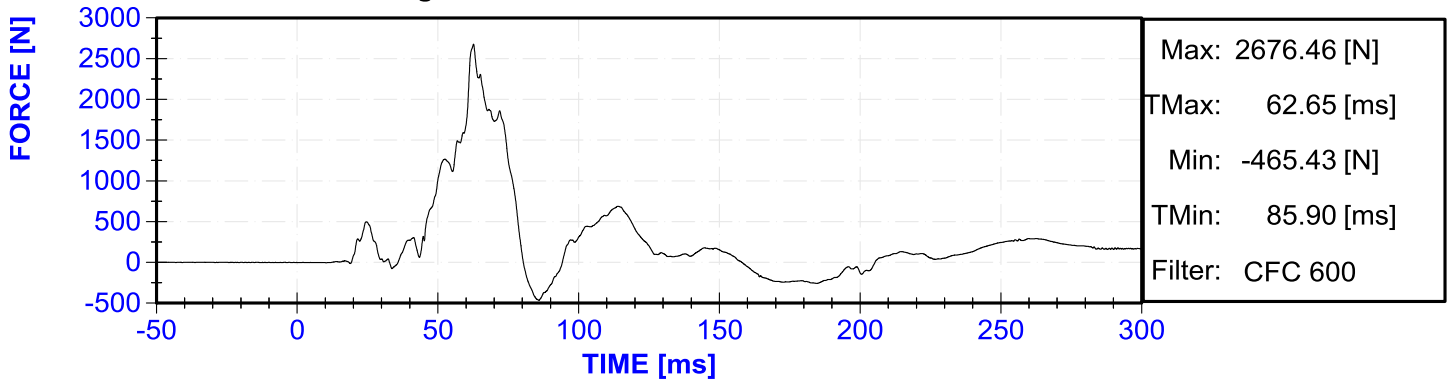
V2P2 Spine Force Z



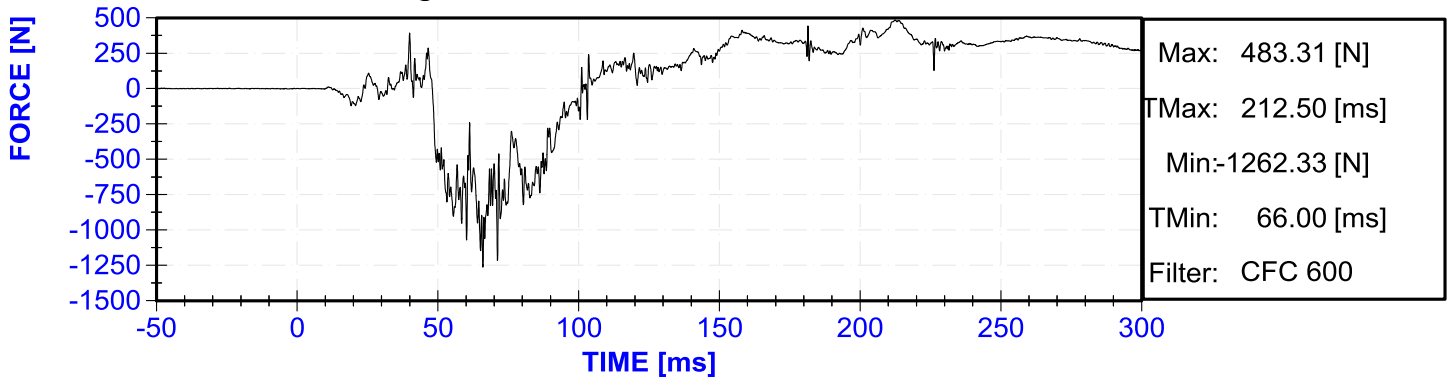




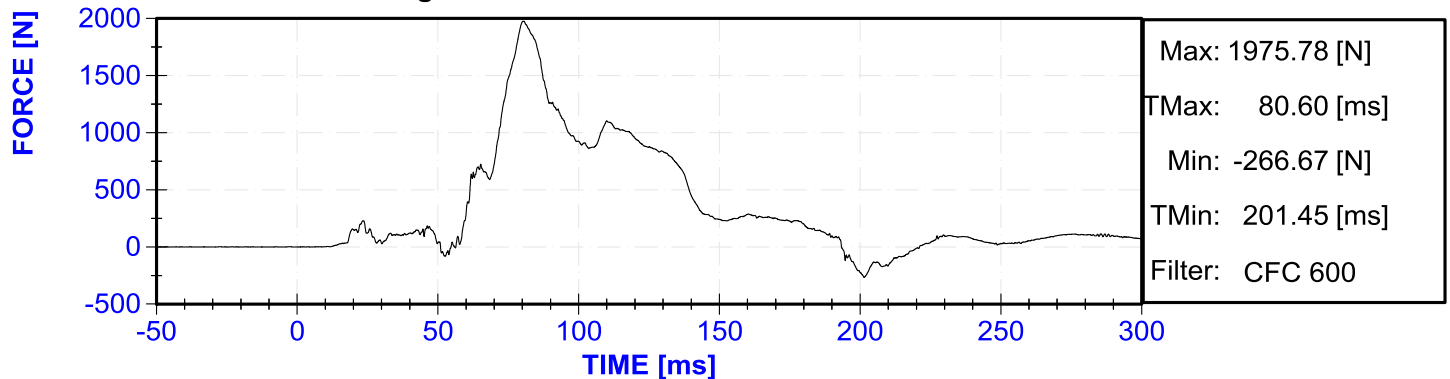
V2P2 Acetabular Right X Force



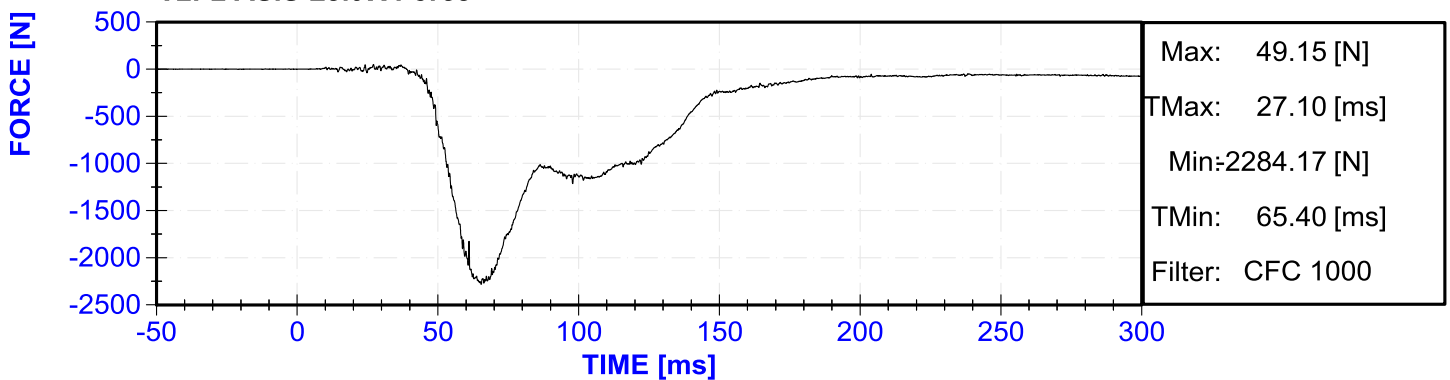
V2P2 Acetabular Right Y Force

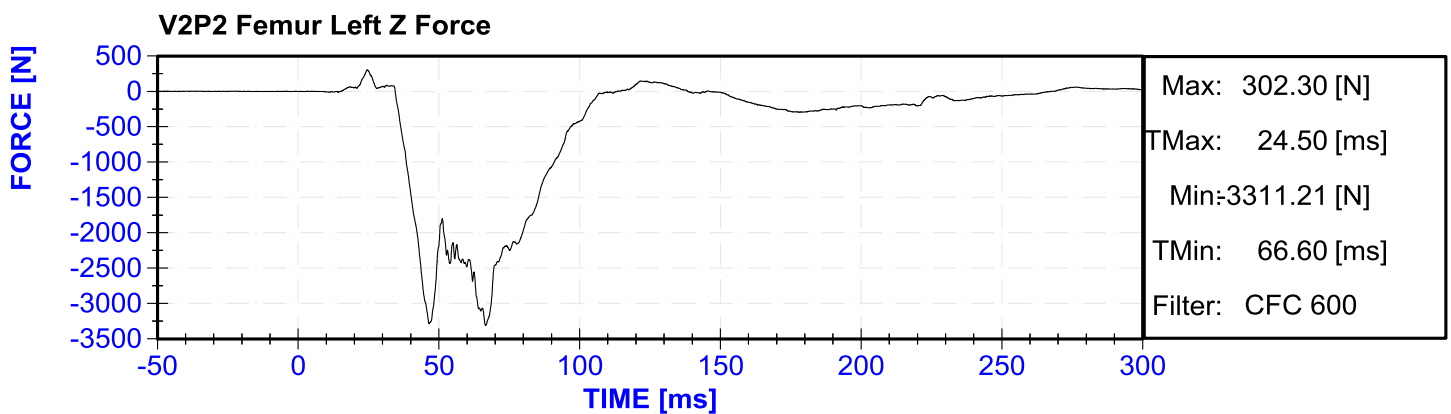
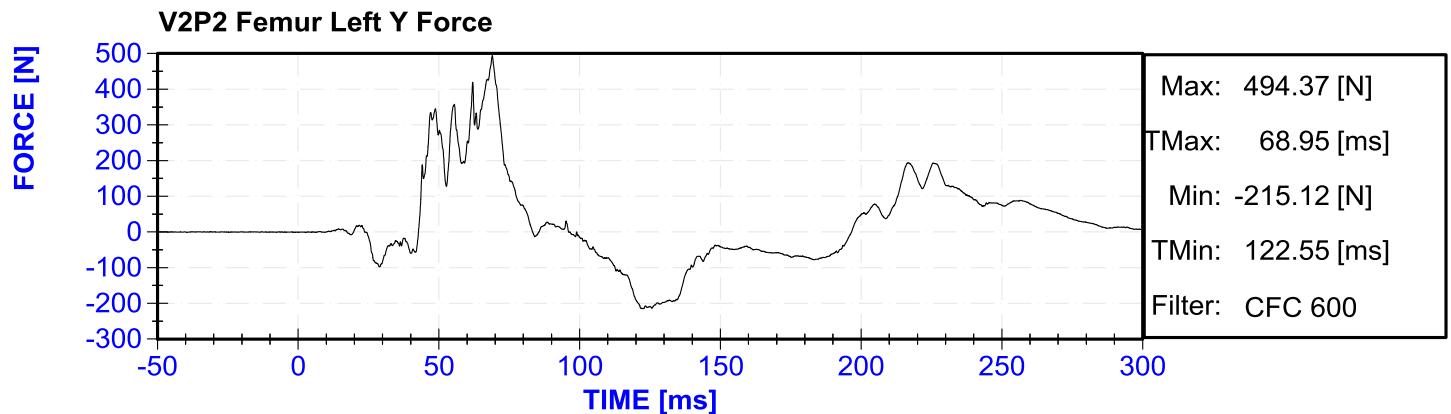
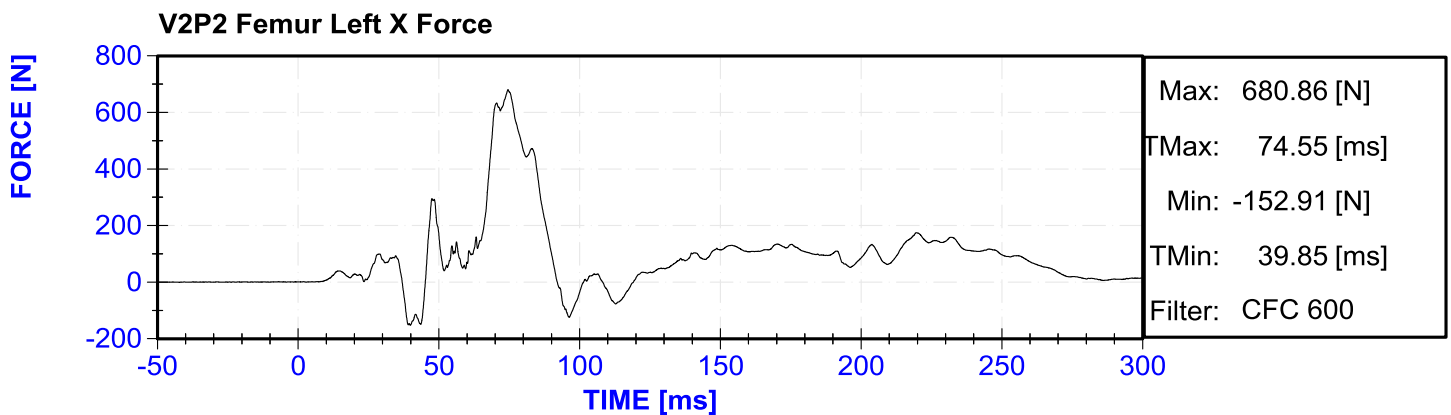
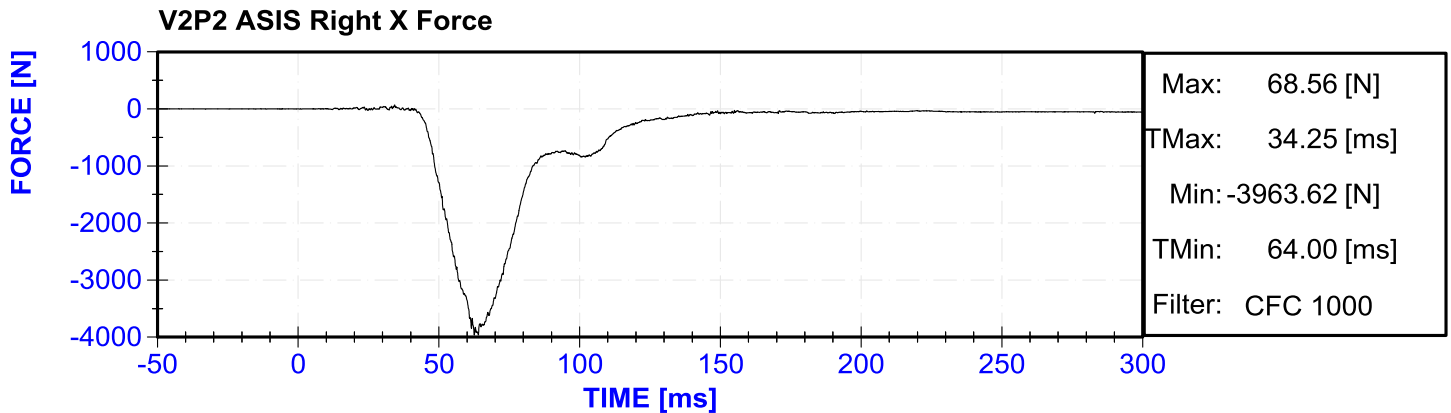


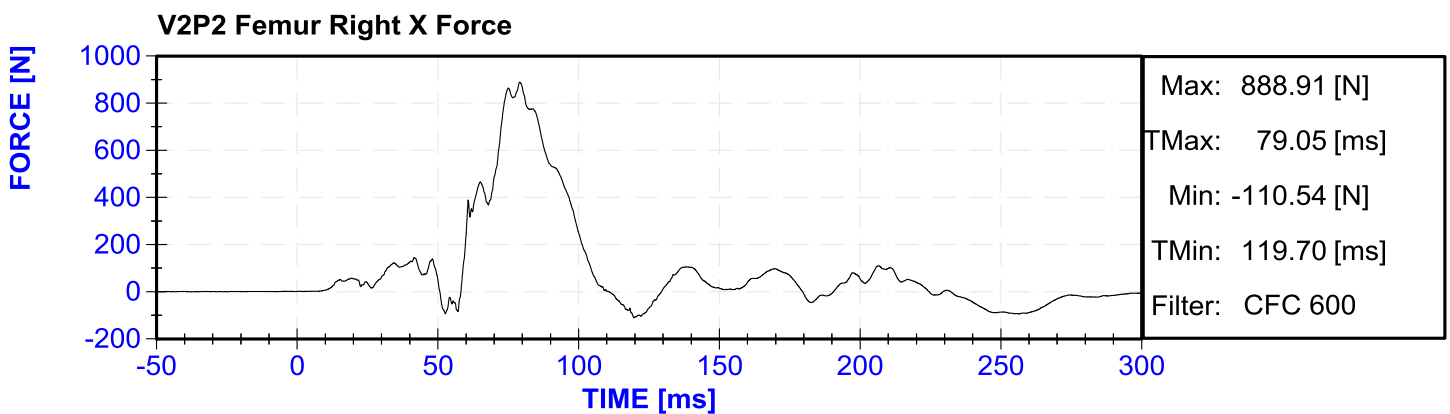
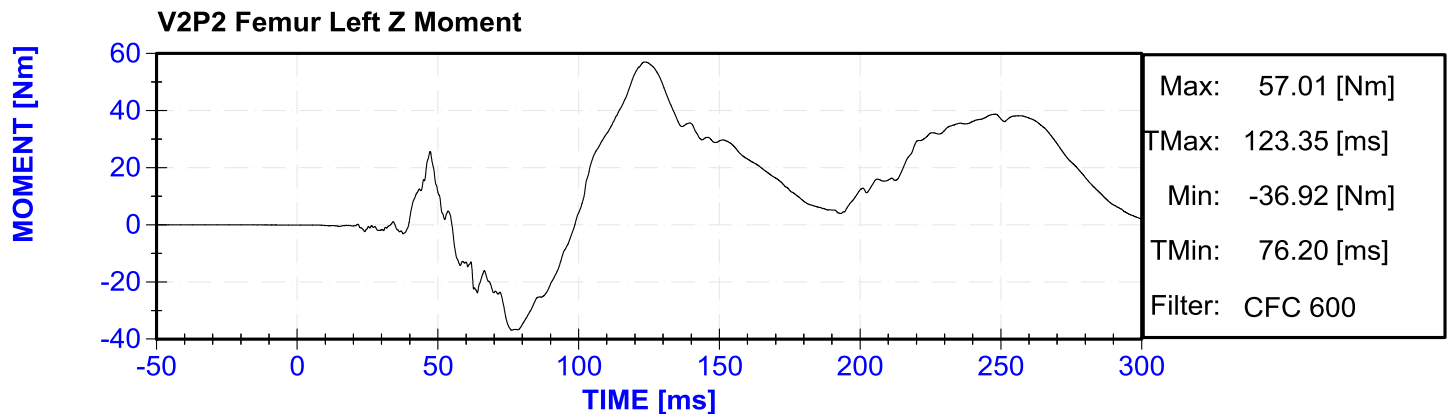
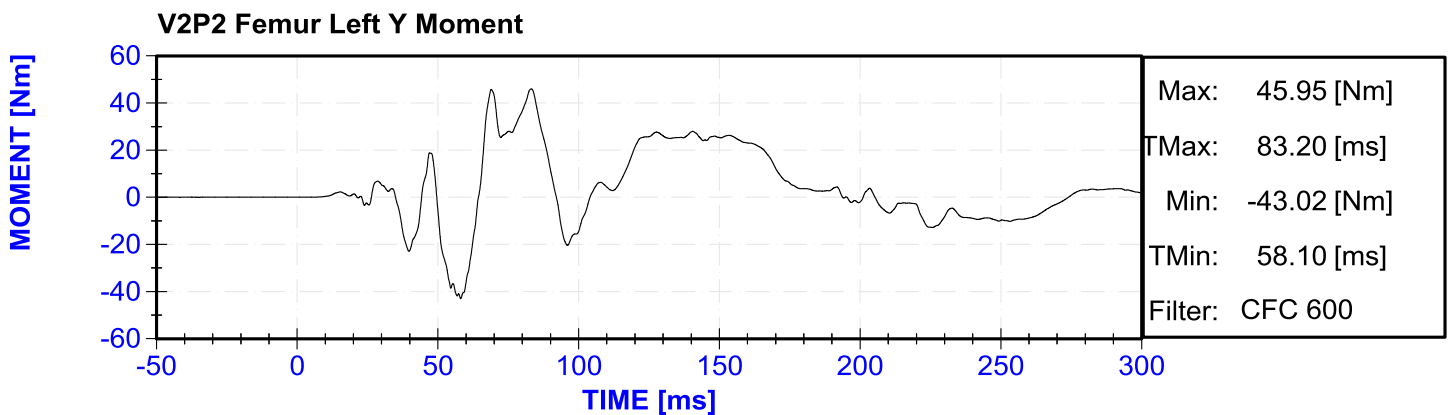
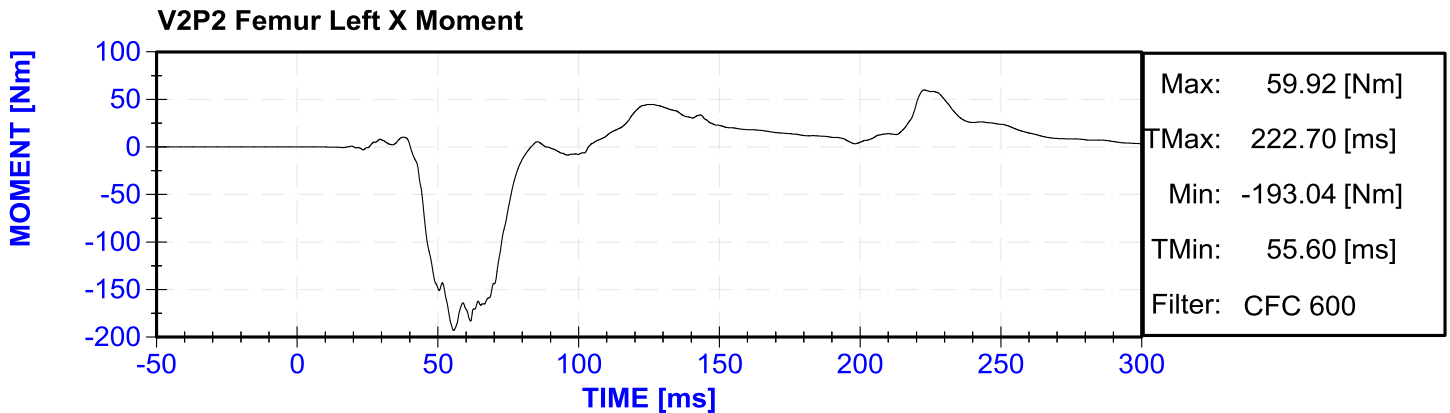
V2P2 Acetabular Right Z Force

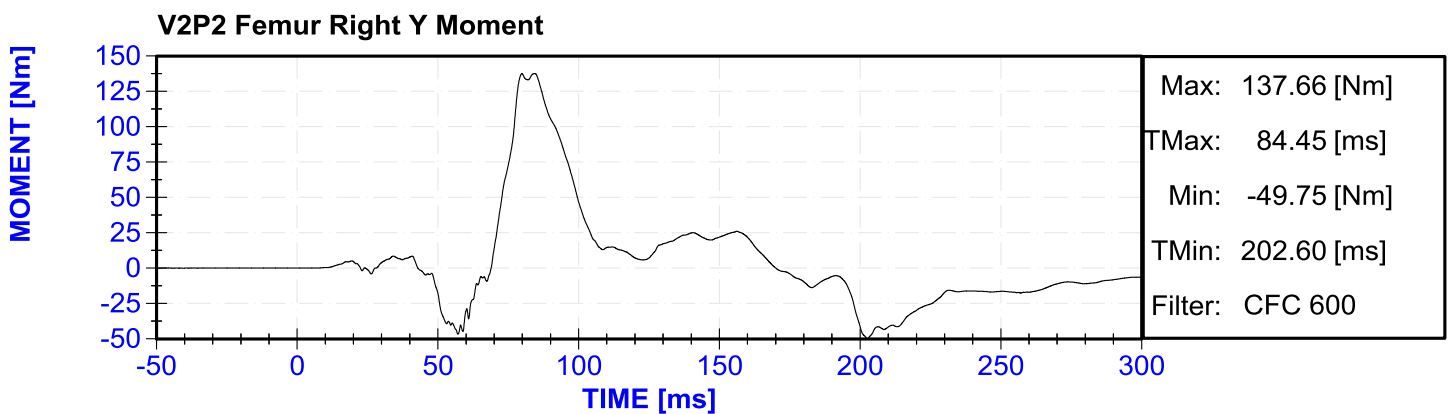
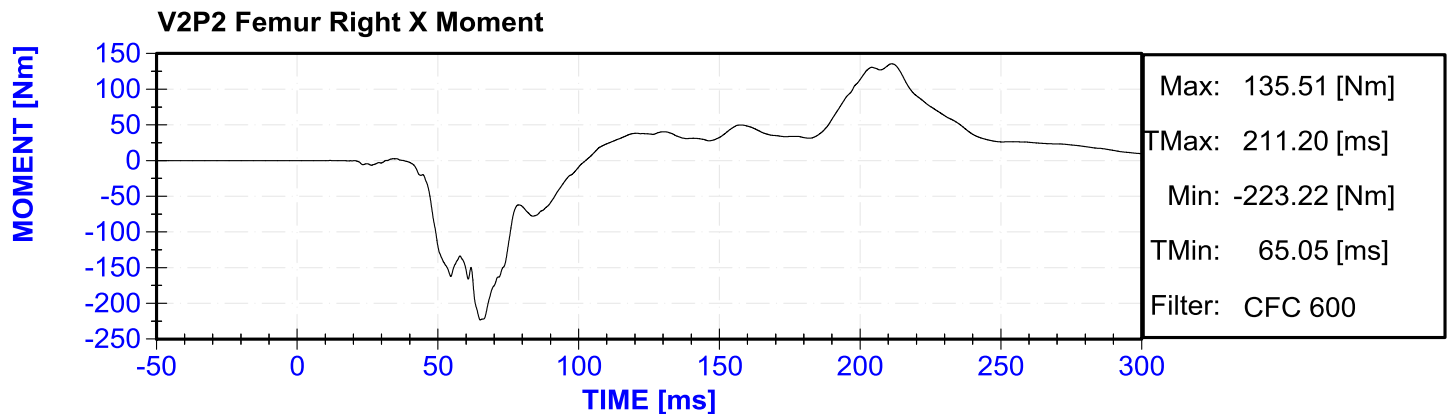
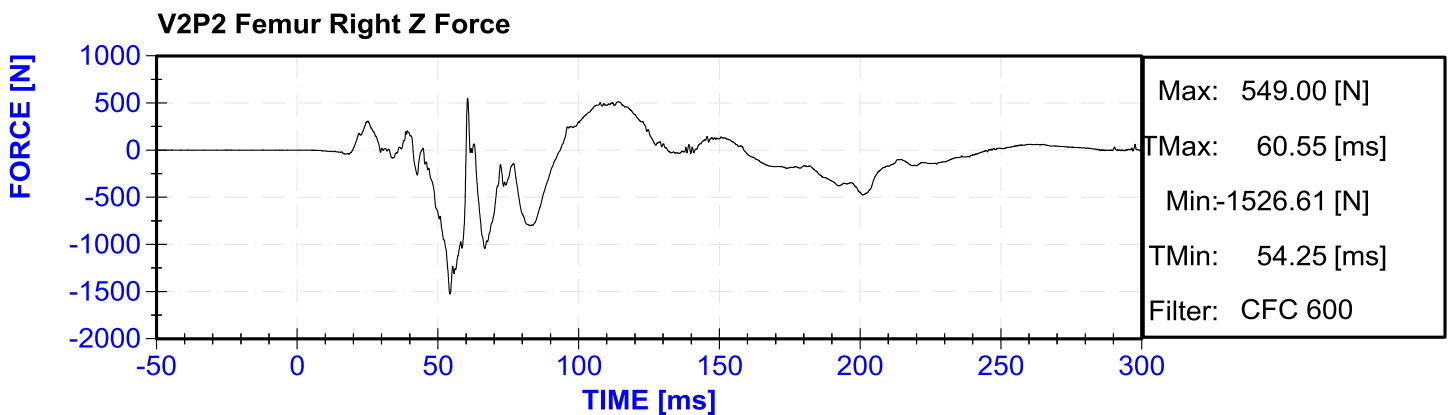
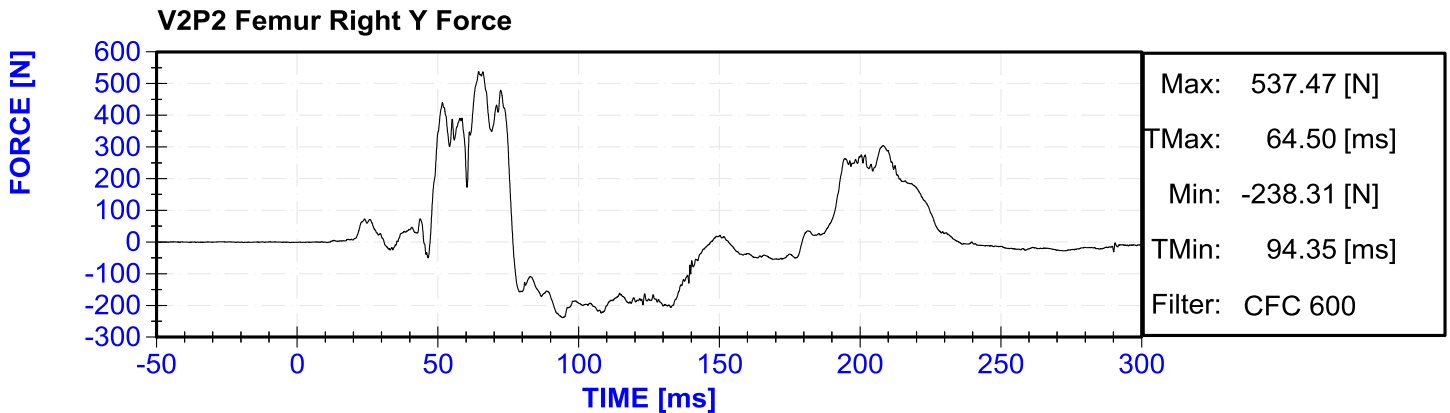


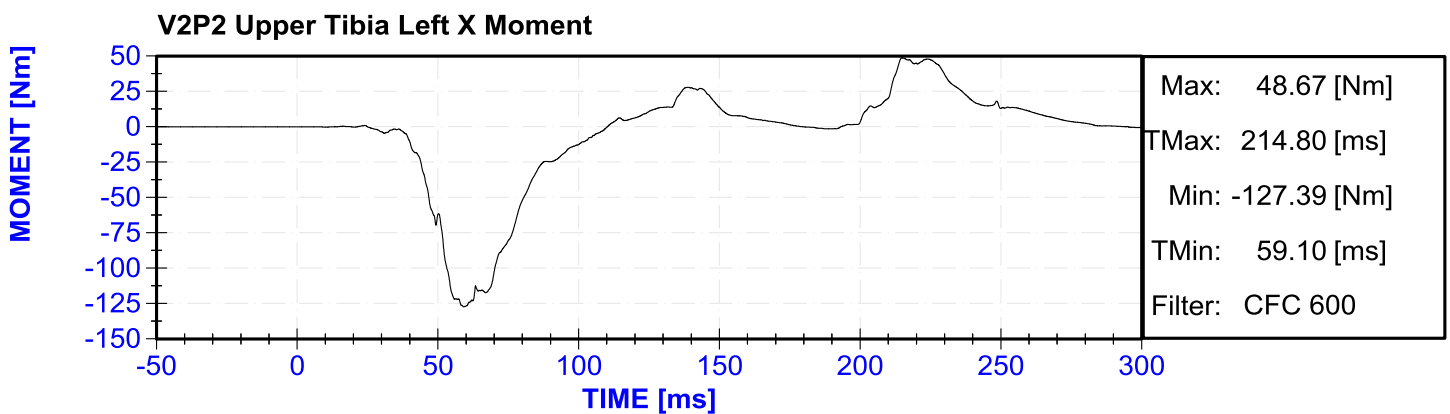
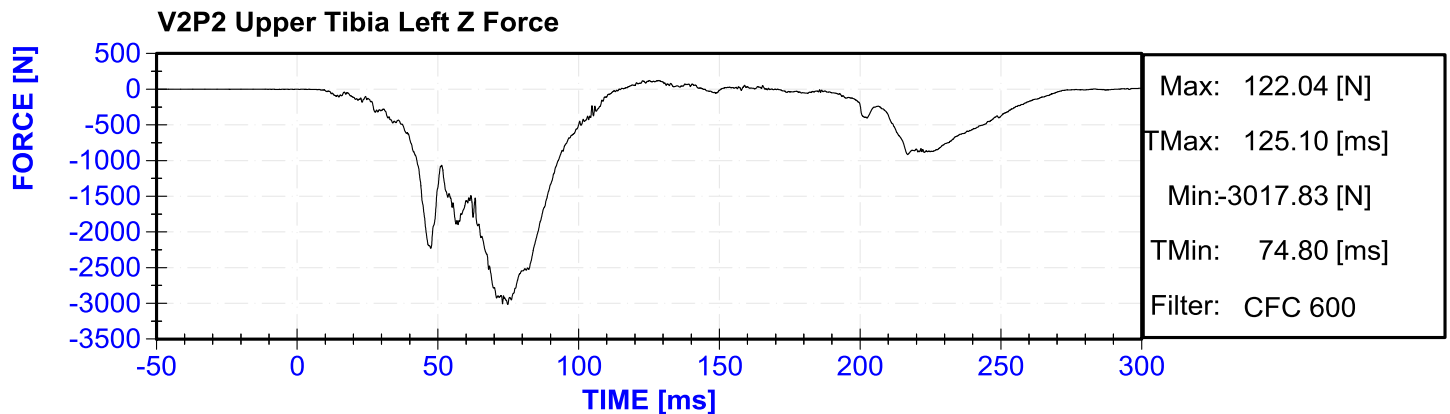
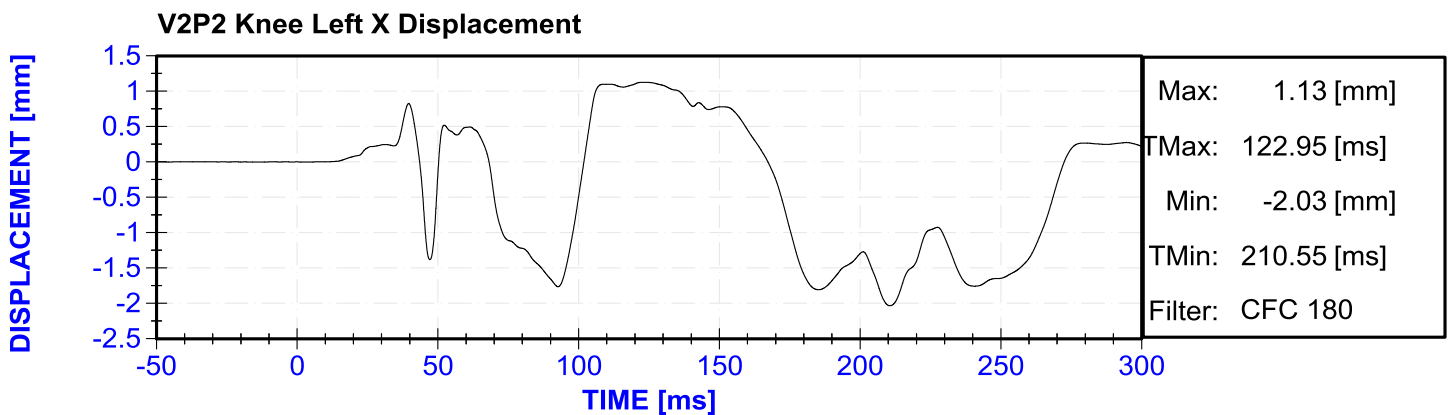
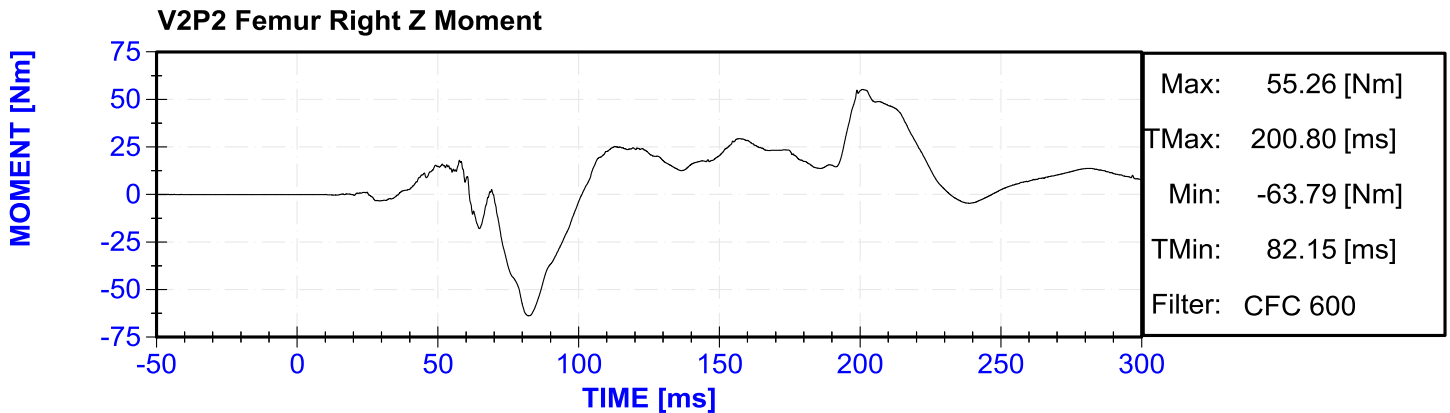
V2P2 ASIS Left X Force

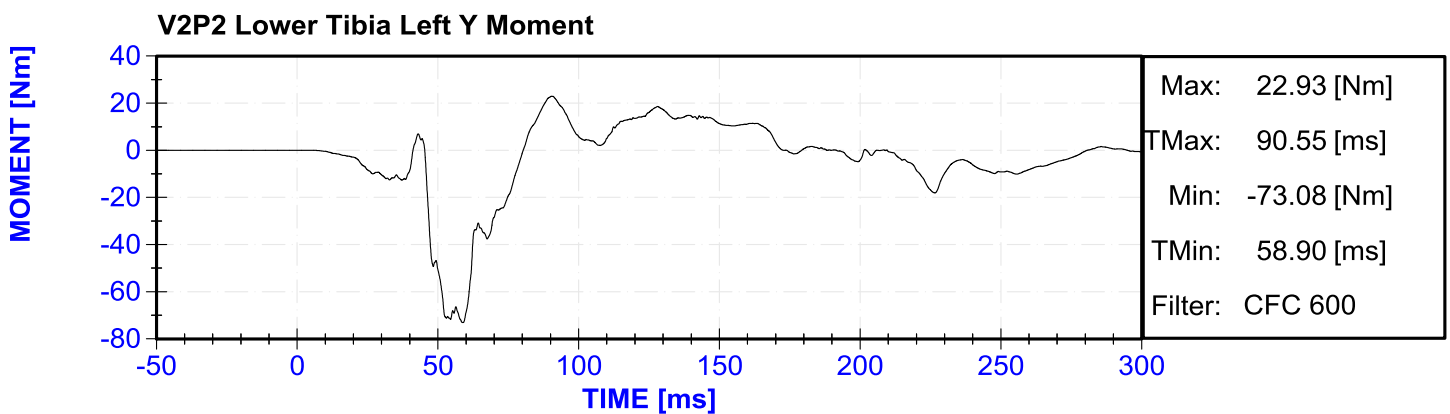
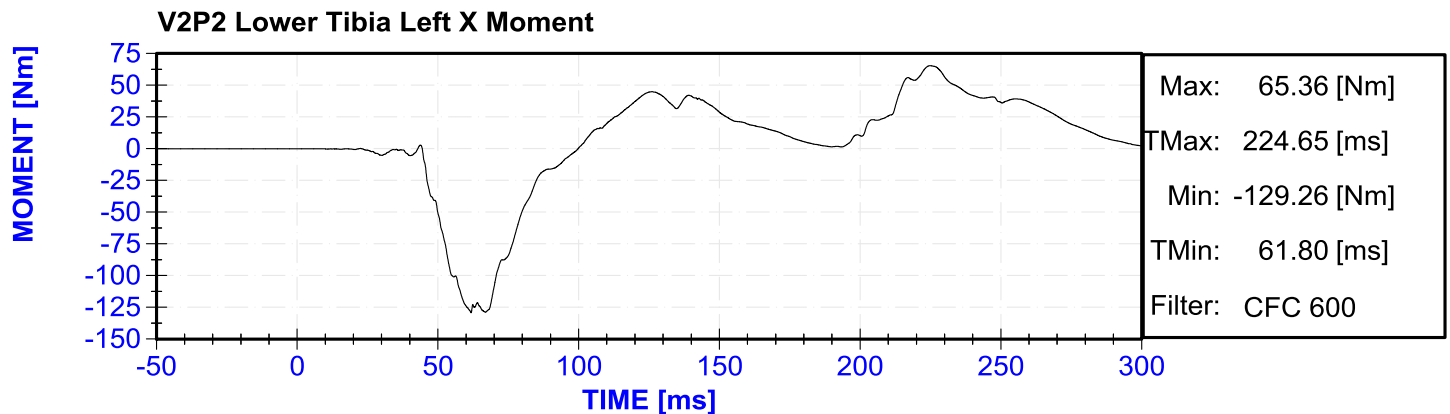
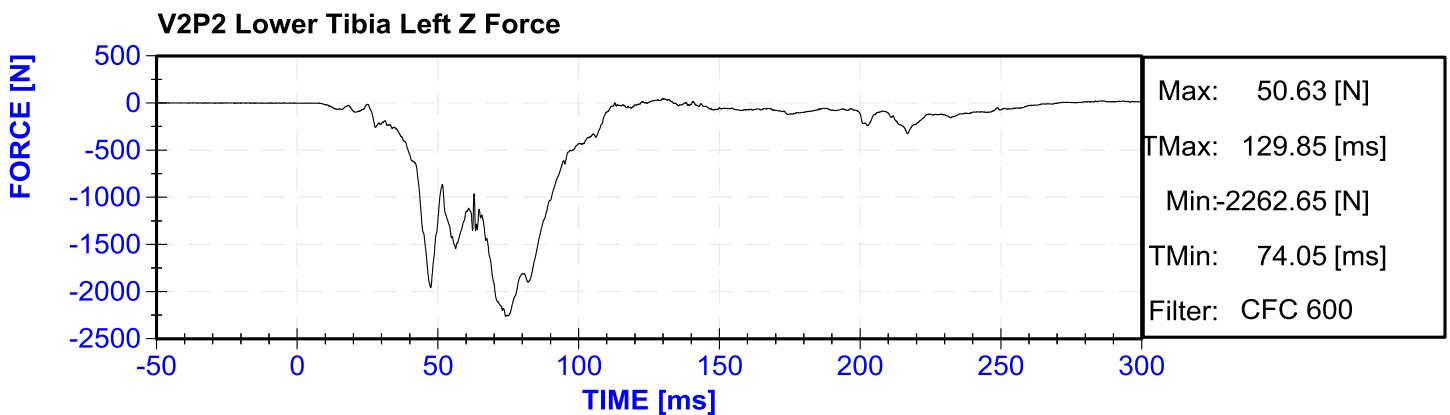
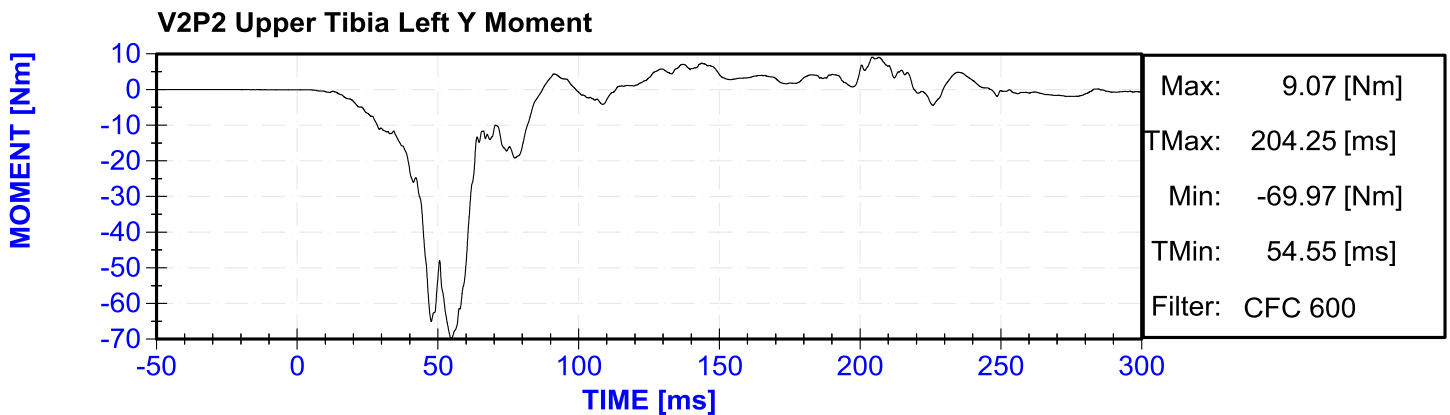




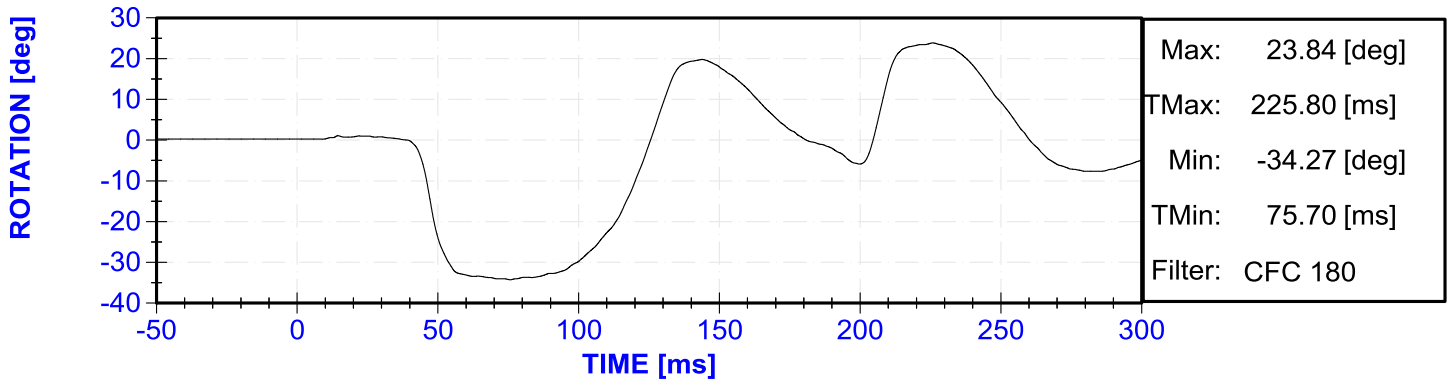




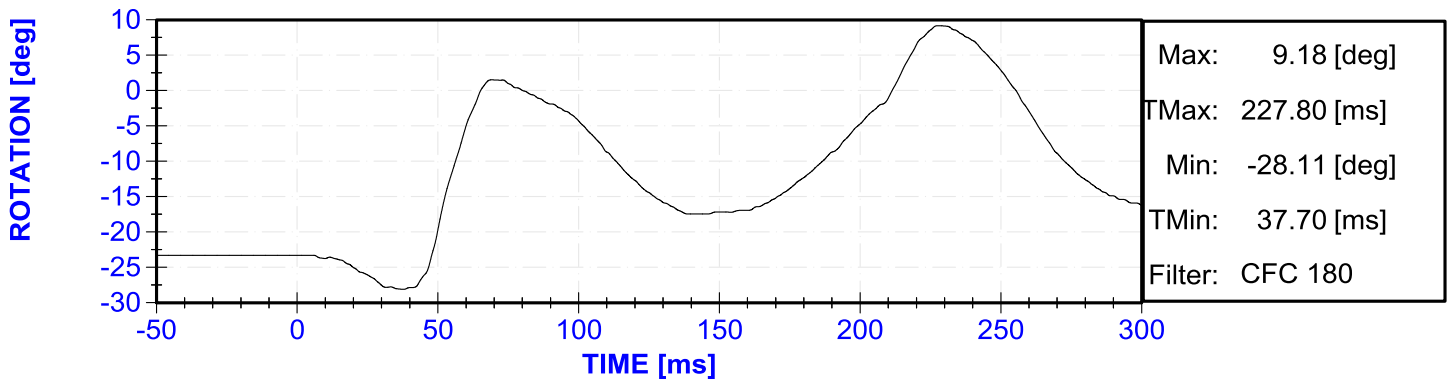




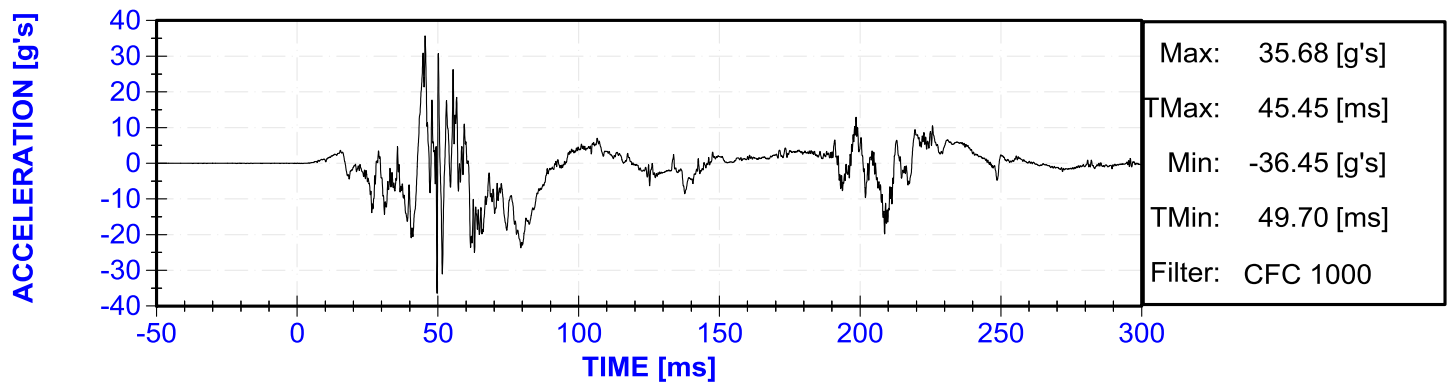
V2P2 Ankle Left X Rotation



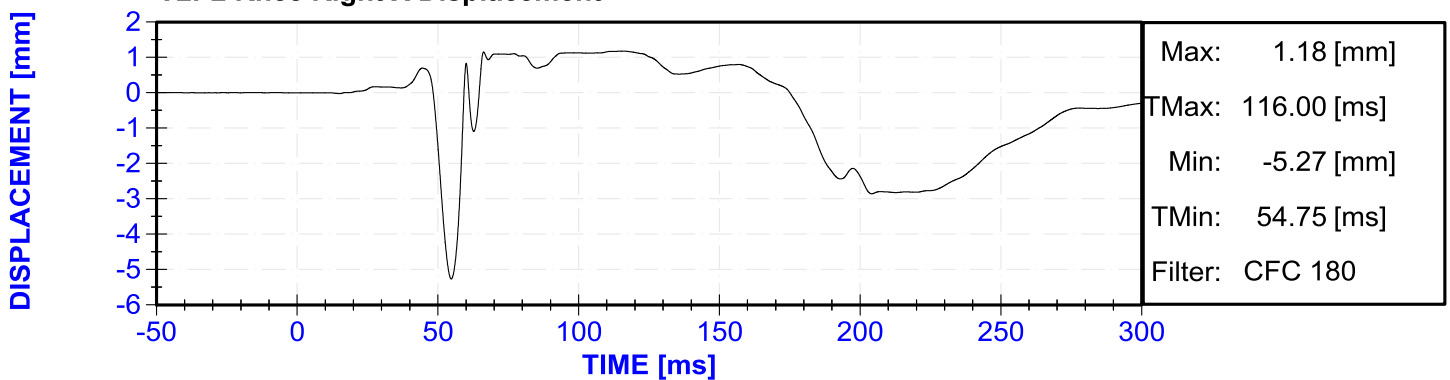
V2P2 Ankle Left Y Rotation

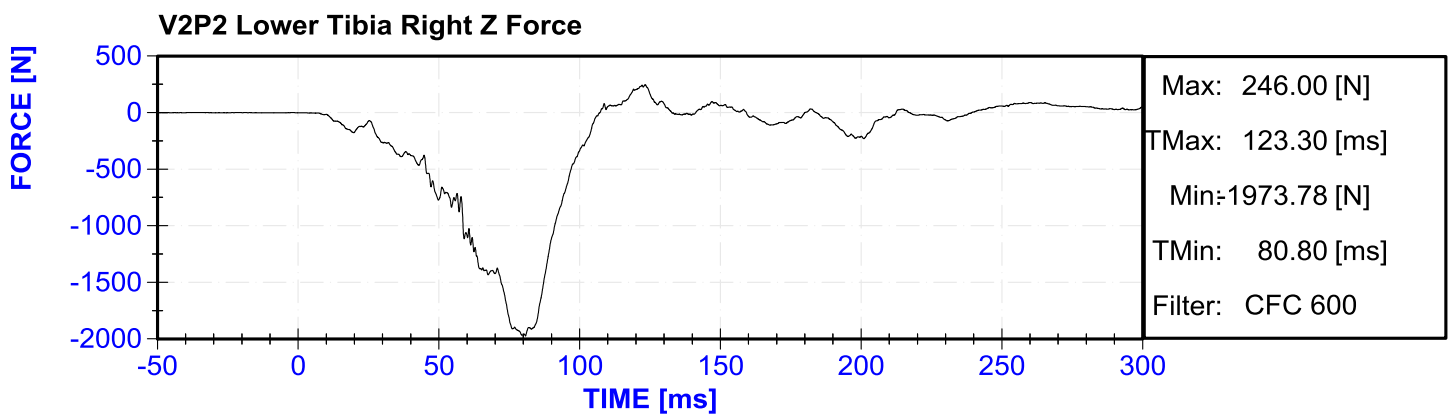
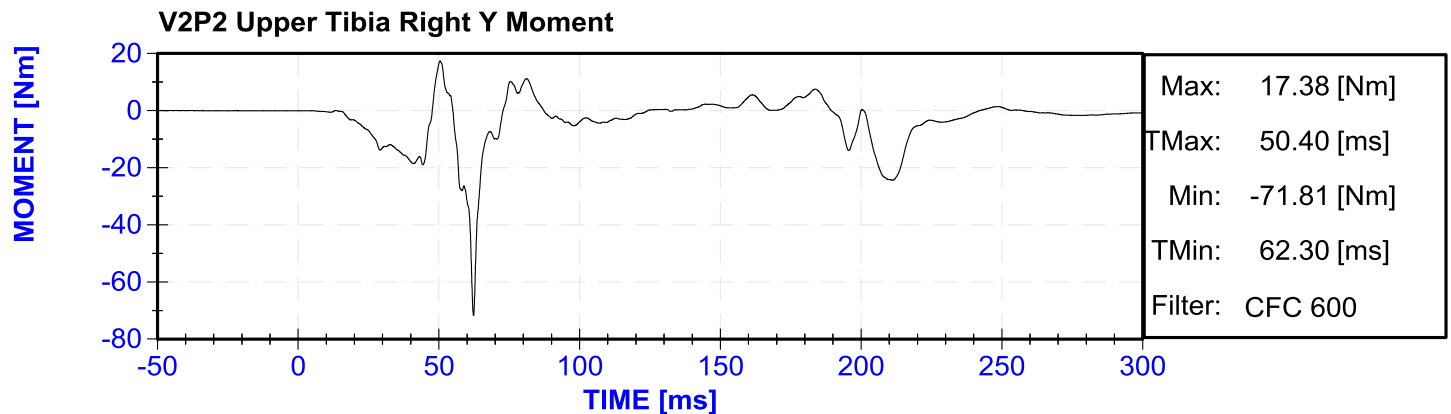
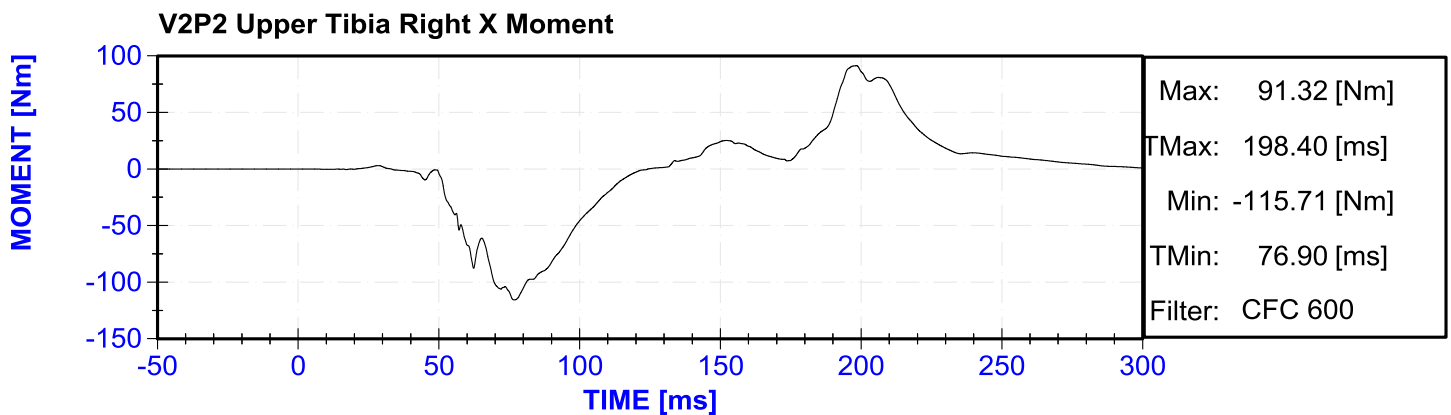
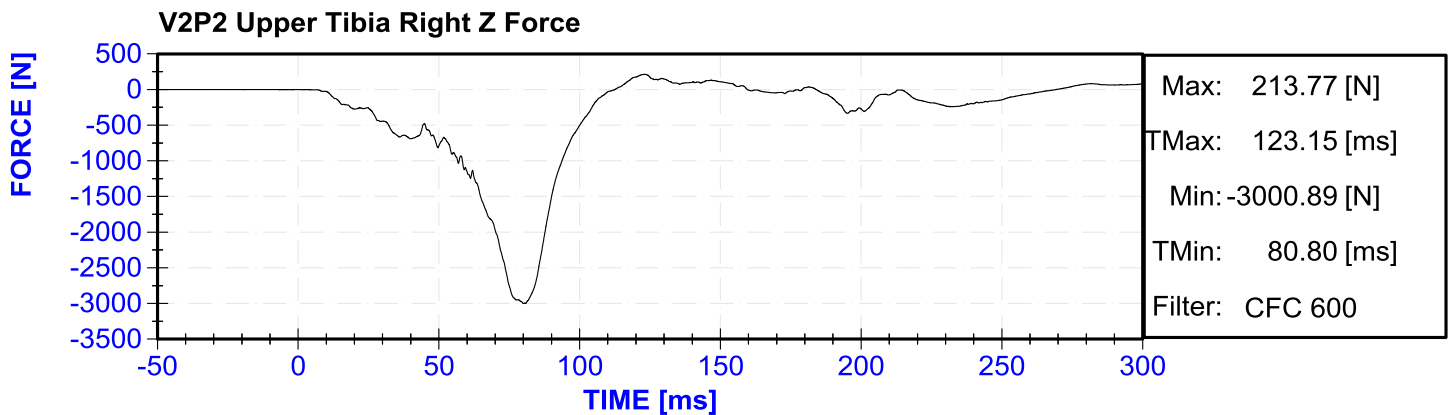


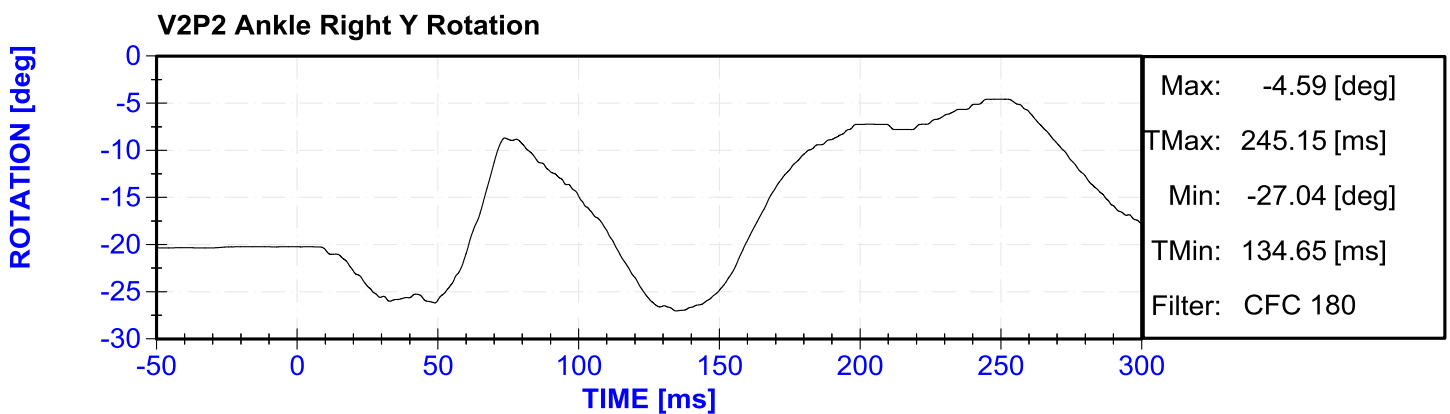
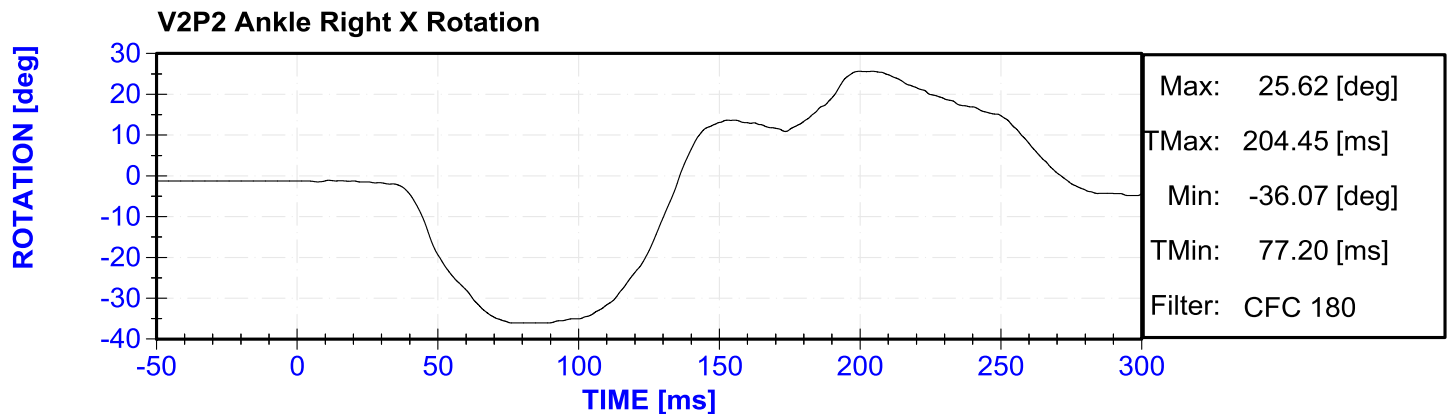
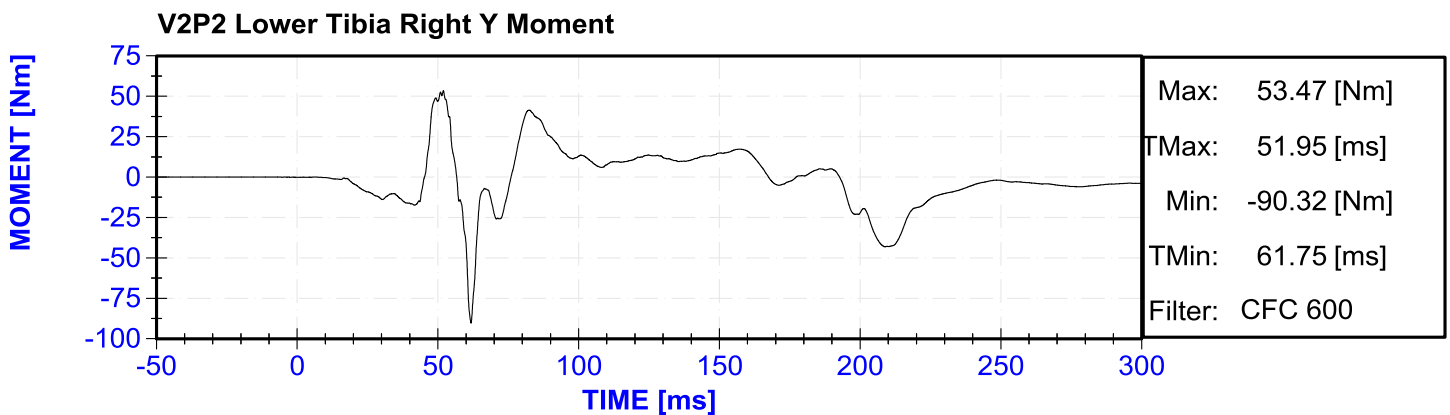
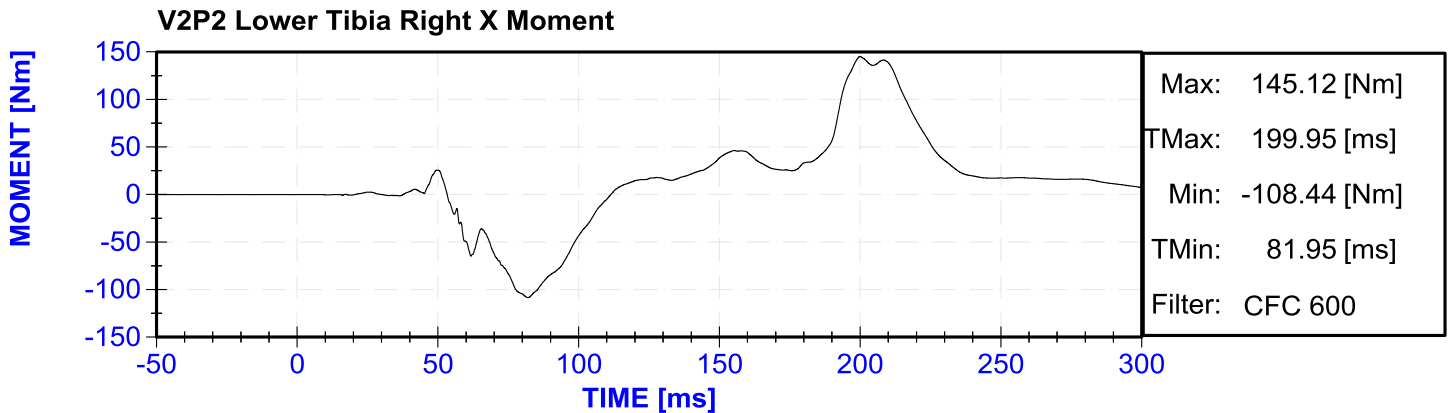
V2P2 Foot Left Z Acceleration



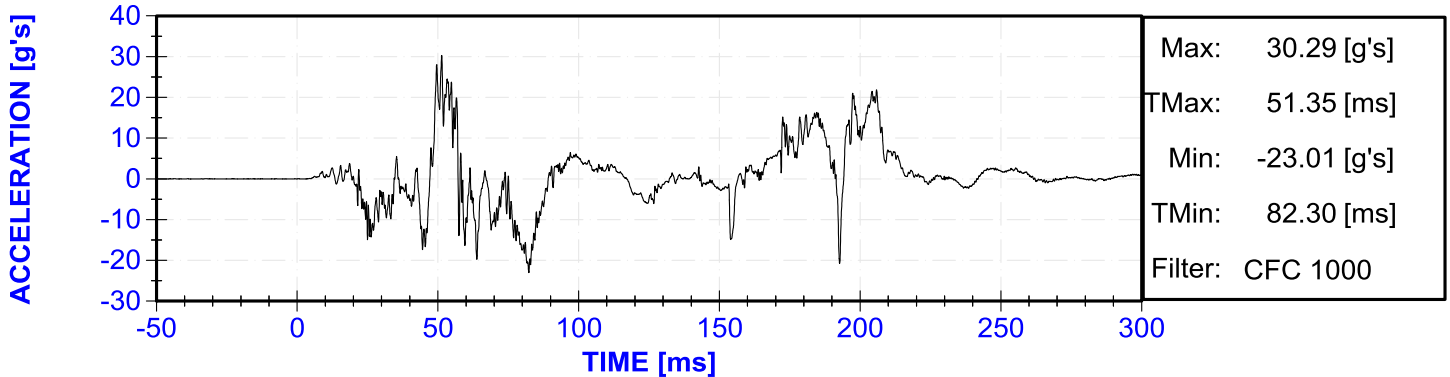
V2P2 Knee Right X Displacement



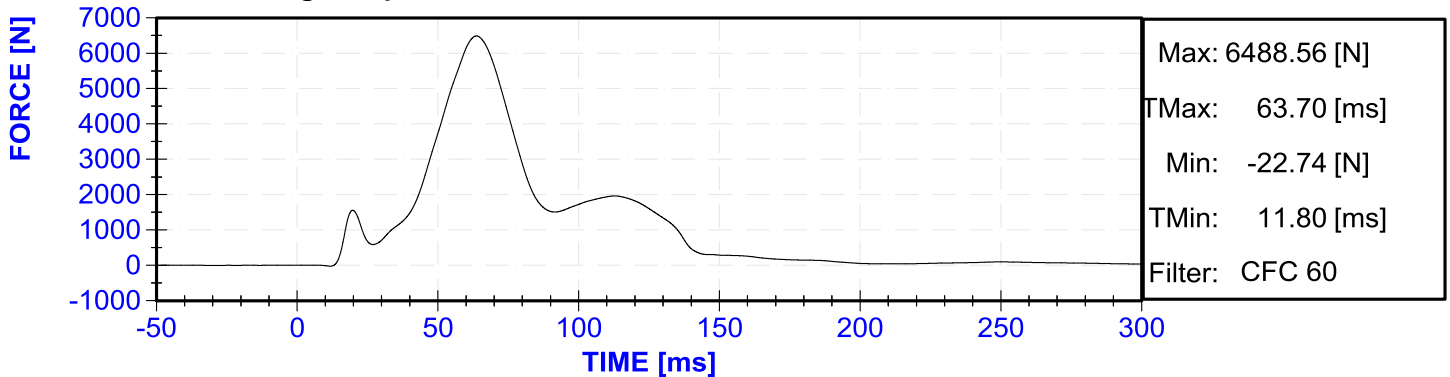




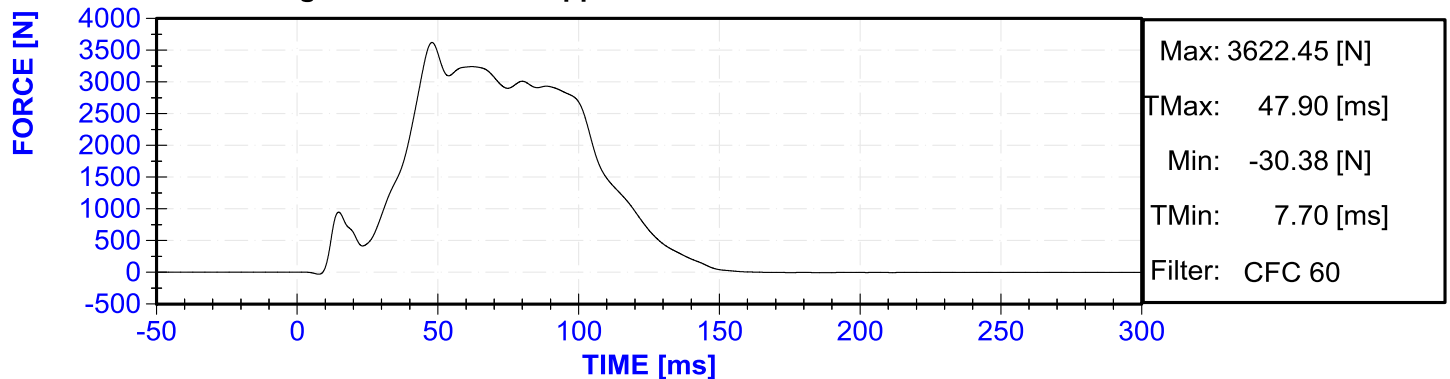
V2P2 Foot Right Z Acceleration



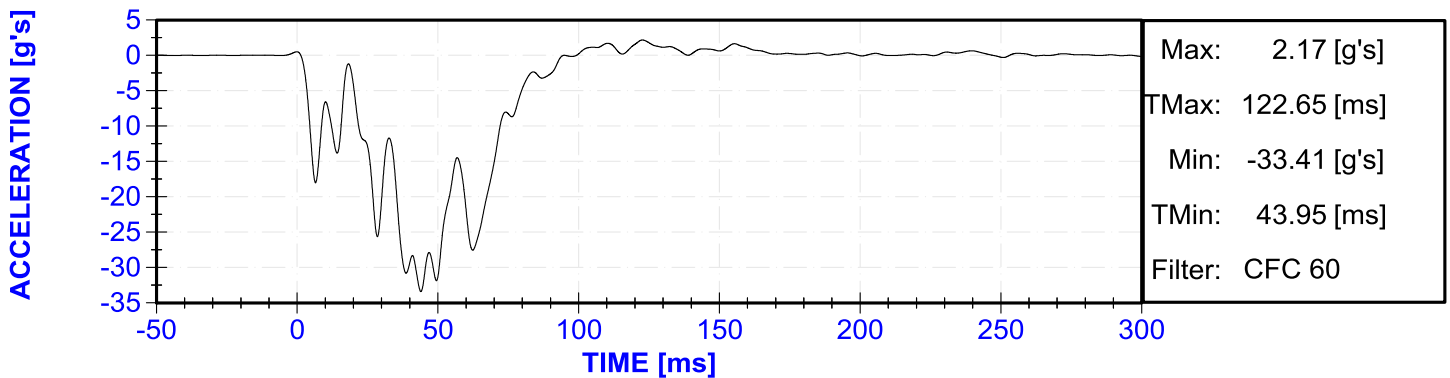
V2 Passenger Lap Belt Force



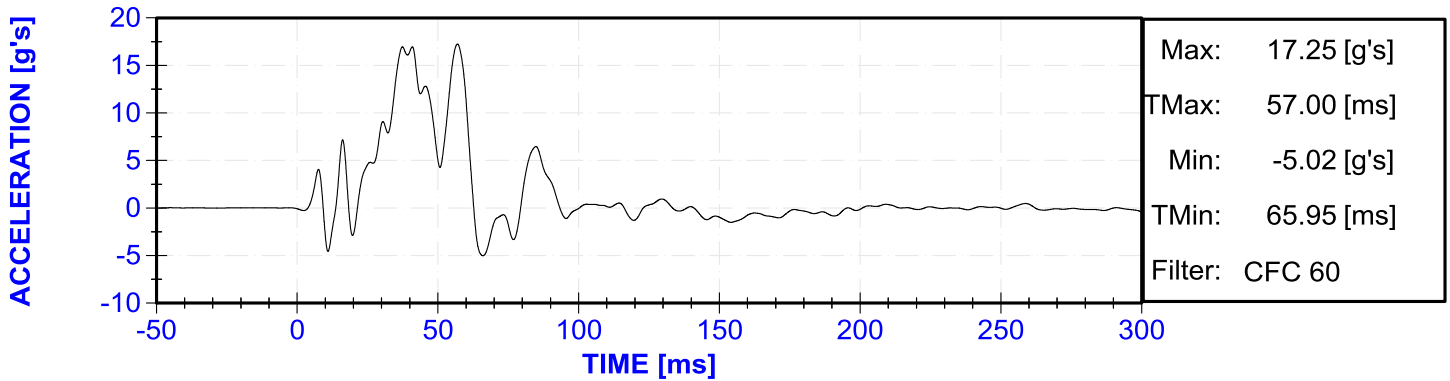
V2 Passenger Shoulder Belt Upper Force



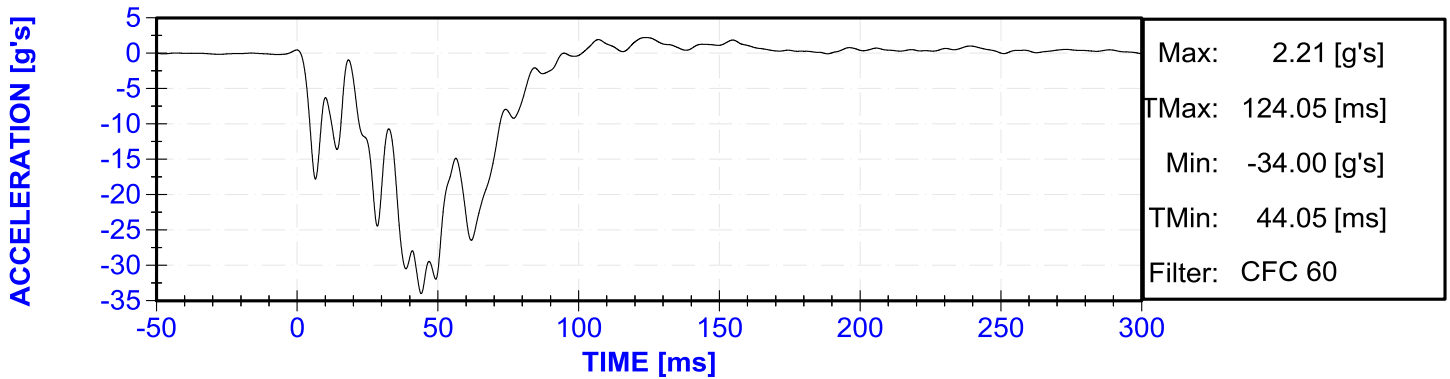
V2 Left Rear Sill X Acceleration



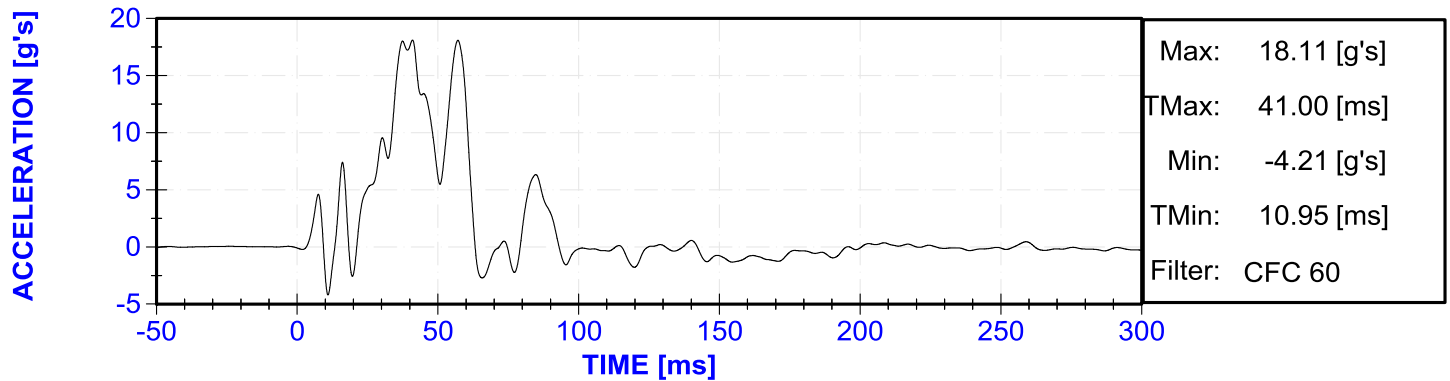
V2 Left Rear Sill Y Acceleration



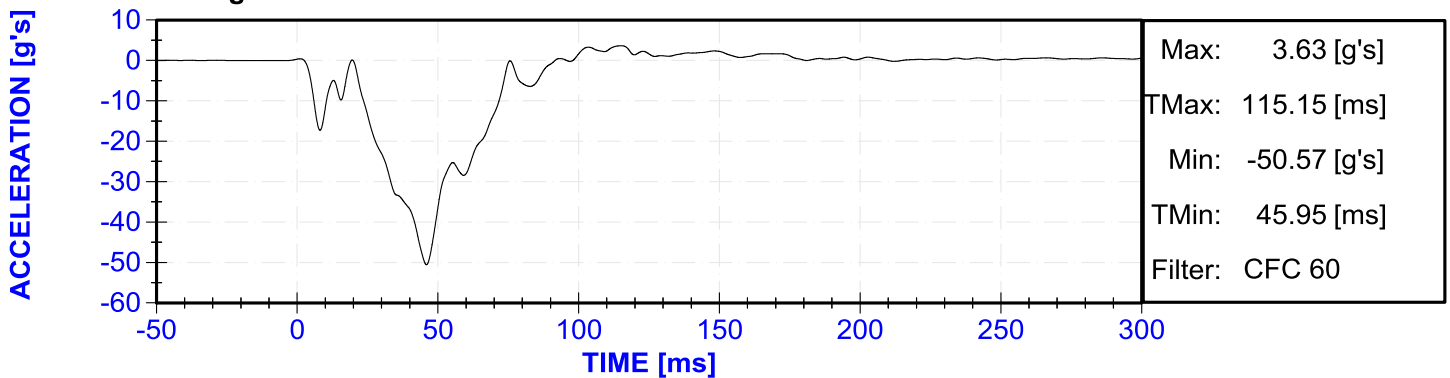
V2 Left Rear Sill Redundant X Acceleration

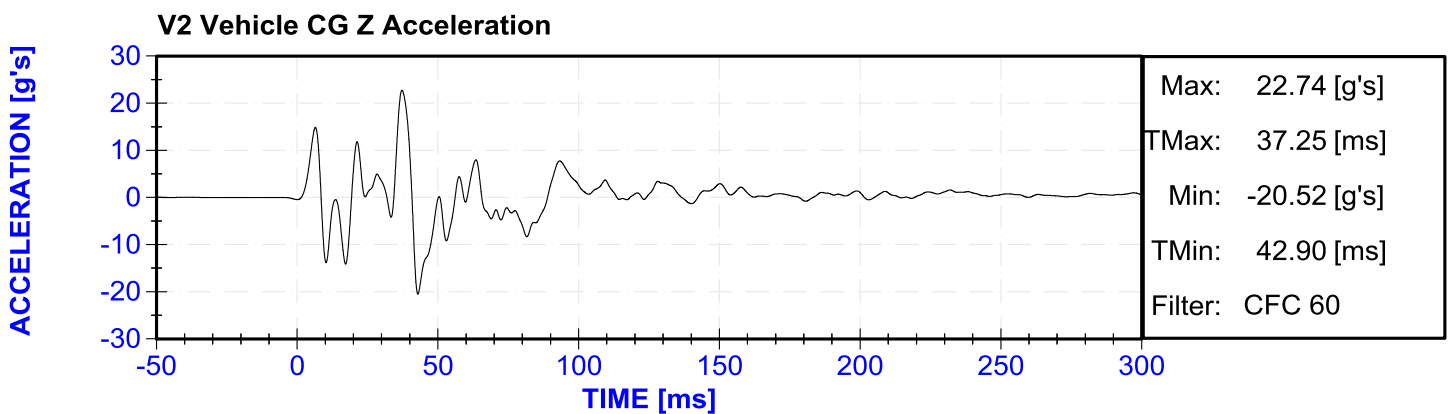
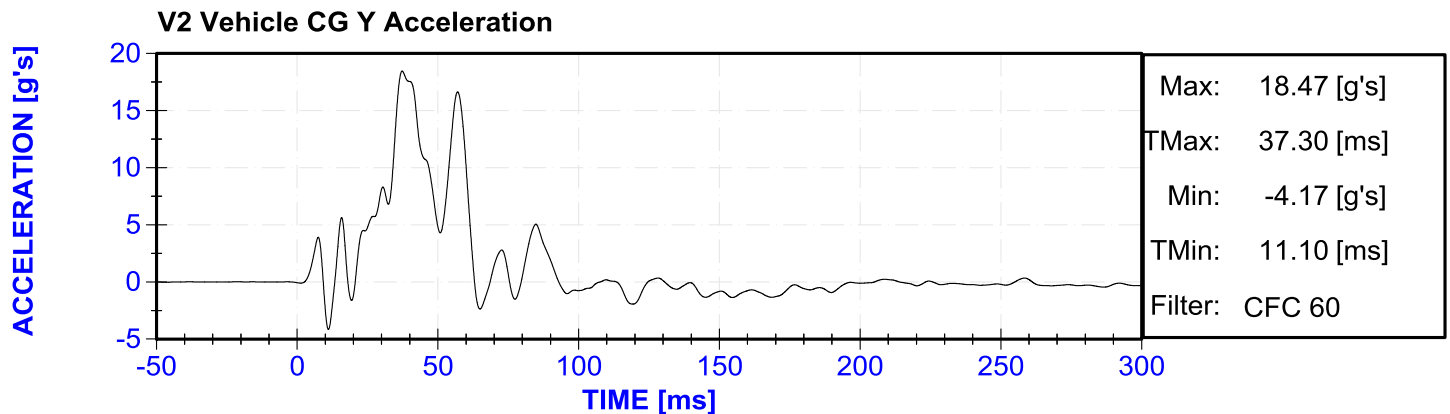
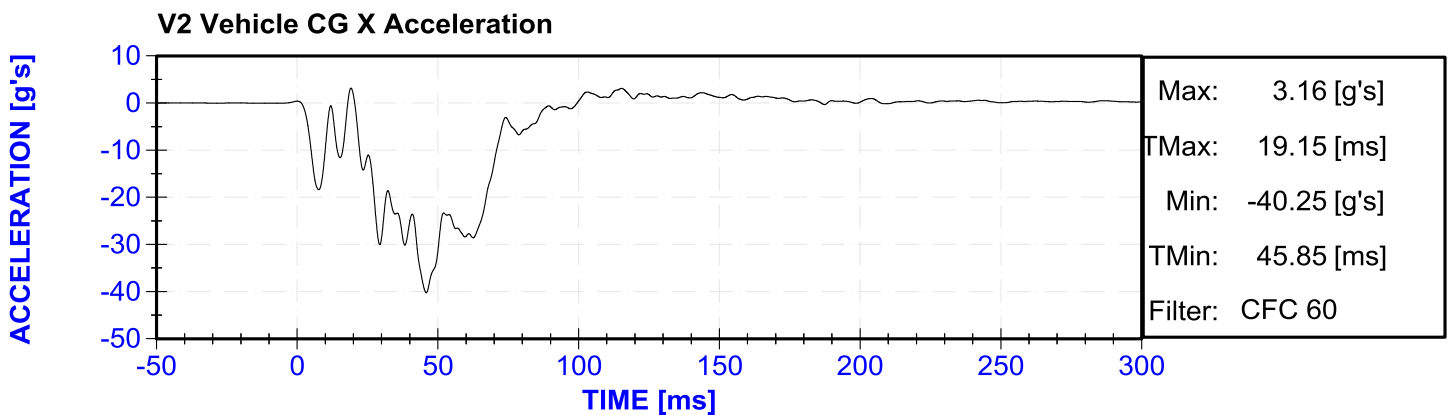
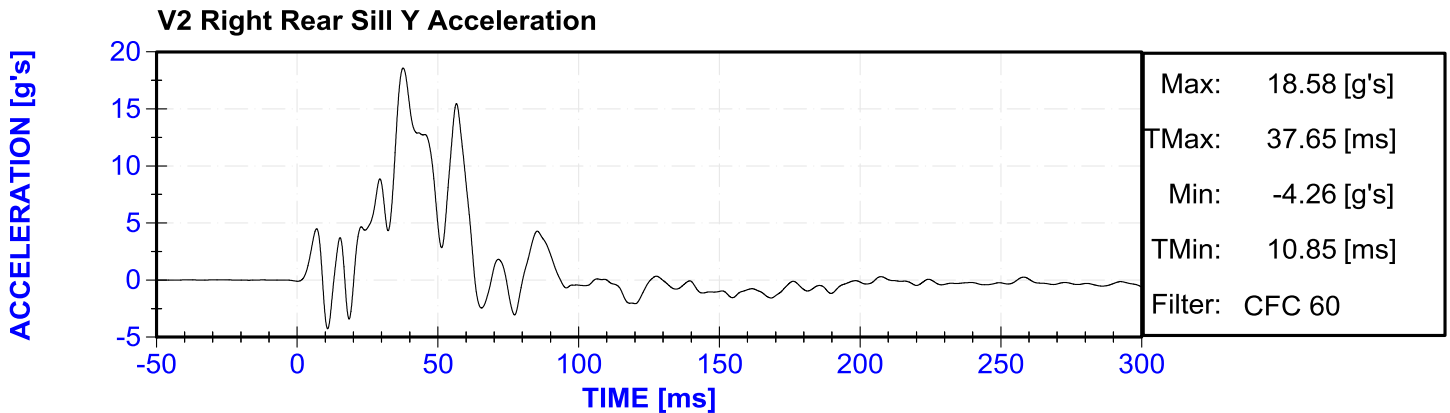


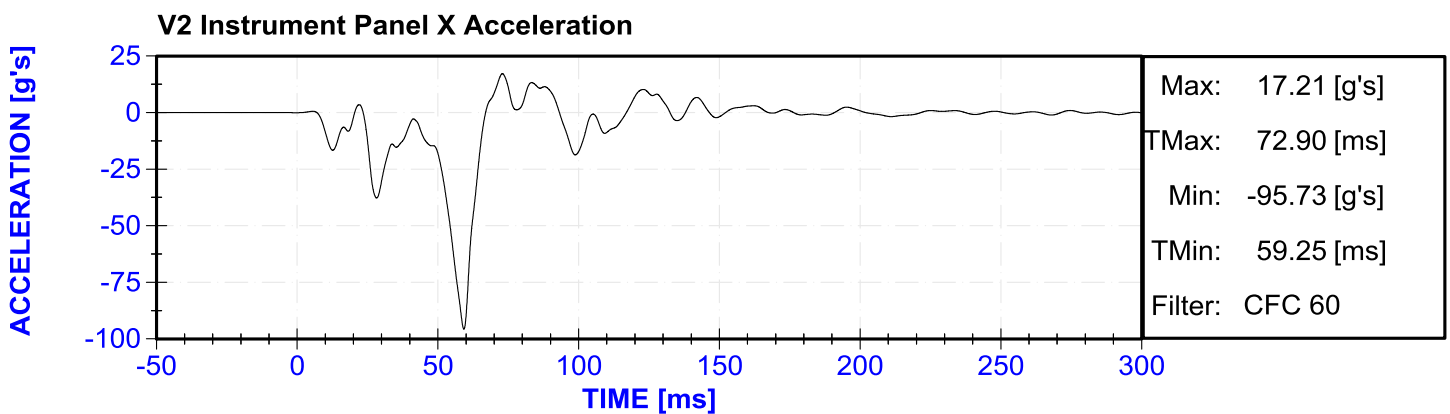
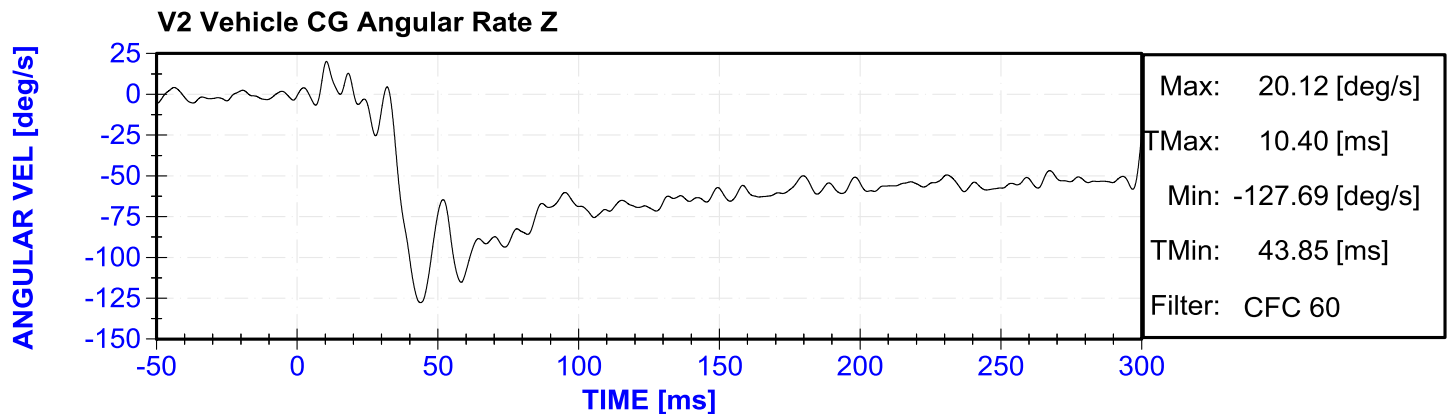
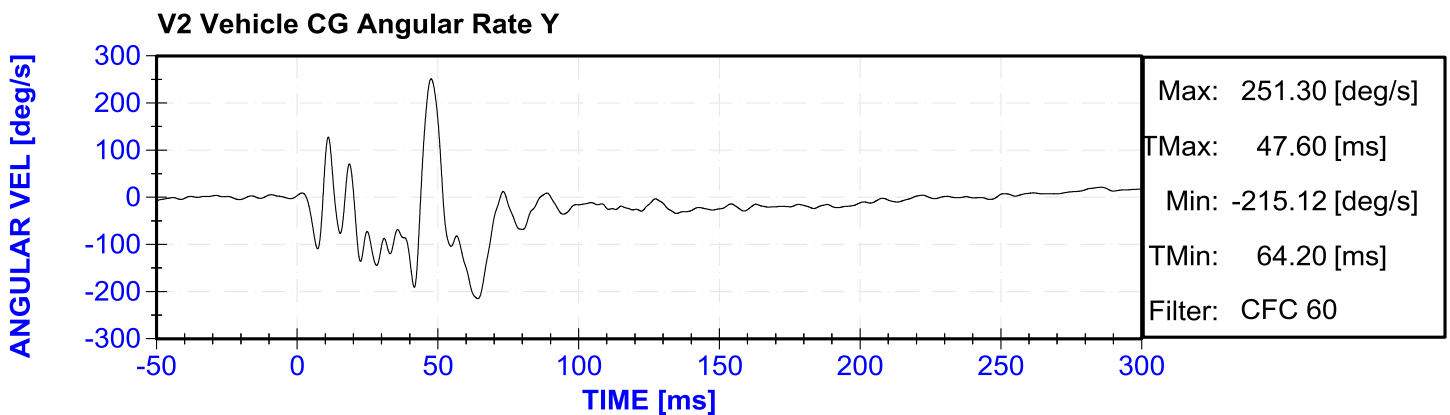
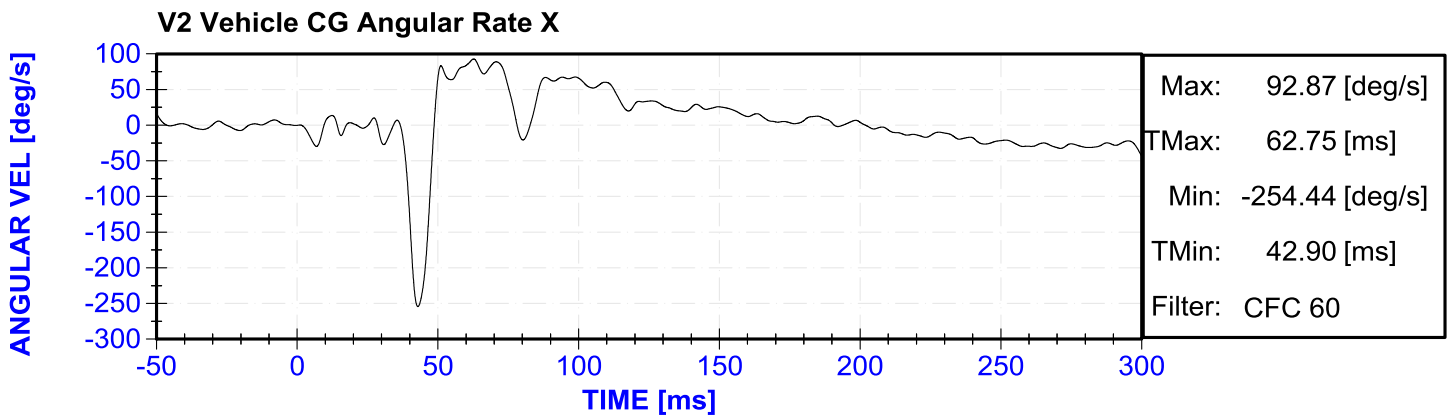
V2 Left Rear Sill Redundant Y Acceleration



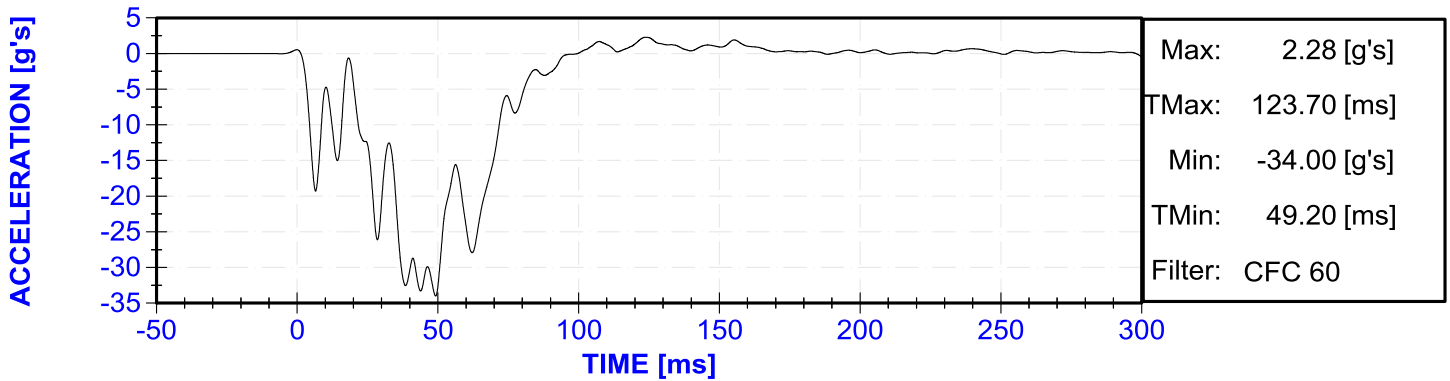
V2 Right Rear Sill X Acceleration



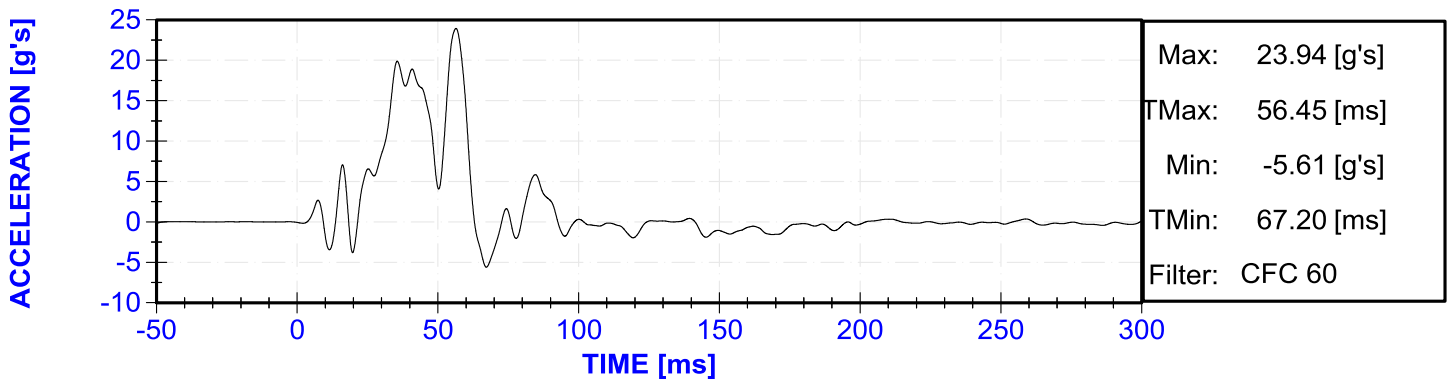




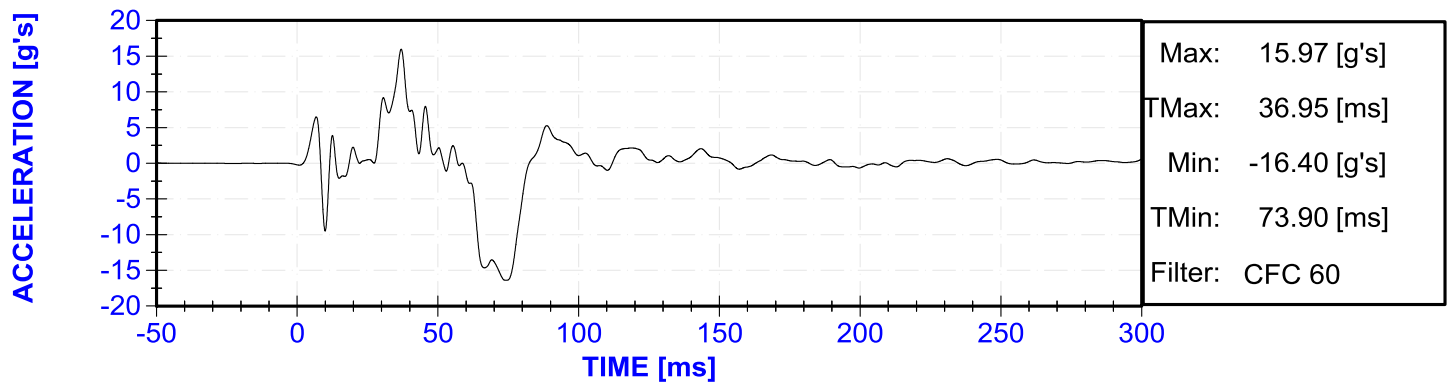
V2 Driver Seat Track X Acceleration



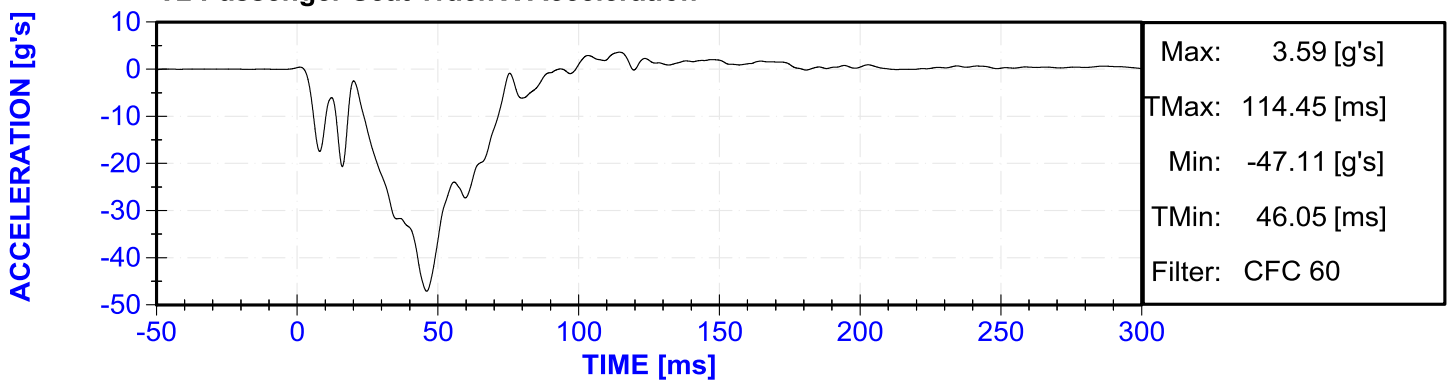
V2 Driver Seat Track Y Acceleration



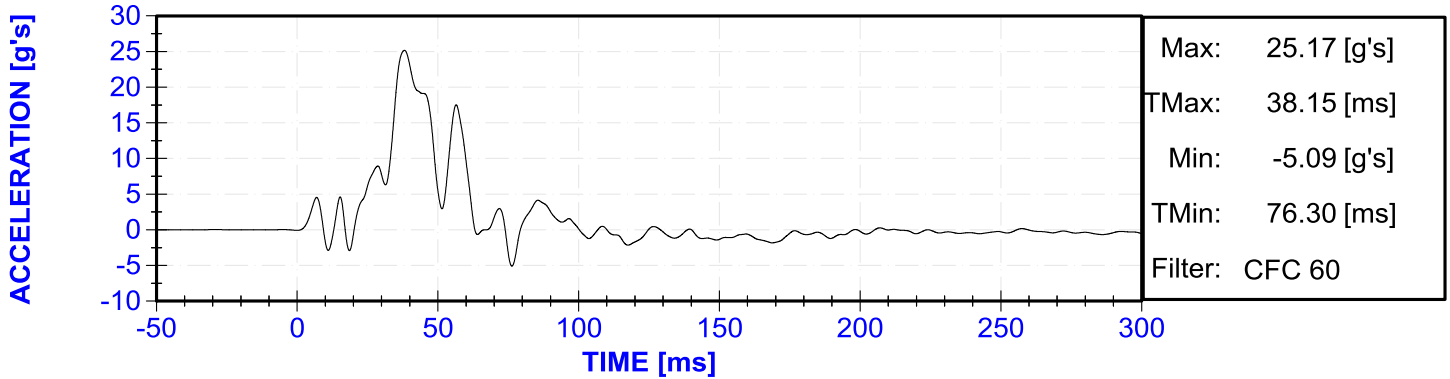
V2 Driver Seat Track Z Acceleration



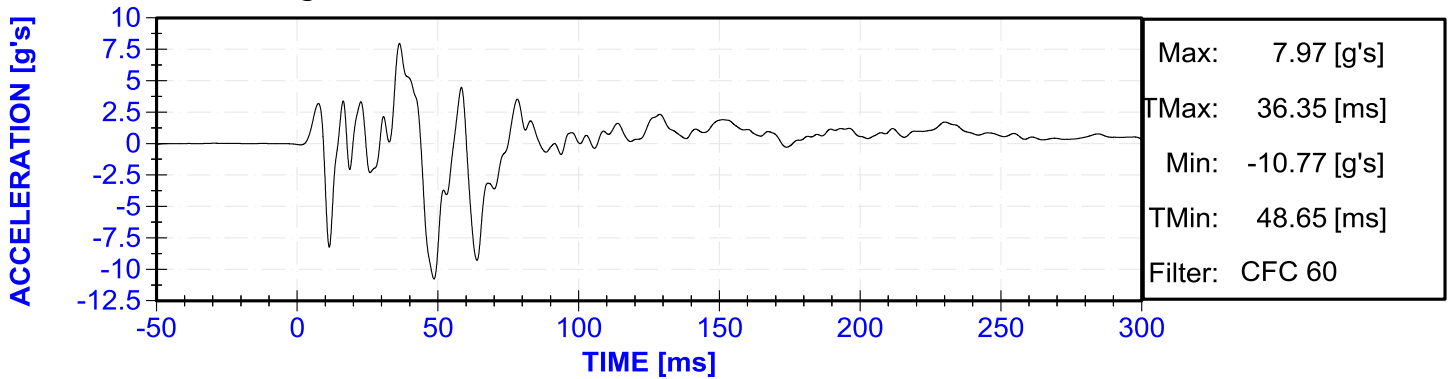
V2 Passenger Seat Track X Acceleration



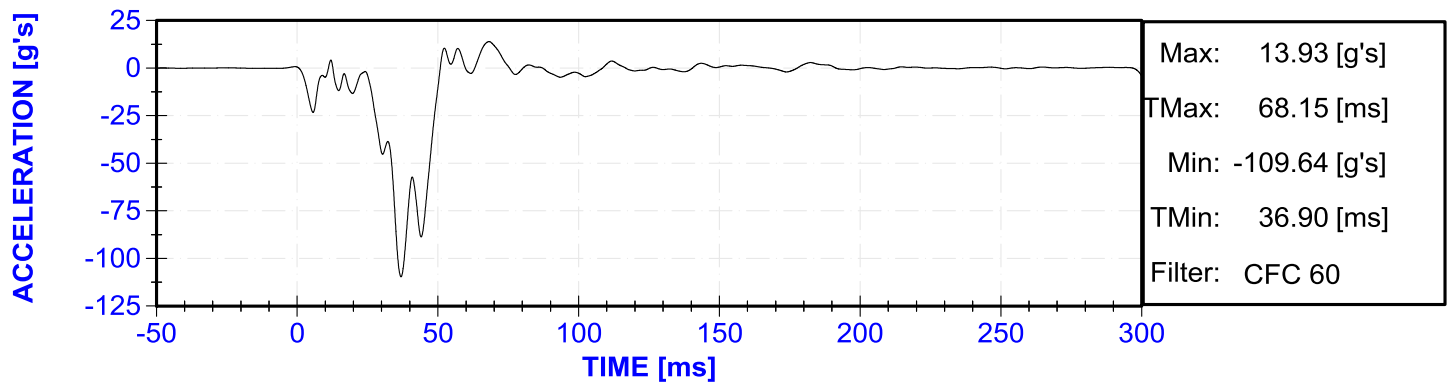
V2 Passenger Seat Track Y Acceleration



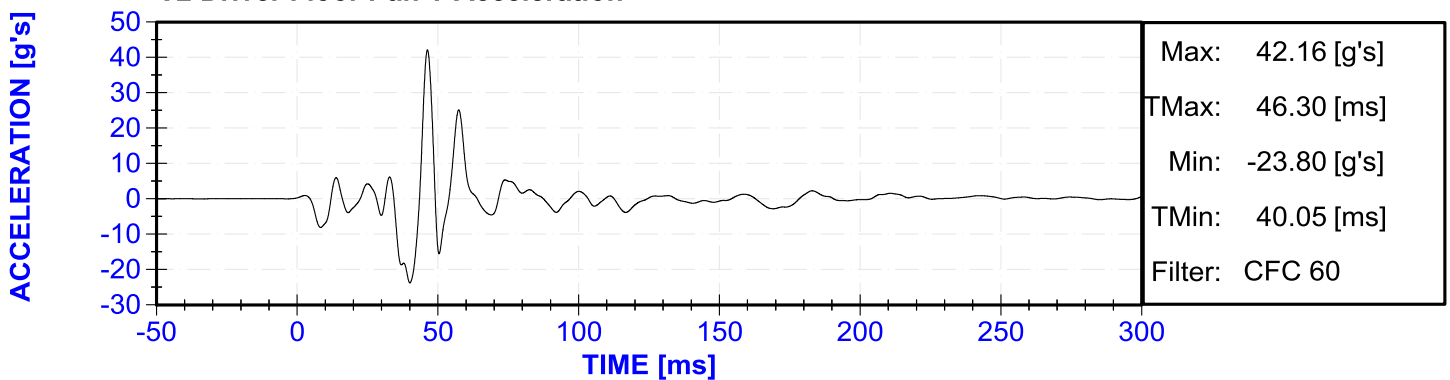
V2 Passenger Seat Track Z Acceleration



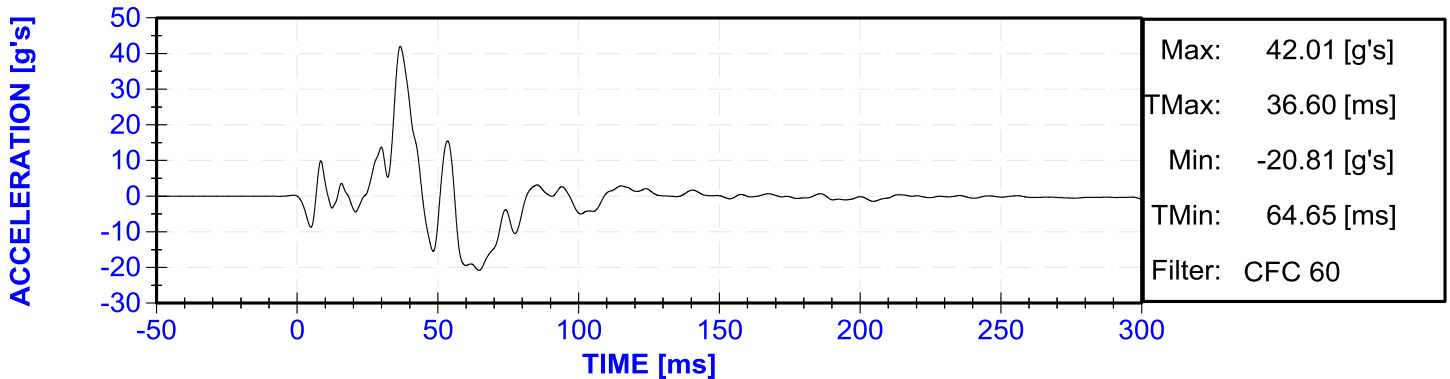
V2 Driver Floor Pan X Acceleration



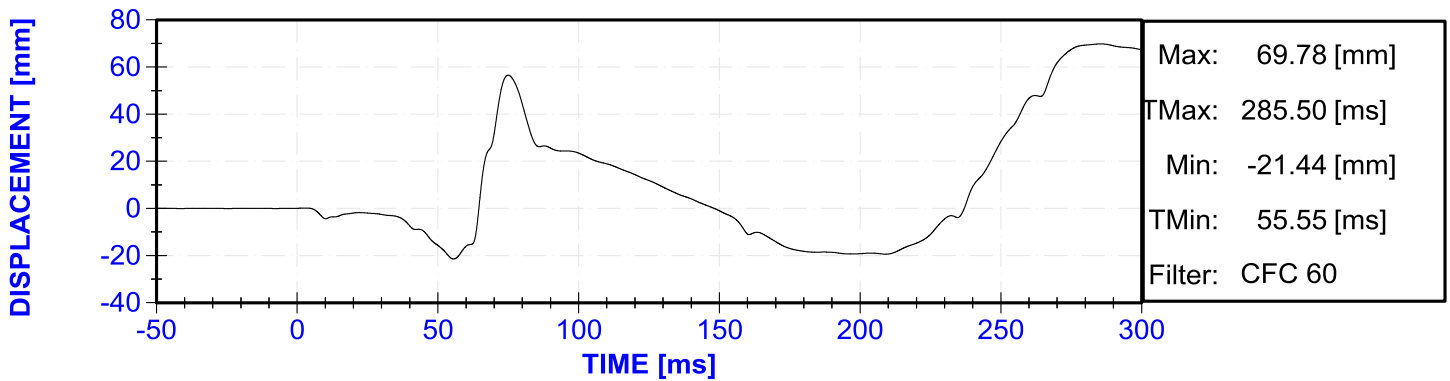
V2 Driver Floor Pan Y Acceleration



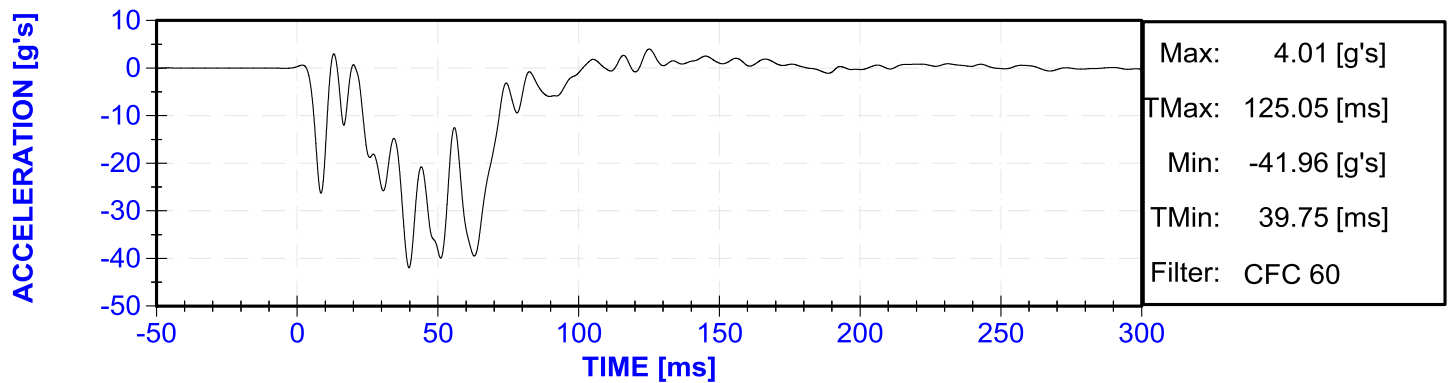
V2 Driver Floor Pan Z Acceleration



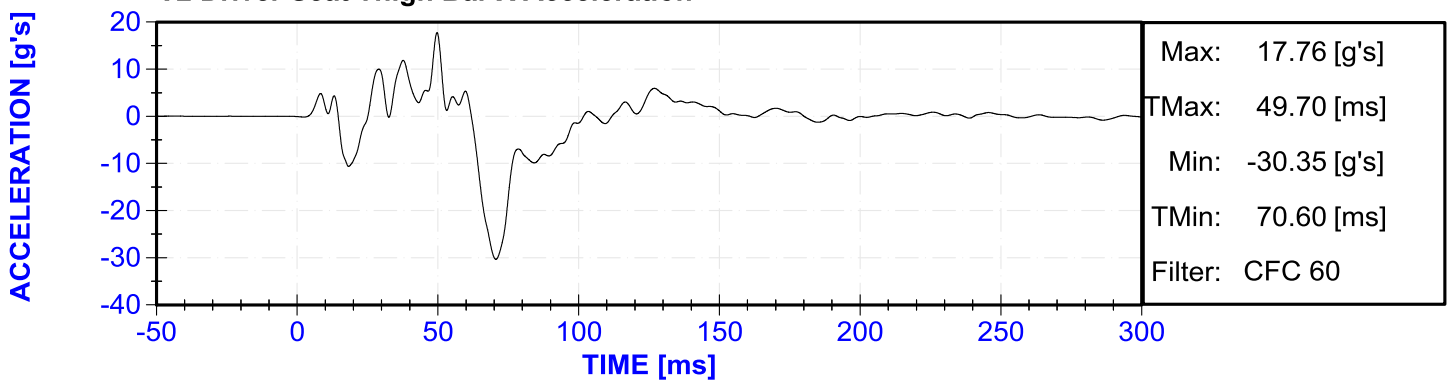
V2 Driver Floor Pan X Deflection



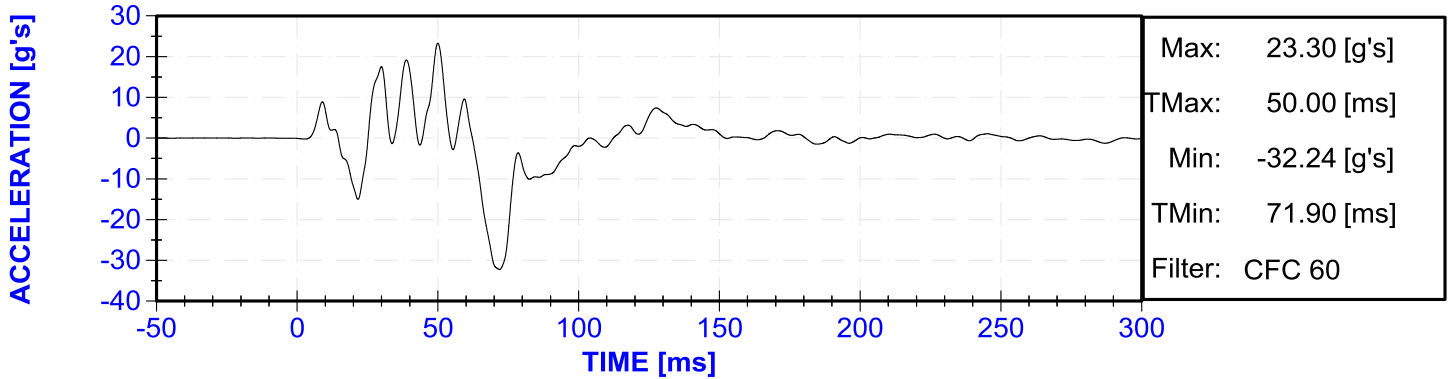
V2 Driver Seat Pan Z Acceleration



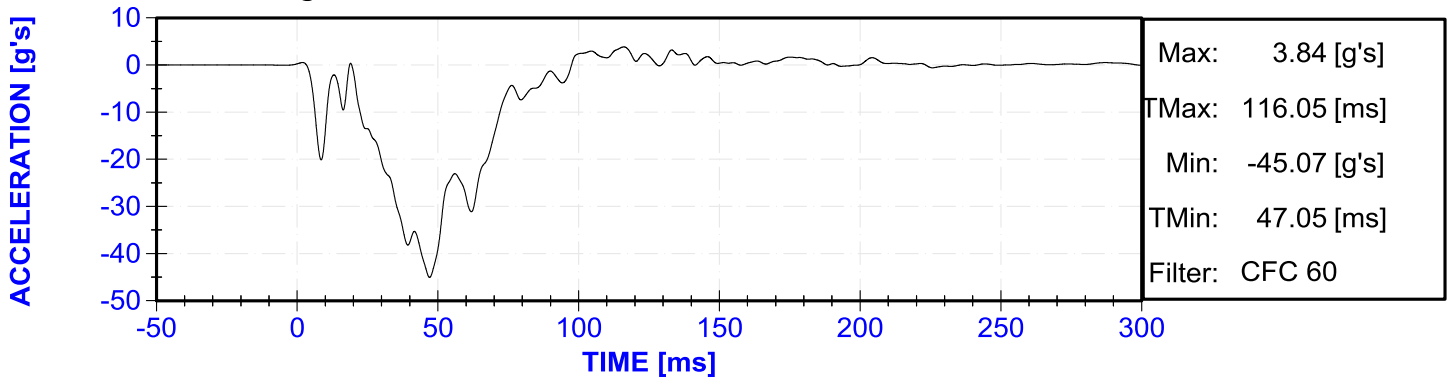
V2 Driver Seat Thigh Bar X Acceleration



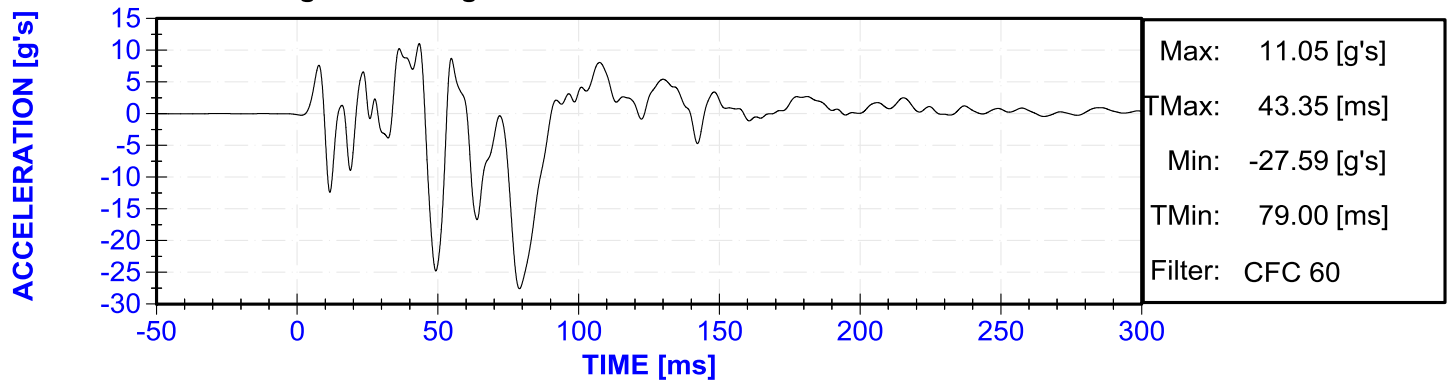
V2 Driver Seat Thigh Bar Z Acceleration



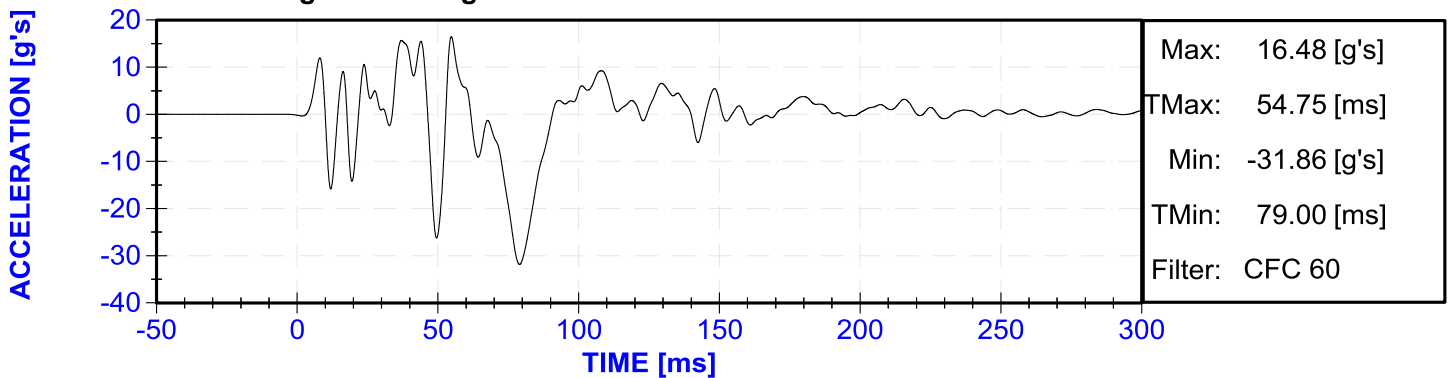
V2 Passenger Seat Pan Z Acceleration

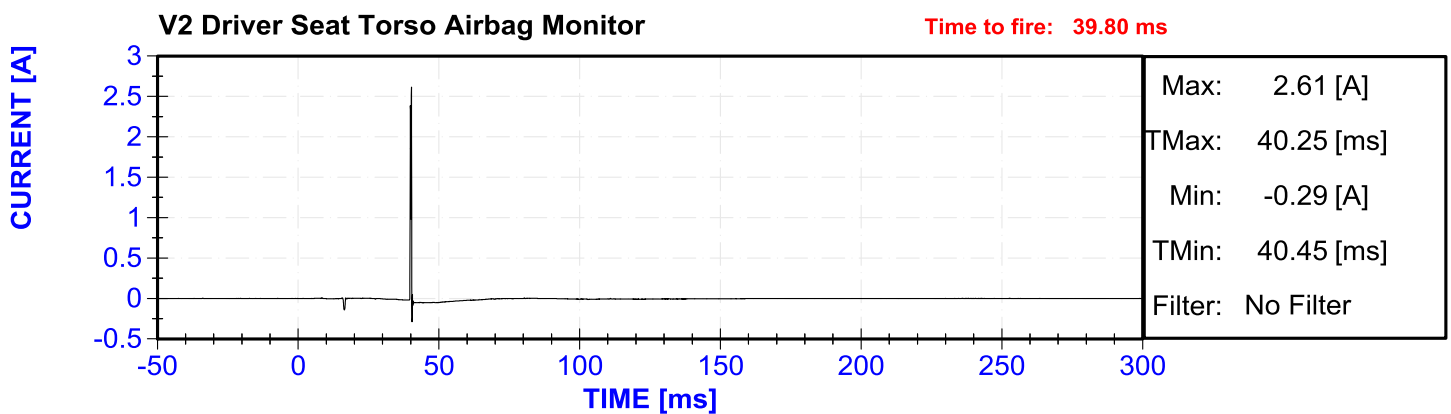
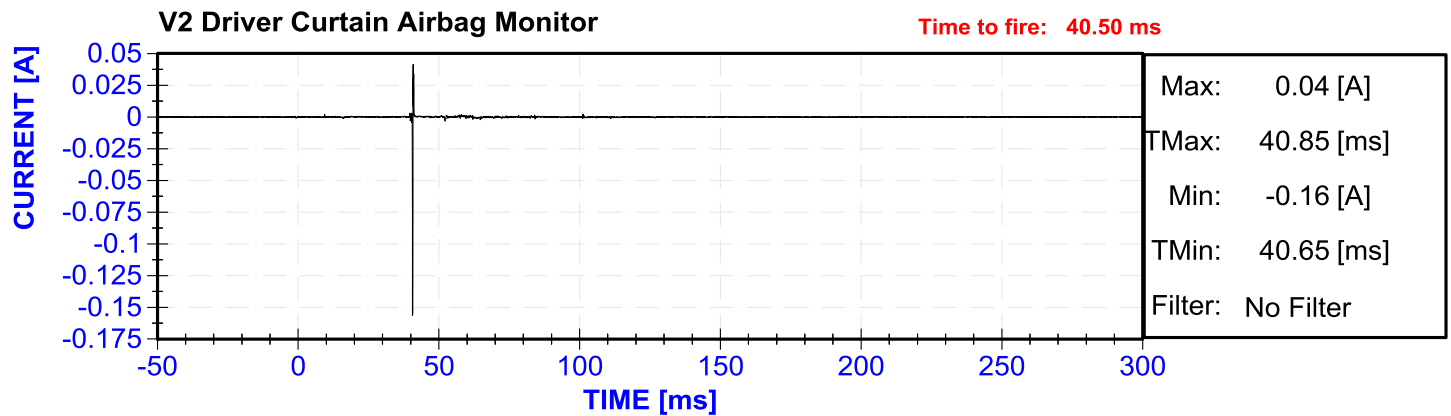
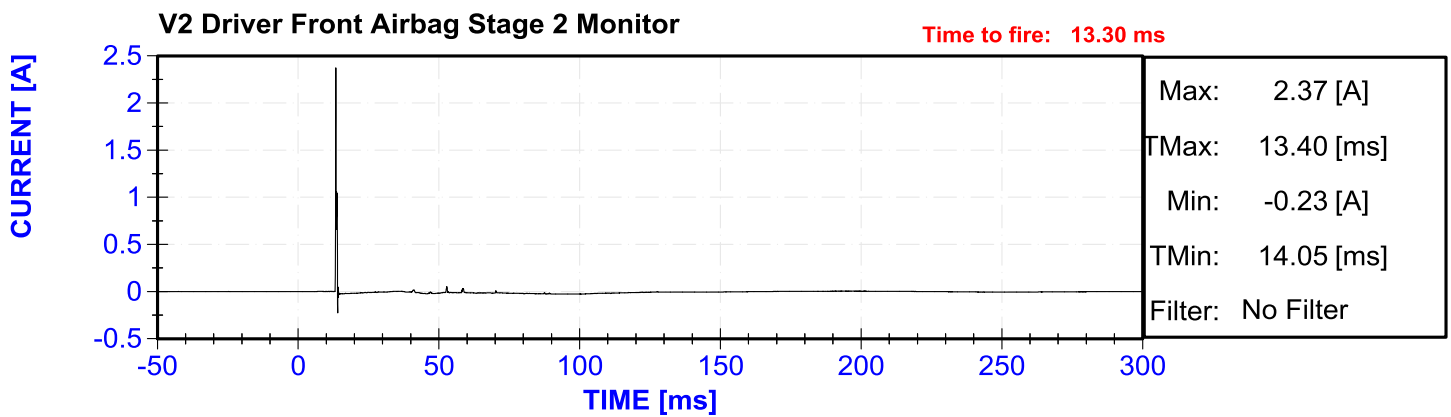
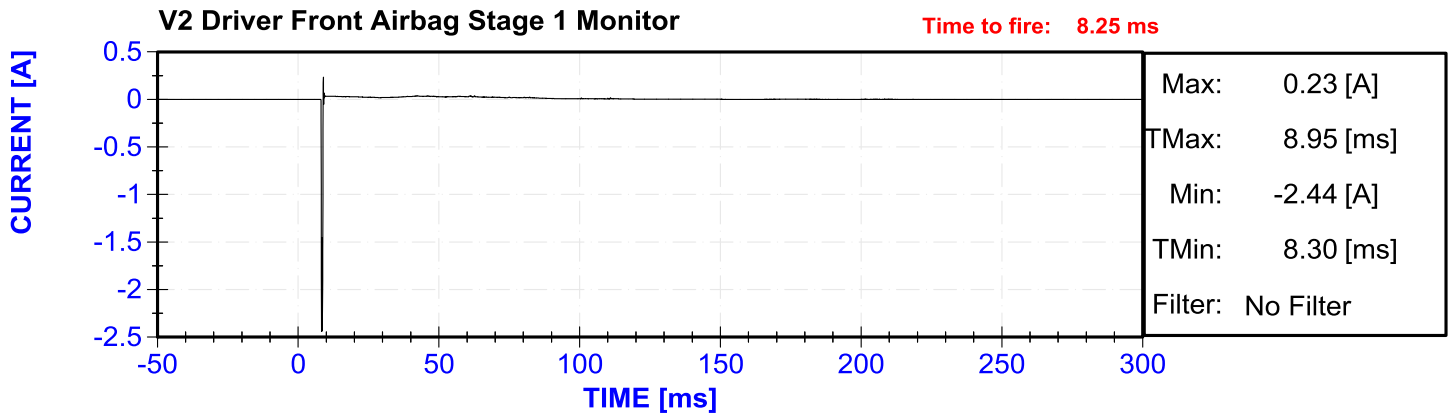


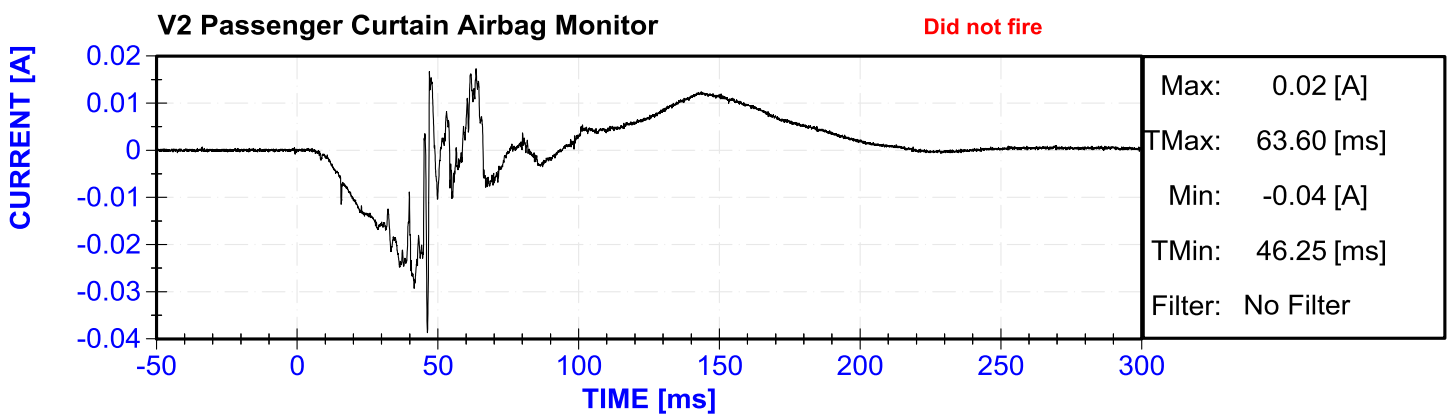
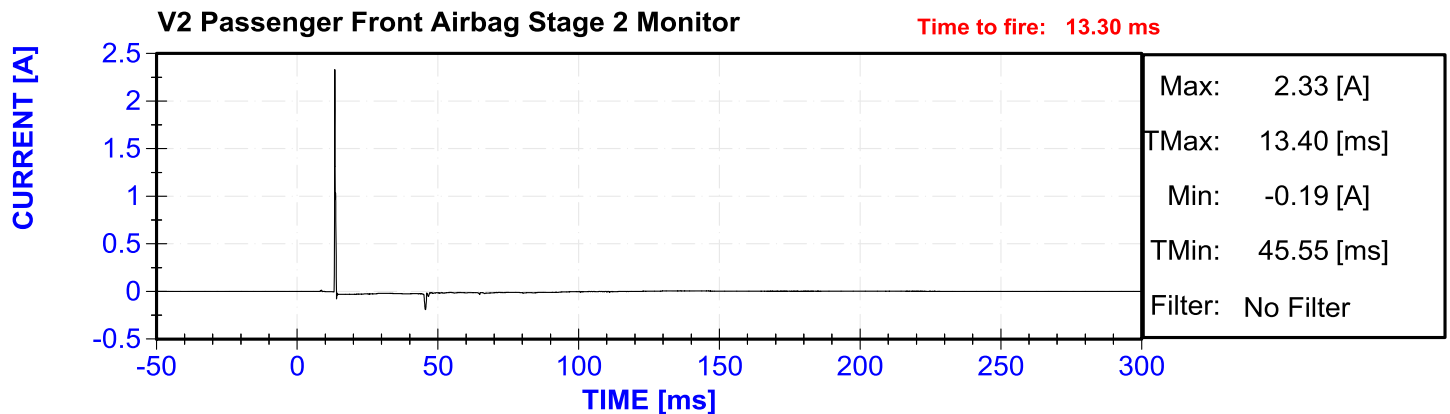
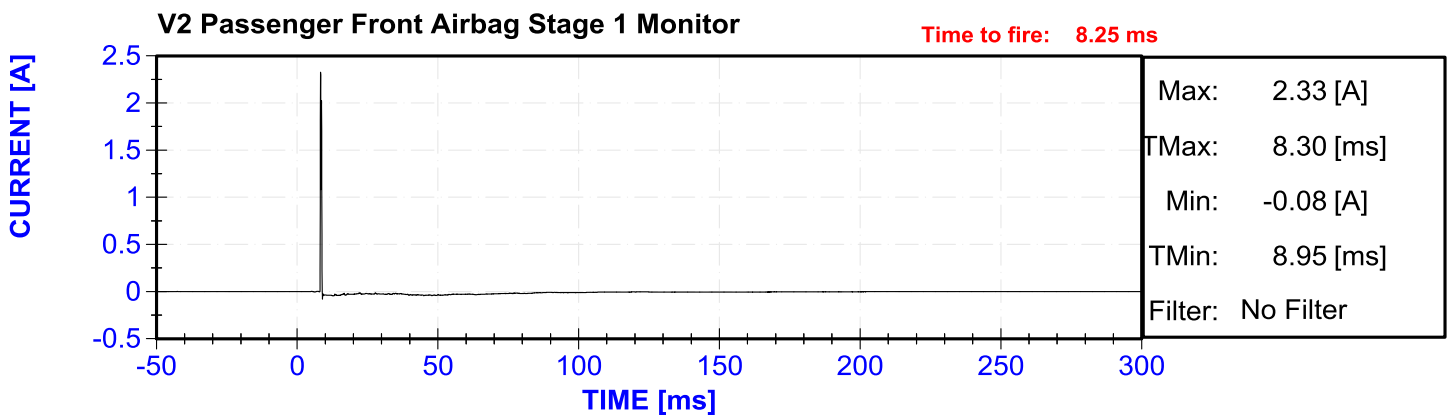
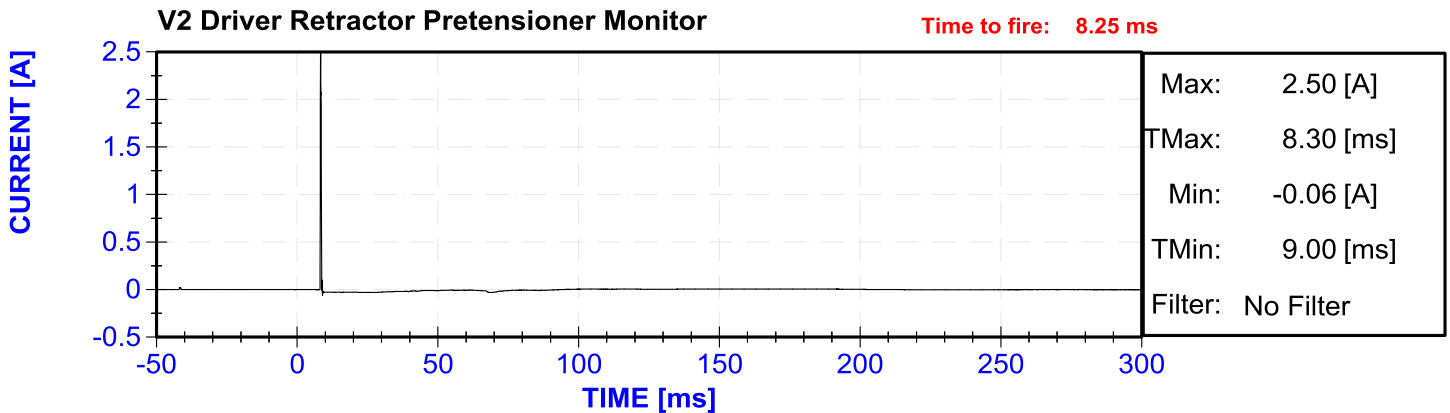
V2 Passenger Seat Thigh Bar X Acceleration



V2 Passenger Seat Thigh Bar Z Acceleration

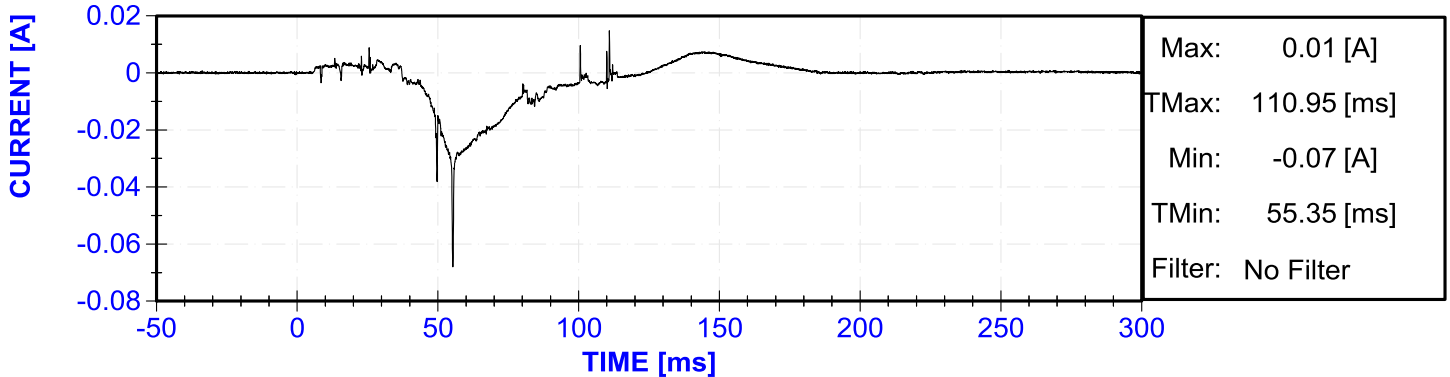






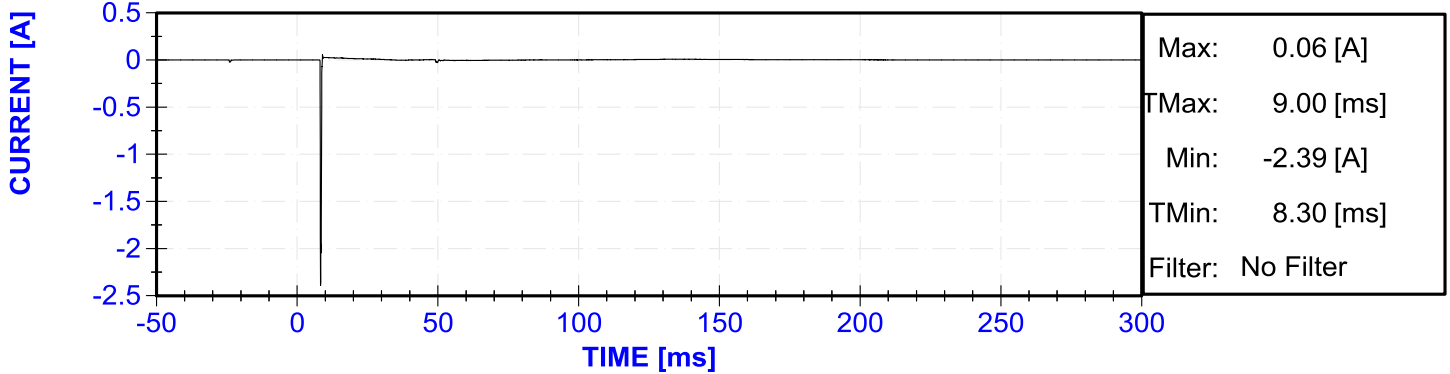
V2 Passenger Seat Torso Airbag Monitor

Did not fire

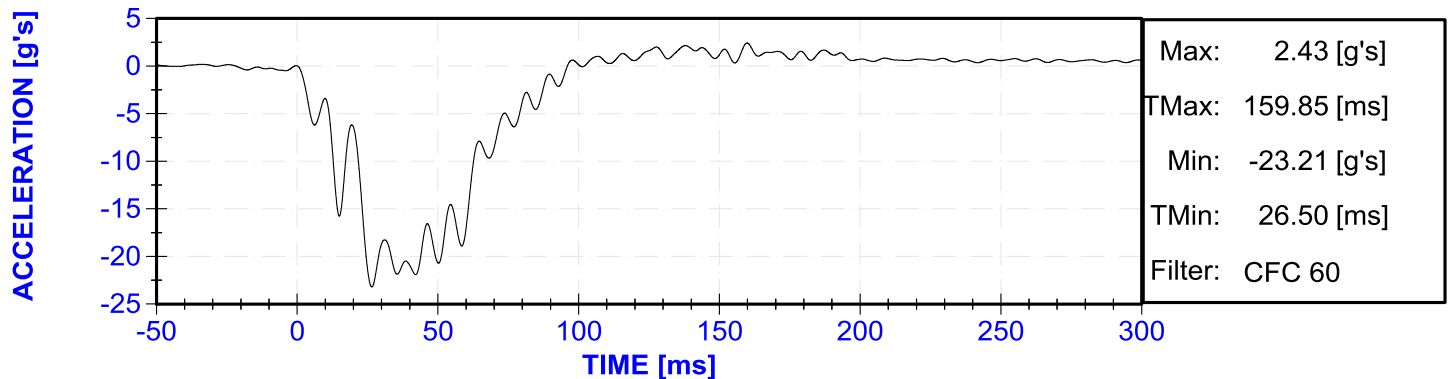


V2 Passenger Retractor Pretensioner Monitor

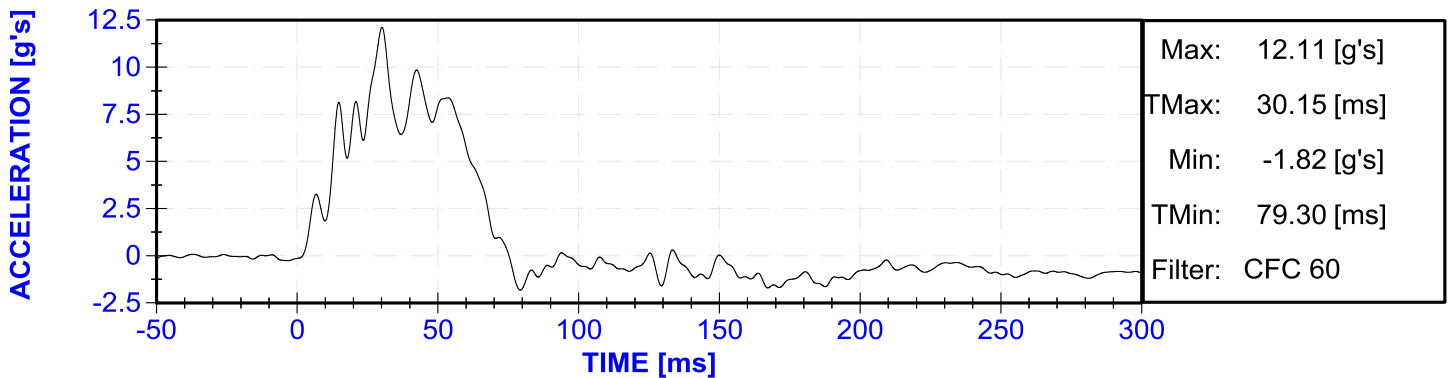
Time to fire: 8.25 ms



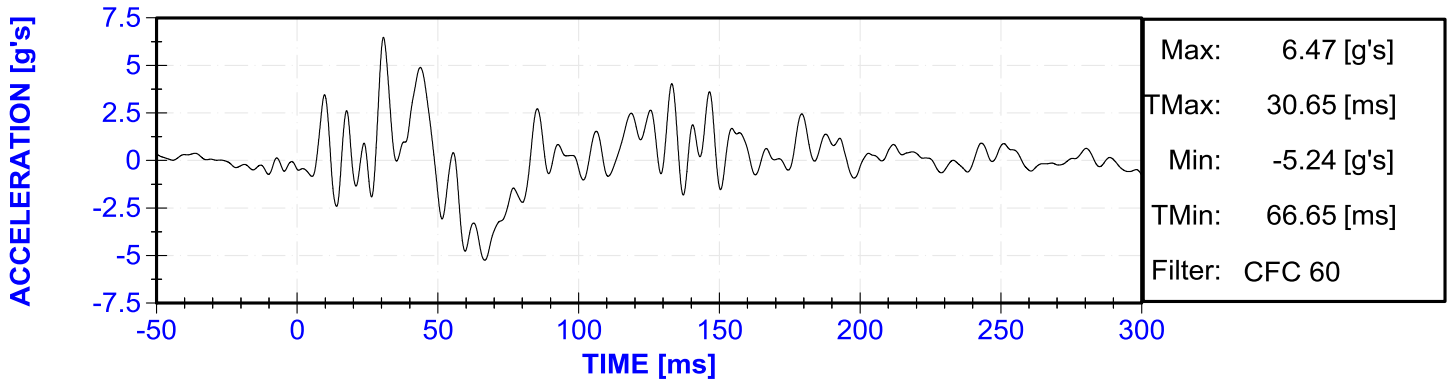
V1 Cart CG X Acceleration



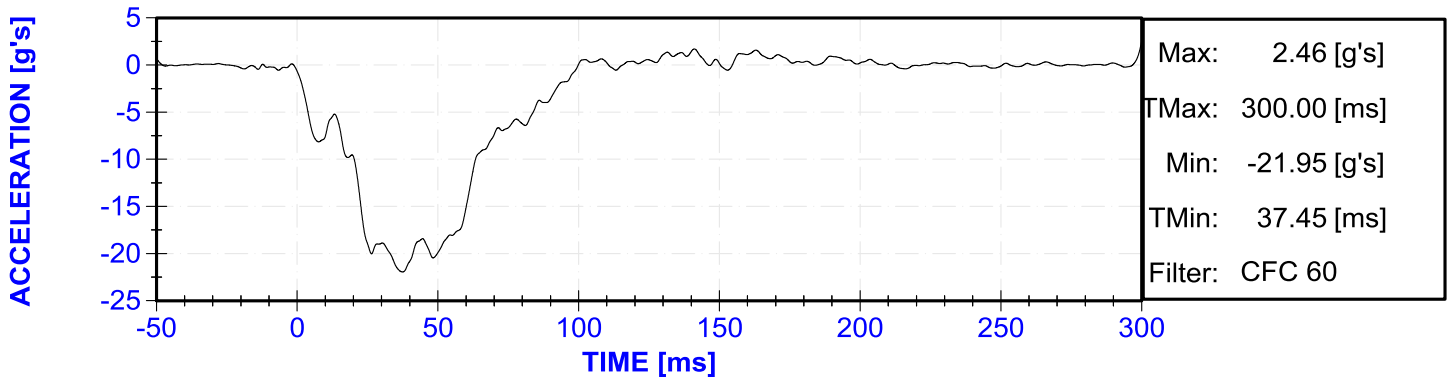
V1 Cart CG Y Acceleration



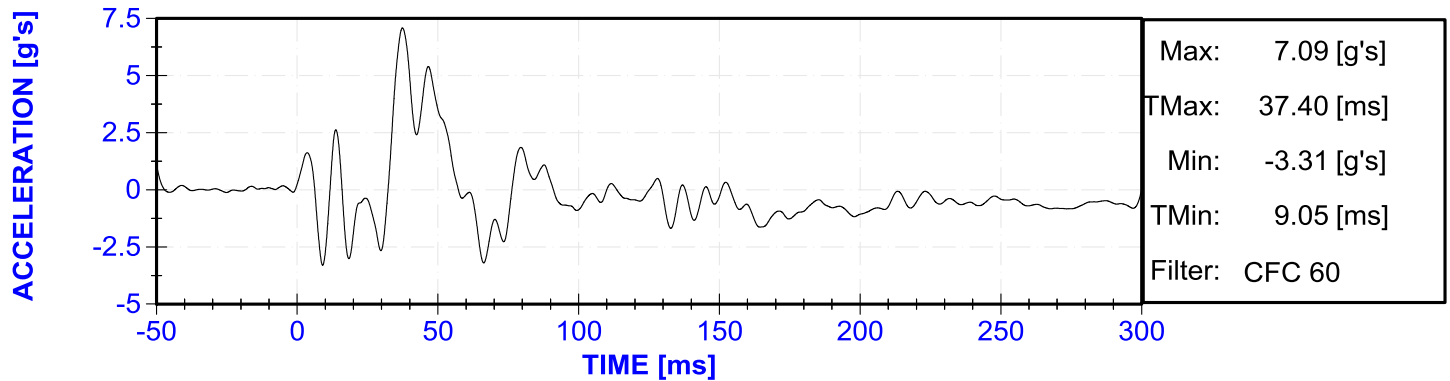
V1 Cart CG Z Acceleration



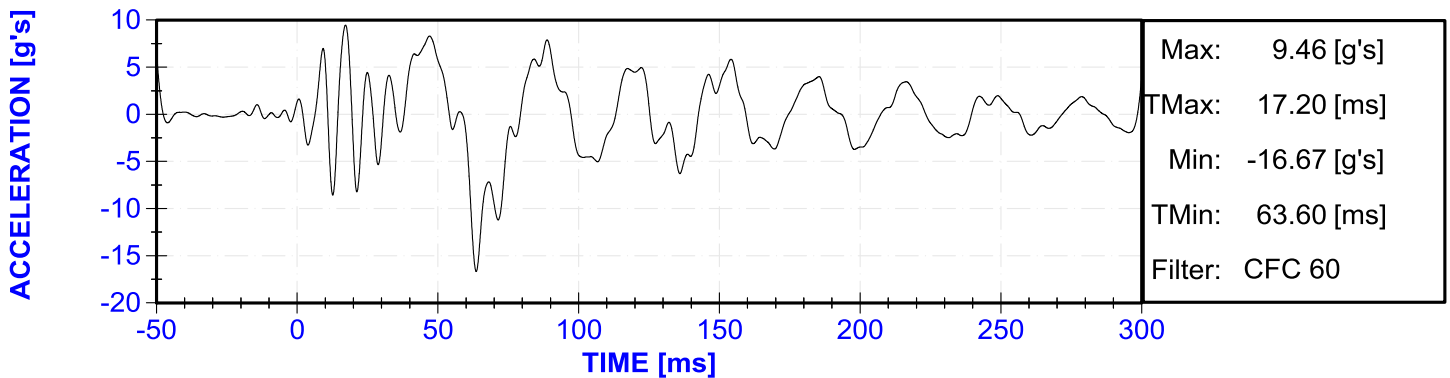
V1 Cart Rear C/L X Acceleration



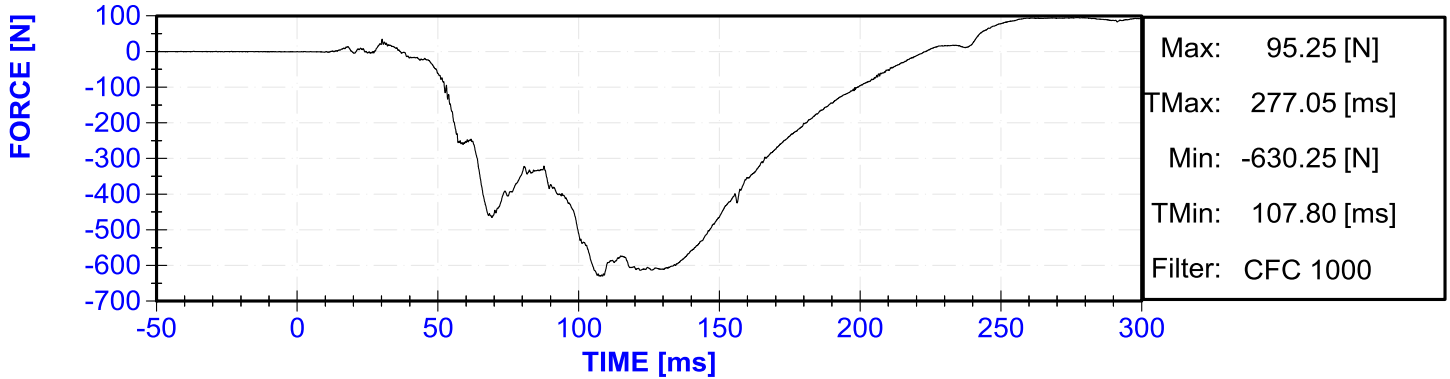
V1 Cart Rear C/L Y Acceleration



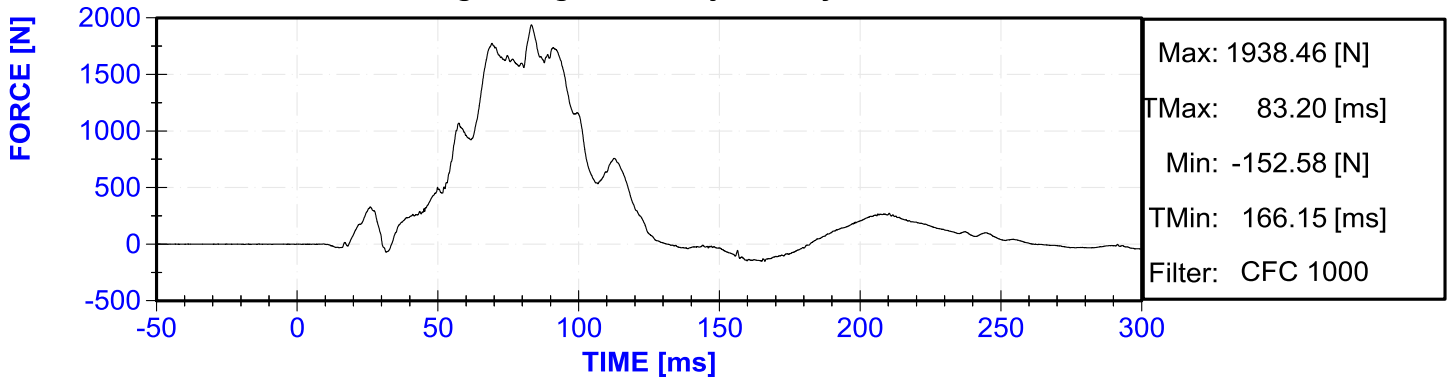
V1 Cart Rear C/L Z Acceleration



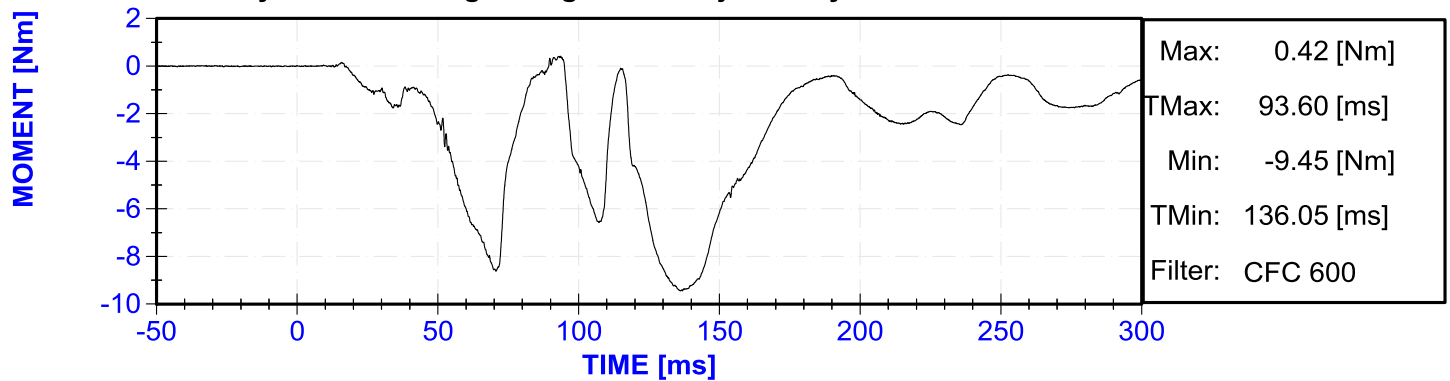
V2P1 Fx on head acting through the O.C. joint only



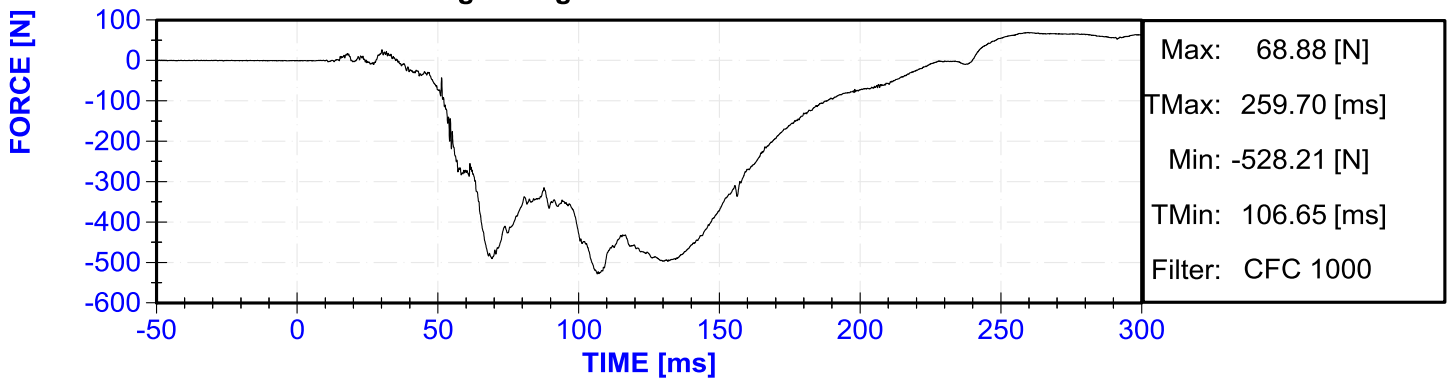
V2P1 Fz on head acting through the O.C. joint only



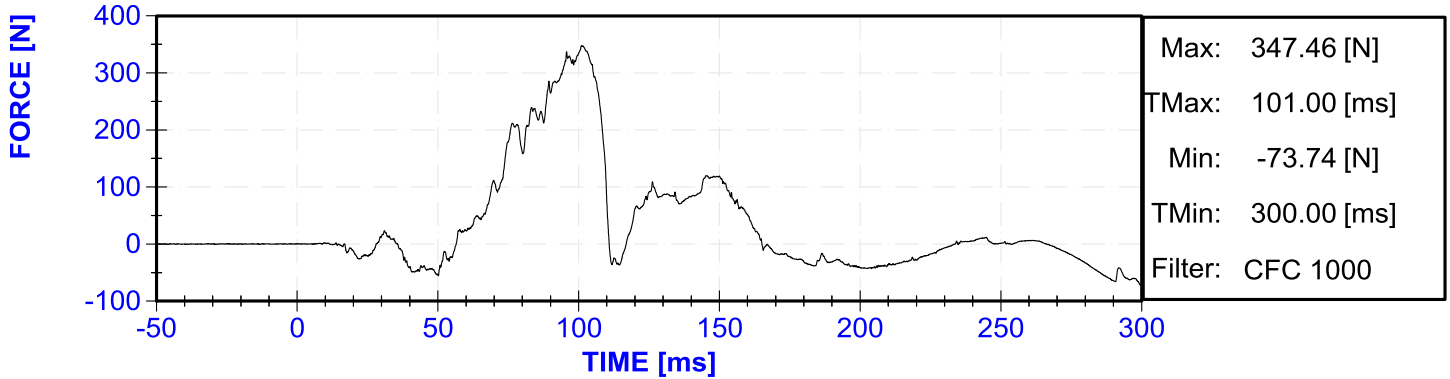
V2P1 My on head acting through the O.C. joint only



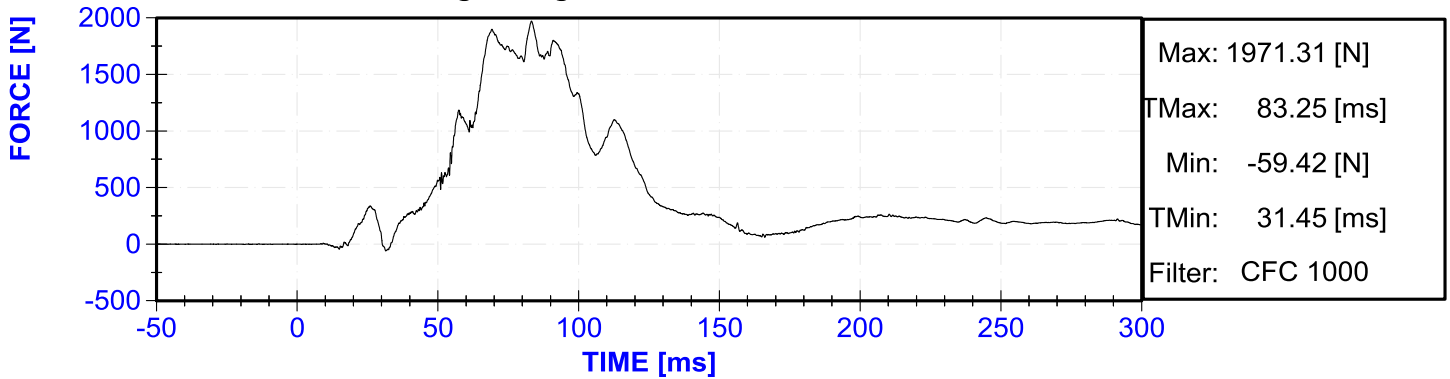
V2P1 Fx on head acting through the total neck section



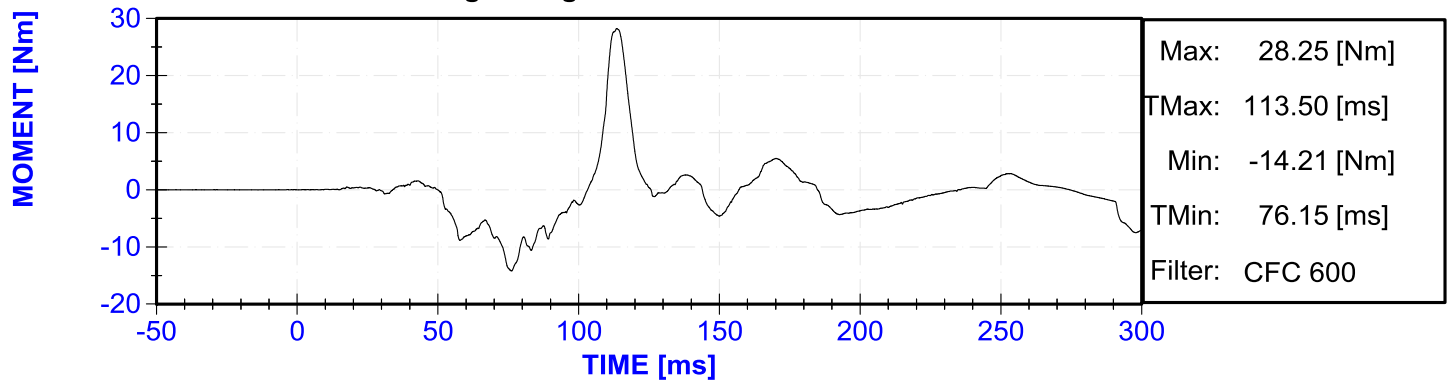
V2P1 Fy on head acting through the total neck section



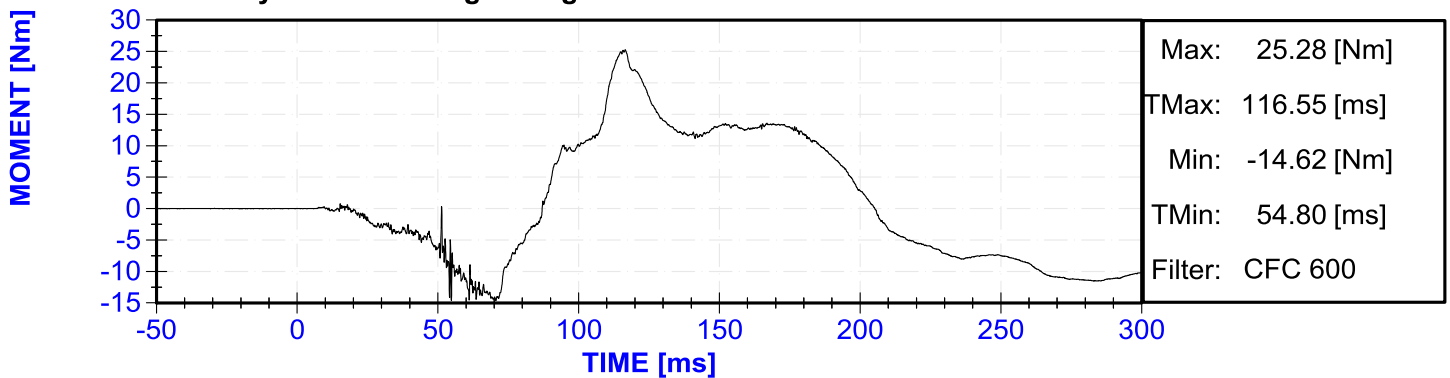
V2P1 Fz on head acting through the total neck section



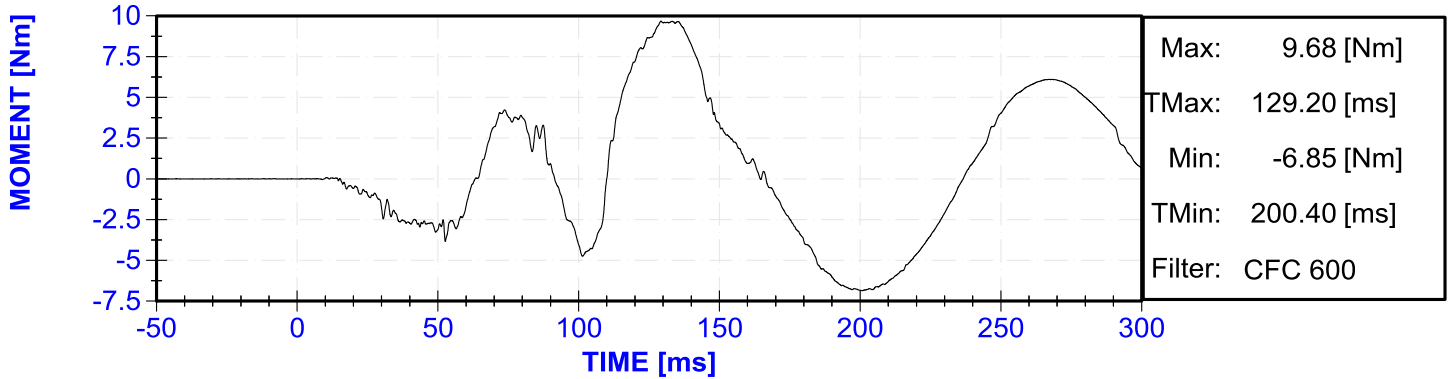
V2P1 Mx on head acting through the total neck section



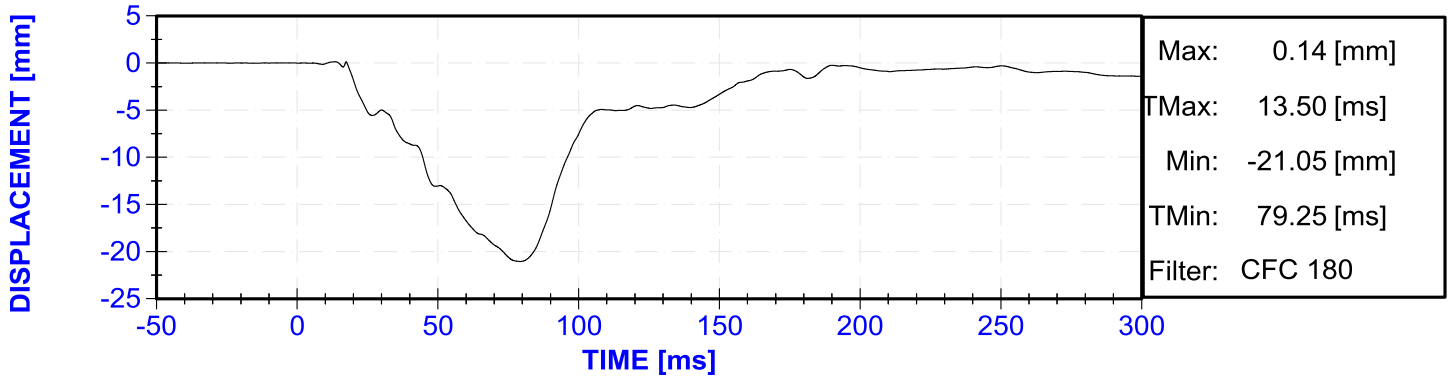
V2P1 My on head acting through the total neck section



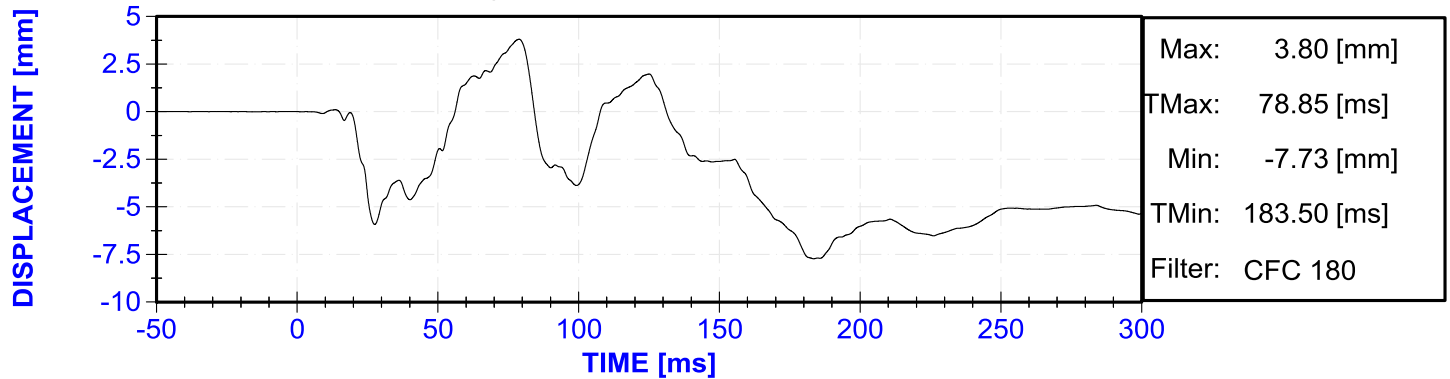
V2P1 Mz on head acting through the total neck section



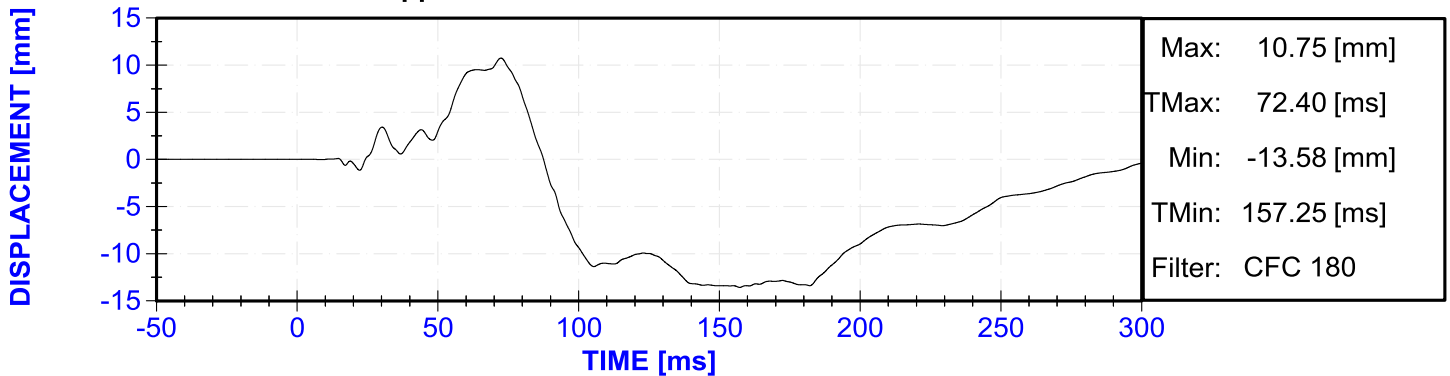
V2P1 Chest Left Upper Dx



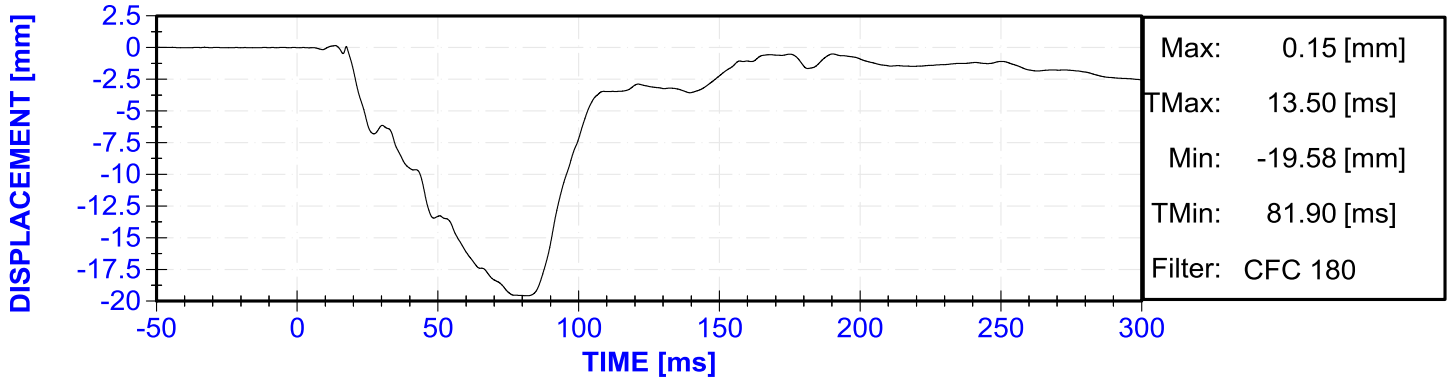
V2P1 Chest Left Upper Dy



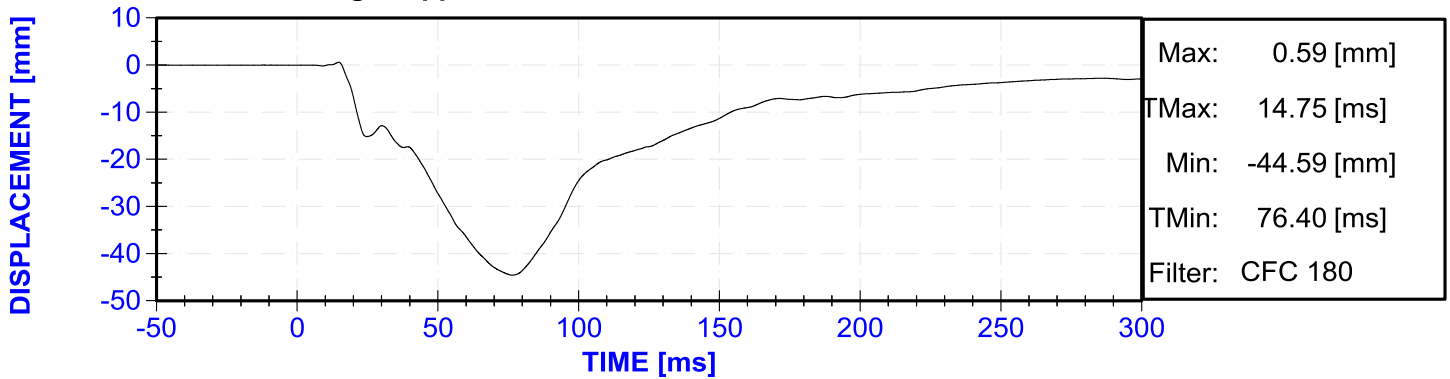
V2P1 Chest Left Upper Dz



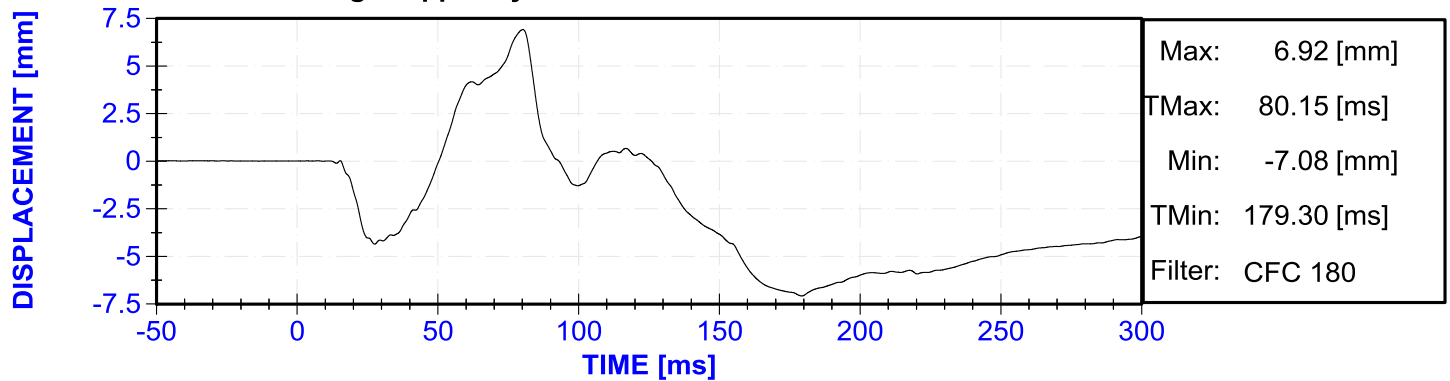
V2P1 Chest Left Upper D



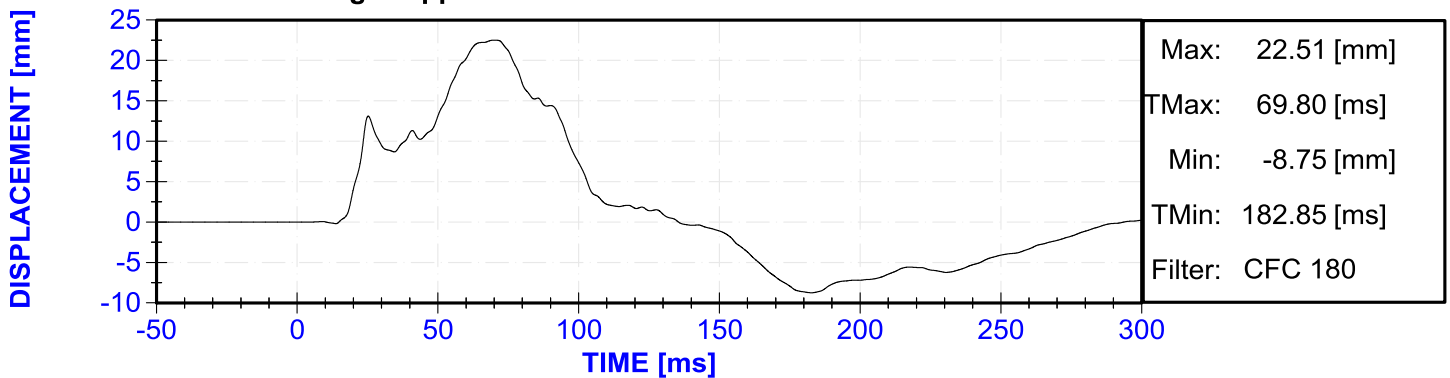
V2P1 Chest Right Upper Dx

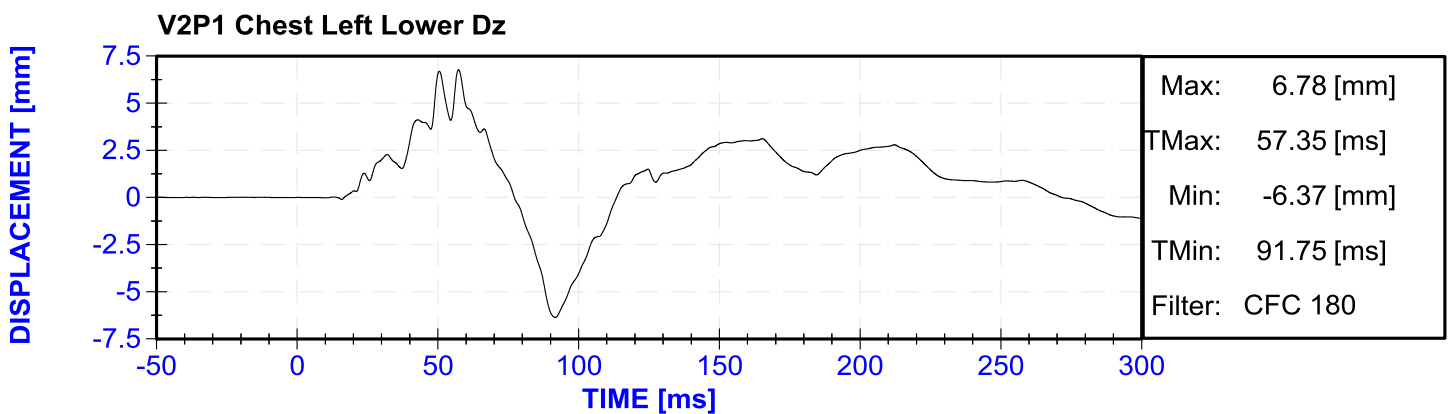
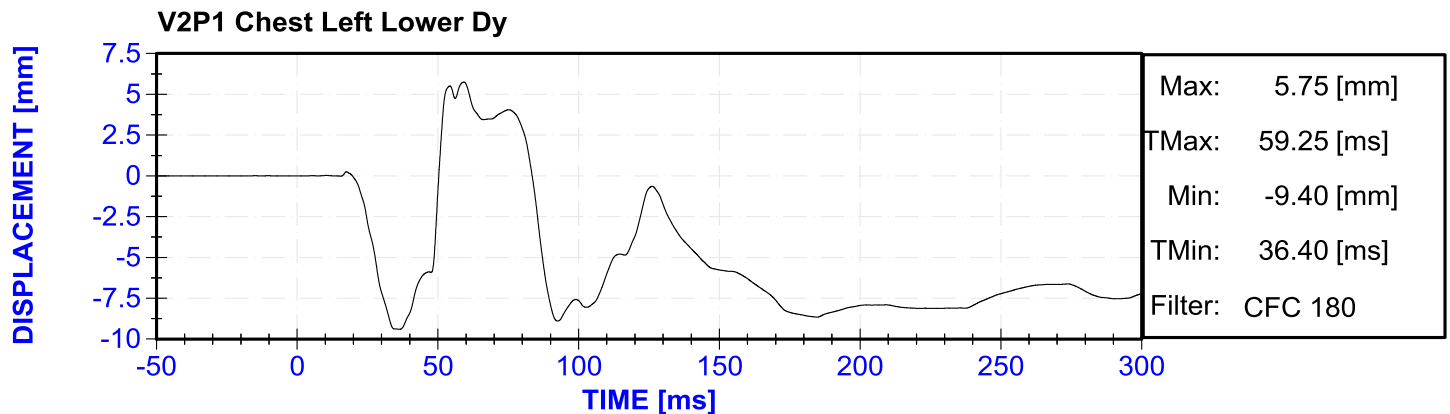
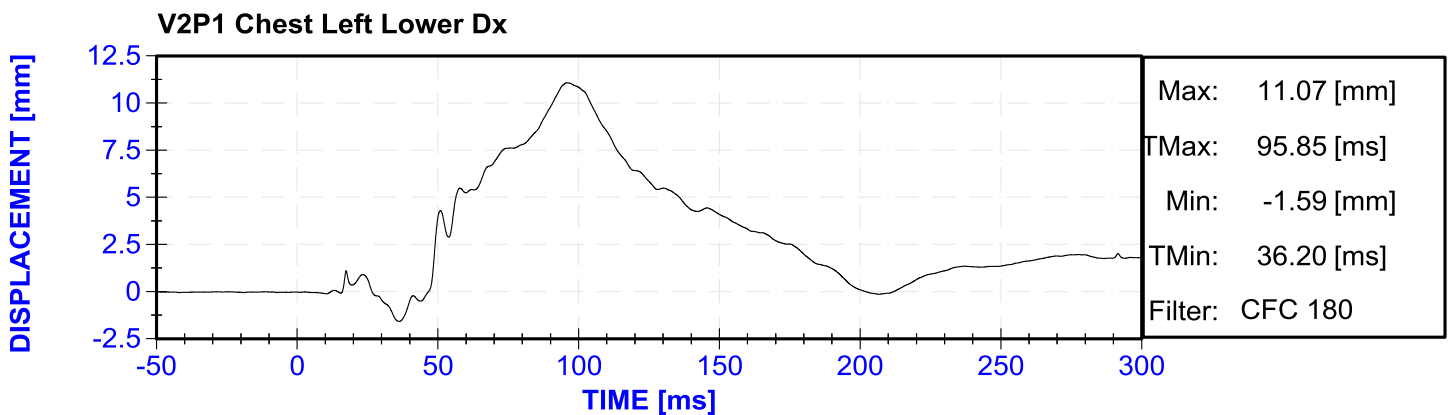
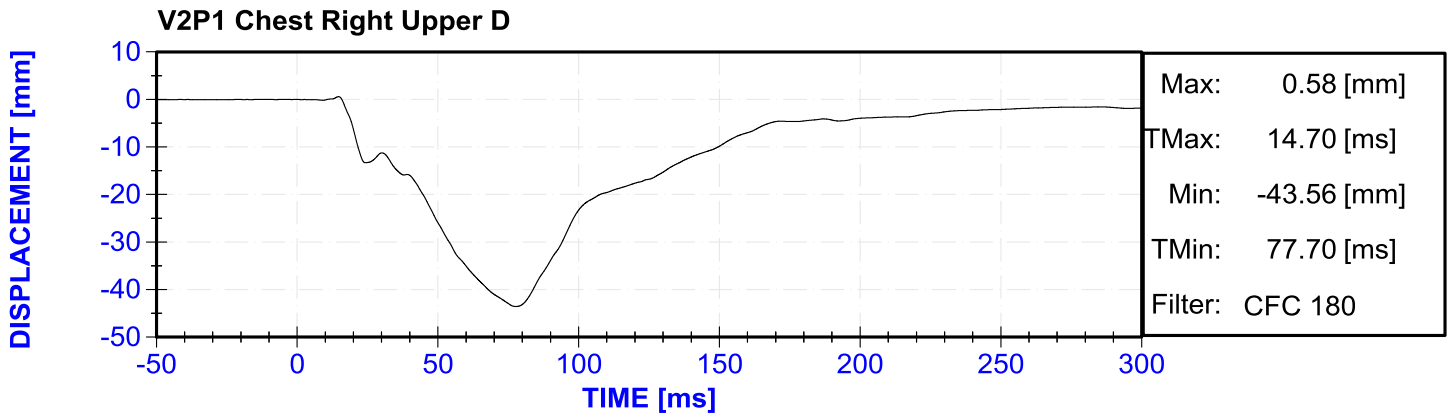


V2P1 Chest Right Upper Dy

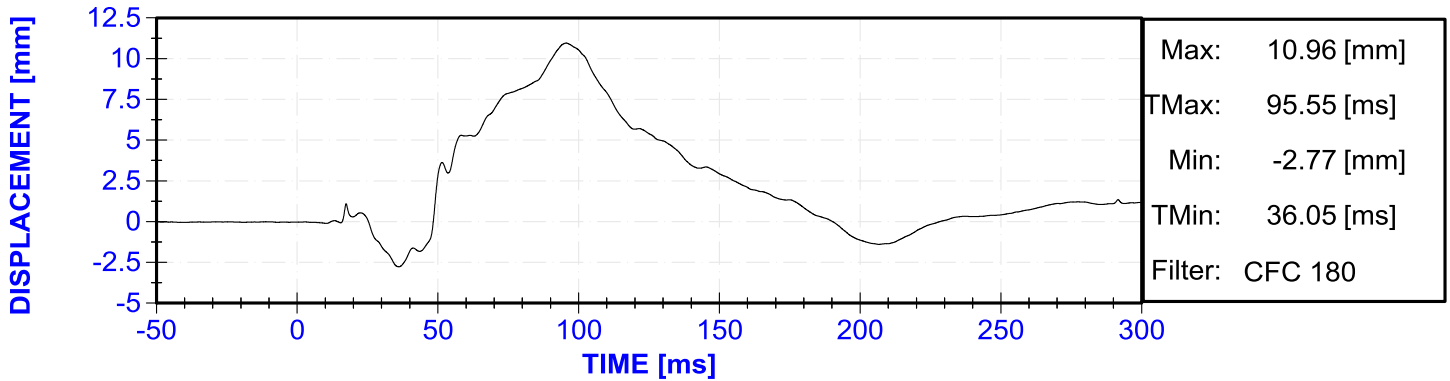


V2P1 Chest Right Upper Dz

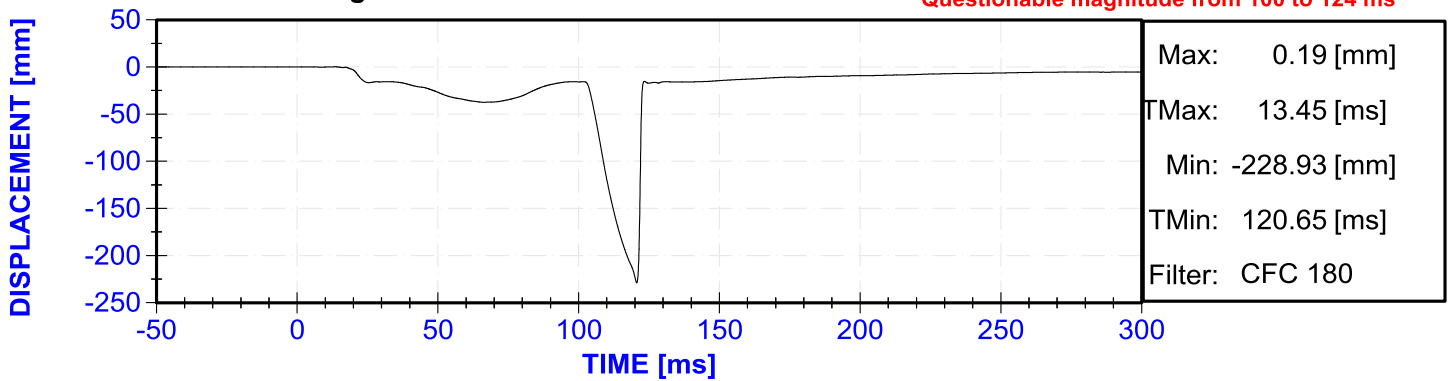




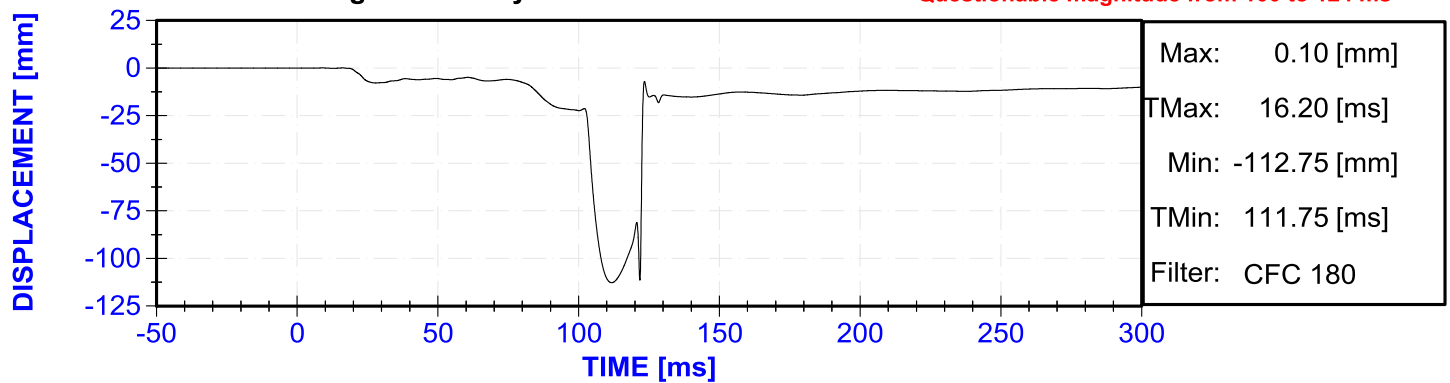
V2P1 Chest Left Lower D



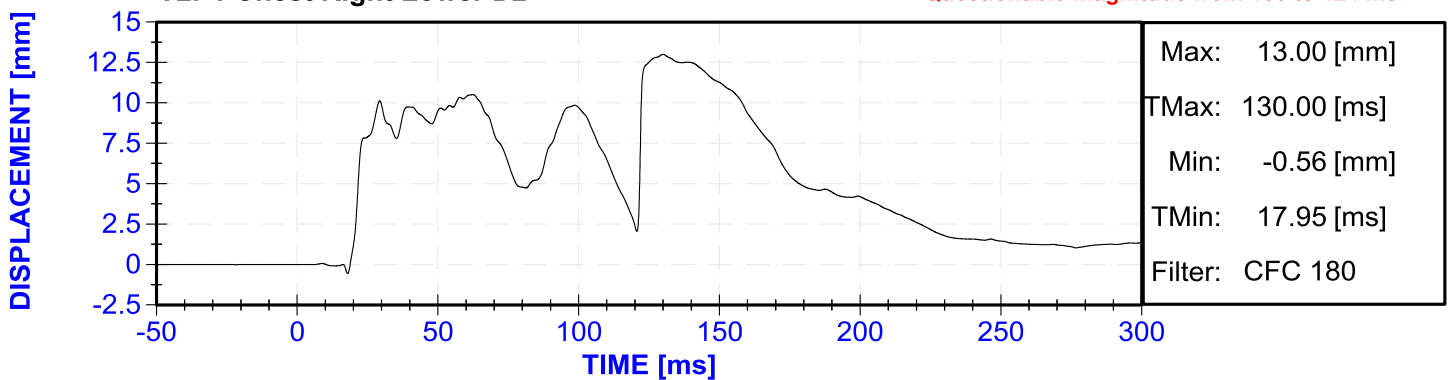
V2P1 Chest Right Lower Dx

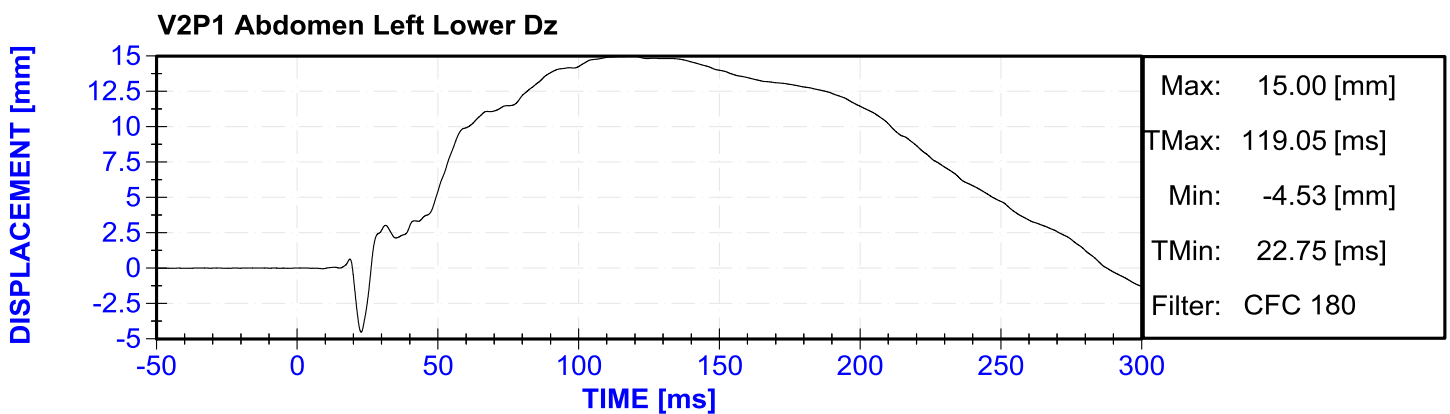
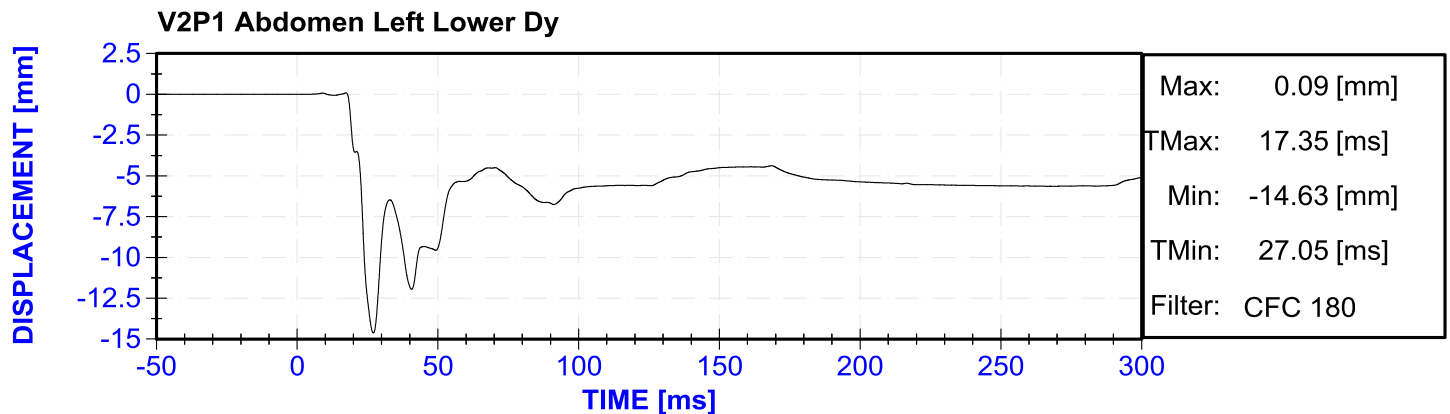
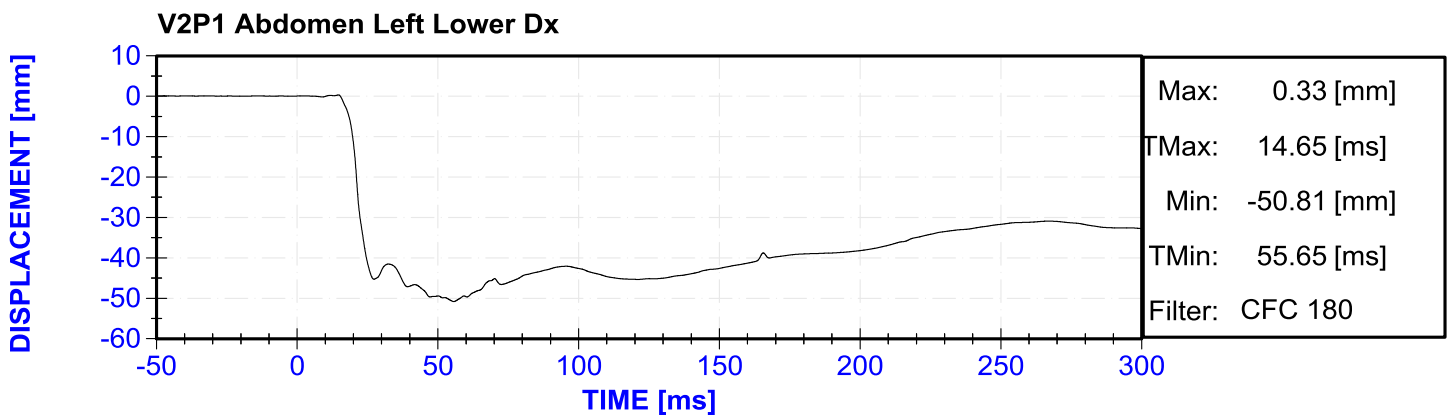
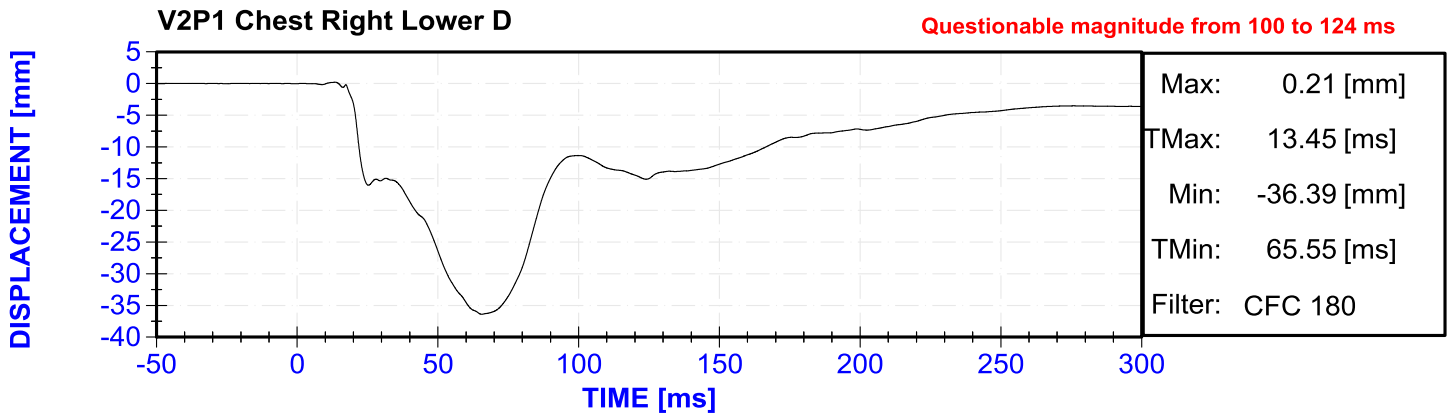


V2P1 Chest Right Lower Dy

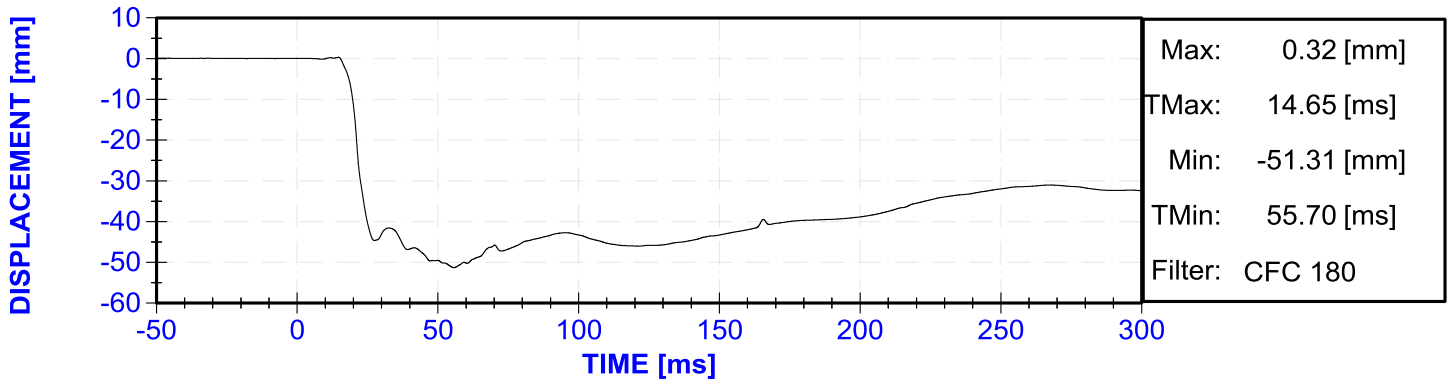


V2P1 Chest Right Lower Dz

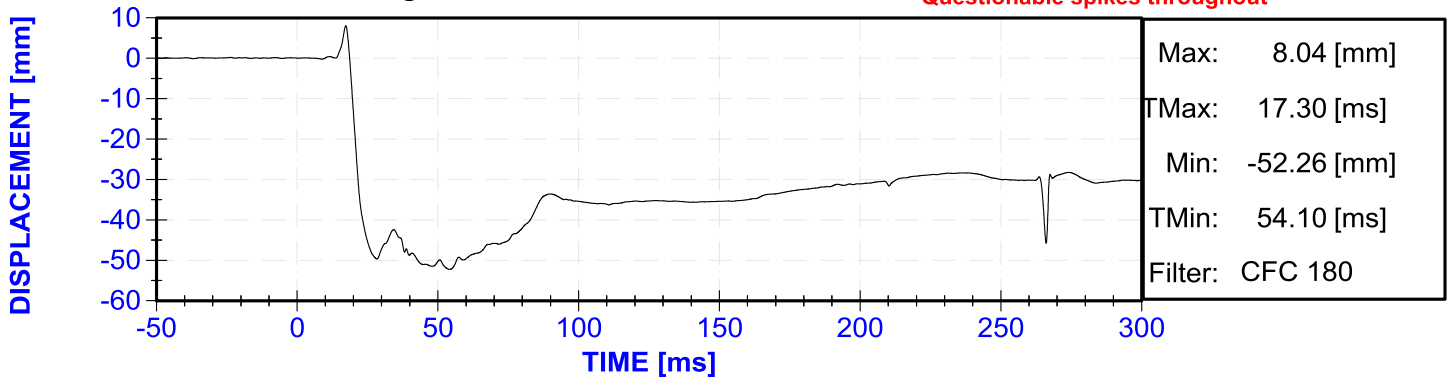




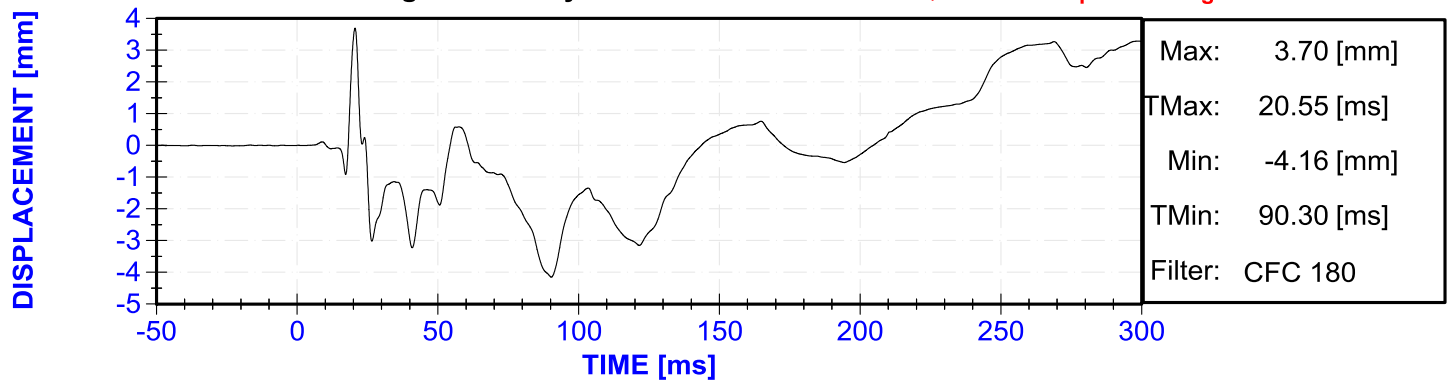
V2P1 Abdomen Left Lower D



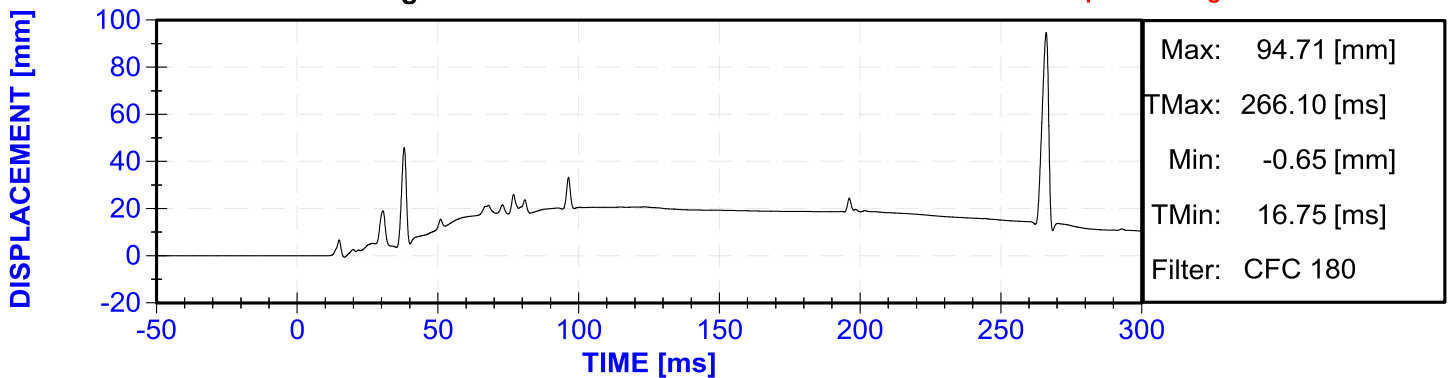
V2P1 Abdomen Right Lower Dx

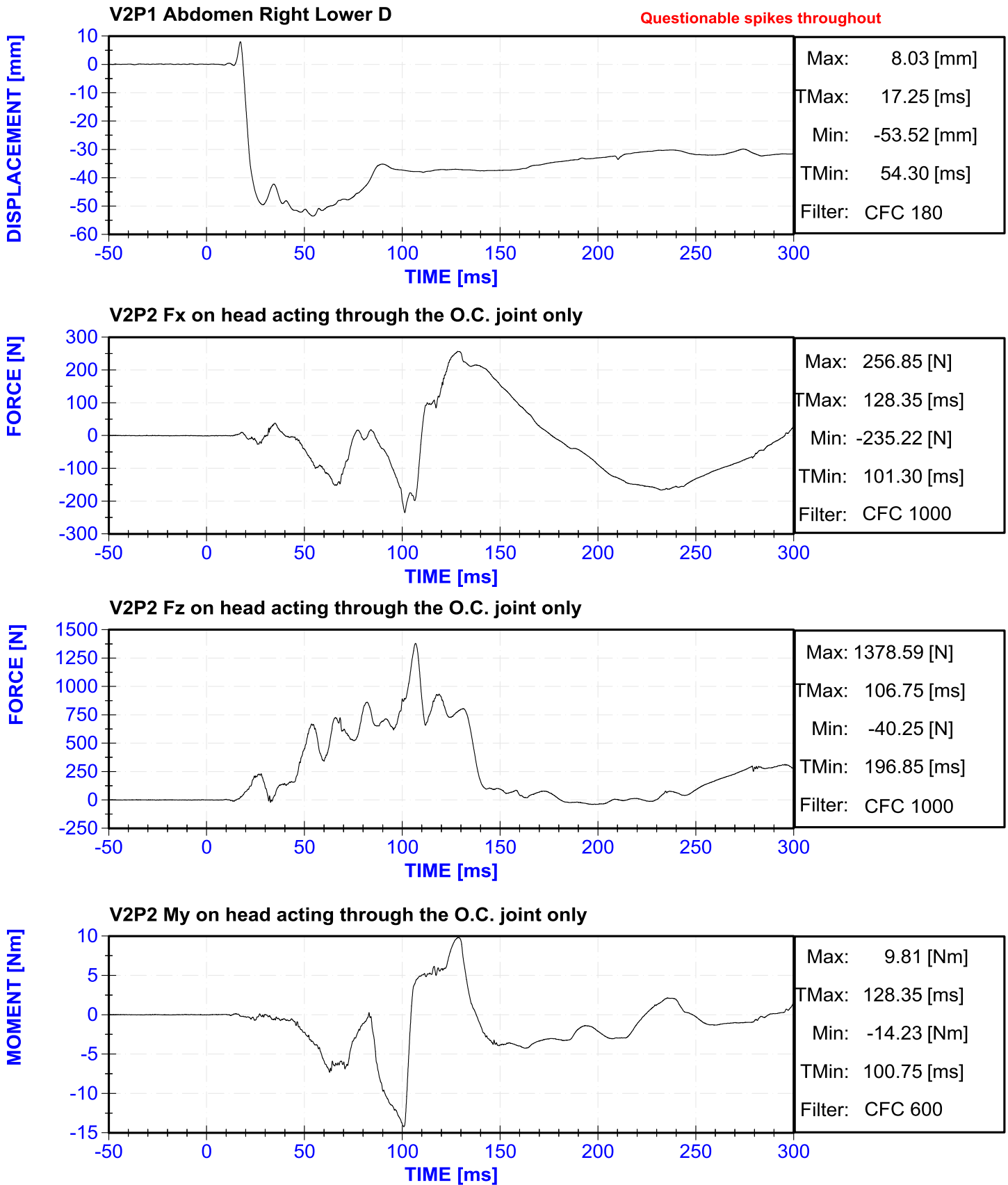


V2P1 Abdomen Right Lower Dy

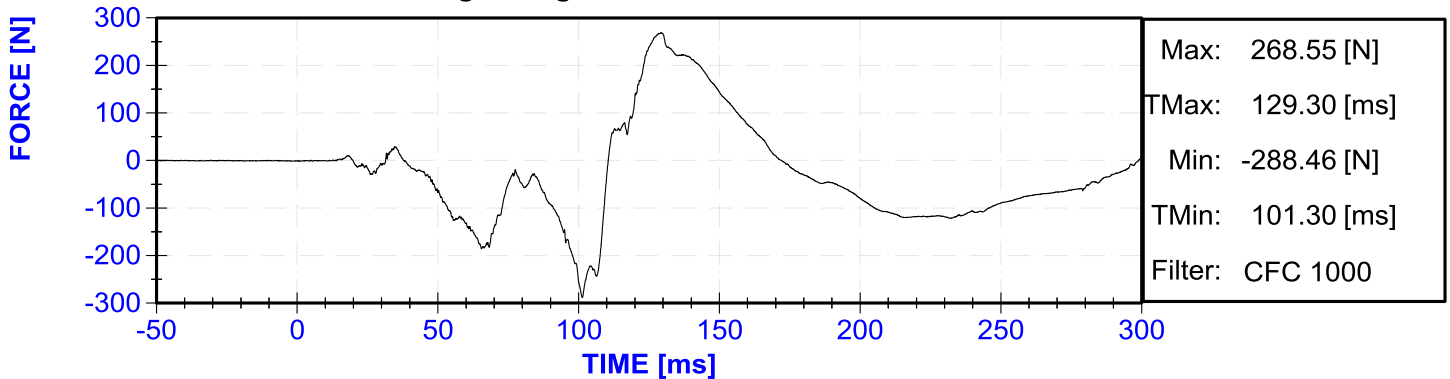


V2P1 Abdomen Right Lower Dz

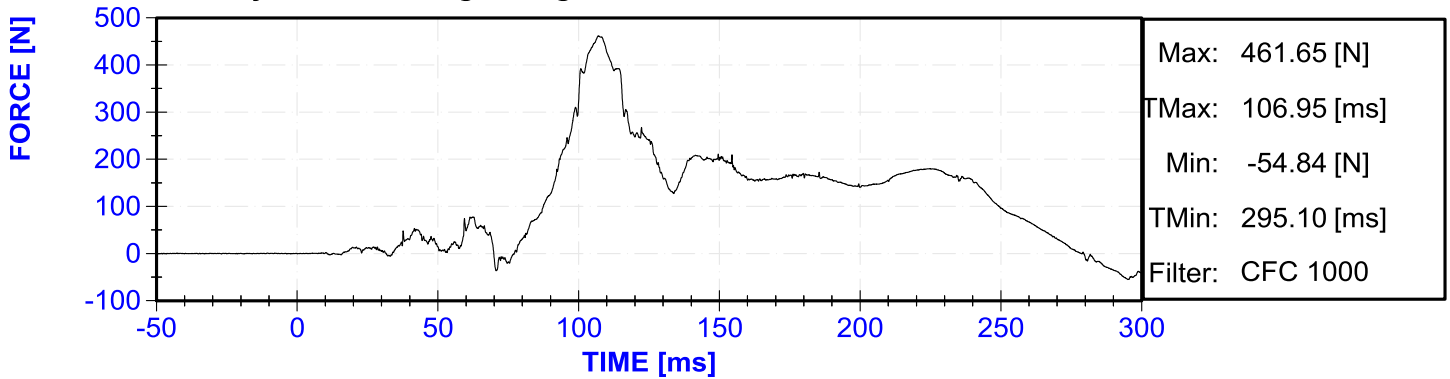




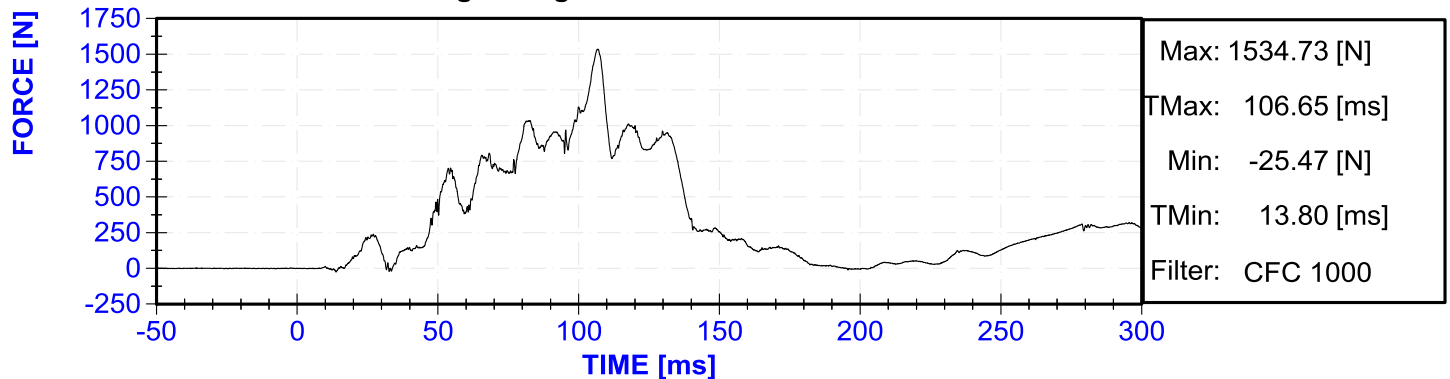
V2P2 Fx on head acting through the total neck section



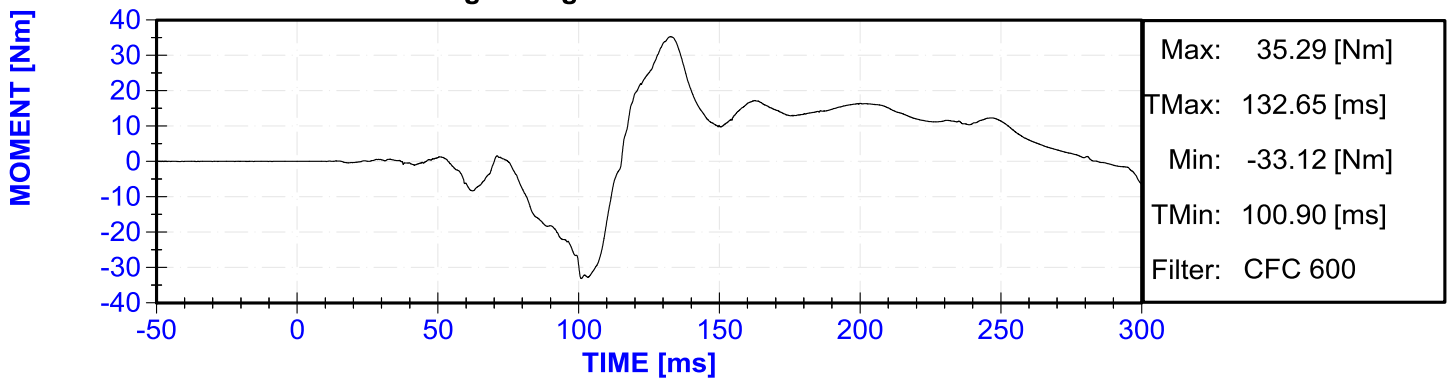
V2P2 Fy on head acting through the total neck section



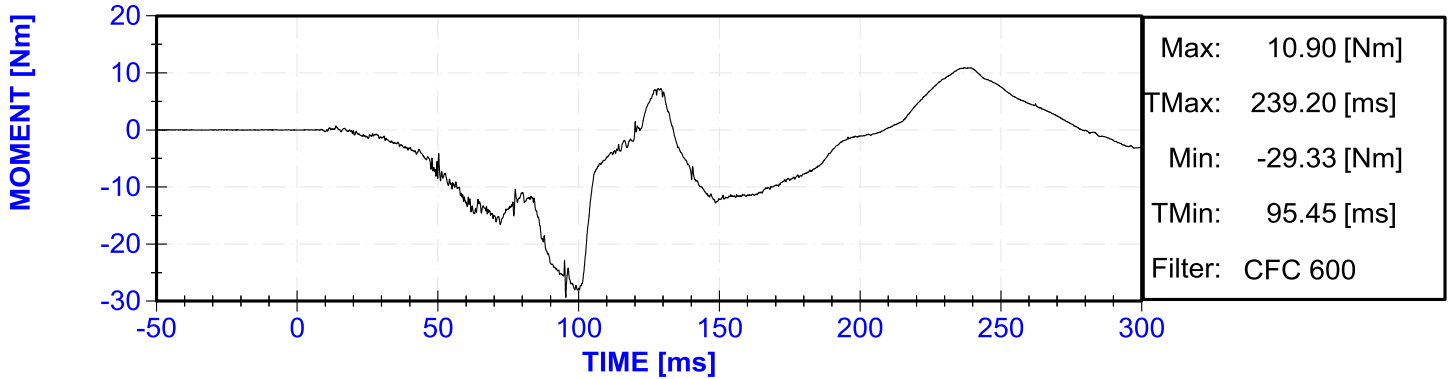
V2P2 Fz on head acting through the total neck section



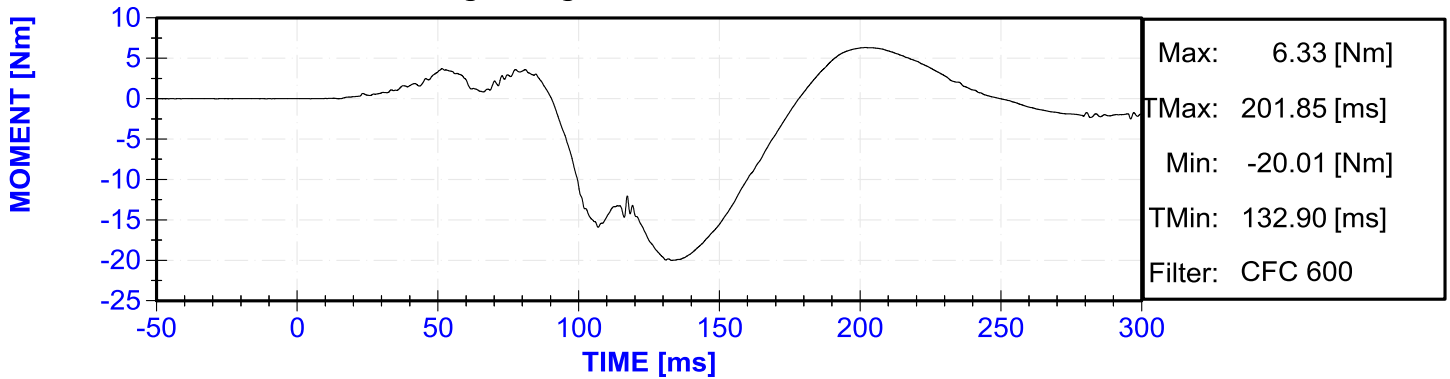
V2P2 Mx on head acting through the total neck section



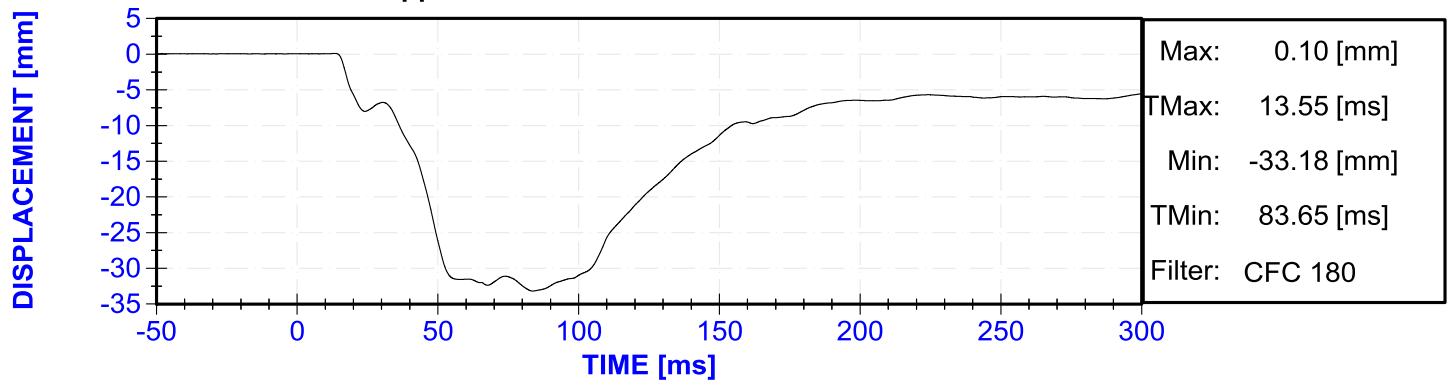
V2P2 My on head acting through the total neck section



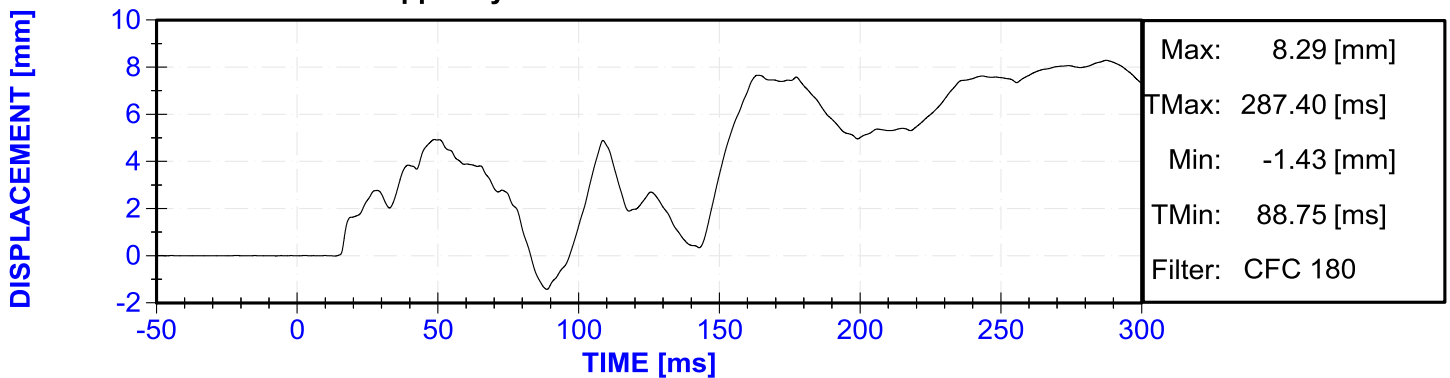
V2P2 Mz on head acting through the total neck section

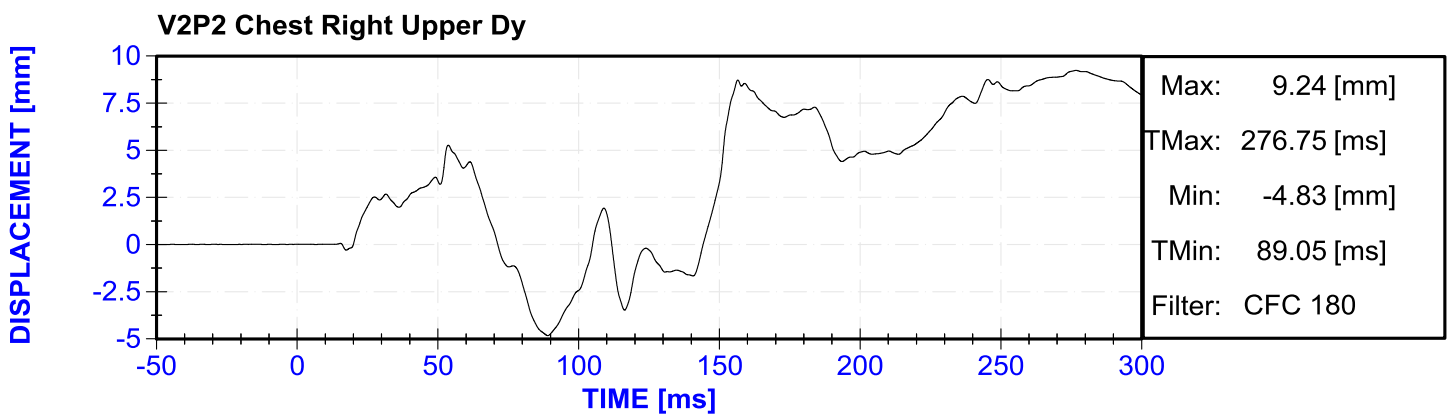
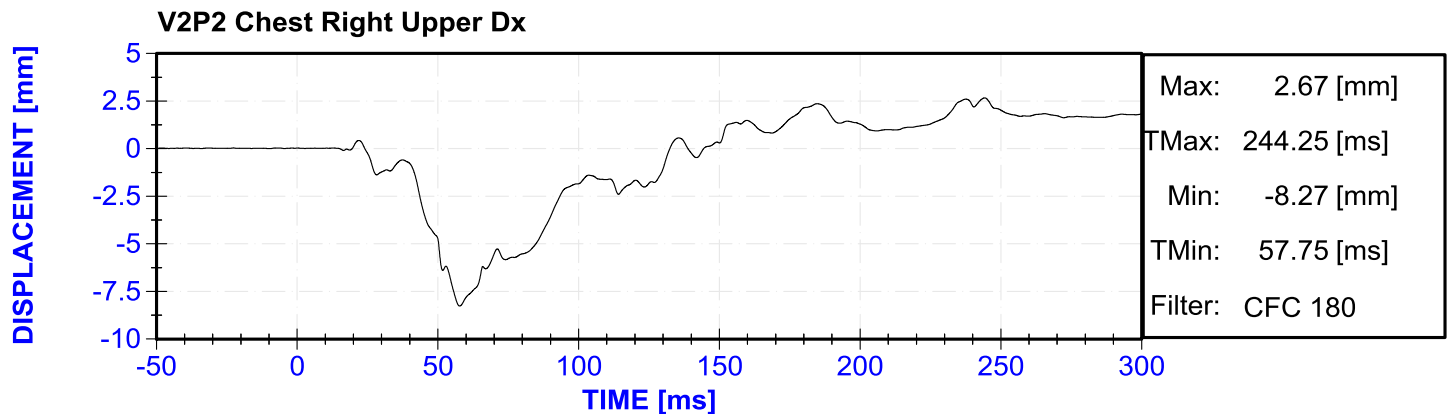
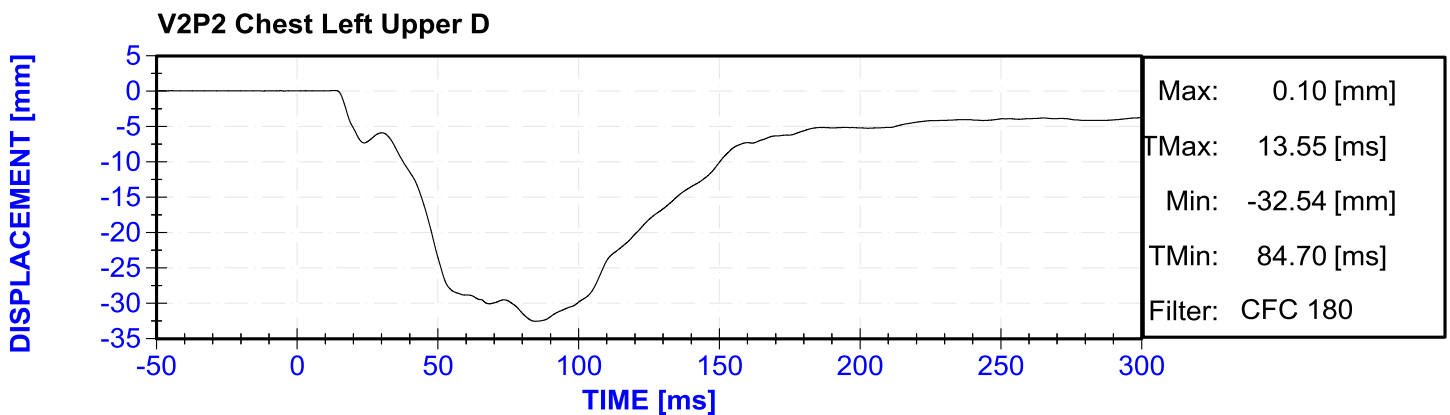
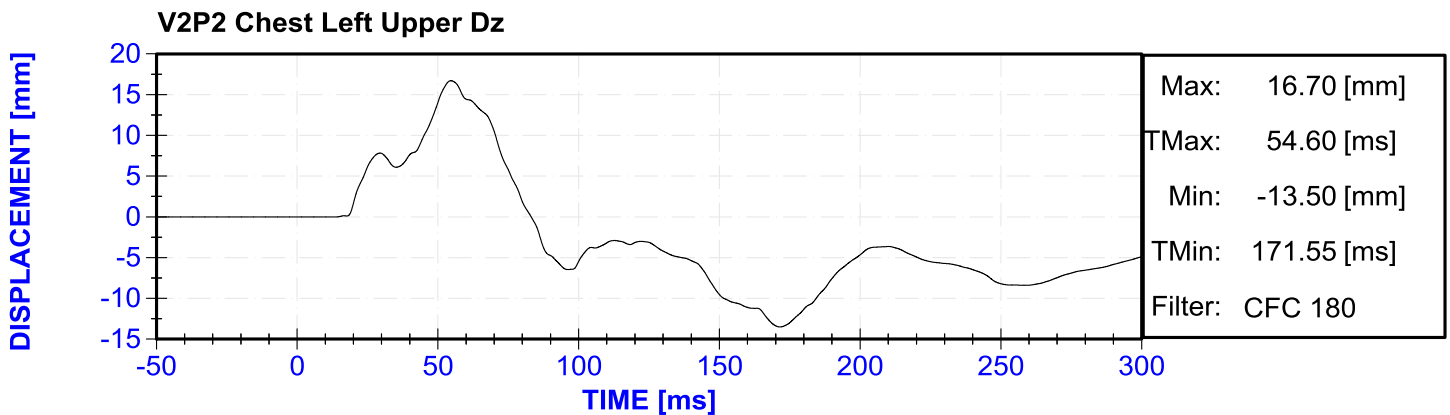


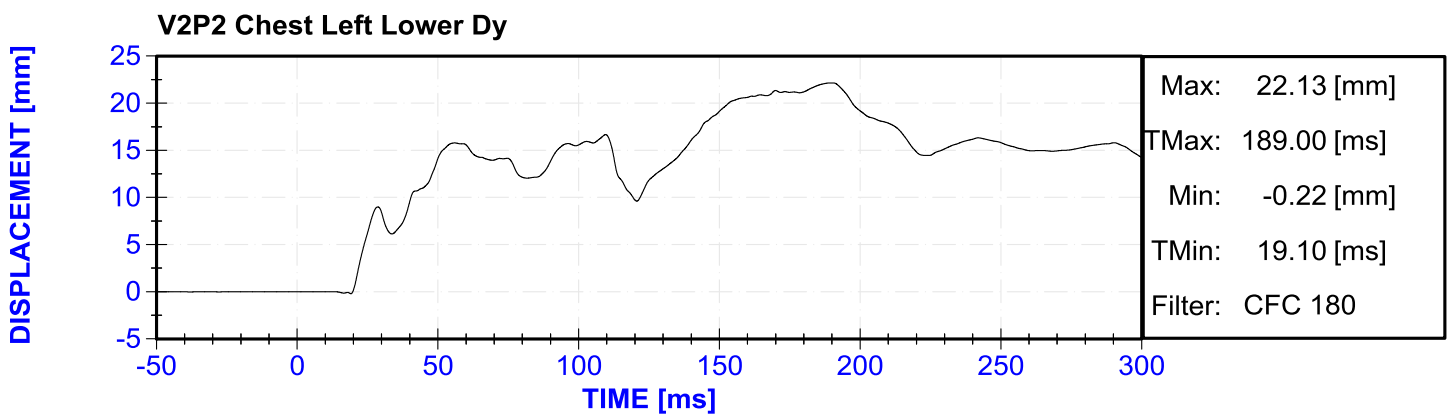
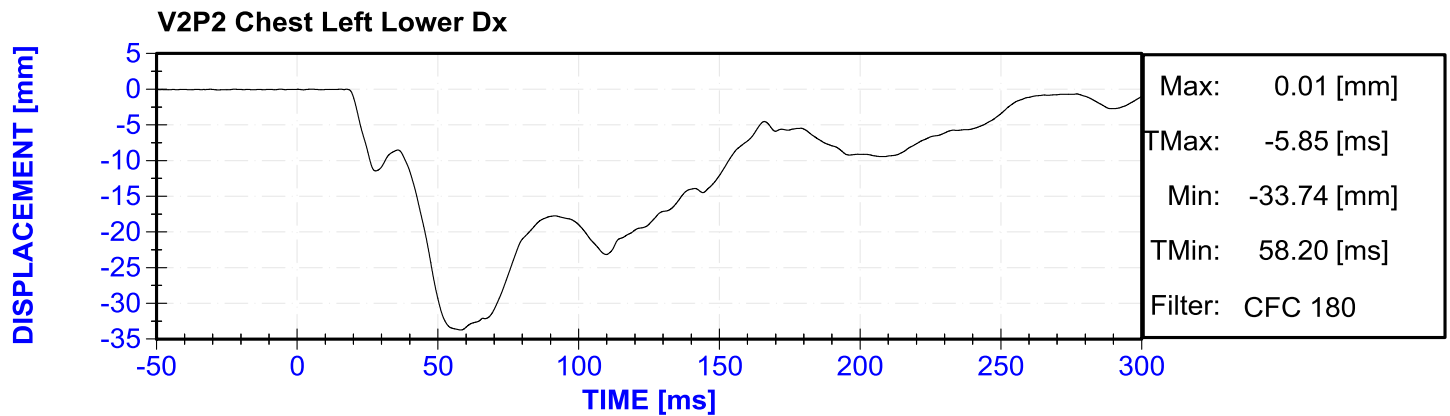
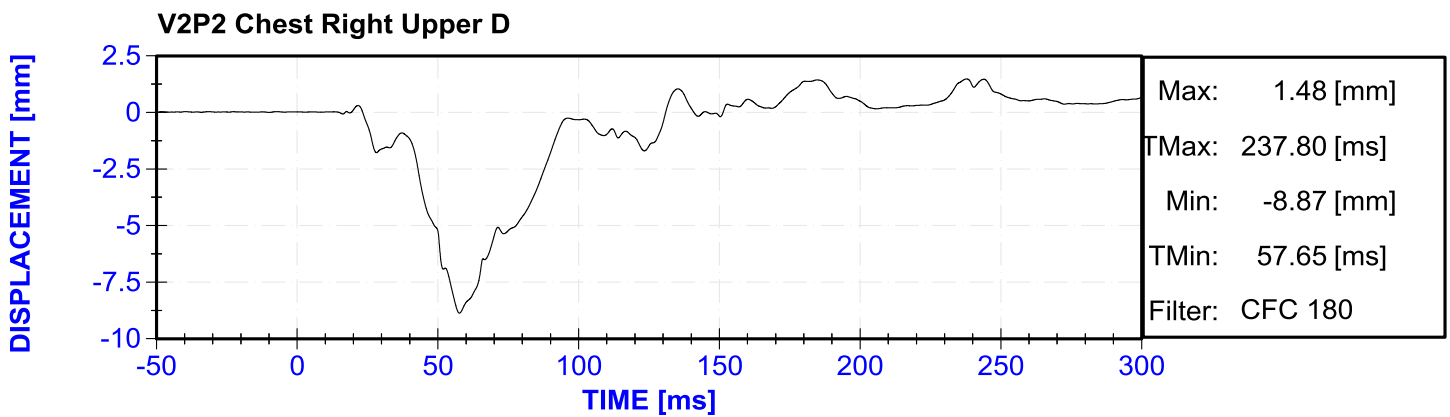
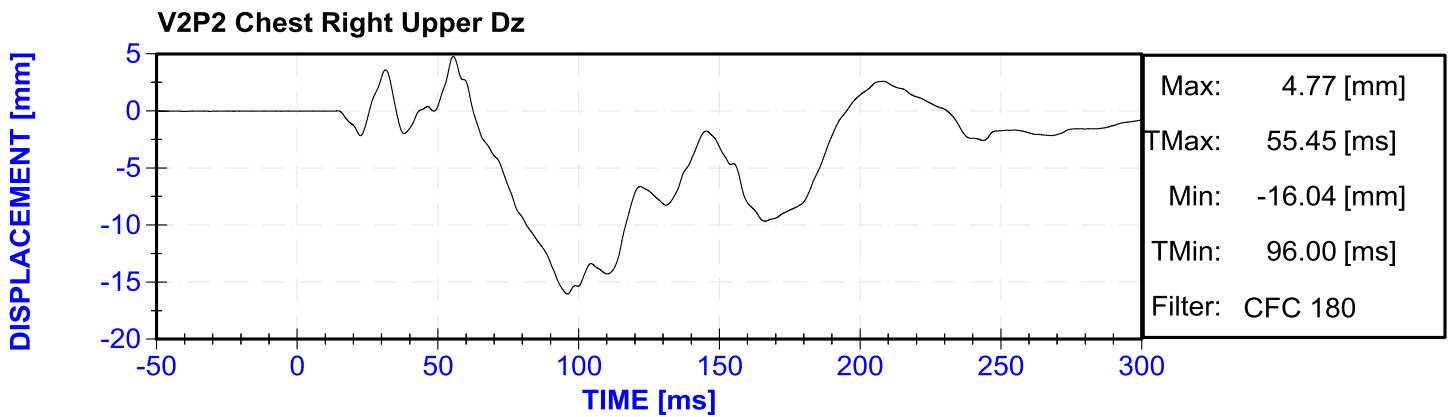
V2P2 Chest Left Upper Dx

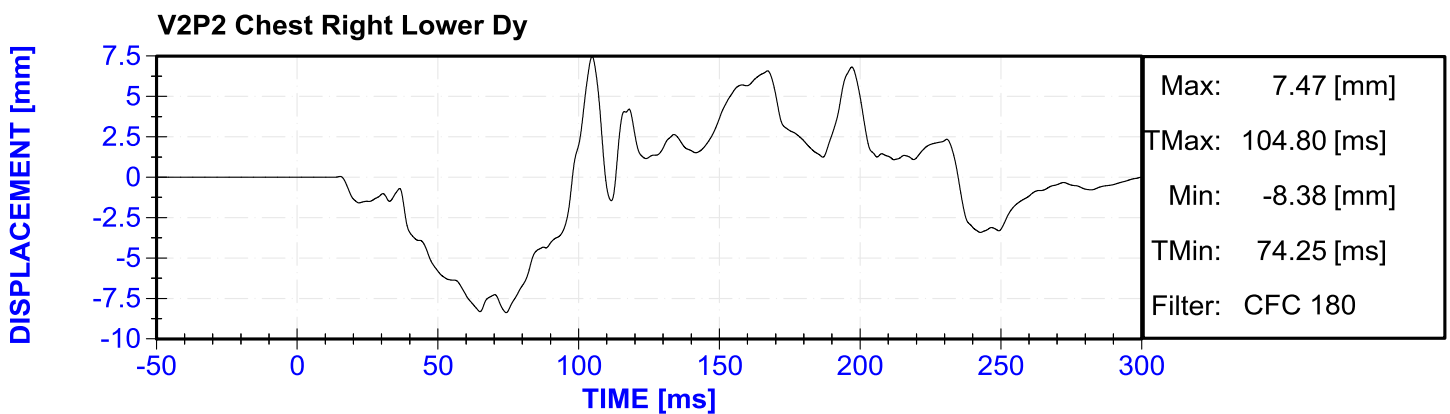
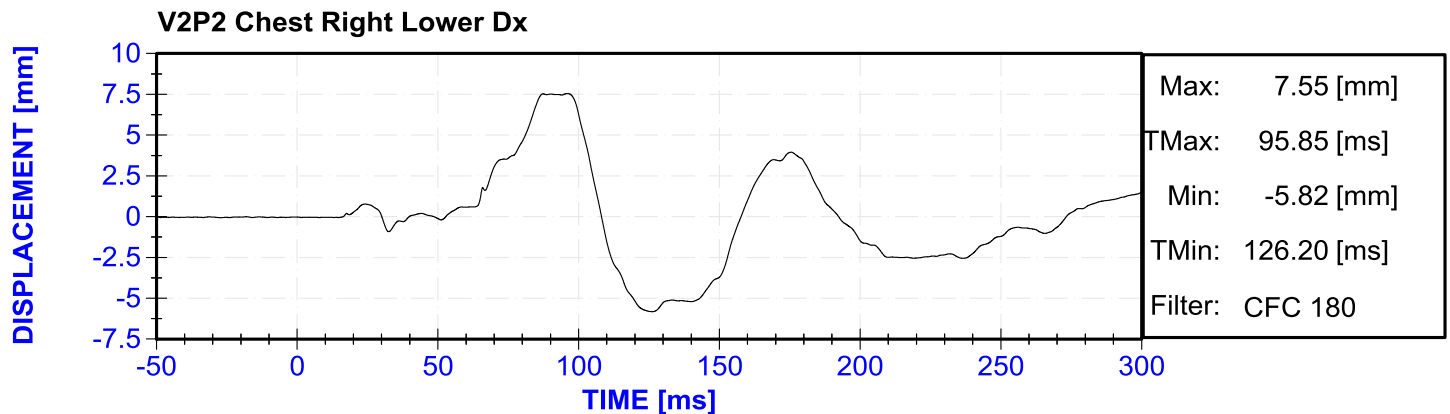
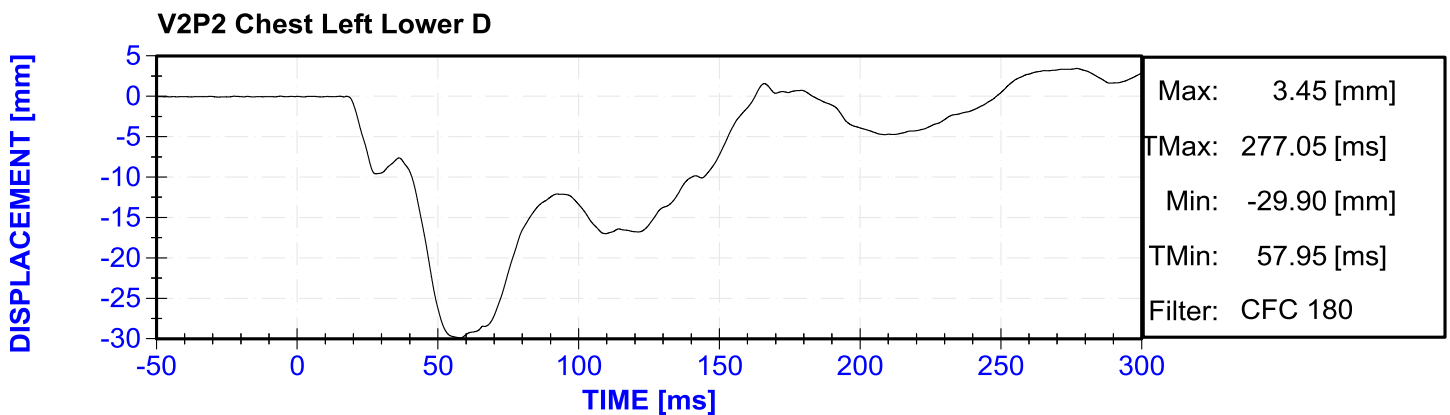
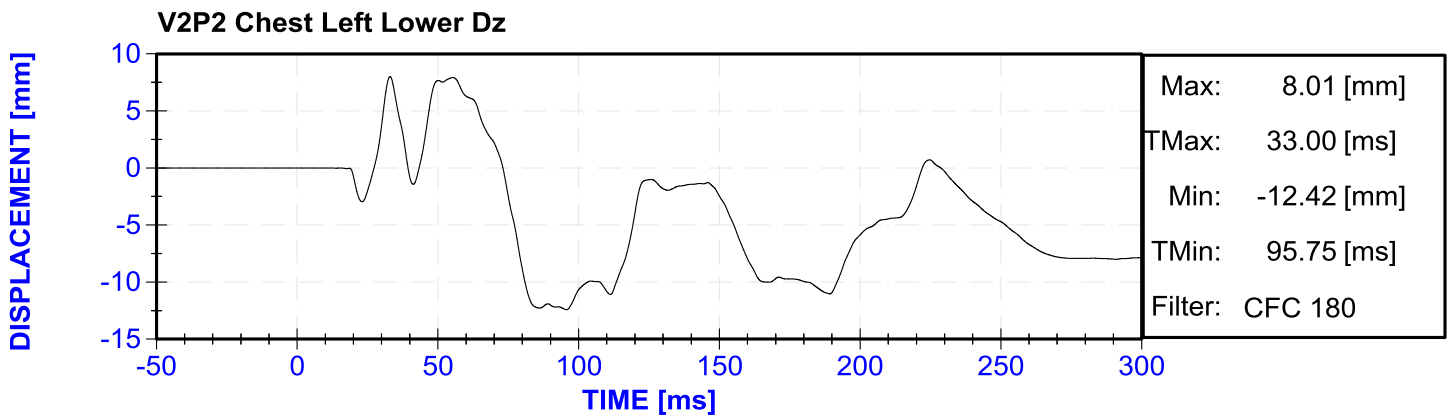


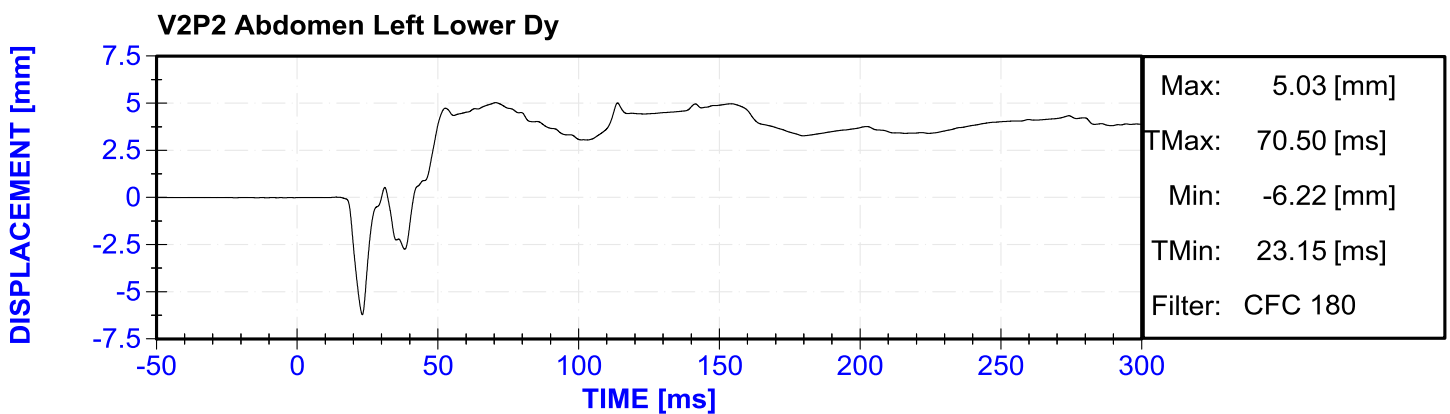
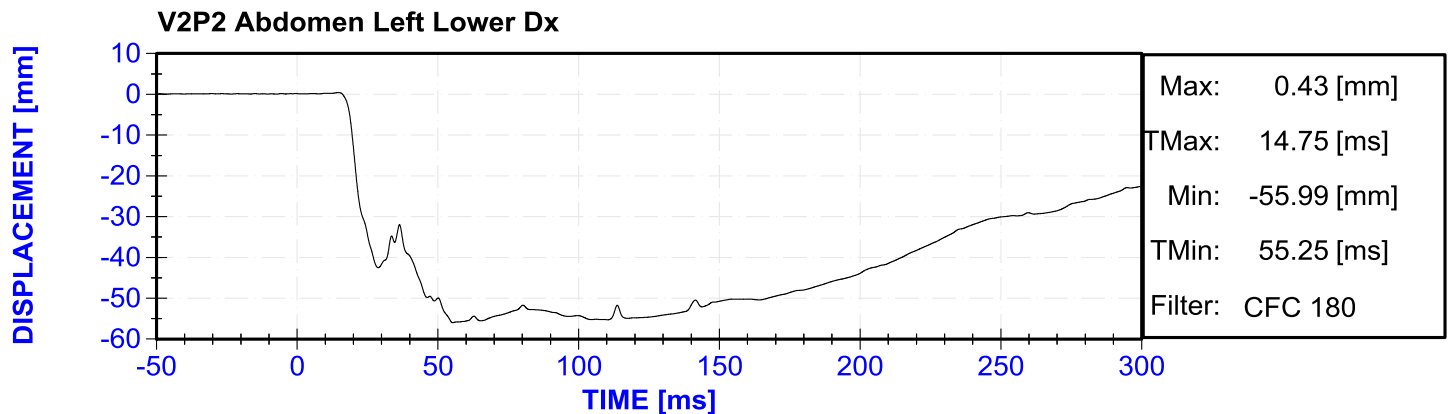
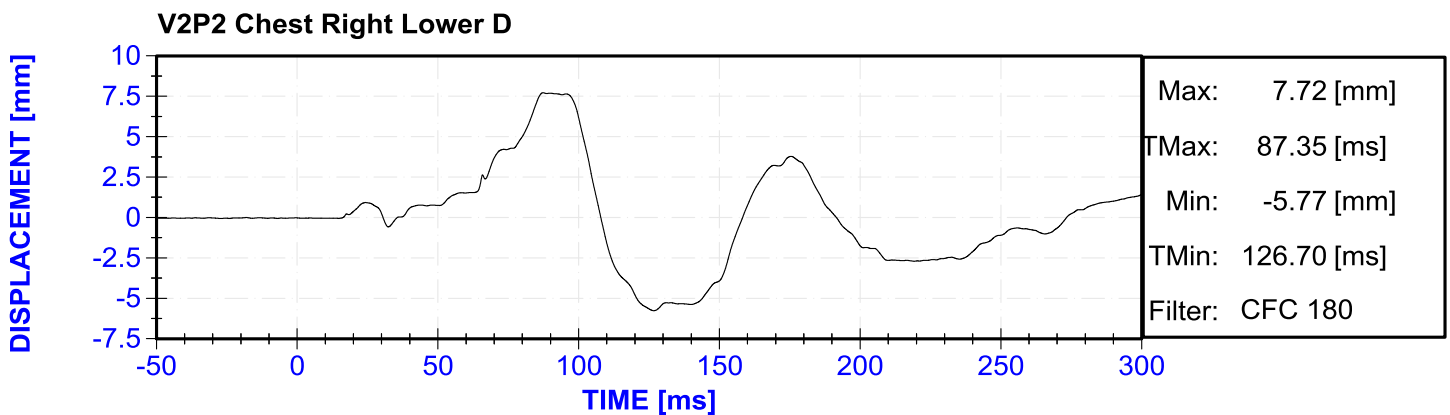
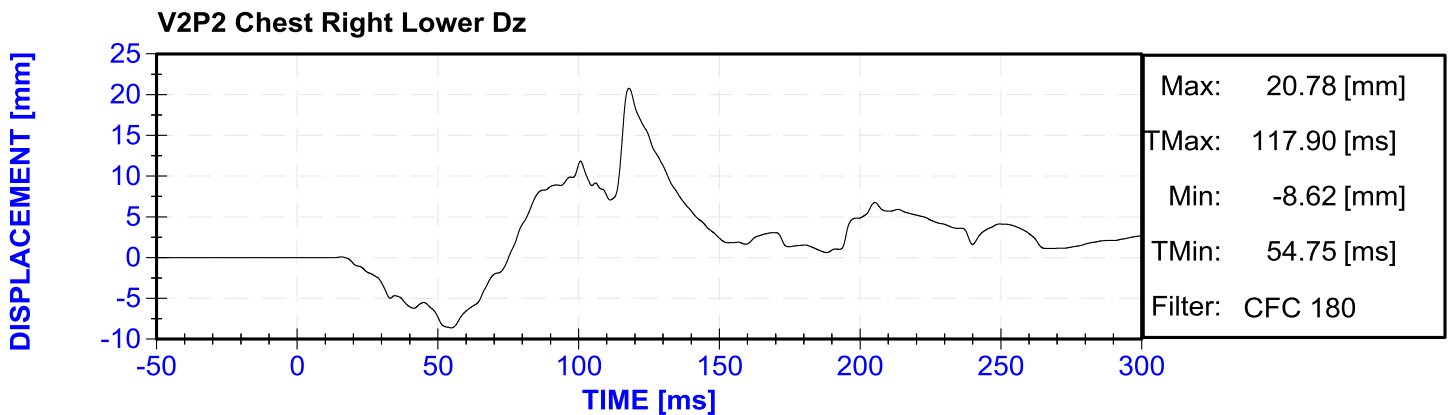
V2P2 Chest Left Upper Dy



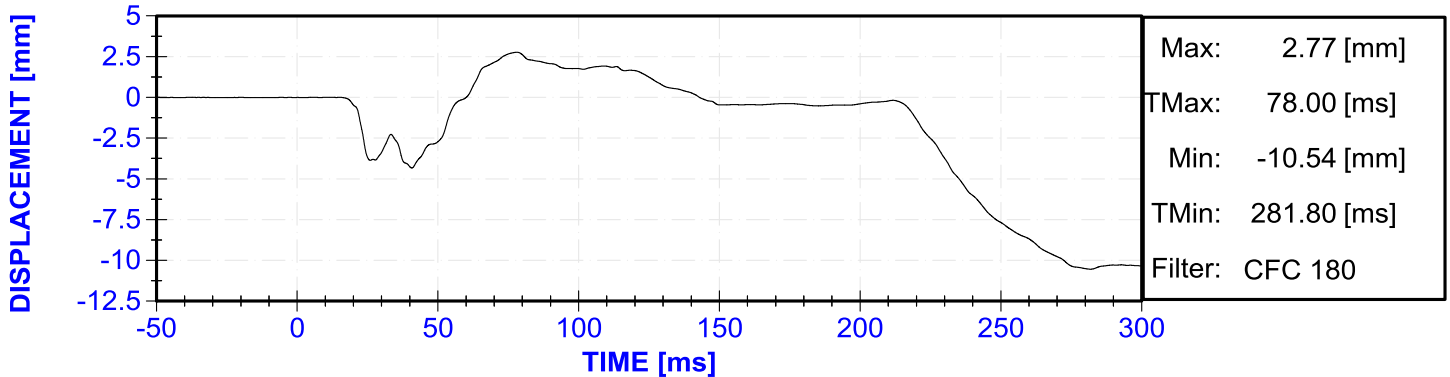




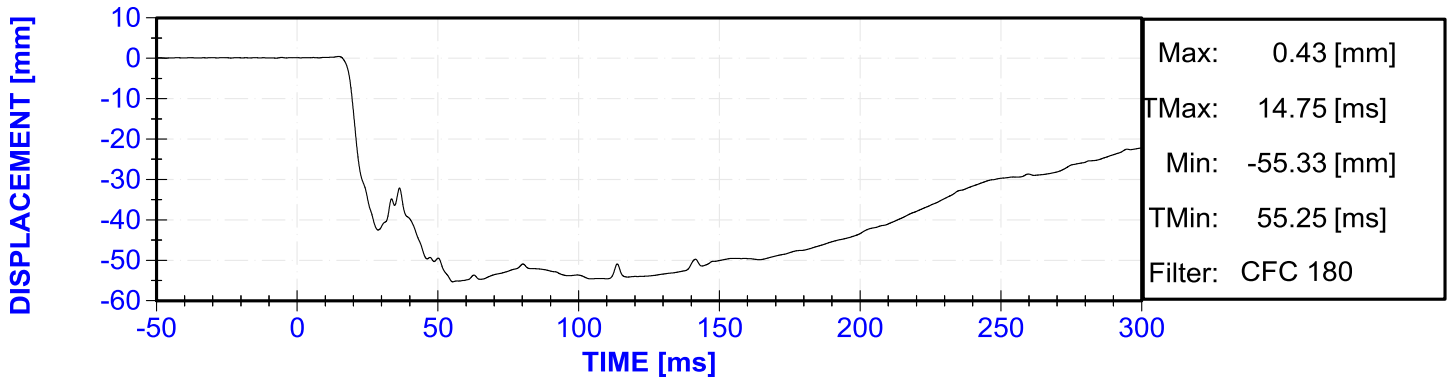




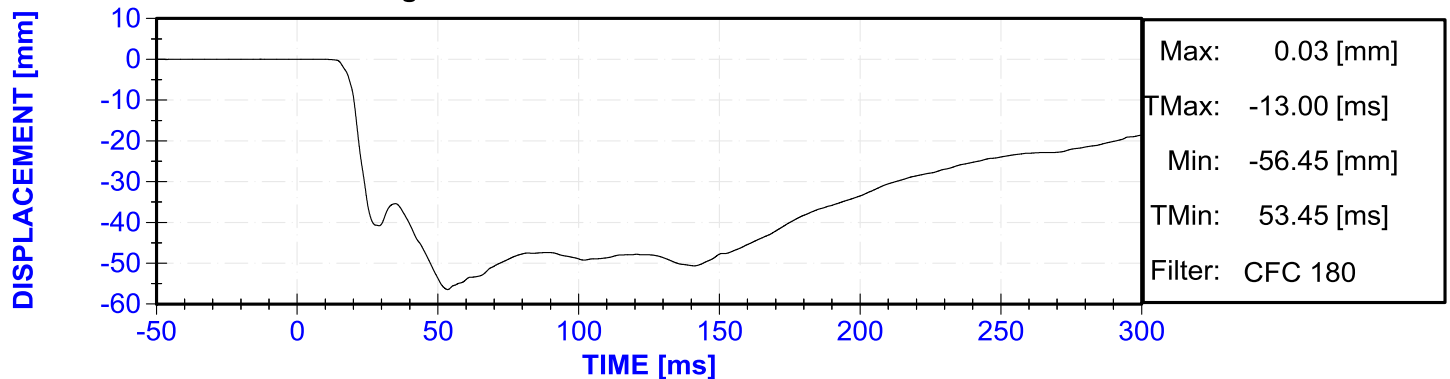
V2P2 Abdomen Left Lower Dz



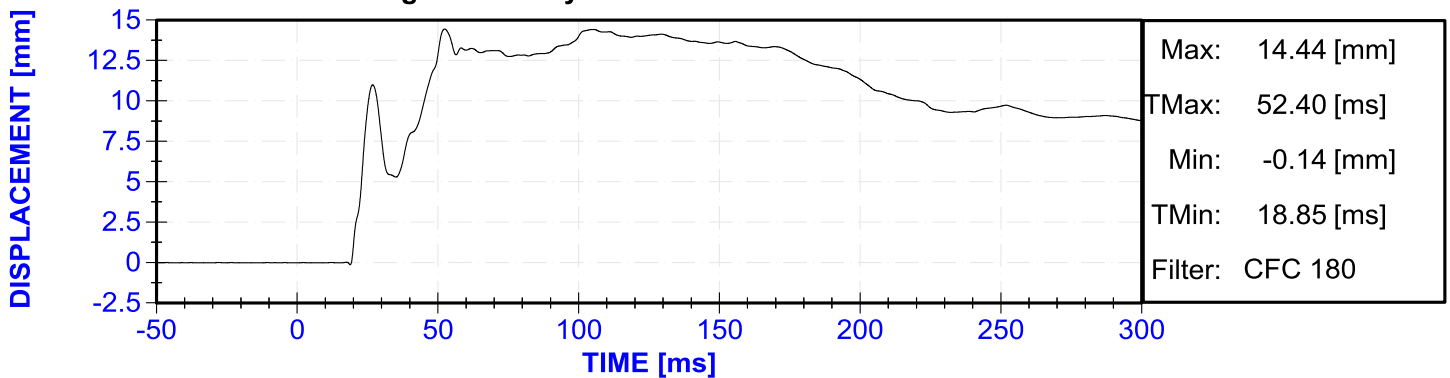
V2P2 Abdomen Left Lower D



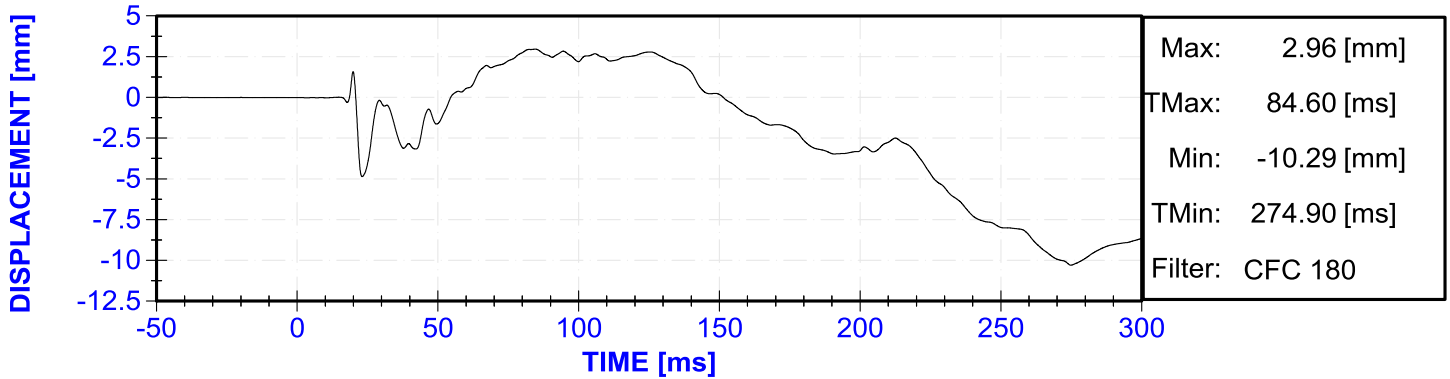
V2P2 Abdomen Right Lower Dx



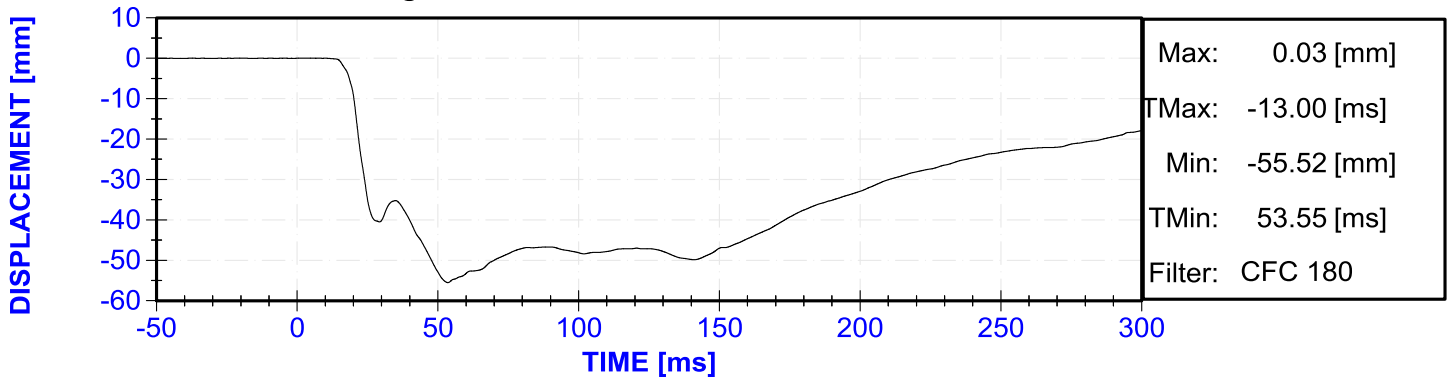
V2P2 Abdomen Right Lower Dy



V2P2 Abdomen Right Lower Dz



V2P2 Abdomen Right Lower D



APPENDIX C

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

Table C-1: Dummy Information

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

Table C-2: Ankle Offset Files

THOR – TK S/N: 016					
LFTX	LFTY	LFTZ	RFTX	RFTY	RFTZ
Left Ankle X Rotation	Left Ankle Y Rotation	Left Ankle Z Rotation	Right Ankle X Rotation	Right Ankle Y Rotation	Right Ankle Z Rotation
-0.281010	13.9793		-0.926255	17.6868	
THOR – TK S/N: 015					
LFTX	LFTY	LFTZ	RFTX	RFTY	RFTZ
Left Ankle X Rotation	Left Ankle Y Rotation	Left Ankle Z Rotation	Right Ankle X Rotation	Right Ankle Y Rotation	Right Ankle Z Rotation
.762525	14.9331		-1.31005	13.7803	

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

THOR – TK S/N: 016								
Sensor	Manufacturer	Serial #	Capacity	Units (M)	Range	CFC	Sensitivity (mv/V/EU)	Initial Offset (EU)
HEAD CG X	Endevco	AC-P74956	2000	g	2000	1000	0.01851	0.415576
HEAD CG Y	Endevco	AC-P51933	2000	g	2000	1000	0.01927	0
HEAD CG Z	Endevco	AC-P52069	2000	g	2000	1000	0.01904	0
HDCG Wx	DTS	ARS-5928	18000	deg/s	18000	1000	0.09340	-47.3992
HDCG Wy	DTS	ARS-5950	18000	deg/s	18000	1000	0.09373	-82.2398
HDCG Wz	DTS	ARS-5990	18000	deg/s	18000	1000	0.09396	-27.7157
NEKU Fx	Denton	LC-3454J-76Fx	8896	N	8896	1000	0.000231531	-1.74156
NEKU Fy	Denton	LC-3454J-76Fy	8896	N	8896	1000	0.000233790	-1.73876
NEKU Fz	Denton	LC-3454J-76Fz	13345	N	13345	1000	0.000088380	-7.82127
NEKU Mx	Denton	LC-3454J-76Mx	282	N-m	282	600	0.006027005	0
NEKU My	Denton	LC-3454J-76My	282	N-m	282	600	0.005967528	-0.165369
NEKU Mz	Denton	LC-3454J-76Mz	282	N-m	282	600	0.009944701	-0.0552506
NEKL Fx	Denton	LC-DM4552FX	13345	N	13345	1000	0.000170802	0
NEKL Fy	Denton	LC-DM4552FY	13345	N	13345	1000	0.000170203	0
NEKL Fz	Denton	LC-DM4552FZ	13345	N	13345	1000	0.000071152	0
NEKL Mx	Denton	LC-DM4552MX	452	N-m	452	600	0.004108075	-0.0885175
NEKL My	Denton	LC-DM4552MY	452	N-m	452	600	0.004134627	-0.0885933
NEKL Mz	Denton	LC-DM4552MZ	226	N-m	226	600	0.006758431	0
NKCF Fz	Denton	LC-6005J-77Fz	4448	N	4448	1000	0.000850317	-0.871135

THOR – TK (Continued)

S/N: 016

Sensor	Manufacturer	Serial #	Capacity	Units (M)	Range	CFC	Sensitivity (mv/V/EU)	Initial Offset (EU)
NKCR Fz	Denton	LC-6005J-78Fz	4448	N	4448	1000	0.000862839	0
HDOT RDy	Sfernice	DS-007	180	deg	160	180	3.045	0.0328407
SPNU Ax	Endevco	AC-P64099	2000	g	2000	180	0.02212	-0.821963
SPNU Ay	Endevco	AC-P58838	2000	g	2000	180	0.01904	-0.404008
SPNU Az	Entran	AC-02I02I05-F14	2000	g	2000	180	0.02184	0
SPNM Ax	Endevco	AC-P64002	2000	g	2000	180	0.01993	0.41813
SPNM Ay	Endevco	AC-P58735	2000	g	2000	180	0.01954	0.39367
SPNM Az	Entran	AC-03D03D16-F12	2000	g	2000	180	0.02265	0
CHLU Dx	Humanetics	DS-DM1151	3.3	V	3.3	600	Raw	0.144062
CHLU Ry	Humanetics	DS-DJ4106	180	deg	160	180	3.074	0
CHLU Rz	Humanetics	DS-DJ4108	180	deg	160	180	2.995	0.033389
CHRU Dx	Humanetics	DS-DI4716	3.3	V	3.3	600	Raw	0.125521
CHRU Ry	Humanetics	DS-DI2381	180	deg	160	180	3.029	0
CHRU Rz	Humanetics	DS-DI2380	180	deg	160	180	3.064	0
CHLL Dx	Humanetics	DS-DM1152	3.3	V	3.3	600	Raw	0.0989583
CHLL Ry	Humanetics	DS-DI7903	180	deg	160	180	2.997	0
CHLL Rz	Humanetics	DS-DJ0023	180	deg	160	180	3.065	-0.0326264
CHRL Dx	Humanetics	DS-DI4717	3.3	V	3.3	600	Raw	0.08
CHRL Ry	Humanetics	DS-DI2385	180	deg	160	180	2.584	0.0322497
CHRL Rz	Humanetics	DS-DI2384	180	deg	160	180	3.007	0
SPNL Fx	Denton	LC-92Fx	13345	N	13345	1000	0.000137463	2.60741
SPNL Fy	Denton	LC-92Fy	13345	N	13345	1000	0.000138198	-2.61227
SPNL Fz	Denton	LC-92Fz	17793	N	13345	1000	0.000052639	-5.21904
SPNL Mx	Denton	LC-92Mx	678	N-m	678	1000	0.002164893	0
SPNL My	Denton	LC-92My	904	N-m	904	1000	0.001775128	2.68257
PVCG Ax	Endevco	AC-P64087	2000	g	2000	1000	0.02017	0
PVCG Ay	Endevco	AC-P50065	2000	g	2000	1000	0.01704	0
PVCG Az	Endevco	AC-P64123	2000	g	2000	1000	0.01961	-0.392265
PVAL Fx	Humanetics	LC-84Fx	22241	N	22241	600	0.0001229300	8.70164
PVAL Fy	Humanetics	LC-84Fy	13345	N	13345	600	0.0000607883	0
PVAL Fz	Humanetics	LC-84Fz	13345	N	13345	600	0.0001661788	0
PVAR Fx	Humanetics	LC-77Fx	22241	N	22241	600	0.0001216936	-4.34865
PVAR Fy	Humanetics	LC-77Fy	13345	N	13345	600	0.0000598142	0
PVAR Fz	Humanetics	LC-77Fz	13345	N	13345	600	0.0001651371	2.61043
PILL Fx	Humanetics	LC-DI4774 Fx	13000	N	13000	600	0.000067785	5.07945
PILR Fx	Humanetics	LC-DI4775 Fx	13000	N	13000	600	0.000067854	12.7074
FMRL Fx	Humanetics	LC-108Fx	15000	N	15000	600	0.0001449	0
FMRL Fy	Humanetics	LC-108Fy	15000	N	15000	600	0.0001457	2.93308
FMRL Fz	Humanetics	LC-108Fz	15000	N	15000	600	0.0000750	-2.9304
FMRL Mx	Humanetics	LC-108Mx	350	N-m	350	600	0.0065318	-0.0686534
FMRL My	Humanetics	LC-108My	350	N-m	350	600	0.0065158	13.0026
FMRL Mz	Humanetics	LC-108Mz	350	N-m	350	600	0.0093691	-0.0684191
KNEL Dx	Space Age	DS-D2103665B	30	mm	20	180	23.87593	0.00418832
TBLU Fz	Denton	LC-4509J-110Fz	11120	N	11120	600	0.0000923	-6.52665
TBLU Mx	Denton	LC-4509J-110Mx	395	N-m	395	600	0.0073903	-0.0773214
TBLU My	Denton	LC-4509J-110My	395	N-m	395	600	0.0073054	0
TBLL Fz	Denton	LC-76Fz	11120	N	11120	600	0.0000948	-6.52486

THOR – TK (Continued) S/N: 016								
Sensor	Manufacturer	Serial #	Capacity	Units (M)	Range	CFC	Sensitivity (mv/V/EU)	Initial Offset (EU)
TBLL Mx	Denton	LC-76Mx	395	N	395	600	0.0074420	0
TBLL My	Denton	LC-76My	395	N	395	600	0.0073706	-0.0775281
ANKL Rx	Contelec	DS-001x	180	deg	150	180	3.20532	-0.28101
ANKL Ry	Contelec	DS-002y	180	deg	150	180	3.16119	13.9793
FOTL Az	Endevco	AC-J19244	2000	g	2000	1000	0.02590	2.36388
FMRR Fx	Humanetics	LC-DJ1045Fx	15000	N	15000	600	0.0001450	-2.9347
FMRR Fy	Humanetics	LC-DJ1045Fy	15000	N	15000	600	0.0001452	-2.93066
FMRR Fz	Humanetics	LC-DJ1045Fz	15000	N	15000	600	0.0000732	0
FMRR Mx	Humanetics	LC-DJ1045Mx	350	N-m	350	600	0.0065293	-0.0683731
FMRR My	Humanetics	LC-DJ1045My	350	N-m	350	600	0.0065638	0.0686265
FMRR Mz	Humanetics	LC-DJ1045Mz	350	N-m	350	600	0.0088260	0
KNER Dx	Space Age	DS-D2103657B	30	mm	20	180	24.06200	0.00415593
TBRU Fz	Denton	LC-4509J-107Fz	11120	N	11120	600	0.0000923	-6.52665
TBRU Mx	Denton	LC-4509J-107Mx	395	N-m	395	600	0.0073875	-0.0773507
TBRU My	Denton	LC-4509J-107My	395	N-m	395	600	0.0073329	0
TBRL Fz	Denton	LC-75Fz	11120	N	11120	600	0.0000958	0
TBRL Mx	Denton	LC-75Mx	395	N-m	395	600	0.0072968	0.0774273
TBRL My	Denton	LC-75My	395	N-m	395	600	0.0073137	0
ANKR Rx	Contelec	DS-004X	180	deg	150	180	3.16542	-0.92625
ANKR Ry	Contelec	DS-0534Y	180	deg	150	180	3.17825	17.6868
FOTR Az	Endevco	AC-P74773	2000	g	2000	1000	0.01818	-0.392896

THOR – TK S/N: 015								
Sensor	Manufacturer	Serial #	Capacity	Units (M)	Range	CFC	Sensitivity (mv/V/EU)	Initial Offset (EU)
HEAD CG X	Endevco	P63926	2000	g	2000	1000	0.01887	0
HEAD CG Y	Endevco	P64084	2000	g	2000	1000	0.02366	-1.95673
HEAD CG Z	Endevco	P51732	2000	g	2000	1000	0.01901	-0.404645
HDCG Wx	DTS	ARS4727	18000	deg/s	18000	1000	0.09212	-98.9425
HDCG Wy	DTS	ARS4712	18000	deg/s	18000	1000	0.09309	-11.7494
HDCG Wz	DTS	ARS4714	18000	deg/s	18000	1000	0.09443	-14.892
NEKU Fx	Denton	77	8896	N	8896	1000	0.000231857	-5.6069
NEKU Fy	Denton	77	8896	N	8896	1000	0.000228428	-0.875549
NEKU Fz	Denton	77	13345	N	13345	1000	0.000086454	2.31337
NEKU Mx	Denton	77	282	N-m	282	600	0.005888226	-0.0509491
NEKU My	Denton	77	282	N-m	282	600	0.005997267	-0.0333485
NEKU Mz	Denton	77	282	N-m	282	600	0.009965588	0.100345
NKCF Fz	Denton	LC-6005J-77Fz	80	N	4448	1000	0.000868639	0
NKCR Fz	Denton	LC-6005J-78Fz	75	N	4448	1000	0.000709137	0
HDOT RDy	Humanetics	DS-007	160	deg	160	180	3.036	0
SPNU Ax	Endevco	AC-P64099	2000	g	2000	180	0.01736	0
SPNU Ay	Entran	AC-P58838	2000	g	2000	180	0.02330	-1.18124
SPNU Az	Endevco	AC-02I02I05-F14	2000	g	2000	180	0.01914	0
SPNM Ax	Endevco	AC-P64002	2000	g	2000	180	0.01819	0.39268

THOR – TK (Continued)

S/N: 015

Sensor	Manufacturer	Serial #	Capacity	Units (M)	Range	CFC	Sensitivity (mv/V/EU)	Initial Offset (EU)
SPNM Ay	Endevco	P58717	2000	g	2000	180	0.01797	0
SPNM Az	Endevco	P63843	2000	g	2000	180	0.02361	-0.784351
CHLU Dx	Humanetics	DK3867	3.3	V	3.3	600	Raw	0.112292
CHLU Ry	Humanetics	DJ5448	180	deg	160	180	3.074	-0.0325309
CHLU Rz	Humanetics	DJ5449	180	deg	160	180	3.042	0
CHRU Dx	Humanetics	DK3868	3.3	V	3.3	600	Raw	0.10875
CHRU Ry	Humanetics	DJ5451	180	deg	160	180	3.045	0
CHRU Rz	Humanetics	DJ5450	180	deg	160	180	3.032	0
CHLL Dx	Humanetics	DI4718	3.3	V	3.3	600	Raw	0.0783333
CHLL Ry	Humanetics	DI2386	180	deg	160	180	2.958	0
CHLL Rz	Humanetics	DI6129	180	deg	160	180	3.053	0.0327547
CHRL Dx	Humanetics	DJ2614	3.3	V	3.3	600	Raw	0.0870833
CHRL Ry	Humanetics	DJ4107	180	deg	160	180	2.978	0.0335796
CHRL Rz	Humanetics	DJ4109	180	deg	160	180	3.045	0
SPNL Fx	Denton	125	13345	N	13345	1000	0.000142439	-2.80822
SPNL Fy	Denton	125	13345	N	13345	1000	0.000142551	0.701503
SPNL Fz	Denton	125	17793	N	13345	1000	0.000061260	4.89716
SPNL Mx	Denton	125	678	N-m	678	1000	0.002138341	-0.420887
SPNL My	Denton	125	904	N-m	904	1000	0.001834428	0.272565
PVCG Ax	Endevco	P51294	2000	g	2000	1000	0.02201	0
PVCG Ay	Endevco	P63857	2000	g	2000	1000	0.02371	1.57668
PVCG Az	Endevco	P59011	2000	g	2000	1000	0.01781	0
PVAL Fx	Humanetics	83	22241	N	22241	600	0.0001206055	9.12061
PVAL Fy	Humanetics	83	13345	N	13345	600	0.0000591322	15.2284
PVAL Fz	Humanetics	83	13345	N	13345	600	0.0001630614	-5.51941
PVAR Fx	Humanetics	79	22241	N	22241	600	0.0001206190	-9.94868
PVAR Fy	Humanetics	79	13345	N	13345	600	0.0000595968	-6.71141
PVAR Fz	Humanetics	79	13345	N	13345	600	0.0001636234	2.44464
PILL Fx	Humanetics	DJ5524	13000	N	13000	600	0.000070654	-10.1641
PILR Fx	Humanetics	77	13000	N	13000	600	0.000068416	-7.62598
FMRL Fx	Humanetics	DM4951	15000	N	15000	600	0.000142057	-2.93309
FMRL Fy	Humanetics	DM4951	15000	N	15000	600	0.000142086	-2.9325
FMRL Fz	Humanetics	DM4951	15000	N	15000	600	0.000071741	5.86907
FMRL Mx	Humanetics	DM4951	350	N-m	350	600	0.006425656	-0.137116
FMRL My	Humanetics	DM4951	350	N-m	350	600	0.006432760	-0.0684821
FMRL Mz	Humanetics	DM4951	350	N-m	350	600	0.009035044	0
KNEL Dx	Space Age	C2102639B	30	mm	20	180	24.03214	0.00832219
TBLU Fz	Denton	106	11120	N	11120	600	0.00009360	-6.52776
TBLU Mx	Denton	106	395	N-m	395	600	0.00741550	-0.155003
TBLU My	Denton	106	395	N-m	395	600	0.00742091	0
TBLL Fz	Denton	139	11120	N	11120	600	0.00009648	4.34585

THOR – TK (Continued) S/N: 015								
Sensor	Manufacturer	Serial #	Capacity	Units (M)	Range	CFC	Sensitivity (mv/V/EU)	Initial Offset (EU)
TBLL Mx	Denton	139	395	N	395	600	0.00749952	-0.0775243
TBLL My	Denton	139	395	N	395	600	0.00754555	-0.077502
ANKL Rx	Contelec	7921-0382	180	deg	150	180	3.18215	0.762525
ANKL Ry	Contelec	7921-0386	180	deg	150	180	3.17717	14.9331
FOTL Az	Endevco	J27525	2000	g	2000	1000	0.02143	6.36321
FMRR Fx	Humanetics	DM4950	15000	N	15000	600	0.000141110	0
FMRR Fy	Humanetics	DM4950	15000	N	15000	600	0.000141643	0
FMRR Fz	Humanetics	DM4950	15000	N	15000	600	0.000071653	-8.79589
FMRR Mx	Humanetics	DM4950	350	N-m	350	600	0.006388454	0.0686546
FMRR My	Humanetics	DM4950	350	N-m	350	600	0.006411979	-0.136805
FMRR Mz	Humanetics	DM4950	350	N-m	350	600	0.008857852	0
KNER Dx	Space Age	I1807966B	30	mm	20	180	23.38064	0
TBRU Fz	Denton	88	11120	N	11120	600	0.00009280	-4.34511
TBRU Mx	Denton	88	395	N-m	395	600	0.00726490	0
TBRU My	Denton	88	395	N-m	395	600	0.00725530	0
TBRL Fz	Denton	140	11120	N	11120	600	0.00009658	0
TBRL Mx	Denton	140	395	N-m	395	600	0.00760594	0
TBRL My	Denton	140	395	N-m	395	600	0.00764658	0
ANKR Rx	Contelec	7921-0385	180	deg	150	180	3.18522	-1.31005
ANKR Ry	Contelec	7921-0383	180	deg	150	180	3.18949	13.7803
FOTR Az	Endevco	P58616	2000	g	2000	1000	0.01995	0

Table C-4: THOR Dummy Initial Set-Up Information (IR-TRACC)

THOR – TK S/N: 016			
Sensor	IR-TRACC Exponent	IR-TRACC Slope	IR-TRACC Intercept
CHLU Dx	-0.54440	26.4269	N/A
CHRU Dx	-0.4872	31.6935	N/A
CHLL Dx	-0.49197	31.3308	N/A
CHRL Dx	-0.4865	30.3707	N/A
ABDL Dx	N/A	N/A	N/A
ABDR Dx	N/A	N/A	N/A
THOR – TK S/N: 015			
Sensor	IR-TRACC Exponent	IR-TRACC Slope	IR-TRACC Intercept
CHLU Dx	-0.5268	28.0630	N/A
CHRU Dx	-0.4888	31.4311	N/A
CHLL Dx	-0.4500	34.0200	N/A
CHRL Dx	-0.4647	34.5897	N/A
ABDL Dx	N/A	N/A	N/A
ABDR Dx	N/A	N/A	N/A

Table 5 – THOR IR-TRACC Polarity

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

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

THOR 016

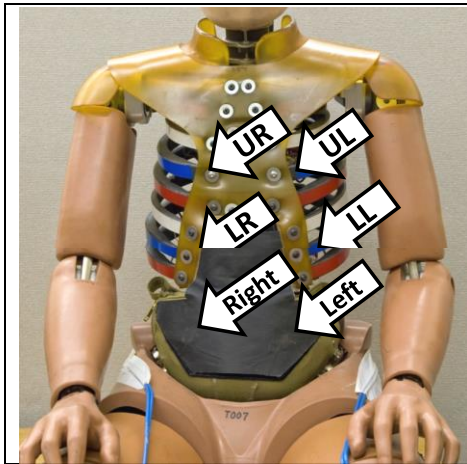


Figure 1. Manipulation to determine thoracic and abdominal IR-TRACC polarity.

Channel	Motion
DX	Push inward
RY	Push upward
RZ	Push rightward

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

THOR 015

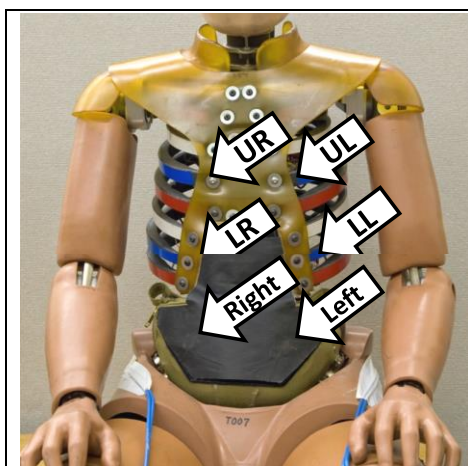


Figure 2. Manipulation to determine thoracic and abdominal IR-TRACC polarity.

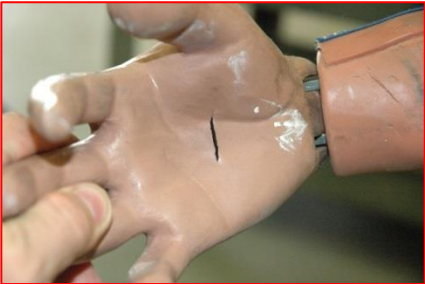
Channel	Motion
DX	Push inward
RY	Push upward
RZ	Push rightward

Upper Right Thorax				Upper Left Thorax			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	0.10823	+	+	DX (V)	0.11271	+	+
RY (Deg)	6.54762	+	+	RY (Deg)	8.5546	+	+
RZ (Deg)	-16.135	+	+	RZ (Deg)	14.2536	+	+
Lower Right Thorax				Lower Left Thorax			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	0.07854	+	+	DX (V)	0.07073	+	+
RY (Deg)	3.8564	+	+	RY (Deg)	4.5322	+	+
RZ (Deg)	-9.8420	+	+	RZ (Deg)	6.39228	+	+
Abdomen Right				Abdomen Left			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	N/A	+	N/A	DX (V)	N/A	+	N/A
RY (Deg)	N/A	+	N/A	RY (Deg)	N/A	+	N/A
RZ (Deg)	N/A	+	N/A	RZ (Deg)	N/A	+	N/A

THOR Inspection Checklist

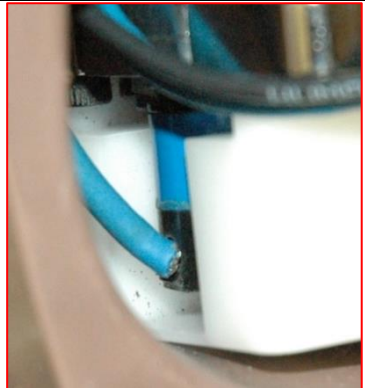
Date: 6/23/2014	
NHTSA Representative: James Saunders	
Inspection Reporter: Matthew Goehle	
Inspection type (check one): ☒ Pre-Test ☐ Post-Test	
Dummy S/N: 0015	Legs S/N: LX0038/LX0039
Dummy Description: THOR NT 50 th Male	
Date of last Certification: Certification performed in May 2014	
<u>Tests conducted since last full certification or inspection:</u> Since last inspection: R20145401 – Mazda 3 Since last certification: R20145401 – Mazda 3	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> 11ABDORL00THANYP,Abdomen Right DGIR Y Rotation,Questionable Spikes from 177 to 217ms, SN:DS-218 – Could not reproduce spikes. Cable shield is detached from potentiometer assembly and may account for ground spikes. 11FEMRRL00THMOYP,Femur Right Y Moment,Questionable Spikes Throughout, SN:LC-DK3608 My – Could not reproduce issue. Additional Ground from DAS to Pelvis was added.	
<u>Physical evidence of damage:</u> See Report – Minor Damage (Hand cut, Shoulder stop, ITRACC cable, Leg flesh)	
<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 4 IRTraccs 8 Rotational Pots 1 Spine LC 2 Acetabulum LC 2 ASIS LC 2 Femur LC	<i>Continued</i> 2 LX Leg Assemblies 2 Upper Tibia LC 2 Lower Tibia LC 6 Ank1e Potentiometers 2 Knee Sliders 1 Neck Skin 1 Neck Foam 1 Tiltview Interface Cable 4 Tilt Sensors 1 H-Point Tool 1 Tool Box 1 Laptop 1 LX Zeroing Bracket

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 Horizontal cut in face flesh goes all the way through 
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 debonding between neck pucks and plates
Y / N	No evidence of debonding 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	Rear upper neck stop is missing rubber 
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 debonding, tearing, or permanent compression of posterior soft stops Left softstop is missing. 
OTHER	 Right hand has a cut.

SPINE	
Y / N	No evidence of debonding between thoracic spine flex joint and metal plates
Y / N	No evidence of debonding between lumbar spine flex joint and metal plates
Y / N	Lumbar spine pitch change joint mechanism mating teeth are engaged
OTHER	

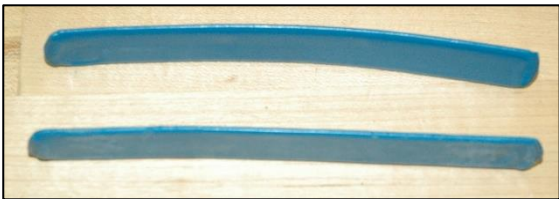
THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material
Y / N	No evidence of debonding between rib damping material and ribs
Y / N	CRUX anterior arms securely attached to anterior ribs
Y / N	CRUX posterior arms securely attached to double gimbals, spine
Y / N	Urethane 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	Hole in chest damper foam on the left side 

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 Holes on both sides of lower abdomen bag 
Y / N	Lower abdomen insert securely attached to spine
Y / N	Lower abdomen insert shows no evidence of permanent set
OTHER	 Lower right abdomen IRTRACC Y-Axis potentiometer cable has detached.

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	Multiple cuts and pitting in pelvis flesh 

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 Knees are scuffed 
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 debonding, tearing, or permanent compression of ankle soft stops
Y / N	No cuts, tears, or scuffing of leg flesh Right leg flesh is torn at zipper attachment. 
OTHER	

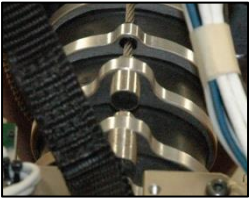
JACKET	
Y / N	Rib stiffeners show no sign of permanent deformation Note: Bent, but can be corrected 
Y / N	No evidence of tears or holes in jacket fabric, Velcro, or zippers Multiple holes, tears in lining, frayed seams, back foam insert is falling apart 
OTHER	

THOR Inspection Checklist

Date: 6/23/2014	
NHTSA Representative: James Saunders	
Inspection Reporter: Mary Geesey, Matthew Goehle	
Inspection type (check one): ☐ Pre-Test ☒ Post-Test	
Dummy S/N: 0015	Legs S/N: LX0038/LX0039
Dummy Description: THOR NT 50th Male	
Date of last Certification: Certification performed in May 2014	
<u>Tests conducted since last full certification or inspection:</u> Since last inspection: R20145401 – Mazda CX-5 Since last certification: R20145400 – Mazda 3 R20145401 – Mazda CX-5	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> -11CHSTRILOTHANZP - Driver Right Lower Thorax IRTACC Z Potentiometer - Questionable magnitude spike from 100ms to 122ms - Cannot reproduce issue. We replaced adapter to be safe. -11ABDORL00THANY - Driver Right Abdomen IRTACC Y Potentiometer - Data spikes throughout. - Wires at THOR side of Amp connector are intermittent at strain relief clamp. We will repair. -11FEMRRL00THMOYP - Driver Right Femur Y Moment - Data spikes throughout. - Wires at THOR side of Amp connector are intermittent at strain relief clamp. We will repair.	
<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 4 IRTaccs 8 Rotational Pots 1 Spine LC 2 Acetabulum LC 2 ASIS LC 2 Femur LC	<i>Continued</i> 2 LX Leg Assemblies 2 Upper Tibia LC 2 Lower Tibia LC 6 Ank1e Potentiometers 2 Knee Sliders 1 Neck Skin 1 Neck Foam 1 Tiltview Interface Cable 4 Tilt Sensors 1 H-Point Tool 1 Tool Box 1 Laptop 1 LX Zeroing Bracket

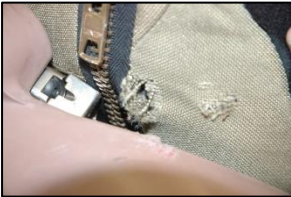
Note: New Damage is Noted in Red

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 Horizontal cut in face flesh goes all the way through 
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 debonding between neck pucks and plates
Y / N	No evidence of debonding 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	Rear upper neck stop is missing rubber 

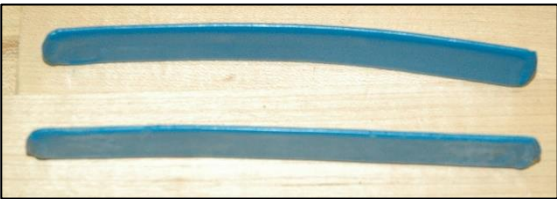
SHOULDER	
Y / N	Urethane shoulder pads show no evidence of contact
Y / N	Clavicles securely attached to sternum and shoulder
Y / N	No evidence of debonding, tearing, or permanent compression of posterior soft stops Left softstop is missing. 
OTHER	Right hand has a cut. 

SPINE	
Y / N	No evidence of debonding between thoracic spine flex joint and metal plates
Y / N	No evidence of debonding 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 debonding between rib damping material and ribs
Y / N	CRUX anterior arms securely attached to anterior ribs
Y / N	CRUX posterior arms 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	Hole in chest damper foam on the left side 
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 Holes on both sides of lower abdomen bag 
Y / N	Lower abdomen insert securely attached to spine
Y / N	Lower abdomen insert shows no evidence of permanent set
OTHER	Lower right abdomen IRTACC Y-Axis potentiometer cable has detached. 
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	Multiple cuts and pitting in pelvis flesh 

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 Knees are scuffed
	
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 debonding, tearing, or permanent compression of ankle soft stops
Y / N	No cuts, tears, or scuffing of leg flesh Right leg flesh is torn at zipper attachment.
	
OTHER	

JACKET	
Y / N	Rib stiffeners show no sign of permanent deformation Note: Bent, but can be corrected
	
Y / N	No evidence of tears or holes in jacket fabric, Velcro, or zippers Multiple holes, tears in lining, frayed seams, back foam insert is falling apart
	
OTHER	

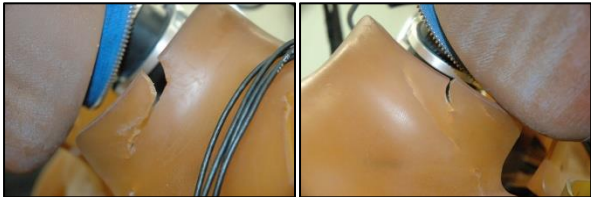
THOR Inspection Checklist

Date: 6/23/2014	
NHTSA Representative: James Saunders	
Inspection Reporter: Mary Geesey, Matthew Goehle	
Inspection type (check one): ☒ Pre-Test ☐ Post-Test	
Dummy S/N: 0016	Legs S/N: LX0019/LX0018
Dummy Description: THOR NT 50th Male	
Date of last Certification: Certification performed in June 2014	
<u>Tests conducted since last full certification or inspection:</u> Since last inspection: R20145401 – Mazda 3 Since last certification: R20145401 – Mazda 3	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> None	
<u>Physical evidence of damage:</u> See Report – Minor Damage (Cut knees)	
<u>Anecdotal evidence of damage:</u> None	
<u>Equipment delivered to Borrower:</u> THOR 0016 ATD 26 Accelerometers 3 Angular Rate Sensors 2 Skull Spring LC 1 Condyle Pot 1 Upper Neck LC 4 IRTraccs 8 Rotational Pots 1 Spine LC 2 Acetabulum LC 2 ASIS LC 2 Femur LC	<i>Continued</i> 2 LX Leg Assemblies 2 Upper Tibia LC 2 Lower Tibia LC 6 Ank1e Potentiometers 2 Knee Sliders 1 Neck Skin 1 Neck Foam 1 Tiltview Interface Cable 4 Tilt Sensors 1 H-Point Tool 1 Tool Box 1 Laptop

Note: New Damage is Noted in Red

HEAD	
Y / N	Rear head cap mounts securely to head
Y / N	Head skin fits securely over skull
Y / N	Head skin shows no sign of tears or damage
Y / N	Interior components of skull cavity (ballast, accelerometer mount, accelerometers) securely attached
Y / N	Head securely mounted to OC joint
OTHER	

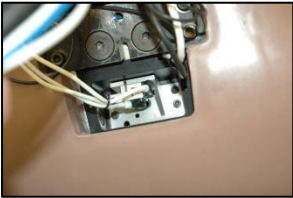
NECK	
Y / N	Neck cables slide freely through holes in neck plates
Y / N	Neck cables show no sign of fraying, broken strands, or kinking
Y / N	No evidence of debonding between neck pucks and plates
Y / N	No evidence of debonding or permanent compression in neck soft stop assemblies
Y / N	Neck securely attached to upper neck load cell
Y / N	Neck securely attached to lower neck load cell
Y / N	Neck pitch change joint mechanism mating teeth are engaged
OTHER	

SHOULDER	
Y / N	Urethane shoulder pads show no evidence of contact Both shoulder pads are torn. We used Gaffer's tape to prevent further damage. 
Y / N	Clavicles securely attached to sternum and shoulder
Y / N	No evidence of debonding, tearing, or permanent compression of posterior soft stops
OTHER	

SPINE	
Y / N	No evidence of debonding between thoracic spine flex joint and metal plates
Y / N	No evidence of debonding between lumbar spine flex joint and metal plates
Y / N	Lumbar spine pitch change joint mechanism mating teeth are engaged
OTHER	

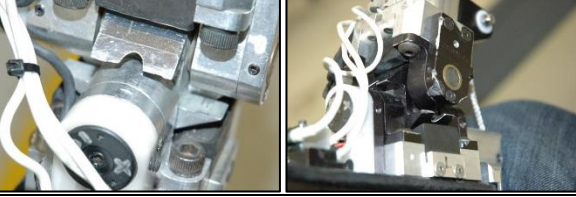
THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material
Y / N	No evidence of debonding between rib damping material and ribs
Y / N	CRUX anterior arms securely attached to anterior ribs
Y / N	CRUX posterior arms securely attached to double gimbals, spine
Y / N	Urethane bib is securely attached to ribs with no sign of tearing or washer penetration Uppermost rib was not connected to sternum. I installed.

	 Bib is torn in the center near clavicle attachment. 
Y / N	Ribs securely attached to posterior spine
Y / N	Rib stiffeners show no evidence of bending (no gaps between ribs and stiffeners)
OTHER	T6 Accelerometer cable is torn at accelerometer. 

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  Lower abdomen bag has a number of ribs and tears.
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	Pelvis Instrumentation protective cover is missing. 

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 Knees are both cut. Left insert is slightly cut.

	
OTHER	

LOWER EXTREMITY (LX)	
Y / N	Rotational potentiometers in ankle securely attached Ankle assemblies are both marked up but functional. 
Y / N	Achilles tendon provides resistance to dorsiflexion
Y / N	No evidence of debonding, tearing, or permanent compression of ankle soft stops
Y / N	No cuts, tears, or scuffing of leg flesh Right tibia flesh has mild scuffing. 
OTHER	Inside left and right knee covers were swapped resulting in permanent markings in the rear knee stops. I swapped. 

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 Jacket has a number of tears throughout.
OTHER	

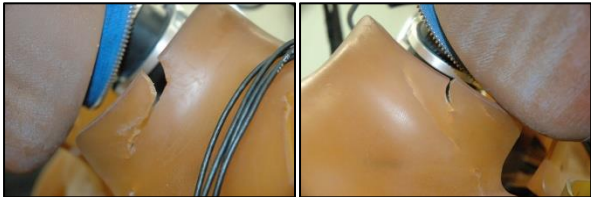
THOR Inspection Checklist

Date: 6/23/2014	
NHTSA Representative: James Saunders	
Inspection Reporter: Mary Geesey, Matthew Goehle	
Inspection type (check one): ☐ Pre-Test ☒ Post-Test	
Dummy S/N: 0016	Legs S/N: LX0019/LX0018
Dummy Description: THOR NT 50th Male	
Date of last Certification: Certification performed in June 2014	
<u>Tests conducted since last full certification or inspection:</u> Since last inspection: R20145401 – Mazda CX-5 Since last certification: R20145400 – Mazda 3 R20145401 – Mazda CX-5	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> -13NECKLO00THFOXP - Passenger Lower Neck X Force - Extreme Spikes at 55 and 130ms. -Exc wire not secured to the Amp pin on THOR side of the adapter. We will repair. -13ACTBLE00THFOYP - Passenger Left Acetabulum Y Force - Channel failed. -Exc shorted to ground in THOR side of Amp connector. We will repair.	
<u>Physical evidence of damage:</u> None New	
<u>Anecdotal evidence of damage:</u> None	
<u>Equipment delivered to Borrower:</u> THOR 0016 ATD 26 Accelerometers 3 Angular Rate Sensors 2 Skull Spring LC 1 Condyle Pot 1 Upper Neck LC 4 IRTraccs 8 Rotational Pots 1 Spine LC 2 Acetabulum LC 2 ASIS LC 2 Femur LC	<i>Continued</i> 2 LX Leg Assemblies 2 Upper Tibia LC 2 Lower Tibia LC 6 Ank1e Potentiometers 2 Knee Sliders 1 Neck Skin 1 Neck Foam 1 Tiltview Interface Cable 4 Tilt Sensors 1 H-Point Tool 1 Tool Box 1 Laptop

Note: New Damage is Noted in Red

HEAD	
Y / N	Rear head cap mounts securely to head
Y / N	Head skin fits securely over skull
Y / N	Head skin shows no sign of tears or damage
Y / N	Interior components of skull cavity (ballast, accelerometer mount, accelerometers) securely attached
Y / N	Head securely mounted to OC joint
OTHER	

NECK	
Y / N	Neck cables slide freely through holes in neck plates
Y / N	Neck cables show no sign of fraying, broken strands, or kinking
Y / N	No evidence of debonding between neck pucks and plates
Y / N	No evidence of debonding or permanent compression in neck soft stop assemblies
Y / N	Neck securely attached to upper neck load cell
Y / N	Neck securely attached to lower neck load cell
Y / N	Neck pitch change joint mechanism mating teeth are engaged
OTHER	

SHOULDER	
Y / N	Urethane shoulder pads show no evidence of contact Both shoulder pads are torn. We used Gaffer's tape to prevent further damage. 
Y / N	Clavicles securely attached to sternum and shoulder
Y / N	No evidence of debonding, tearing, or permanent compression of posterior soft stops
OTHER	

SPINE	
Y / N	No evidence of debonding between thoracic spine flex joint and metal plates
Y / N	No evidence of debonding 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 debonding between rib damping material and ribs
Y / N	CRUX anterior arms securely attached to anterior ribs
Y / N	CRUX posterior arms securely attached to double gimbals, spine
Y / N	Urethane bib is securely attached to ribs with no sign of tearing or washer penetration Uppermost rib was not connected to sternum. I installed.

	 Bib is torn in the center near clavicle attachment. 
Y / N	Ribs securely attached to posterior spine
Y / N	Rib stiffeners show no evidence of bending (no gaps between ribs and stiffeners)
OTHER	T6 Accelerometer cable is torn at accelerometer. 

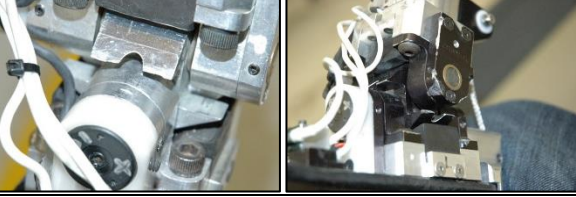
ABDOMEN	
Y / N	No evidence of tearing, cuts, or broken stitches in upper abdomen bag and zipper
Y / N	Upper abdomen insert securely attached to spine
Y / N	Upper abdomen insert shows no evidence of permanent set
Y / N	No evidence of tearing, cuts, or broken stitches in lower abdomen bag and zipper Lower abdomen bag has a number of ribs and tears. 
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	Pelvis Instrumentation protective cover is missing. 

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 Knees are both cut. Left insert is slightly cut.

	
OTHER	

LOWER EXTREMITY (LX)

Y / N	Rotational potentiometers in ankle securely attached Ankle assemblies are both marked up but functional. 
Y / N	Achilles tendon provides resistance to dorsiflexion
Y / N	No evidence of debonding, tearing, or permanent compression of ankle soft stops
Y / N	No cuts, tears, or scuffing of leg flesh Right tibia flesh has mild scuffing. 
OTHER	Inside left and right knee covers were swapped resulting in permanent markings in the rear knee stops. I  swapped.

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 Jacket has a number of tears throughout.
OTHER	

Test Data/Sensor Repair Notes

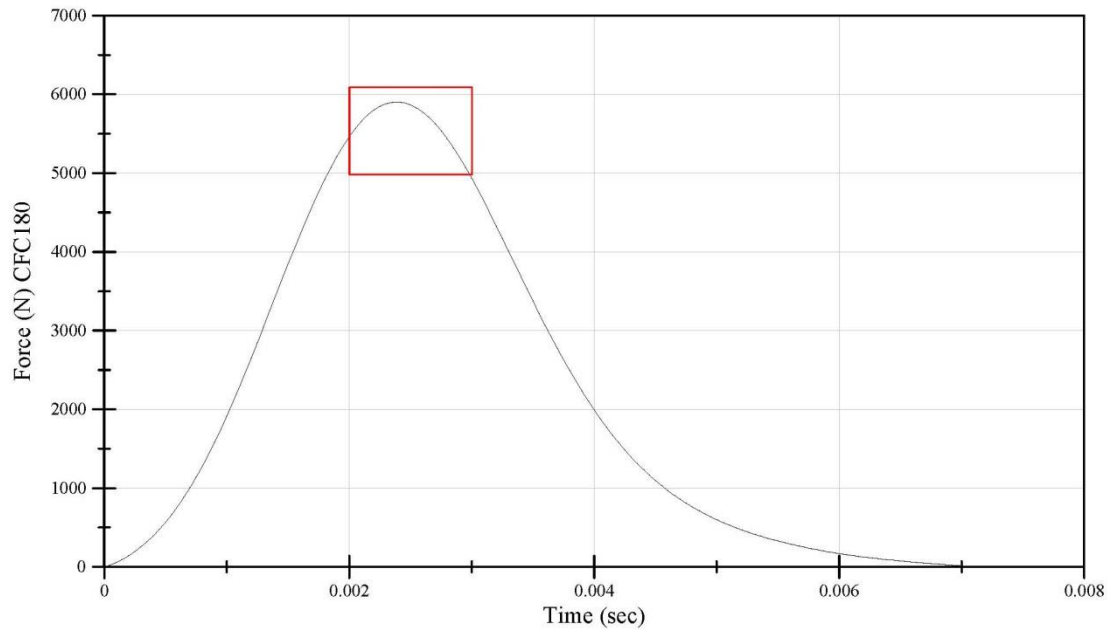
DUMMY CALIBRATIONS

50% ADULT MALE THOR016 DUMMY CALIBRATIONS

Test Temperature: 71 degrees
Relative Humidity: 38%
Test Velocity: 1.99 m/s

THOR Head Impact Certification

Probe Force
Serial Number: T016



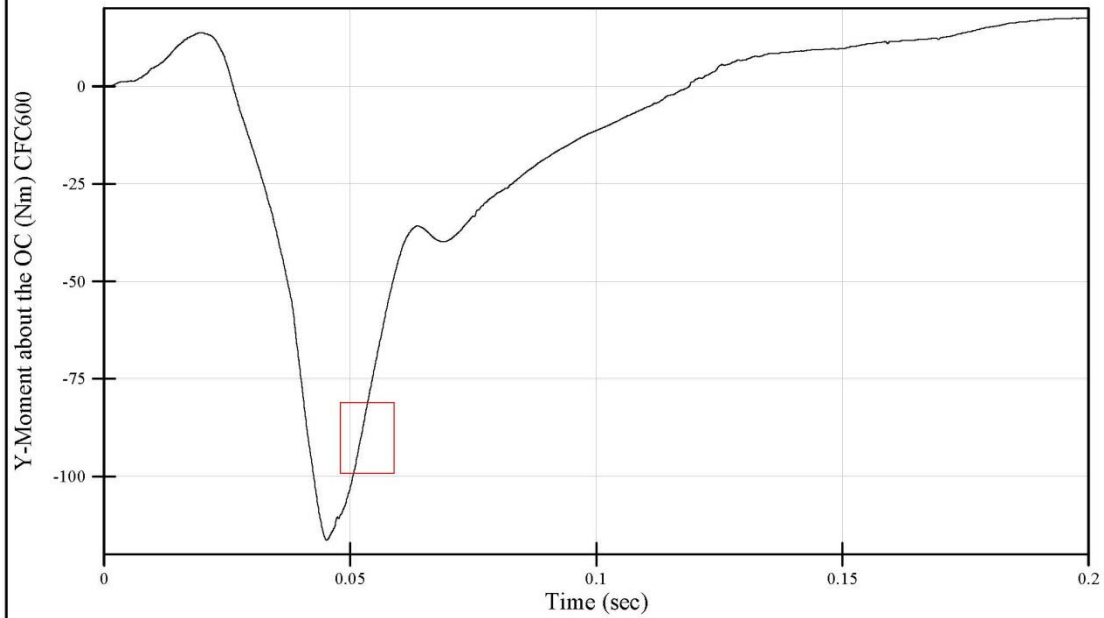
Software Version: 2.4

File Name: T016Head140617_01_DIAdemHeader_BINARYprocessed
06/17/2014 14:50:56.0000

Test Temperature: 70.9 degrees
Relative Humidity: 51%
Test Velocity: 3.65 m/s

THOR Neck Extension Certification

Y-Moment
Serial Number: T0016



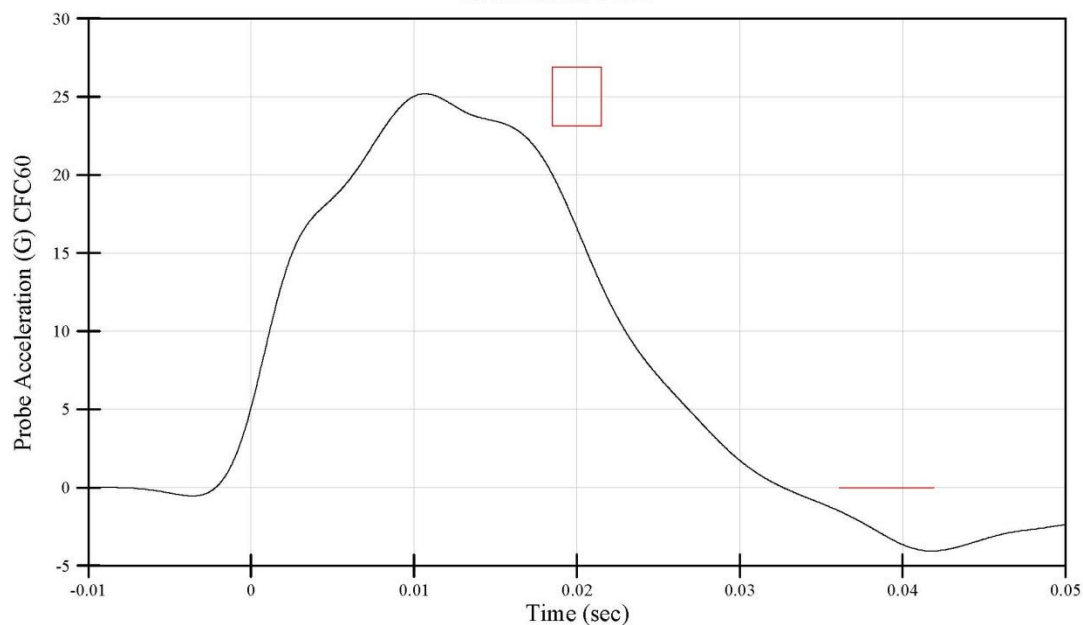
Software Version: 2.4

File Name: T016NeckExtension140616-01_Processed2
06/16/2014 10:56:25.0000

Test Temperature: 70.9 degrees
Relative Humidity: 51%
Test Velocity: 3.65 m/s

THOR Neck Extension Certification

Probe Acceleration
Serial Number: T0016



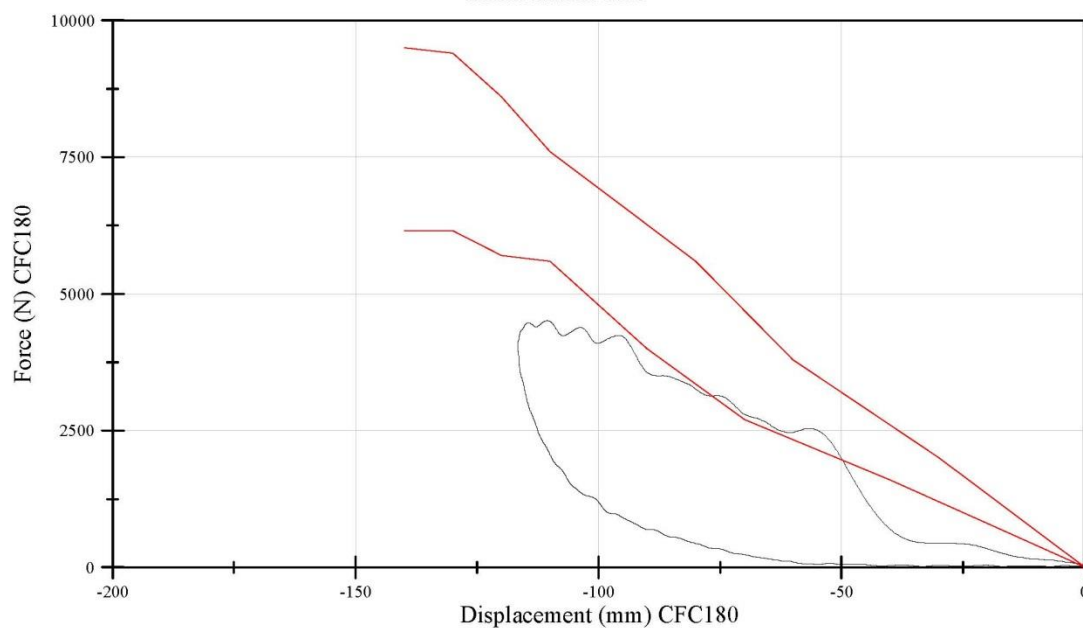
Software Version: 2.4

File Name: T016NeckExtension140616-01_Processed2
06/16/2014 10:56:25.0000

Test Temperature: 70.5 degrees
Relative Humidity: 51%
Test Velocity: 6.68 m/s

THOR Upper Abdomen Certification Abdomen Displacement vs. Probe Force

Serial Number: T016

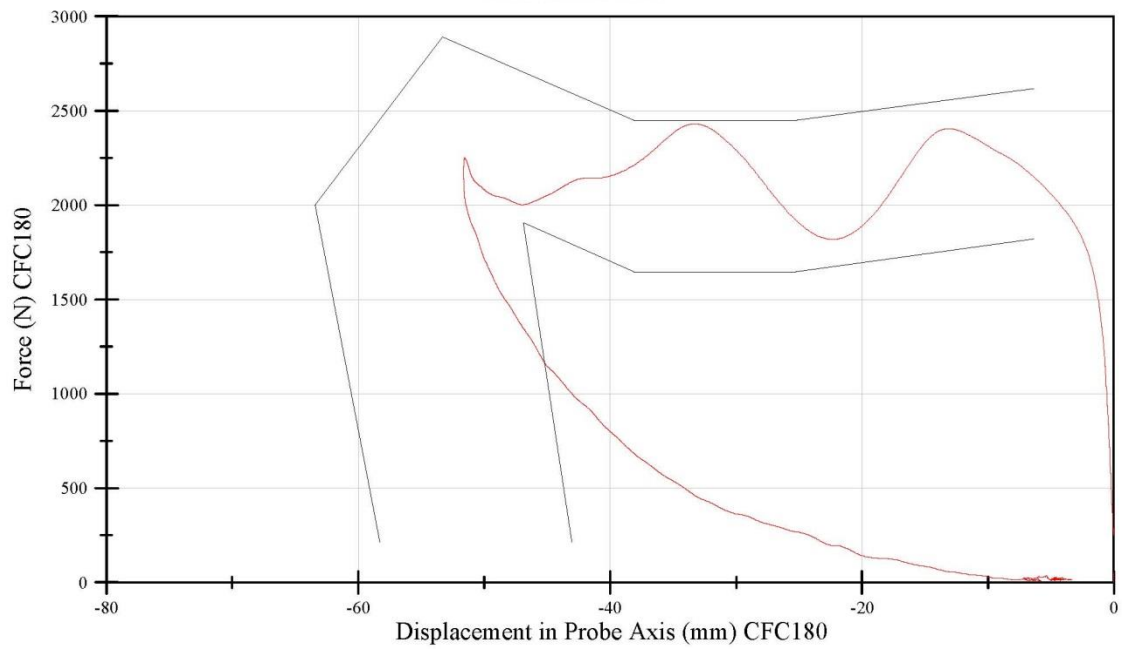


Software Version: 2.4

File Name: T016UpperAbdomen140610-01_Processed
06/10/2014 15:54:17.0000

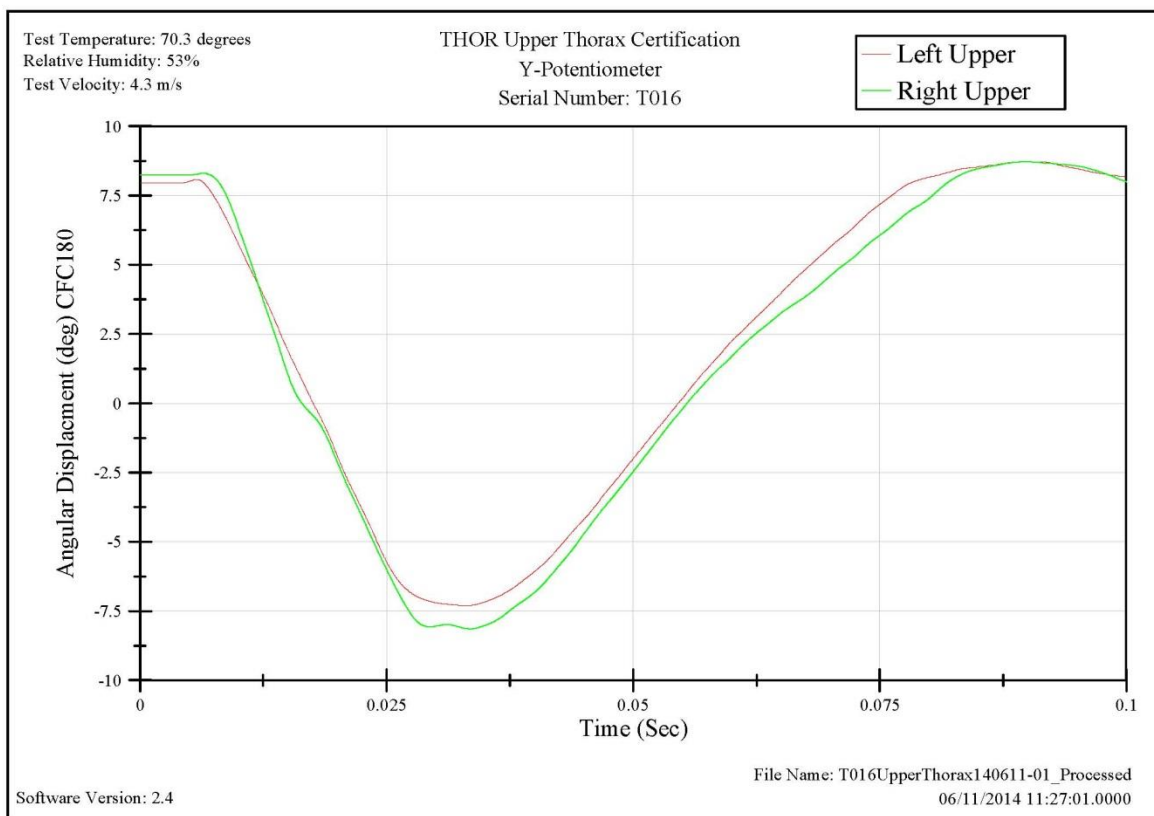
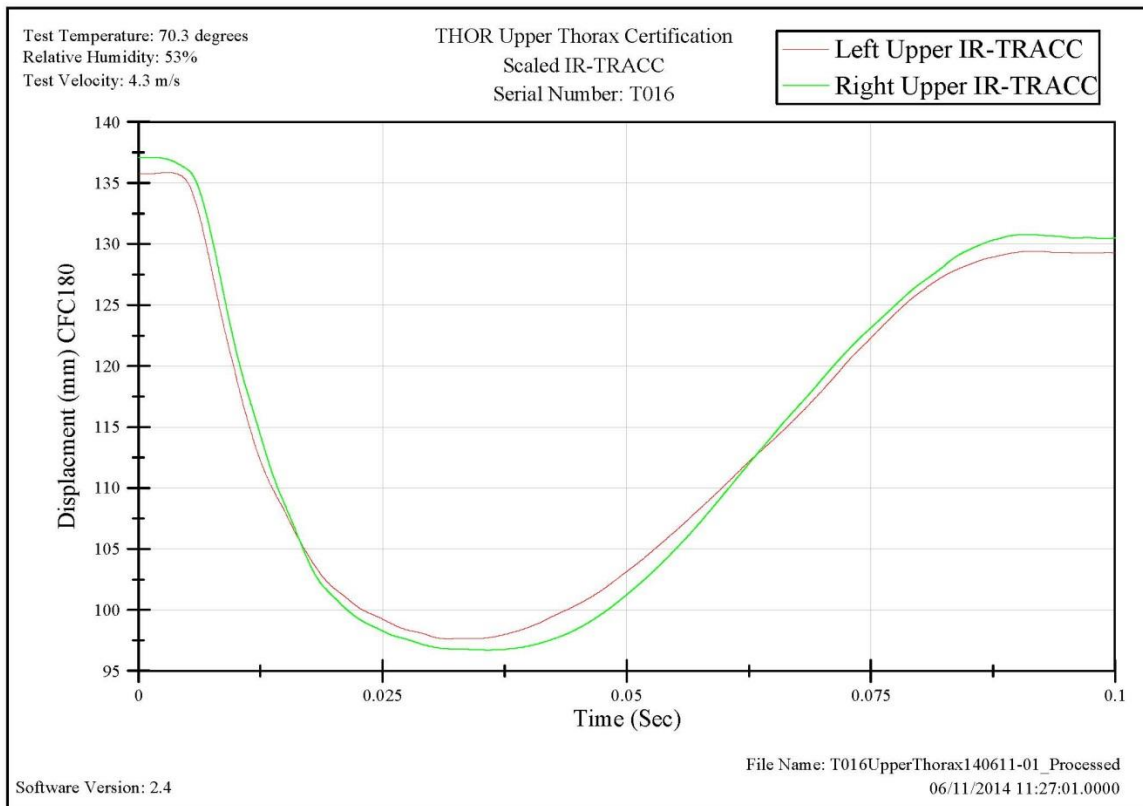
Test Temperature: 70.3 degrees
Relative Humidity: 53%
Test Velocity: 4.3 m/s

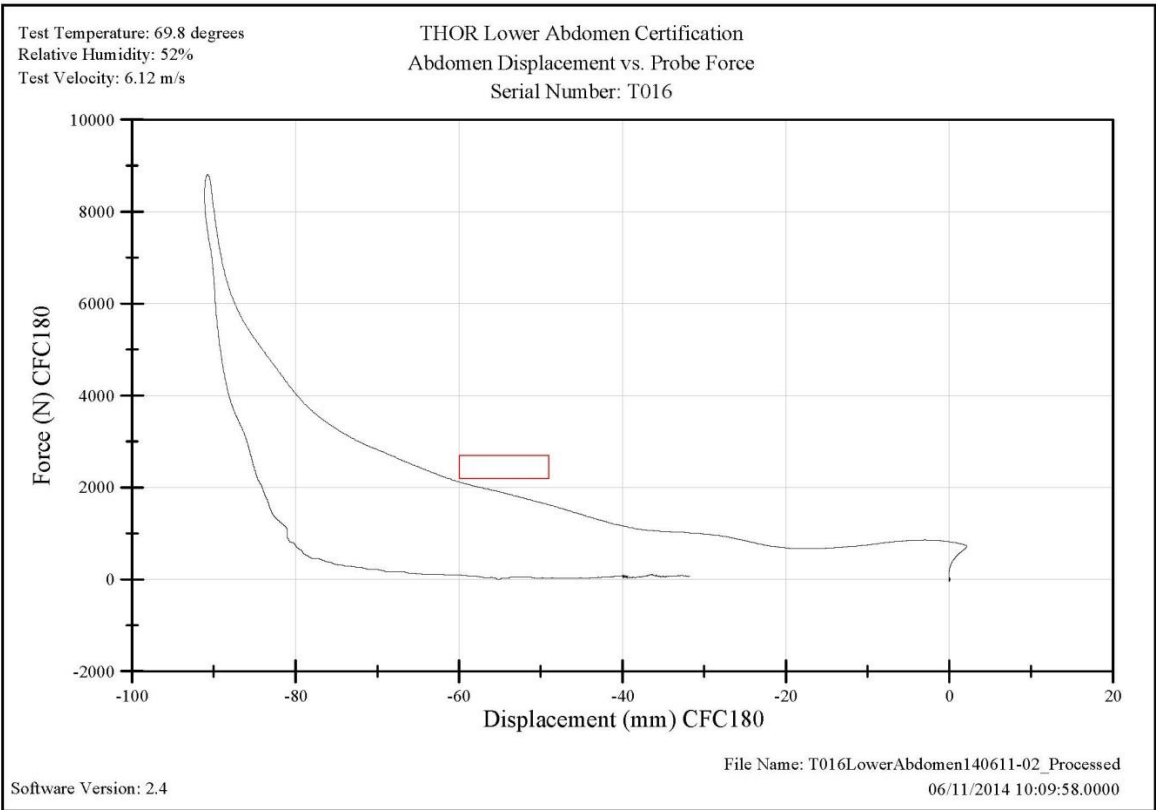
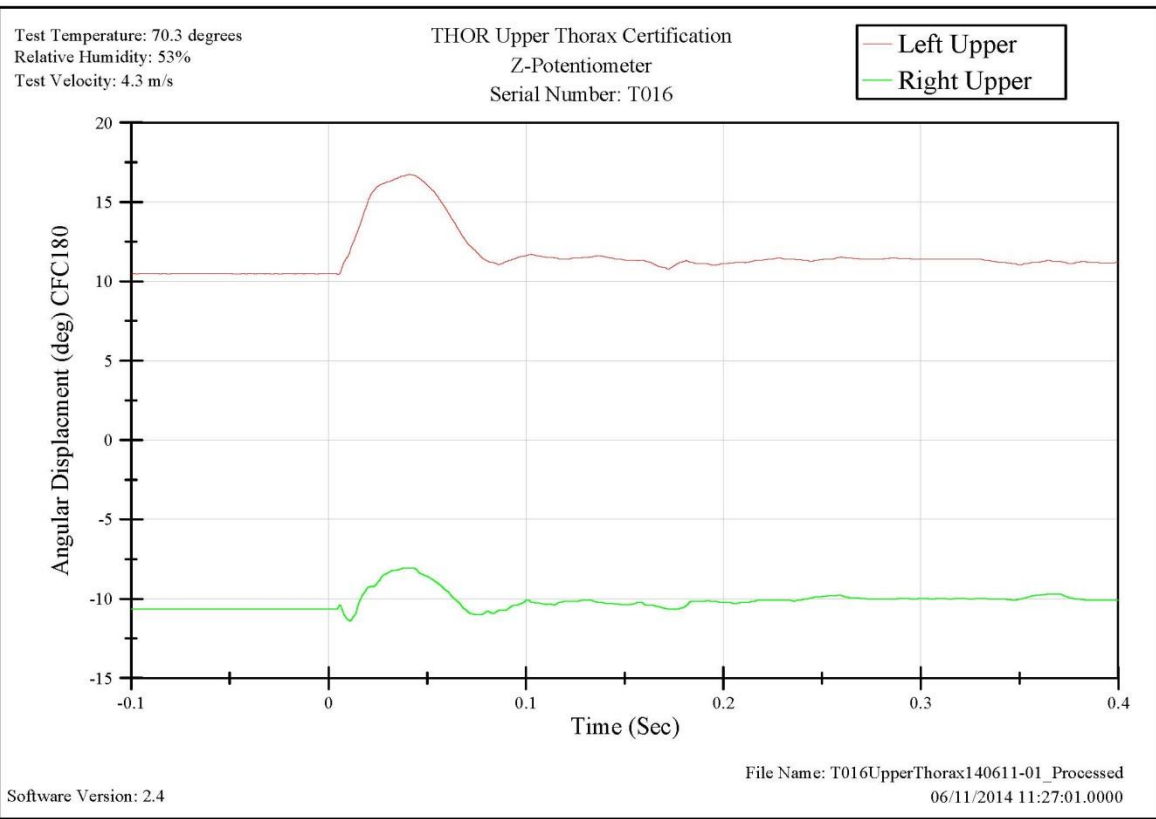
THOR Upper Thorax Certification
Thorax Response With Kroell Corridor
Serial Number: T016

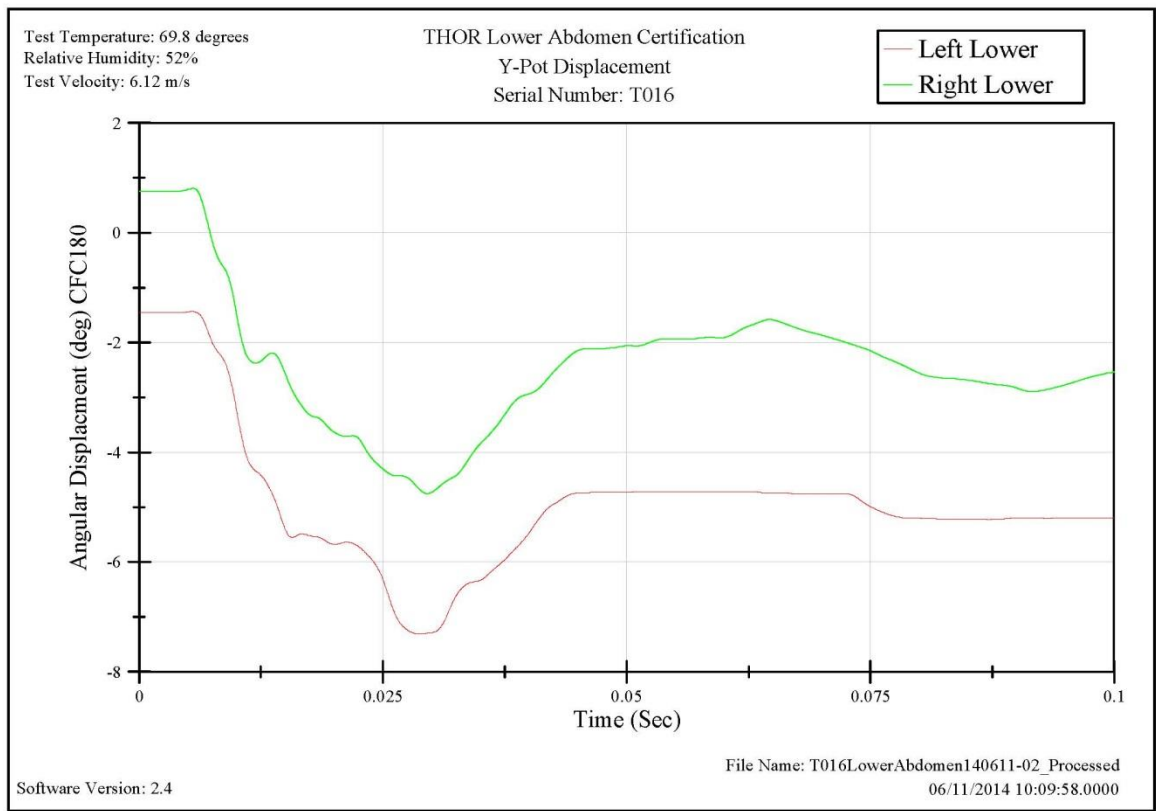
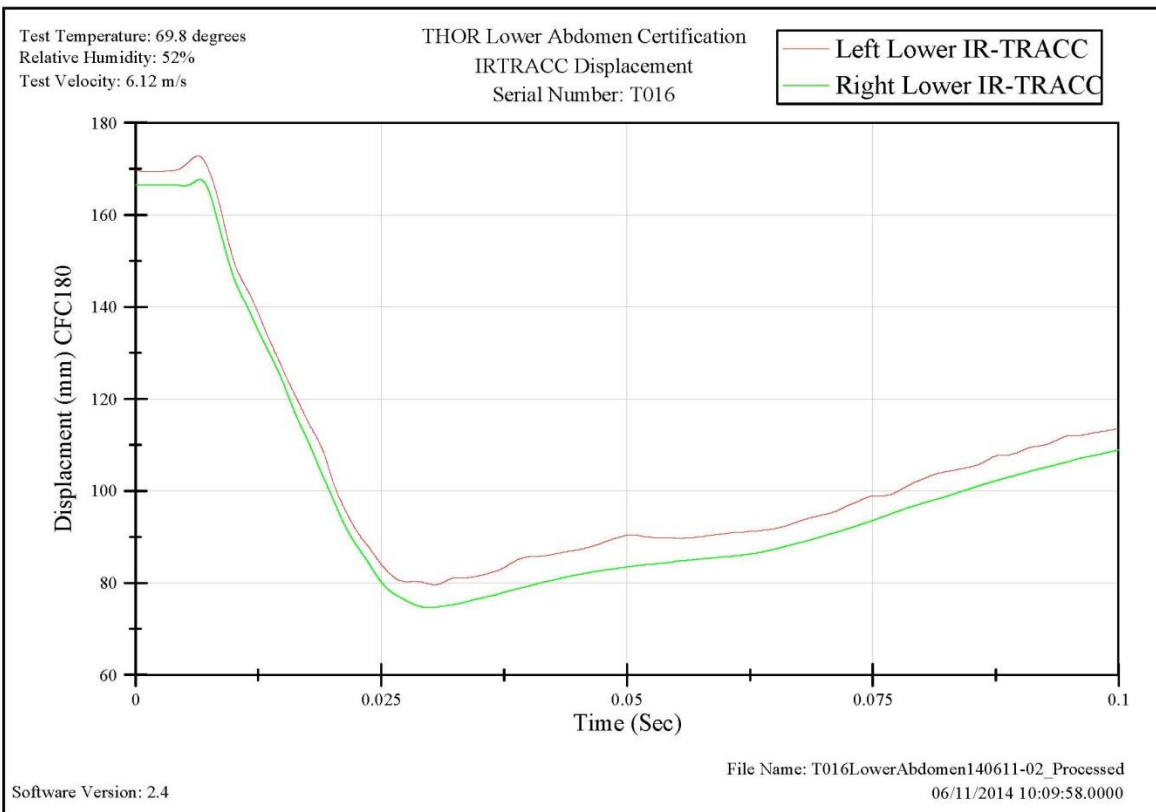


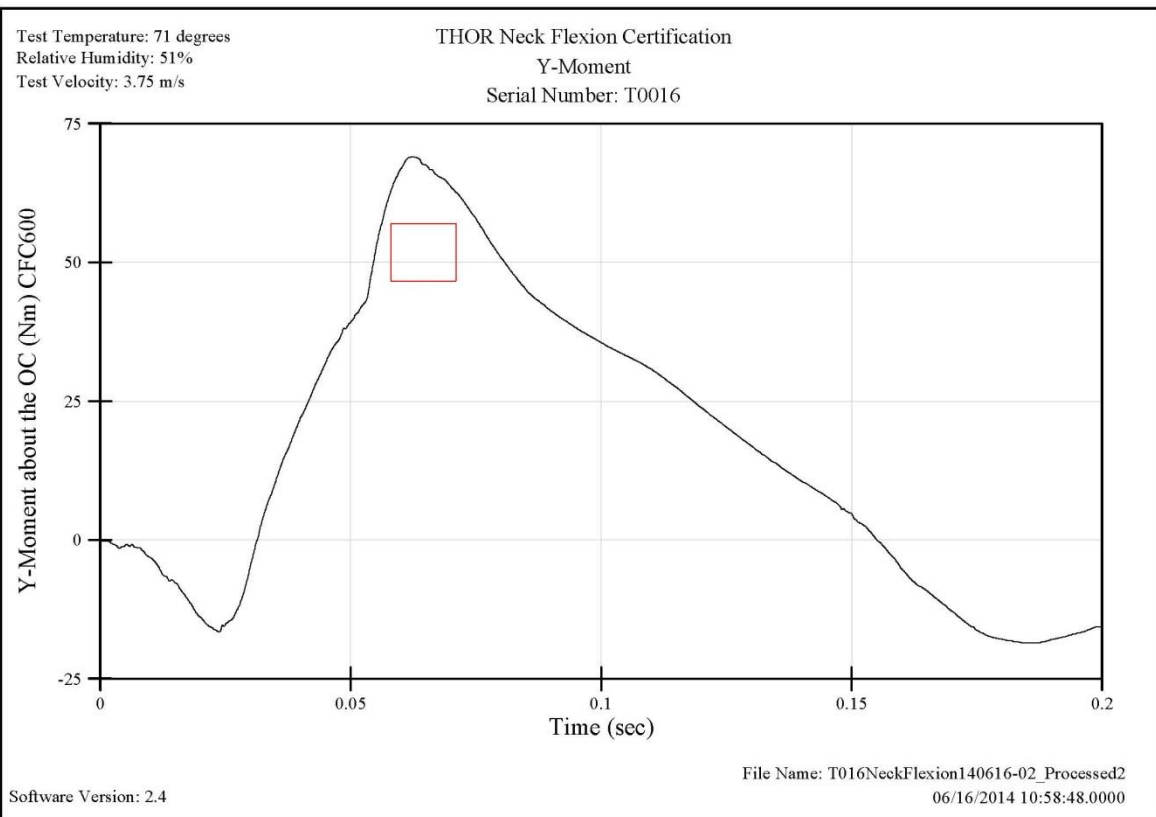
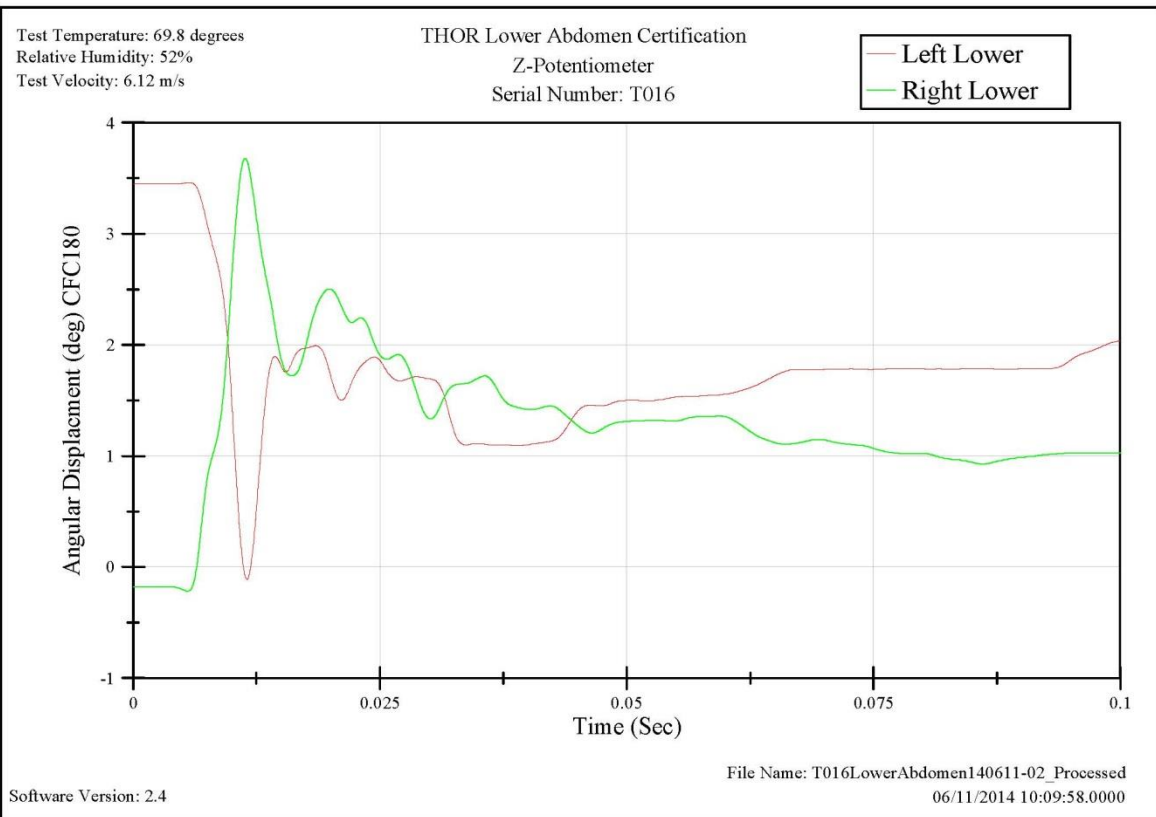
Software Version: 2.4

File Name: T016UpperThorax140611-01_Processed
06/11/2014 11:27:01.0000



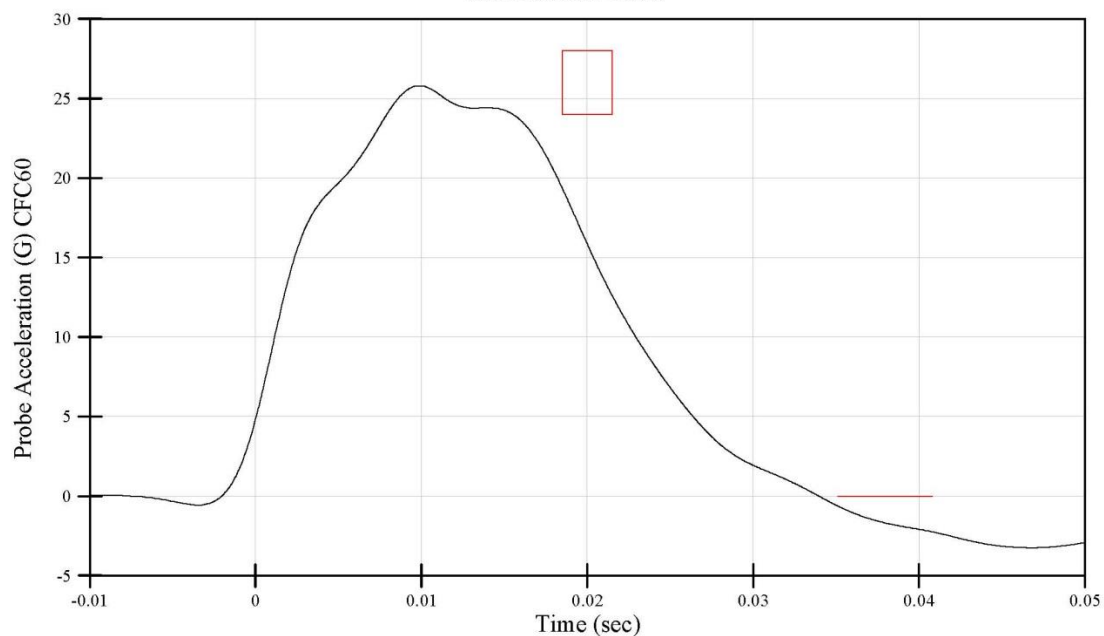






Test Temperature: 71 degrees
Relative Humidity: 51%
Test Velocity: 3.75 m/s

THOR Neck Flexion Certification
Probe Acceleration
Serial Number: T0016

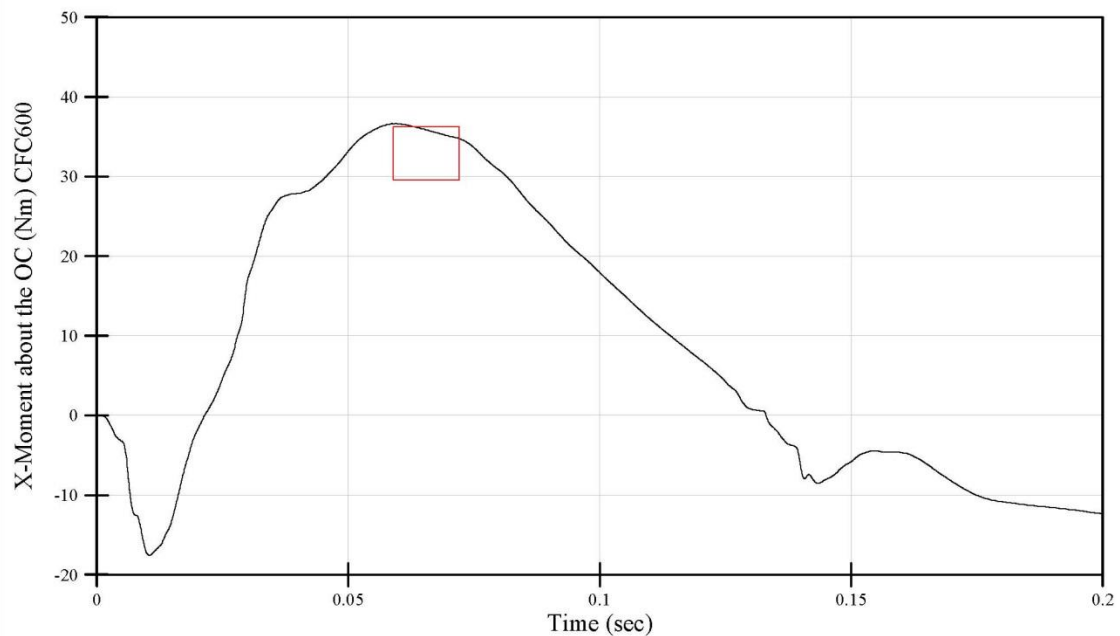


Software Version: 2.4

File Name: T016NeckFlexion140616-02_Processed2
06/16/2014 10:58:48.0000

Test Temperature: 70.4 degrees
Relative Humidity: 52%
Test Velocity: 2.86 m/s

THOR Neck Left Lateral Flexion Certification
X-Moment
Serial Number: T0016



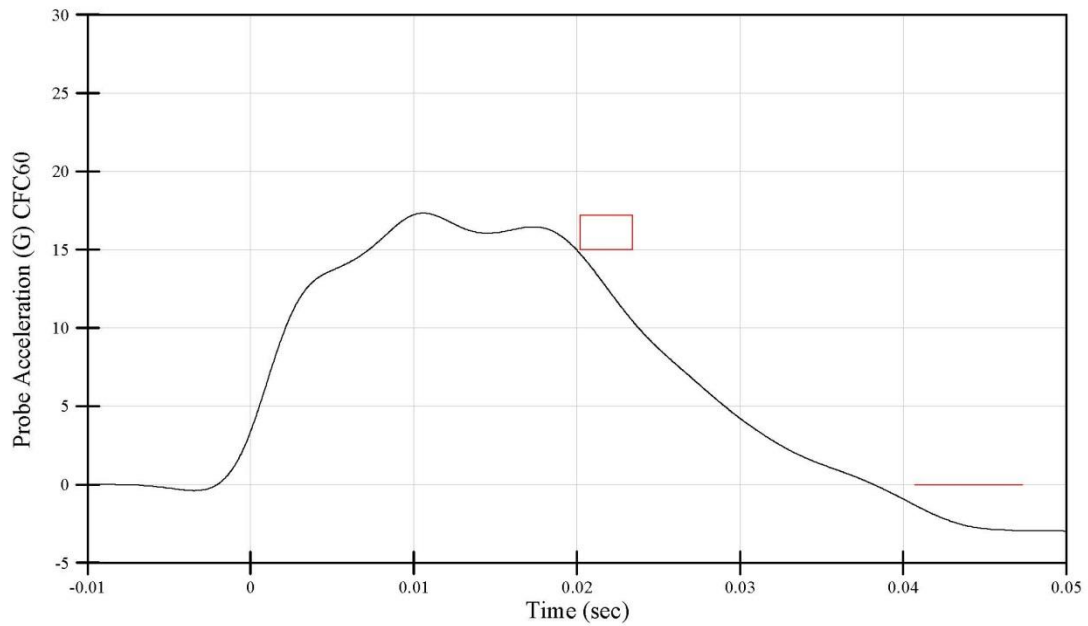
Software Version: 2.4

File Name: T016NeckLeftLateral140616-01_Processed
06/16/2014 11:07:30.0000

Test Temperature: 70.4 degrees
Relative Humidity: 52%
Test Velocity: 2.86 m/s

THOR Neck Left Lateral Flexion Certification

Probe Acceleration
Serial Number: T0016



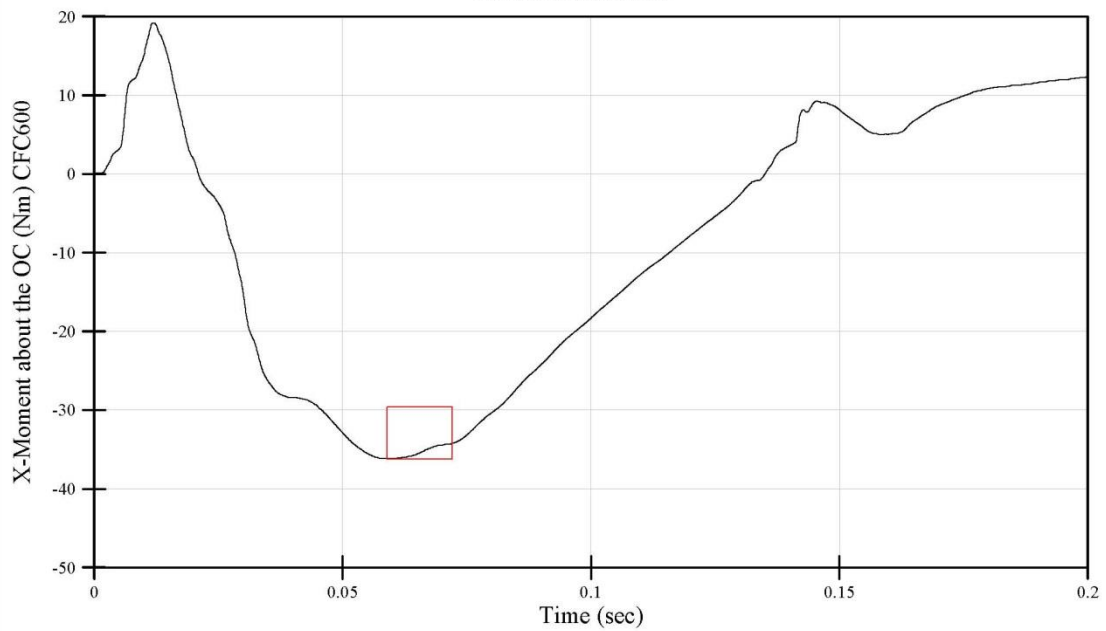
Software Version: 2.4

File Name: T016NeckLeftLateral140616-01_Processed
06/16/2014 11:07:30.0000

Test Temperature: 70.3 degrees
Relative Humidity: 53%
Test Velocity: 2.86 m/s

THOR Neck Right Lateral Flexion Certification

X-Moment
Serial Number: T0016



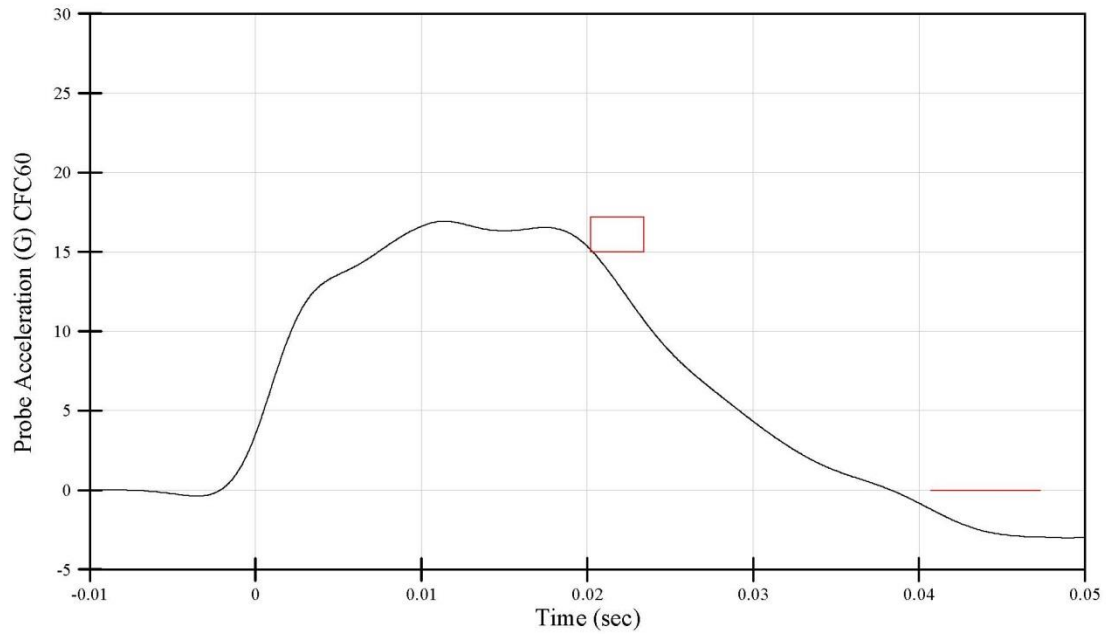
Software Version: 2.4

File Name: T016NeckRightLateral140616-01_Processed
06/16/2014 11:37:51.0000

Test Temperature: 70.3 degrees
Relative Humidity: 53%
Test Velocity: 2.86 m/s

THOR Neck Right Lateral Flexion Certification

Probe Acceleration
Serial Number: T0016



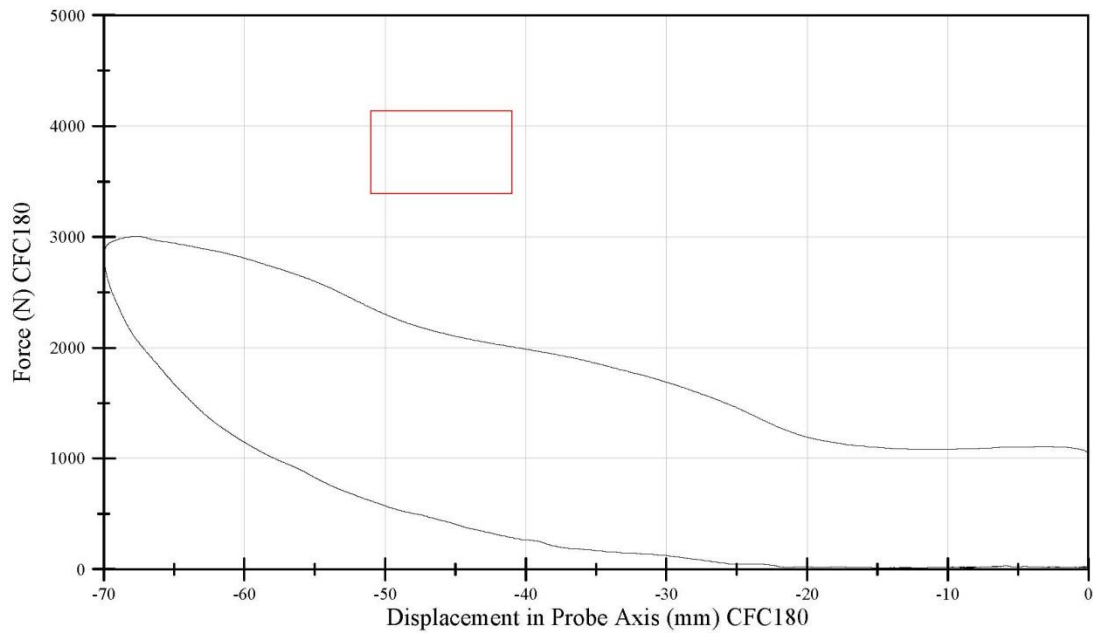
Software Version: 2.4

File Name: T016NeckRightLateral140616-01_Processed
06/16/2014 11:37:51.0000

Test Temperature: 70.5 degrees
Relative Humidity: 51%
Test Velocity: 4.27 m/s

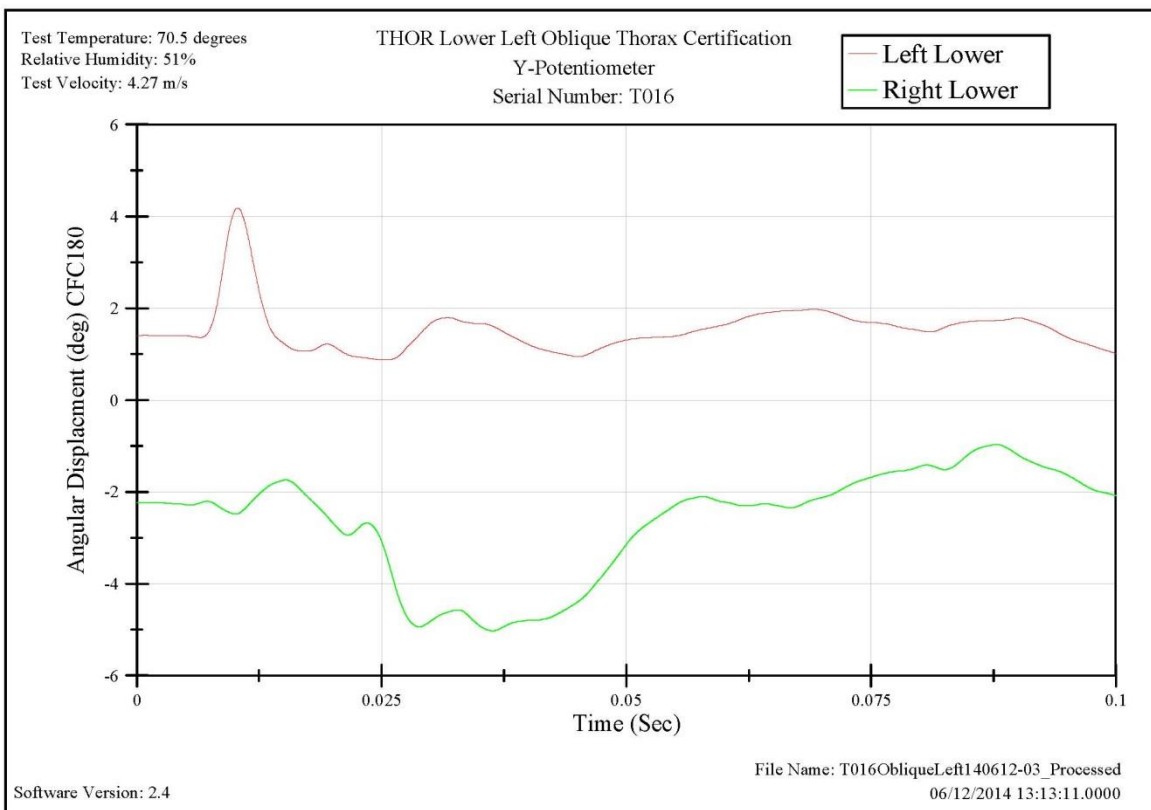
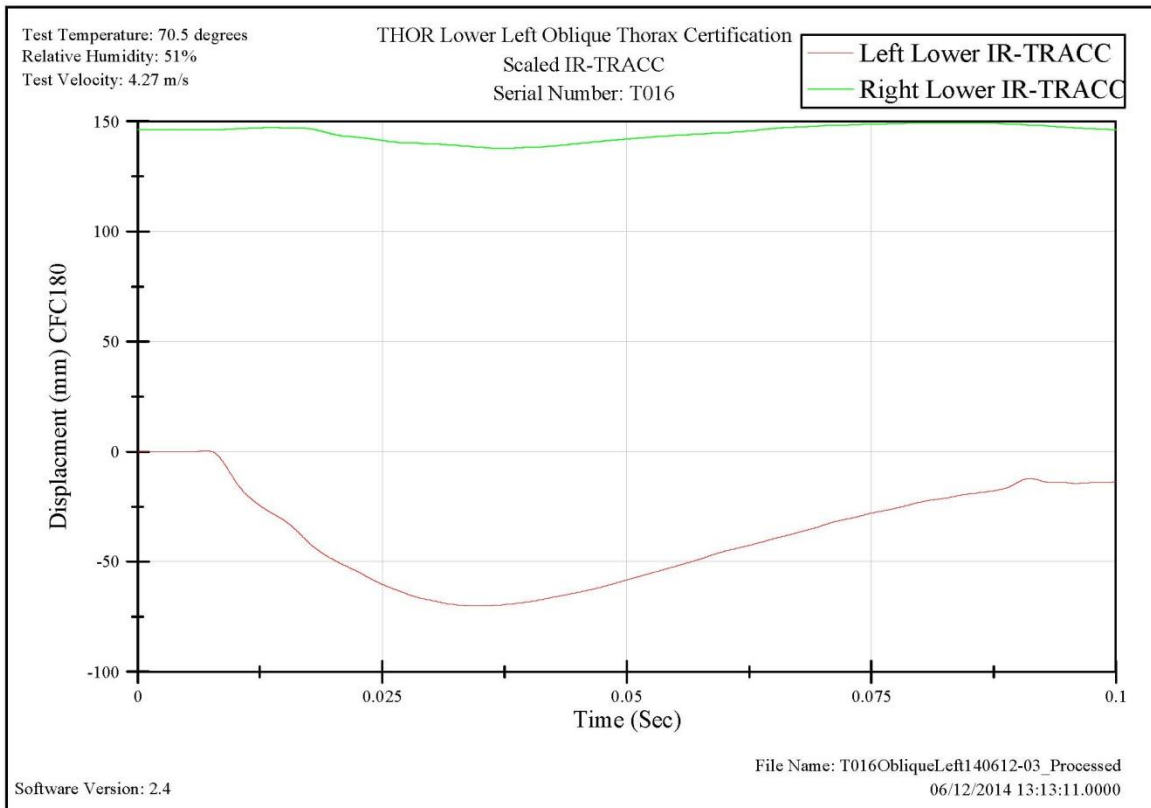
THOR Lower Left Oblique Thorax Certification

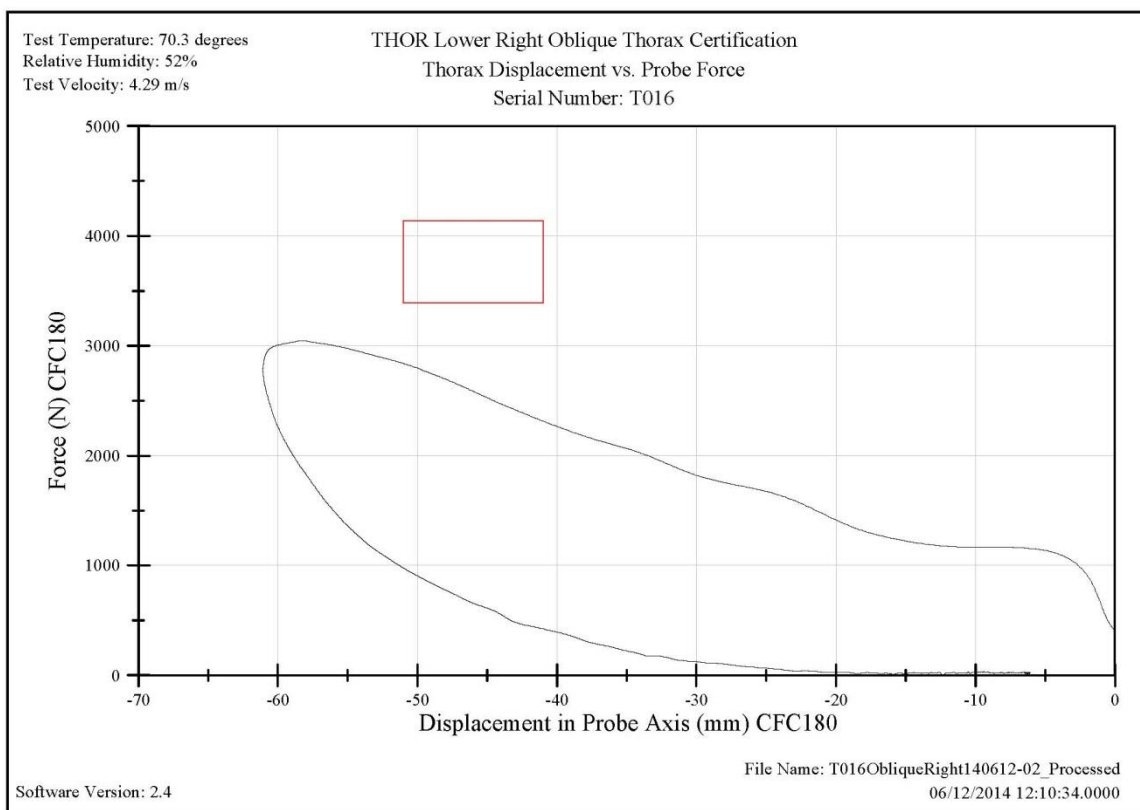
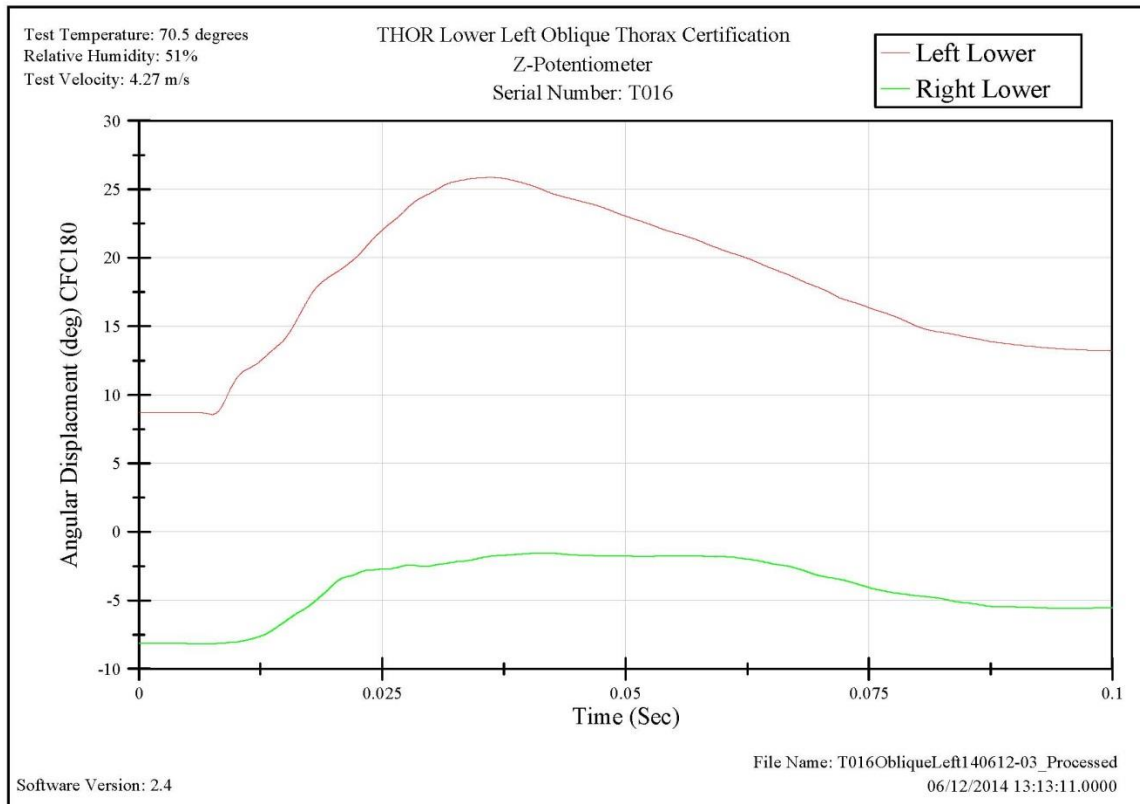
Thorax Displacement vs. Probe Force
Serial Number: T016

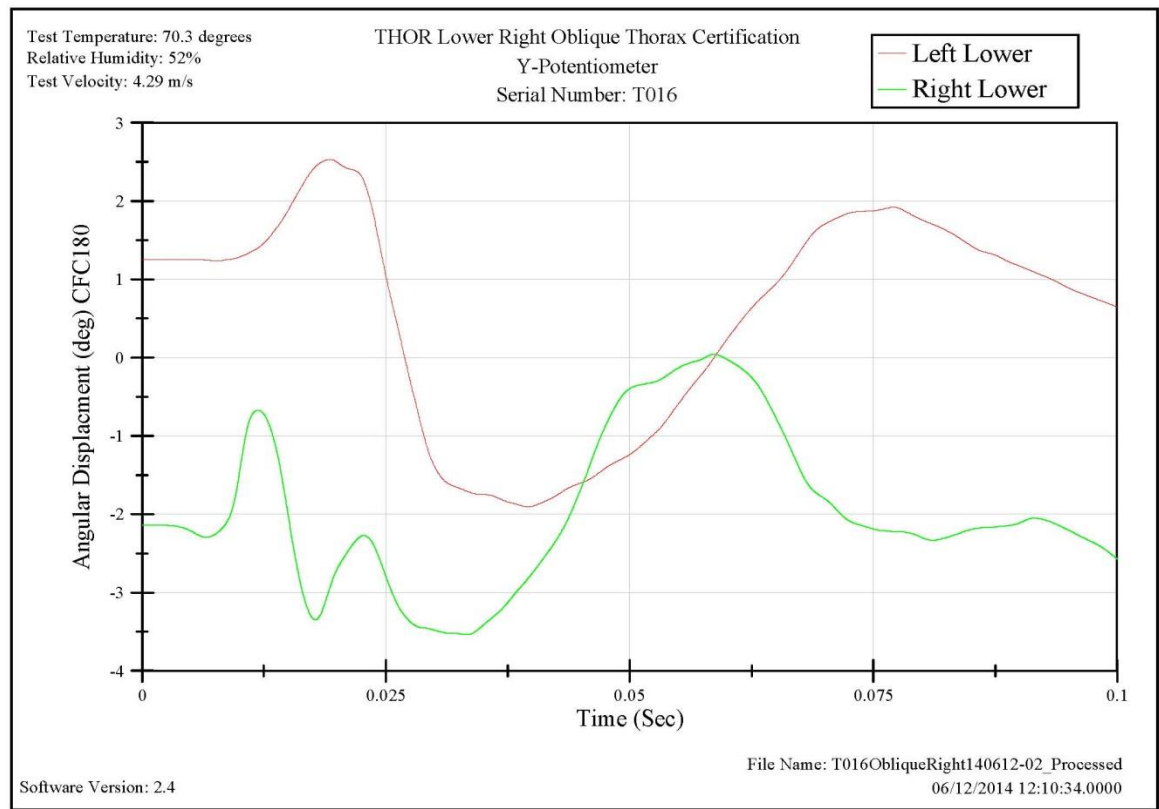
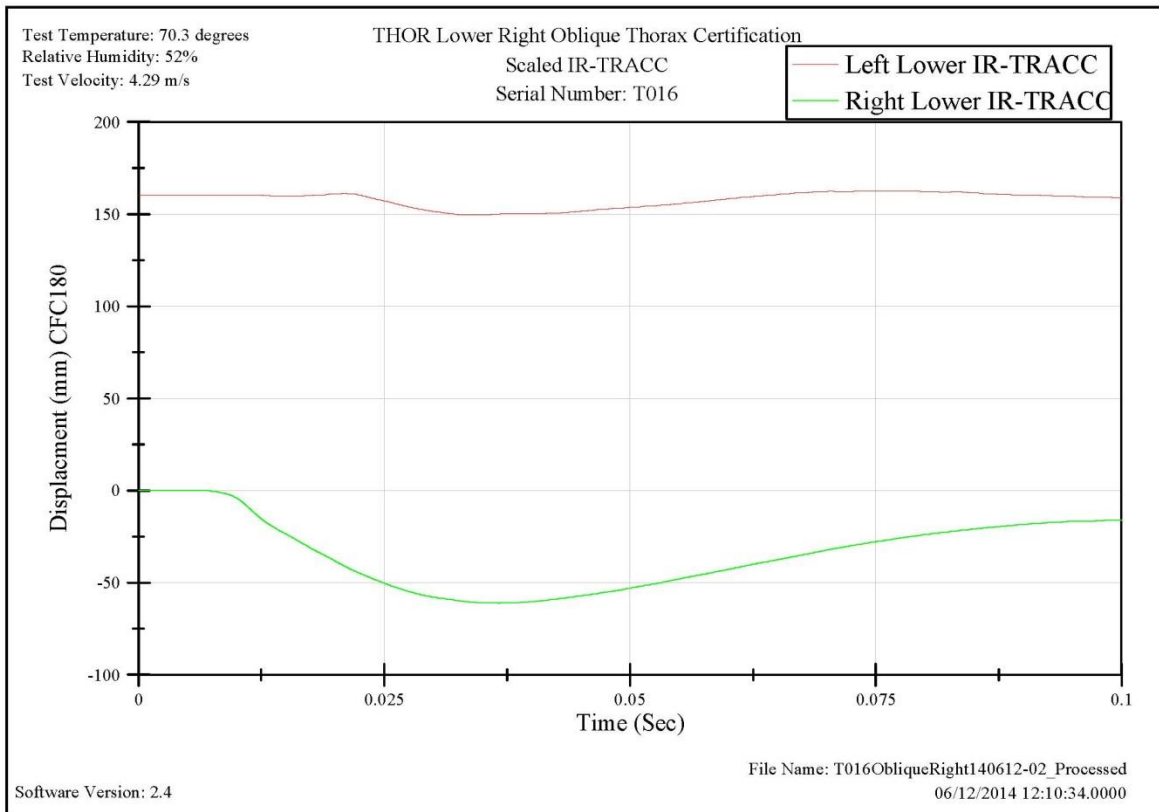


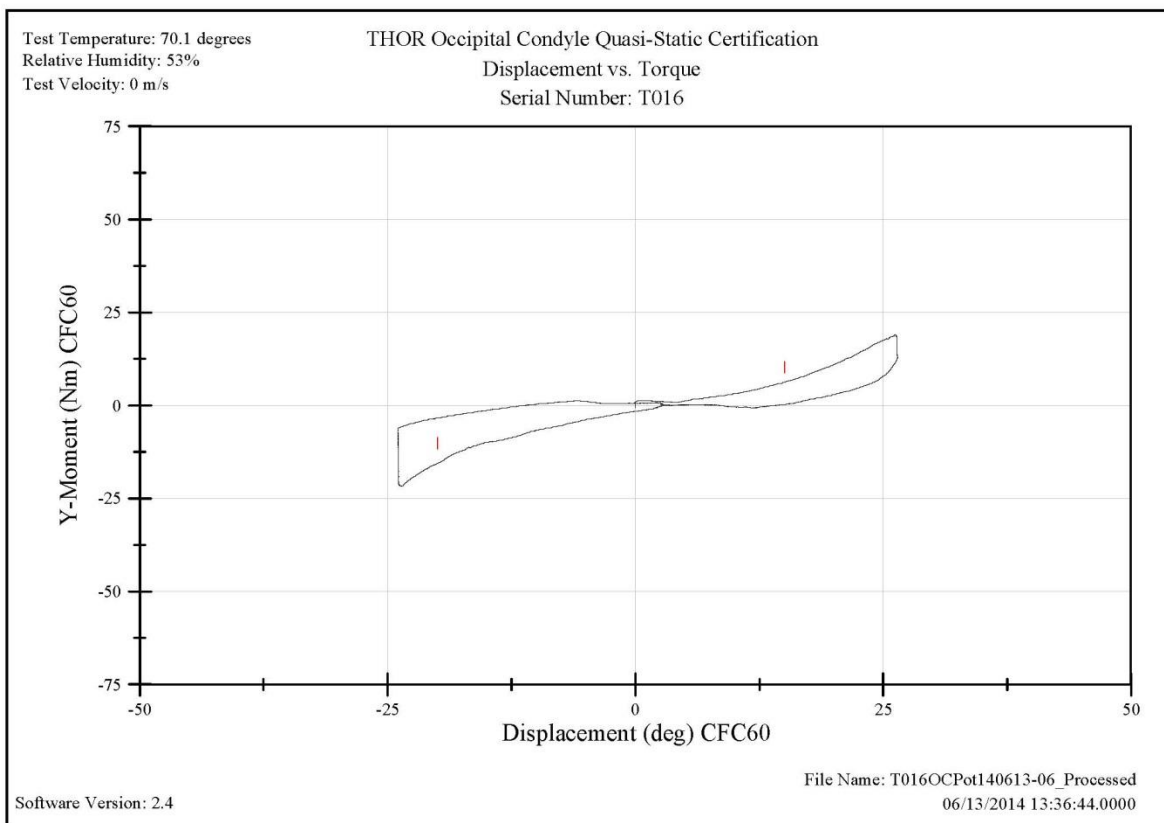
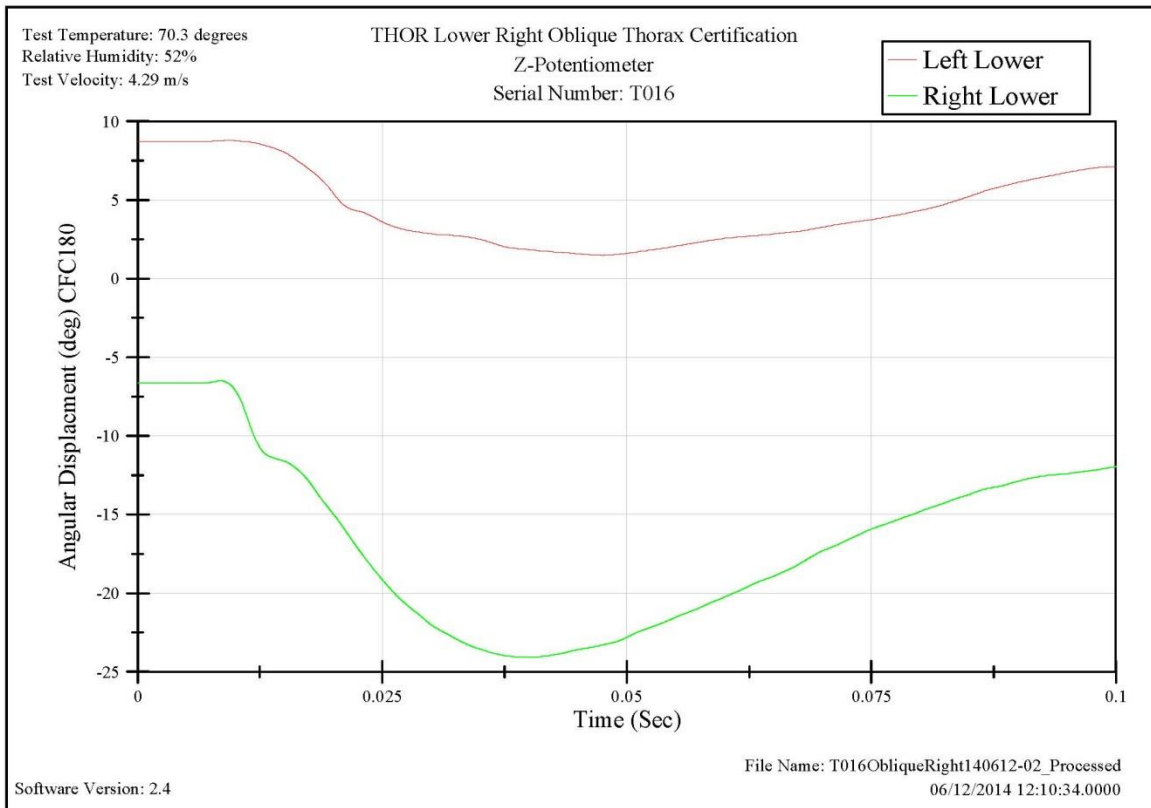
Software Version: 2.4

File Name: T016ObliqueLeft140612-03_Processed
06/12/2014 13:13:11.0000



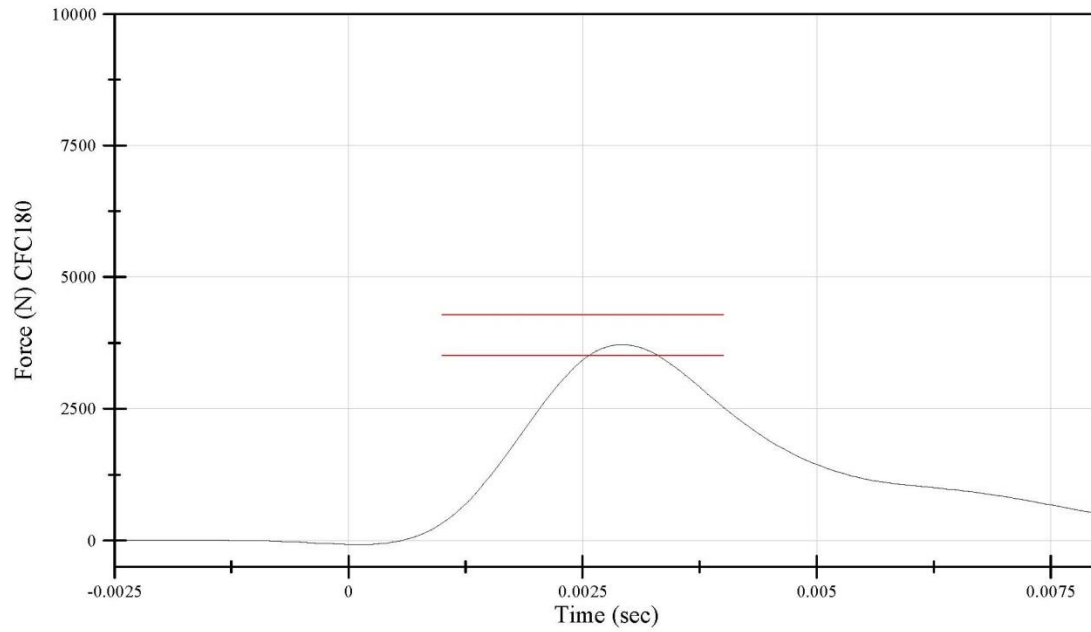






Test Temperature: 70.6 degrees
Relative Humidity: 52%
Test Velocity: 2.59 m/s

THOR Left Femur Certification
Probe Force
Serial Number: T0016

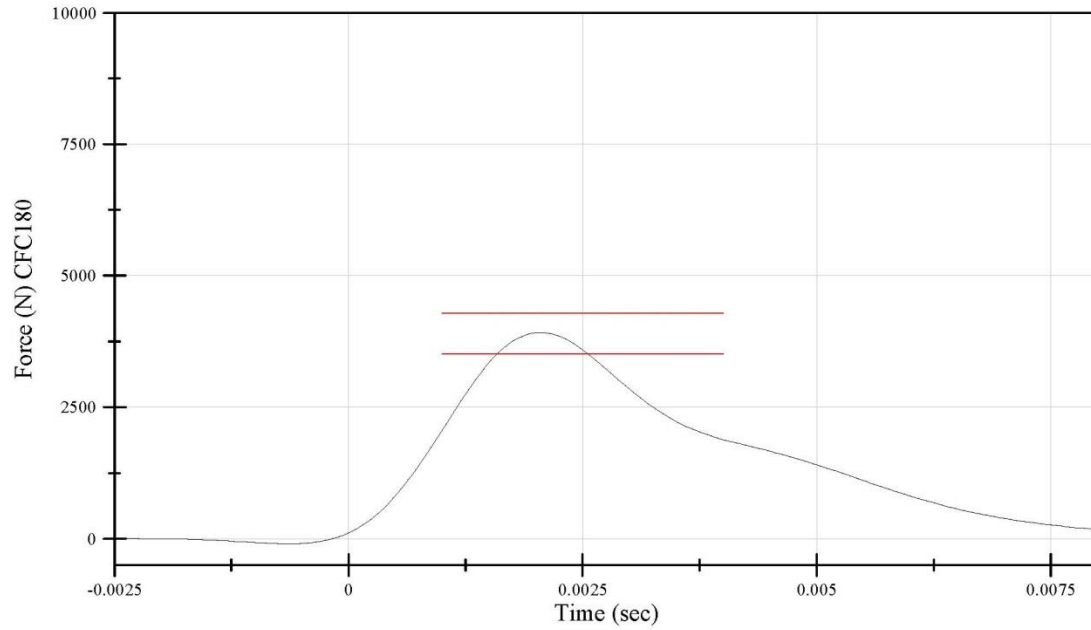


Software Version: 2.4

File Name: T016LeftKnee140613-03_Processed
06/16/2014 08:24:42.0000

Test Temperature: 70.3 degrees
Relative Humidity: 52%
Test Velocity: 2.59 m/s

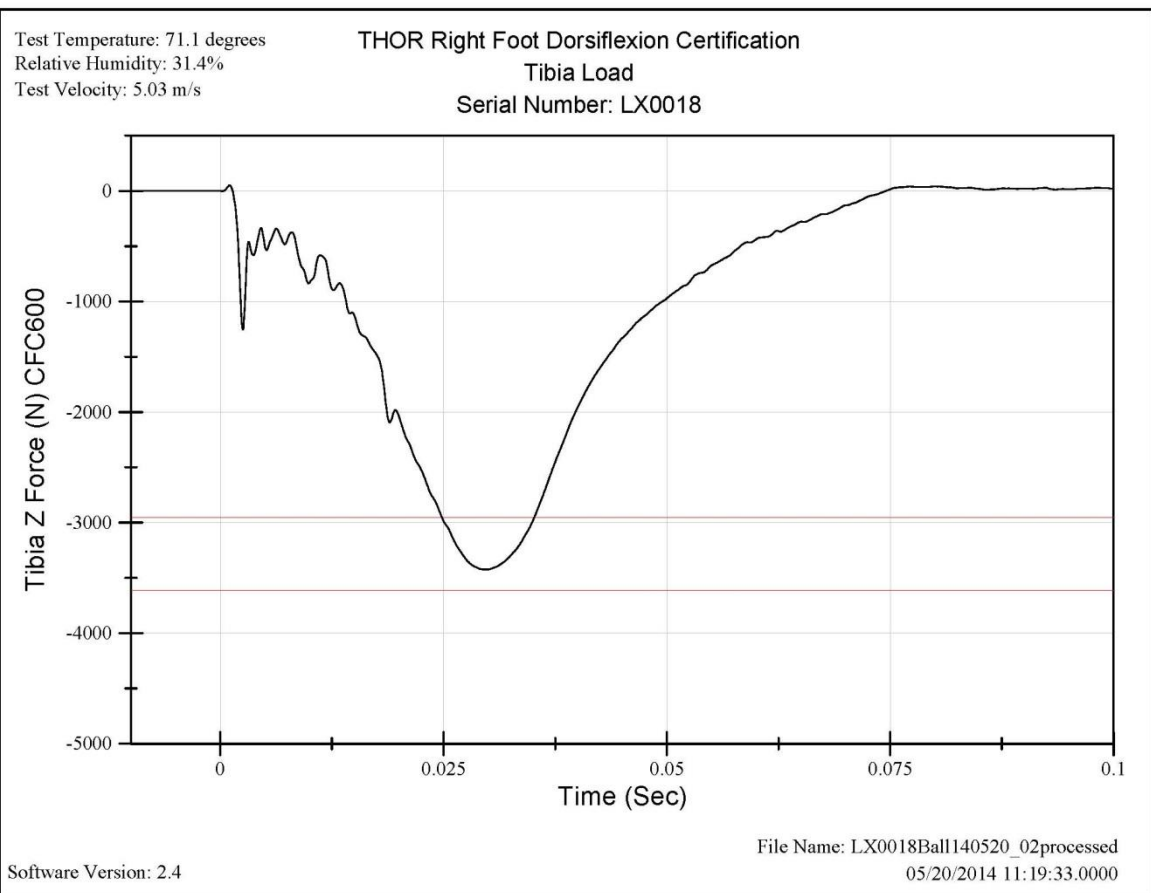
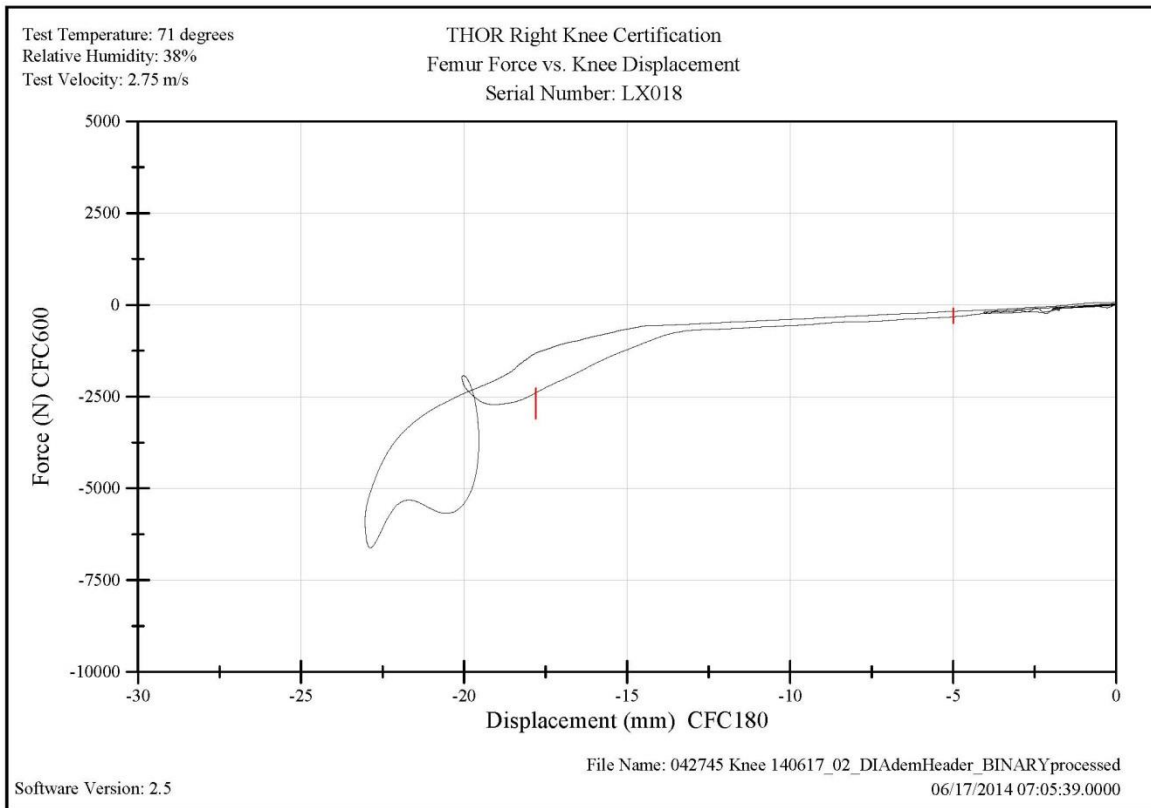
THOR Right Femur Certification
Probe Force
Serial Number: T016



Software Version: 2.4

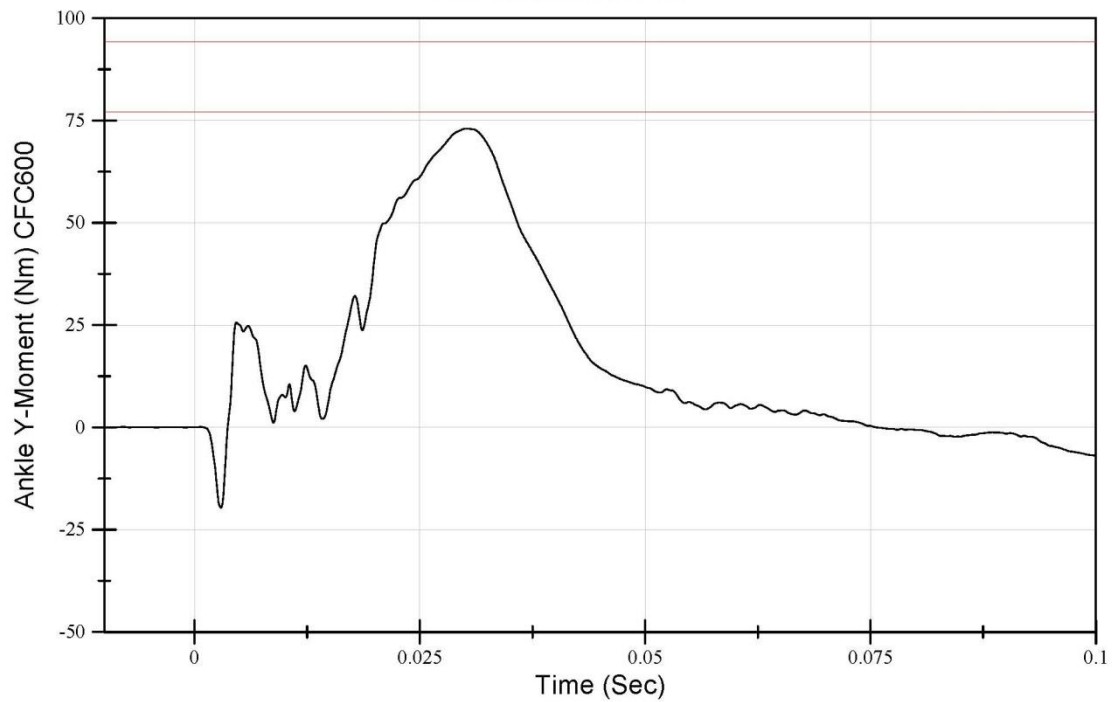
File Name: T016RightKnee140613-01_Processed
06/13/2014 16:14:24.0000

THOR 016 LEG CALIBRATIONS
LX0018/ LX0019



Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 5.03 m/s

THOR Right Foot Dorsiflexion Certification
Ankle Y-Moment
Serial Number: LX0018

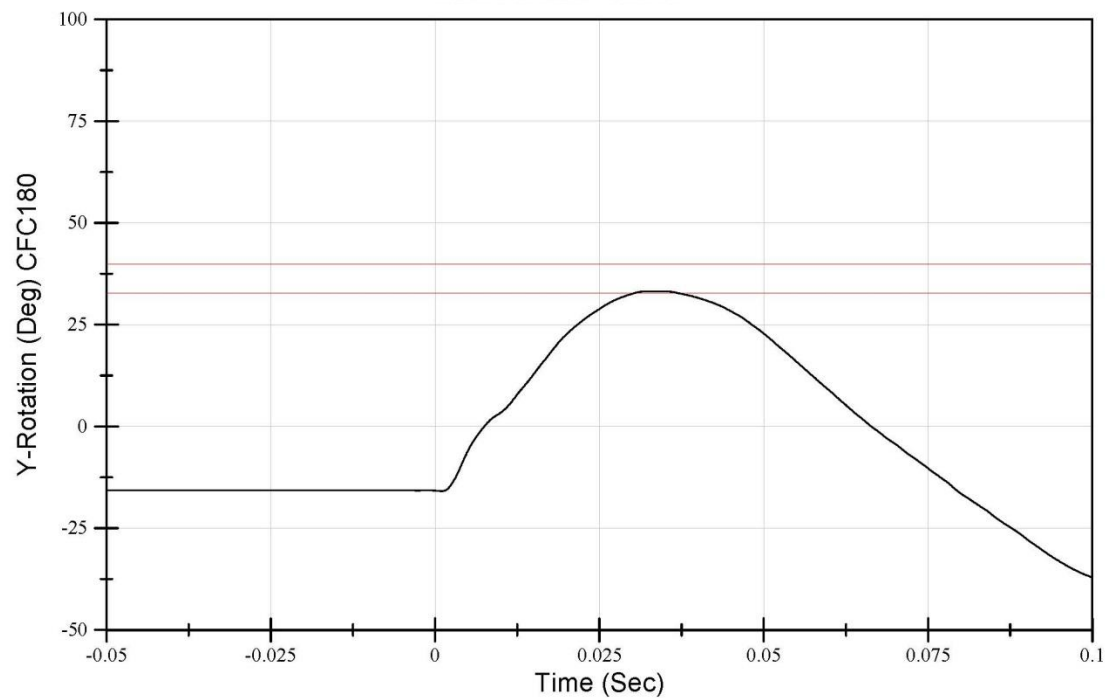


Software Version: 2.4

File Name: LX0018Ball140520_02processed
05/20/2014 11:19:33.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 5.03 m/s

THOR Right Foot Dorsiflexion Certification
Ankle Y-Rotation
Serial Number: LX0018

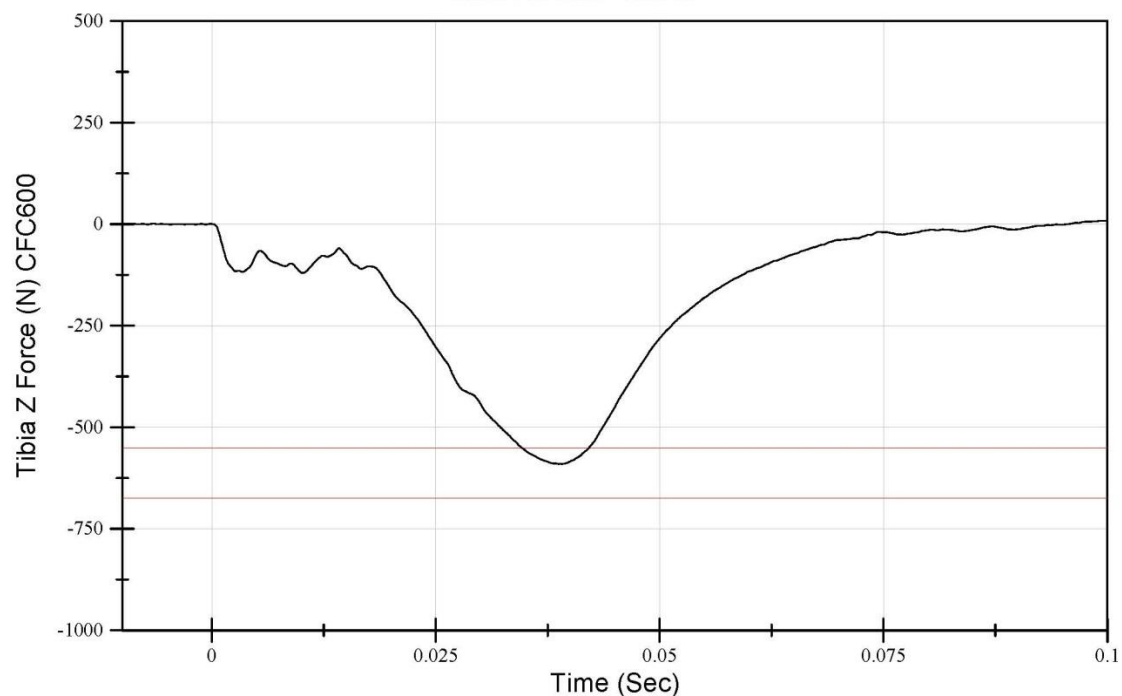


Software Version: 2.4

File Name: LX0018Ball140520_02processed
05/20/2014 11:19:33.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 2 m/s

THOR Right Foot Eversion Certification
Tibia Load
Serial Number: LX0018

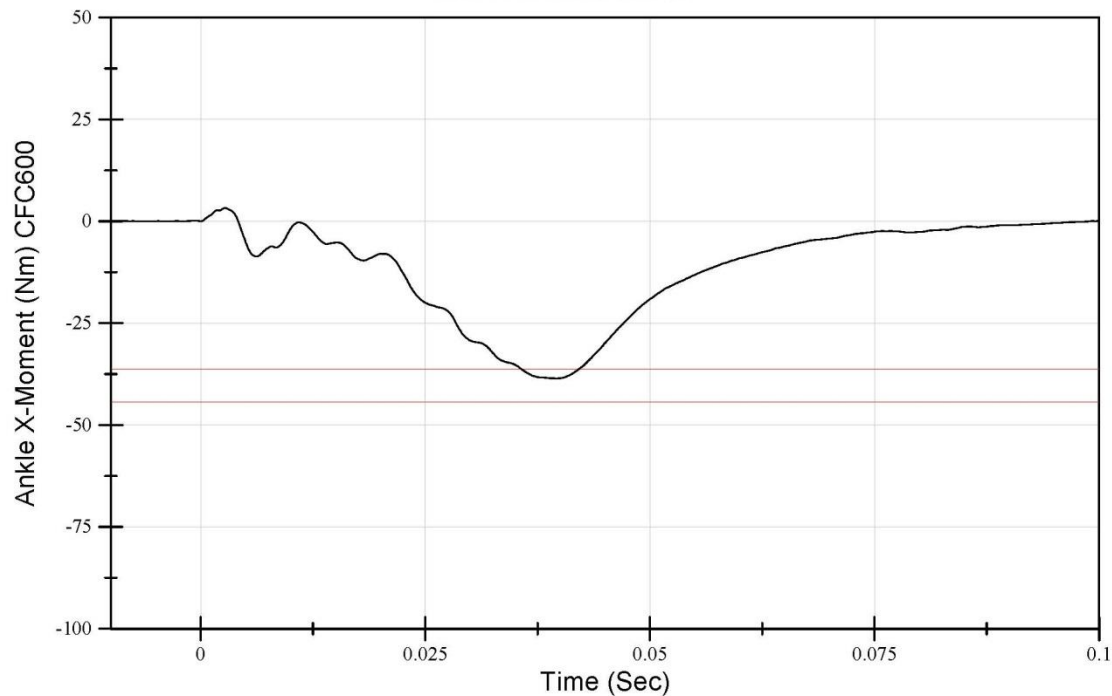


Software Version: 2.4

File Name: LX0018Eversion140520_01processed
05/20/2014 10:15:43.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 2 m/s

THOR Right Foot Eversion Certification
Ankle Moment
Serial Number: LX0018

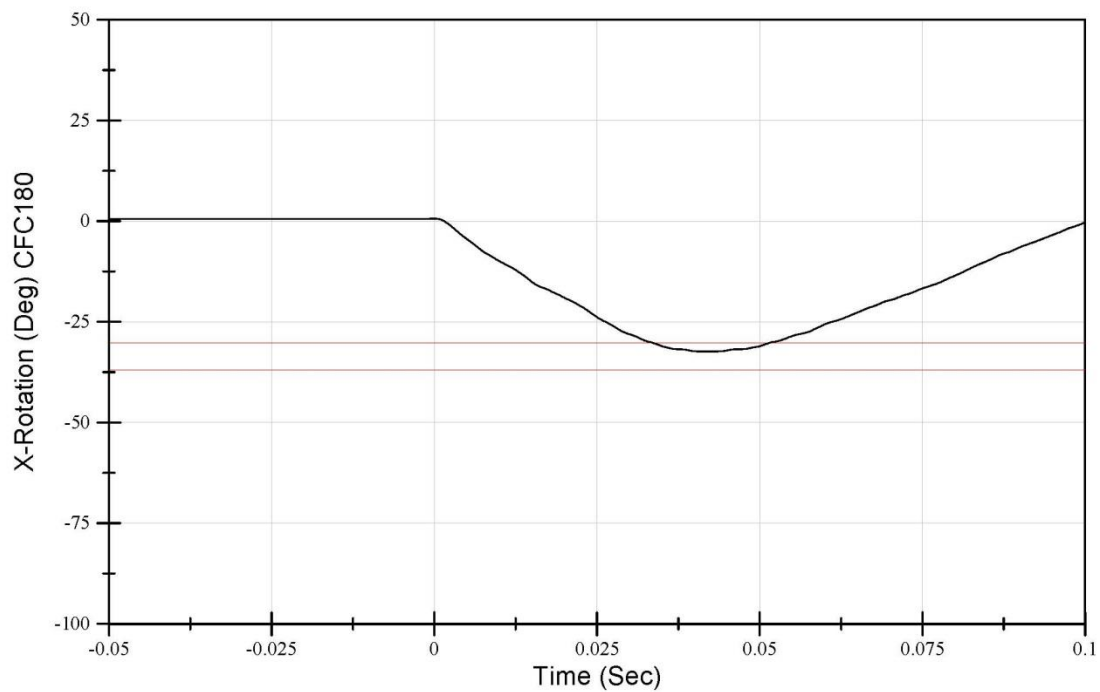


Software Version: 2.4

File Name: LX0018Eversion140520_01processed
05/20/2014 10:15:43.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 2 m/s

THOR Right Foot Eversion Certification
Ankle X-Rotation
Serial Number: LX0018

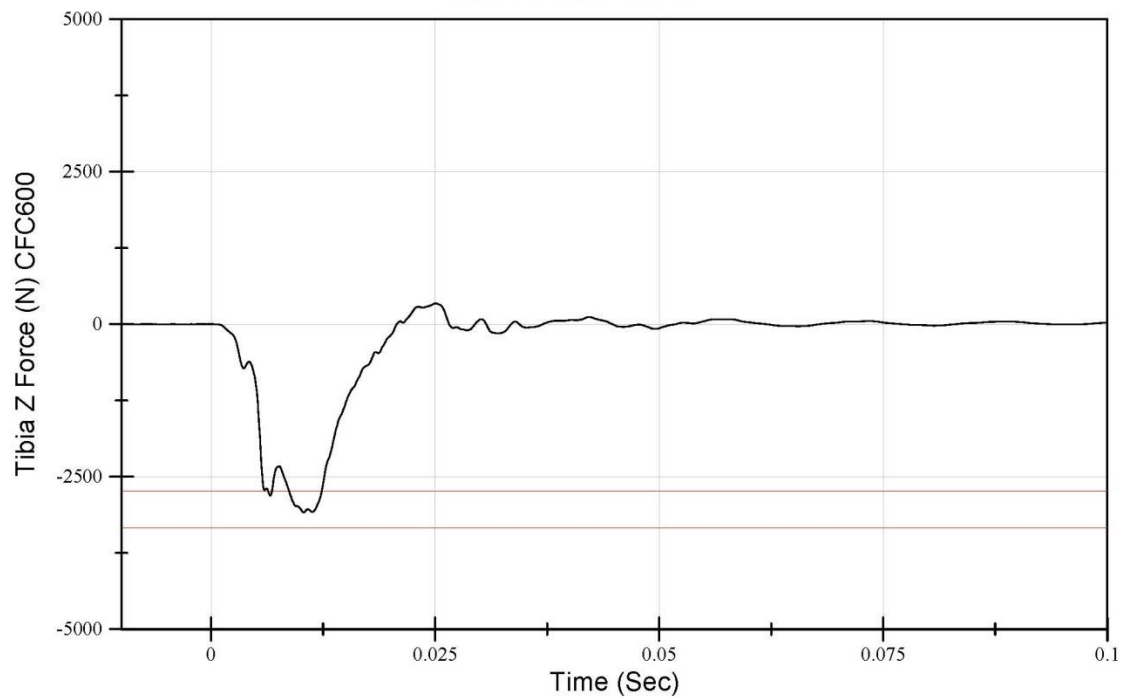


Software Version: 2.4

File Name: LX0018Eversion140520_01processed
05/20/2014 10:15:43.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 3.94 m/s

THOR Right Foot Heel Certification
Tibia Load
Serial Number: LX0018

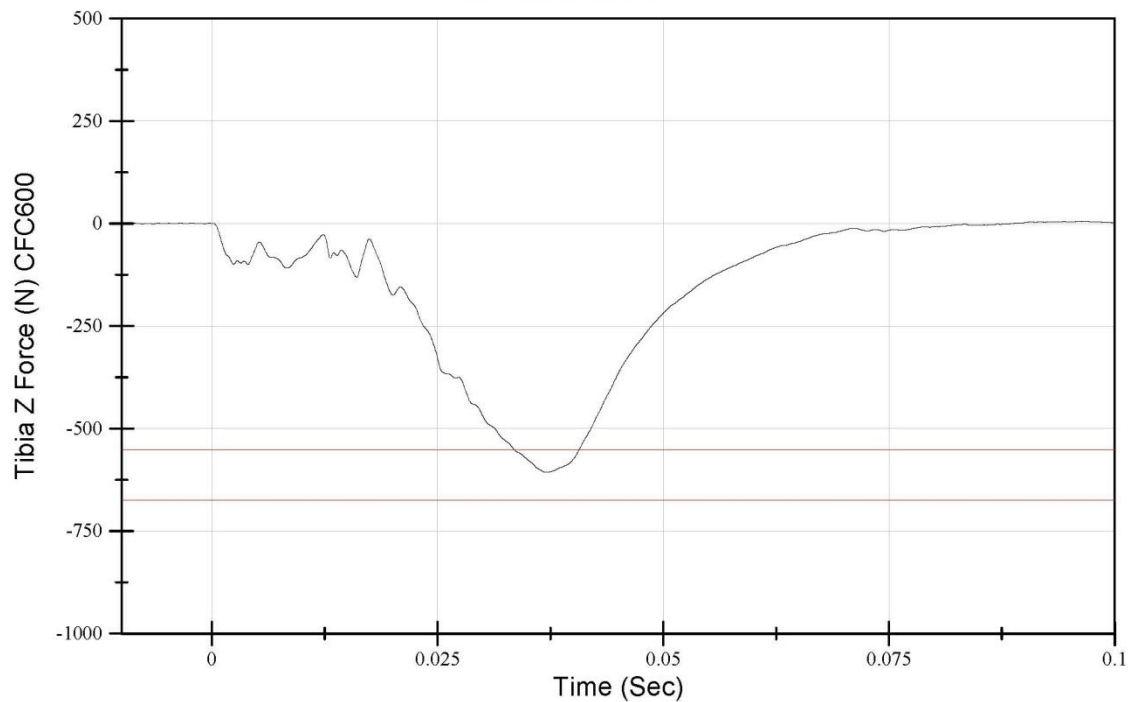


Software Version: 2.4

File Name: LX0018Heel140520_01processed
05/20/2014 12:59:01.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 2 m/s

THOR Right Foot Inversion Certification
Tibia Load
Serial Number: LX0018

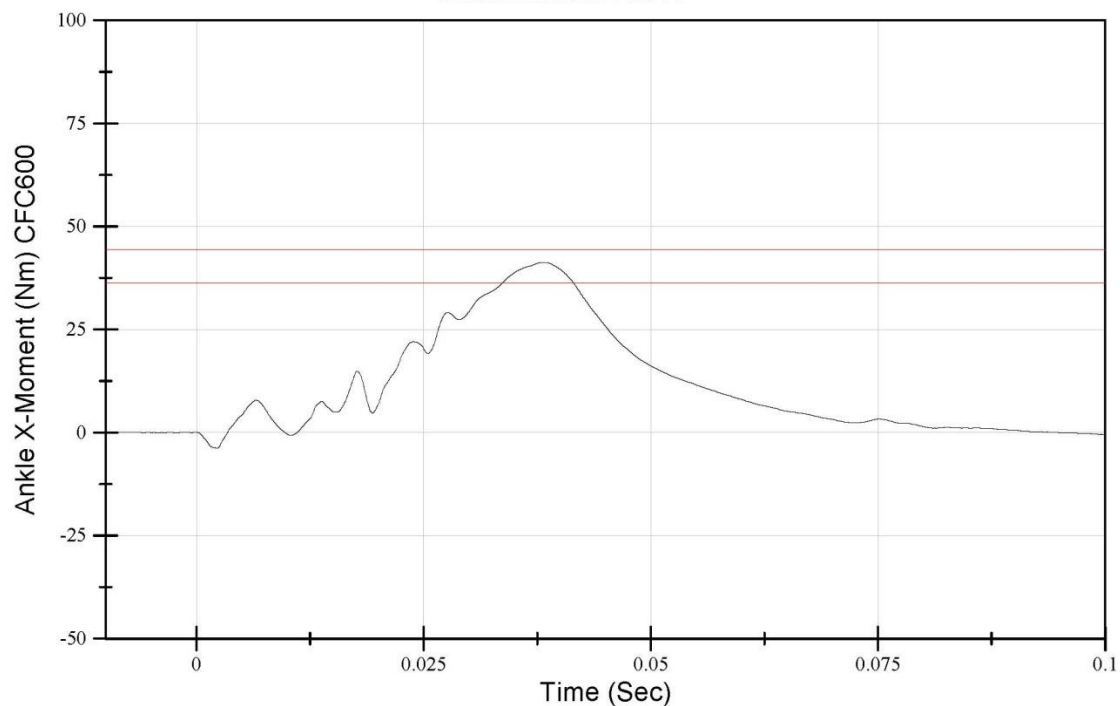


Software Version: 2.4

File Name: LX0018Inversion140520_04processed
05/20/2014 09:27:22.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 2 m/s

THOR Right Foot Inversion Certification
Ankle Moment
Serial Number: LX0018

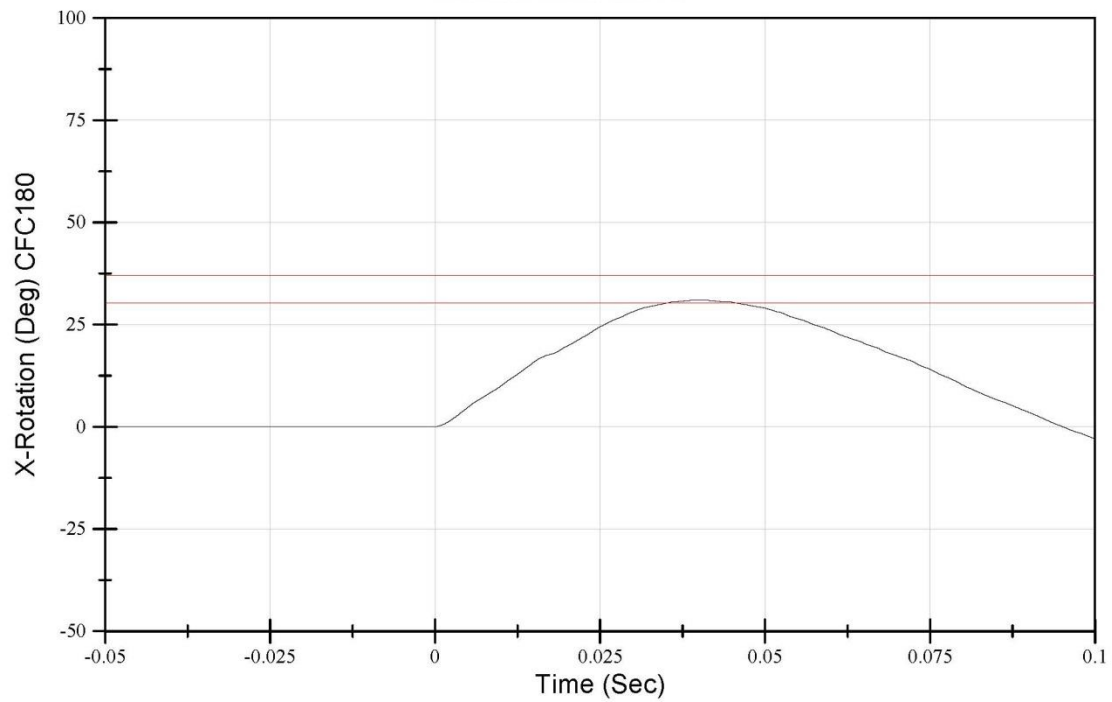


Software Version: 2.4

File Name: LX0018Inversion140520_04processed
05/20/2014 09:27:22.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 2 m/s

THOR Right Foot Inversion Certification
Ankle X-Rotation
Serial Number: LX0018

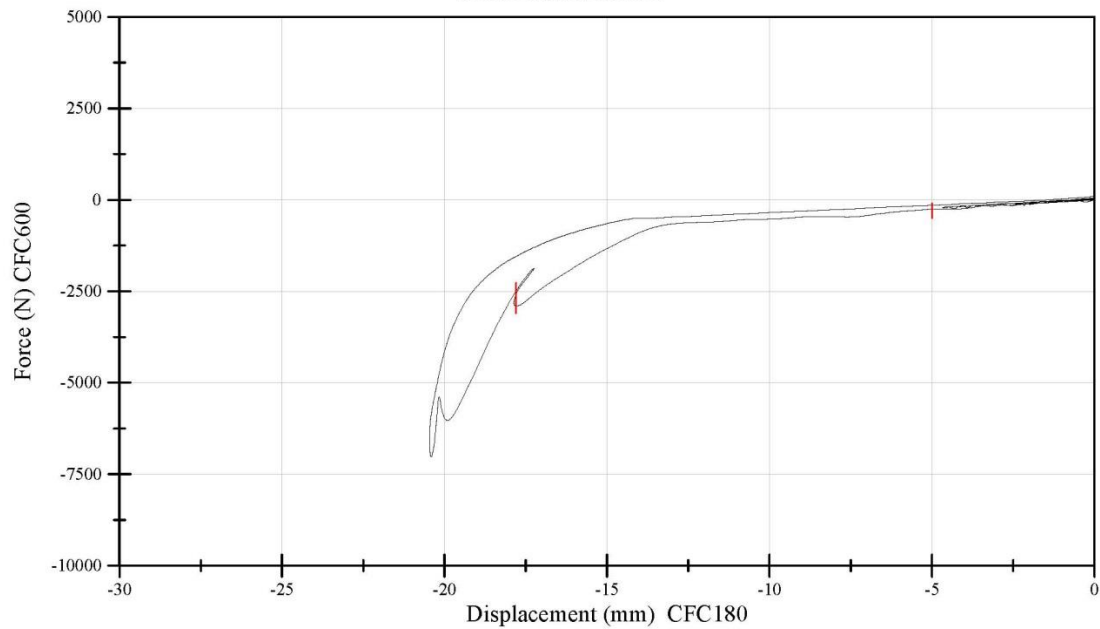


Software Version: 2.4

File Name: LX0018Inversion140520_04processed
05/20/2014 09:27:22.0000

Test Temperature: 71 degrees
Relative Humidity: 38%
Test Velocity: 2.75 m/s

THOR Left Knee Certification
Femur Force vs. Knee Displacement
Serial Number: LX0019

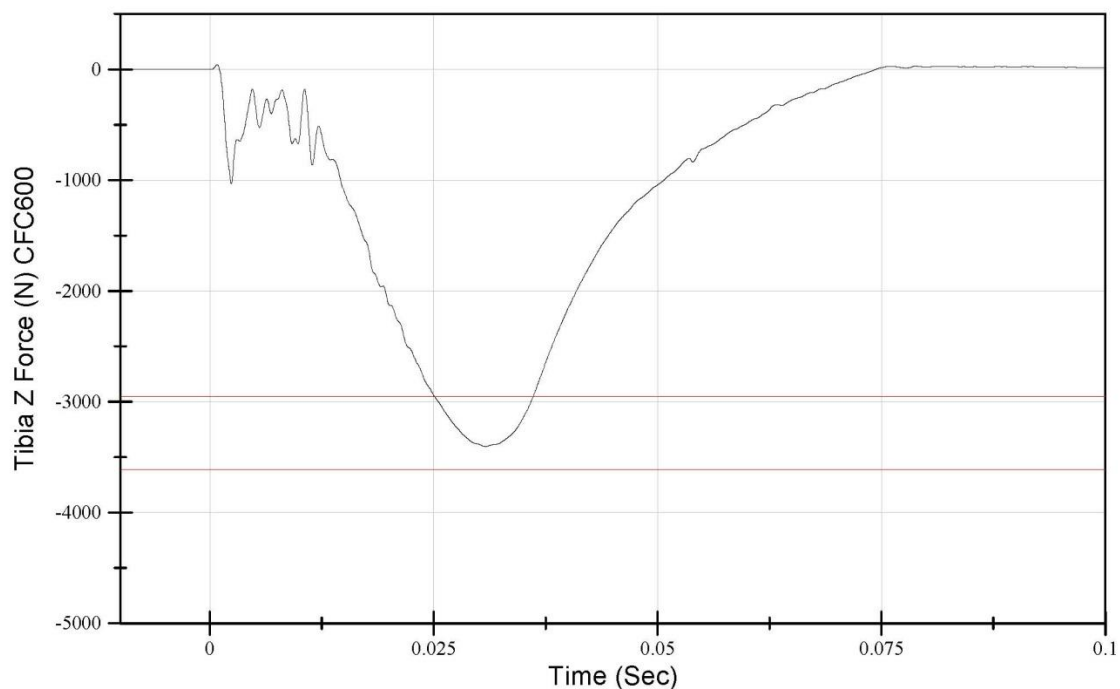


Software Version: 2.5

File Name: 13074235Knee140617_01_DIADEMHeader_BINARYprocessed
06/17/2014 10:50:02.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 5.03 m/s

THOR Left Foot Dorsiflexion Certification
Tibia Load
Serial Number: LX0019

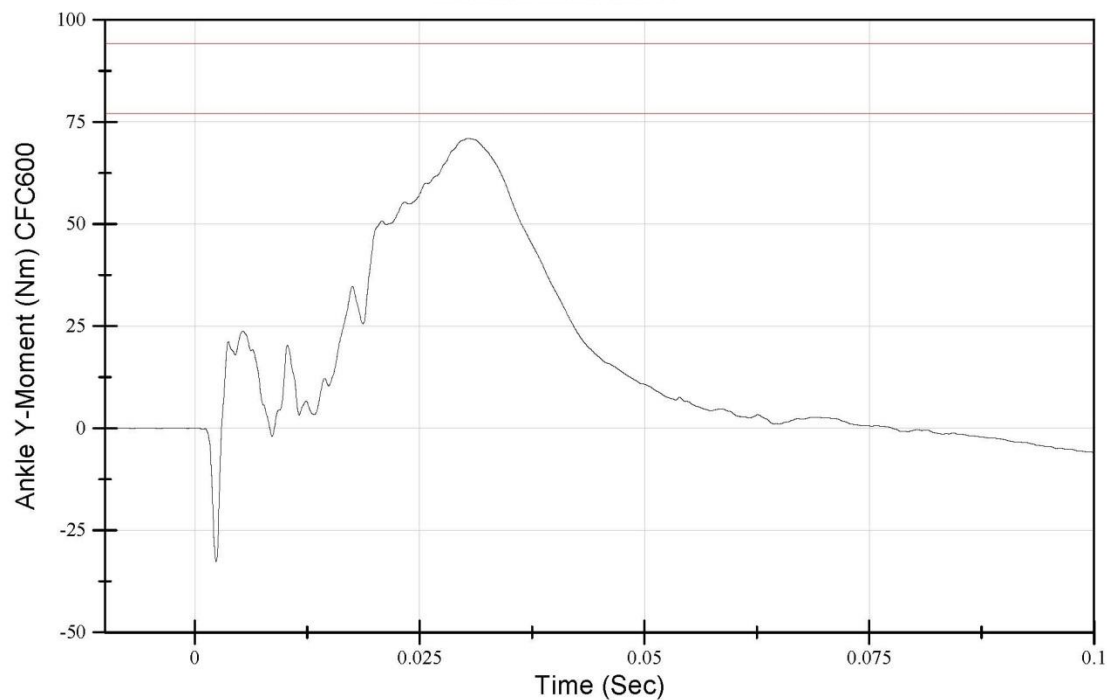


Software Version: 2.4

File Name: LX0019Ball140521_03processed
05/21/2014 13:20:28.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 5.03 m/s

THOR Left Foot Dorsiflexion Certification
Ankle Y-Moment
Serial Number: LX0019

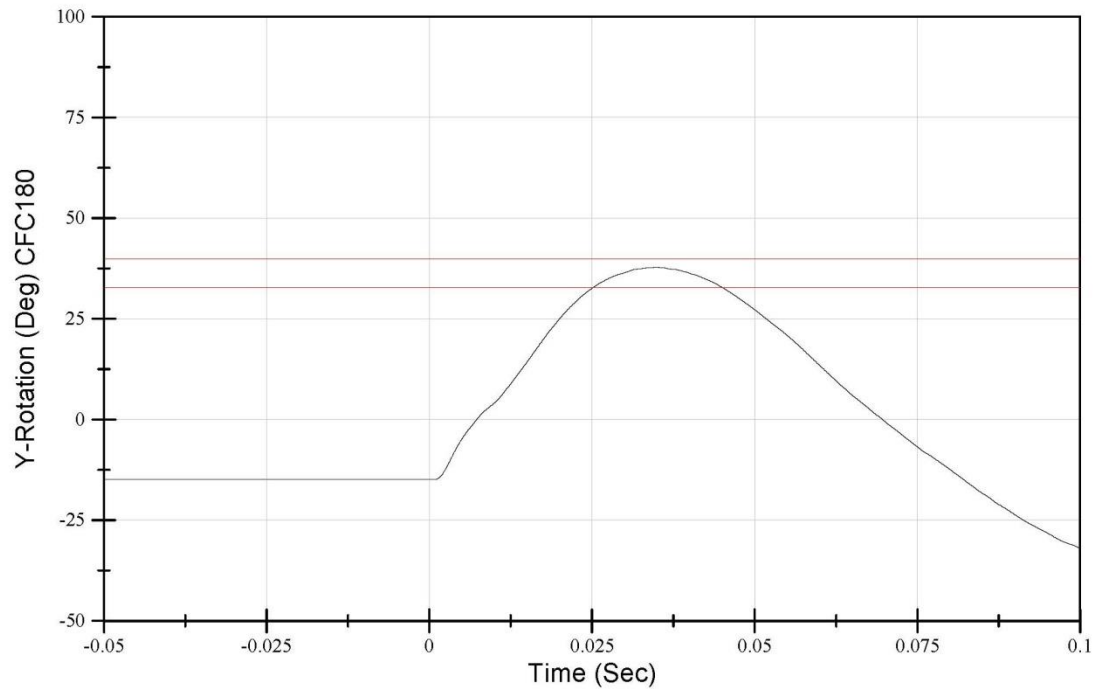


Software Version: 2.4

File Name: LX0019Ball140521_03processed
05/21/2014 13:20:28.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 5.03 m/s

THOR Left Foot Dorsiflexion Certification
Ankle Y-Rotation
Serial Number: LX0019

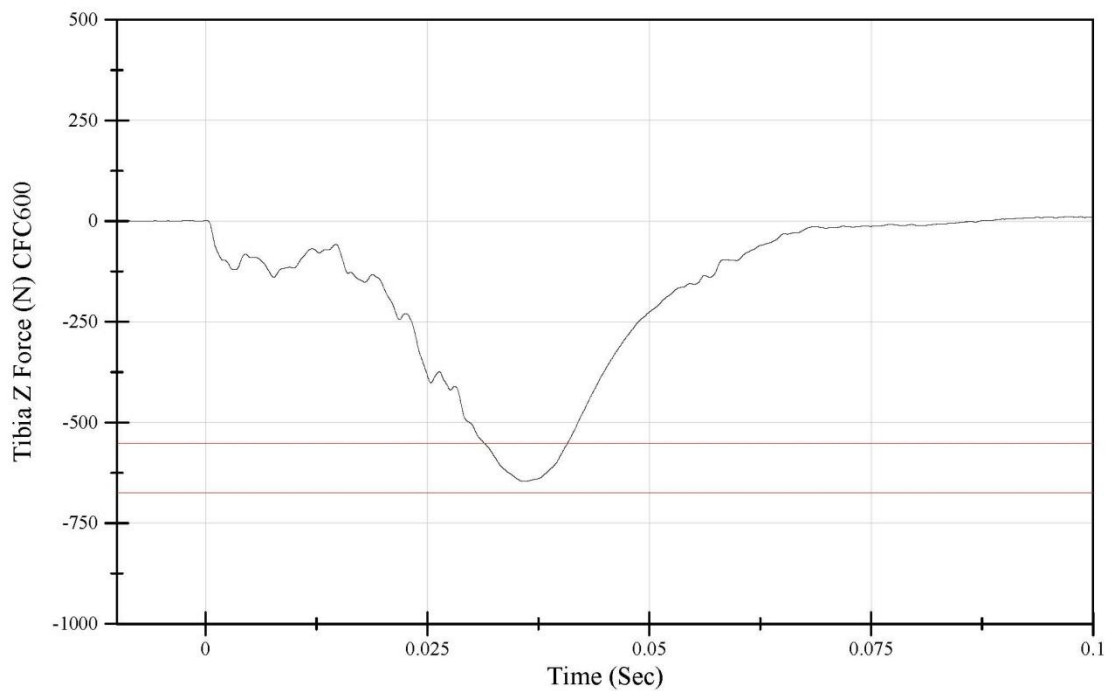


Software Version: 2.4

File Name: LX0019Ball140521_03processed
05/21/2014 13:20:28.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 1.97 m/s

THOR Left Foot Eversion Certification
Tibia Load
Serial Number: LX0019

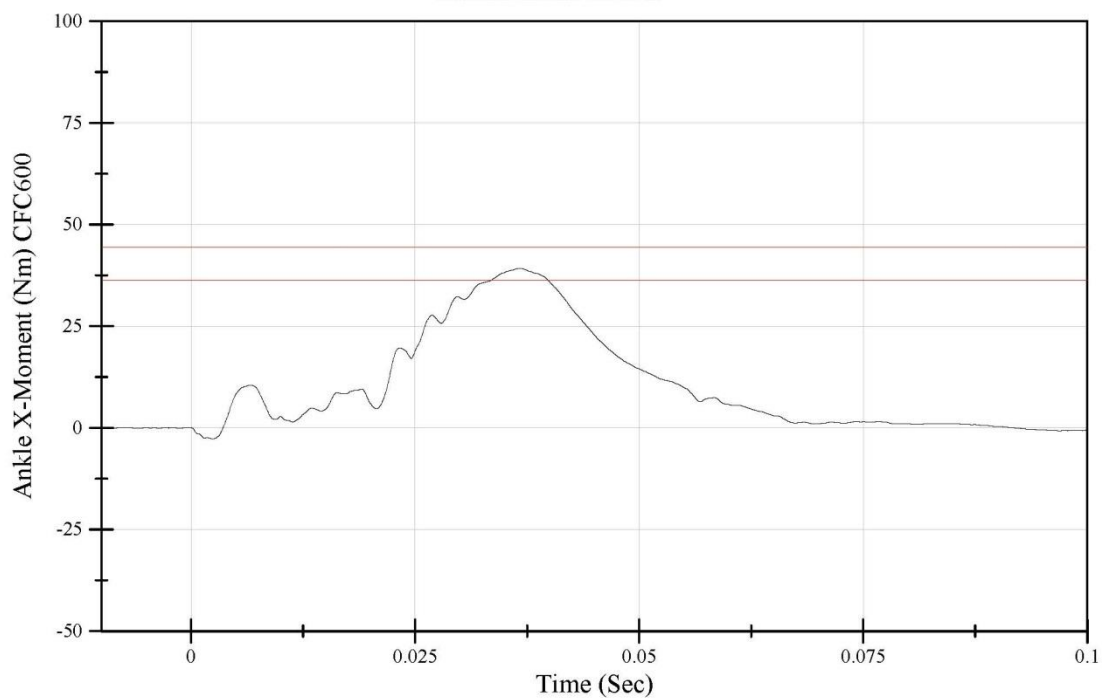


Software Version: 2.4

File Name: LX0019Eversion140521_02processed
05/21/2014 09:58:27.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 1.97 m/s

THOR Left Foot Eversion Certification
Ankle Moment
Serial Number: LX0019

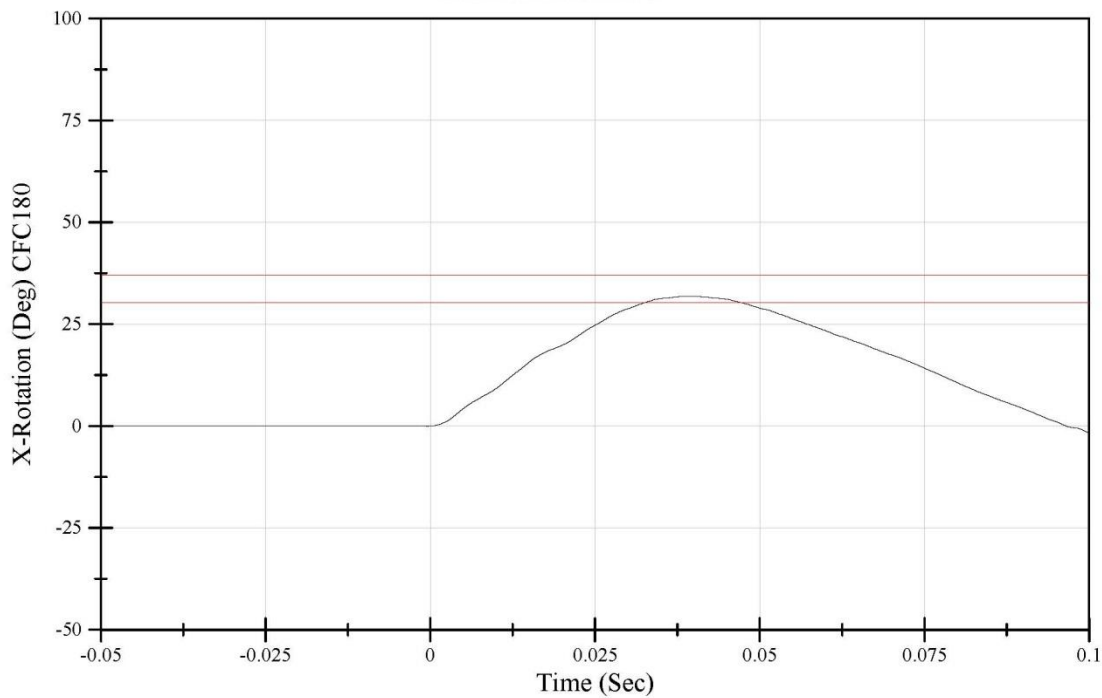


Software Version: 2.4

File Name: LX0019Eversion140521_02processed
05/21/2014 09:58:27.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 1.97 m/s

THOR Left Foot Eversion Certification
Ankle X-Rotation
Serial Number: LX0019

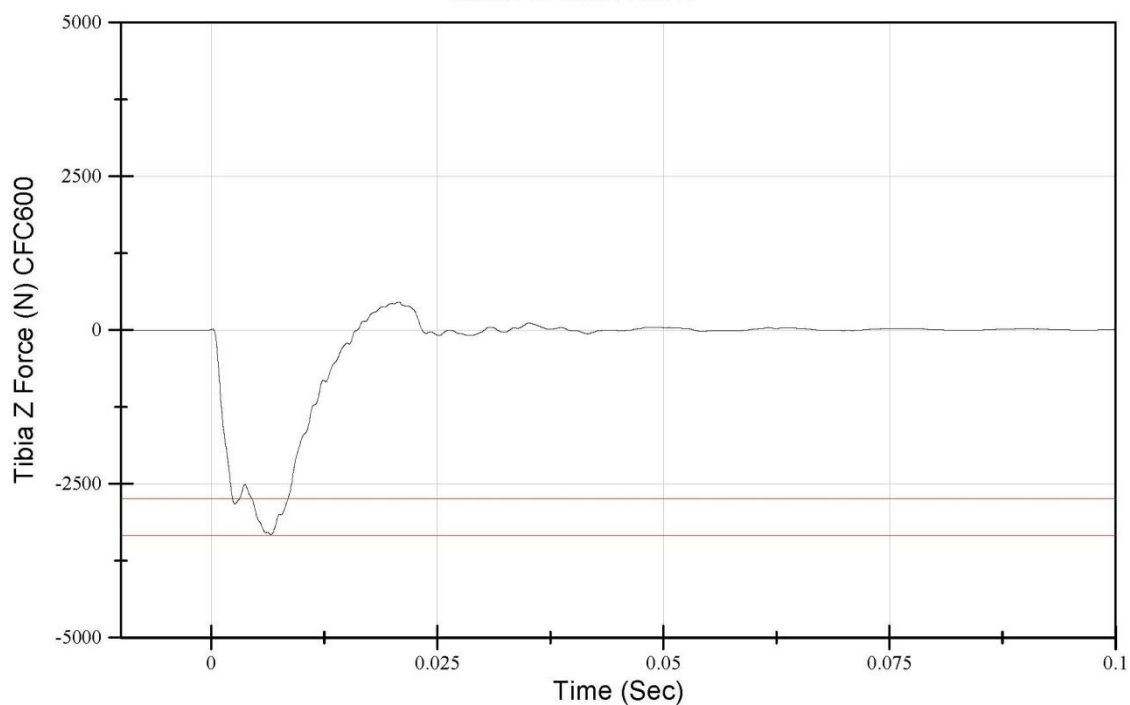


Software Version: 2.4

File Name: LX0019Eversion140521_02processed
05/21/2014 09:58:27.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 4 m/s

THOR Left Foot Heel Certification
Tibia Load
Serial Number: LX0019

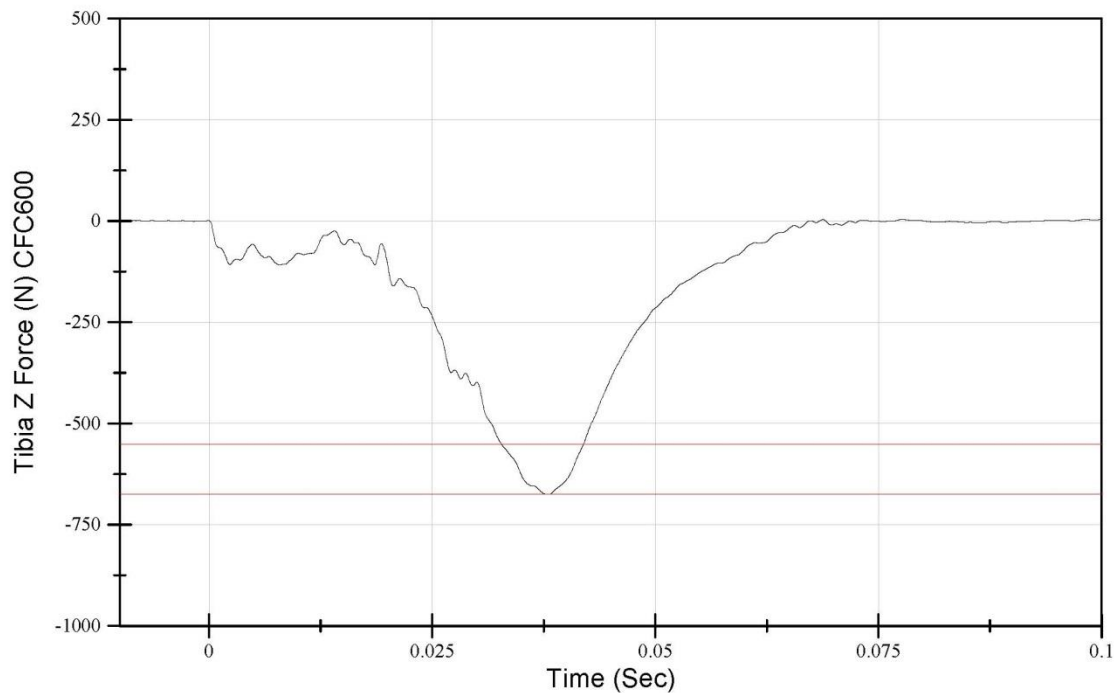


Software Version: 2.4

File Name: LX0019Heel140521_01processed
05/21/2014 14:19:36.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 1.96 m/s

THOR Left Foot Inversion Certification
Tibia Load
Serial Number: LX0019

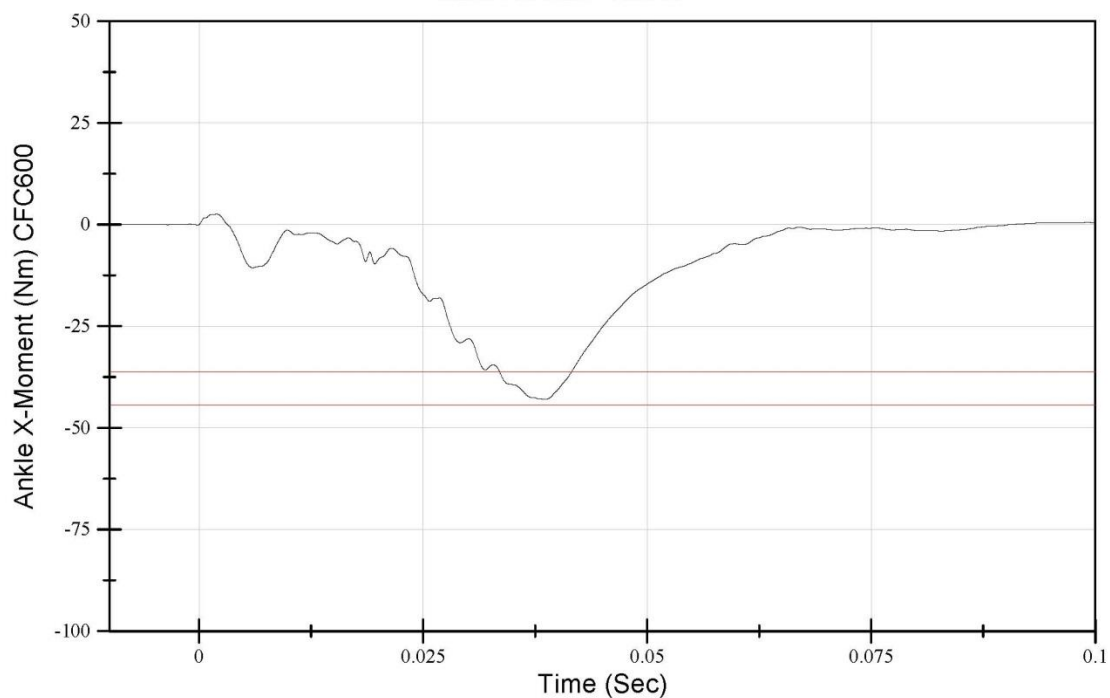


Software Version: 2.4

File Name: LX0019Inversion140521_03processed
05/21/2014 08:53:35.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 1.96 m/s

THOR Left Foot Inversion Certification
Ankle Moment
Serial Number: LX0019

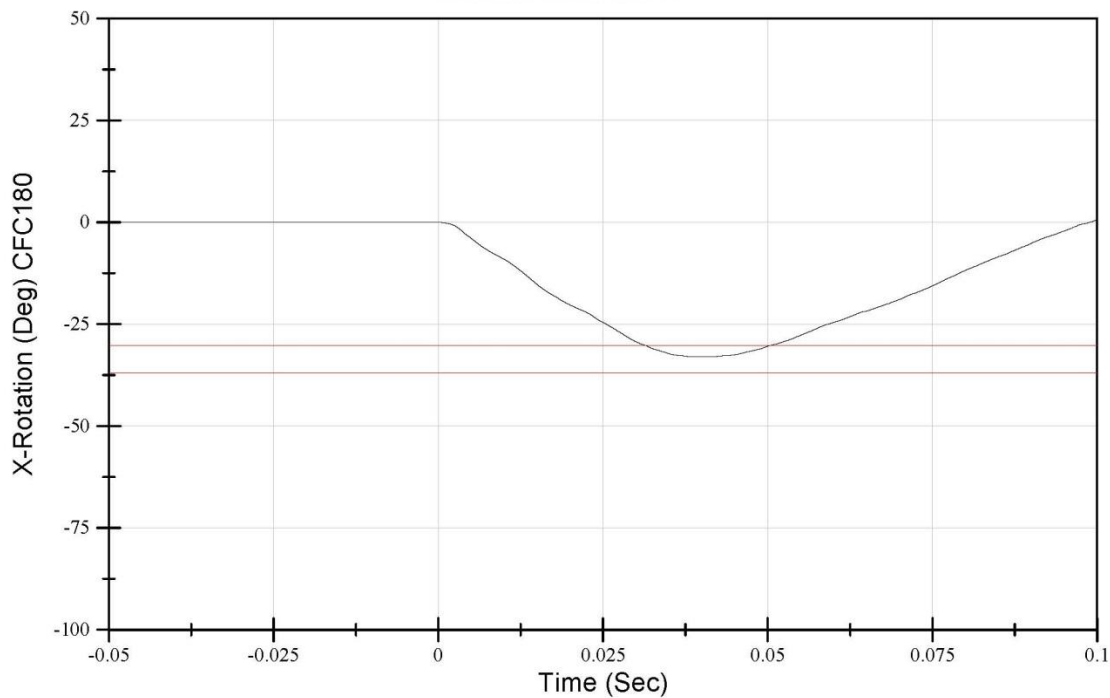


Software Version: 2.4

File Name: LX0019Inversion140521_03processed
05/21/2014 08:53:35.0000

Test Temperature: 71.1 degrees
Relative Humidity: 31.4%
Test Velocity: 1.96 m/s

THOR Left Foot Inversion Certification
Ankle X-Rotation
Serial Number: LX0019



Software Version: 2.4

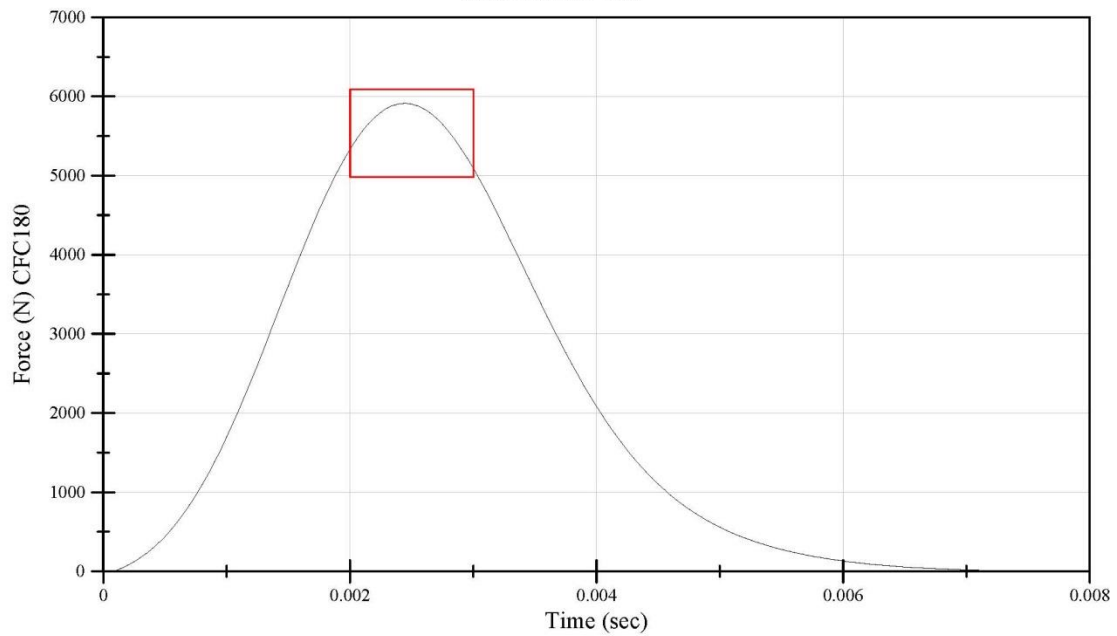
File Name: LX0019Inversion140521_03processed
05/21/2014 08:53:35.0000

50% ADULT MALE THOR015 DUMMY CALIBRATIONS

Test Temperature: 71 degrees
Relative Humidity: 31%
Test Velocity: 1.98 m/s

THOR Head Impact Certification

Probe Force
Serial Number: T015



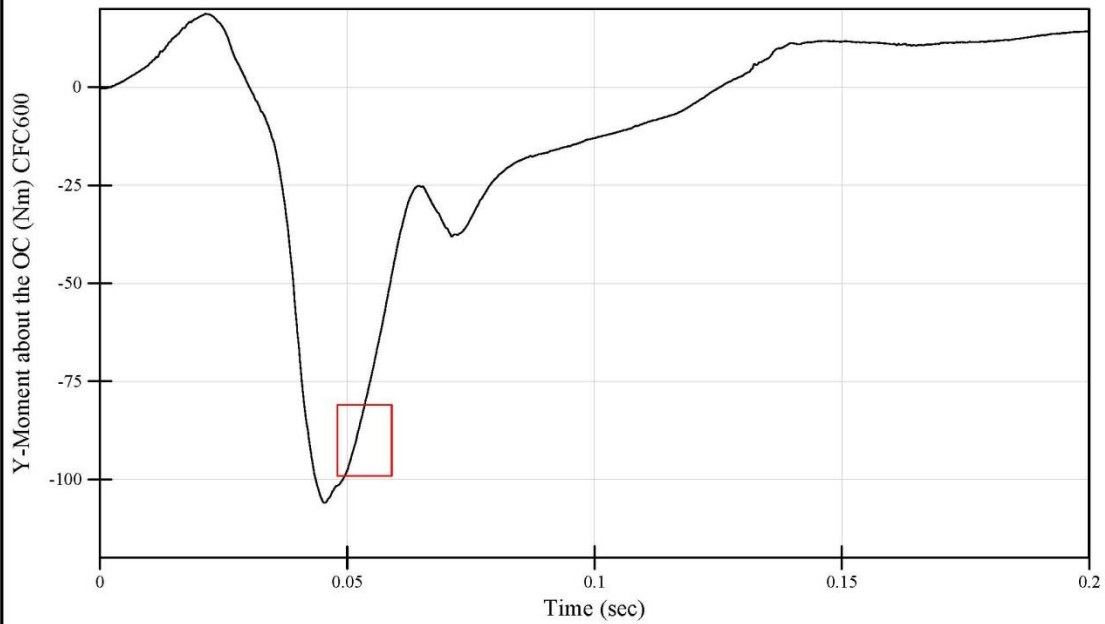
Software Version: 2.4

File Name: T015Head051914_01_DIAdemHeader_BINARYpatrick
05/19/2014 14:31:34.0000

Test Temperature: 71 degrees
Relative Humidity: 31%
Test Velocity: 3.66 m/s

THOR Neck Extension Certification

Y-Moment
Serial Number: T015

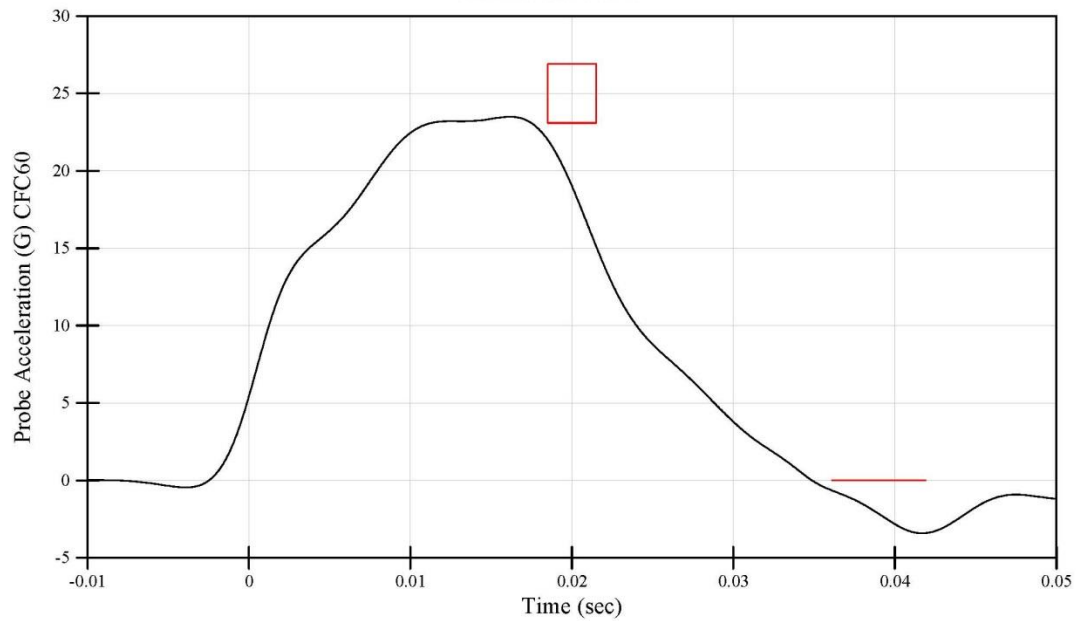


Software Version: 2.4

File Name: T015NeckExtension051914_02_DIAdemHeader_BINARYpatrick
05/19/2014 08:49:38.0000

Test Temperature: 71 degrees
Relative Humidity: 31%
Test Velocity: 3.66 m/s

THOR Neck Extension Certification
Probe Acceleration
Serial Number: T015

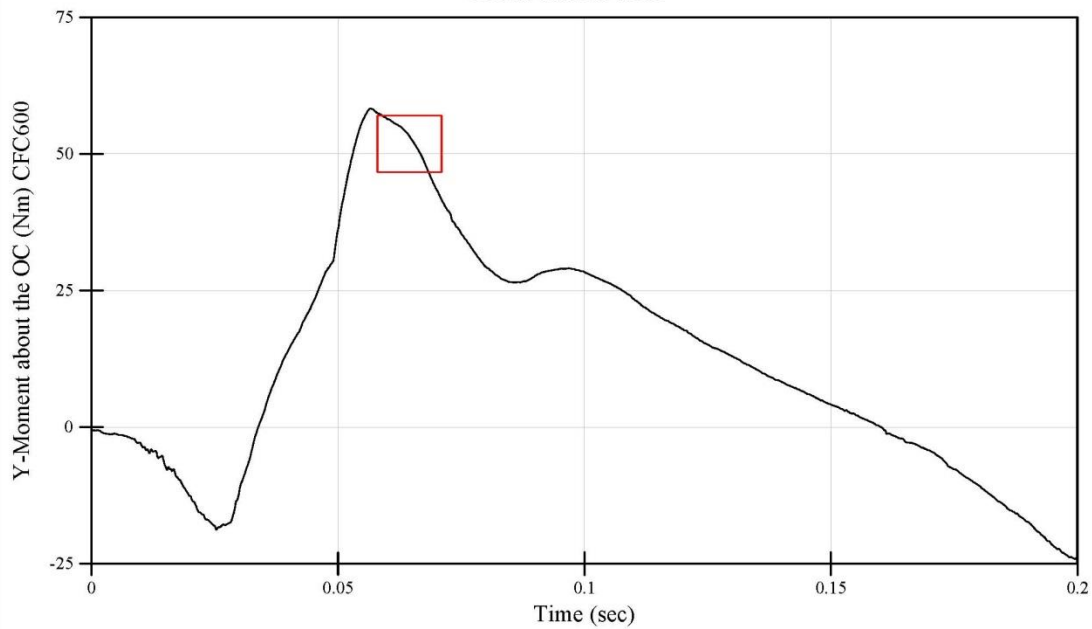


Software Version: 2.4

File Name: T015NeckExtension051914_02_DIAdemHeader_BINARYpatrick
05/19/2014 08:49:38.0000

Test Temperature: 71 degrees
Relative Humidity: 31%
Test Velocity: 3.78 m/s

THOR Neck Flexion Certification
Y-Moment
Serial Number: T015

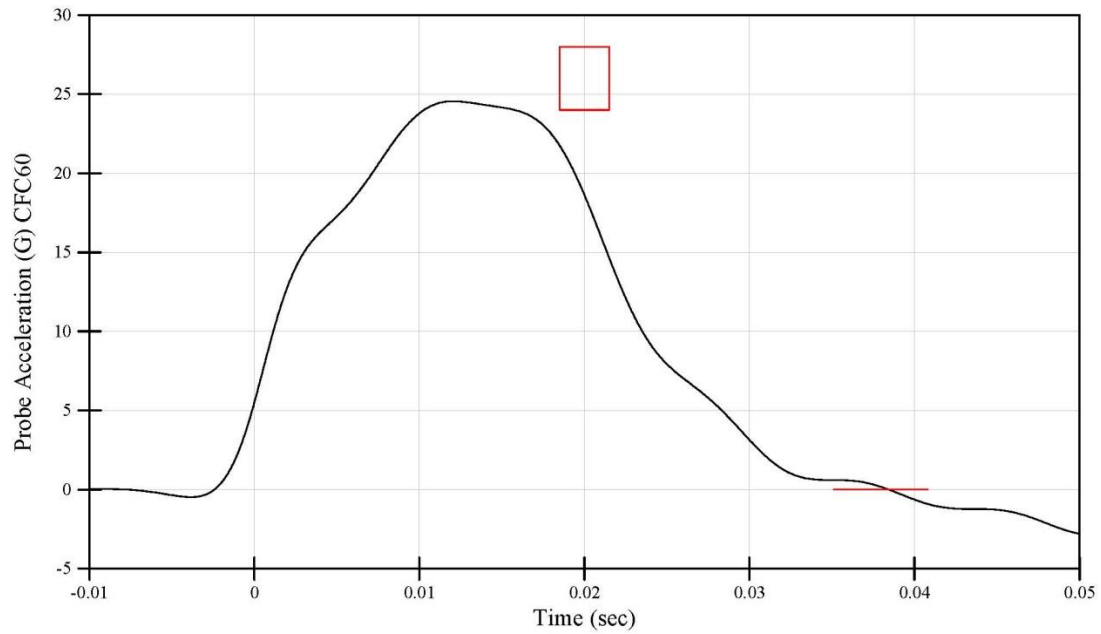


Software Version: 2.4

File Name: T015NeckFlexion051914_02_DIAdemHeader_BINARYpatrick
05/19/2014 08:24:12.0000

Test Temperature: 71 degrees
Relative Humidity: 31%
Test Velocity: 3.78 m/s

THOR Neck Flexion Certification
Probe Acceleration
Serial Number: T015

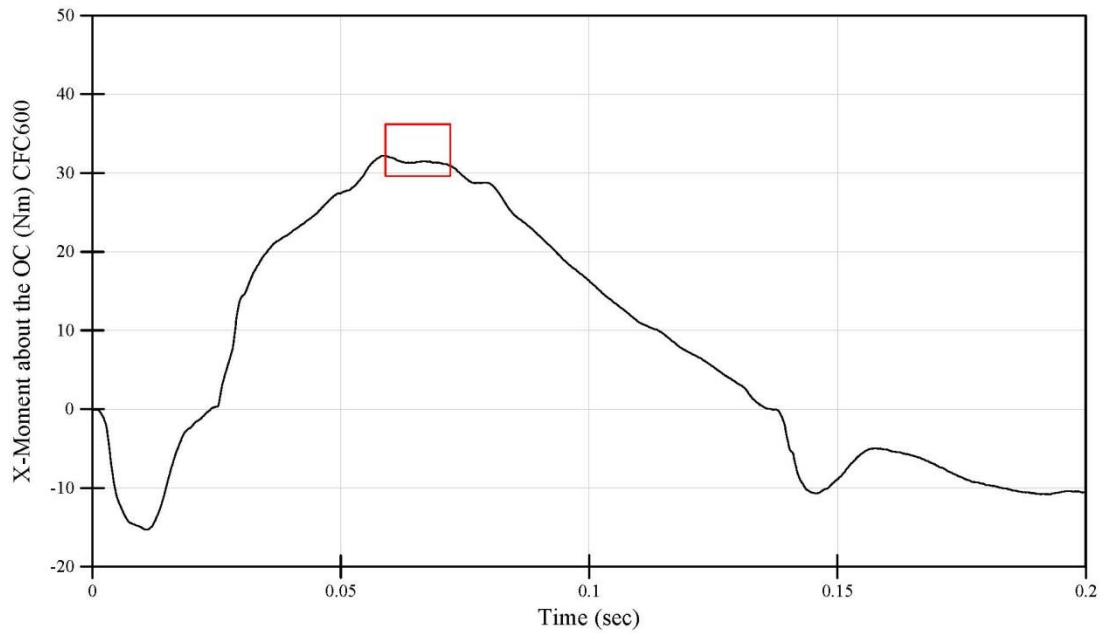


Software Version: 2.4

File Name: T015NeckFlexion051914_02_DIAdemHeader_BINARYpatrick
05/19/2014 08:24:12.0000

Test Temperature: 71 degrees
Relative Humidity: 31%
Test Velocity: 2.88 m/s

THOR Neck Left Lateral Flexion Certification
X-Moment
Serial Number: T015

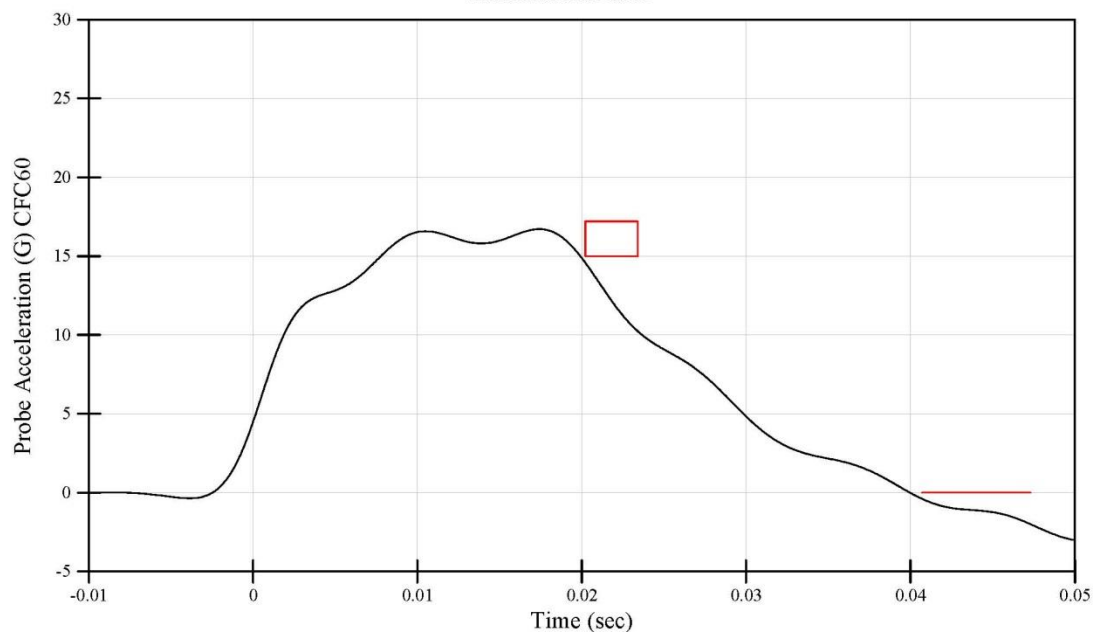


Software Version: 2.4

File Name: T015NeckLeft051914_02_DIAdemHeader_BINARYpatrick
05/19/2014 10:02:58.0000

Test Temperature: 71 degrees
Relative Humidity: 31%
Test Velocity: 2.88 m/s

THOR Neck Left Lateral Flexion Certification
Probe Acceleration
Serial Number: T015

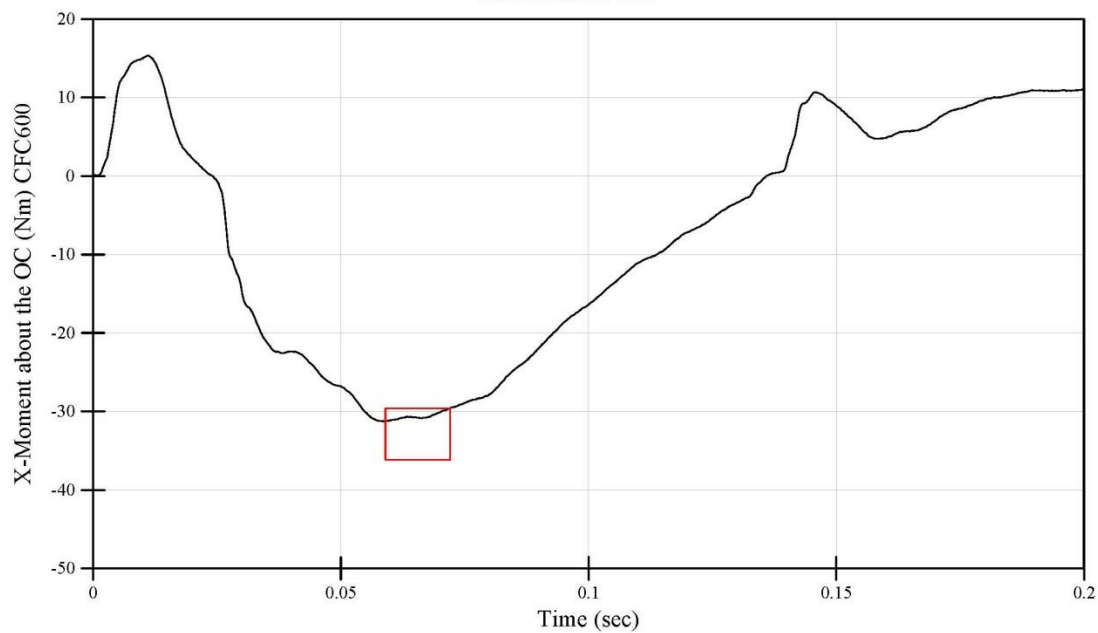


Software Version: 2.4

File Name: T015NeckLeft051914_02_DIAdemHeader_BINARYpatrick
05/19/2014 10:02:58.0000

Test Temperature: 71 degrees
Relative Humidity: 31%
Test Velocity: 2.87 m/s

THOR Neck Right Lateral Flexion Certification
X-Moment
Serial Number: T015



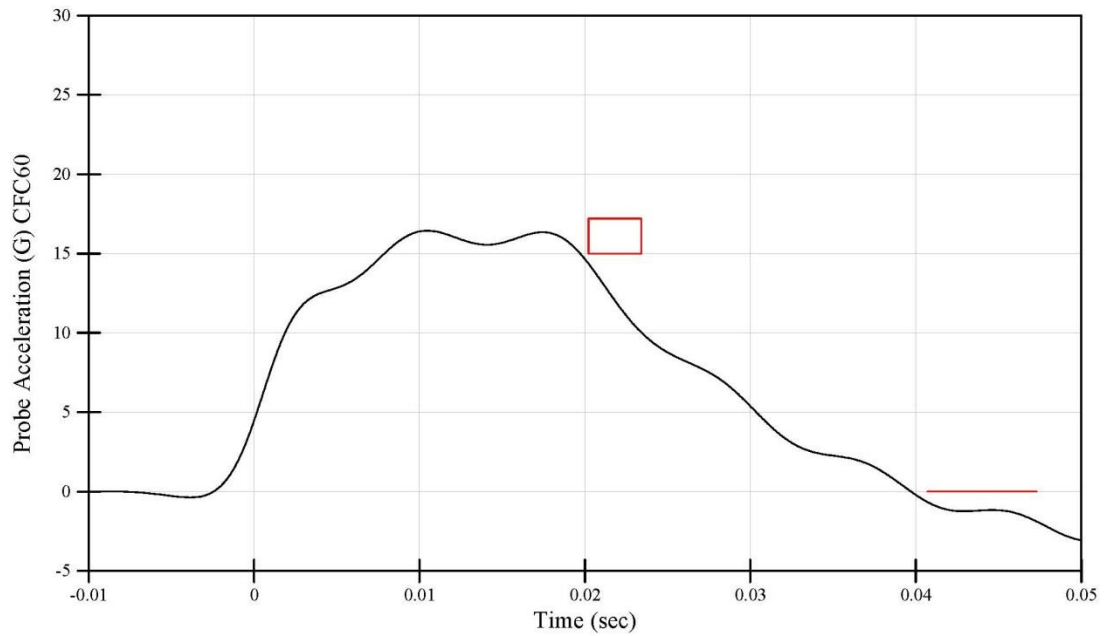
Software Version: 2.4

File Name: T015NeckRight051914_02_DIAdemHeader_BINARYpatrick
05/19/2014 09:29:56.0000

Test Temperature: 71 degrees
Relative Humidity: 31%
Test Velocity: 2.87 m/s

THOR Neck Right Lateral Flexion Certification

Probe Acceleration
Serial Number: T015

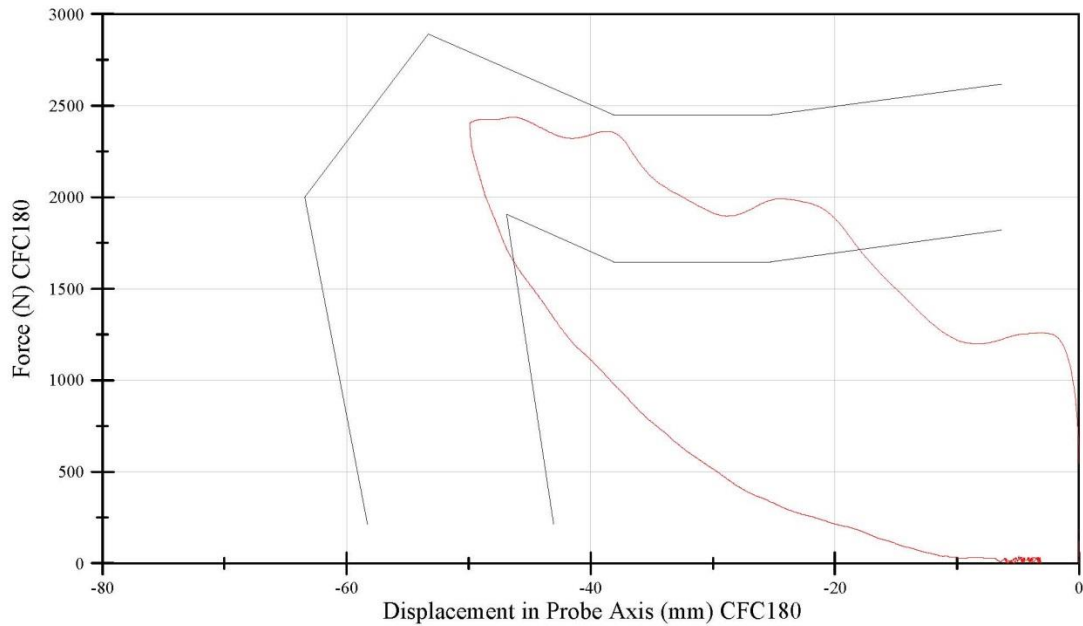


Software Version: 2.4

File Name: T015NeckRight051914_02_DIADEMHeader_BINARYpatrick
05/19/2014 09:29:56.0000

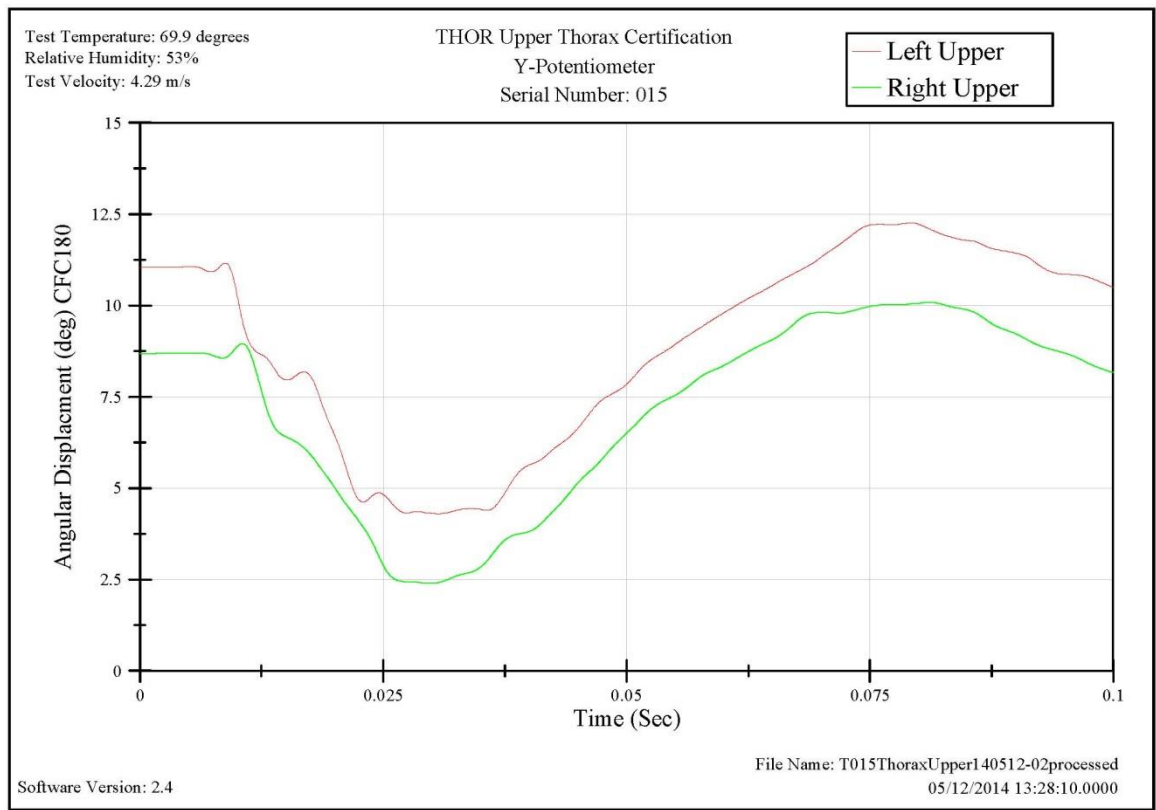
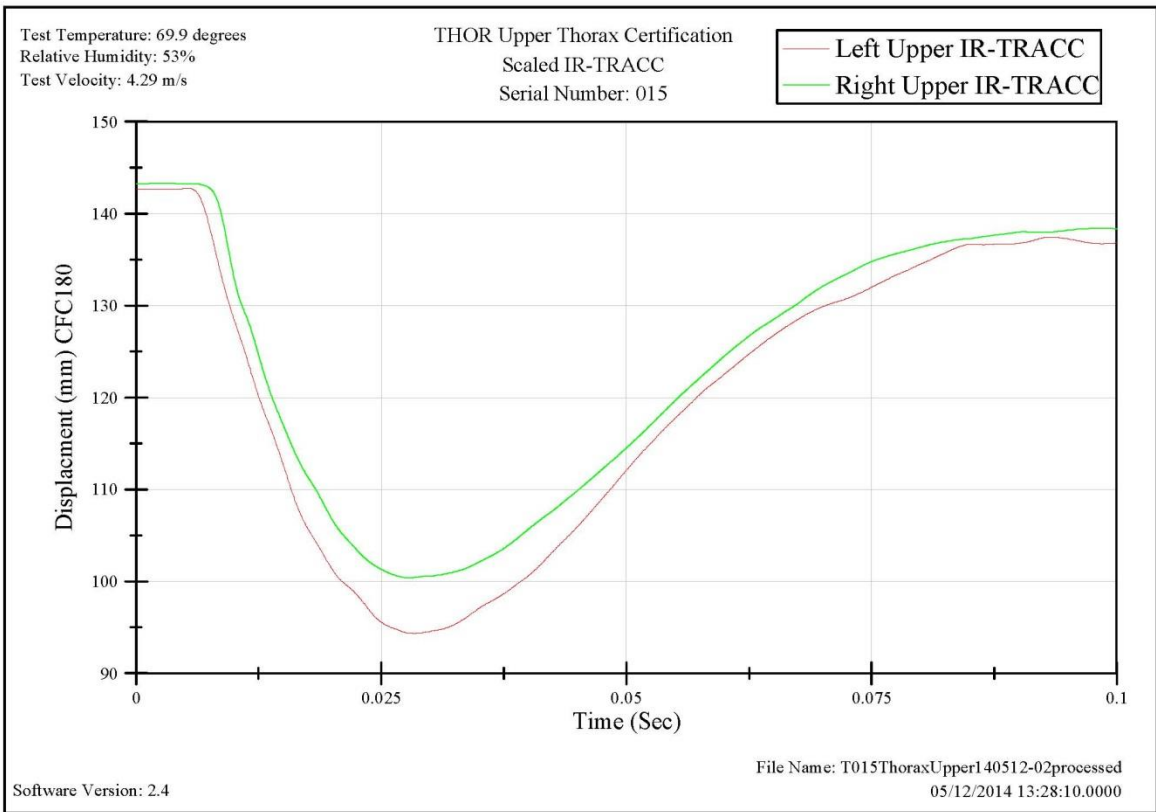
Test Temperature: 69.9 degrees
Relative Humidity: 53%
Test Velocity: 4.29 m/s

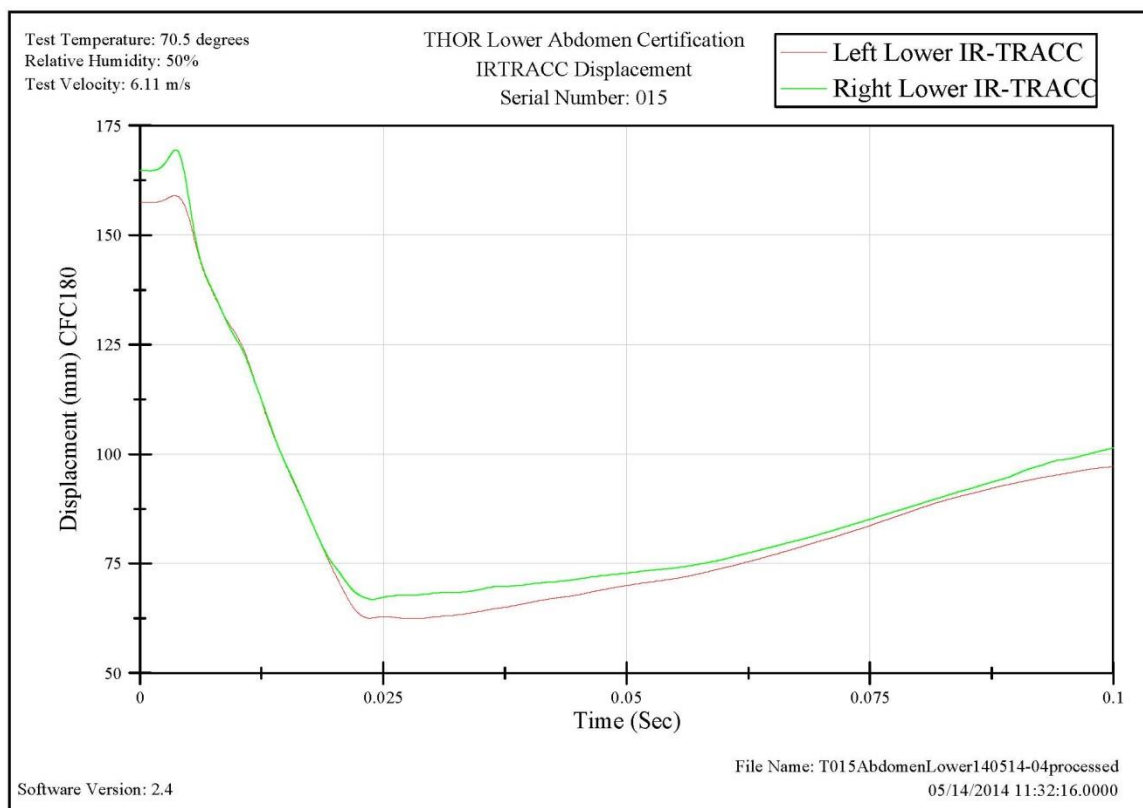
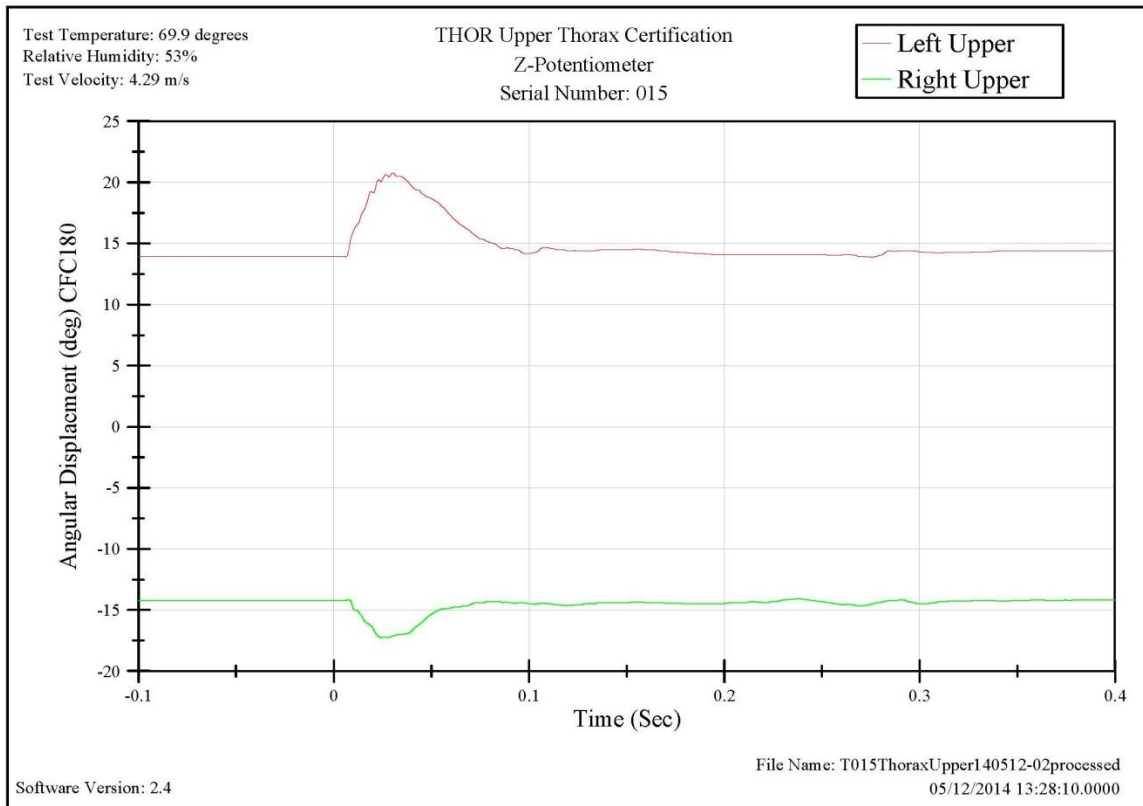
THOR Upper Thorax Certification Thorax Response With Kroell Corridor Serial Number: 015

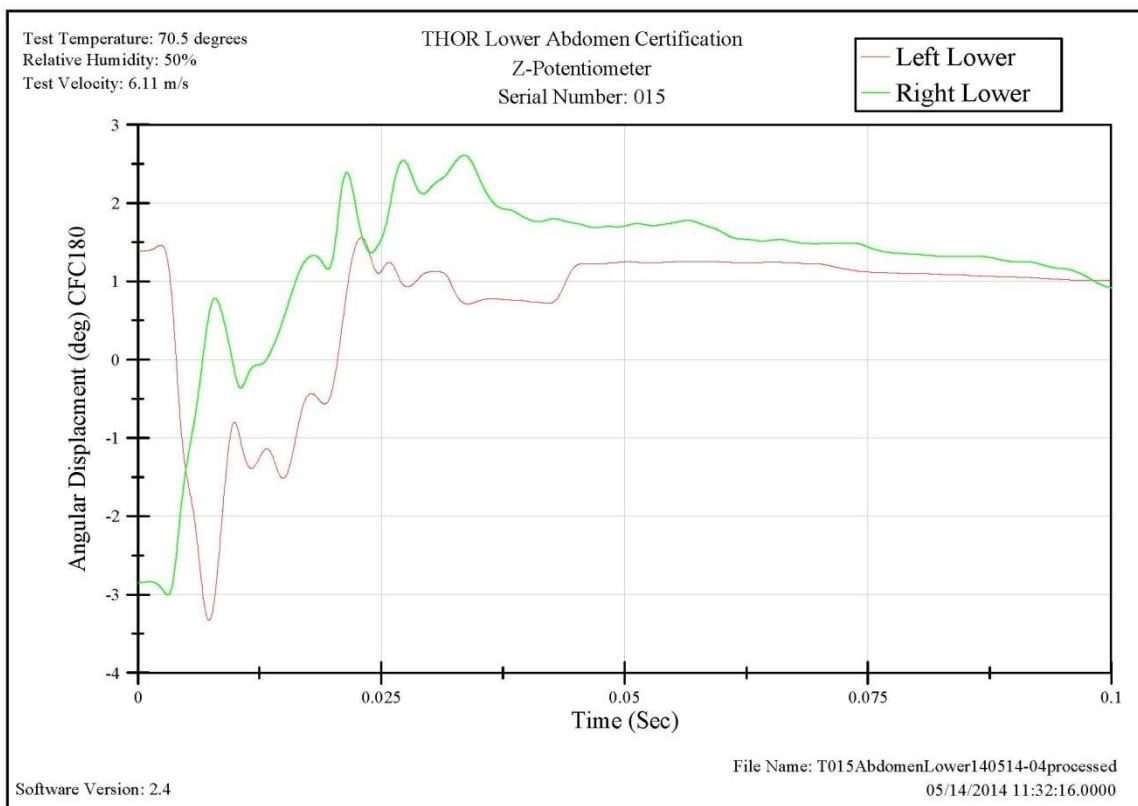
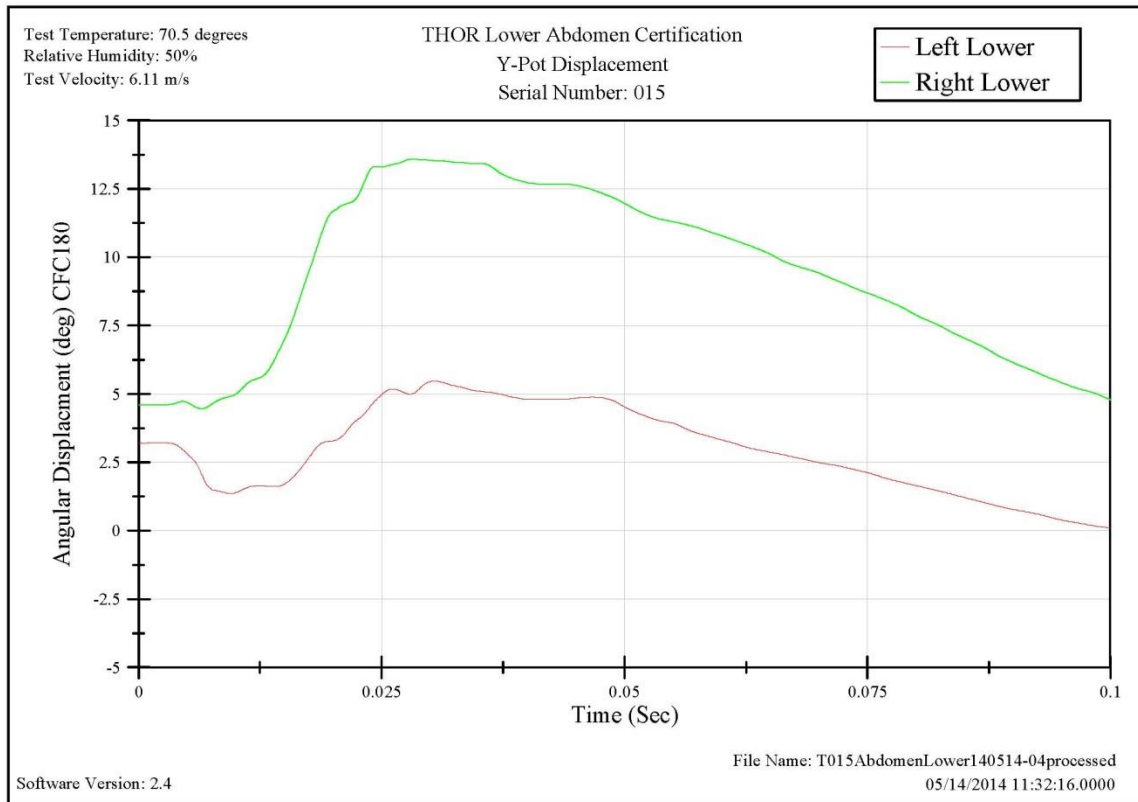


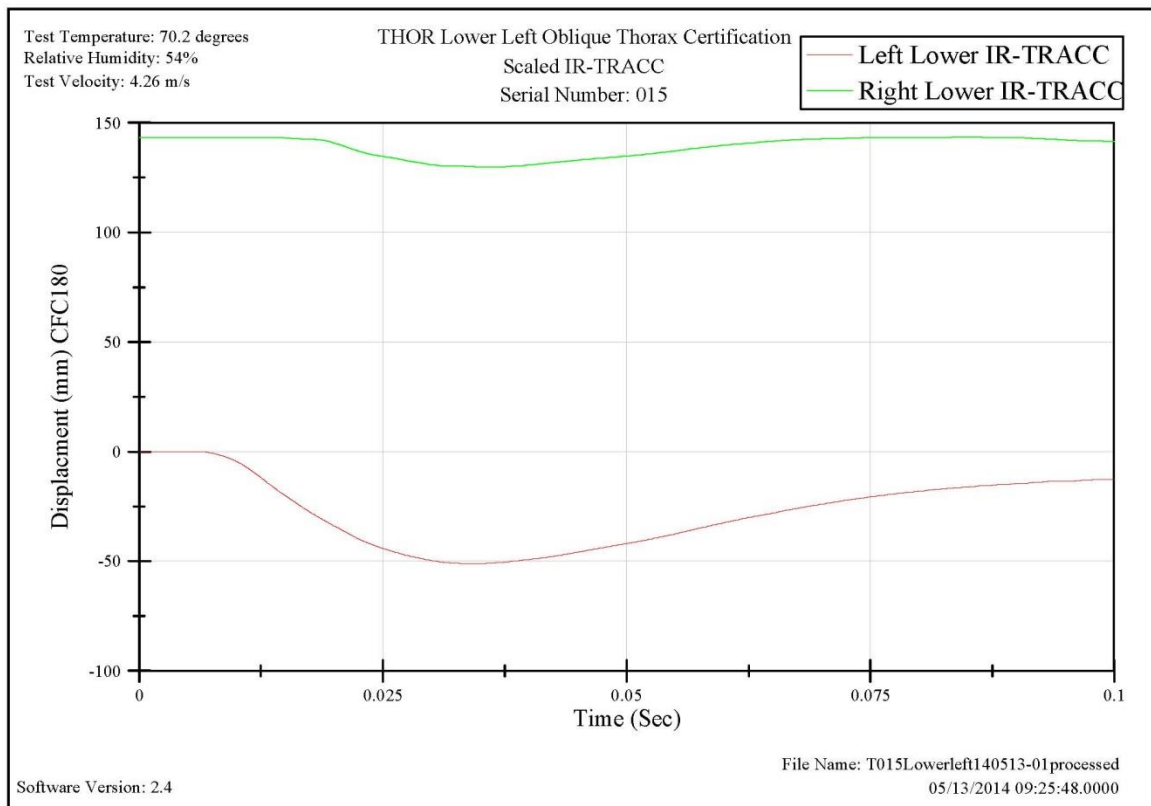
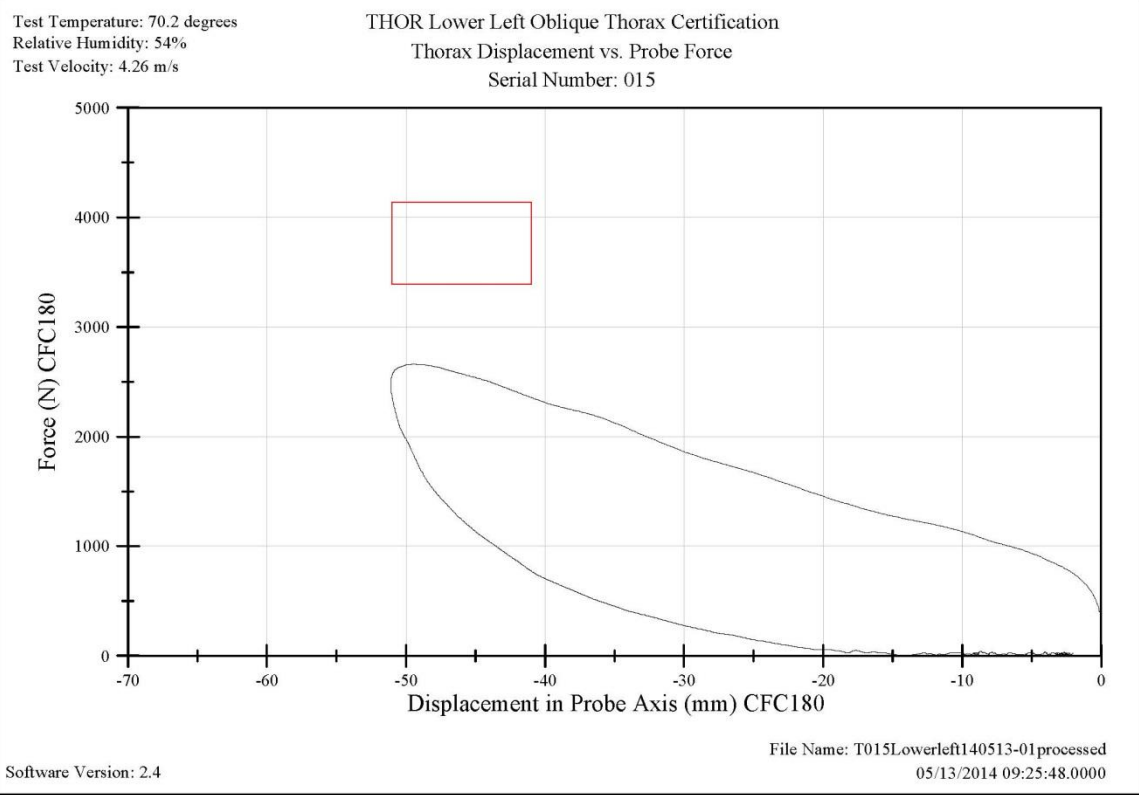
Software Version: 2.4

File Name: T015ThoraxUpper140512-02processed
05/12/2014 13:28:10.0000



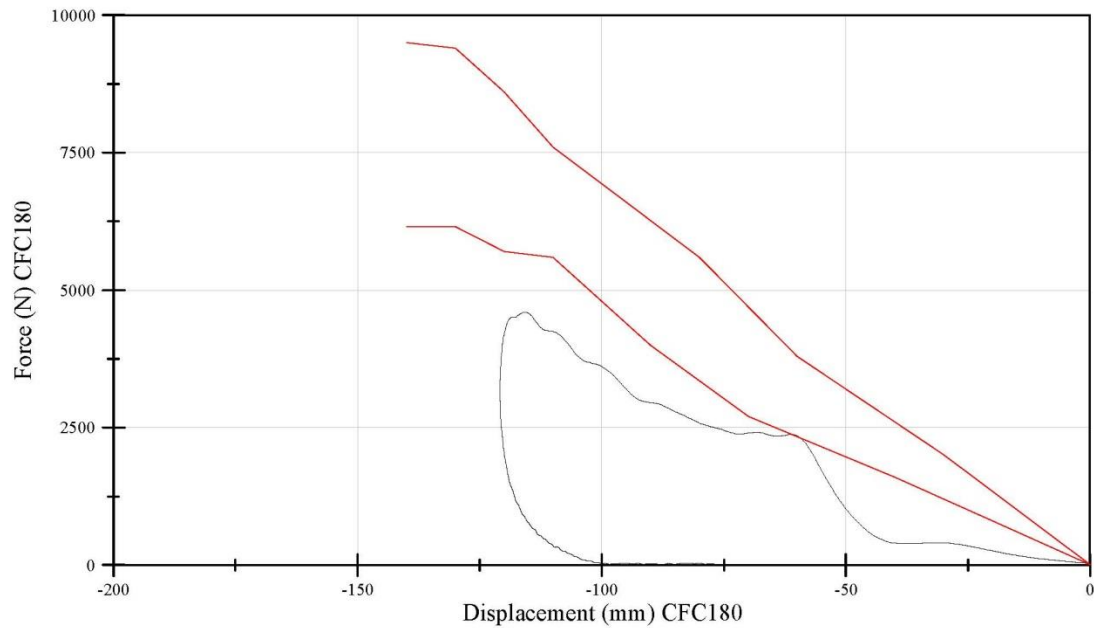






Test Temperature: 68.9 degrees
Relative Humidity: 51%
Test Velocity: 6.64 m/s

THOR Upper Abdomen Certification
Abdomen Displacement vs. Probe Force
Serial Number: 015

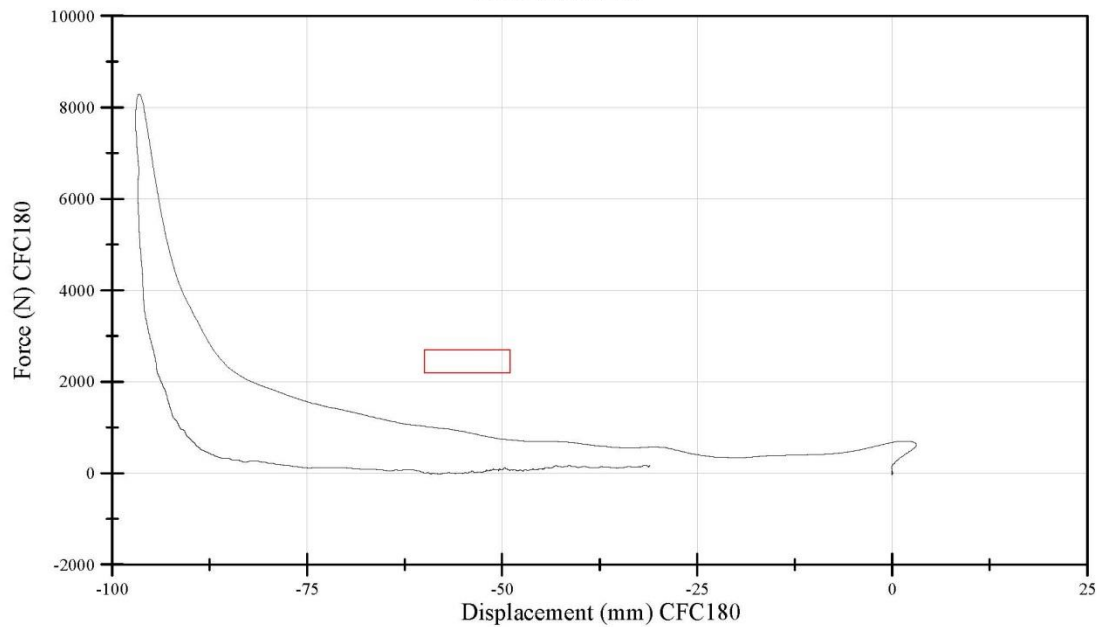


Software Version: 2.4

File Name: THFR-04
05/08/2014 14:50:17.0000

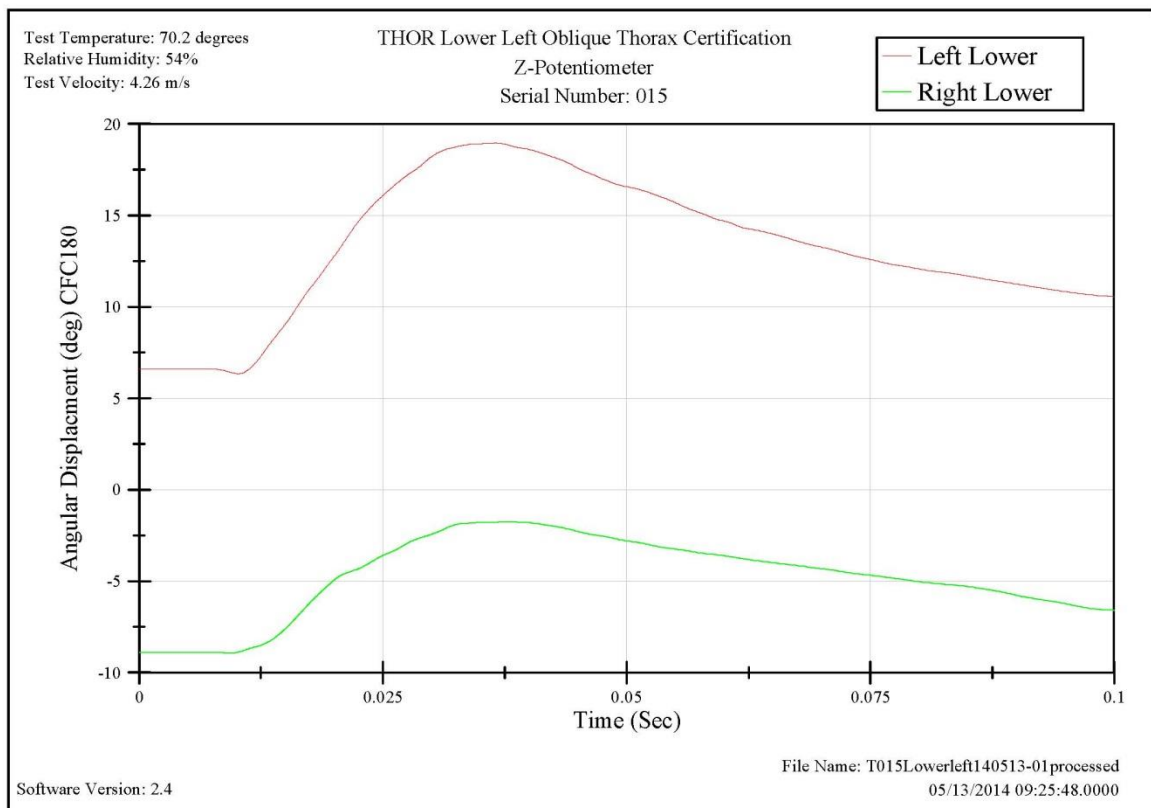
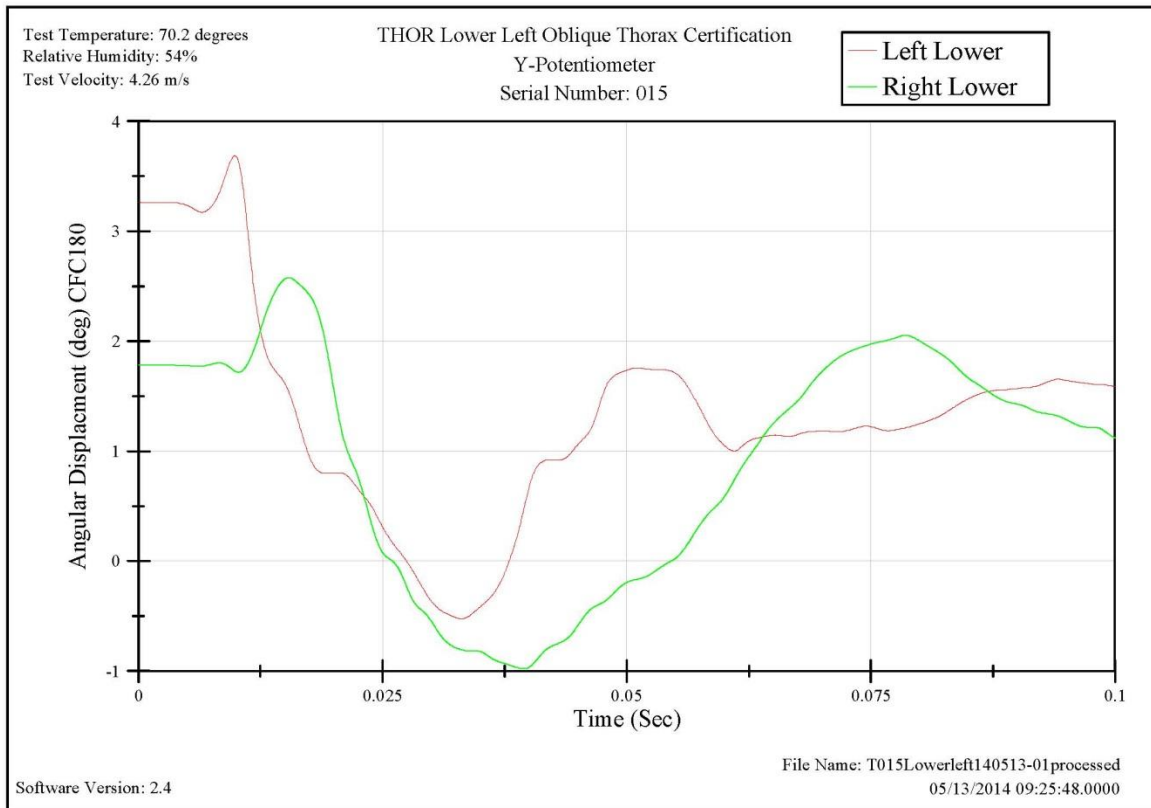
Test Temperature: 70.5 degrees
Relative Humidity: 50%
Test Velocity: 6.11 m/s

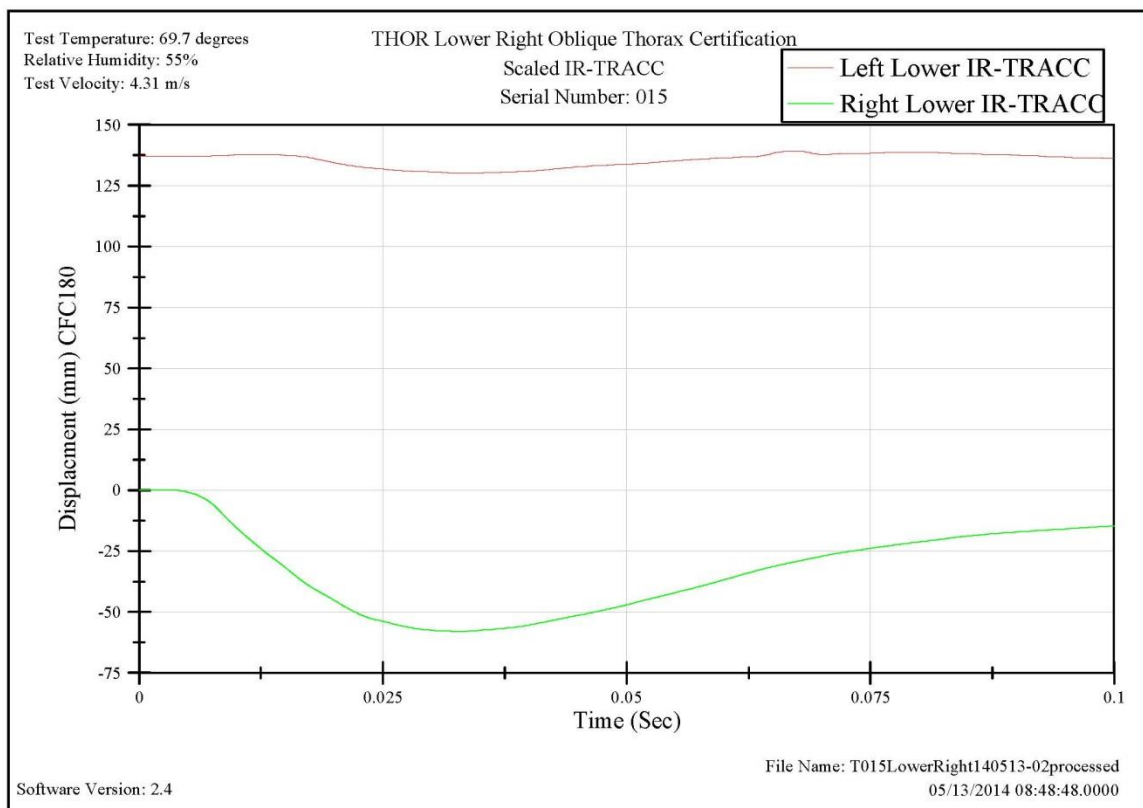
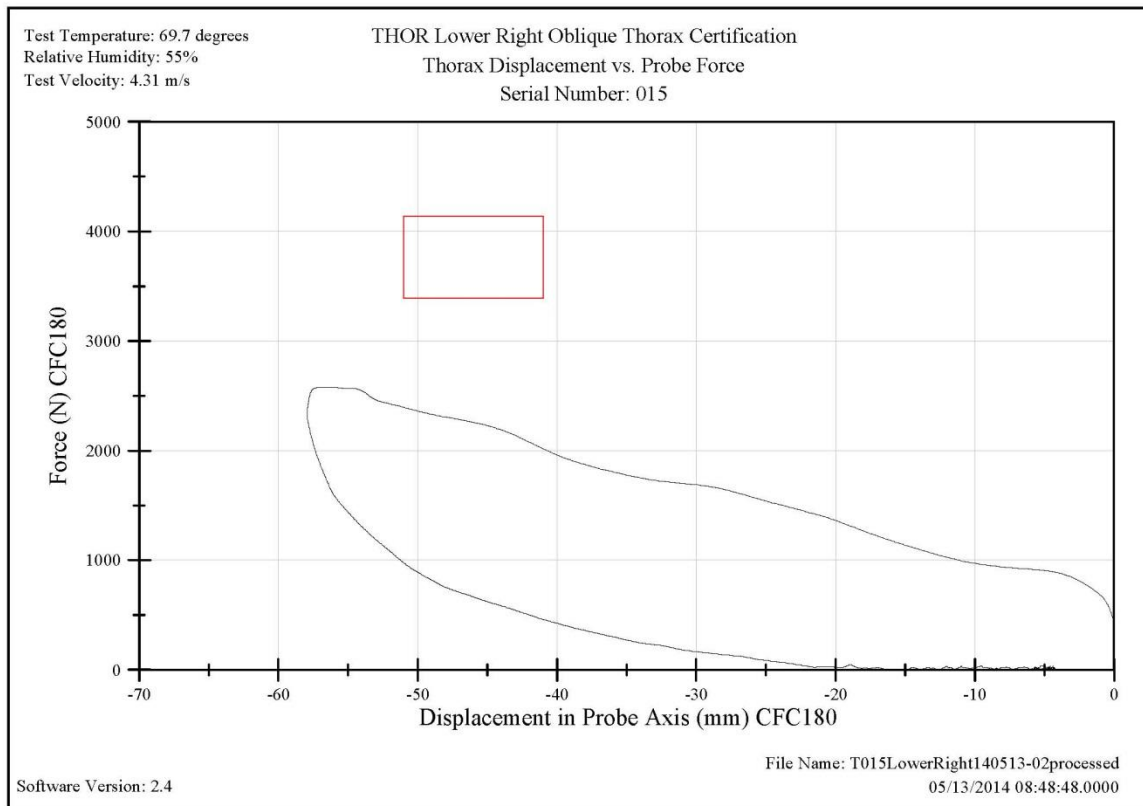
THOR Lower Abdomen Certification
Abdomen Displacement vs. Probe Force
Serial Number: 015

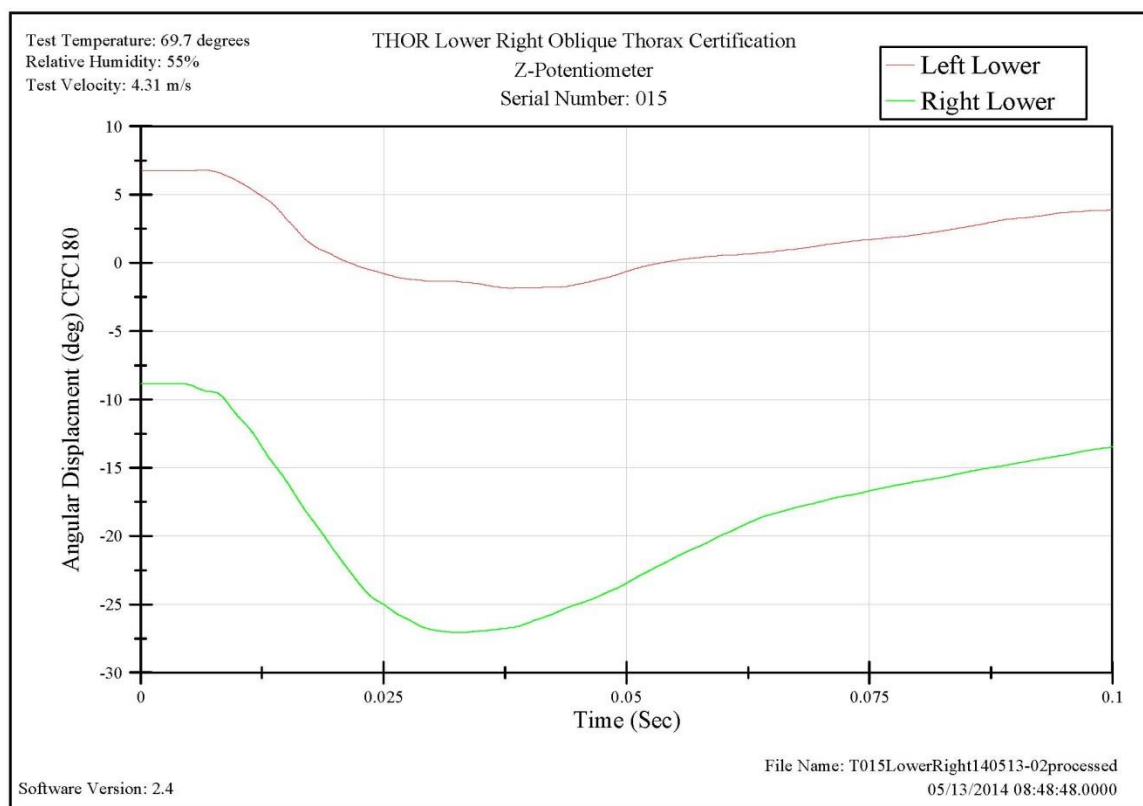
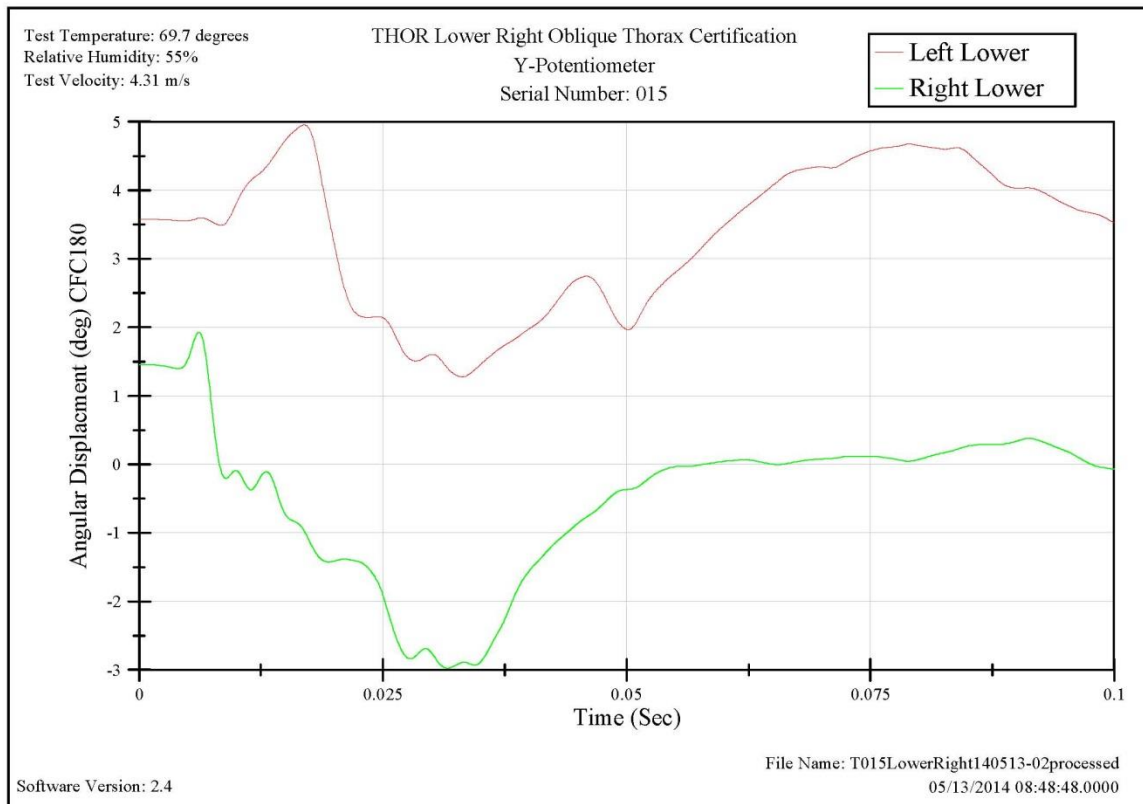


Software Version: 2.4

File Name: T015AbdomenLower140514-04processed
05/14/2014 11:32:16.0000

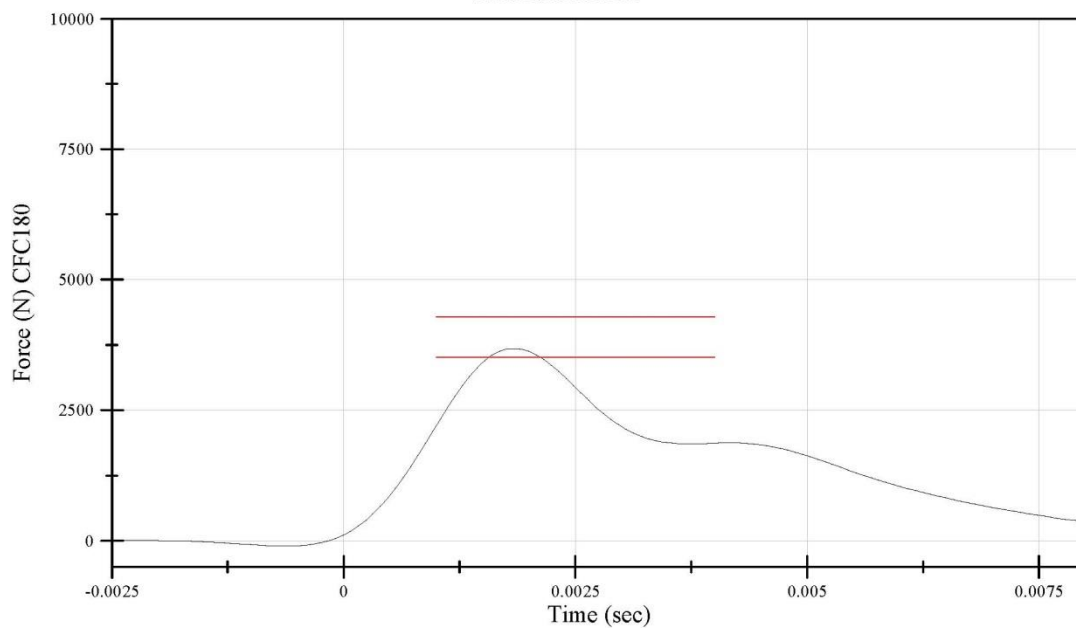






Test Temperature: 69.9 degrees
Relative Humidity: 53%
Test Velocity: 2.65 m/s

THOR Left Femur Certification
Probe Force
Serial Number: 015

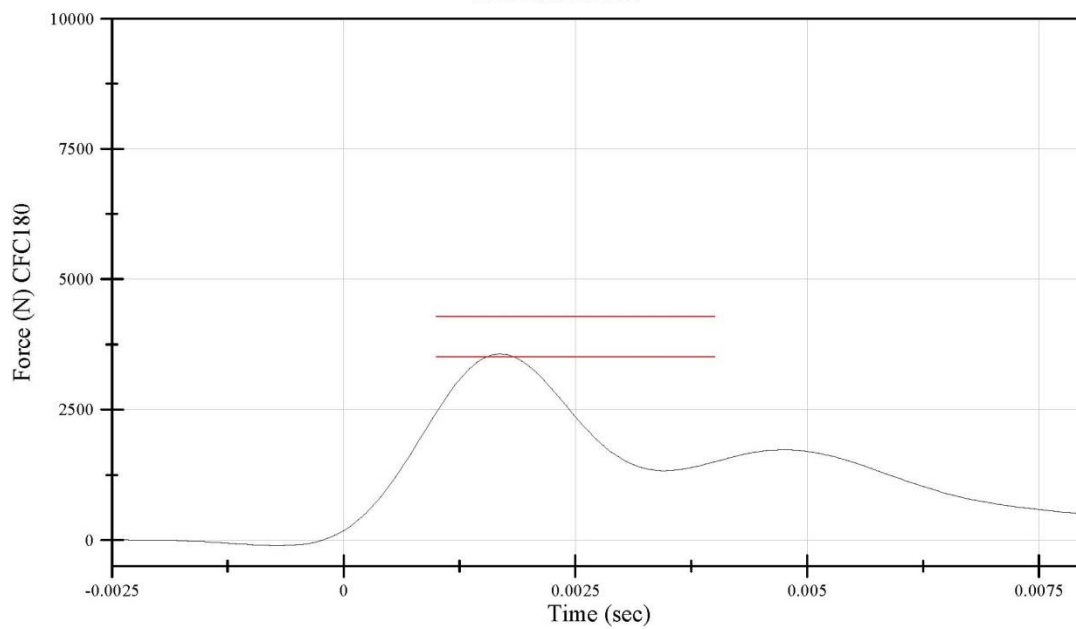


Software Version: 2.4

File Name: T015LeftKnee140514-02 time correctedprocessed
05/14/2014 15:13:25.0000

Test Temperature: 71.6 degrees
Relative Humidity: 50%
Test Velocity: 2.62 m/s

THOR Right Femur Certification
Probe Force
Serial Number: 015

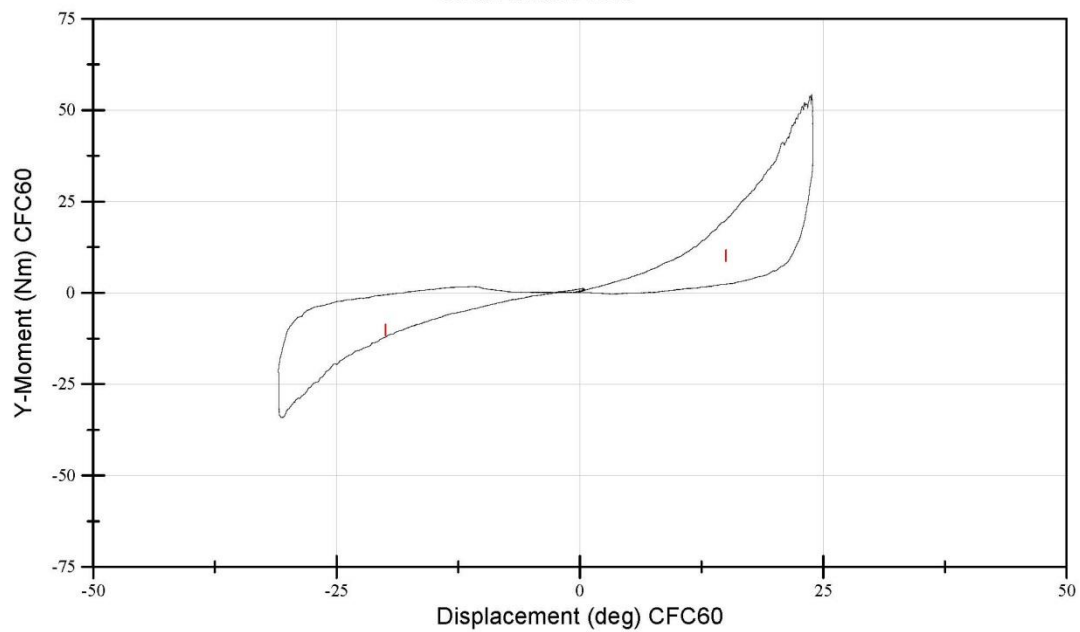


Software Version: 2.4

File Name: T015RightKnee140514-01processed
05/14/2014 15:28:10.0000

Test Temperature: 71 degrees
Relative Humidity: 35%
Test Velocity: 0 m/s

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



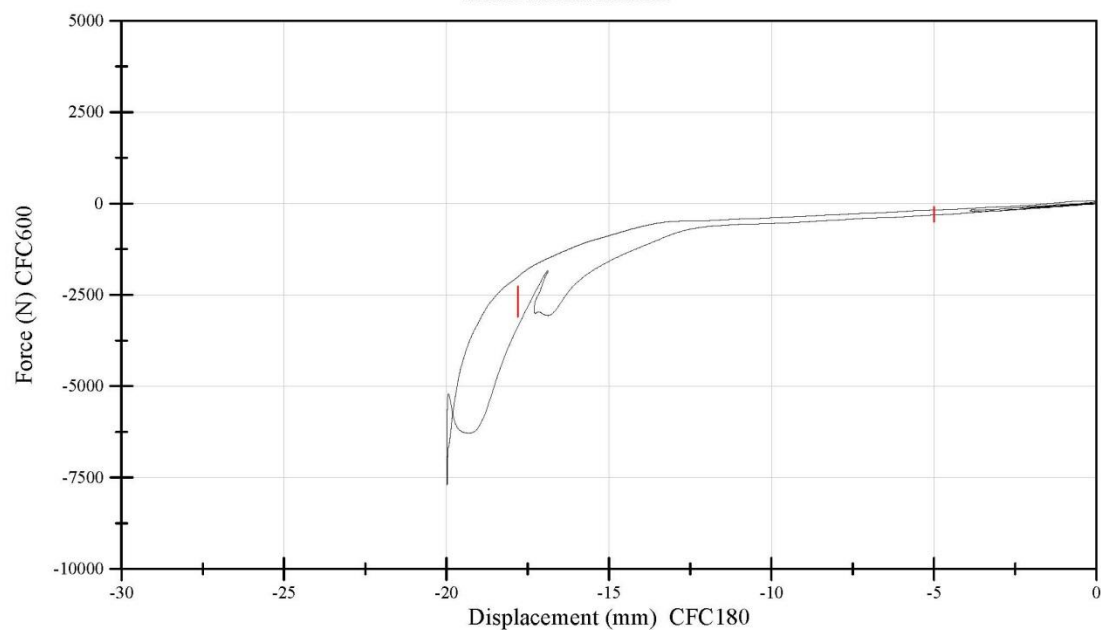
Software Version: 2.4

File Name: T015OC050814_01_DIADEMHeader_BINARYpatrick
05/08/2014 08:51:05.0000

THOR 015 LEG CALIBRATIONS
LX0039 / LX0038

Test Temperature: 71.6 degrees
Relative Humidity: 31.8%
Test Velocity: 2.78 m/s

THOR Knee Certification
Femur Force vs. Knee Displacement
Serial Number: LX0038

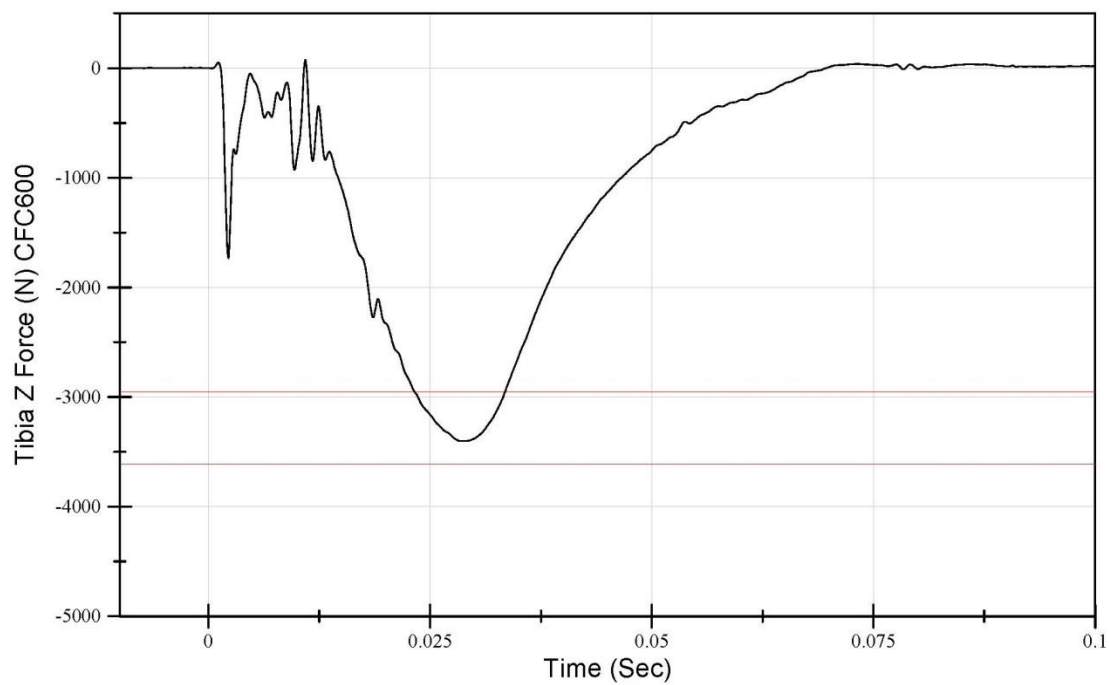


Software Version: 2.4

File Name: I1807966BKnee140424_01_DIADEMHeader_BINARYprocessed
04/24/2014 11:40:26.0000

Test Temperature: 71.2 degrees
Relative Humidity: 32%
Test Velocity: 5.03 m/s

THOR Right Foot Dorsiflexion Certification
Tibia Load
Serial Number: LX0038

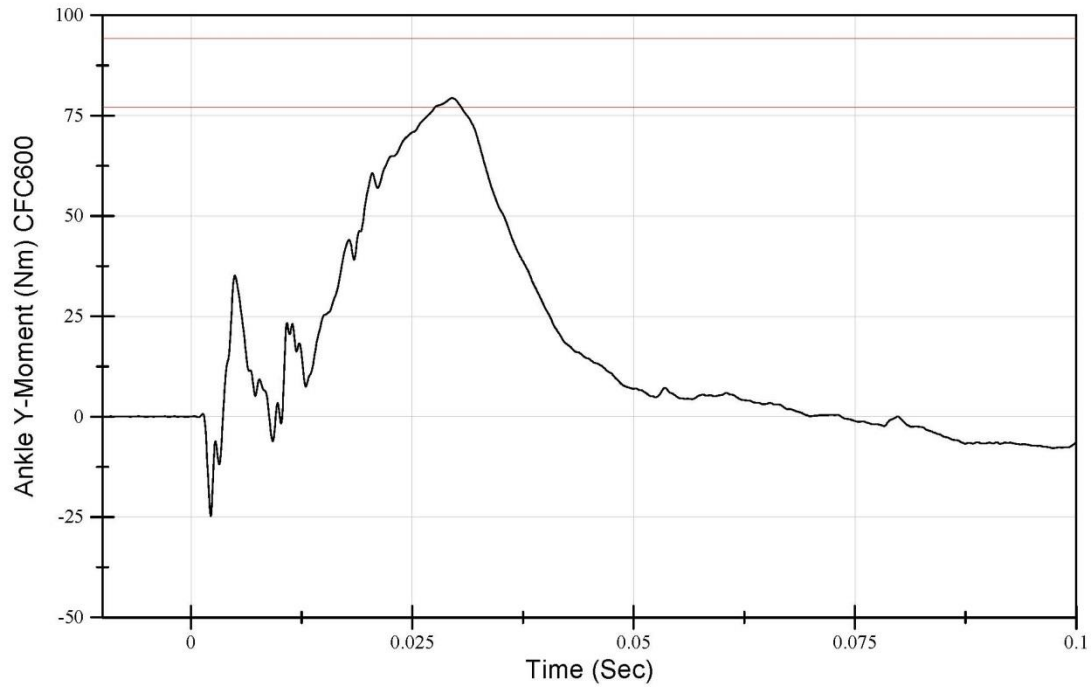


Software Version: 2.4

File Name: LX0038Ball140423_01_DIADEMHeader_BINARYprocessed
04/23/2014 11:20:29.0000

Test Temperature: 71.2 degrees
Relative Humidity: 32%
Test Velocity: 5.03 m/s

THOR Right Foot Dorsiflexion Certification
Ankle Y-Moment
Serial Number: LX0038

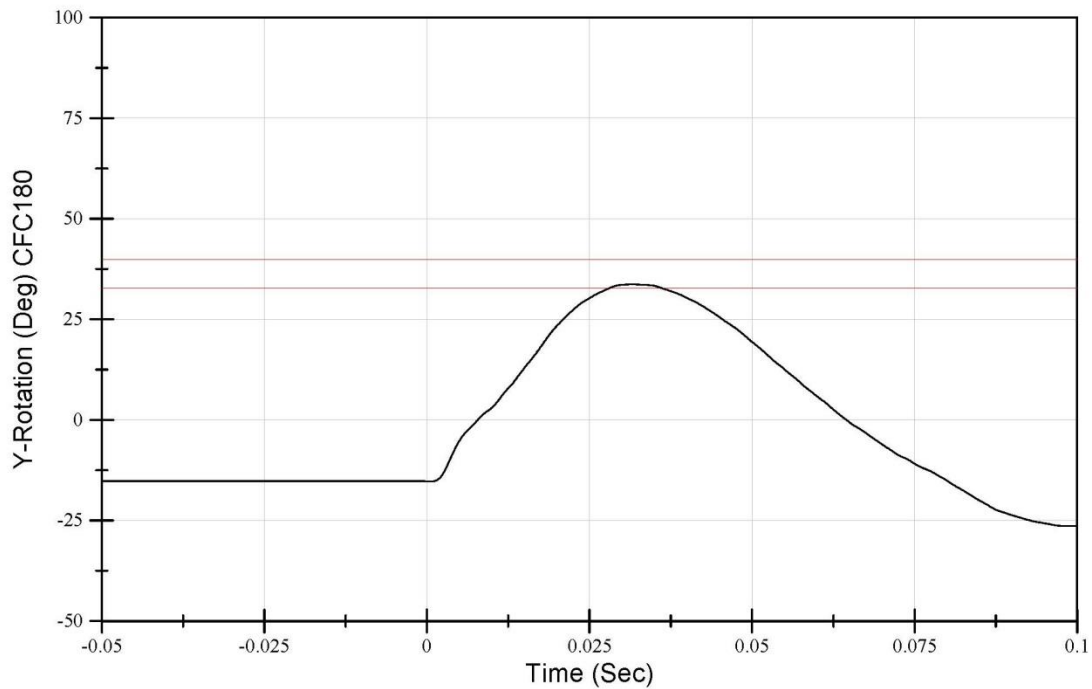


Software Version: 2.4

File Name: LX0038Ball140423_01_DIADEMHeader_BINARYprocessed
04/23/2014 11:20:29.0000

Test Temperature: 71.2 degrees
Relative Humidity: 32%
Test Velocity: 5.03 m/s

THOR Right Foot Dorsiflexion Certification
Ankle Y-Rotation
Serial Number: LX0038

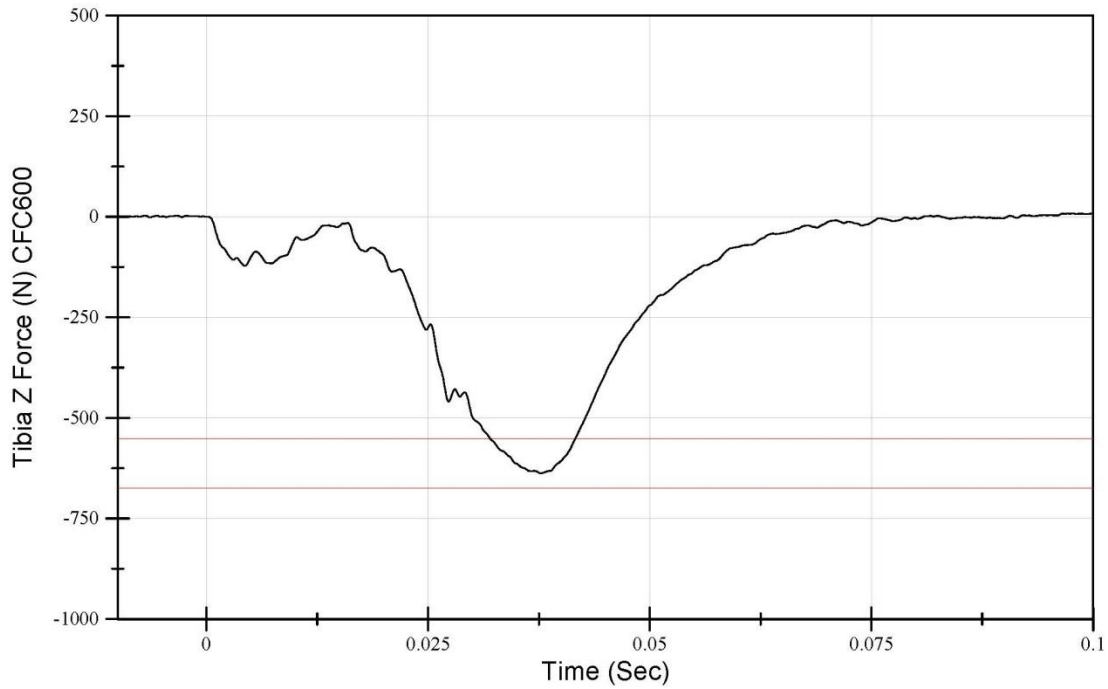


Software Version: 2.4

File Name: LX0038Ball140423_01_DIADEMHeader_BINARYprocessed
04/23/2014 11:20:29.0000

Test Temperature: 71.2 degrees
Relative Humidity: 32%
Test Velocity: 2 m/s

THOR Right Foot Eversion Certification
Tibia Load
Serial Number: LX0038

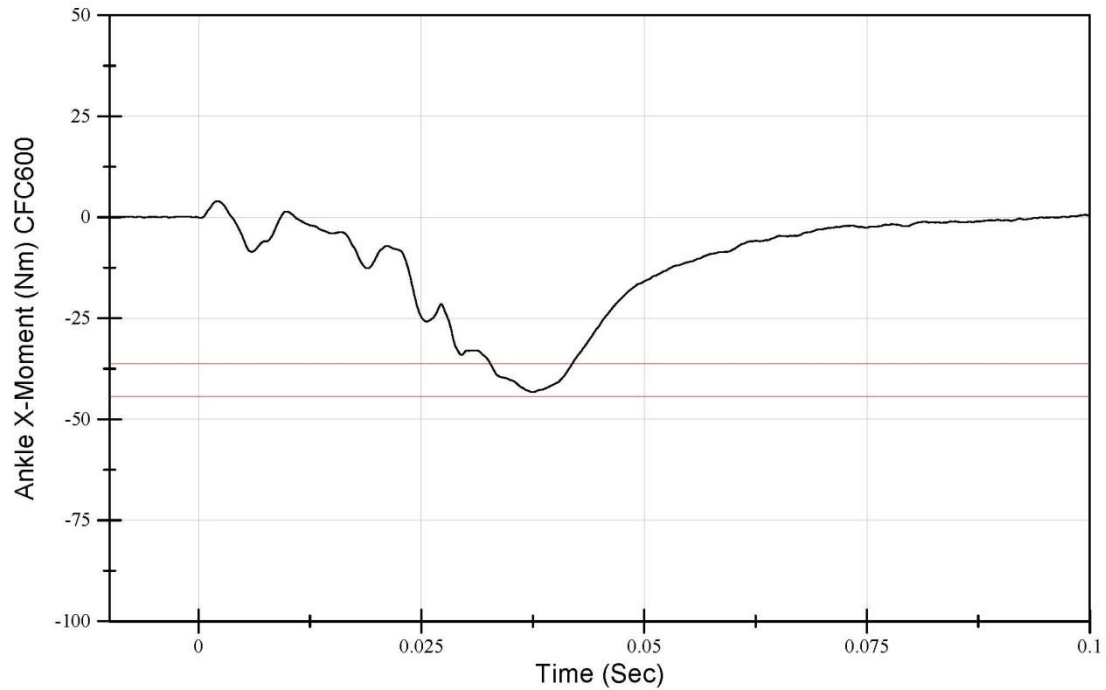


Software Version: 2.4

File Name: LX0038Eversion140423_01_DIADEMHeader_BINARYprocessed
04/23/2014 10:22:49.0000

Test Temperature: 71.2 degrees
Relative Humidity: 32%
Test Velocity: 2 m/s

THOR Right Foot Eversion Certification
Ankle Moment
Serial Number: LX0038

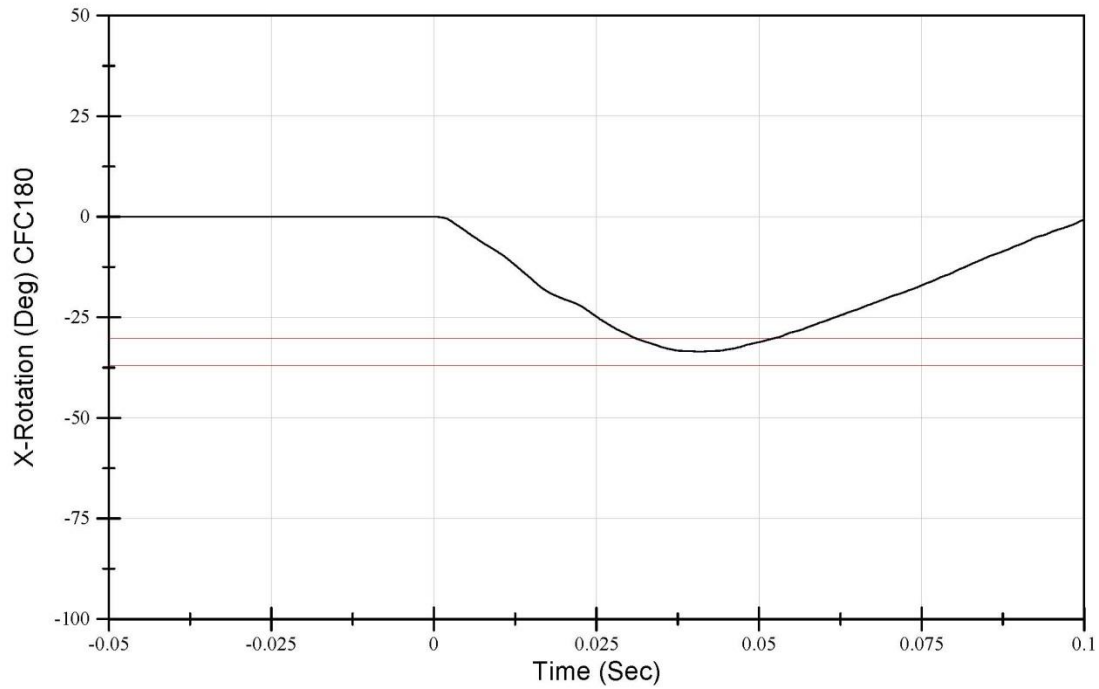


Software Version: 2.4

File Name: LX0038Eversion140423_01_DIADEMHeader_BINARYprocessed
04/23/2014 10:22:49.0000

Test Temperature: 71.2 degrees
Relative Humidity: 32%
Test Velocity: 2 m/s

THOR Right Foot Eversion Certification
Ankle X-Rotation
Serial Number: LX0038

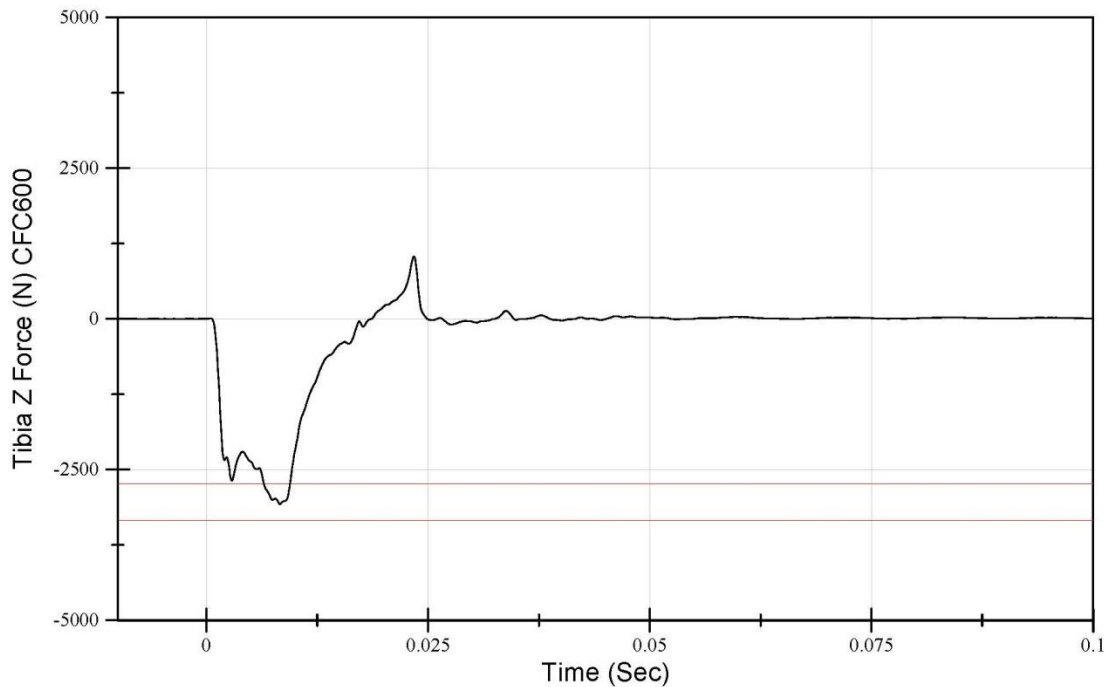


Software Version: 2.4

File Name: LX0038Eversion140423_01_DIADEMHeader_BINARYprocessed
04/23/2014 10:22:49.0000

Test Temperature: 71.2 degrees
Relative Humidity: 32%
Test Velocity: 4.03 m/s

THOR Right Foot Heel Certification
Tibia Load
Serial Number: LX0038

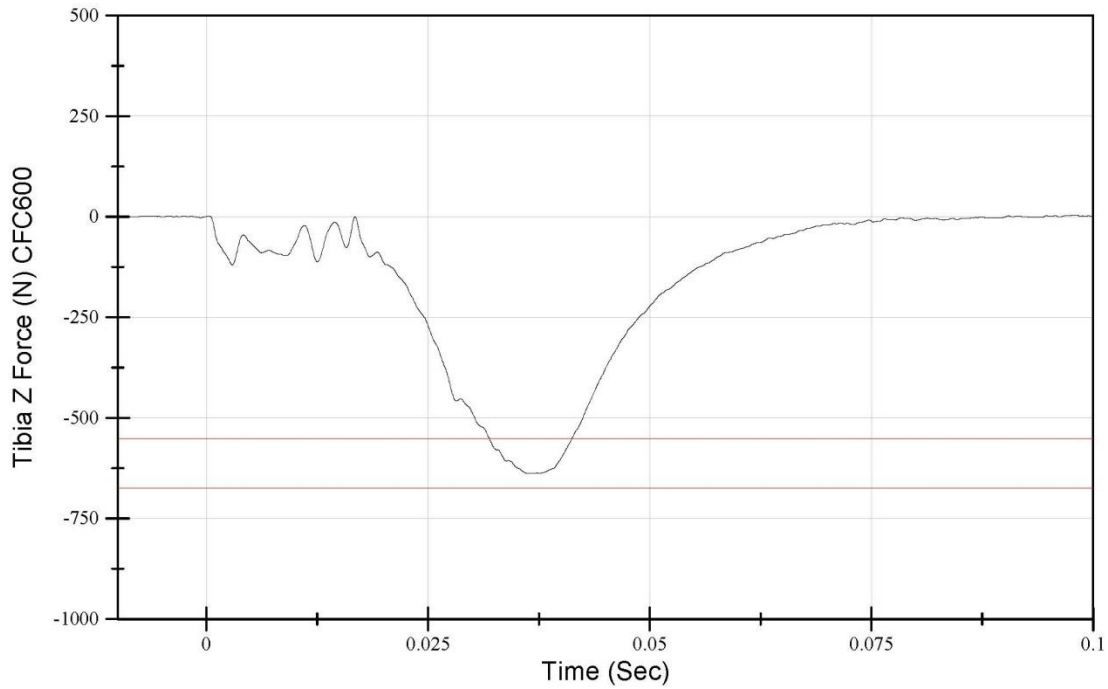


Software Version: 2.4

File Name: LX0038Heel140423_01_DIADEMHeader_BINARYprocessed
04/23/2014 13:15:18.0000

Test Temperature: 71.2 degrees
Relative Humidity: 32%
Test Velocity: 2 m/s

THOR Right Foot Inversion Certification
Tibia Load
Serial Number: LX0038

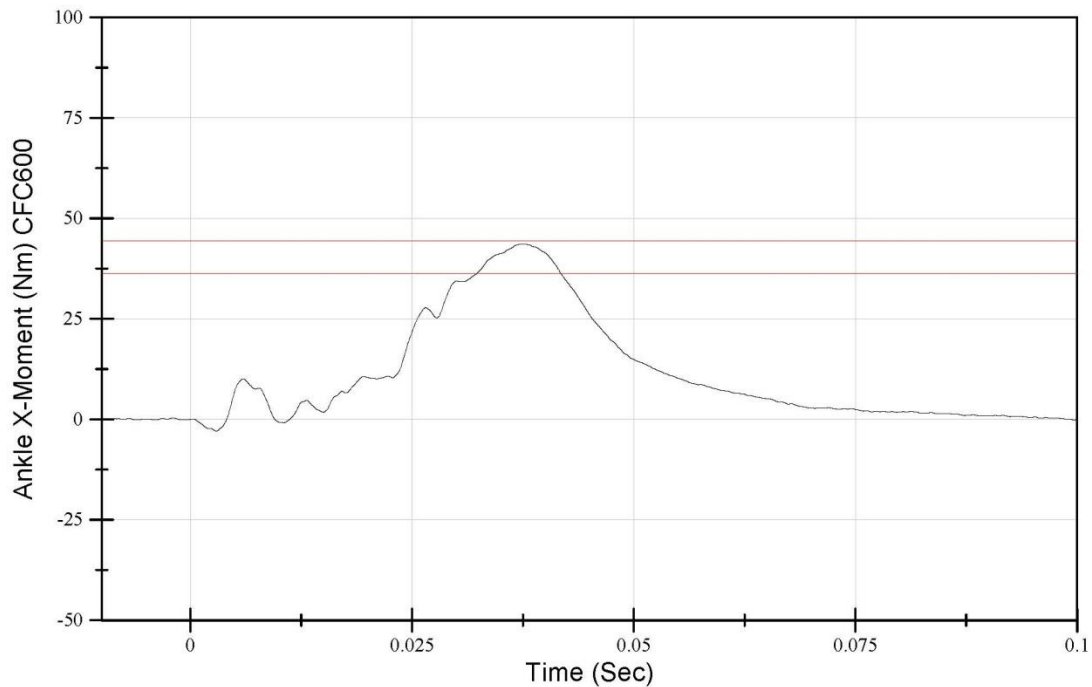


Software Version: 2.4

File Name: LX0038Inversion140423_01_DIADEMHeader_BINARYprocessed
04/23/2014 09:52:27.0000

Test Temperature: 71.2 degrees
Relative Humidity: 32%
Test Velocity: 2 m/s

THOR Right Foot Inversion Certification
Ankle Moment
Serial Number: LX0038

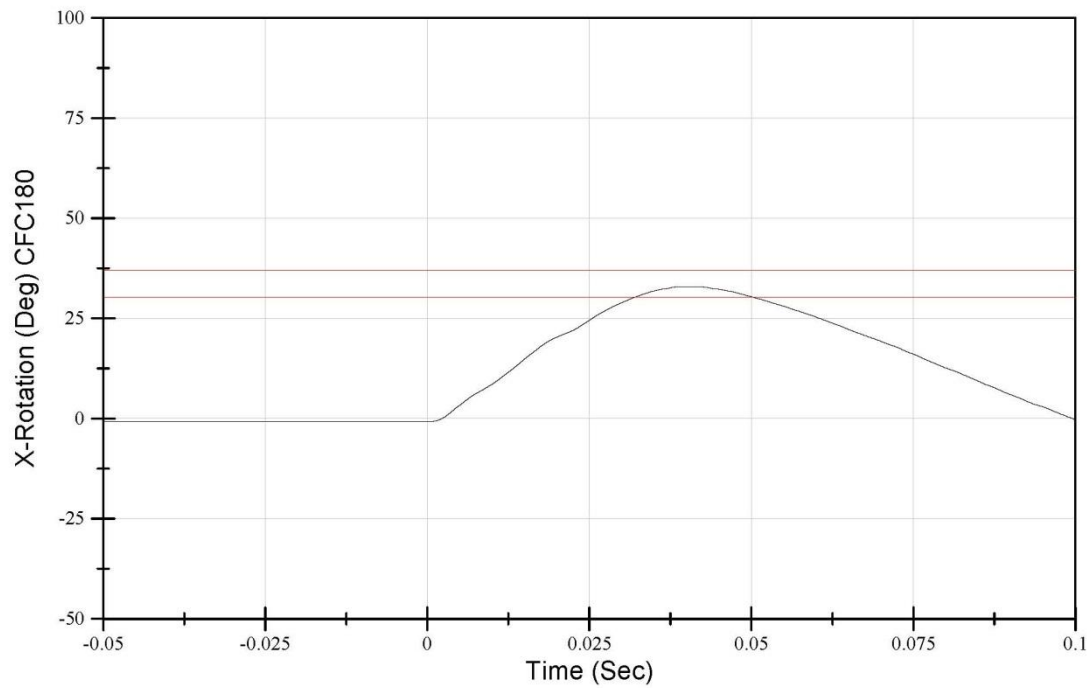


Software Version: 2.4

File Name: LX0038Inversion140423_01_DIADEMHeader_BINARYprocessed
04/23/2014 09:52:27.0000

Test Temperature: 71.2 degrees
Relative Humidity: 32%
Test Velocity: 2 m/s

THOR Right Foot Inversion Certification
Ankle X-Rotation
Serial Number: LX0038

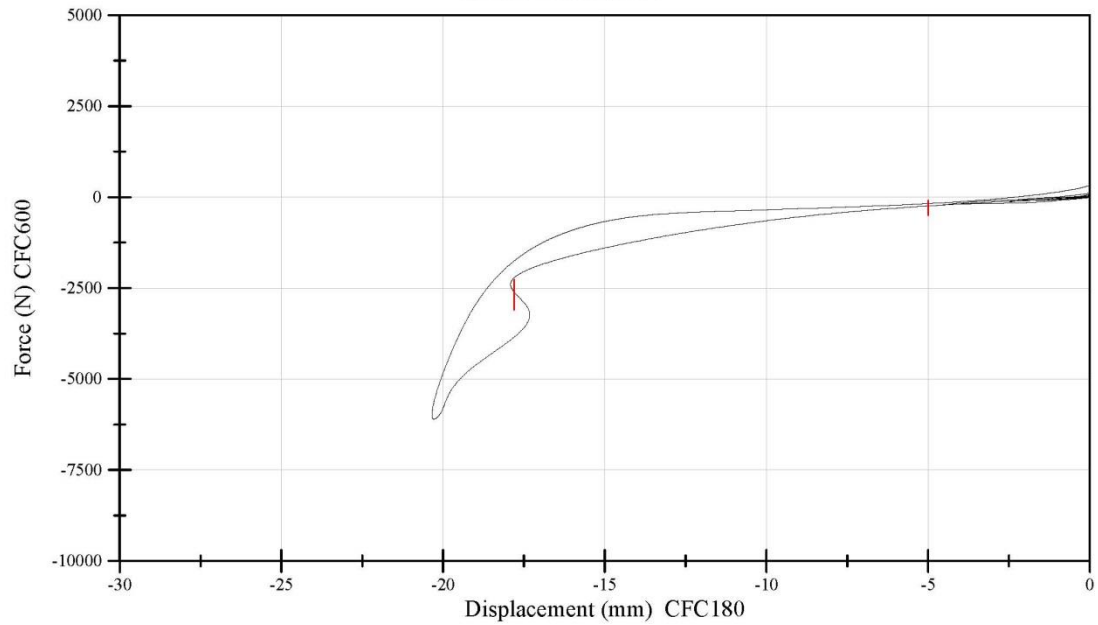


Software Version: 2.4

File Name: LX0038Inversion140423_01_DIADEMHeader_BINARYprocessed
04/23/2014 09:52:27.0000

Test Temperature: 71.6 degrees
Relative Humidity: 31.8%
Test Velocity: 2.78 m/s

THOR Left Knee Certification
Femur Force vs. Knee Displacement
Serial Number: LX0039



Software Version: 2.4

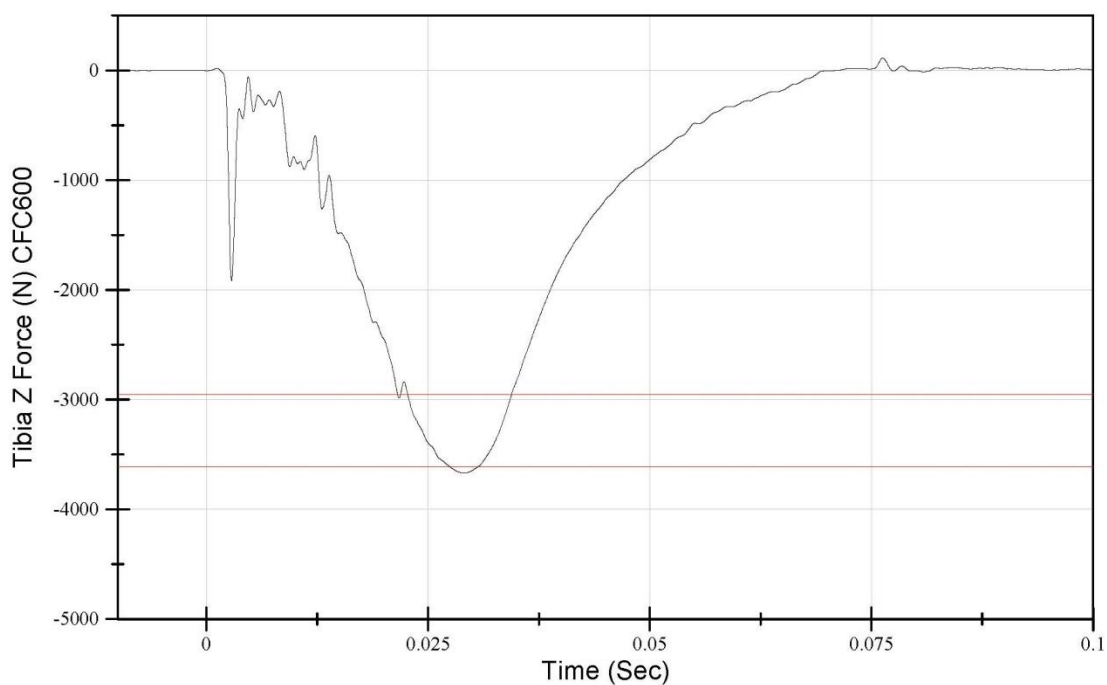
File Name: C2102639BKnee140424_01_DIADEMHeader_BINARYISOprocessed
04/24/2014 10:59:41.0000

Test Temperature: 70.4 degrees
Relative Humidity: 30.1%
Test Velocity: 5.03 m/s

THOR Left Foot Dorsiflexion Certification

Tibia Load

Serial Number: LX0039



Software Version: 2.4

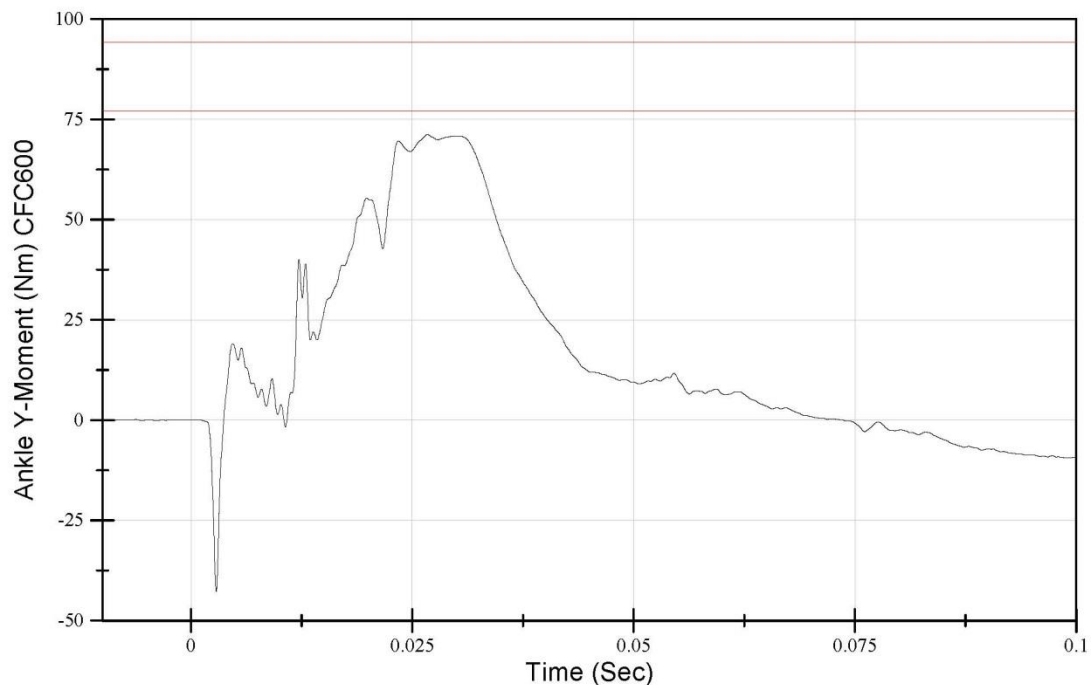
File Name: LX0039Ball140422_01_DIADEMHeader_BINARYprocessed
04/22/2014 15:55:44.0000

Test Temperature: 70.4 degrees
Relative Humidity: 30.1%
Test Velocity: 5.03 m/s

THOR Left Foot Dorsiflexion Certification

Ankle Y-Moment

Serial Number: LX0039

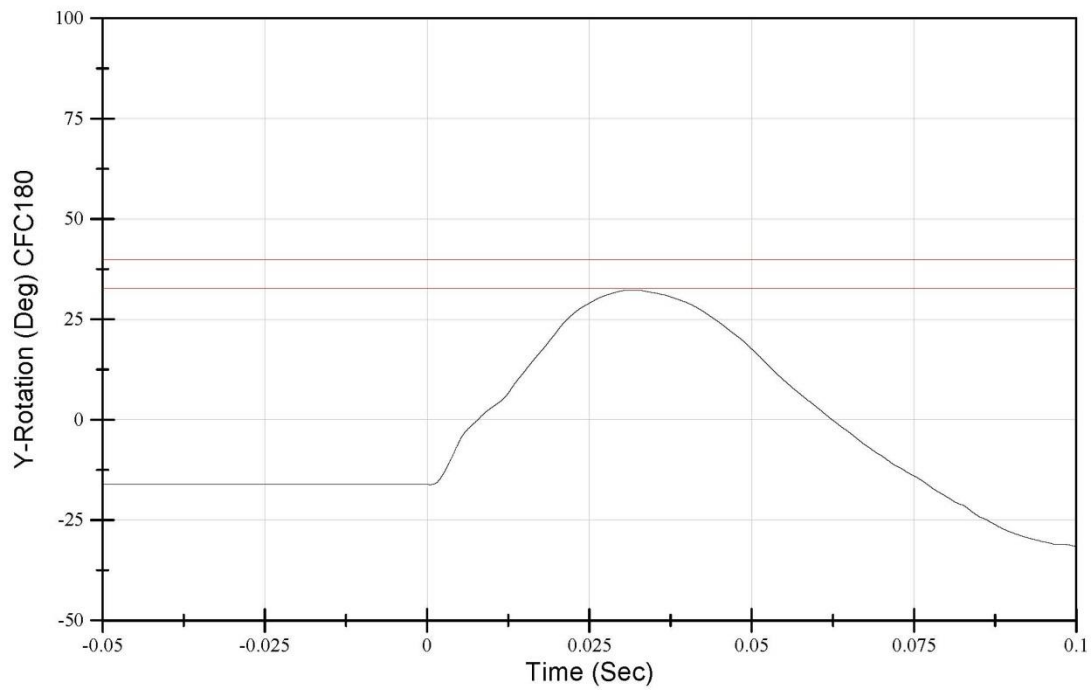


Software Version: 2.4

File Name: LX0039Ball140422_01_DIADEMHeader_BINARYprocessed
04/22/2014 15:55:44.0000

Test Temperature: 70.4 degrees
Relative Humidity: 30.1%
Test Velocity: 5.03 m/s

THOR Left Foot Dorsiflexion Certification
Ankle Y-Rotation
Serial Number: LX0039

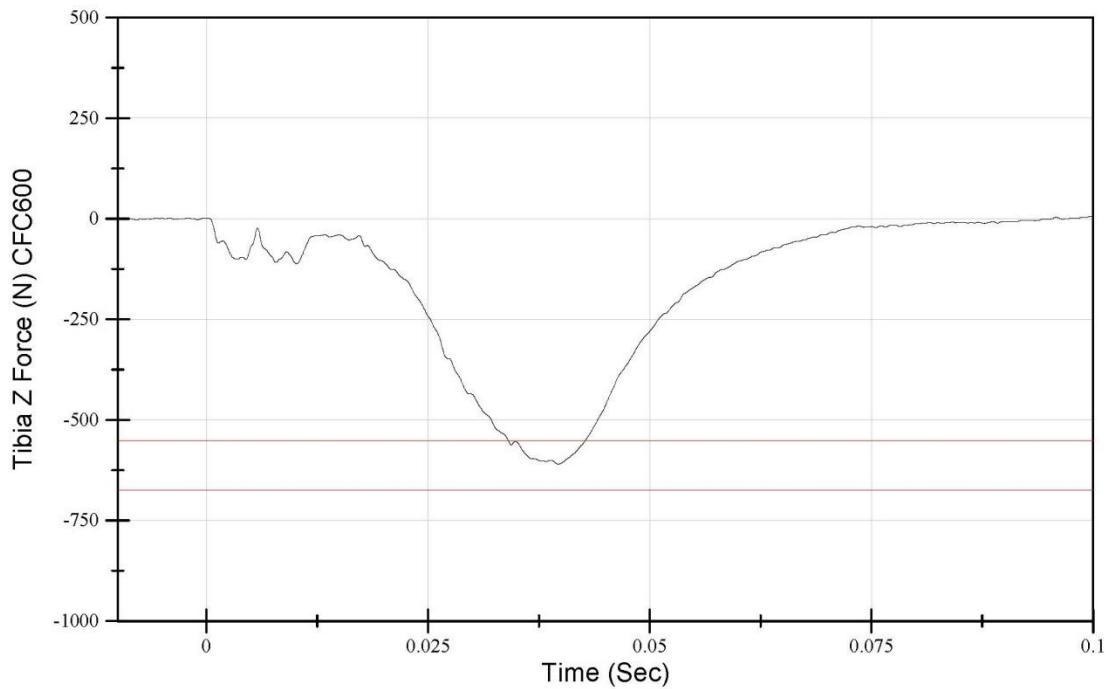


Software Version: 2.4

File Name: LX0039Ball140422_01_DIADEMHeader_BINARYprocessed
04/22/2014 15:55:44.0000

Test Temperature: 71.2 degrees
Relative Humidity: 30.4%
Test Velocity: 2 m/s

THOR Left Foot Eversion Certification
Tibia Load
Serial Number: LX0039

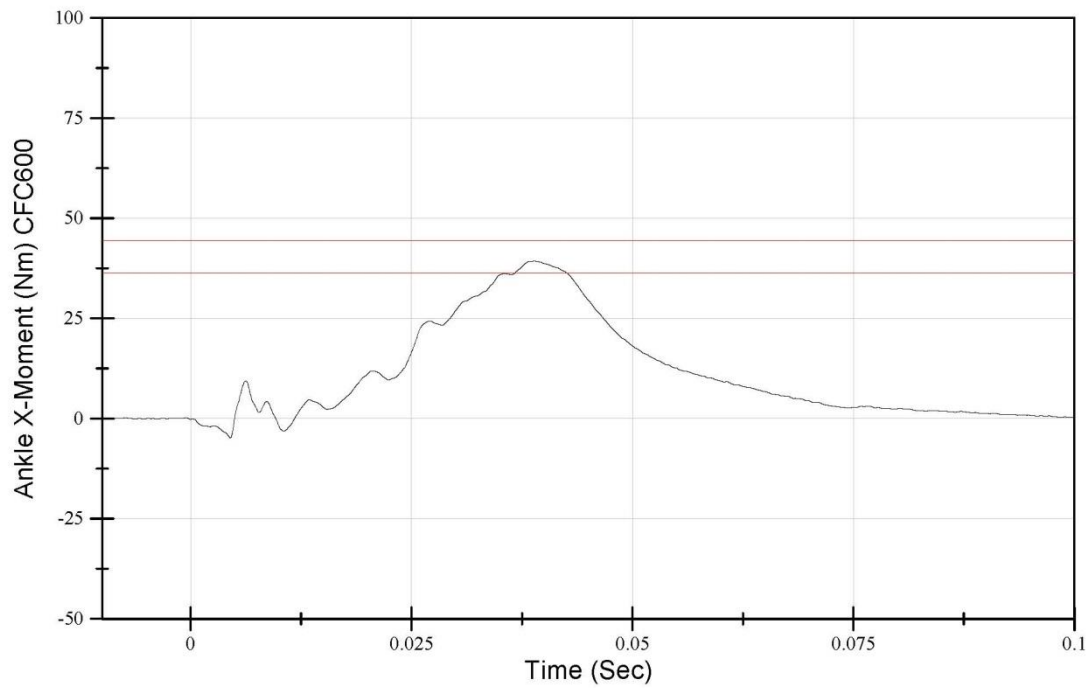


Software Version: 2.4

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Relative Humidity: 30.4%
Test Velocity: 2 m/s

THOR Left Foot Eversion Certification
Ankle Moment
Serial Number: LX0039

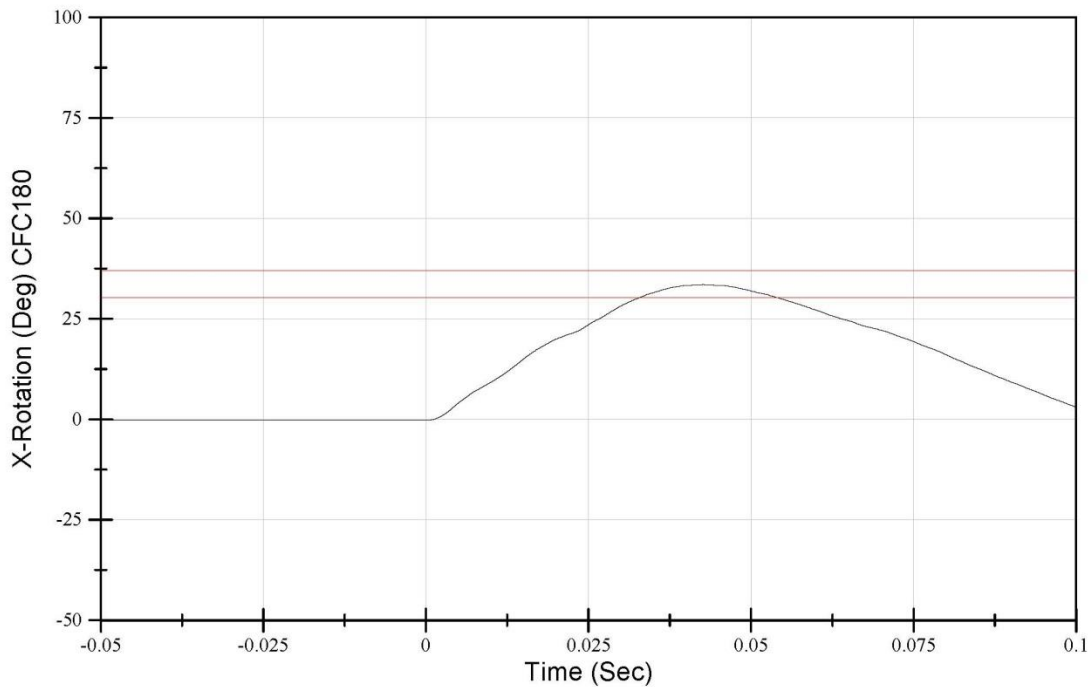


Software Version: 2.4

File Name: LX0039Eversion140422_01_DIADEMHeader_BINARYprocessed
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Test Temperature: 71.2 degrees
Relative Humidity: 30.4%
Test Velocity: 2 m/s

THOR Left Foot Eversion Certification
Ankle X-Rotation
Serial Number: LX0039

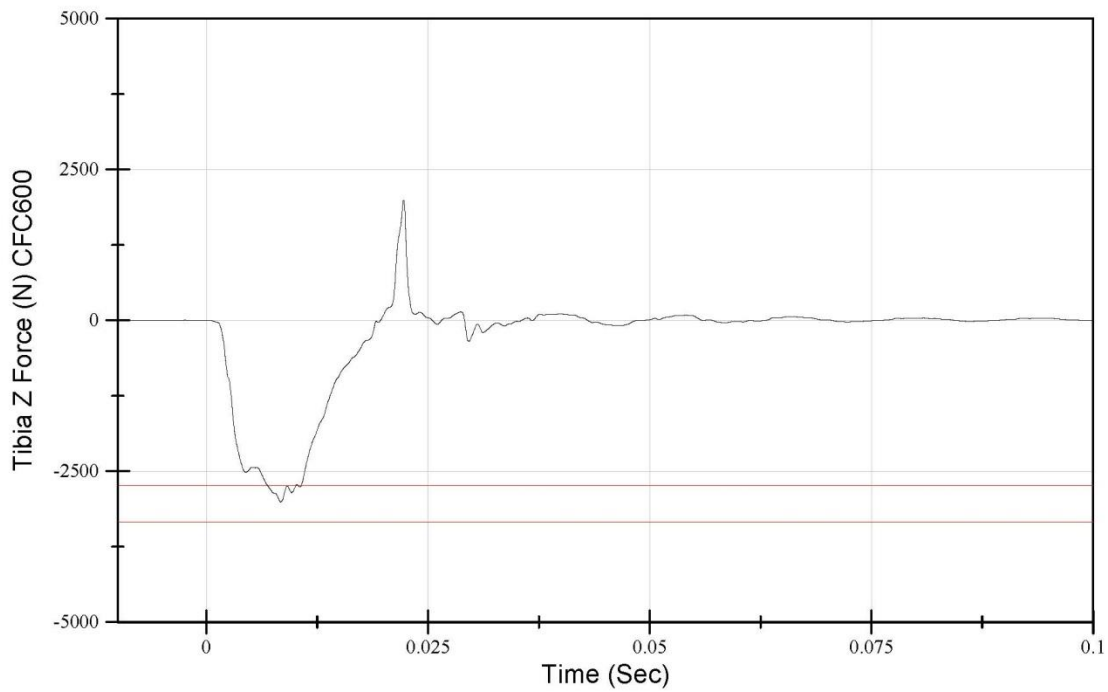


Software Version: 2.4

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Test Velocity: 4.03 m/s

THOR Left Foot Heel Certification
Tibia Load
Serial Number: LX0039

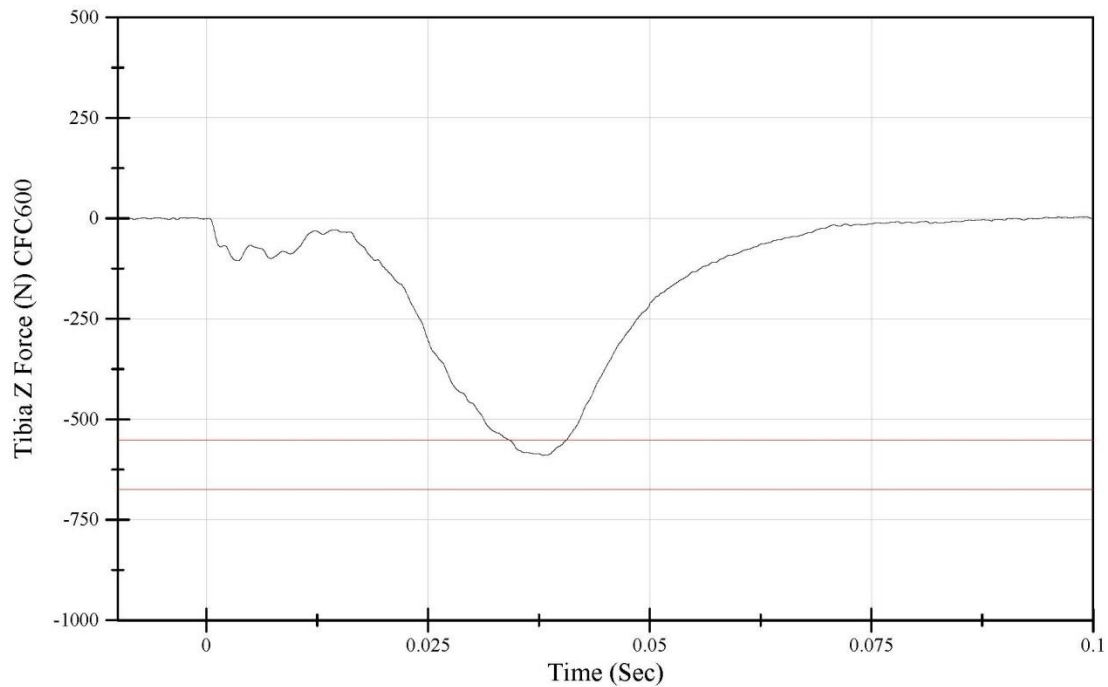


Software Version: 2.4

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Relative Humidity: 3.4%
Test Velocity: 2 m/s

THOR Left Foot Inversion Certification
Tibia Load
Serial Number: LX0039

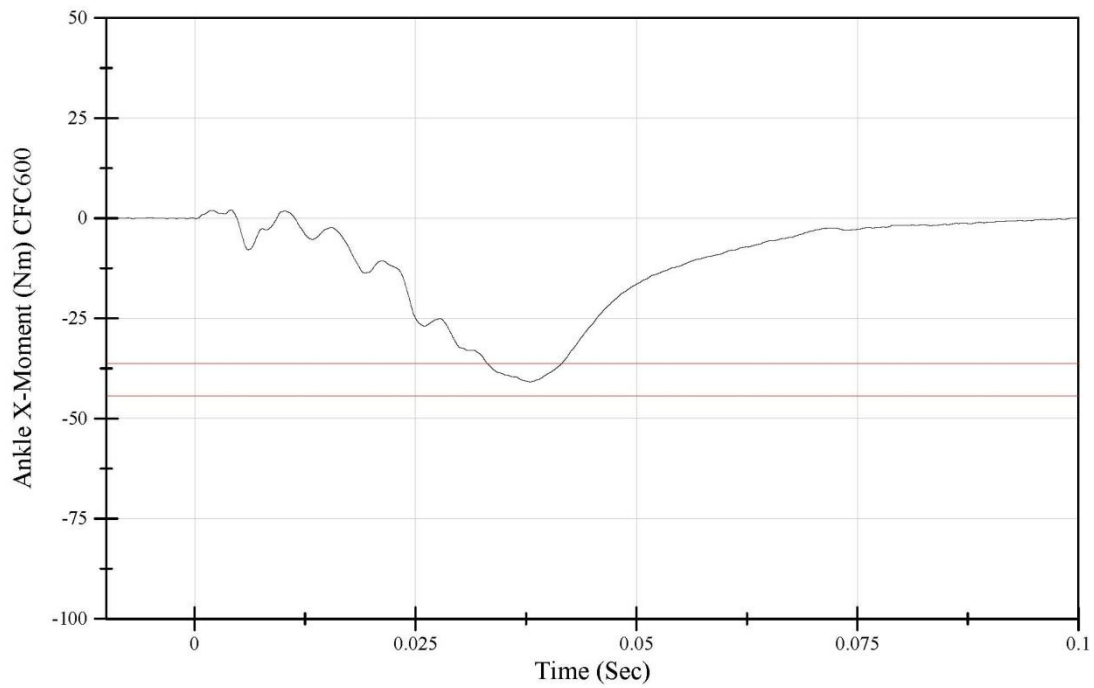


Software Version: 2.4

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04/22/2014 14:28:41.0000

Test Temperature: 71.2 degrees
Relative Humidity: 3.4%
Test Velocity: 2 m/s

THOR Left Foot Inversion Certification
Ankle Moment
Serial Number: LX0039

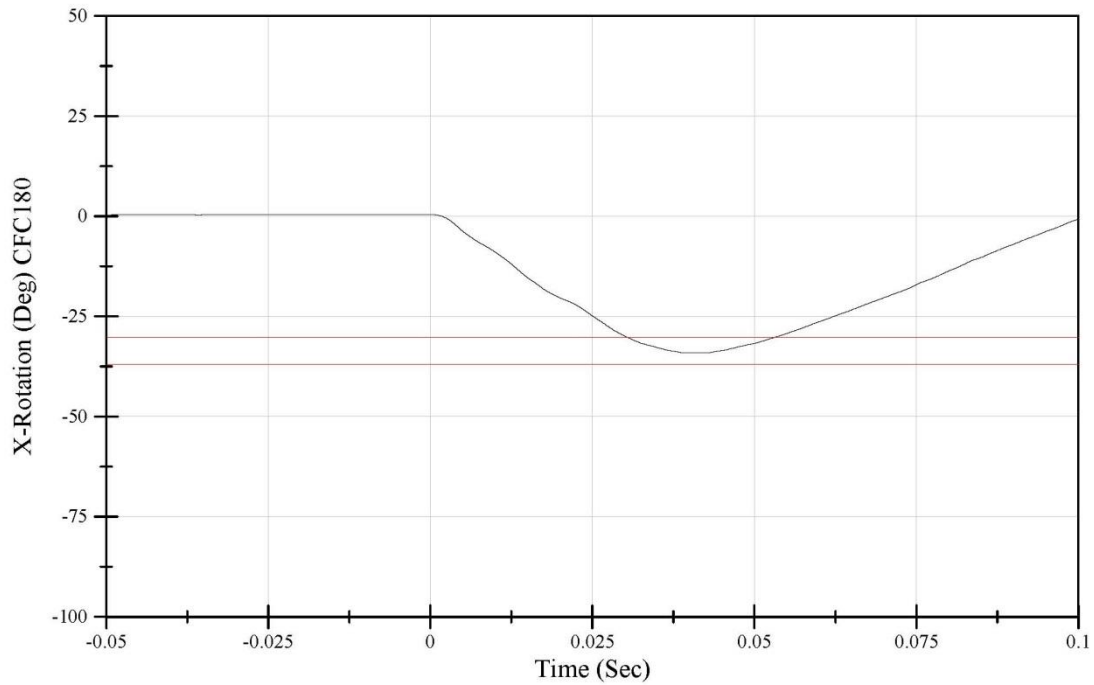


Software Version: 2.4

File Name: LX0039Inversion140422_01_DIADEMHeader_BINARYISOprocessed
04/22/2014 14:28:41.0000

Test Temperature: 71.2 degrees
Relative Humidity: 3.4%
Test Velocity: 2 m/s

THOR Left Foot Inversion Certification
Ankle X-Rotation
Serial Number: LX0039



Software Version: 2.4

File Name: LX0039Inversion140422_01_DIADEMHeader_BINARYISOprocessed
04/22/2014 14:28:41.0000

APPENDIX D:
CMM MEASUREMENT PROCEDURES

Vehicle Coordinate System

The origin point of the VCS is a point 50 mm forward of the rear window glass or hatchback door onto the roof of the vehicle along the vehicle's lateral centerline. The ground is not used as a reference.

The following procedure was used to create the Vehicle Coordinate System (VCS):

- 1) Place the As Delivered vehicle on a flat surface.
- 2) Measure the width of the vehicle at the rear of the vehicle to establish a first center point.
- 3) Measure the width of the vehicle at the front of the vehicle to establish a second center point.
- 4) Using a vertical laser beam, connect the two points to establish the lateral centerline of the vehicle.
- 5) Establish a point 50 mm from the edge of the rear window glass or rear hatchback door frame at the intersection of the roof onto the roof to establish the VCS origin point.
- 6) Construct a line perpendicular to the lateral centerline of the vehicle from VCS origin point towards the C-pillar. Mark a point along this line that is on the C-pillar at the body crease line between the roof and pillar geometry. This will be reference point #2.
- 7) Construct another perpendicular line in the opposite direction from the lateral centerline of the vehicle that is the same distance from the centerline as reference point #2. This will be reference point #3.
- 8) The VCS origin point is defined as the following:
 - Positive X is from the VCS origin point to the front of the vehicle
 - Positive Y is from the driver side of the vehicle to the passenger side of the vehicle
 - Positive Z is from the VCS origin point of the vehicle to the bottom of the vehicle

Steering Column Reference Point

The Steering Column Reference point is the x, y, and z location of the geometric center of the steering wheel in the VCS.

Brake Pedal Reference Point

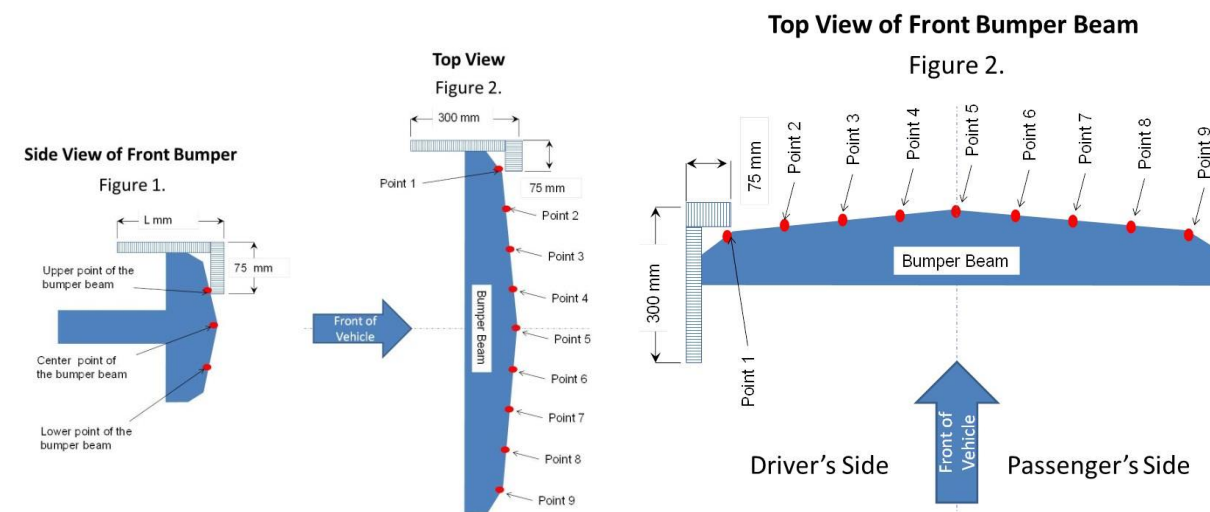
The Brake Pedal Reference Point is the x, y, and z location of the geometric center of the brake pedal pad (top surface) in the VCS.

Floor Reference Point

The Floor Reference Point is the x, y, and z location of the floor in the VCS. Use the following procedure to determine the Floor Reference Point:

1. If the vehicle has an accelerator pedal with fore-aft adjustment, adjust the pedal to its forward most position
2. Locate the centerline of the top surface of the bottom of the accelerator pedal (CLAP)
3. Remove floor mats
4. Project a vertical line down from the CLAP point until contact is made to the floor. This point is the Floor Reference Point

Pre and Post Bumper Beam and Radiator Support Measurement



Find the vertical center of the bumper beam using the following procedure (Reference Figure 1).

- 1) Position a square above the bumper beam at the centerline of the vehicle such that the plane of the square is aligned with the longitudinal axis of the vehicle and the "L mm" part of the square is parallel to the ground.
- 2) Move the square toward the ground until it contacts the bumper beam.
- 3) Move the square toward the rear of the vehicle until it contacts the bumper beam. The point where the 75 mm part of the square contacts the bumper beam is the Upper point of the bumper beam.
- 4) Perform the same procedure for the lower part of the bumper beam. The point where the 75 mm part of the square contacts the bumper beam is the Lower point of the bumper beam.
- 5) The center point of the bumper beam is half the distance between the Upper and Lower points of the bumper beam.
- 6) Transpose the lateral center of the bumper beam up onto the top of the upper radiator support.
- 7) Mark the center of the upper radiator support along its forward leading edge. If the radiator support is not flat this mark is made along the top edge.
- 8) Mark enough points along this edge to define its profile.

Pre and Post Driver Left Lower Instrument Panel

The left lower instrument panel (knee bolster) lateral coordinates are defined by adding 15 cm from the steering column reference lateral coordinate, respectively. The vertical coordinate is defined as 45 cm above the height of the floor reference point. If the panel or knee bolster loosens or breaks away in the crash, the post-crash measurements are taken by pressing and holding the panel against the underlying structure.

Create a floor vehicle coordinate system on the floor at the location of this measurement.

Pre and Post Driver Right Lower Instrument Panel

The left lower instrument panel (knee bolster) lateral coordinates are defined by subtracting 15 cm from the steering column reference lateral coordinate, respectively. The vertical coordinate is defined as 45 cm above the height of the floor reference point. If the panel or knee bolster loosens or breaks away in the crash, the post-crash measurements are taken by pressing and holding the panel against the underlying structure.

Pre and Post Brake Pedal (Figure 22)

If the brake pedal is constructed so that it dangles loosely after the crash, the brake pedal is pushed straight forward against the toepan/floor pan and held there to take the post-crash measurement. If the pedal drops away entirely, no post-crash measurement is taken.

Pre and Post Driver Toe pan and Floor Board (Figure 22)

DRIVER POINT A1

The vertical coordinate for the A1 measurement location is the vertical of the brake pedal reference. The lateral coordinate of the A1 is obtained by subtracting 25 cm from the brake pedal reference lateral coordinate.

DRIVER POINT B1

The vertical coordinate for the B1 location is the vertical coordinate of the brake pedal reference. The lateral coordinate of the B1 is obtained by subtracting 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT C1

The vertical coordinate for the C1 location is the vertical coordinate of the brake pedal reference. The lateral coordinate of the C1 is obtained by subtracting 0 cm from the brake pedal reference lateral coordinate.

DRIVER POINT D1

The vertical coordinate for the D1 location is the vertical coordinate of the brake pedal reference. The lateral coordinate of the D1 is obtained by adding 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT A2

The vertical coordinate of the A2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference and the vertical coordinate of the floor reference. The lateral coordinate of the A2 is obtained by subtracting 25 cm from the brake pedal reference lateral coordinate.

DRIVER POINT B2

The vertical coordinate of the B2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference the vertical coordinate of the floor reference. The lateral coordinate of the B2 is obtained by subtracting 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT C2

The vertical coordinate of the C2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference and the vertical coordinate of the floor reference. The lateral coordinate of the C2 is obtained by subtracting 0 cm from the brake pedal reference lateral coordinate.

DRIVER POINT D2

The vertical coordinate of the D2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference and the vertical coordinate of the floor reference. The lateral coordinate of the D2 is obtained by adding 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT A3

The vertical coordinate of the A3 measurement location is obtained by subtracting 1 cm from the floor reference. The lateral coordinate of the A3 is obtained by subtracting 25 cm from the brake pedal reference lateral coordinate.

DRIVER POINT B3

The vertical coordinate of the B3 measurement location is obtained by subtracting 1 cm from the floor reference. The lateral coordinate of the B3 is obtained by subtracting 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT C3

The vertical coordinate of the C3 measurement location is obtained by subtracting 1 cm from the floor reference. The lateral coordinate of the C3 is obtained by subtracting 0 cm from the brake pedal reference lateral coordinate.

DRIVER POINT D3

The vertical coordinate of the D3 measurement location is obtained by subtracting 1 cm from the floor reference. The lateral coordinate of the D3 is obtained by adding 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT A4

The longitudinal coordinate of the A4 measurement location is obtained by subtracting 10 cm from the D3 reference. The lateral coordinate of the A4 is obtained by subtracting 25 cm from the brake pedal reference lateral coordinate.

DRIVER POINT B4

The longitudinal coordinate of the B4 measurement location is obtained by subtracting 10 cm from the D3 reference. The lateral coordinate of the B4 is obtained by subtracting 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT C4

The longitudinal coordinate of the C4 measurement location is obtained by subtracting 10 cm from the D3 reference. The lateral coordinate of the C4 is obtained by subtracting 0 cm from the brake pedal reference lateral coordinate.

DRIVER POINT D4

The longitudinal coordinate of the D4 measurement location is obtained by subtracting 10 cm from the D3 reference. The lateral coordinate of the D4 is obtained by adding 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT A5

The longitudinal coordinate of the A5 measurement location is obtained by subtracting 10 cm from the A4 reference. The lateral coordinate of the A5 is obtained by subtracting 25 cm from the brake pedal reference lateral coordinate.

DRIVER POINT B5

The longitudinal coordinate of the B5 measurement location is obtained by subtracting 10 cm from the B4 reference. The lateral coordinate of the B5 is obtained by subtracting 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT C5

The longitudinal coordinate of the C5 measurement location is obtained by subtracting 10 cm from the C4 reference. The lateral coordinate of the C5 is obtained by subtracting 0 cm from the brake pedal reference lateral coordinate.

DRIVER POINT D5

The longitudinal coordinate of the D5 measurement location is obtained by subtracting 10 cm from the D4 reference. The lateral coordinate of the D5 is obtained by adding 15 cm from the brake pedal reference lateral coordinate.

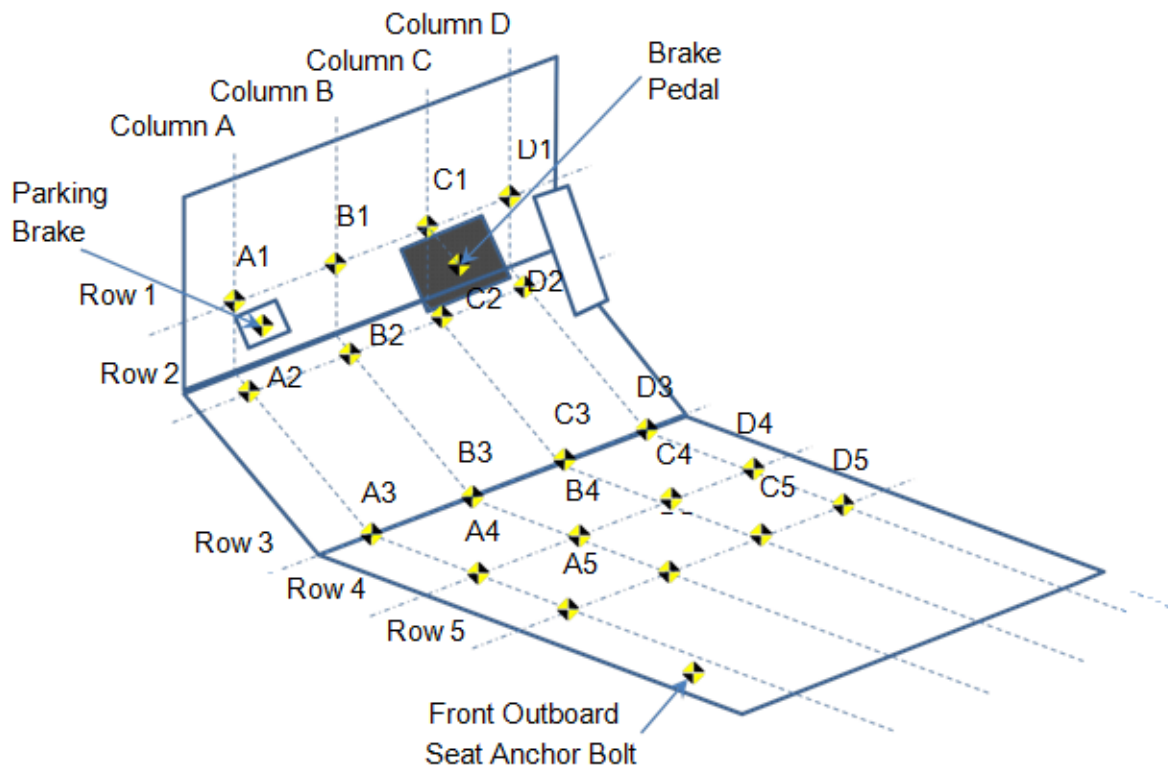
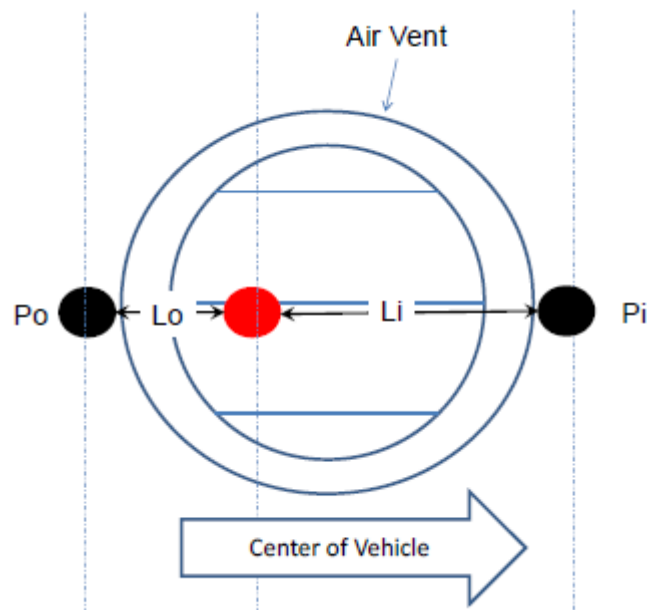


Figure 22: Lower interior intrusion measurements

Driver Upper Dash

The upper dash point is obtained by subtracting 25 cm from the lateral coordinate of the steering column reference lateral coordinate. This defines a line of points on the edge of the upper dash. The upper dash point is located on the rearward most (toward the rear of the vehicle) point on this line. This point must be located at least 30 cm above the brake pedal reference point to ensure a vertical location high enough to represent a location that could be contacted by the driver's upper body or head. If the rearward most point is less than 30 cm above the brake pedal reference point, the upper dash point is located at this 30 cm reference location.

There may be instances when the upper dash point is located on a “soft component” such as an air vent or control knob (Figure 23). To measure a more robust structure, the upper dash point is replaced with two additional points, and the weighted average of their coordinates is used to represent the deformation of a point at the original location (Equation 1). Each new point is determined by moving inboard/outboard to a location that is just off of the soft component.



$$dp = \frac{L_i}{L_o + L_i} [X_o, Y_o, Z_o] + \frac{L_o}{L_o + L_i} [X_i, Y_i, Z_i]$$

Figure 23: Equation for Measuring Soft Component Driver Upper Dash Point

Passenger Left Lower Instrument Panel

The left lower instrument panel (knee bolster) lateral coordinates are defined by adding 15 cm from the center passenger seat reference lateral coordinate, respectively. The vertical coordinate is defined as 45 cm above the height of the floor (without floor mats). If the panel or knee bolster loosens or breaks away in the crash, the post-crash measurements are taken by pressing and holding the panel against the underlying structure.

Create a floor vehicle coordinate system on the floor at the location of this measurement.

Passenger Right Lower Instrument Panel

The left lower instrument panel (knee bolster) lateral coordinates are defined by subtracting 15 cm from the center passenger seat reference lateral coordinate, respectively. The vertical coordinate is defined as 45 cm above the height of the floor (without floor mats). If the panel or knee bolster loosens or breaks away in the crash, the post-crash measurements are taken by pressing and holding the panel against the underlying structure.

Passenger Toe pan and Floor Board (Figure 24)

PASSENGER POINT A1

The vertical coordinate for the A1 measurement location is the vertical coordinate of the brake pedal reference. The lateral coordinate of the A1 is obtained by subtracting 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT B1

The vertical coordinate for the B1 location is the vertical coordinate of the brake pedal reference. The lateral coordinate of the B1 is obtained by subtracting 0 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT C1

The vertical coordinate for the C1 location is the vertical coordinate of the brake pedal reference. The lateral coordinate of the C1 is obtained by adding 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT D1

The vertical coordinate for the D1 location is the vertical coordinate of the brake pedal reference. The lateral coordinate of the D1 is obtained by adding 25 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT A2

The vertical coordinate of the A2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference and the vertical coordinate of the floor reference. The lateral coordinate of the A2 is obtained by subtracting 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT B2

The vertical coordinate of the B2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference the vertical coordinate of the floor reference. The lateral coordinate of the B2 is obtained by subtracting 0 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT C2

The vertical coordinate of the C2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference and the vertical coordinate of the floor reference. The lateral coordinate of the C2 is obtained by adding 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT D2

The vertical coordinate of the C2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference and the vertical coordinate of the floor reference. The lateral coordinate of the D2 is obtained by adding 25 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT A3

The vertical coordinate of the A3 measurement location is obtained by subtracting 1 cm from the driver's floor reference. The lateral coordinate of the A3 is obtained by subtracting 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT B3

The vertical coordinate of the B3 measurement location is obtained by subtracting 1 cm from the driver's floor reference. The lateral coordinate of the B3 is obtained by subtracting 0 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT C3

The vertical coordinate of the C3 measurement location is obtained by subtracting 1 cm from the driver's floor reference. The lateral coordinate of the C3 is obtained by adding 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT D3

The vertical coordinate of the D3 measurement location is obtained by subtracting 1 cm from the driver's floor reference. The lateral coordinate of the D3 is obtained by adding 25 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT A4

The longitudinal coordinate of the A4 measurement location is obtained by subtracting 10 cm from the A3 reference. The lateral coordinate of the A4 is obtained by subtracting 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT B4

The longitudinal coordinate of the B4 measurement location is obtained by subtracting 10 cm from the A3 reference. The lateral coordinate of the B4 is obtained by subtracting 0 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT C4

The longitudinal coordinate of the C4 measurement location is obtained by subtracting 10 cm from the A3 reference. The lateral coordinate of the C4 is obtained by adding 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT D4

The longitudinal coordinate of the D4 measurement location is obtained by subtracting 10 cm from the A3 reference. The lateral coordinate of the D4 is obtained by adding 25 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT A5

The longitudinal coordinate of the A5 measurement location is obtained by subtracting 10 cm from the A4 reference. The lateral coordinate of the A5 is obtained by subtracting 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT B5

The longitudinal coordinate of the B5 measurement location is obtained by subtracting 10 cm from the B4 reference. The lateral coordinate of the B5 is obtained by subtracting 0 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT C5

The longitudinal coordinate of the C5 measurement location is obtained by subtracting 10 cm from the C4 reference. The lateral coordinate of the C5 is obtained by adding 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT D5

The longitudinal coordinate of the D5 measurement location is obtained by subtracting 10 cm from the D4 reference. The lateral coordinate of the D5 is obtained by adding 25 cm from the center passenger seat reference lateral coordinate.

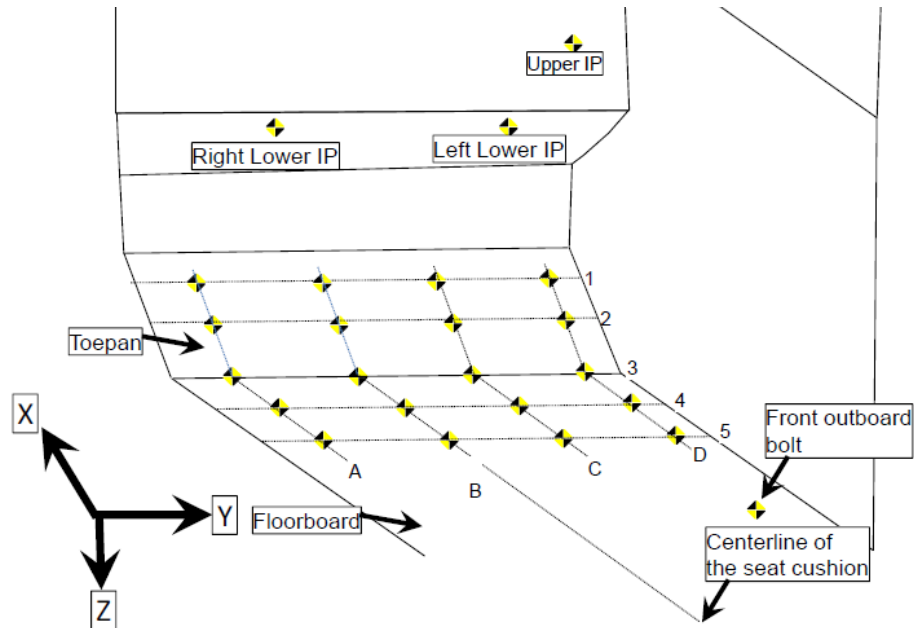


Figure 24: Passenger side lower interior measurements

Passenger Upper Dash

The upper dash point is obtained by adding 25 cm from the lateral coordinate of the center passenger seat reference lateral coordinate. This defines a line of points on the edge of the upper dash. The upper dash point is located on the rearward most (toward the rear of the vehicle) point on this line. This point must be located at least 30 cm above the brake pedal reference point to ensure a vertical location high enough to represent a location that could be contacted by the driver's upper body or head. If the rearward most point is less than 30 cm above the brake pedal reference point, the upper dash point is located at this 30 cm reference location.

There may be instances when the upper dash point is located on a "soft component" such as an air vent or control knob (Figure 23). To measure a more robust structure, the upper dash point is replaced with two additional points, and the weighted average of their coordinates is used to represent the deformation of a point at the original location (Equation 1). Each new point is determined by moving inboard/outboard to a location that is just off of the soft component.

Driver Door Measurements (Figure 25)

Mark the following points on the inner most surface of the door opening, typically on the pinch weld.

- 1) **Point 1:** The vertical coordinates of this point is obtained by subtracting 0 cm from the brake pedal reference point.
- 2) **Point 2:** The vertical coordinates of this point is obtained by subtracting 7.5 cm from the brake pedal reference point.
- 3) **Point 3:** The vertical coordinates of this point is obtained by subtracting 15 cm from the brake pedal reference point
- 4) **Point 4:** The vertical coordinates of this point is obtained by subtracting 45 cm from the brake pedal reference point.
- 5) **Point 5:** The vertical coordinates of this point is obtained by subtracting 52.5 cm from the brake pedal reference point).
- 6) **Point 6:** The vertical coordinates of this point is obtained by subtracting 60 cm from the brake pedal reference point
- 7) **Point 7:** The longitudinal coordinates of this point is obtained by subtracting 20 cm from the brake pedal reference point. If the 20 cm point is forward of the actual door frame, this point is located 5 cm rearward of lower hinge pillar point.
- 8) **Point 8:** The longitudinal coordinates of this point is obtained by subtracting 35 cm from the brake pedal reference point.
- 9) **Point 9:** The longitudinal coordinates of this point is obtained by subtracting 50 cm from the brake pedal reference point.
- 10) **Point 10 and 11:** Mark 2 evenly spaced points between points 1 and 7
- 11) **Point 12 and 13:** Mark 2 evenly spaced points between points 3 and 4
- 12) **Point 26:** Mark a point at the intersection of the roof rail and the start of the B-pillar
- 13) **Points 14-25:** Mark 12 evenly spaced points between points 6 and 26
- 14) **Point 32:** Mark a point at the intersection of the lower sill and the start of the B-pillar
- 15) **Points 27-31:** Mark 5 evenly spaced points between points 9 and 32
- 16) **Point 33:** Subtract 150mm from the vertical coordinate of the brake pedal reference point
- 17) **Point 34:** Subtract 0mm from the vertical coordinate of the brake pedal reference point

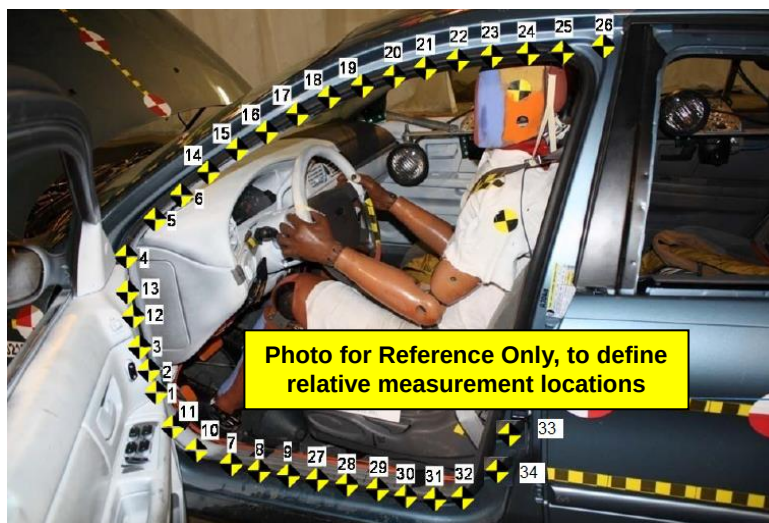


Figure 25: Driver Door Measurements

Passenger Door Measurements

Perform the same procedure as the driver door on the passenger side.

Pre-Test Exterior Profile

- 1) Expose the front bumper beam.
- 2) At the lateral center of the bumper beam, measure and mark the center of the front bumper beam (along front face of beam).
- 3) Using this Z coordinate, mark and measure enough points around the complete circumference of the vehicle to establish cross section A-A.
- 4) Transpose the lateral center of the bumper beam up onto the top of the upper radiator support.
- 5) Mark the center of the upper radiator support along its forward leading edge.
- 6) Using this Z coordinate, mark and measure enough points around the complete circumference of the vehicle to establish cross section B-B.

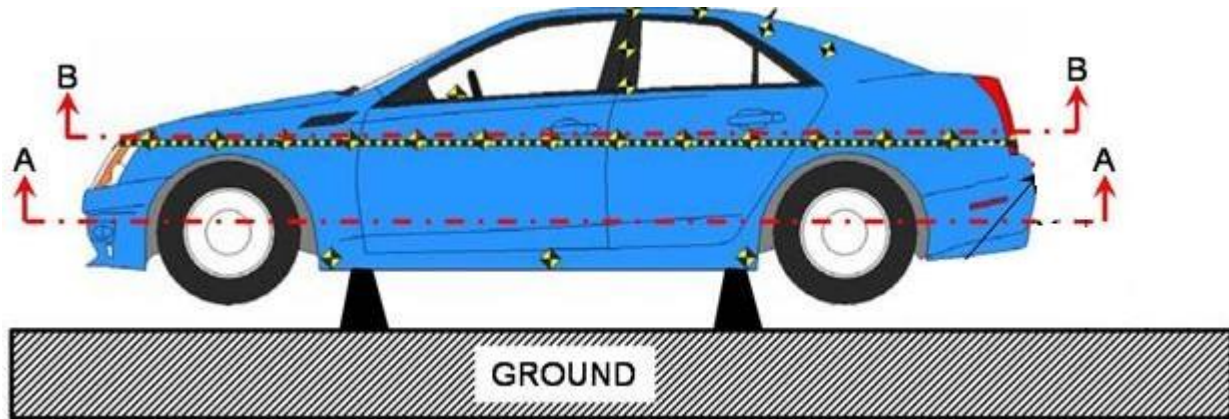


Figure 26: Pre-Test Vehicle Profile

Post-Test Exterior Profile

- 1) Remove bumper cover
- 2) Using the vehicle's origin reference point leap into vehicle's coordinate system.
- 3) Using the pre-Test z-value at section A-A which was recorded from VCS origin, take measurements at this z-distance around the circumference of the vehicle.
- 4) Using the pre-Test z-value at section B-B that was recorded from VCS origin, take measurements at this z-distance around the circumference of the vehicle.

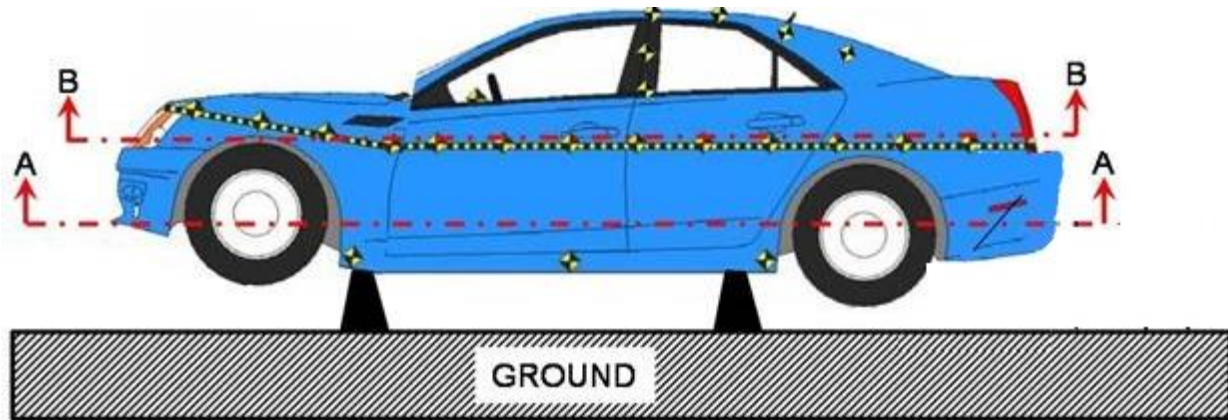
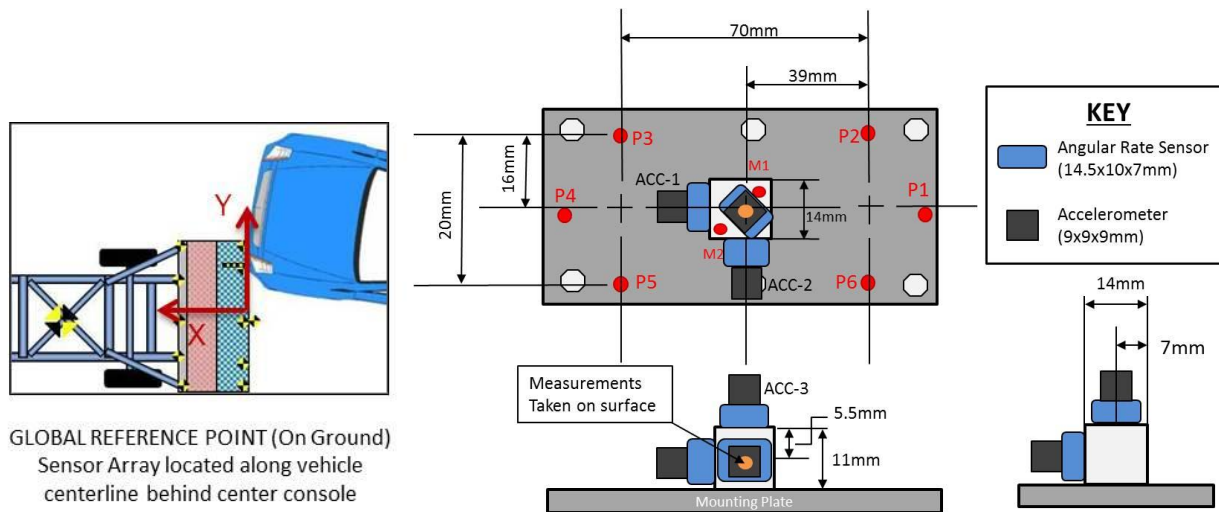


Figure 27: Post-Test Vehicle Profile

Pre and Post Honeycomb Requirements

The contractor shall take pre-and post-crush measurements of the honeycomb while attached to the barrier. These measurements shall be documented in the appropriate datasheet. Also, the contractor shall take pre-and post-Test pictures of the left and right side, top, and front view of the honeycomb while attached to the barrier.

Angular Rate Sensor Mounting & Dimensions:



- 1) Make sure the vehicle is in the **LVC** condition by placing jacks under each jack point and leveling the sill as previously described.
- 2) The ARS sensors and vehicle CG accelerometers were installed directly behind the center console on the floor board using the above pictured mounting block.
- 3) The block was mounted at the longitudinal centerline such that the x, y, and z axis of the block align with the vehicle coordinate system.
 - a. P1 and P4 were placed along the lateral centerline of the vehicle
 - b. P4 is mounted toward the front of the vehicle
 - c. The mounting plate is parallel to the horizontal plan of the vehicle coordinate system

Note: the block shall not move relative to the vehicle during the test

- 4) CMM each position alignment point (P1-P6) while the vehicle is level.
- 5) CMM the middle of the top surface of each direction of the CG accelerometer while the vehicle is level. (ie. Accelerometer CGx will be taken on the surface in the x-direction)
- 6) Transport the vehicle to test area and align with the RMDB barrier
- 7) Once vehicle is aligned with the barrier and all dummies are positioned, create a global coordinate system on the ground (GCS). The origin of the GCS is located at the front most point at the centerline of the RMDB.
 - Positive X is from the GCS origin point to the rear of RMDB
 - Positive Y is from the center of RMDB towards the left of RMDB when looking from the back of the RMDB
 - Positive Z is from the GCS origin point downward into the ground
- 8) Measure and record all points described above