

REPORT NUMBER: R&D-CAL-14-001

**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 3

90.1KPH, 15 DEGREE ANGLE, 35% OVERLAP

TEST DATE: 06/20/2014

NHTSA No: C20145400

**CALSPAN CORPORATION
TRANSPORTATION TEST OPERATIONS
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FINAL REPORT SUBMITTED:

October 29, 2014

PREPARED FOR:

**U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Vehicle safety Research
1200 New Jersey Ave, SE
Room W46-446
Washington, DC 20590**

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Date: October 29, 2014

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Transportation Test Operations

Date: October 29, 2014

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

Date: _____

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

Date: _____

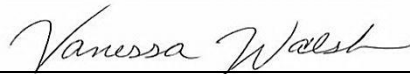
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15. Supplementary Notes																																																								
16. Abstract A test was conducted in accordance with Task Order 0002 of Contract DTNH22-10-D-00155. The Test consisted of a Research Moving Deformable Barrier (RMDB) traveling at a target speed of 90.12 kph into a stationary 2014 Mazda3 four door sedan. The struck vehicle was positioned 15 degrees relative to the moving barrier and impacted 35% of the left side of the vehicle. The test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The test was conducted at the Calspan Corporation's Transportation Test Operation's facility in Buffalo, New York on June 20, 2014. The RMDB impact velocity was 89.84 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 598 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>267.48</td> <td>700</td> <td>805.52</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-40.65</td> <td>63</td> <td>-37.99</td> </tr> <tr> <td>Neck Injury Criteria (Nij)</td> <td>N/A</td> <td>1</td> <td>0.30</td> <td>1</td> <td>0.31</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4,170</td> <td>1885.97</td> <td>4,170</td> <td>1655.06</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4,000</td> <td>-284.20</td> <td>4,000</td> <td>-776.69</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10,008</td> <td>-2401.16</td> <td>10,008</td> <td>-5487.16</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10,008</td> <td>-2077.83</td> <td>10,008</td> <td>-1877.54</td> </tr> </tbody> </table>					Measurement Description	Units	Driver ATD		Pass. ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)	N/A	700	267.48	700	805.52	Maximum Chest Compression	mm	63	-40.65	63	-37.99	Neck Injury Criteria (Nij)	N/A	1	0.30	1	0.31	Neck Tension	N	4,170	1885.97	4,170	1655.06	Neck Compression	N	4,000	-284.20	4,000	-776.69	Left Femur Force	N	10,008	-2401.16	10,008	-5487.16	Right Femur Force	N	10,008	-2077.83	10,008	-1877.54
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DISCLAIMER

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

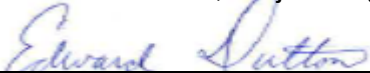
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Date: October 29, 2014

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SECTION 1
PURPOSE OF TEST

Test Vehicle: 2014 Mazda3 four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
Test Date: 6/20/2014

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.

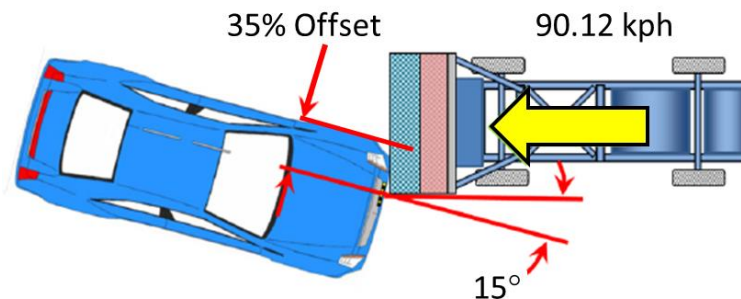
This test was conducted in accordance with the instructions set forth for a 15° angle, 35% offset moving barrier to vehicle impact, outlined in Contract No. DTNH22-10-D-00155, TO 0002. Data was obtained indicant of Federal Motor Vehicle Safety Standard FMVSS 208-Occupant Crash Protection, FMVSS 212 – 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 Mazda3 four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
Test Date: 6/20/2014

A 2014 Mazda3 four door sedan 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 1,587.5 kg (3,499.8 lbs), and the RMDB's mass was 2490.2 kg (5490 lbs). The test was conducted by Calspan Corporation on June 20, 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 airbag. 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 Mazda3 four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
Test Date: 6/20/2014

Two hundred and thirty eight (238) 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 84.3% total windshield retention, with 78% and 90.5% retention on the left and right sides, respectively. There appeared to be no intrusion into the protected zone of the windshield during any portion of the impact event. The maximum static crush of the vehicle was 598 mm at C1 to the left of the vehicle's centerline. The maximum crush of the structural bumper beam was 502 mm at B2, to the left of the vehicle's centerline. Full vehicle measurements are presented in Section 3 of this report.

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

Structure observations include the following:

- Windshield had cracks throughout with 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 airbags.
- Torso contacted the frontal airbag, torso airbag, and driver's shoulder/arm contacted the side door
- Knee contacted the knee bolster and outside leg contacted the driver's door.

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

- Head contacted the frontal airbag, interior target bar, visor, and B-Pillar.
- Torso contacted the frontal airbag, and left shoulder contacted the center instrument panel and the right shoulder contacted the passenger door.
- Knees contacted the glove box.

SECTION 2 (CONTINUED) CRASH VEHICLE SUMMARY

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

Primary Impact Data

Measured Parameter	Units	Value
RMDB Velocity at Impact	kph	89.84
RMDB Test Weight	kg	2490.2
RMDB Maximum Static Crush	mm	305
Vehicle Test Weight	kg	1587.5
Actual Vehicle Angle	degrees	15
Vehicle Maximum Static Crush	mm	598
Vertical Offset from Target Point (+ down / - up)*	mm	-16
Lateral Offset from Target Point (+ left / - right)*	mm	+19
Number of Data Channels		238
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: 015		THOR, S/N: 016	
Head Contact	Front & Curtain Airbags	A49-A51	Front Airbag, Interior Target Bar, Visor, B-Pillar	A70-A72
Left Shoulder Contact	Driver's Door	N/A	Center Instrument Panel	N/A
Upper Torso Contact	Front & Torso Airbags	N/A	Frontal 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	Driver's Door	N/A	None	N/A
Right Knee Contact	Knee Bolster	A28	Glove Box	A52

Data Anamolies:

- Driver's Abdomen Right DGIR Y Rotation, has questionable Spikes from 177 to 217ms
- Driver's Femur Right Y Moment, has questionable Spikes Throughout

SECTION 2 (CONTINUED)
PRELIMINARY INJURY SUMMARY: Driver

Test Vehicle: 2014 Mazda 3 NHTSA No.: R20145400
Test Program: Research and Development Left Oblique Offset Test Date: 6/20/2014

Driver: Thor Serial No. 015 Injury Summary

	Nomenclature	Units	Source	Max	Min
Head	Head CG X	g	1000	4.35	-41.53
	Head CG Y	g	1000	39.21	-9.75
	Head CG Z	g	1000	44.37	-1.47
	Head Resultant	g	Compute	54.39	
	36 ms HIC		Compute	469.32	
	15 ms HIC		Compute	267.48	
	Head Resultant CG Acceleration, 3 ms Clip	g	Compute	52.34	
	Head Rotational Velocity X	deg/s	60	1348.47	-1681.59
	Head Rotational Velocity Y	deg/s	60	943.62	-1949.60
	Head Rotational Velocity Z	deg/s	60	916.26	-2273.64
	Head Rotational Velocity Resultant	deg/s	Compute	2419.89	
	Brain Injury Criteria		Compute	1.19	
Neck	UNLC Transferred to OC, Neck System, FX	N	1000	119.59	-886.74
	UNLC Neck System Tension, FZ	N	1000	1885.97	
	UNLC Neck System Compression, FZ	N	1000		-284.20
	UNLC Transferred to OC, Neck System Flexion, MY	N-m	Thortest	5.24	
	UNLC Transferred to OC, Neck System Extension, MY	N-m	Thortest		-21.49
	NIJ		Compute	0.30	
	On head acting through total neck section, FX	N	Thortest	159.92	-853.64
	On head acting through total neck section, FY	N	Thortest	319.62	-331.24
	On head acting through total neck section, FZ	N	Thortest	2116.70	-36.47
	On head acting through total neck section, MX	N-m	Thortest	43.55	-17.41
	On head acting through total neck section, MY	N-m	Thortest	26.14	-18.16
	On head acting through total neck section, MZ	N-m	Thortest	28.40	-15.97
	On head acting through O.C. joint only, FX	N	Thortest	169.42	-987.31
	On head acting through O.C. joint only, FZ	N	Thortest	1881.58	-257.17
	On head acting through O.C. joint only, MY	N-m	Thortest	5.24	-21.49
Chest	Upper Left IR-TRACC X - deflection	mm	Thortest	0.22	-20.72
	Upper Left IR-TRACC Y - deflection	mm	Thortest	4.97	-5.99
	Upper Left IR-TRACC Z - deflection	mm	Thortest	14.01	-13.18
	Upper Left IR-TRACC D - deflection	mm	Thortest	0.98	-19.57
	Upper Right IR-TRACC X - deflection	mm	Thortest	0.55	-42.44
	Upper Right IR-TRACC Y - deflection	mm	Thortest	6.85	-4.82
	Upper Right IR-TRACC Z - deflection	mm	Thortest	22.84	-10.72
	Upper Right IR-TRACC D - deflection	mm	Thortest	0.50	-40.55
	Lower Left IR-TRACC X - deflection	mm	Thortest	7.00	-1.33
	Lower Left IR-TRACC Y - deflection	mm	Thortest	3.93	-7.35

PRELIMINARY INJURY SUMMARY: Driver

Test Vehicle: 2014 Mazda 3 NHTSA No.: R20145400
 Test Program: Research and Development Left Oblique Offset Test Date: 6/20/2014

Driver: Thor Serial No. 015 Injury Summary

	Nomenclature	Units	Source	Max	Min
Chest (Con't)	Lower Left IR-TRACC Z - deflection	mm	Thortest	14.40	-0.18
	Lower Left IR-TRACC D - deflection	mm	Thortest	4.75	-3.44
	Lower Right IR-TRACC X - deflection	mm	Thortest	0.00	-40.94
	Lower Right IR-TRACC Y - deflection	mm	Thortest	1.07	-17.39
	Lower Right IR-TRACC Z - deflection	mm	Thortest	16.49	-1.54
	Lower Right IR-TRACC D - deflection	mm	Thortest	0.01	-40.65
	Chest CG Acceleration, 3 ms clip	g	Compute	N/A	
Abdomen	Lower Left IR-TRACC X - deflection	mm	Thortest	0.01	-44.94
	Lower Left IR-TRACC Y - deflection	mm	Thortest	0.01	-14.33
	Lower Left IR-TRACC Z - deflection	mm	Thortest	21.61	-4.86
	Lower Left IR-TRACC D - deflection	mm	Thortest	0.01	-45.78
	Left Viscous Criterion Based on X - deflection		Compute	1.31	
	Lower Right IR-TRACC X - deflection	mm	Thortest	10.09 ⁽¹⁾	-115.11 ⁽¹⁾
	Lower Right IR-TRACC Y - deflection	mm	Thortest	9.94	-4.95
	Lower Right IR-TRACC Z - deflection	mm	Thortest	152.62 ⁽¹⁾	-0.89 ⁽¹⁾
	Lower Right IR-TRACC D - deflection	mm	Thortest	10.06	-66.50
	Right Viscous Criterion Based on X - deflection		Compute	13.32 ⁽¹⁾	
Spine	Upper Spine (T1) AX	g	180	6.62	-57.48
	Upper Spine (T1) AY	g	180	3.09	-22.91
	Upper Spine (T1) AZ	g	180	15.67	-4.16
	Upper Spine (T1) Resultant	g	Compute	61.89	
	Middle Spine (T6) AX	g	180	4.39	-37.94
	Middle Spine (T6) AY	g	180	25.32	-2.94
	Middle Spine (T6) AZ	g	180	7.17	-16.47
	Middle Spine (T6) Resultant	g	Compute	44.75	
Pelvis	Pelvis CG Resultant Acceleration	g	Compute	56.94	
Acetabulum	Left FX force	N	600	1501.16	-660.59
	Left FY force	N	600	234.34	-670.07
	Left FZ force	N	600	903.60	-562.94
	Left Acetabulum Resultant	N	Compute	1554.78	
	Right FX force	N	600	2393.11	-1276.48
	Right FY force	N	600	270.81	-1609.91
	Right FZ force	N	600	1962.92	-610.25
	Right Acetabulum Resultant	N	Compute	2447.99	
Anomalies					
(1) Questionable spikes from 177 to 217ms					

PRELIMINARY INJURY SUMMARY: Driver Legs

Test Vehicle: 2014 Mazda 3 NHTSA No.: R20145400
 Test Program: Research and Development Left Oblique Offset Test Date: 6/20/2014

Driver: Thor Serial No. 015 Injury Summary

	Nomenclature	Units	Source	Max	Min
Knee	Left Knee Displacement, DX	mm	180	1.93	-7.96
	Right Knee Displacement, DX	mm	180	1.70	-4.97
Femur	Left Femur Force, FZ	N	600	820.62	-2401.16
	Left Femur Moment, MX	N-m	600	23.93	-190.58
	Left Femur Moment, MY	N-m	600	102.15	-88.22
	Left Femur Res (MX / MY only, not MZ)	N-m	Compute	198.63	
	Right Femur Force, FZ	N	600	779.39	-2077.83
	Right Femur Moment, MX	N-m	600	29.27	-190.81
	Right Femur Moment, MY	N-m	600	317.49 ⁽²⁾	-373.06 ⁽²⁾
	Right Femur Res (MX / MY only, not MZ)	N-m	Compute	373.06 ⁽²⁾	
	Left Upper Tibia, FZ	N	600	54.85	-1426.94
	Left Upper Tibia, MY	N-m	600	65.44	-42.22
Tibia	Left Upper Tibia, Index		Compute	0.40	
	Right Upper Tibia, FZ	N	600	504.43	-2585.14
	Right Upper Tibia, MY	N-m	600	91.83	-62.95
	Right Upper Tibia, Index		Compute	0.68	
	Left Lower Tibia, FZ	N	600	159.40	-3646.37
	Left Lower Tibia, MY	N-m	600	47.66	-36.36
	Left Lower Tibia, Index		Compute	0.51	
	Right Lower Tibia, FZ	N	600	551.08	-4116.37
	Right Lower Tibia, MY	N-m	600	49.61	-65.26
	Right Lower Tibia, Index		Compute	0.70	
Ankle	Left Ankle Rotation, RX	Deg	180	6.98	-19.12
	Left Ankle Rotation, RY	Deg	180	28.89	-14.04
	Right Ankle Rotation, RX	Deg	180	21.00	-33.81
	Right Ankle Rotation, RY	Deg	180	17.19	-16.38
Anomalies					
(2) Questionable spikes throughout					

PRELIMINARY INJURY SUMMARY: Right Front Passenger

Test Vehicle: 2014 Mazda 3 NHTSA No.: R20145400
 Test Program: Research and Development Left Oblique Offset Test Date: 6/20/2014

Right Front Passenger: Thor Serial No. 016 Injury Summary

	Nomenclature	Units	Source	Max	Min
Head	Head CG X	g	1000	13.59	-78.26
	Head CG Y	g	1000	80.92	-15.50
	Head CG Z	g	1000	42.28	-2.41
	Head Resultant	g	Compute	108.96	
	36 ms HIC		Compute	805.52	
	15 ms HIC		Compute	805.52	
	Head Resultant CG Acceleration, 3 ms Clip	g	Compute	98.27	
	Head Rotational Velocity X	deg/s	60	801.17	-1649.37
	Head Rotational Velocity Y	deg/s	60	242.24	-1227.54
	Head Rotational Velocity Z	deg/s	60	2367.89	-1116.04
	Head Rotational Velocity Resultant	deg/s	Compute	2679.54	
	Brain Injury Criteria		Compute	1.12	
Neck	UNLC Transferred to OC, Neck System, FX	N	1000	323.39	-234.77
	UNLC Neck System Tension, FZ	N	1000	1655.06	
	UNLC Neck System Compression, FZ	N	1000		-776.69
	UNLC Transferred to OC, Neck System Flexion, MY	N-m	Thortest	8.66	
	UNLC Transferred to OC, Neck System Extension, MY	N-m	Thortest		-12.66
	NIJ		Compute	0.31	
	On head acting through total neck section, FX	N	Thortest	406.40	-438.90
	On head acting through total neck section, FY	N	Thortest	738.15	-52.11
	On head acting through total neck section, FZ	N	Thortest	1939.87	-539.12
	On head acting through total neck section, MX	N-m	Thortest	39.33	-42.55
	On head acting through total neck section, MY	N-m	Thortest	9.68	-31.24
	On head acting through total neck section, MZ	N-m	Thortest	9.43	-28.65
	On head acting through O.C. joint only, FX	N	Thortest	451.03	-370.11
	On head acting through O.C. joint only, FZ	N	Thortest	1616.23	-713.64
	On head acting through O.C. joint only, MY	N-m	Thortest	8.66	-12.66
Chest	Upper Left IR-TRACC X - deflection	mm	Thortest	0.05	-31.18
	Upper Left IR-TRACC Y - deflection	mm	Thortest	3.47	-13.27
	Upper Left IR-TRACC Z - deflection	mm	Thortest	15.24	-12.29
	Upper Left IR-TRACC D - deflection	mm	Thortest	0.05	-32.13
	Upper Right IR-TRACC X - deflection	mm	Thortest	0.04	-18.42
	Upper Right IR-TRACC Y - deflection	mm	Thortest	5.72	-12.13
	Upper Right IR-TRACC Z - deflection	mm	Thortest	8.97	-13.50
	Upper Right IR-TRACC D - deflection	mm	Thortest	0.05	-17.73
	Lower Left IR-TRACC X - deflection	mm	Thortest	0.14	-39.81
	Lower Left IR-TRACC Y - deflection	mm	Thortest	15.25	-0.20

PRELIMINARY INJURY SUMMARY: Right Front Passenger

Test Vehicle: 2014 Mazda 3 NHTSA No.: R20145400
 Test Program: Research and Development Left Oblique Offset Test Date: 6/20/2014

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	4.66	-15.23
	Lower Left IR-TRACC D - deflection	mm	Thortest	0.14	-37.99
	Lower Right IR-TRACC X - deflection	mm	Thortest	3.75	-5.46
	Lower Right IR-TRACC Y - deflection	mm	Thortest	11.65	-7.52
	Lower Right IR-TRACC Z - deflection	mm	Thortest	17.60	-5.60
	Lower Right IR-TRACC D - deflection	mm	Thortest	4.24	-5.09
	Chest CG Acceleration, 3 ms clip	g	Compute	N/A	
Abdomen	Lower Left IR-TRACC X - deflection	mm	Thortest	0.49	-58.81
	Lower Left IR-TRACC Y - deflection	mm	Thortest	3.17	-5.61
	Lower Left IR-TRACC Z - deflection	mm	Thortest	4.42	-5.55
	Lower Left IR-TRACC D - deflection	mm	Thortest	0.49	-58.38
	Left Viscous Criterion Based on X - deflection		Compute	2.14	
	Lower Right IR-TRACC X - deflection	mm	Thortest	0.13	-53.79
	Lower Right IR-TRACC Y - deflection	mm	Thortest	12.22	-0.02
	Lower Right IR-TRACC Z - deflection	mm	Thortest	6.12	-5.85
	Lower Right IR-TRACC D - deflection	mm	Thortest	0.13	-53.49
	Right Viscous Criterion Based on X - deflection		Compute	1.50	
Spine	Upper Spine (T1) AX	g	180	6.10	-33.64
	Upper Spine (T1) AY	g	180	33.42	-4.37
	Upper Spine (T1) AZ	g	180	24.49	-2.47
	Upper Spine (T1) Resultant	g	Compute	48.73	
	Middle Spine (T6) AX	g	180	3.69	-31.35
	Middle Spine (T6) AY	g	180	23.98	-3.01
	Middle Spine (T6) AZ	g	180	14.98	-7.83
	Middle Spine (T6) Resultant	g	Compute	34.14	
Pelvis	Pelvis CG Resultant Acceleration	g	Compute	76.47	
Acetabulum	Left FX force	N	600	2028.21	-2289.77
	Left FY force	N	600	387.85	-860.29
	Left FZ force	N	600	1886.23	-449.79
	Left Acetabulum Resultant	N	Compute	2424.97	
	Right FX force	N	600	2705.26	-776.28
	Right FY force	N	600	580.94	-1241.37
	Right FZ force	N	600	2610.64	-21.25
	Right Acetabulum Resultant	N	Compute	2876.92	
Anomalies None					

PRELIMINARY INJURY SUMMARY: Right Front Passenger Legs

Test Vehicle: 2014 Mazda 3 NHTSA No.: R20145400
 Test Program: Research and Development Left Oblique Offset Test Date: 6/20/2014

Right Front Passenger: Thor Serial No. 016 Injury Summary

	Nomenclature	Units	Source	Max	Min
Knee	Left Knee Displacement, DX	mm	180	1.02	-3.29
	Right Knee Displacement, DX	mm	180	0.93	-1.08
Femur	Left Femur Force, FZ	N	600	393.78	-5487.16
	Left Femur Moment, MX	N-m	600	74.02	-187.84
	Left Femur Moment, MY	N-m	600	113.21	-113.06
	Left Femur Res (MX / MY only, not MZ)	N-m	Compute	201.65	
	Right Femur Force, FZ	N	600	469.46	-1877.54
	Right Femur Moment, MX	N-m	600	48.33	-232.55
	Right Femur Moment, MY	N-m	600	152.85	-58.84
	Right Femur Res (MX / MY only, not MZ)	N-m	Compute	234.03	
Tibia	Left Upper Tibia, FZ	N	600	90.59	-2946.92
	Left Upper Tibia, MY	N-m	600	13.07	-87.17
	Left Upper Tibia, Index		Compute	0.54	
	Right Upper Tibia, FZ	N	600	285.24	-3100.01
	Right Upper Tibia, MY	N-m	600	37.35	-37.48
	Right Upper Tibia, Index		Compute	0.60	
	Left Lower Tibia, FZ	N	600	2.40	-1867.50
	Left Lower Tibia, MY	N-m	600	25.98	-79.23
	Left Lower Tibia, Index		Compute	0.55	
	Right Lower Tibia, FZ	N	600	228.10	-2069.40
	Right Lower Tibia, MY	N-m	600	60.10	-37.63
	Right Lower Tibia, Index		Compute	0.61	
Ankle	Left Ankle Rotation, RX	Deg	180	23.44	-27.38
	Left Ankle Rotation, RY	Deg	180	12.46	-31.05
	Right Ankle Rotation, RX	Deg	180	18.53	-35.68
	Right Ankle Rotation, RY	Deg	180	-5.64	-30.28
Anomalies					
None					

SECTION 3 DATA SHEETS

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

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3	Dummy Longitudinal Clearance Dimensions	3-8
4	Dummy Lateral Clearance Dimensions	3-10
5	Seat Belt Positioning Data	3-11
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DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

VEHICLE INFORMATION

NHTSA No.	R20145400
Model Year	2014
Make	Mazda
Model	Mazda 3
Body Style	Four Door Sedan
VIN	JM1BM1L77E1173303
Body Color	Black
Odometer Reading (km/mi)	86.9 km / 54 mi
Engine Displacement. (L)	2.0
Type/No. Cylinders	I4
Engine Placement	Transvers
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	Front Wheel Drive
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes
All-Wheel Drive (AWD)	No
Traction Control System (TCS)	Yes

VEHICLE OPTIONS

Auto-Leveling System	No
Automatic Door Locks (ADL)	Yes
Power Window Auto-Reverse	No
Other Optional Feature	-
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	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	01/14

GWR (kg)	1815
GAWR Front (kg)	975
GAWR Rear (kg)	848

VEHICLE SEATING AND WEIGHT CAPACITY

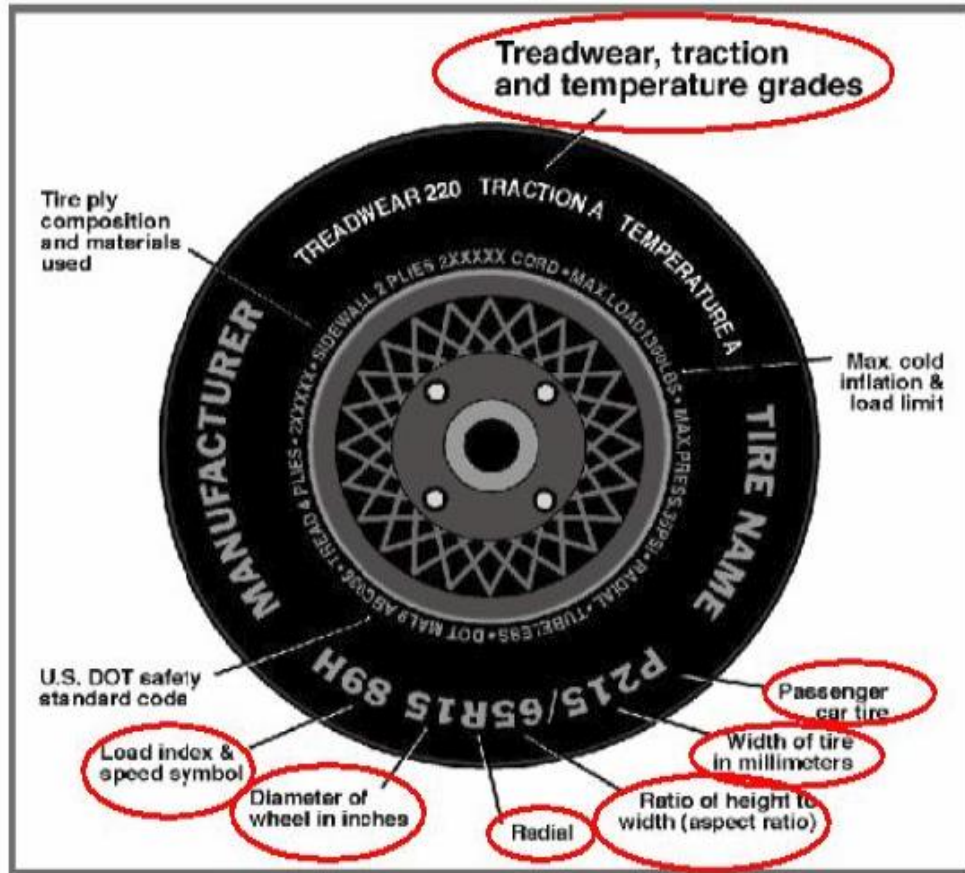
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	--	
Number of Occupants	2	3	--	5
Capacity Wt. (VCW) (kg)				385
Cargo Wt. (RCLW) (kg)				44.8

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

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

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



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	250	250
Recommended Tire Size	P205/60R16	P205/60R16
Tire Size on Vehicle	P205/60R16	P205/60R16
Tire Manufacturer	Yokohama	Yokohama
Tire Model	Avid S34	Avid S34
Treadwear	320	320
Traction	B	B
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel	1 Polyester, 2 Steel
Load Index/Speed Symbol	91H	91H
Tire Material	Rubber	Rubber
DOT Safety Code Right	FD20PHY0114	FD20PHY0114
DOT Safety Code Left	FD20PHY0114	FD20PHY0114

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

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	399	273		448.5	360.5	
Right	kg	394	245		423.5	355	
Ratio	%	60%	40%		55%	45%	
Totals	kg	793	518	1311	872	715.5	1587.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1311.0
Weight of 2 P572E ATDs	kg	197.8
Rated Cargo/Luggage Weight (RCLW)	kg	44.8
Calculated Vehicle Target Weight (TVTW)	kg	1553.6

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	699	702	721	728	1066
As Tested	mm	680	679	677	684	1216
Post Test	mm	750	720	645	722	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2697
Total Vehicle Length at Left Side	mm	4328
Total Vehicle Length at Centerline	mm	4461
Total Vehicle Length at Right Side	mm	4334
Weight of Ballast in Cargo Area	kg	0
Weight of Vehicle Components Removed	kg	44
Amount of Stoddard Solvent in Fuel Tank	L	46.6

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

Trunk carpeting, spare tire, rear seats, and plastic underbody panels.

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

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements		Pre-Test
1	Total Length	mm	4461
2	Total Width	mm	1796
3*	Bumper Top Height	mm	600
4*	Bumper Bottom Height	mm	443
5*	Longitudinal Member Top Height	mm	608
6	Distance Between Longitudinal Members	mm	1034
7	Longitudinal Member Width	mm	50
8*	Engine Top Height	mm	915
9*	Engine Bottom Height	mm	199
10	Engine and Gearbox Width	mm	589
11	Front Bumper-Engine Distance	mm	555
12*	Front Shock Absorber Fixing Height	mm	920
13*	Bonnet Leading Edge Height	mm	810
14	Front Shock Absorber Fixing Width	mm	1133
15	Front Bumper – Front Axle Distance	mm	922
16	Front Axle – A Pillar Distance	mm	536
17	A-Pillar – B-Pillar Distance	mm	1120
18	B-Pillar – Rear Axle Distance	mm	1042
19	B-Pillar – C-Pillar Distance	mm	1003
20*	Roof Sill Bottom Height	mm	1325
21*	Roof Sill Top Height	mm	1432
22*	Floor Sill Bottom Height	mm	255
23*	Floor Sill Top Height	mm	389

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

DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

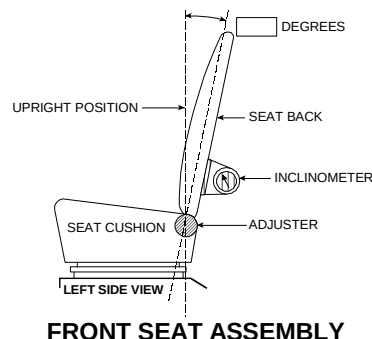
NHTSA No.: R20145400
 Test Date: 6/20/2014

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	+4.7
Passenger Seat Back Angle	+4.4

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.

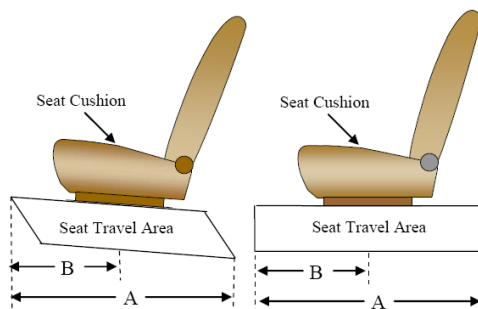
	Total Fore/Aft Travel	Placed in Position #
Driver Seat	27 (0-26)	11
Passenger Seat	27 (0-26)	13

SEAT BELT UPPER ANCHORAGES

Describe the method of positioning seat belt upper anchorages. Belt anchorages were moved along the full range of motion, and marked on the B-Pillar to their respective possible positions.

Photographic evidence can be found in Appendix A of this report. Zero is defined as the upper-most position.

	Total # of Positions	Placed in Position #
Driver Seat	3	0
Passenger Seat	3	0



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

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

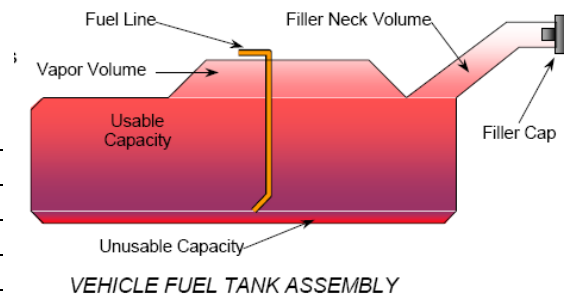
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	50.0
Usable Capacity of "Optional Tank"	
93% of Usable Capacity	46.6
Actual Amount of Solvent Used	46.6
1/3 of Usable Capacity	16.5

FUEL PUMP

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

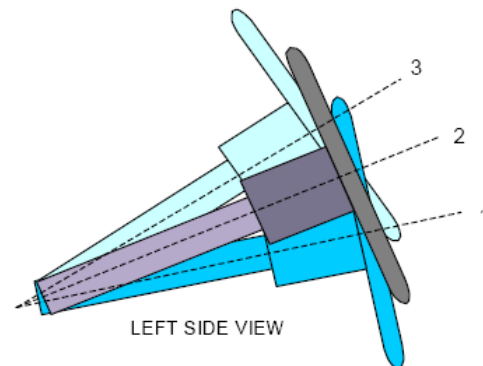
Fuel evacuated according to the specifications provided by the manufacturer in Form 1. Electric fuel pump operates when the ignition is in the 'on' position and the engine is running. The fuel filler neck is located above the left rear wheel.



STEERING COLUMN ADJUSTMENT

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

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



STEERING COLUMN ASSEMBLY

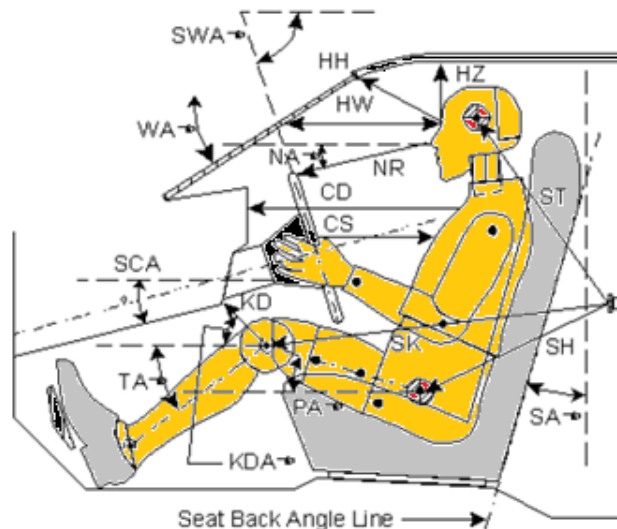
STEERING COLUMN POSITIONS

	Tilt (degrees)	Fore/Aft Position (mm)
Lowermost position No. 1	21.3	
Geometric center position No. 2	23.7	
Uppermost position No. 3	26.0	
Telescoping Steering Wheel Travel		50
Test Position	23.7	25

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014



Code	Measurement Description	Driver (Serial # THOR 016)		Passenger (Serial # THOR 015)	
		Length (mm)	Angle(°)	Length (mm)	Angle (°)
WA°	Windshield Angle		25.8		
SWA°	Steering Wheel Angle		23.6		
SCA°	Steering Column Angle		66.4		
SA°	Seat Back Angle (on headrest post)		5.7		4.0
HZ	Head to Roof (Z)	197	90	178	90
HH	Head to Header	395	20.4	386	15.3
HW	Head to Windshield	695	0	592	0
NR	Nose to Rim	508	14.6	708	30.2
CD	Chest to Dash	588		552	
CS	Chest to Steering Hub	370	-2.8		
RA	Rim to Abdomen	222	0		
KDL	Left Knee to Dash	164	28.2	142	32.5
KDR	Right Knee to Dash	136	32.9	151	31.9
PA°	Pelvic Angle		24.5		24.2
TA°	Tibia Angle		-36.6		-34.4
SK	Striker to Knee	564	-5.5	591	-6.8
ST	Striker to Head	474	84.9	507	85.2
SH	Striker to H-Point	271	-47.8	254	-44.5
HAX°	Head Angle (X)		-0.2		-0.4
HAY°	Head Angle (Y)		0.3		0.2
NAX°	Neck Angle (X)		N/A		N/A
NAY°	Neck Angle (Y)		N/A		N/A
TAX°	T6 Angle (X)		0.0		0.4
TAY°	T6 Angle (Y)		20.7		16.7
LAX°	T1 (X)		-1.2		3.8
LAY°	T1 (Y)		2.8		0.6

DATA SHEET NO.3 (CONTINUED)
DUMMY CMM MEASUREMENTS

Test Vehicle: 2014 Mazda3 four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
Test Date: 6/20/2014

Description	Units	Driver			Passenger		
		X	Y	Z	X	Y	Z
Striker	mm	1108	-786	678	1109	791	679
Head CG	mm	1100	-442	214	1099	458	184
Bridge of Nose	mm	1192	-361	205	1189	378	173
Tip of Nose	mm	1192	-361	240	1188	378	204
Shoulder Bolt	mm	1139	-554	458	1162	567	442
Tip of Chin	mm	1187	-361	342	1183	371	313
H-Point	mm	1325	-614	887	1321	624	867
Left Knee	mm	1705	-571	741	1728	311	762
Right Knee	mm	1706	-280	748	1728	534	760
Left Ankle	mm	2043	-569	988	2079	305	982
Right Ankle	mm	2042	-234	995	2080	514	983
Left Heel	mm	2081	-549	1124	2068	272	1121
Right Heel	mm	2060	-207	1122	2065	476	1123
Head Bolt 1 – Top Left	mm	1033	-398	161	1028	351	134
Head Bolt 2 – Lower Left	mm	1039	-390	248	1037	359	220
Head Bolt 3 – Top Right	mm	1030	-328	163	1030	421	136
Head Bolt 4 – Lower Right	mm	1036	-342	249	1037	408	221
Outboard Seat Anchor Bolt	mm	1591	-606	1064	1591	610	1065
Outboard Head Restraint Post	mm	918	-447	377	940	456	349
Top of Head Restraint	mm	979	-360	98	1011	372	83
Center of Steering Wheel	mm	1605	-363	492			

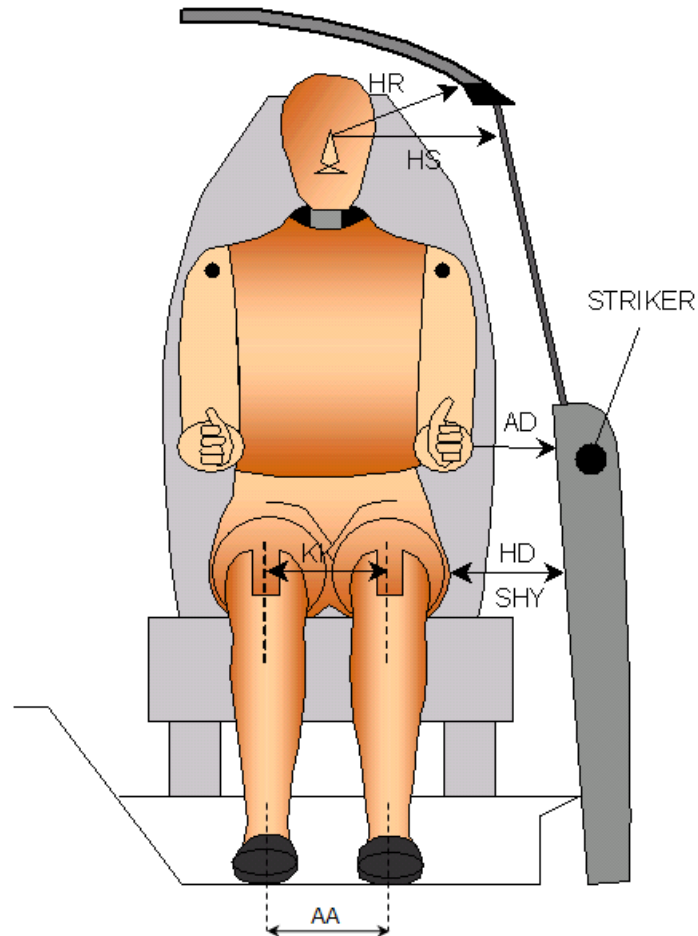
Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +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 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

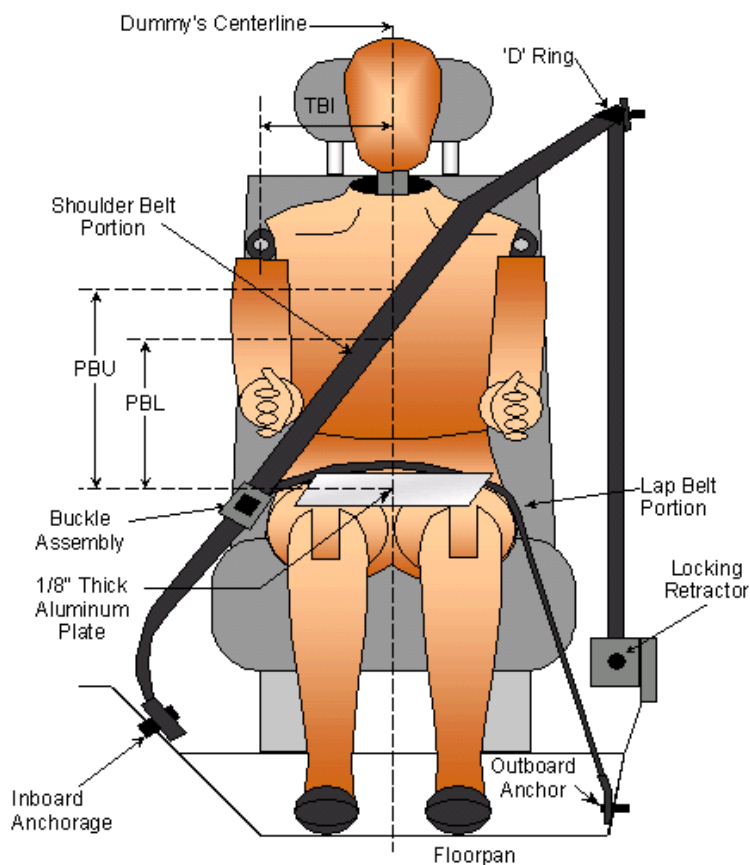


Code	Description	Units	Driver	Passenger
AD	Arm to Door	mm	115	55
HD	H-Point to Door	mm	145	138
HR	Head to Side Header	mm	232	197
HS	Head to Side Window	mm	356	322
KK	Knee to Knee	mm	340	270
SHY	Striker to H-Point (Y Direction)	mm	225	220
AA	Ankle to Ankle	mm	335	207

DATA SHEET NO. 5 SEAT BELT POSITIONING DATA

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU — Top surface of reference to belt upper edge	mm	385	390
PBL — Top surface of reference to belt lower edge	mm	305	315

BELT LENGTH DATA

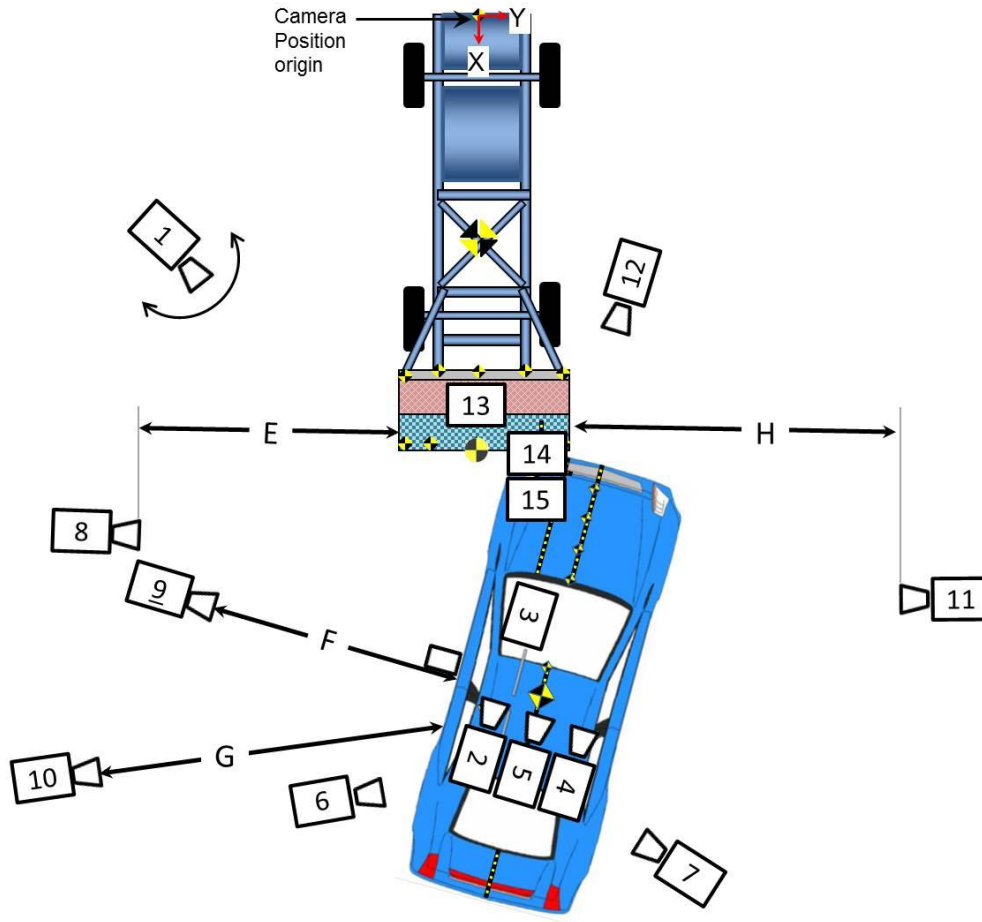
Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	835	855
Lap Belt Length as measured on ATD	mm	695	715
Remainder of belt on reel	mm	970	830
Total belt length for continuous webbing systems	mm	2500	2400

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

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

HORIZONTAL LOCATION



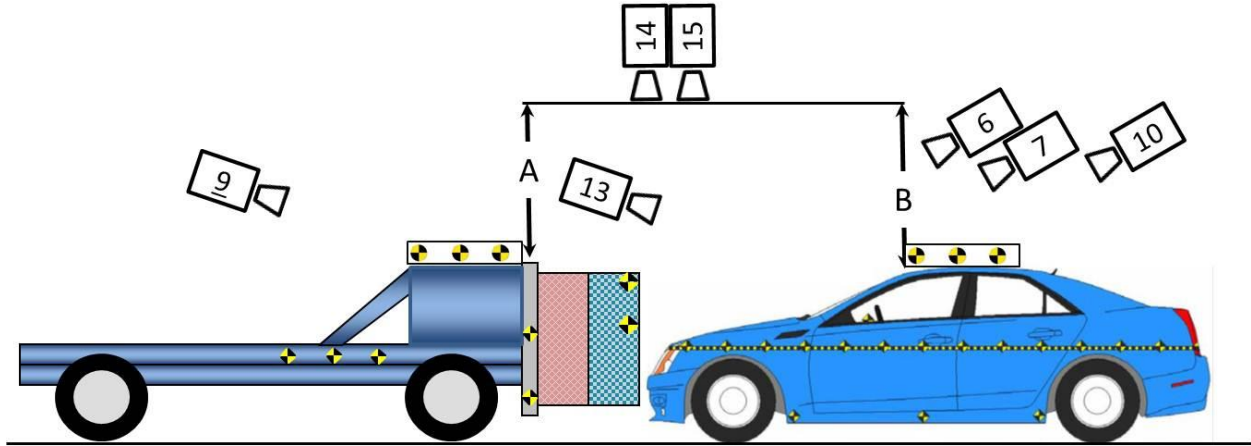
E	mm	6830
F	mm	7435
G	mm	9409
H	mm	6371

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

Test Vehicle: 2014 Mazda3 four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
Test Date: 6/20/2014

VERTICAL LOCATION



A	mm	4069
B	mm	3814

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

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

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	7693	-75	1252	12.5	1000
3	Onboard Driver Lower Leg	6565	-458	388	6.5	1000
4	Onboard Driver Movement	7824	-925	1252	12.5	1000
5	Onboard Centerline	7802	-545	1252	6.5	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

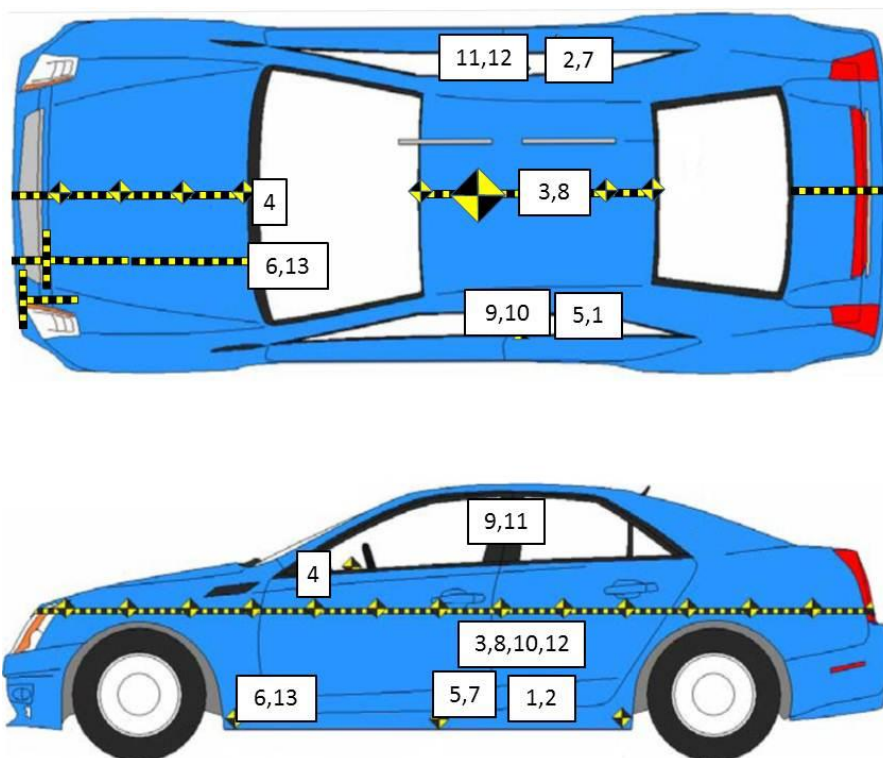
Reference Point: Center most rearward point of the RMDB when in contact with the target vehicle:

- +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 Mazda3 four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
Test Date: 6/20/2014



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Axes	Units	Measurements (mm)		
				X	Y	Z
1	Left Rear Sill	X,Y	mm	837	-691	1059
2	Right Rear Sill	X,Y	mm	845	703	1065
3	Vehicle CG	X,Y,Z	mm	885	1	1007
4	Instrument Panel	X	mm	1785	-7	602
5	Driver Seat Track	X,Y,Z	mm	1114	-615	1151
6	Behind Brake Pedal	X,Y,Z	mm	2422	-352	847
7	Passenger Seat Track	X,Y,Z	mm	1113	616	1152
8	Angular Rate Sensors	X	mm	896	2	1016
		Y	mm	885	12	1012
		Z,	mm	885	1	1007

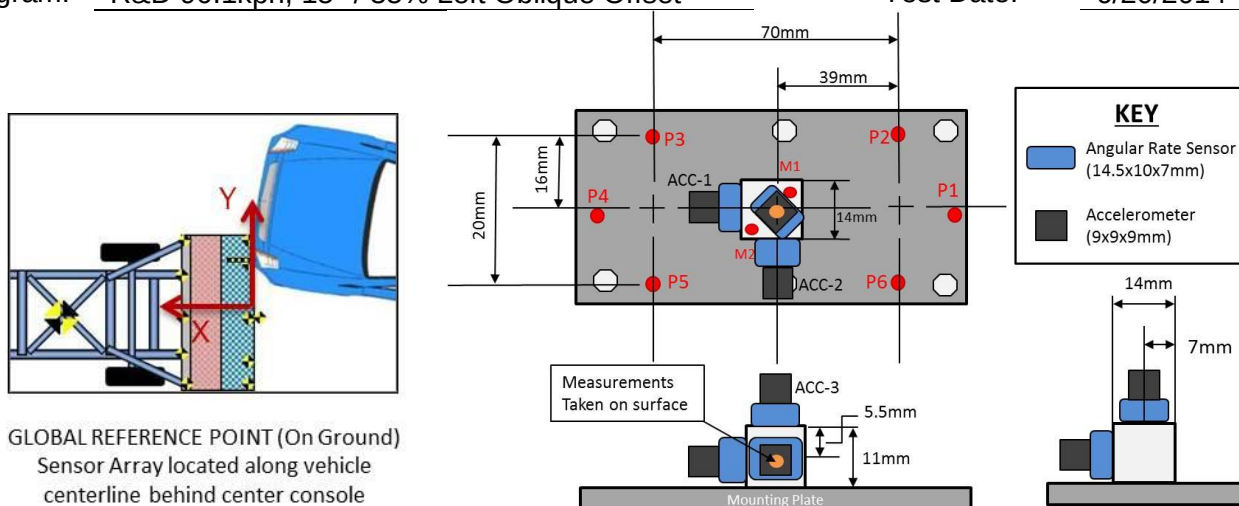
Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +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 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014



VEHICLE COORDINATE SYSTEM					
No.	Accelerometer Location	Units	Measurements (mm)		
			X	Y	Z
ACC-1	Accelerometer CG – X Direction	mm	896	2	1016
ACC-2	Accelerometer CG – Y Direction	mm	885	12	1012
ACC-3	Accelerometer CG – Z Direction	mm	885	1	1007
M1	Mounting Bolt 1	mm	893	9	1008
M2	Mounting Bolt 2	mm	878	-6	1008
P1	Plate Point 1	mm	931	1	1022
P2	Plate Point 2	mm	920	-20	1022
P3	Plate Point 3	mm	850	-20	1022
P4	Plate Point 4	mm	839	1	1022
P5	Plate Point 5	mm	850	21	1022
P6	Plate Point 6	mm	920	21	1022

GLOBAL COORDINATE SYSTEM*					
No.	Accelerometer Location	Units	Measurements (mm)		
			X	Y	Z
ACC-1	Accelerometer CG – X Direction	mm	-2420	-1328	343
ACC-2	Accelerometer CG – Y Direction	mm	-2431	-1338	346
ACC-3	Accelerometer CG – Z Direction	mm	-2431	-1327	352
M1	Mounting Bolt 1	mm	-2423	-1335	351
M2	Mounting Bolt 2	mm	-2438	-1319	351
P1	Plate Point 1	mm	-2384	-1326	337
P2	Plate Point 2	mm	-2396	-1306	337
P3	Plate Point 3	mm	-2466	-1306	337
P4	Plate Point 4	mm	-2477	-1327	337
P5	Plate Point 5	mm	-2466	-1347	337
P6	Plate Point 6	mm	-2396	-1347	336

*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 Mazda3 four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
Test Date: 6/20/2014

VEHICLE INSTRUMENTATION DATA

Loc.	Description	Axes	Units	Positive Direction		Negative Direction	
				Max	Time (ms)	Max	Time (ms)
1	Left Rear Sill	X	g	2.98	140.45	-33.09	34.80
		Y	g	19.37	42.50	-5.77	19.30
2	Right Rear Sill	X	g	4.27	133.95	-45.30	45.25
		Y	g	19.15	43.40	-5.72	18.95
3	Vehicle CG	X	g	3.23	138.55	-37.94	45.50
		Y	g	20.60	43.15	-4.21	19.10
		Z	g	20.27	30.80	-26.19	12.50
4	Instrument Panel	X	g	34.14	93.70	-61.30	63.00
5	Driver Seat Track	X	g	2.44	138.90	-34.59	44.95
		Y	g	21.13	29.60	-6.15	19.20
		Z	g	11.58	36.85	-14.47	74.95
6	Behind Brake Pedal	X	g	9.78	59.90	-119.84	29.75
		Y	g	26.06	26.90	-10.85	17.20
		Z	g	107.65	31.85	-22.90	4.45
7	Passenger Seat Track	X	g	3.37	137.65	-47.23	45.15
		Y	g	25.63	42.80	-6.80	18.70
		Z	g	11.04	48.60	-6.38	13.10
8	Angular Rate Sensors	X	Deg/s	123.65	75.95	-271.18	38.85
		Y	Deg/s	222.65	38.20	-351.29	53.45
		Z	Deg/s	25.21	23.95	-139.73	51.65
9	Driver Shoulder Belt		N	4543.12	57.40	-28.17	7.80
10	Driver Lap Belt		N	5839.83	56.60	-8.05	11.60
11	Passenger Shoulder Belt		N	3691.37	45.85	-31.62	7.50
12	Passenger Lap Belt		N	8162.84	58.70	-23.77	11.85
13	Driver Floor Pan String Pot		mm	0.05	0.95	-42.87	72.05

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	8.35
2	Driver Air Bag Squib 2	*	A	13.35
3	Driver Curtain Airbag	*	A	38.40
4	Driver Torso Airbag	*	A	38.35
5	Driver Knee Airbag	*	A	N/A
6	Driver Pretensioner	*	A	8.35
7	Passenger Air Bag Squib 1	*	A	8.35
8	Passenger Air Bag Squib 2	*	A	13.35
9	Passenger Curtain Airbag	*	A	Did Not Fire
10	Passenger Torso Airbag	*	A	Did Not Fire
11	Passenger Knee Airbag	*	A	N/A
12	Passenger Pretensioner	*	A	8.35

* The measurement indicates the time the voltage changed

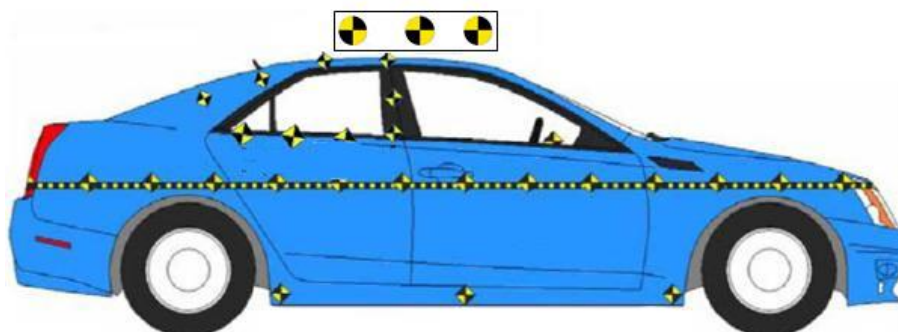
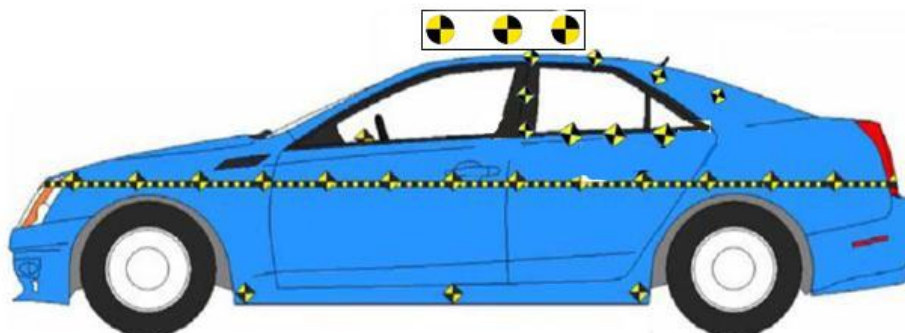
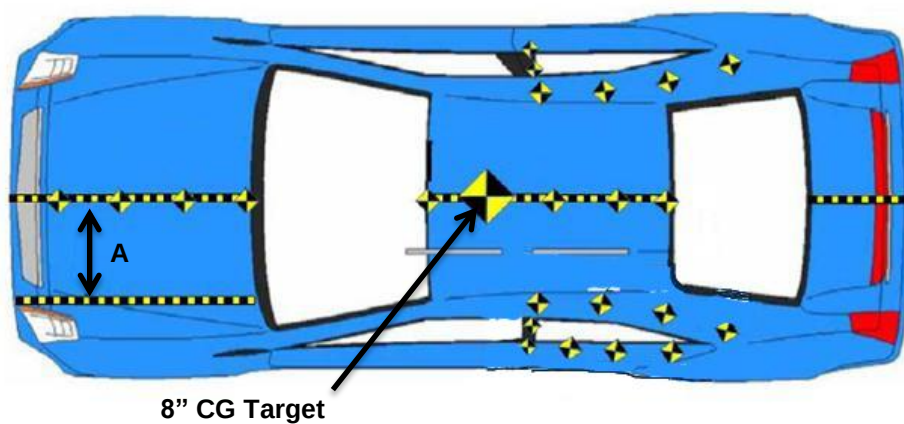
DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2014 Mazda3 four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
Test Date: 6/20/2014

Item	Units	Value
A	mm	270

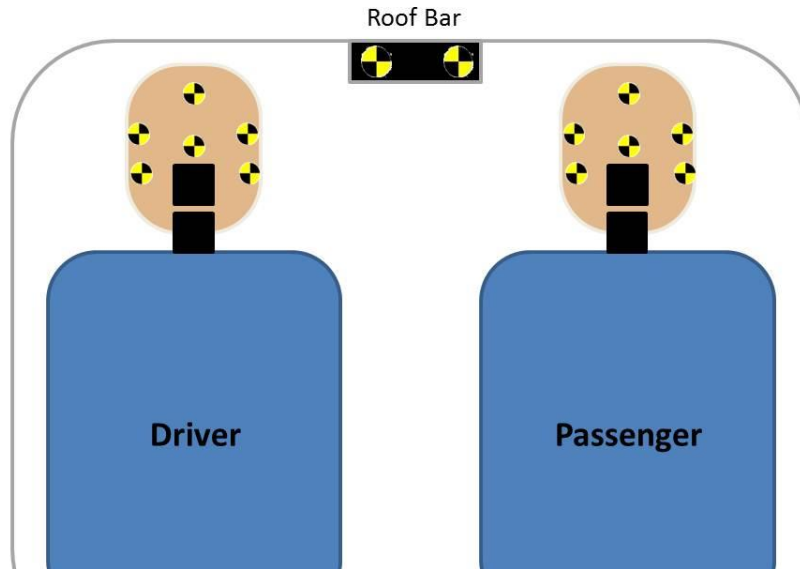
Note: All 6" targets on vehicle are 450 mm apart.



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

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014



Point	Pre-Test		
	X	Y	Z
Roof Bar Driver	1449	-56	127
Roof Bar Passenger	1448	68	128

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

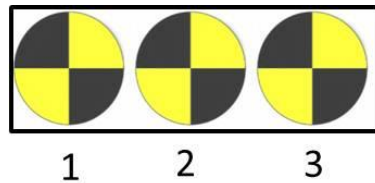
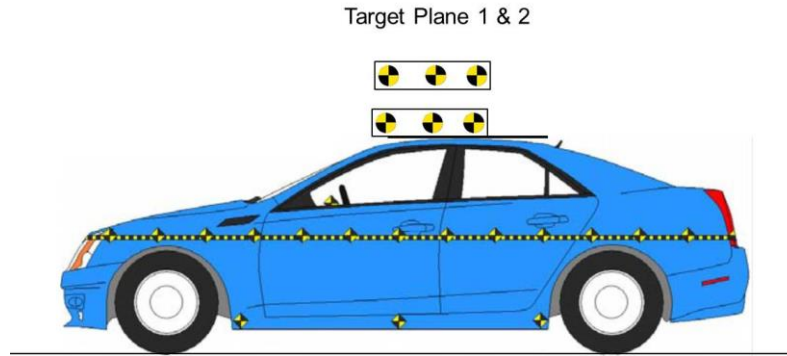
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

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

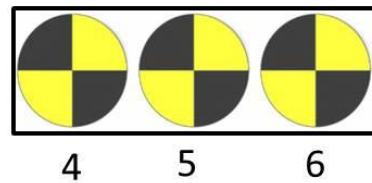
Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

OVERHEAD TARGET BARS



Vertical Target
Plane 1
(Driver's Side)



Vertical Target
Plane 2
(Passenger Side)

Target	Units	X	Y	Z
1	mm	1420	-380	-405
2	mm	970	-382	-406
3	mm	519	-379	-406
4	mm	1444	366	-403
5	mm	994	374	-403
6	mm	542	374	-399

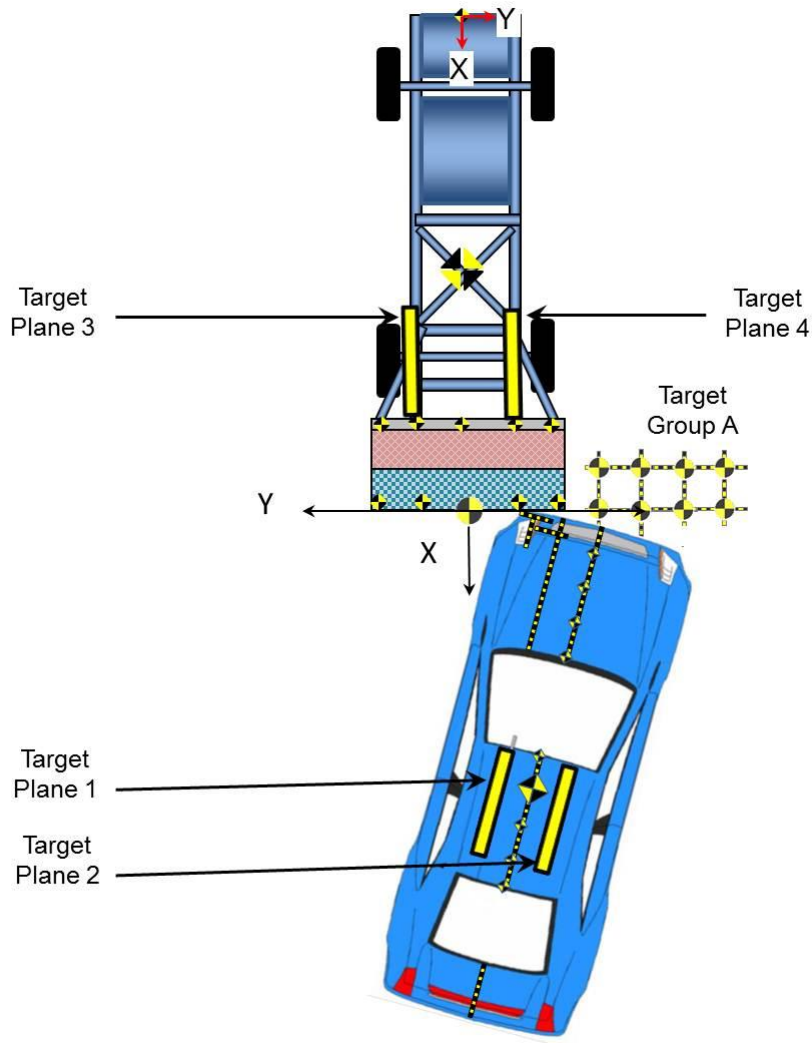
Reference point: 50mm above the center of the rear windshield (See appendix D for procedure to create coordinate system).

- +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 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014



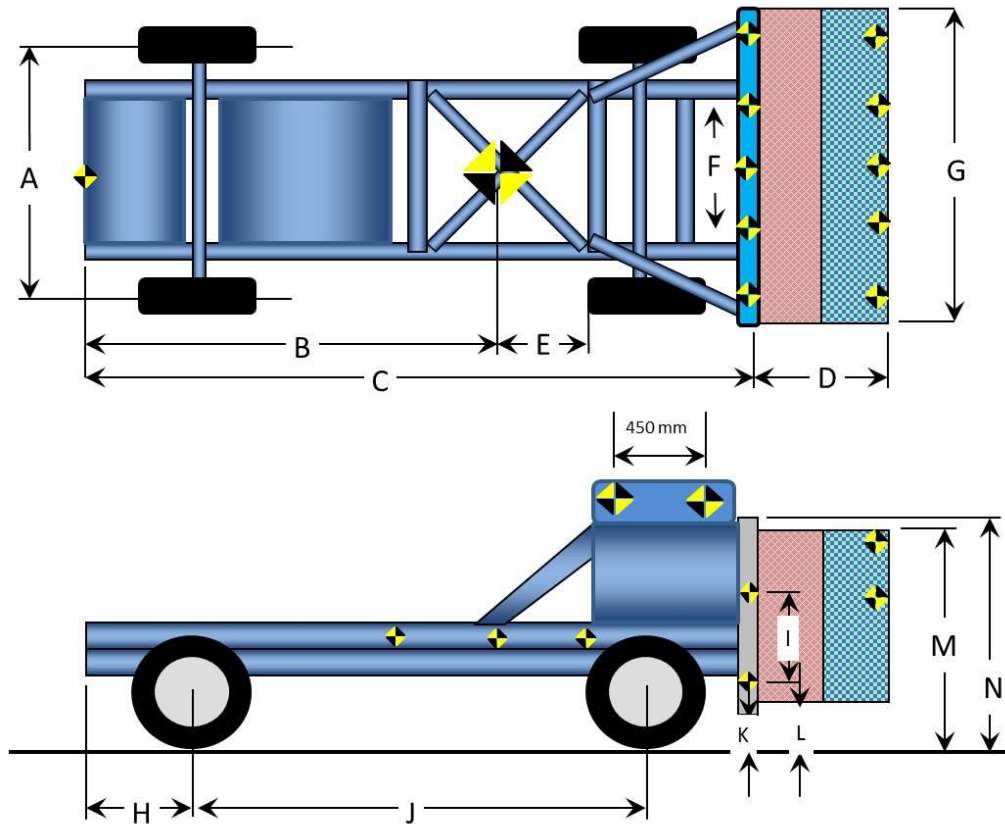
GROUND TARGET LOCATIONS

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 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014



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

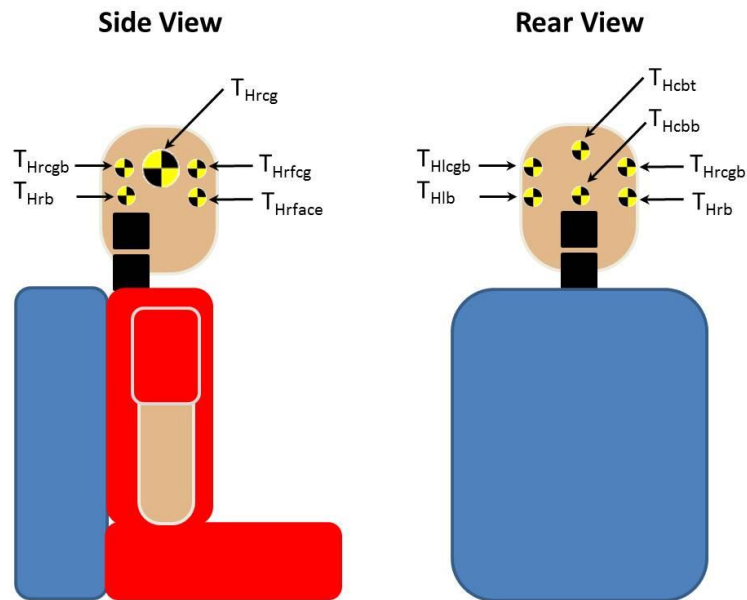
	Units	Front Axle	Rear Axle	Total
Left	kg	804.2	435	1239.2
Right	kg	801.5	449.5	1251
Ratio	%	64.5	35.5	100
Total	kg	1605.7	884.5	2490.2
CG Aft of Front Axle	mm			907

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 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014



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 _{Hlcb}	mm	38
Distance between T _{Hlcbg} & T _{Hrcgb}	mm	38
Distance between T _{Hlcb} & T _{Hrb}	mm	70
Distance between T _{Hlcbg} & T _{Hlface}	mm	70
Distance between T _{Hcgt} & T _{Hcbb}	mm	72

Passenger Dummy Head Targets (S/N 015)

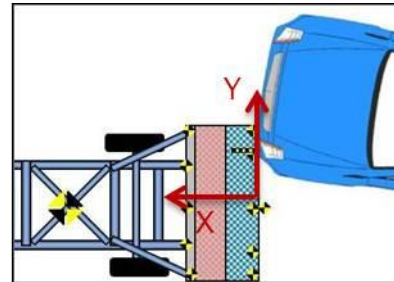
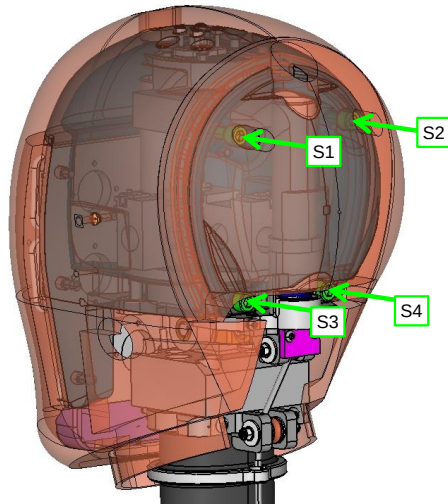
Measurement	Units	Value
Distance between T _{Hrcg} & T _{Hrfcg}	mm	38
Distance between T _{Hrcg} & T _{Hrcgb}	mm	38
Distance between T _{Hrcgb} & T _{Hrb}	mm	70
Distance between T _{Hrfcg} & T _{Hrface}	mm	70
Distance between T _{Hlcbg} & T _{Hlcb}	mm	38
Distance between T _{Hlcbg} & T _{Hrcgb}	mm	38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

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

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

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	-2283	-929	1197
S3	-2277	-937	1110
S2	-2286	-999	1196
S4	-2280	-985	1109

FRONT PASSENGER HEAD BOLT POINTS

Target	X	Y	Z
S1	-2288	-1676	1225
S3	-2279	-1684	1139
S2	-2286	-1747	1223
S4	-2279	-1734	1138

**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 Mazda3 four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
Test Date: 6/20/2014

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	93
Passenger Dummy Accelerometers	93
Vehicle Structure Accelerometers	46
RMDB Cart Accelerometers	6
Total	238

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 Mazda3 four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
Test Date: 6/20/2014

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, interior target bar, visor, and B-Pillar
Upper Torso Contact	Front & Torso Airbags, Shoulder contacted driver's door	Front Airbag, shoulder contacted center instrument panel
Lower Torso Contact	None	None
Left Knee Contact	Knee Bolster	Glove Box
Right Knee Contact	Knee Bolster	Glove Box

DOOR OPENING AND SEAT TRACK INFORMATION

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

POST TEST STRUCTURAL OBSERVATIONS

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

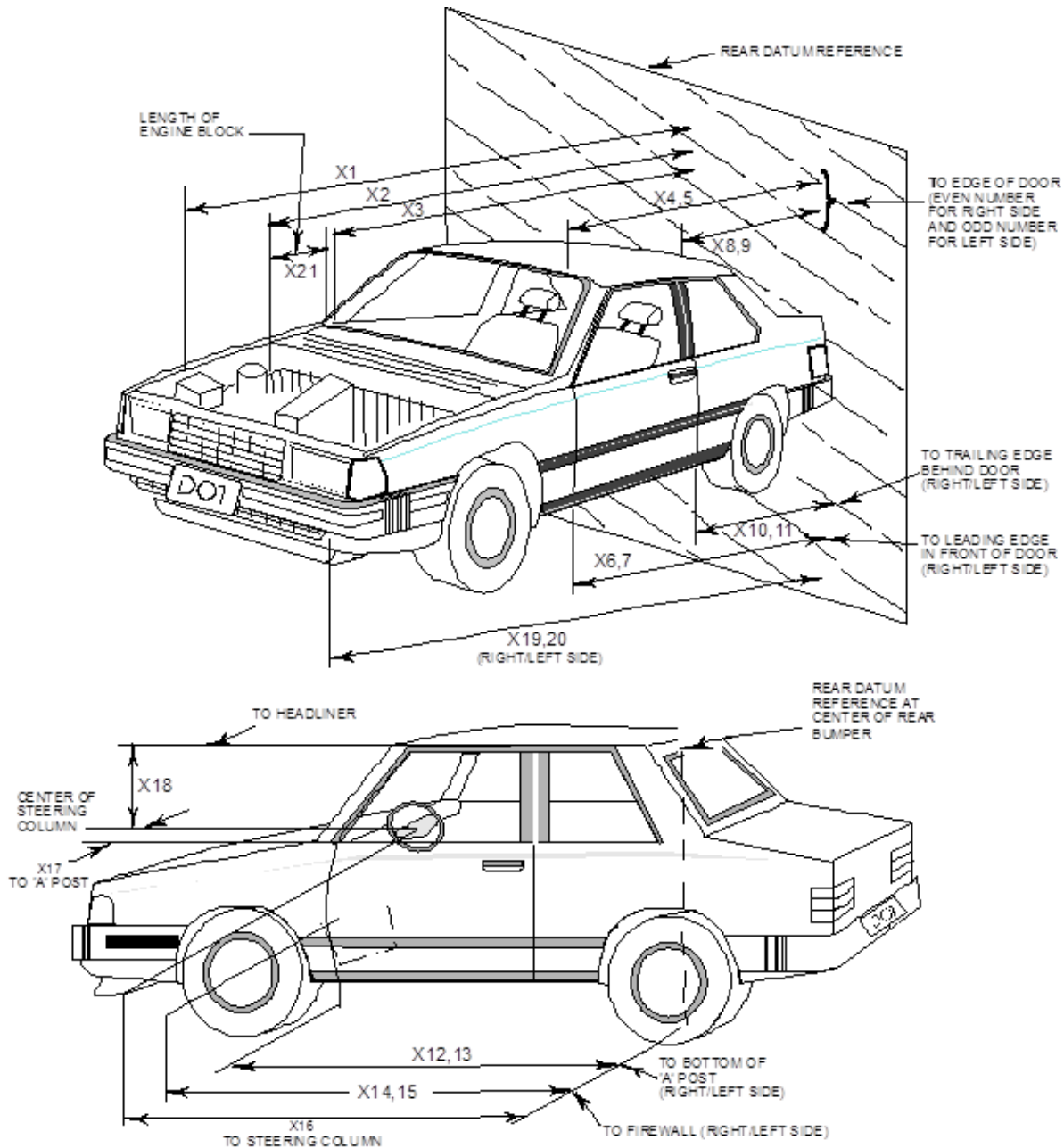
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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 Mazda3 four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
Test Date: 6/20/2014



DATA SHEET NO. 11 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	3590	3237	352
2	Rear Surface of Vehicle (RSOV) to Front of Engine	mm	3035	2795	240
3	RSOV to Firewall	mm	2520	2409	111
4	RSOV to Upper Leading Edge of Right Door	mm	2088	2092	-3
5	RSOV to Upper Leading Edge of Left Door	mm	2087	2082	5
6	RSOV to Lower Leading Edge of Right Door	mm	2127	2129	-2
7	RSOV to Lower Leading Edge of Left Door	mm	2125	2125	0
8	RSOV to Upper Trailing Edge of Right Door	mm	1016	1021	-5
9	RSOV to Upper Trailing Edge of Left Door	mm	1016	1011	6
10	RSOV to Lower Trailing Edge of Right Door	mm	1074	1078	-4
11	RSOV to Lower Trailing Edge of Left Door	mm	1075	1081	-6
12	RSOV to Bottom of "A" Post of Right Side	mm	2106	2111	-4
13	RSOV to Bottom of "A" Post of Left Side	mm	2108	2104	3
14	RSOV to Firewall, Right Side	mm	2675	2658	17
15	RSOV to Firewall, Left Side	mm	2673	2362	311
16	RSOV to Steering Column	mm	1605	1616	-11
17	Center of Steering Column to "A" Post	mm	277	243	34
18	Center of Steering Column to Headliner	mm	413	406	7
19	RSOV to Right Side of Front Bumper	mm	3522	3588	-66
20	RSOV to Left Side of Front Bumper	mm	3518	UR	UR
21	Length of Engine Block	mm	336	332	4
RD	RSOV to Right Side of Dash Panel	mm	1819	1820	-1
CD	RSOV to Center of Dash Panel	mm	1776	1768	7
LD	RSOV to Left Side of Dash Panel	mm	1820	1813	7

UR* = Unrecoverable Data Point

DATA SHEET NO. 12
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2014 Mazda3 four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

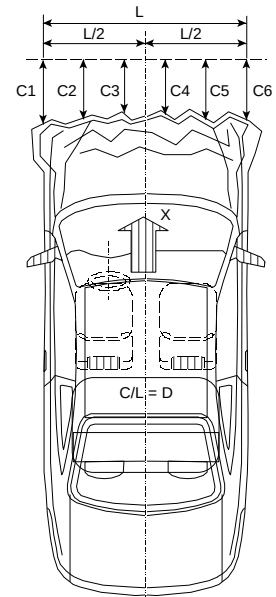
NHTSA No.: R20145400
Test Date: 6/20/2014

VEHICLE INFORMATION

VIN: JM1BM1L77E1173303 Wheelbase (mm): 2697
Vehicle Size Category: Passenger Test Weight (kg): 1587.5

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): 89.84
Velocity Change (kph): 89.84



CRUSH PROFILE

Collision Deformation Classification: 12FYEW03
Midpoint of Damage: C2
Damage Region Length (mm): 959
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	3523	2925	598
C2	Crush zone 2 at left side	mm	3526	3055	471
C3	Crush zone 3 at left side	mm	3546	3200	346
C4	Crush zone 4 at right side	mm	3546	3315	231
C5	Crush zone 5 at right side	mm	3528	3418	110
C6	Crush zone 6 at right side	mm	3525	3538	-13
L	C1 to C6	mm	959	725	234

Crush Measurements: Bumper Cover Removed

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
B1	Bumper Beam 1 at left side	mm	3410	2938	-472
B2	Bumper Beam 2 at left side	mm	3434	2932	-502
B3	Bumper Beam 3 at left side	mm	3456	2957	-499
B4	Bumper Beam 4 at left side	mm	3467	3057	-410
B5	Bumper Beam 5 at right side	mm	3471	3138	-333
B6	Bumper Beam 6 at right side	mm	3467	3212	-255
B7	Bumper Beam 7 at right side	mm	3456	3280	-176
B8	Bumper Beam 8 at right side	mm	3435	3343	-92
B9	Bumper Beam 9 at right side	mm	3410	3402	-8
L	B1 to B9	mm	961	751	210

DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

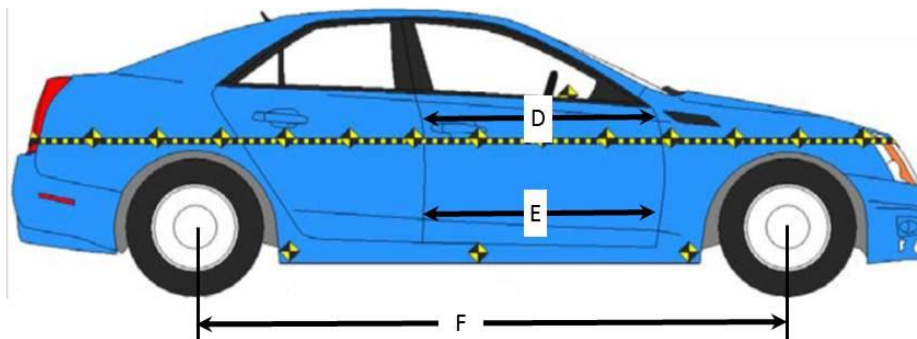
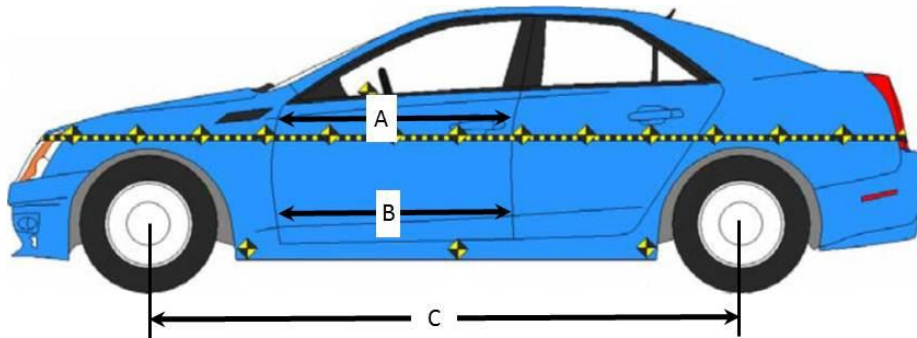
NHTSA No.: R20145400
 Test Date: 6/20/2014

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	984	979	-5
B	Left Side Lower	mm	829	826	-3
D	Right Side Upper	mm	984	983	-1
E	Right Side Lower	mm	827	828	1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2697	2570	-127
F	Right Side Wheelbase	mm	2697	2719	22



DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

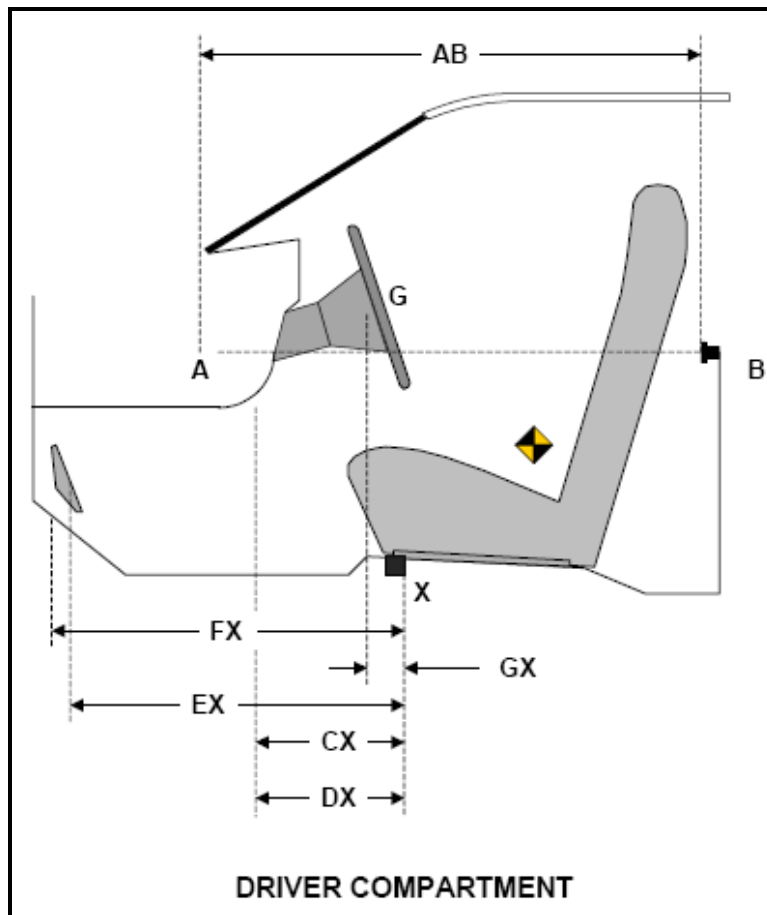
Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	723	722	-1
CX	Left Knee Bolster to X	mm	244	235	-9
DX	Right Knee Bolster to X	mm	236	229	-7
EX	Brake Pedal to X	mm	556	566	10
FX	Foot Rest to X	mm	612	560	-52
GX	Center of Steering Column Wheel Hub to X	mm	14	24	10

X = Front of Seat Track (Stationary)



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

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

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	2018	-742	954	2015	-745	951	-3	-3	-3
2	2046	-732	876	2042	-735	871	-4	-3	-5
3	2039	-730	803	2032	-740	796	-7	-10	-7
4	1968	-726	501	1963	-740	492	-5	-14	-9
5	1951	-723	428	1948	-736	420	-3	-13	-8
6	1877	-708	351	1874	-719	345	-3	-11	-6
7	1948	-752	1011	1947	-756	1007	-1	-4	-4
8	1798	-754	1026	1798	-757	1023	0	-3	-3
9	1647	-755	1024	1647	-758	1022	0	-3	-2
10	1978	-751	996	1976	-752	992	-2	-1	-4
11	2001	-747	977	1998	-749	972	-3	-2	-5
12	2015	-729	704	2009	-739	697	-6	-10	-7
13	1993	-726	605	1986	-739	597	-7	-13	-8
14	1821	-699	319	1819	-711	311	-2	-12	-8
15	1764	-689	287	1762	-701	280	-2	-12	-7
16	1706	-680	256	1704	-691	249	-2	-11	-7

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
17	1647	-670	226	1645	-679	220	-2	-9	-6
18	1587	-660	200	1586	-669	194	-1	-9	-6
19	1526	-650	174	1525	-659	168	-1	-9	-6
20	1464	-640	151	1463	-649	145	-1	-9	-6
21	1401	-632	131	1400	-638	126	-1	-6	-5
22	1337	-624	116	1336	-632	110	-1	-8	-6
23	1272	-618	104	1272	-626	99	0	-8	-5
24	1207	-613	94	1205	-620	90	-2	-7	-4
25	1138	-609	88	1137	-616	85	-1	-7	-3
26	1072	-608	86	1070	-614	85	-2	-6	-1
27	1602	-755	1024	1600	-758	1022	-2	-3	-2
28	1555	-755	1024	1554	-758	1022	-1	-3	-2
29	1509	-757	1024	1509	-758	1022	0	-1	-2
30	1463	-756	1024	1463	-757	1022	0	-1	-2
31	1416	-756	1024	1416	-757	1022	0	-1	-2
32	1379	-756	1019	1379	-757	1018	0	-1	-1
33	1206	-741	801	1205	-743	801	-1	-2	-1
34	1283	-752	949	1283	-754	949	0	-2	0

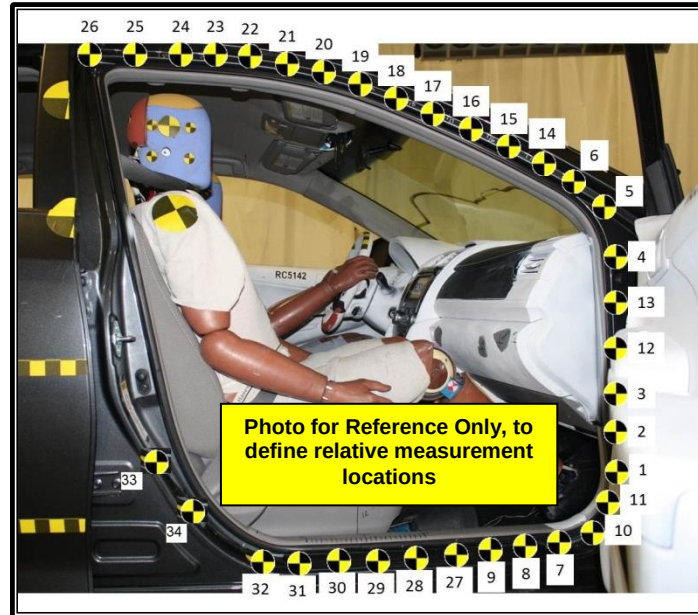
Note: See Appendix D for detailed procedure on how to measure the required door sill intrusions.

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

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

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	2020	746	950	2020	756	951	0	10	1
2	2045	737	876	2044	747	877	-1	10	1
3	2037	736	804	2036	744	804	-1	8	0
4	1966	732	500	1965	737	501	-1	5	1
5	1949	729	428	1948	735	429	-1	6	1
6	1876	714	354	1875	718	355	-1	4	1
7	1949	758	1011	1948	768	1013	-1	10	2
8	1798	760	1028	1797	769	1029	-1	9	1
9	1649	761	1027	1649	768	1028	0	7	1
10	1978	754	996	1976	764	997	-2	10	1
11	2002	751	974	2001	760	976	-1	9	2
12	2011	734	694	2010	741	694	-1	7	0
13	1989	733	597	1988	724	598	-1	-9	1
14	1820	705	320	1820	708	321	0	3	1
15	1762	695	288	1762	698	288	0	3	0
16	1705	685	257	1704	687	258	-1	2	1

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
17	1644	676	227	1644	675	229	0	-1	2
18	1583	665	200	1584	665	201	1	0	1
19	1523	655	174	1523	654	176	0	-1	2
20	1461	645	152	1461	643	154	0	-2	2
21	1398	636	133	1398	634	134	0	-2	1
22	1333	629	116	1334	626	118	1	-3	2
23	1268	623	104	1268	620	106	0	-3	2
24	1202	618	95	1203	616	97	1	-2	2
25	1135	614	89	1135	612	91	0	-2	2
26	1071	612	87	1072	610	89	1	-2	2
27	1607	761	1027	1607	768	1028	0	7	1
28	1562	761	1027	1561	767	1028	-1	6	1
29	1516	761	1027	1515	767	1027	-1	6	0
30	1472	761	1027	1471	767	1027	-1	6	0
31	1426	761	1026	1425	766	1027	-1	5	1
32	1380	760	1022	1379	765	1023	-1	5	1
33	1204	744	800	1203	747	801	-1	3	1
34	1280	757	948	1279	760	949	-1	3	1

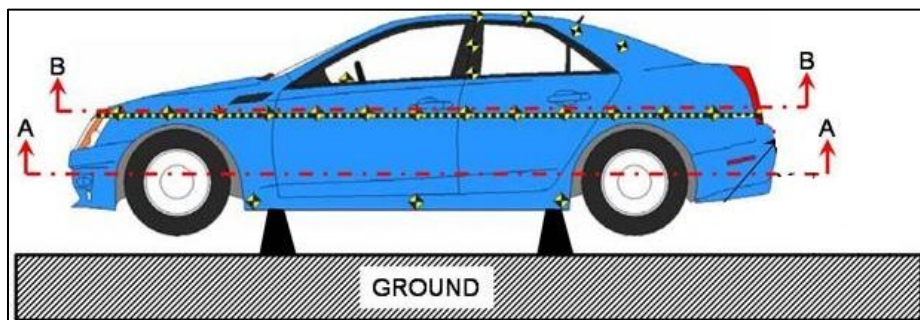
Note: See Appendix D for detailed procedure on how to measure the required door sill intrusions.

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

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	3005	-890	891	1	2919	-693	892
2	3065	-884	891	2	2876	-596	892
3	3163	-848	891	3	2892	-494	891
4	3271	-797	891	4	2958	-460	891
5	3361	-725	891	5	2974	-237	891
6	3429	-640	891	6	2988	-107	891
7	3473	-572	891	7	3100	60	891
8	3521	-483	891	8	3197	192	890
9	3550	-400	890	9	3273	303	891
10	3568	-339	891	10	3328	319	891
11	3560	-322	891	11	3213	499	891
12	3526	-288	892	12	3206	587	891
13	3543	-158	891	13	3188	678	890
14	3548	-47	891	14	3196	783	890
15	3548	52	891	15	3015	846	891
16	3540	200	891	16	3014	845	890
17	3527	291	891	17	2884	928	890
18	3569	329	891	18	2548	884	889
19	3561	370	891	19	2337	901	889
20	3522	485	891	20	2196	902	891
21	3447	616	891	21	2007	900	891
22	3365	725	891	22	1862	898	891
23	3264	804	891	23	1652	895	891
24	3125	867	891	24	1507	893	891
25	3068	887	891	25	1360	891	892

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A (Continued)

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
26	3010	893	891	26	1149	887	892
27	2329	896	891	27	978	884	892
28	2274	896	891	28	788	883	891
29	2159	895	891	29	571	883	892
30	1990	894	891	30	429	892	891
31	1779	893	891	31	338	897	891
32	1562	891	891	32	301	897	891
33	1379	890	891	33	-393	882	892
34	1249	888	891	34	-393	882	892
35	1094	886	891	35	-451	867	892
36	933	885	891	36	-557	819	892
37	750	884	891	37	-659	755	892
38	568	884	891	38	-720	692	892
39	424	892	891	39	-755	644	892
40	310	899	891	40	-784	574	892
41	-368	885	892	41	-812	483	892
42	-446	869	891	42	-843	322	892
43	-566	815	891	43	-860	178	892
44	-680	737	892	44	-868	9	892
45	-742	670	891	45	-861	-162	892
46	-776	606	892	46	-848	-289	892
47	-811	504	891	47	-830	-407	892
48	-847	326	891	48	-804	-516	892
49	-863	188	891	49	-756	-640	892
50	-870	62	891	50	-677	-736	892
51	-871	-6	891	51	-549	-820	893
52	-867	-118	891	52	-448	-866	892
53	-855	-252	891	53	-364	-885	892
54	-839	-372	891	54	300	-894	892
55	-834	-401	892	55	390	-893	891
56	-809	-507	891	56	521	-882	891
57	-774	-608	891	57	718	-881	892
58	-728	-686	891	58	867	-882	891
59	-638	-771	891	59	1025	-884	892
60	-446	-869	891	60	1072	-884	891
61	-362	-887	891	61	1143	-882	891
62	300	-894	891	62	1297	-886	892
63	349	-895	892	63	1474	-890	891
64	434	-887	891	64	1607	-893	891
65	609	-879	891	65	1756	-896	891
66	793	-880	891	66	1914	-899	892

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A (Continued)

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
67	941	-881	891	67	2050	-901	891
68	1067	-881	891	68	2118	-901	891
69	1178	-883	892	69	2135	-913	891
70	1296	-884	891	70	2176	-937	891
71	1450	-885	891	71	2230	-932	891
72	1602	-887	892	72	2283	-910	891
73	1786	-888	891	73	2336	-859	891
74	2004	-889	891	74	2512	-829	891
75	2141	-889	891	75	2672	-794	890
76	2242	-891	892	76	2745	-776	890
77	2326	-891	892	77	2850	-755	891
78	3005	-890	891				

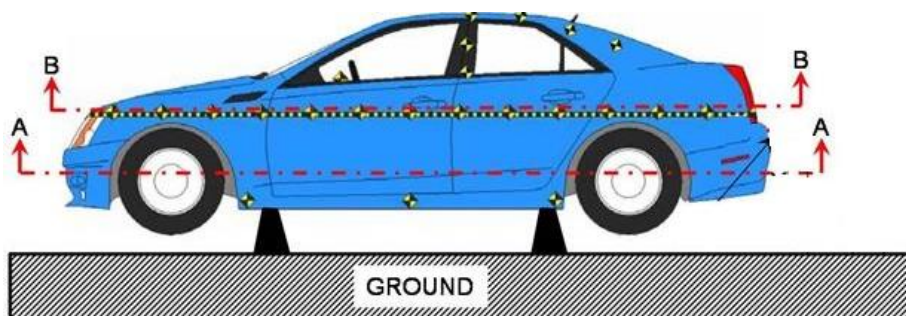
Note: See Appendix D for detailed procedure on how to measure vehicle exterior crush profile

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

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	2461	-890	648	1	2290	-861	648
2	2549	-897	649	2	2361	-828	648
3	2677	-897	648	3	2470	-761	648
4	2809	-893	648	4	2560	-740	647
5	2940	-860	648	5	2637	-761	648
6	3044	-825	648	6	2688	-640	648
7	3175	-785	649	7	2716	-524	647
8	3243	-759	648	8	2775	-443	648
9	3286	-690	648	9	2891	-455	648
10	3333	-612	649	10	2973	-418	649
11	3385	-563	648	11	3113	-381	648
12	3453	-473	648	12	3199	-259	648
13	3512	-348	648	13	3284	-149	649
14	3538	-198	648	14	3393	19	648
15	3547	-82	648	15	3461	145	648
16	3551	3	648	16	3394	397	648
17	3548	52	648	17	3377	524	647
18	3540	176	648	18	3324	620	647
19	3523	304	648	19	3273	694	647
20	3490	420	648	20	3219	759	647
21	3436	493	648	21	3100	800	647
22	3376	562	648	22	3020	840	647
23	3325	625	648	23	2855	888	647
24	3273	710	648	24	2716	902	646
25	3245	758	648	25	2577	902	647

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

VEHICLE EXTERIOR CRUSH PROFILE
SECTION B-B (Continued)

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
26	3132	798	648	26	2489	894	647
27	3012	838	648	27	2318	883	646
28	2859	883	648	28	2178	887	646
29	2714	898	648	29	2099	891	648
30	2584	899	648	30	1927	893	648
31	2508	896	648	31	1760	894	649
32	2433	889	648	32	1543	893	648
33	2264	885	648	33	1337	891	648
34	2157	887	648	34	1074	885	648
35	1988	890	648	35	977	884	648
36	1779	893	648	36	805	881	648
37	1610	893	648	37	647	879	649
38	1457	893	648	38	457	878	648
39	1295	892	648	39	272	887	648
40	1141	890	648	40	145	901	649
41	1008	888	648	41	34	903	648
42	825	884	648	42	-6	902	648
43	662	882	648	43	-122	901	648
44	466	881	648	44	-199	898	648
45	267	889	648	45	-313	871	649
46	140	903	648	46	-423	837	649
47	0	904	648	47	-574	785	649
48	-154	902	648	48	-659	717	649
49	-274	886	648	49	-711	625	649
50	-342	863	648	50	-687	597	649
51	-435	833	648	51	-734	485	649
52	-549	797	648	52	-738	384	649
53	-637	745	648	53	-752	278	649
54	-709	644	649	54	-757	168	648
55	-718	621	648	55	-760	51	649
56	-692	595	649	56	-760	-80	649
57	-734	495	649	57	-756	-219	650
58	-738	403	648	58	-748	-339	650
59	-758	234	648	59	-730	-427	649
60	-763	85	649	60	-741	-465	649
61	-763	-1	648	61	-705	-560	649
62	-761	-152	648	62	-714	-615	649
63	-753	-311	648	63	-676	-695	649
64	-732	-425	648	64	-602	-768	650
65	-742	-467	648	65	-458	-824	649
66	-718	-534	649	66	-327	-865	649
67	-691	-594	649	67	-187	-895	649

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

VEHICLE EXTERIOR CRUSH PROFILE
SECTION B-B (Continued)

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
68	-718	-624	648	68	-10	-898	649
69	-664	-716	649	69	134	-898	649
70	-567	-790	648	70	281	-884	649
71	-420	-838	649	71	346	-880	649
72	-303	-874	648	72	490	-878	648
73	-199	-895	648	73	633	-880	648
74	-27	-899	648	74	825	-883	649
75	144	-898	648	75	988	-887	648
76	286	-883	648	76	1072	-890	649
77	336	-880	648	77	1220	-895	648
78	467	-876	648	78	1413	-900	648
79	642	-878	649	79	1539	-903	648
80	828	-880	648	80	1793	-907	648
81	1006	-883	648	81	1969	-906	648
82	1077	-884	648	82	2091	-905	648
83	1152	-885	649	83	2122	-904	648
84	1327	-887	648	84	2202	-901	648
85	1505	-889	648	85	2246	-848	648
86	1662	-889	649				
87	1877	-887	648				
88	2094	-884	648				
89	2232	-880	648				
90	2401	-883	649				
91	2461	-890	648				

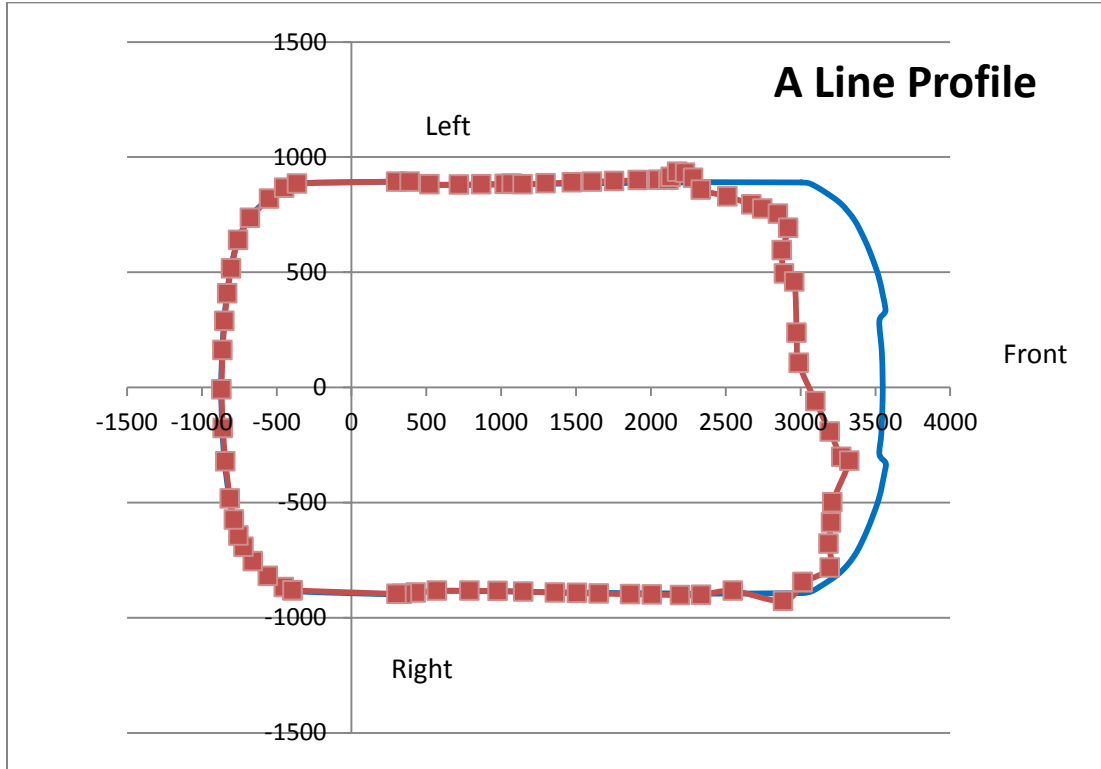
Note: See Appendix D for detailed procedure on how to measure vehicle exterior crush profile

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

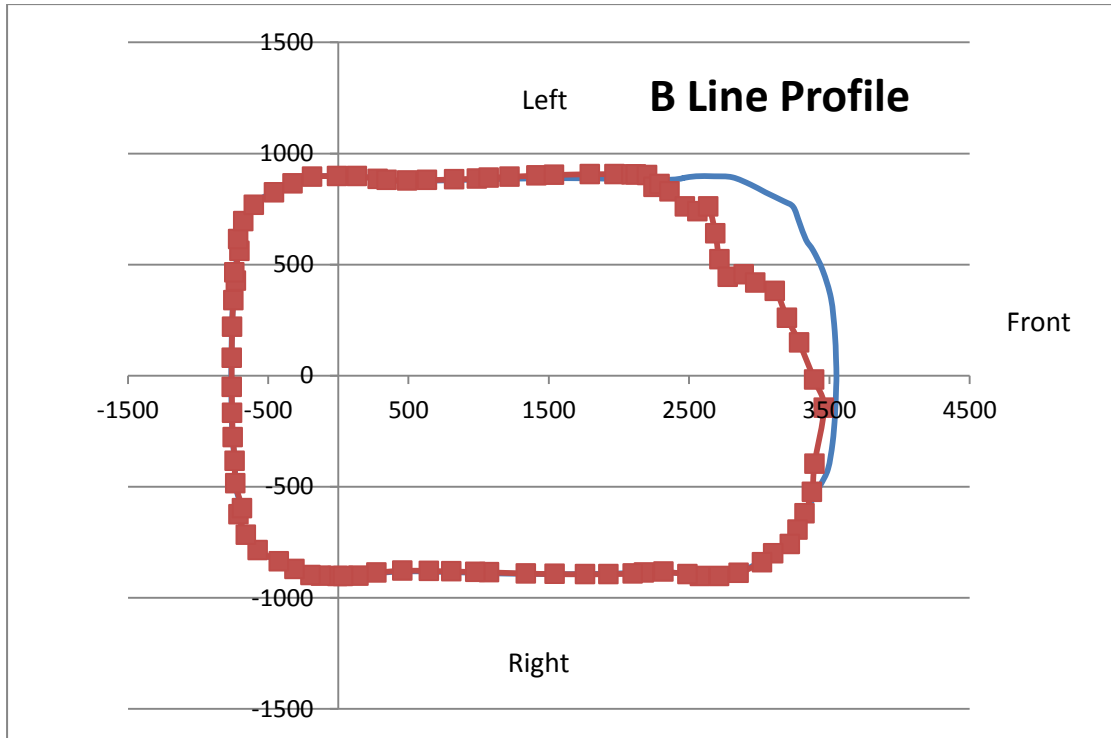
Test Vehicle: 2014 Mazda3 four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
Test Date: 6/20/2014

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A



SECTION B-B



DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

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	3411	-482	866	2938	-313	663	-473	169	-203
	B2	3435	-361	867	2914	-223	680	-521	138	-187
	B3	3456	-243	866	2966	-121	663	-490	122	-203
	B4	3469	-122	866	3054	-45	666	-415	77	-200
	B5	3472	-1	865	3133	43	680	-339	44	-185
	B6	3468	120	867	3208	136	700	-260	16	-167
	B7	3457	238	865	3275	232	716	-182	-6	-149
	B8	3435	360	863	3338	337	737	-97	-23	-126
	B9	3411	478	865	3397	440	762	-14	-38	-103
Center Structural Bumper Beam	B1	3410	-482	889	2938	-320	687	-472	162	-202
	B2	3434	-363	889	2932	-217	693	-502	146	-196
	B3	3456	-241	891	2957	-115	682	-499	126	-209
	B4	3467	-122	892	3057	-54	692	-410	68	-200
	B5	3471	0	893	3138	35	706	-333	35	-187
	B6	3467	121	891	3212	129	722	-255	8	-169
	B7	3456	238	891	3280	224	740	-176	-14	-151
	B8	3435	360	890	3343	328	762	-92	-32	-128
	B9	3410	479	892	3402	431	787	-8	-48	-105
Upper Radiator Support	1	3328	-497	617	2680	-245	467	-648	252	-150
	2	3379	-374	635	2773	-167	499	-606	207	-136
	3	3395	-245	635	2869	-87	485	-526	158	-150
	4	3436	-125	639	2986	-43	465	-450	82	-174
	5	3456	-1	647	3091	27	463	-365	28	-184
	6	3436	125	639	3159	136	458	-277	11	-181
	7	3393	248	635	3203	257	468	-190	9	-167
	8	3376	373	634	3263	367	487	-113	-6	-147
	9	3327	496	615	3286	498	504	-41	2	-111

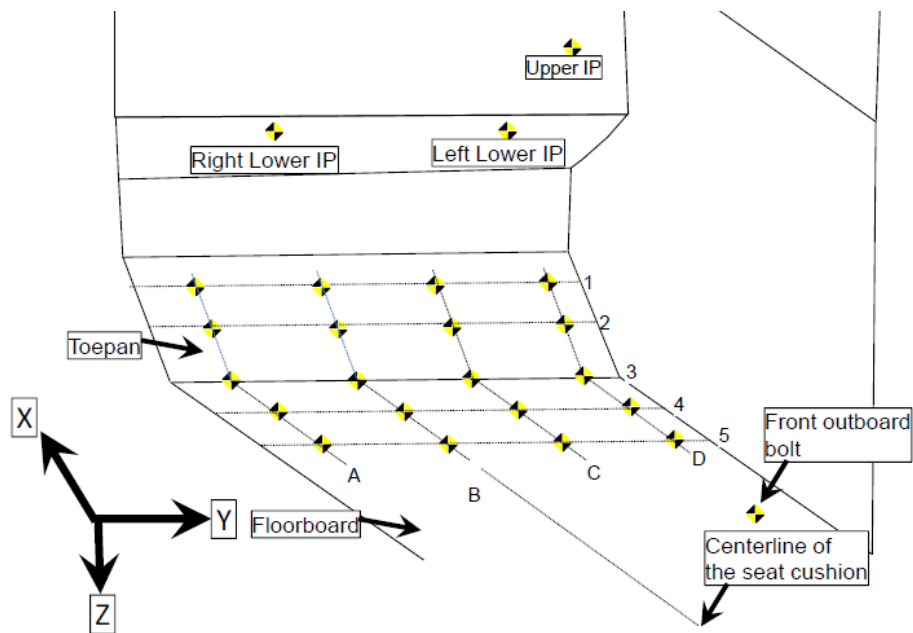
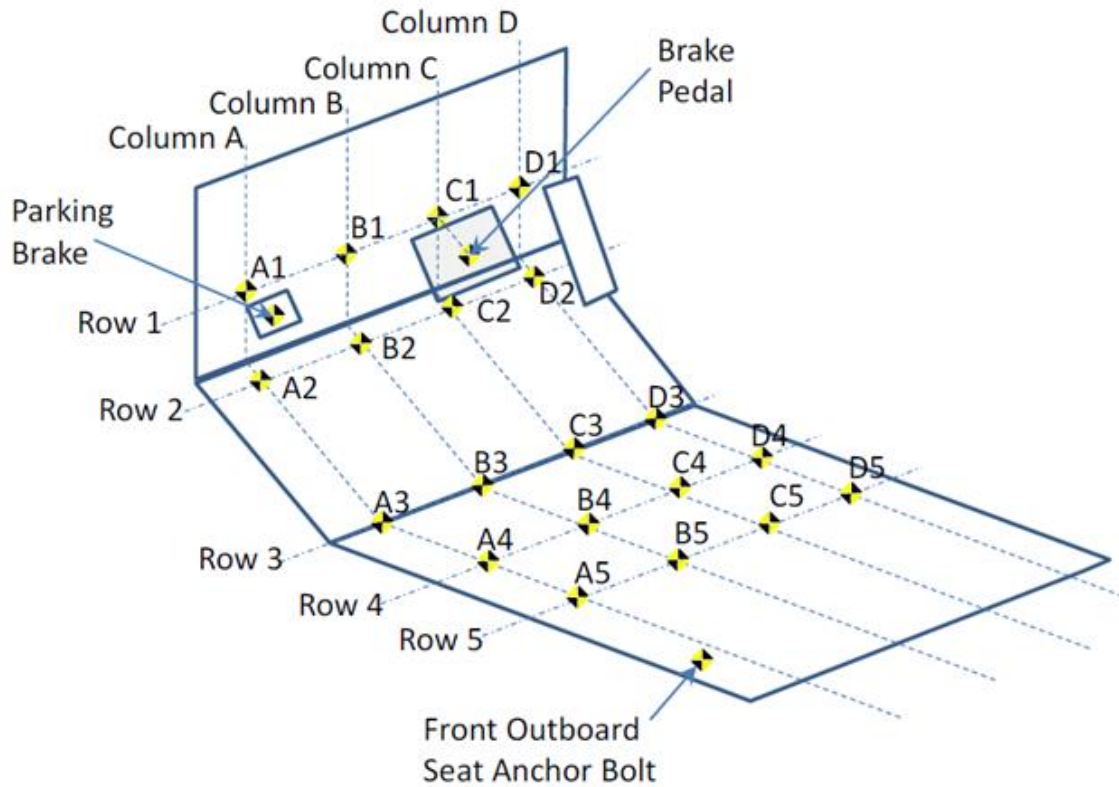
Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +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 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014



Note: See Appendix D for toe pan measuring procedure

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

DRIVER FLOOR PAN MEASUREMENTS

Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	2268	-576	949	2217	-564	931	-51	12	-18
B1	2367	-474	951	2294	-463	908	-73	11	-43
C1	2401	-323	951	2325	-310	897	-76	13	-54
D1	2403	-178	949	2354	-169	923	-49	9	-26
A2	2268	-578	1032	2248	-577	1012	-20	1	-20
B2	2318	-475	1031	2275	-469	998	-43	6	-33
C2	2317	-327	1033	2267	-320	1001	-50	7	-32
D2	2319	-174	1033	2291	-171	1023	-28	3	-10
A3	2206	-575	1126	2196	-572	1111	-10	3	-15
B3	2209	-476	1126	2198	-475	1118	-11	1	-8
C3	2204	-327	1126	2189	-326	1122	-15	1	-4
D3	2212	-174	1126	2206	-176	1135	-6	-2	9
A4	2114	-576	1155	2113	-577	1154	-1	-1	-1
B4	2108	-479	1155	2108	-481	1167	0	-2	12
C4	2112	-324	1161	2112	-327	1183	0	-3	22
D4	2113	-173	1159	2114	-176	1182	1	-3	23
A5	2014	-576	1161	2014	-578	1163	0	-2	2
B5	2012	-477	1160	2011	-478	1167	-1	-1	7
C5	2011	-325	1163	2012	-327	1182	1	-2	19
D5	2012	-174	1162	2013	-177	1182	1	-3	20
Brake Pedal	2148	-327	950	2157	-349	984	9	-22	34
Driver IP Left	1835	-513	666	1827	-526	665	-8	-13	-1
Driver IP Right	1827	-215	664	1820	-226	673	-7	-11	9
DOLP	1837	-615	647	1826	-628	651	-11	-13	4
Steering Column	1605	-363	492	1616	-404	485	11	-41	-7
Front Outboard Bolt	1591	-606	1064	1591	-605	1065	0	1	1
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 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

PASSENGER FLOOR PAN MEASUREMENTS

Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	2385	220	950	2301	283	909	-84	63	-41
B1	2400	371	951	2395	384	945	-5	13	-6
C1	2318	523	948	2322	541	949	4	18	1
D1	2258	625	950	2265	644	951	7	19	1
A2	2311	221	1033	2275	253	1015	-36	32	-18
B2	2311	372	1033	2311	384	1032	0	12	-1
C2	2308	521	1032	2306	533	1031	-2	12	-1
D2	2245	623	1033	2250	639	1034	5	16	1
A3	2214	223	1125	2216	234	1126	2	11	1
B3	2206	371	1126	2207	384	1128	1	13	2
C3	2224	523	1126	2223	535	1127	-1	12	1
D3	2198	622	1125	2199	632	1126	1	10	1
A4	2117	222	1161	2120	233	1165	3	11	4
B4	2117	371	1158	2119	381	1160	2	10	2
C4	2116	522	1155	2117	532	1157	1	10	2
D4	2114	623	1161	2114	634	1161	0	11	0
A5	2016	221	1162	2020	232	1166	4	11	4
B5	2015	371	1163	2018	381	1166	3	10	3
C5	2015	521	1162	2015	531	1164	0	10	2
D5	2016	621	1162	2015	631	1164	-1	10	2
Pass IP Left	1833	219	681	1840	216	681	7	-3	0
Pass IP Right	1866	520	682	1866	516	687	0	-4	5
PORP	1854	621	648	1852	617	657	-2	-4	9
Front Outboard Bolt	1591	610	1065	1591	616	1066	0	6	1

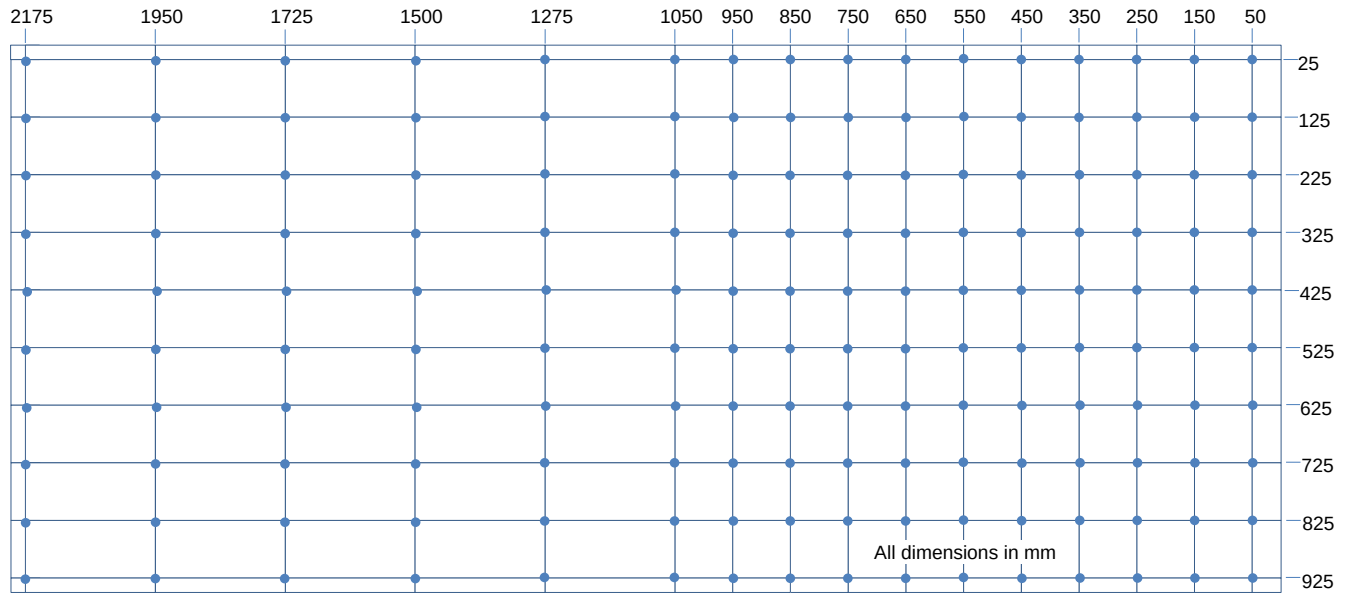
Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +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 Mazda3 four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
Test Date: 6/20/2014



	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
R10	-1.7	-3.3	-3.2	-3.1	-3.1	-3.0	-2.9	-2.8	-2.9	-3.1	-3.2	-1.2	-1.5	-0.6	0.2	3.4
R9	-3.2	-3.0	-2.7	-2.7	-2.9	-2.5	-2.4	-2.4	-2.3	-1.9	-1.0	0.2	2.3	3.4	6.6	20.7
R8	-2.7	-2.4	-2.5	-2.3	-2.3	-2.1	0.2	-1.8	3.9	17.9	14.6	17.6	11.4	15.8	29.4	54.6
R7	-2.2	-2.1	-2.1	-2.0	-2.0	-1.7	-1.3	-0.7	0.4	27.3	33.2	37.8	33.6	51.9	73.2	116.9
R6	-1.9	-1.5	-1.6	-1.7	-1.5	-1.4	-1.2	-0.6	1.1	3.5	12.3	37.8	58.5	94.2	135.7	167.5
R5	-1.5	-1.6	-1.2	-1.0	-1.0	-0.7	-0.5	2.4	75.3	23.0	-15.3	4.3	66.3	305.0	223.2	225.9
R4	-0.9	-0.7	-0.5	-0.4	-0.5	-0.1	0.0	22.0	118.9	51.1	-10.1	-33.3	26.3	284.8	237.7	249.4
R3	-0.6	-0.2	0.0	0.0	0.0	0.4	0.9	56.6	161.1	87.8	7.9	-73.9	-5.3	259.6	250.7	245.6
R2	0.5	0.7	0.6	0.5	0.5	0.7	11.5	81.3	187.8	115.8	25.1	-56.3	61.6	224.7	239.8	238.4
R1	1.3	1.6	1.4	1.4						133.3	27.9	30.1	26.0	22.1	171.8	185.7

*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 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014

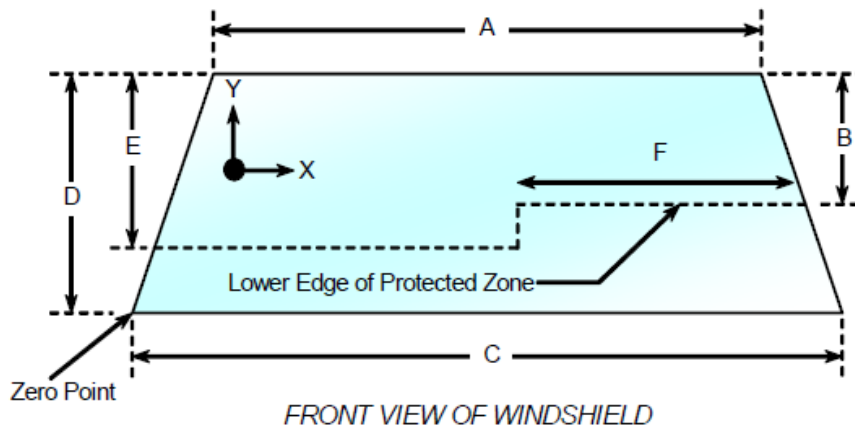
Please provide windshield mounting details. A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

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	2173	1696	78.0%
Right Side	2173	1966	90.5%
Total	4346	3662	84.3%



Item	Units	Value
A	mm	1245
B	mm	465
C	mm	1445
D	mm	828
E	mm	472
F	mm	560

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 Mazda3 four door sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
Test Date: 6/20/2014

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

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

Test Time: 1:27 PM

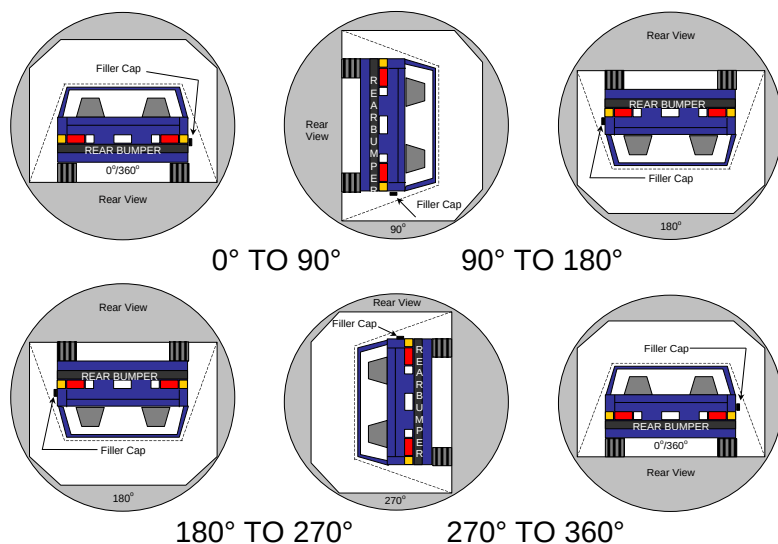
Stoddard Solvent Spillage Measurements

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

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

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014



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°	68	300	368
90° to 180°	62	300	362
180° to 270°	61	300	361
270° to 360°	68	300	368

FMVSS 301 SPILLAGE TABLE

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

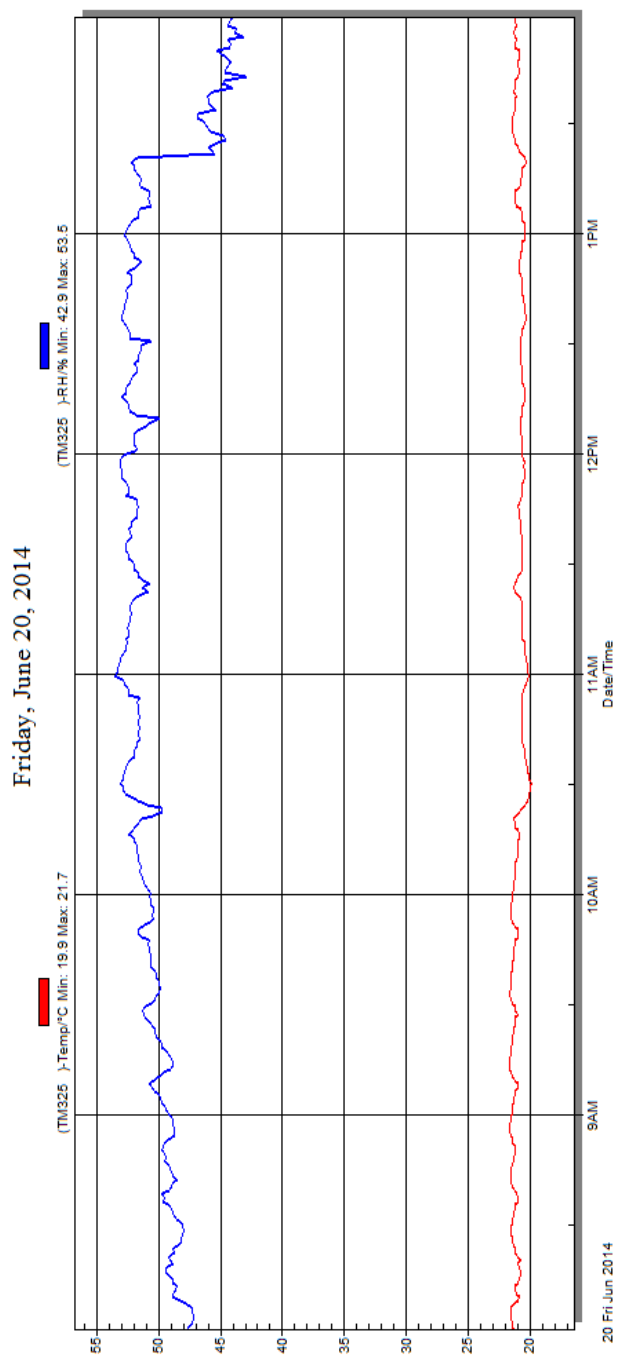
SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle: 2014 Mazda3 four door sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: R20145400
 Test Date: 6/20/2014



Temperature Stabilization Chart/Data

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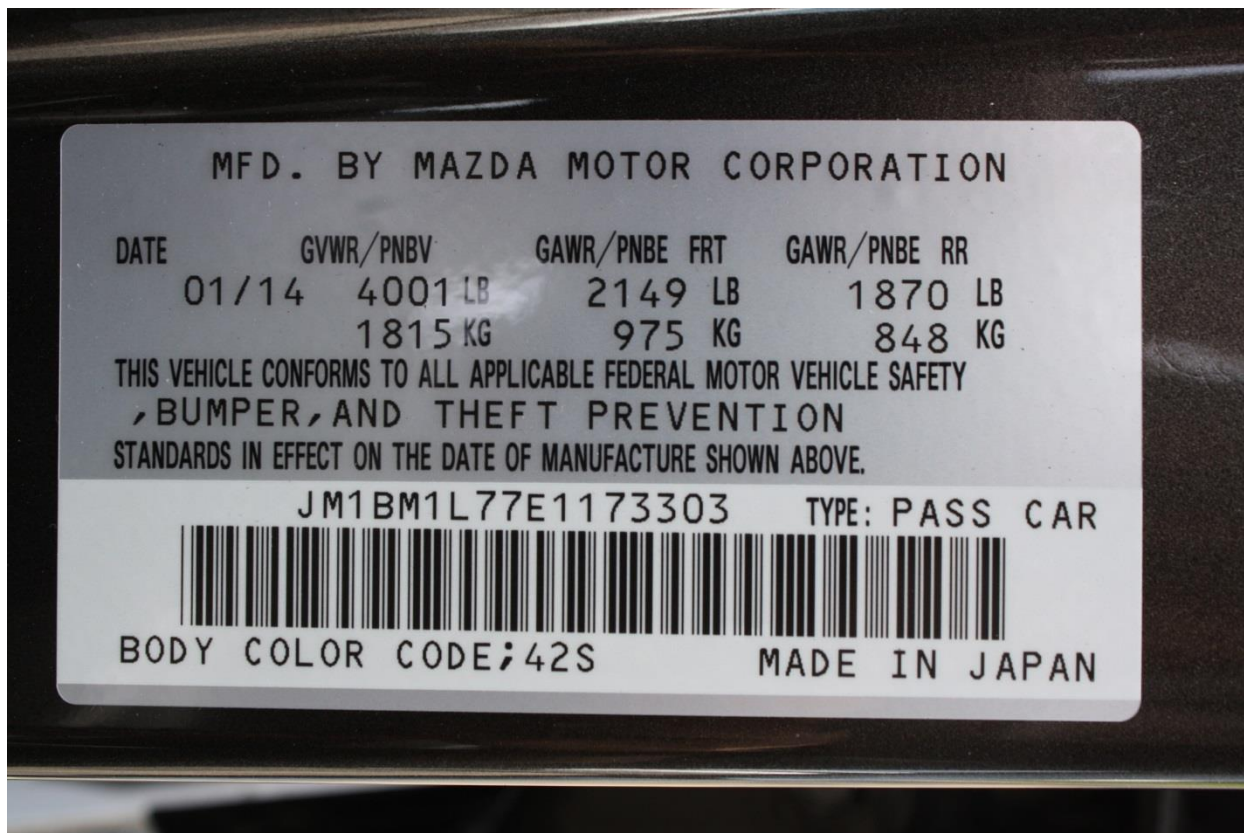
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183	Vehicle at 270 Degrees on Static Rollover Device	A-104
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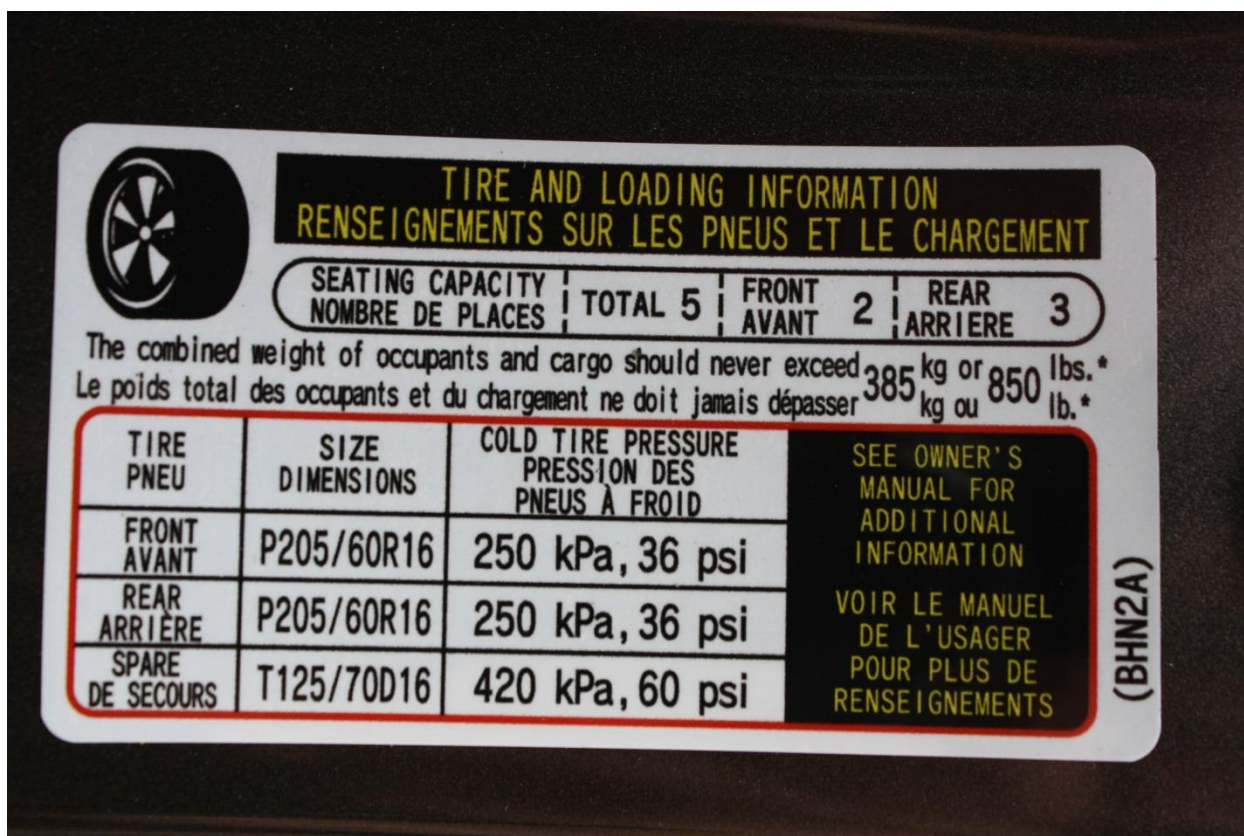
No. 001 As Delivered Right Front 3-4 View of Test Vehicle



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



No. 003 Test Vehicle Certification Label



No. 004 Test Vehicle Tire Placard



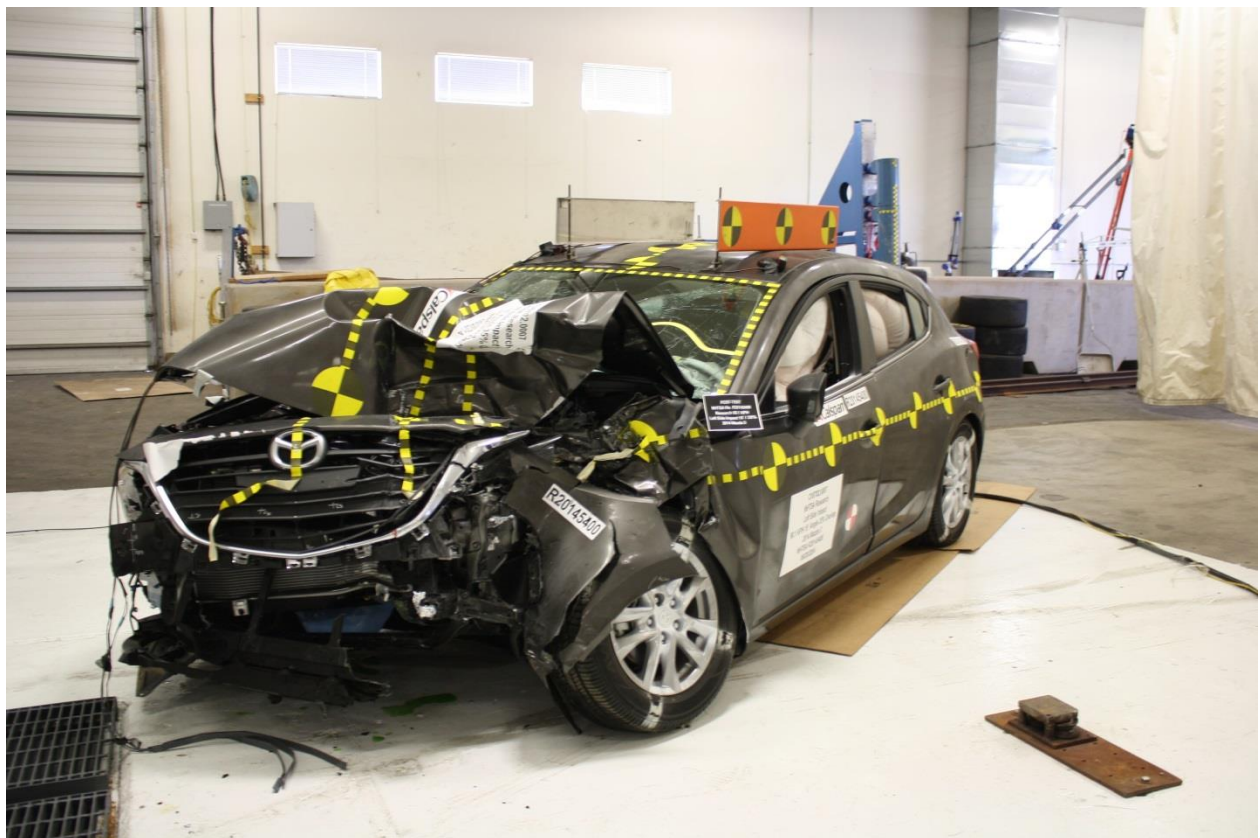
No. 005 Pre-Test Front View of Test Vehicle



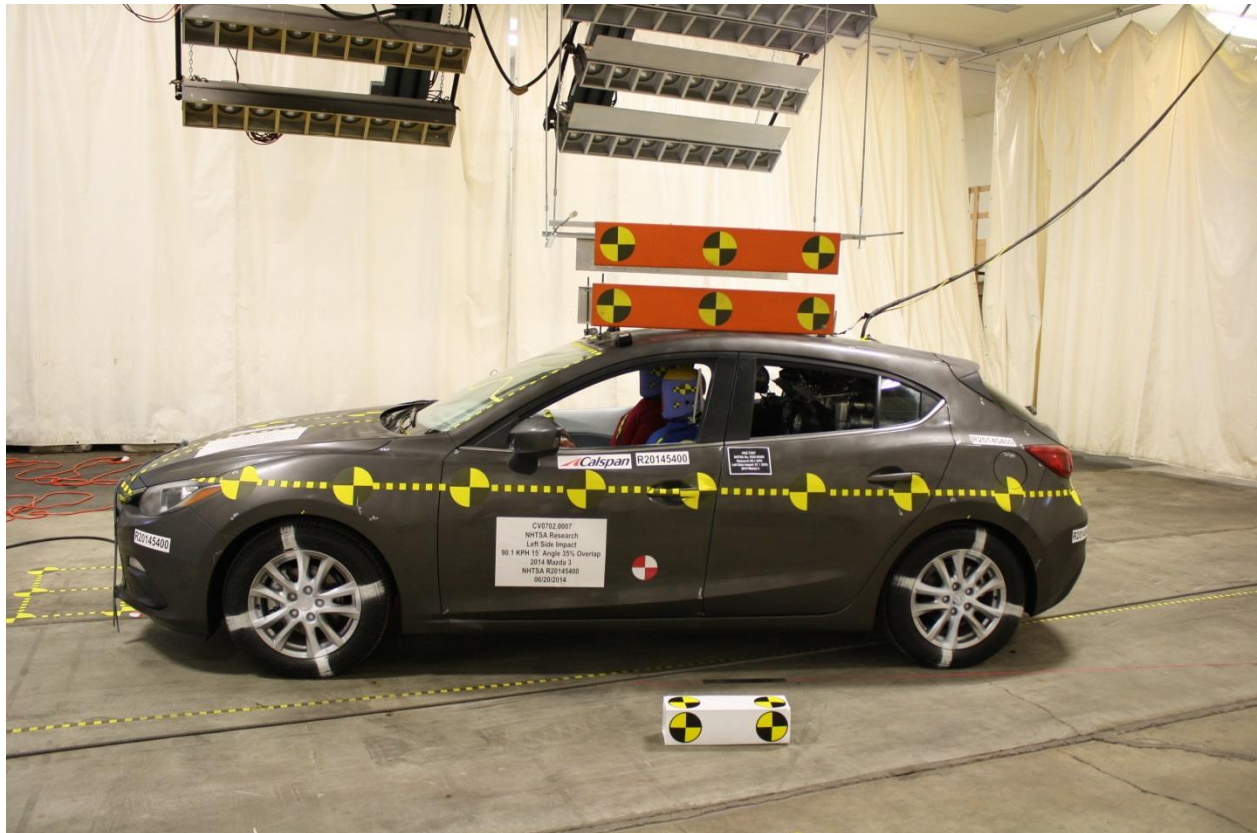
No. 006 Post-Test Front View of Test Vehicle



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



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



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



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



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



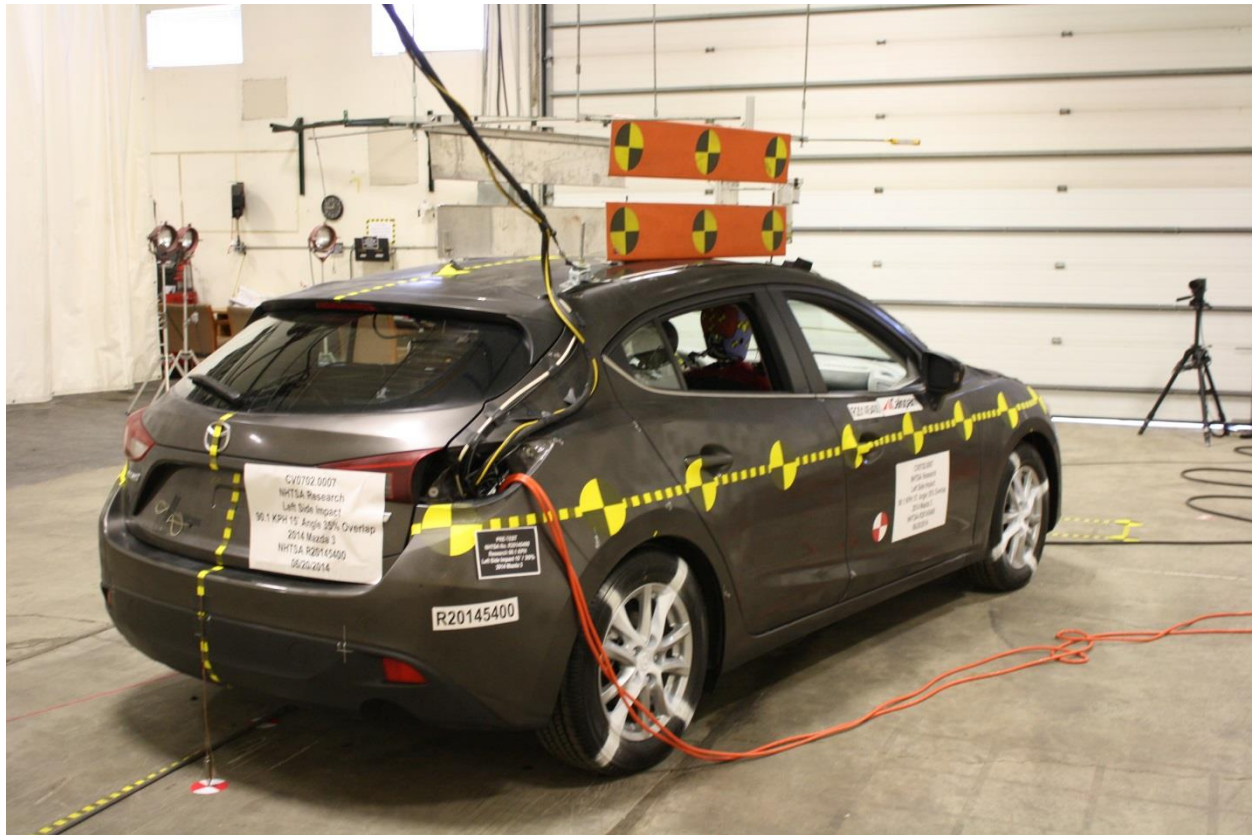
No. 012 Post-Test Left Rear 3-4 View of Test Vehicle



No. 013 Pre-Test Rear View of Test Vehicle



No. 014 Post-Test Rear View of Test Vehicle



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



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



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



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



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



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





Scan for Vehicle Info and offers
 

EPA DOT Fuel Economy and Environment

Fuel Economy

33 MPG

combined city/hwy

30 city

40 highway

3.0 gallons per 100 miles

Annual fuel cost \$1,600

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 \$11,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.50 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuel economy.gov

Calculate personalized estimates and compare vehicles

Gasoline Vehicle

You save \$3,500

in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$1,600

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 \$11,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.50 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

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Calculate personalized estimates and compare vehicles

Parts Content Information:

FOR VEHICLES IN THIS COUNTRY: U.S./CANADIAN PARTS CONTENT: 0% MAJOR SOURCES OF FOREIGN PARTS CONTENT: JAPAN 85%

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

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

This label is affixed pursuant to the Federal Automobile Disclosure Act, Gasoline, License and Title laws, State and Local laws, and Dealer installed options are not included.

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score Not Rated

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

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

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

2014 Mazda3

Model: 2014 MAZDA3 I 5-DOOR TOURING

Exterior Color: TITANIUM FLASH MICA

Interior Color: BLACK

STANDARD EQUIPMENT

ENGINE/MECHANICAL FEATURES

- SKYACTIV-G 2.0L DOHC 4-CYL. ENGINE
- SKYACTIV-DRIVE 6-SPEED AUTO TRANS
- 155 HORSEPOWER, 150 LB-FT TORQUE

EXTERIOR FEATURES

- 16-ALLOY WHEELS
- P205/60 R16 ALL-SEASON TIRES
- VARIABLE INTERMITTENT WIPERS
- POWER SIDE MIRRORS W/TURN LAMPS
- HEATED SIDE MIRRORS
- DUAL EXHAUST W/BRIGHT OUTLETS

INTERIOR FEATURES

- PREMIUM CLOTH-TRIMMED SPORT SEATS
- 6-WAY MANUAL DRIVER'S SEAT
- AIR CONDITIONING W/POLLEN FILTER
- POWER AUTOMATIC DOOR LOCKS
- POWER WINDOWS W/DRIVER ONE-TOUCH
- ADVANCED KEYLESS ENTRY SYSTEM
- PUSH BUTTON ENGINE START
- 60/40 SPLIT FOLD-DOWN REAR SEAT
- REAR SEAT ARMREST W/CUPHOLDERS
- DUAL MAP LIGHTS/VANITY MIRRORS
- CARPETED FLOOR MATS

SAFETY AND SECURITY FEATURES

- 36-MONTH/36,000 MILE "BUMPER-TO-BUMPER" WARRANTY
- 60-MONTH/60,000 MILE POWERTRAIN WARRANTY
- 24-HOUR ROADSIDE ASSISTANCE
- 5-PASSENGER 3-POINT SAFETY BELTS
- LATCH CHILD SAFETY SEAT ANCHORS
- ANTI-THIEF ENGINE IMMOBILIZER
- BLIND SPOT MONITORING
- REAR CROSS TRAFFIC ALERT

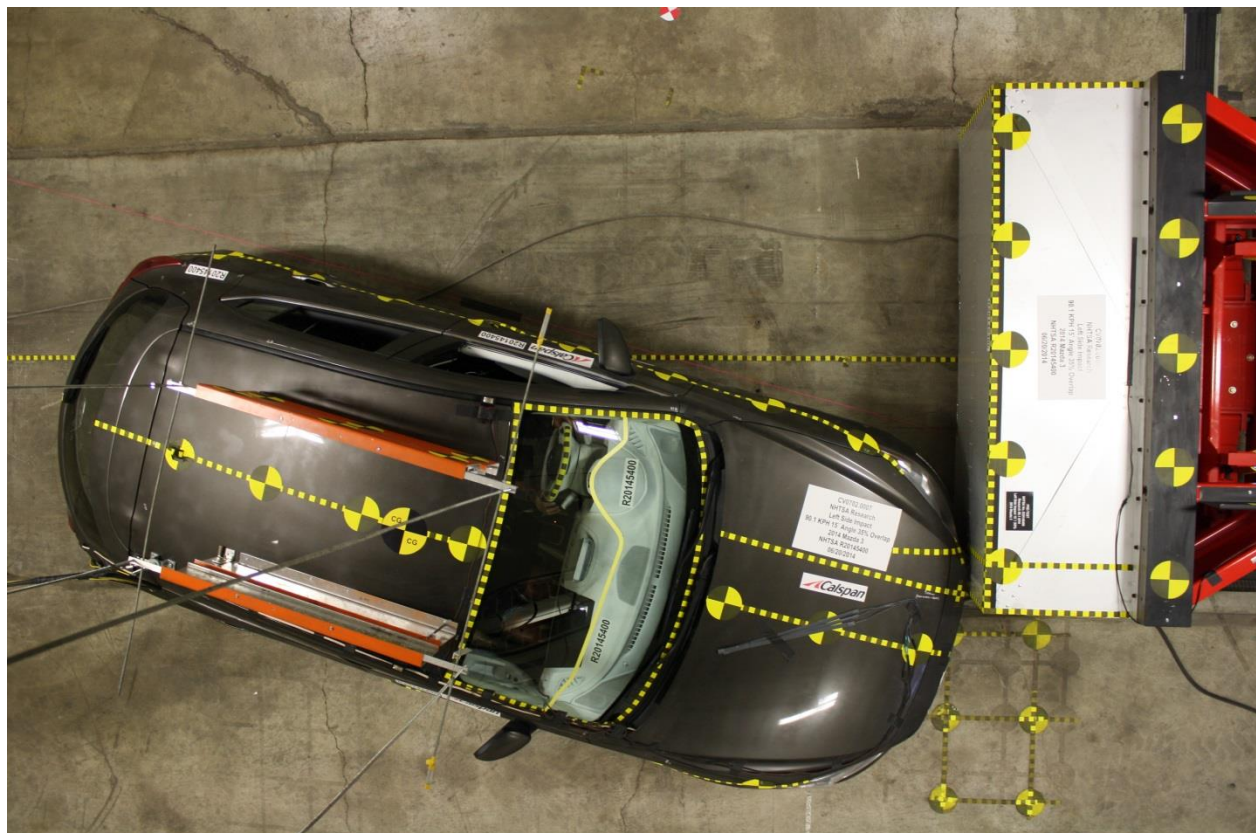
OPTIONAL EQUIPMENT

WLK WHEEL LOCKS \$55

Total Vehicle and Options Delivery, Processing and Handling Fee \$21,200 \$795

Total MSRP \$21,995

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



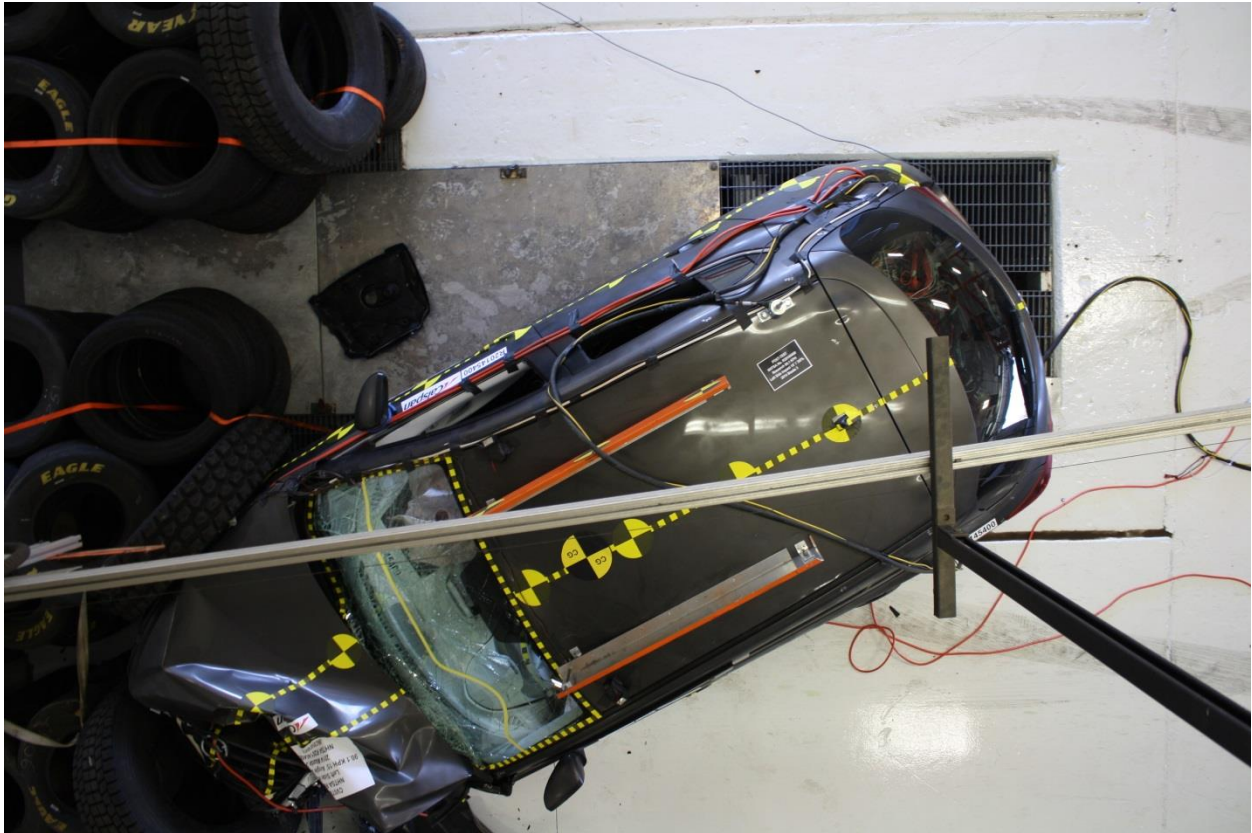
No. 024 Pre-Test Right Side View of RMDB against target vehicle at ideal Impact Point



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



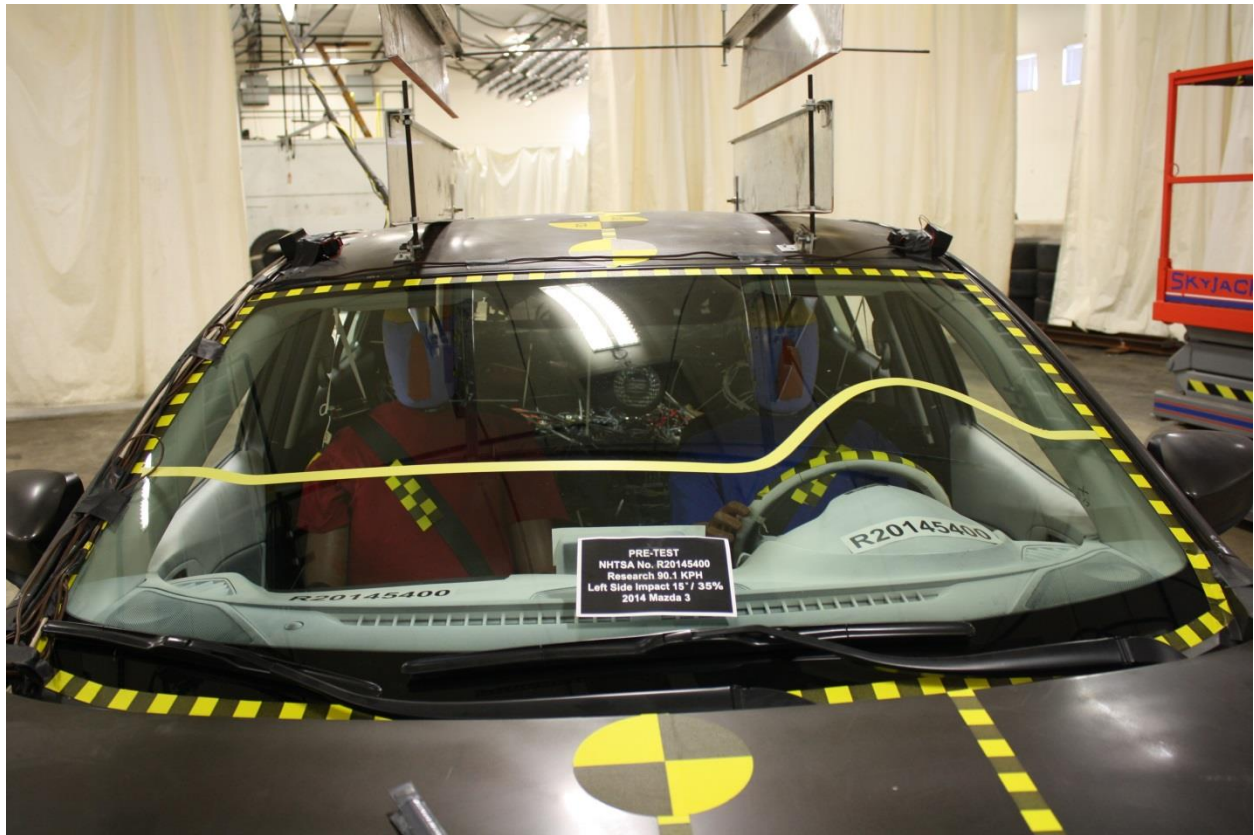
No. 029 Post-Test Close-up View of Driver Door Latch



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



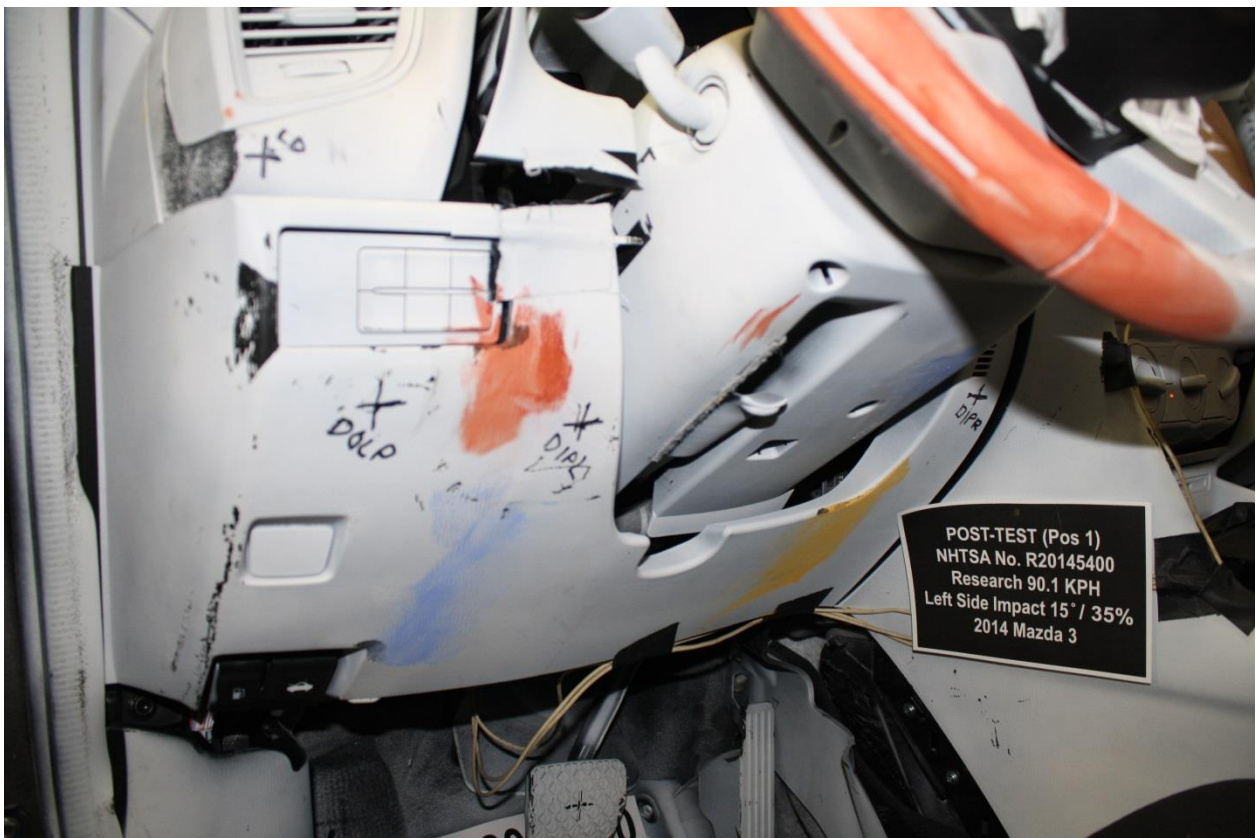
No. 038 Pre-Test Overall View of Driver Knee Bolsters



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



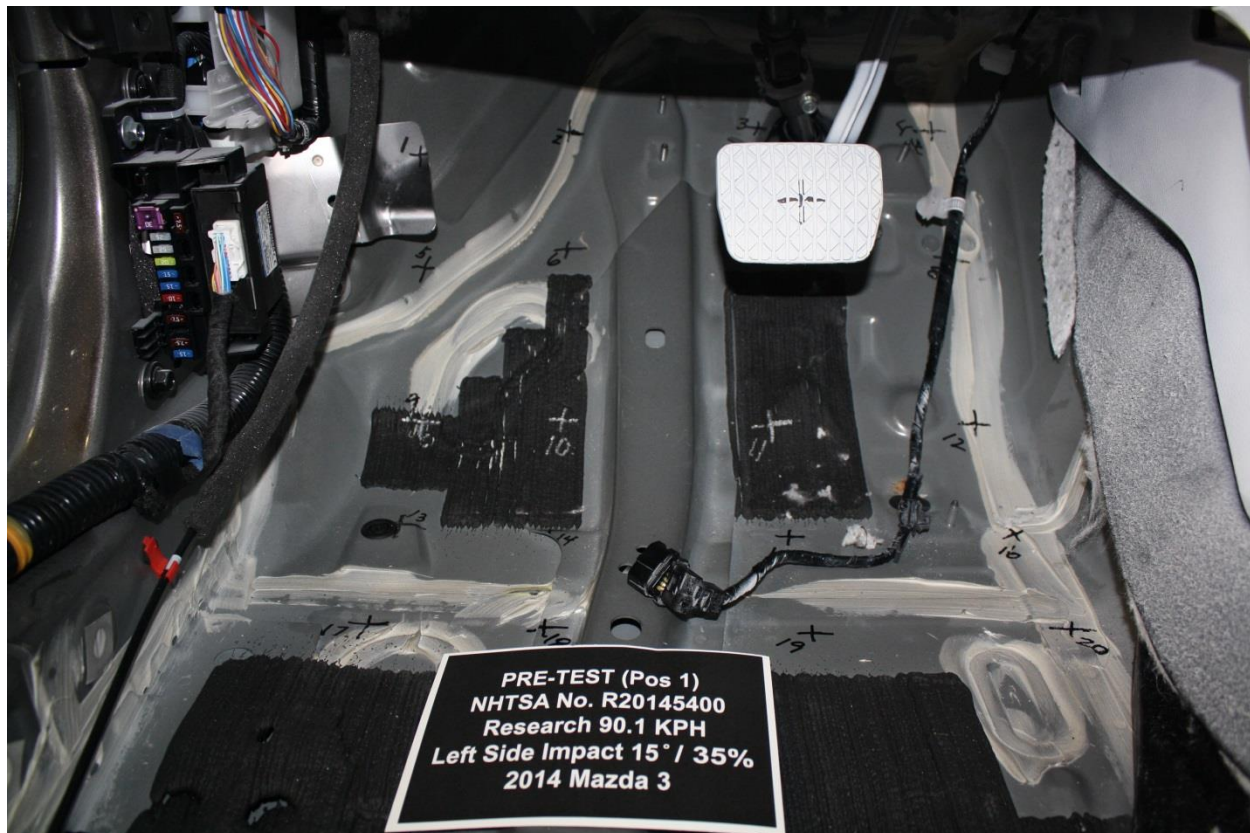
No. 047 Post-Test view of Driver Floor pan at Mid seat level, w/carpet



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



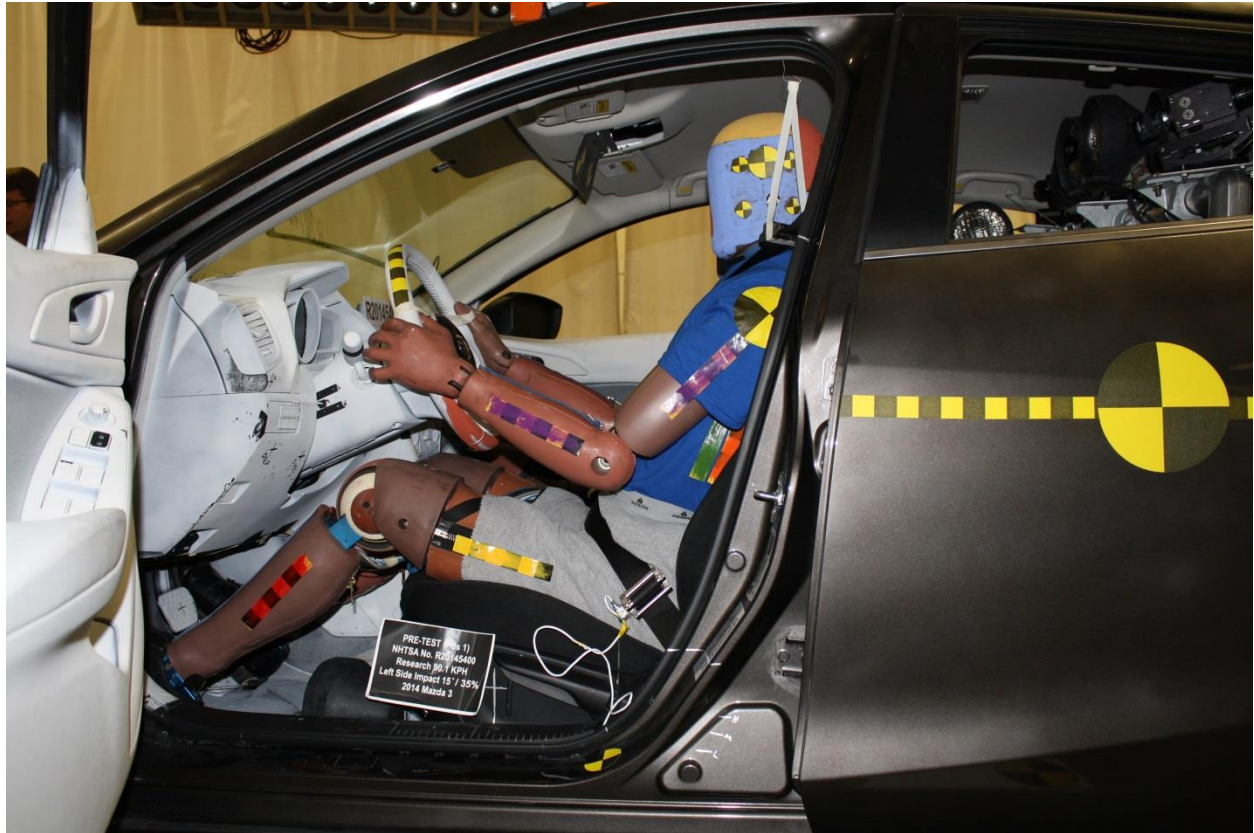
No. 051 Post-Test view of Driver Floor pan at Mid seat level, w/o carpet



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



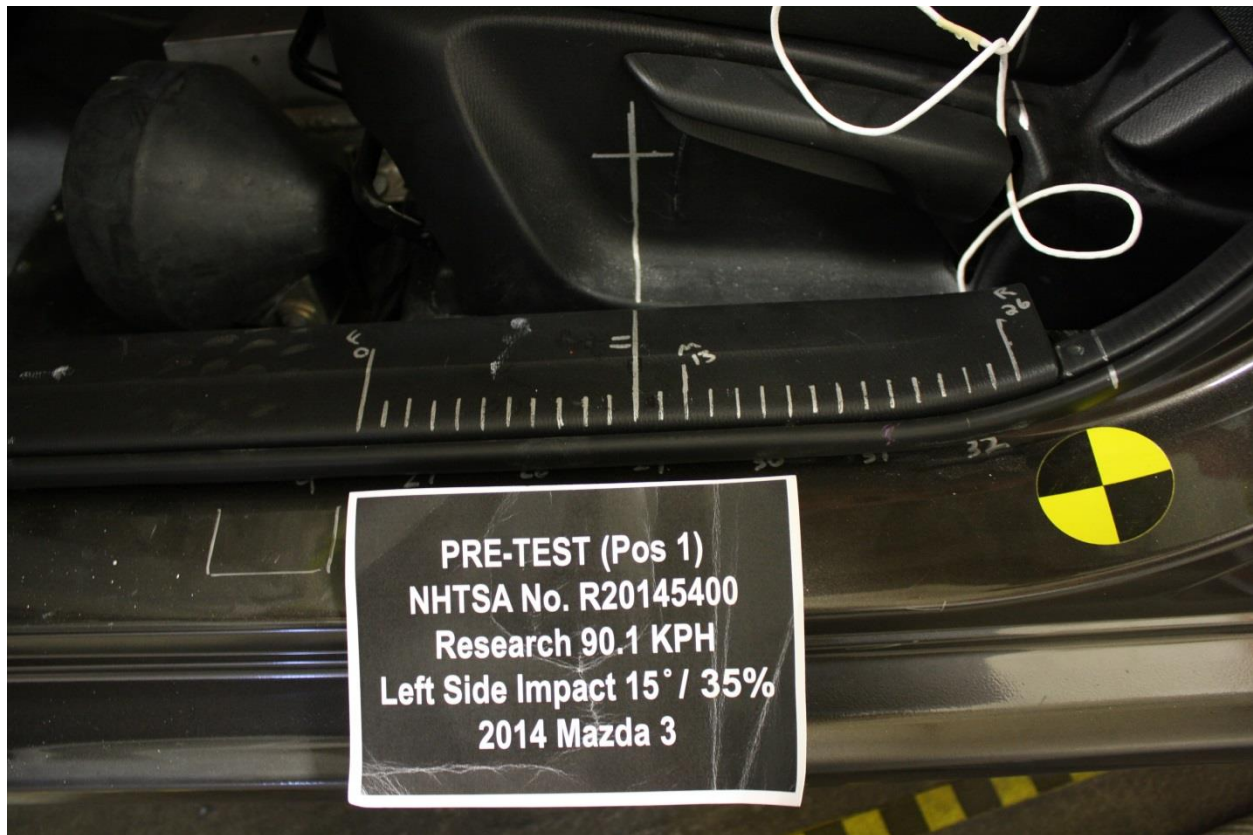
No. 060 Pre-Test View of Driver Door Clearance



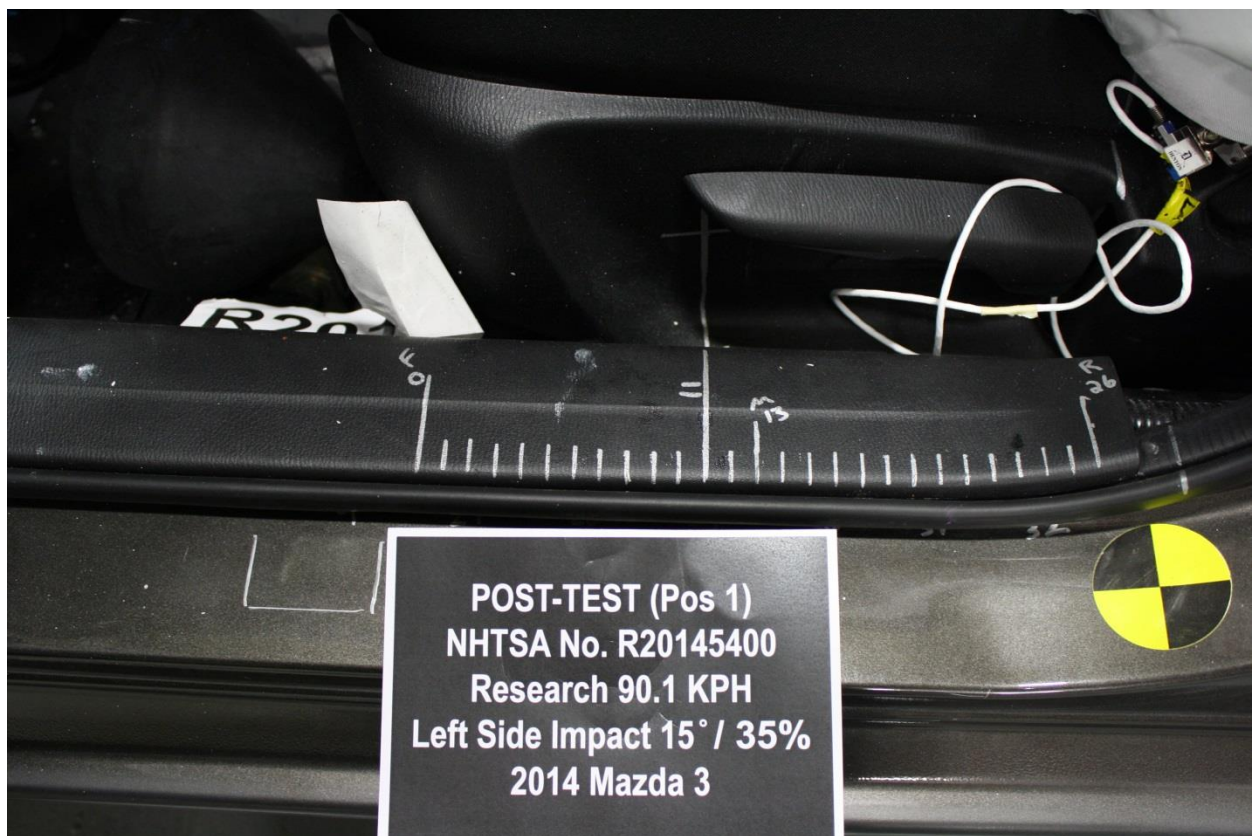
No. 061 Post-Test View of Driver Door Clearance



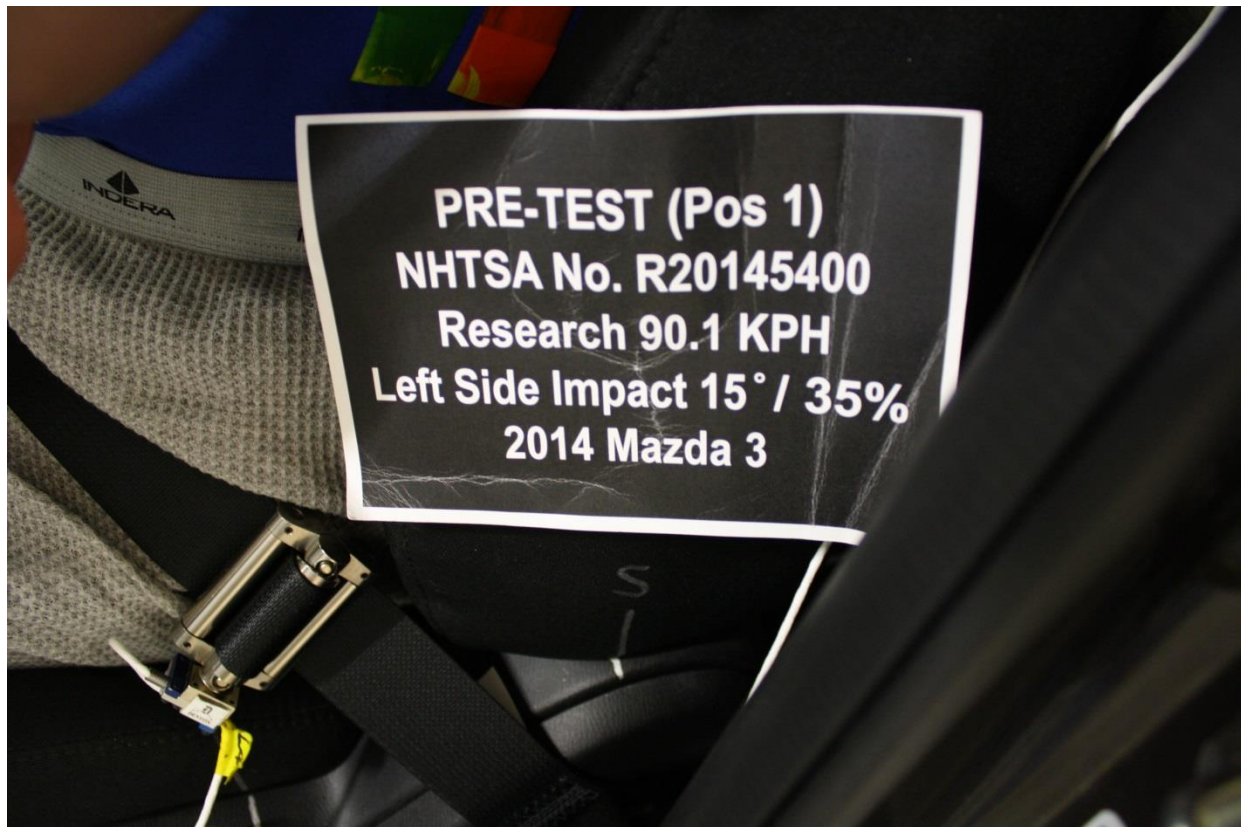
No. 062 Pre-Test View of Parking Brake



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



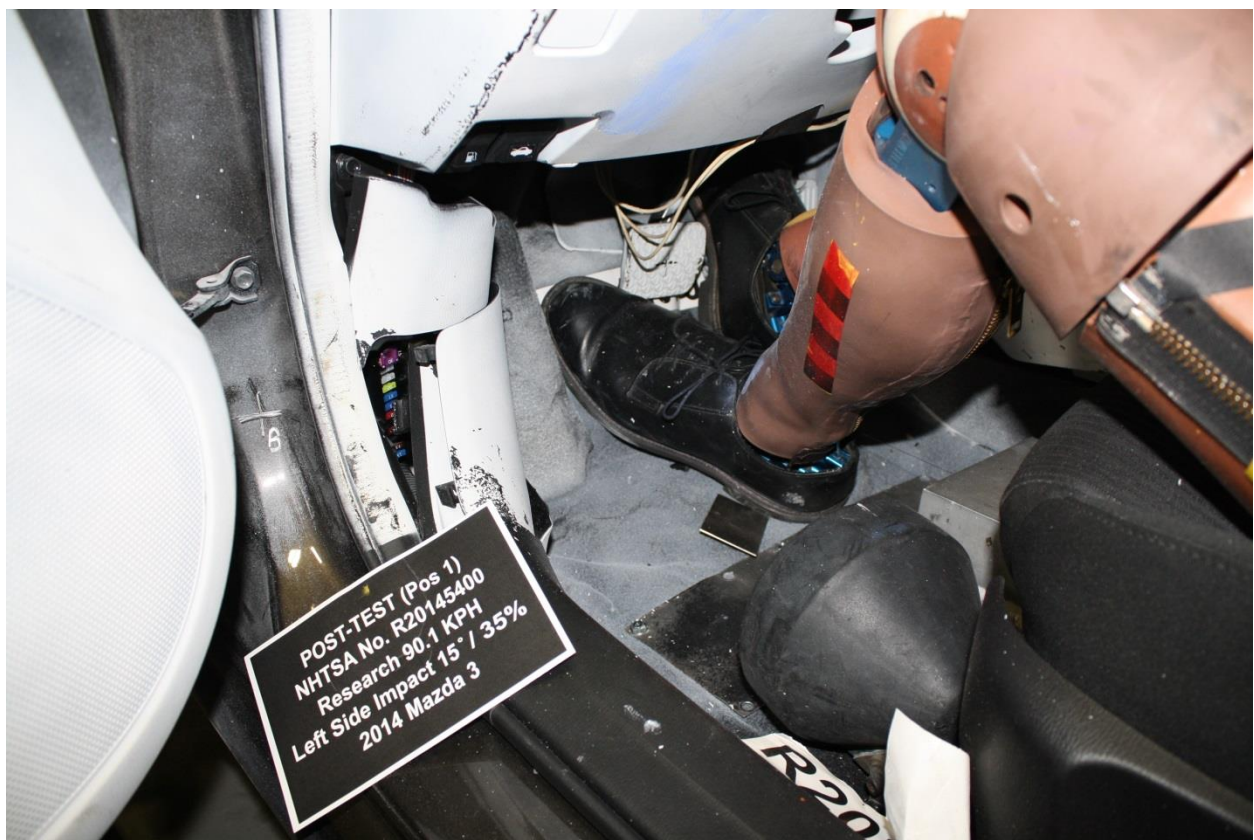
No. 067 Pre-Test Driver Adjustable D-Ring



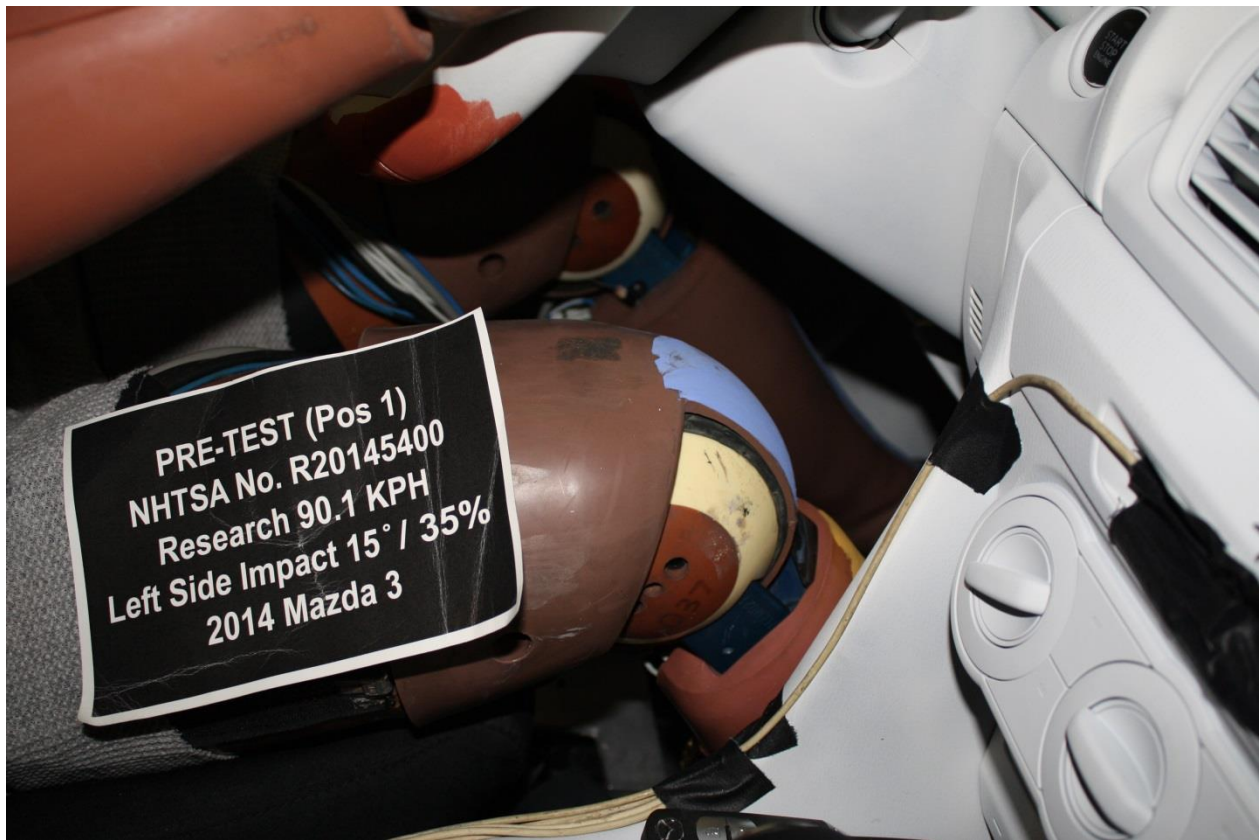
No. 068 Post-Test Driver Adjustable D-Ring



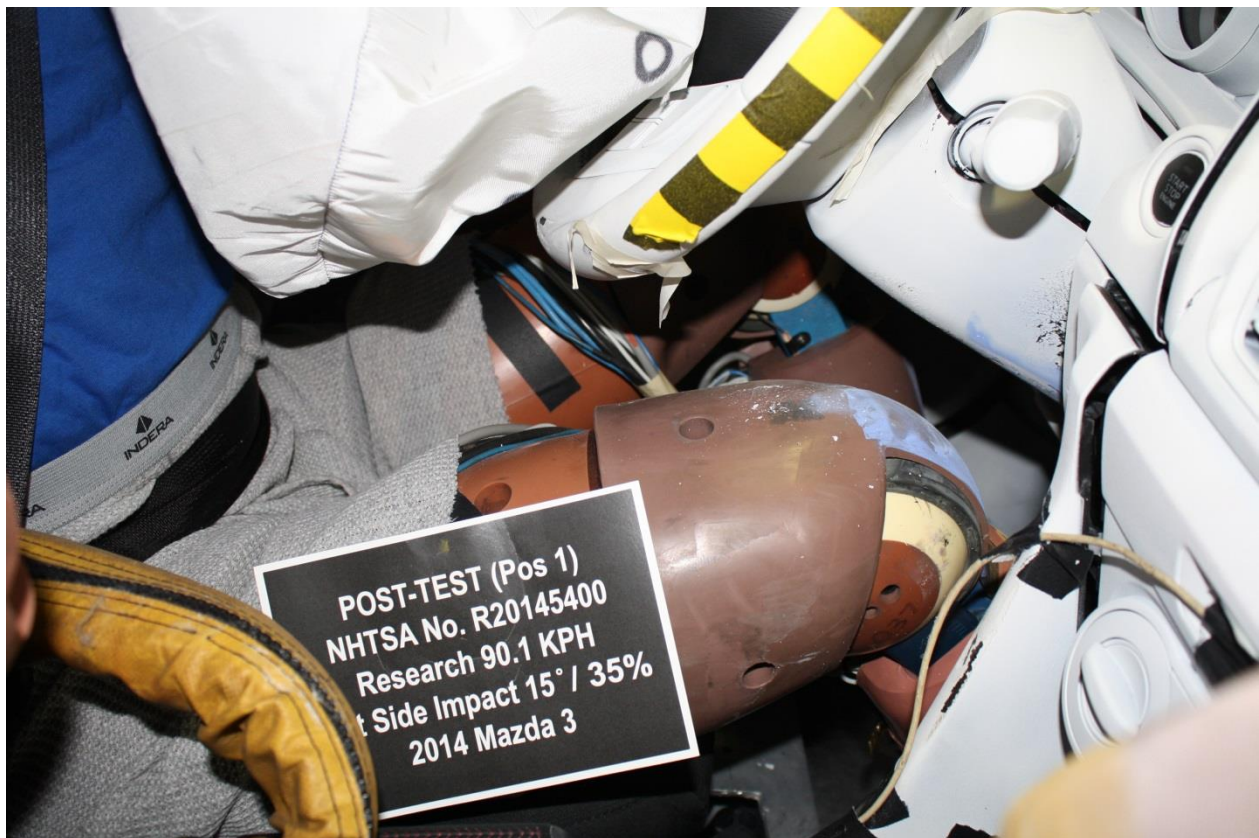
No. 069 Pre-Test Driver Feet



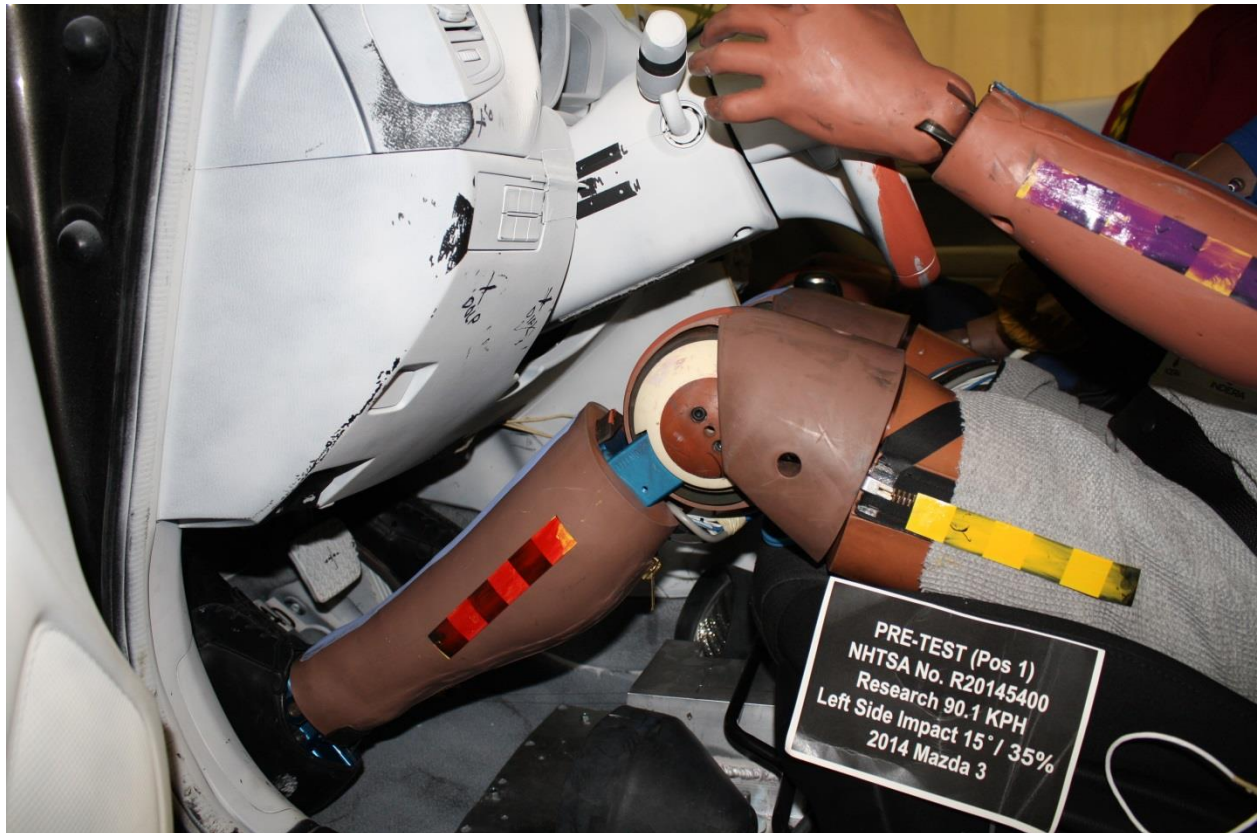
No. 070 Post-Test Driver Feet



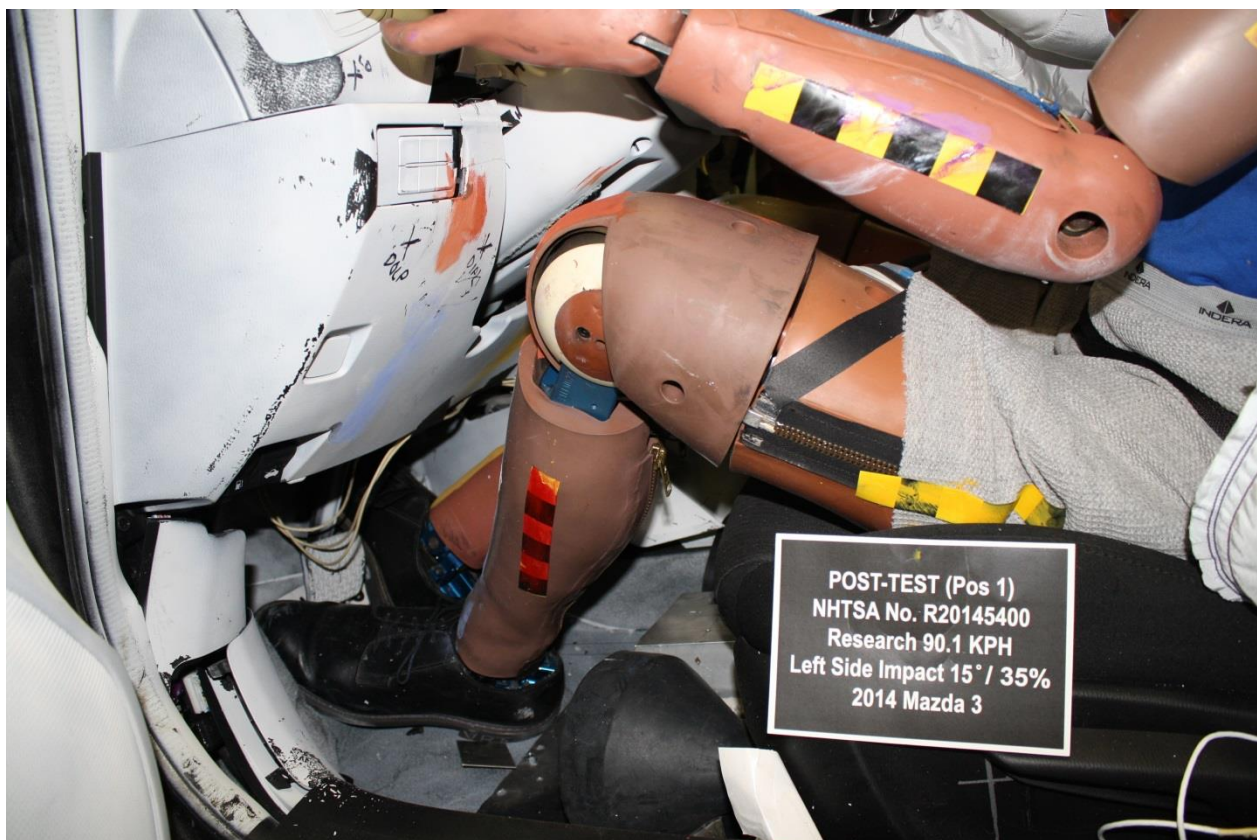
No. 071 Pre-Test View of Driver Right Knee and Bolster



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



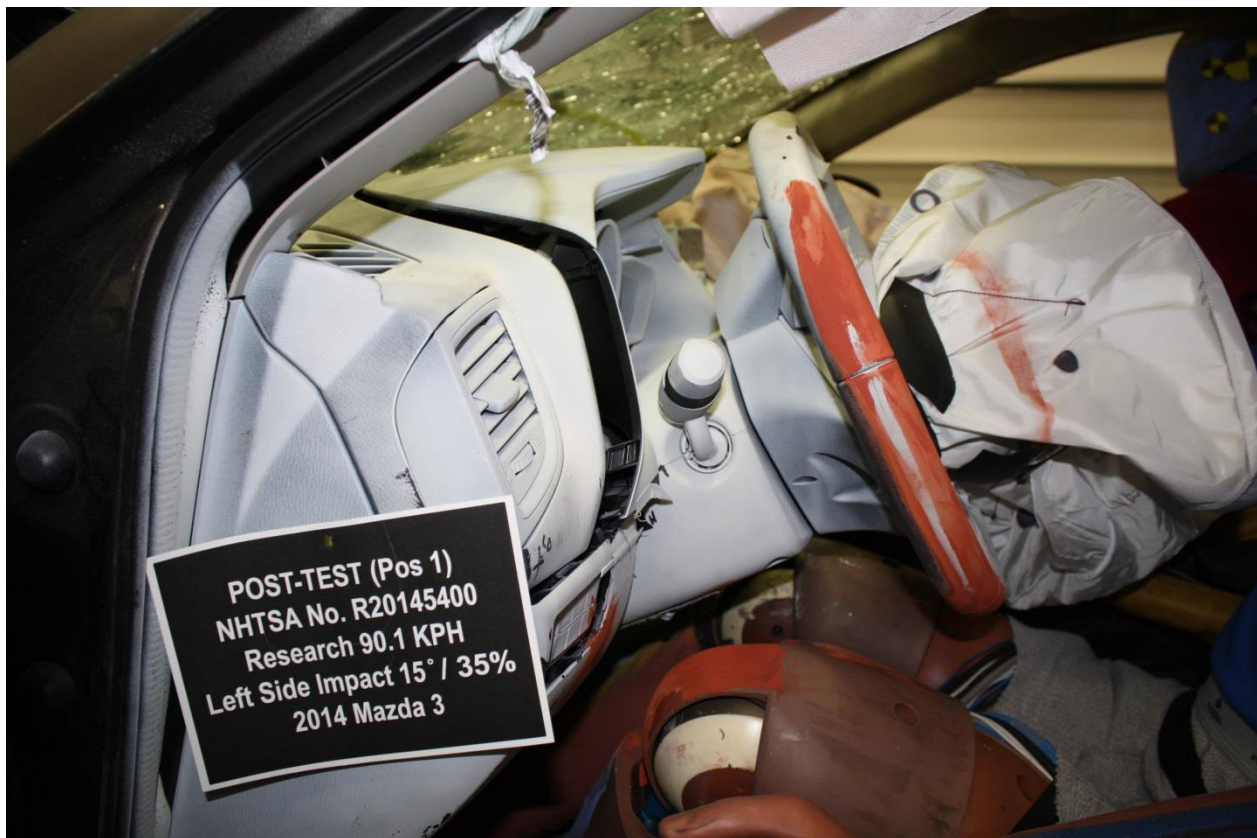
No. 075 Pre-Test View of Driver Abdomen



No. 076 Post-Test View of Driver Abdomen



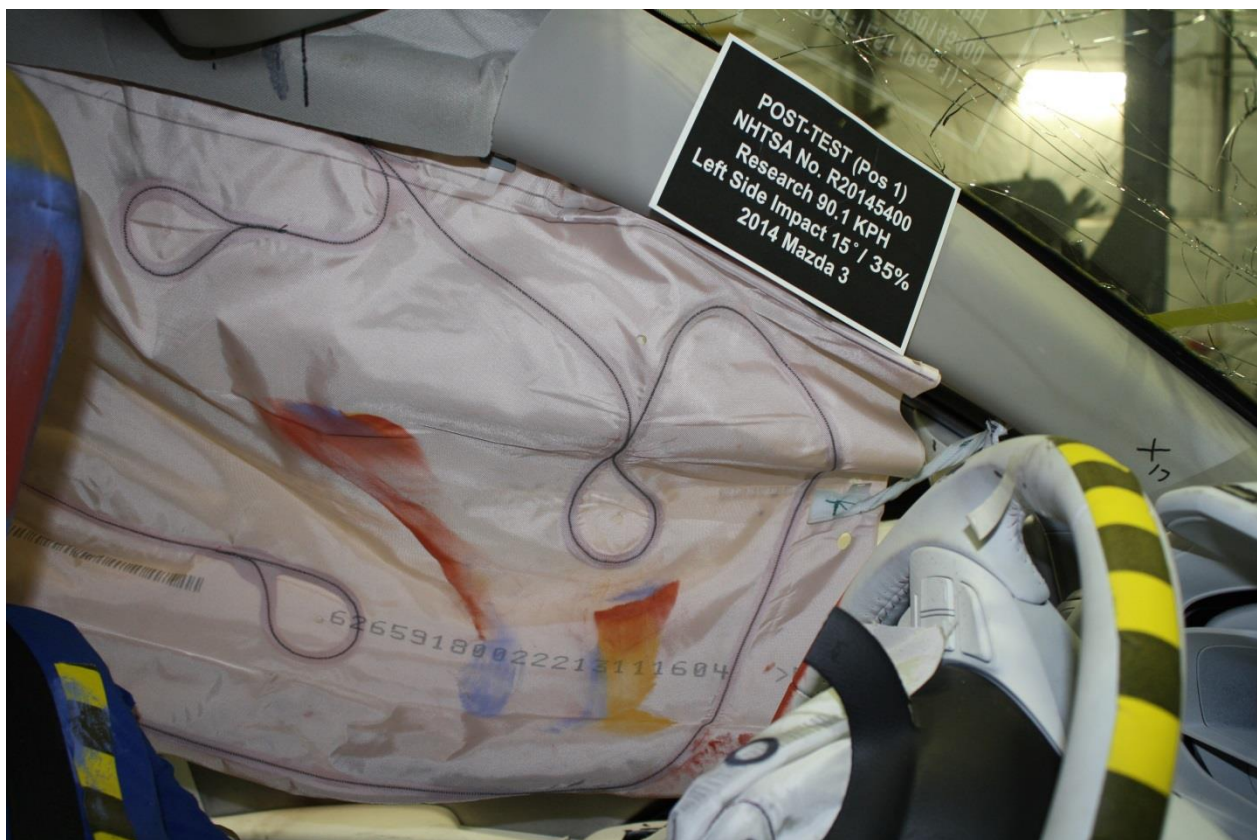
No. 077 Pre-Test Left Side View of Steering Wheel set position



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

Photo Not Applicable

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

Photo Not Applicable

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



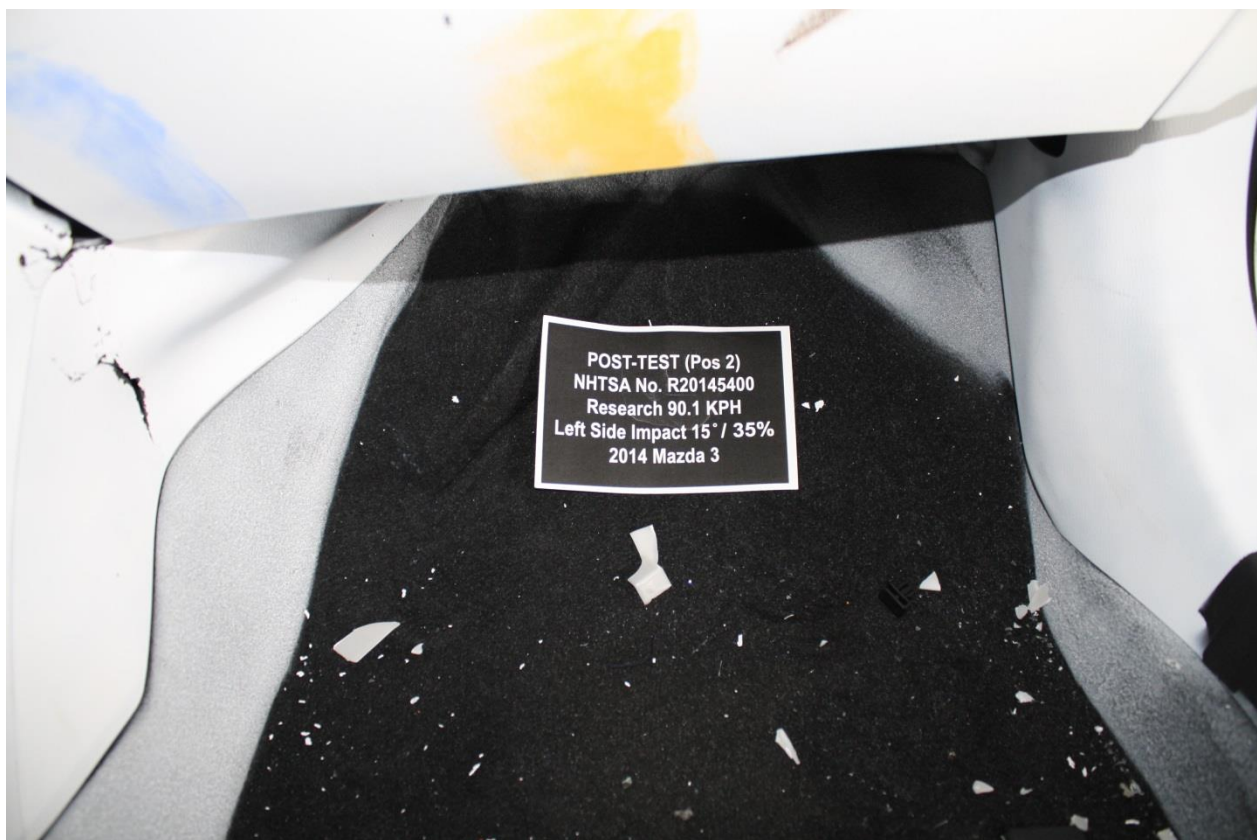
No. 088 Pre-Test View of Passenger Floor pan at Left sill level, w/carpet



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



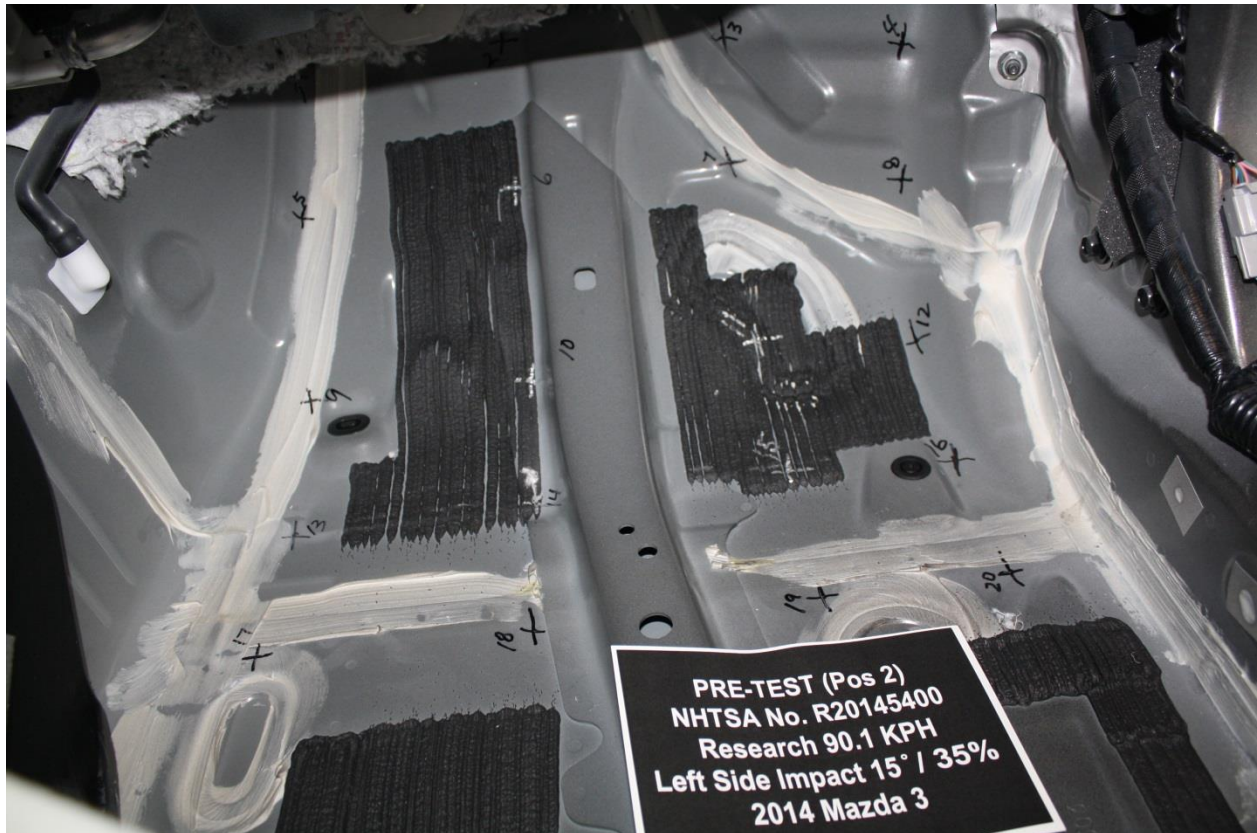
No. 091 Post-Test view of Passenger Floor pan at Mid seat level, w/carpet



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



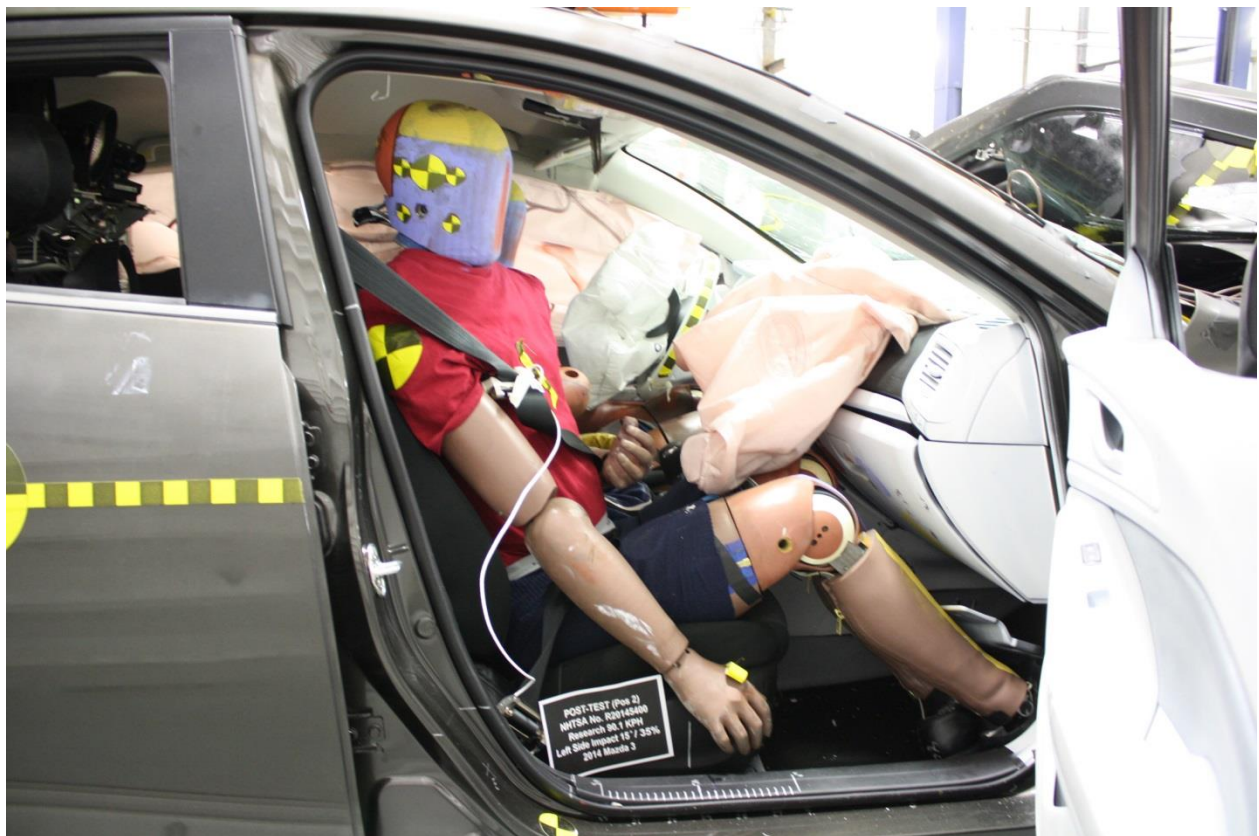
No. 100 Pre-Test Right Side Passenger Window View



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



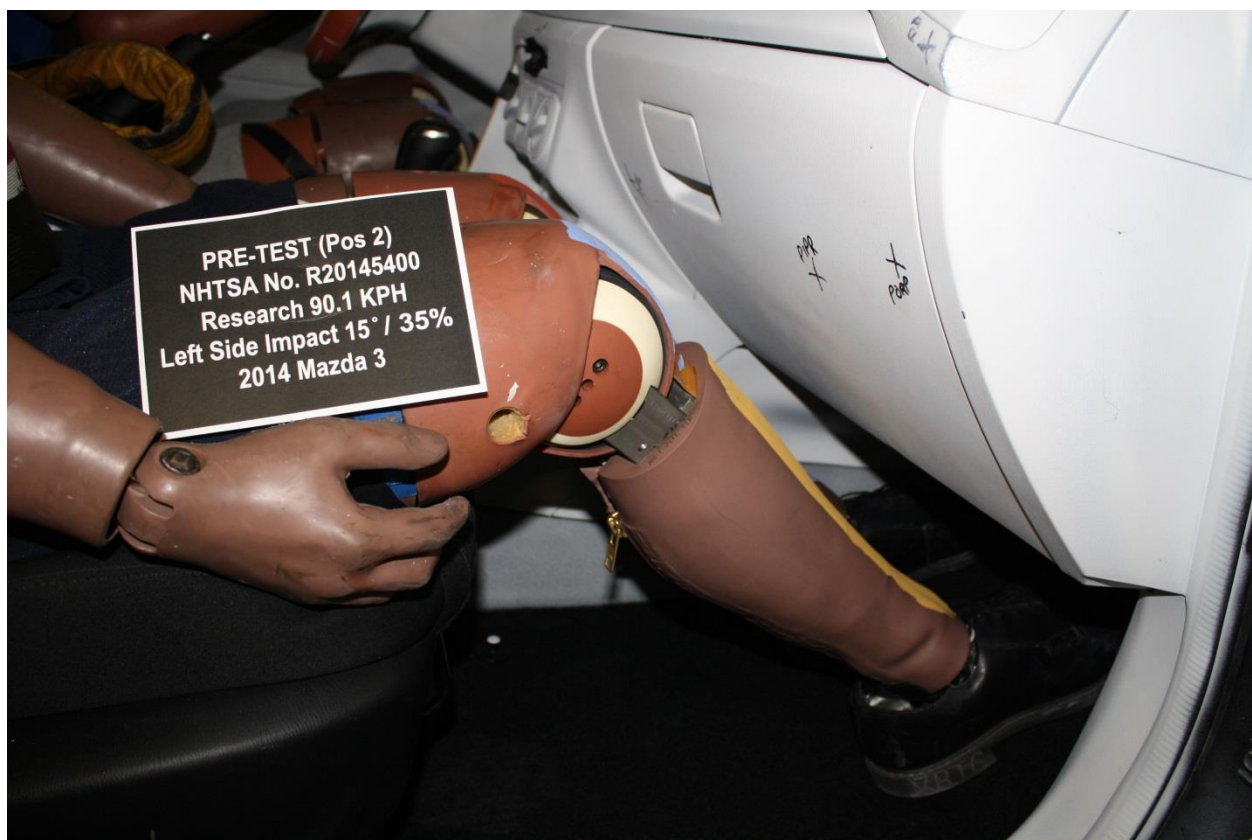
No. 111 Post-Test Passenger Adjustable D-ring



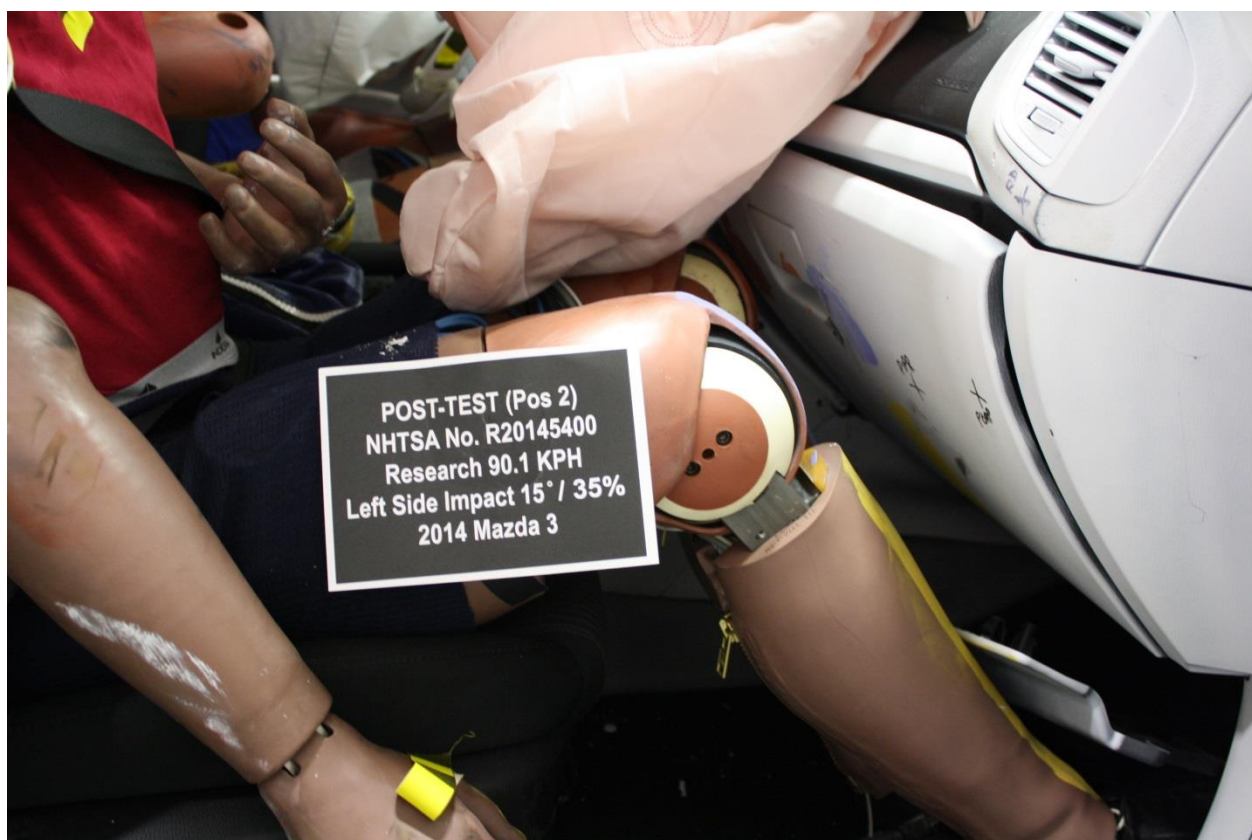
No. 112 Pre-Test View of Passenger Feet



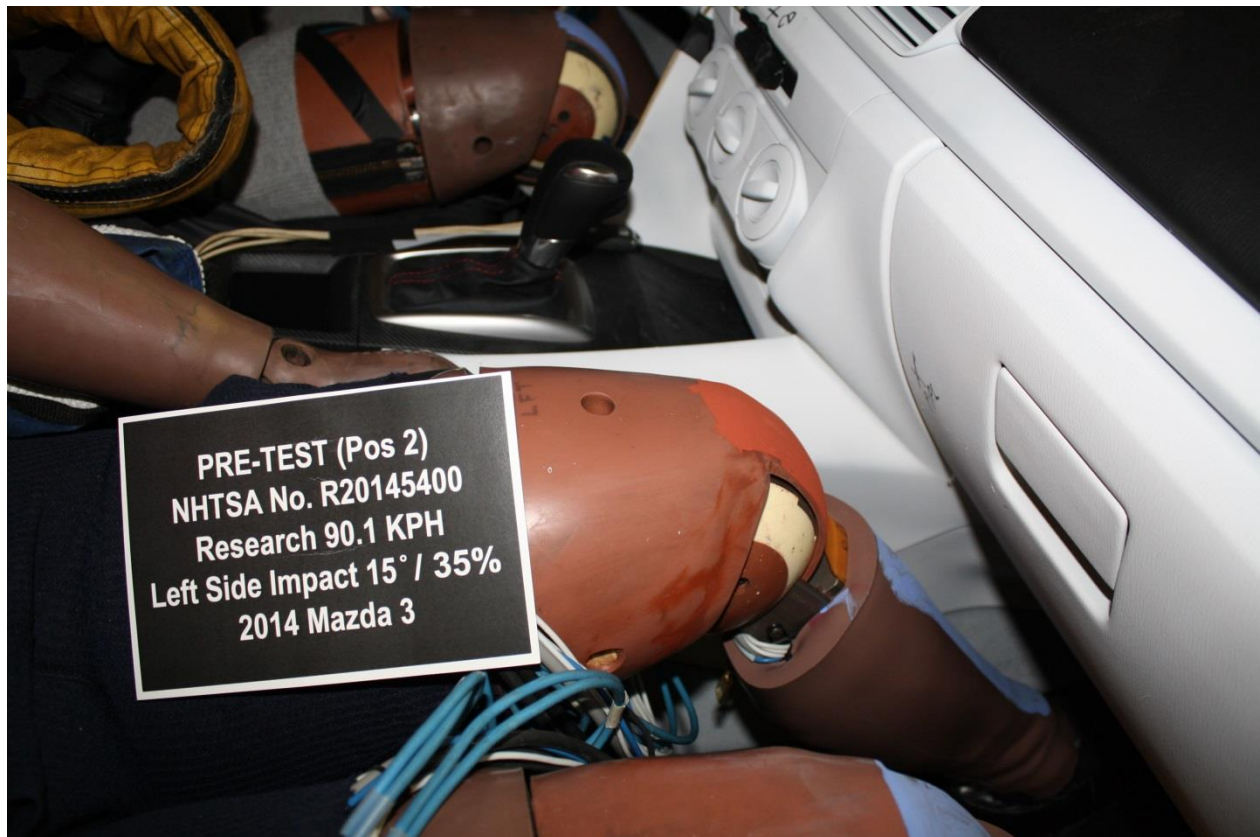
No. 113 Post-Test View of Passenger Feet



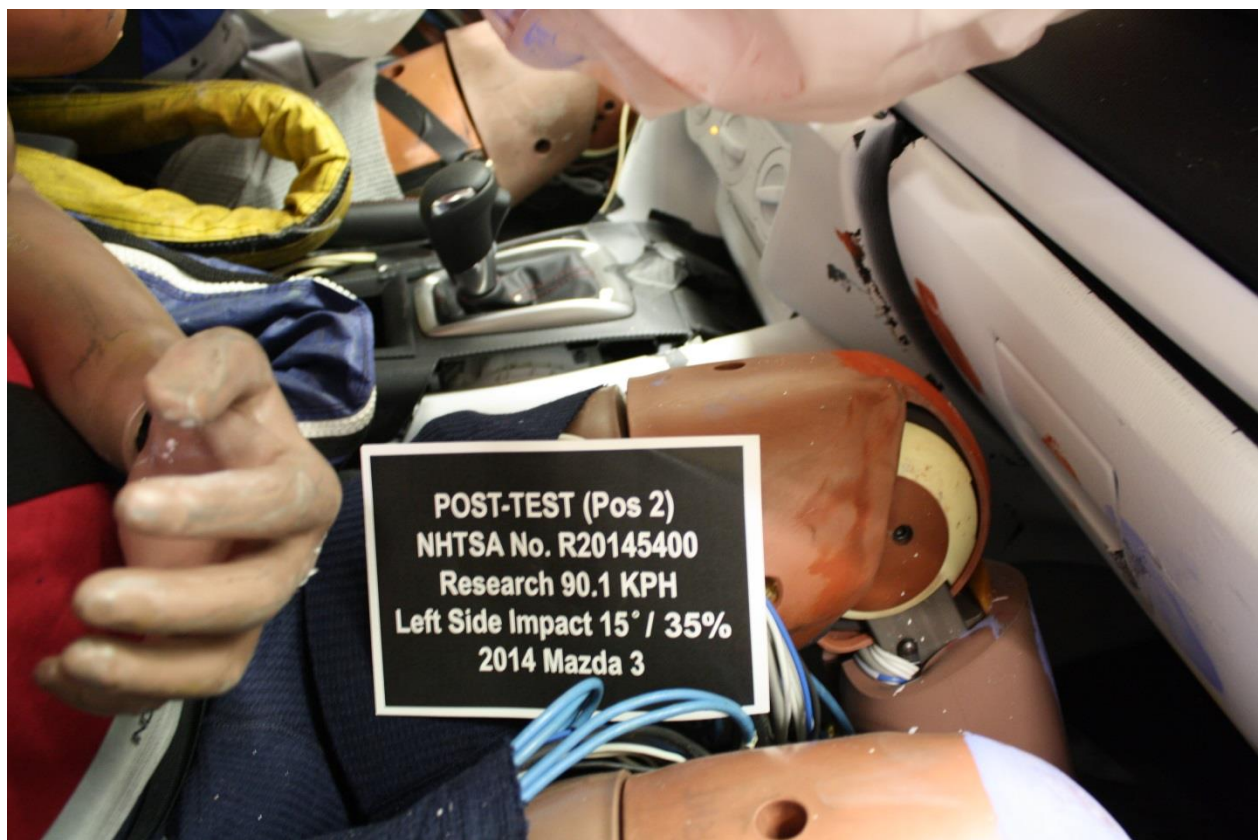
No. 114 Pre-Test View of Passenger Right Knee and Bolster



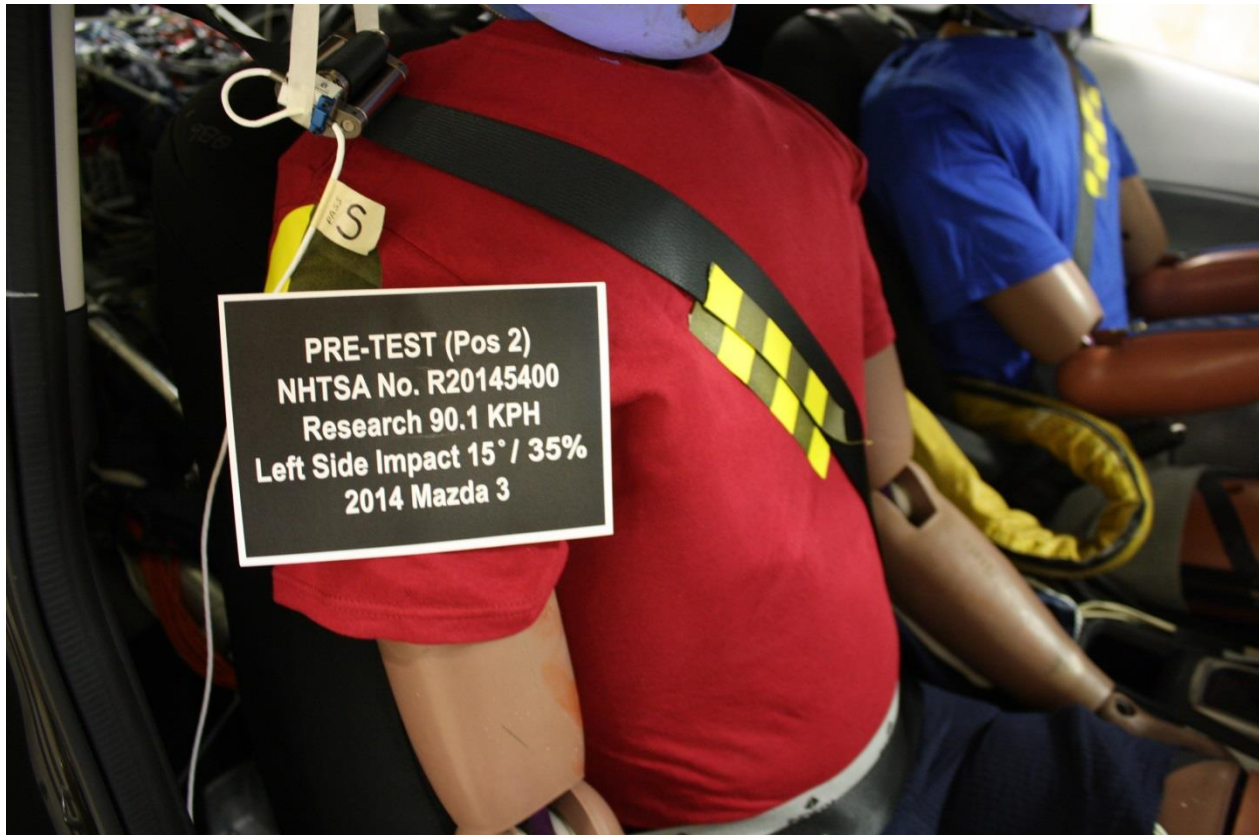
No. 115 Post-Test View of Passenger Right Knee and Bolster



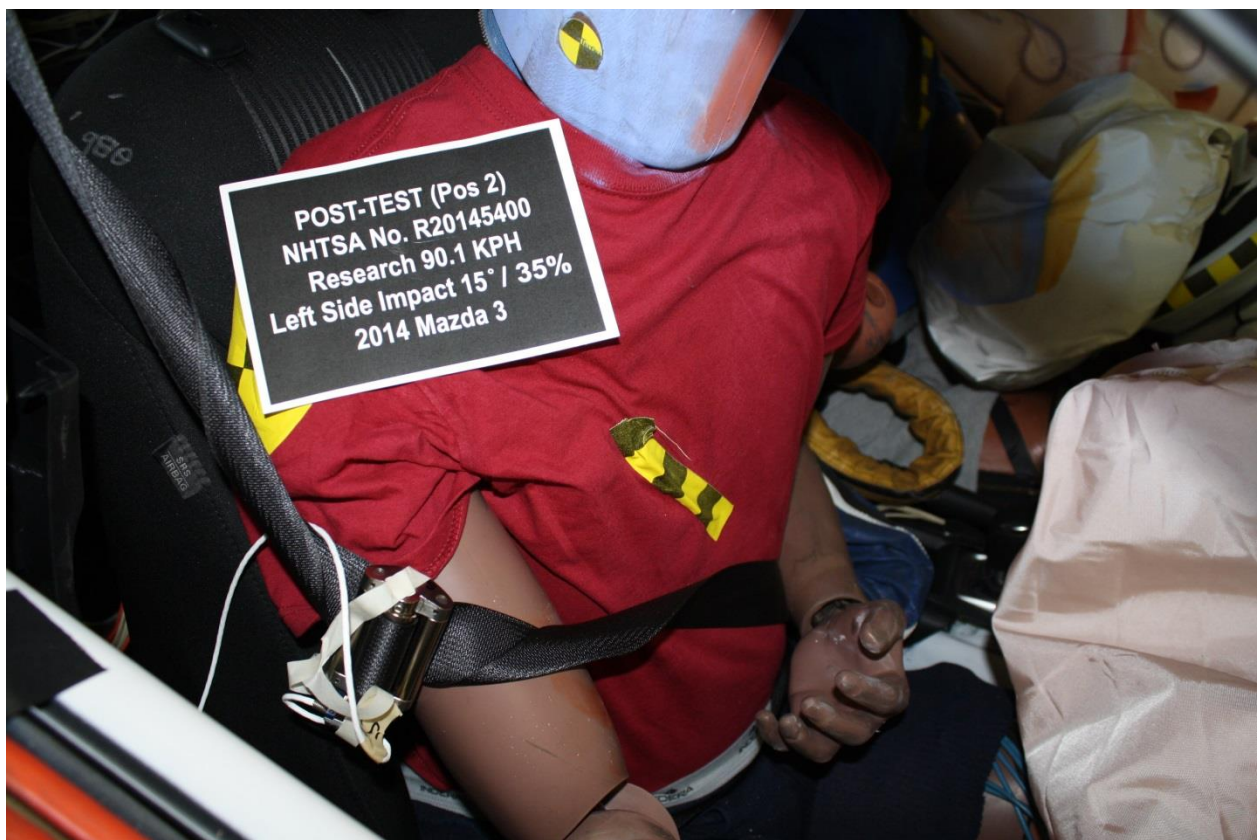
No. 116 Pre-Test View of Passenger Left Knee and Bolster



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



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

Photo Not Applicable

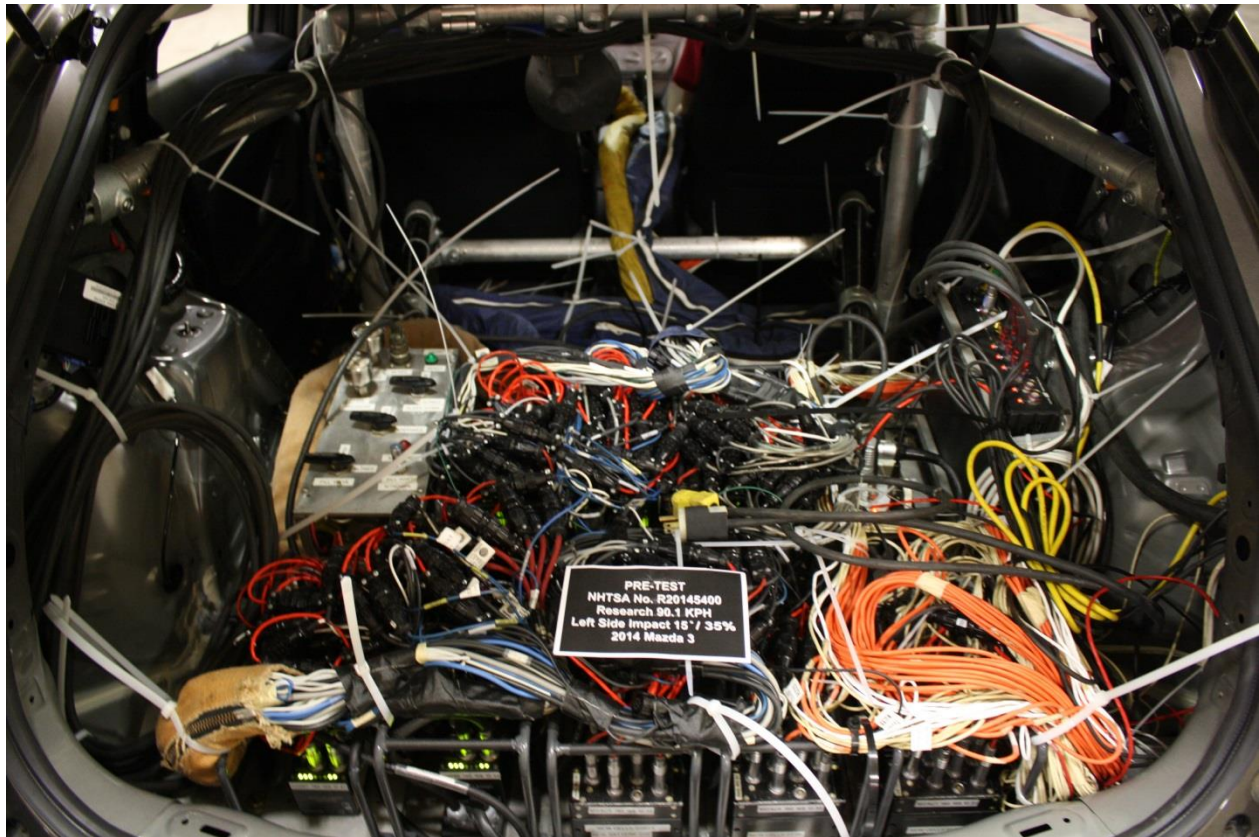
No. 121a Post-Test View of Passenger Head contact with Interior

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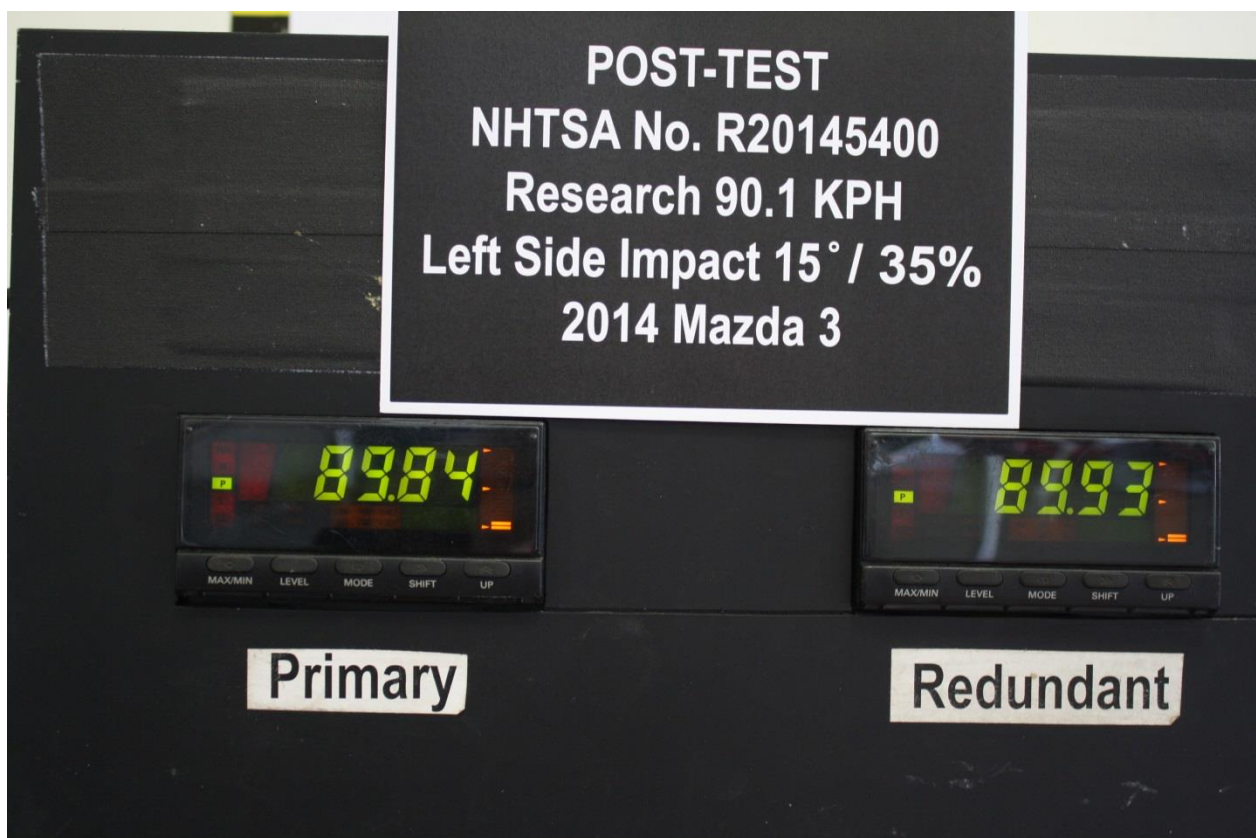
No. 121b Post-Test View of Passenger Head contact with Interior



No. 122 Post-Test Passenger Contact With Glovebox



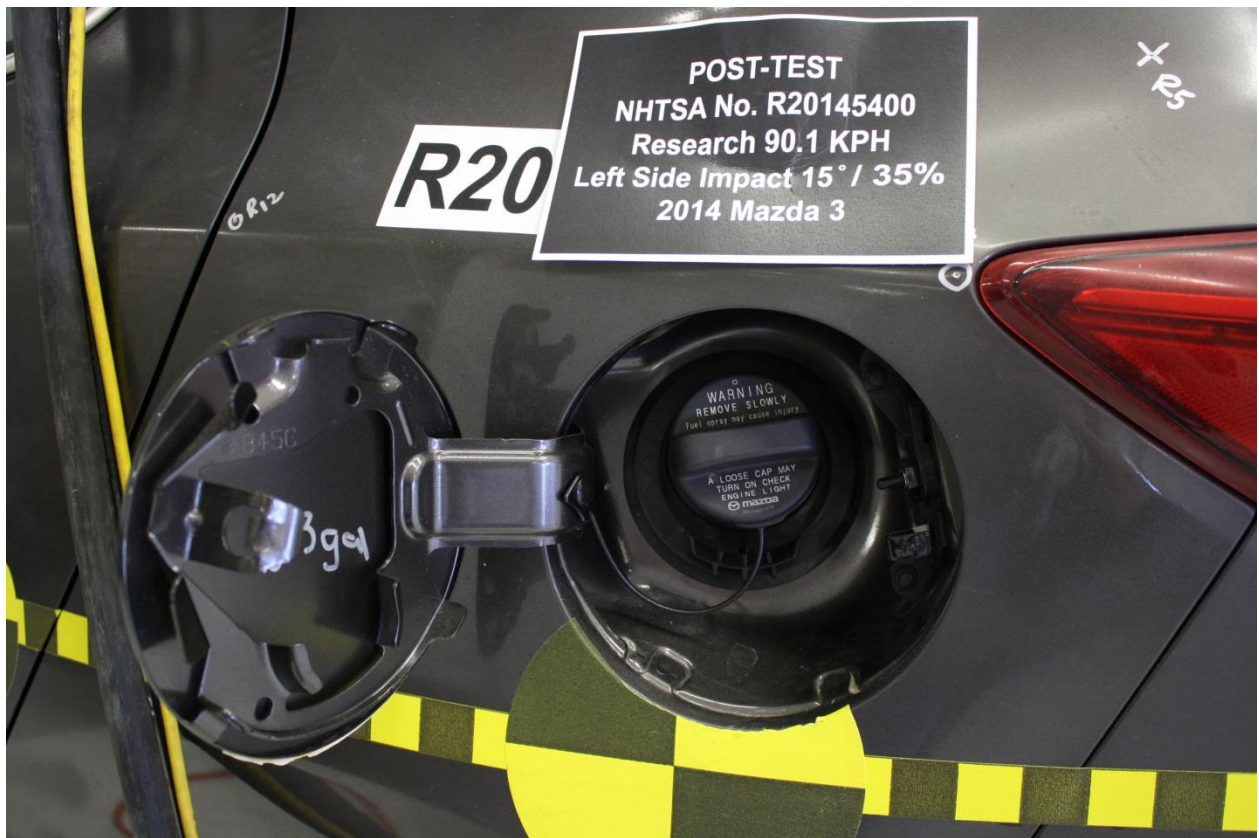
No. 123 Pre-Test Ballast Locations



No. 124 Post-Test Speed Trap Readout



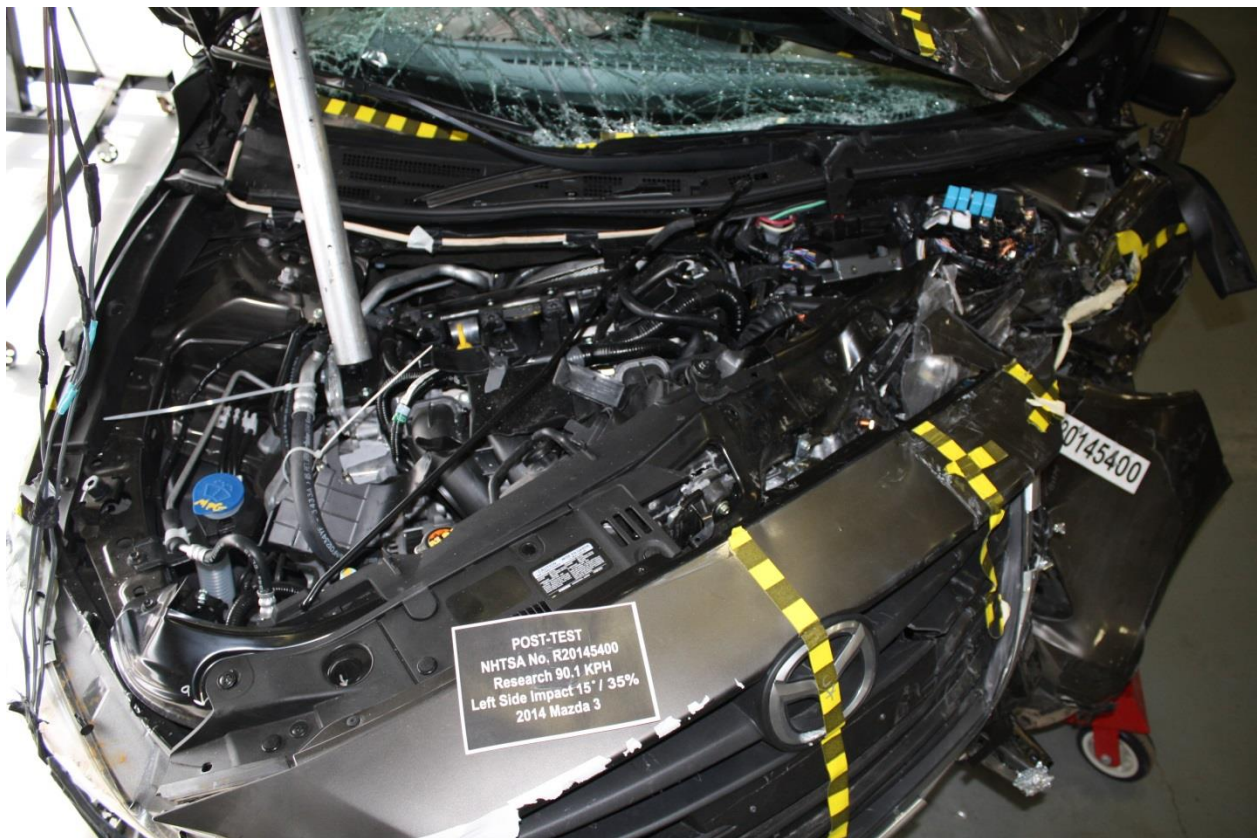
No. 125 Pre-Test View of Fuel Filler Cap



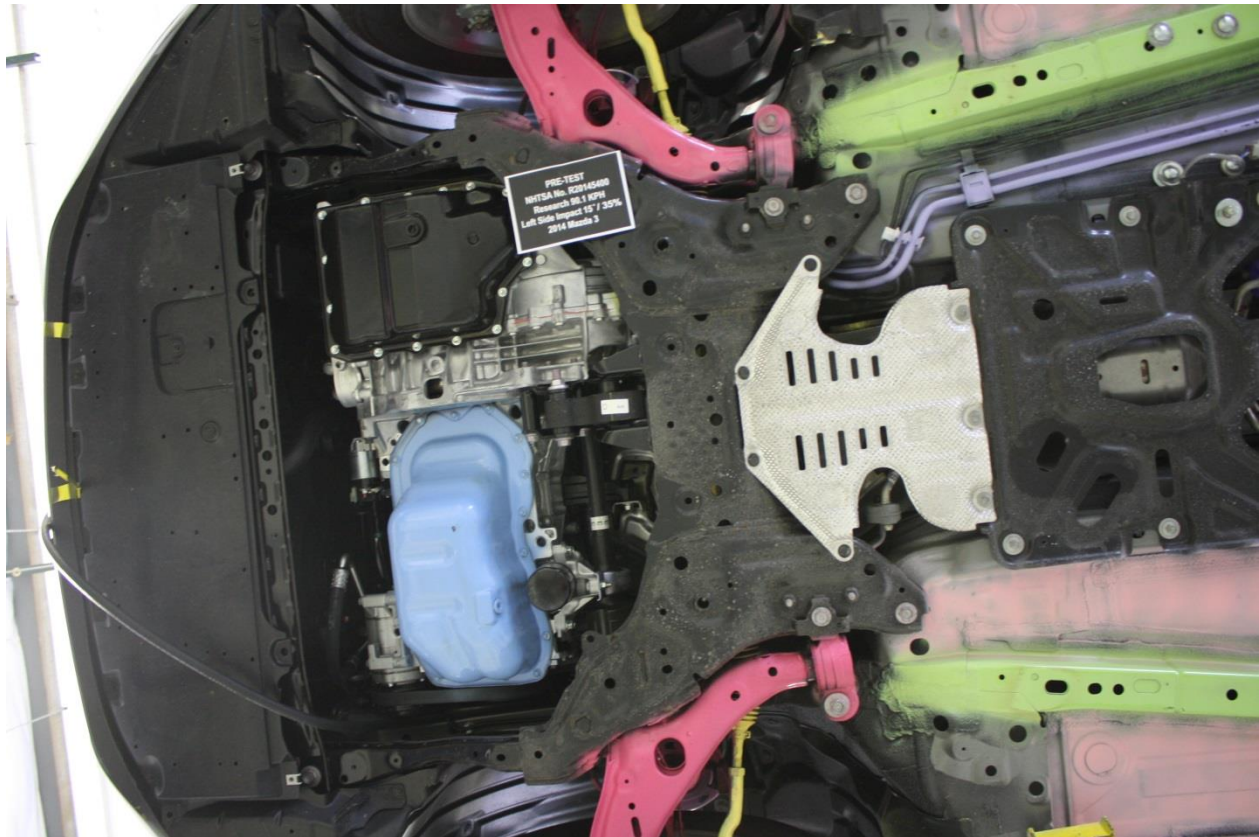
No. 126 Post-Test View of Fuel Filler Cap



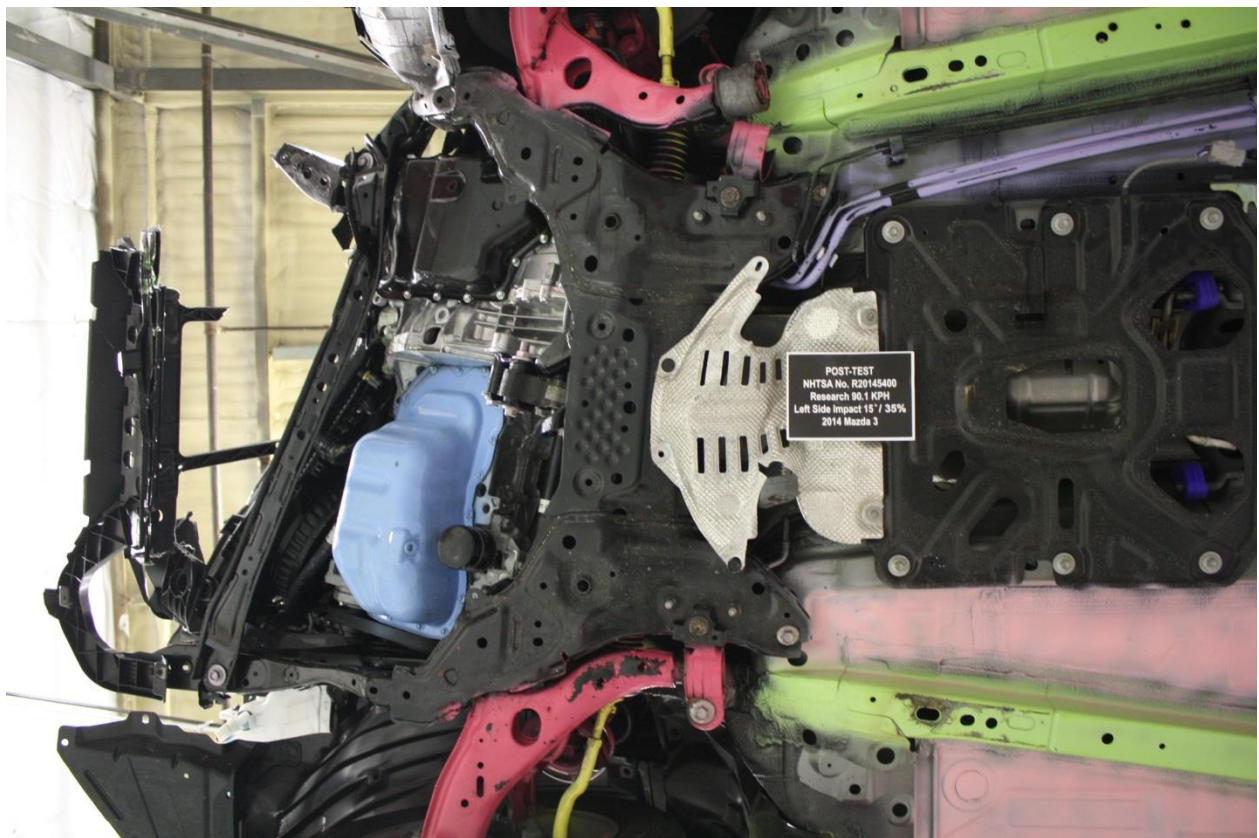
No. 127 Pre-Test Engine Compartment View



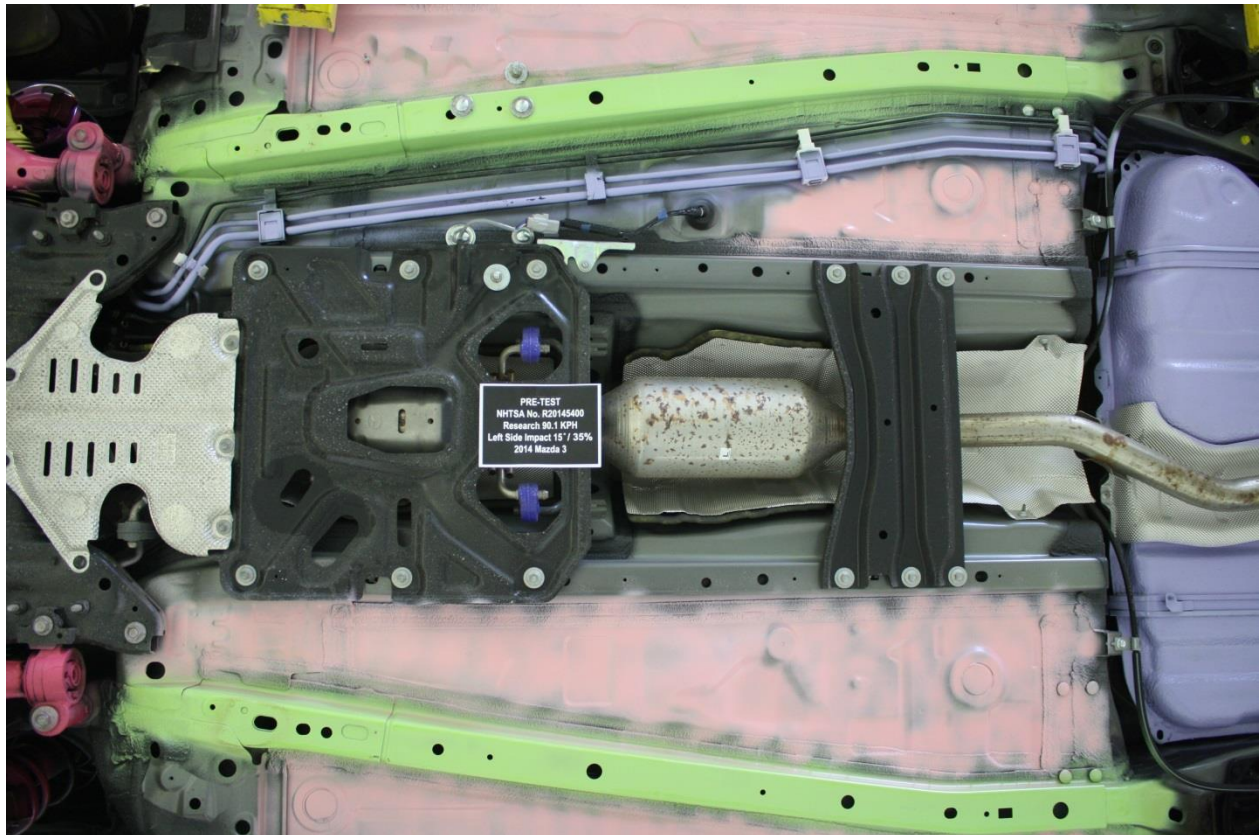
No. 128 Post-Test Engine Compartment View



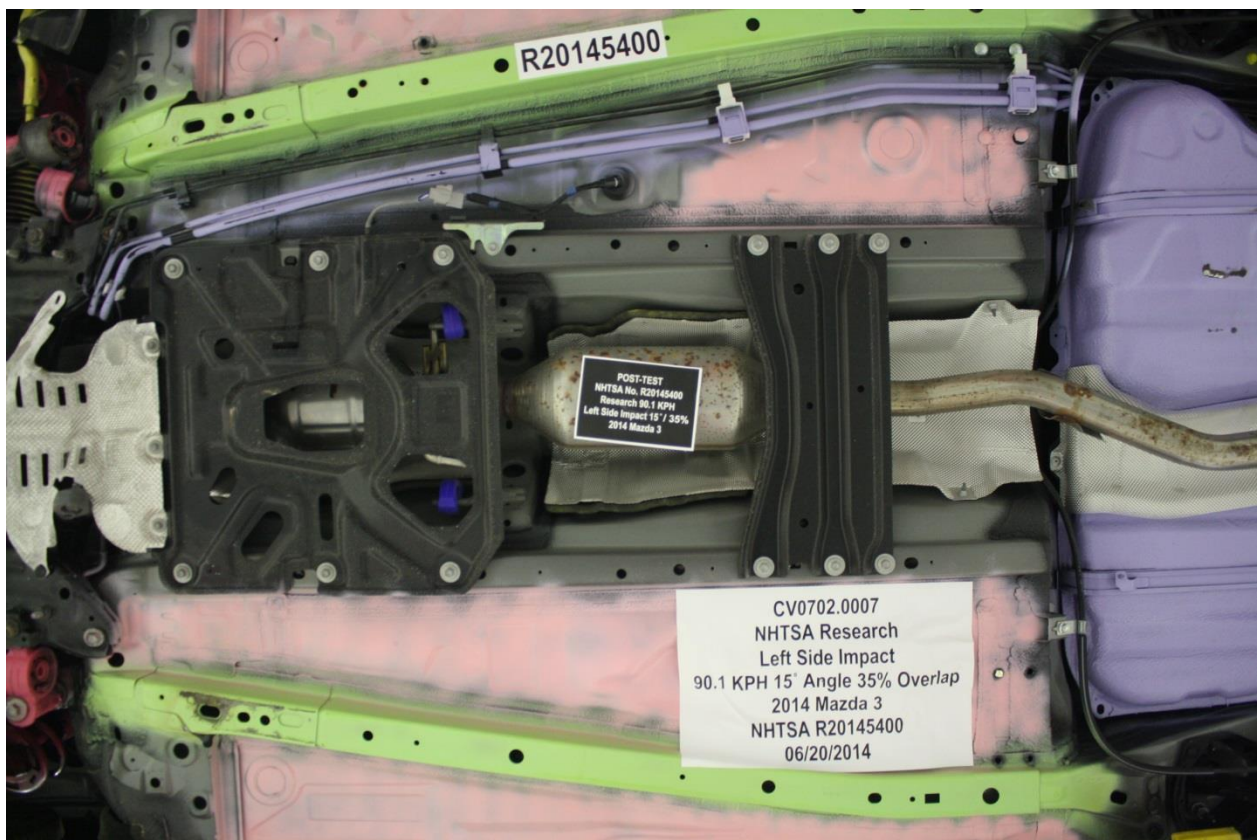
No. 129 Pre-Test View of Front Underbody (perpendicular to vehicle)



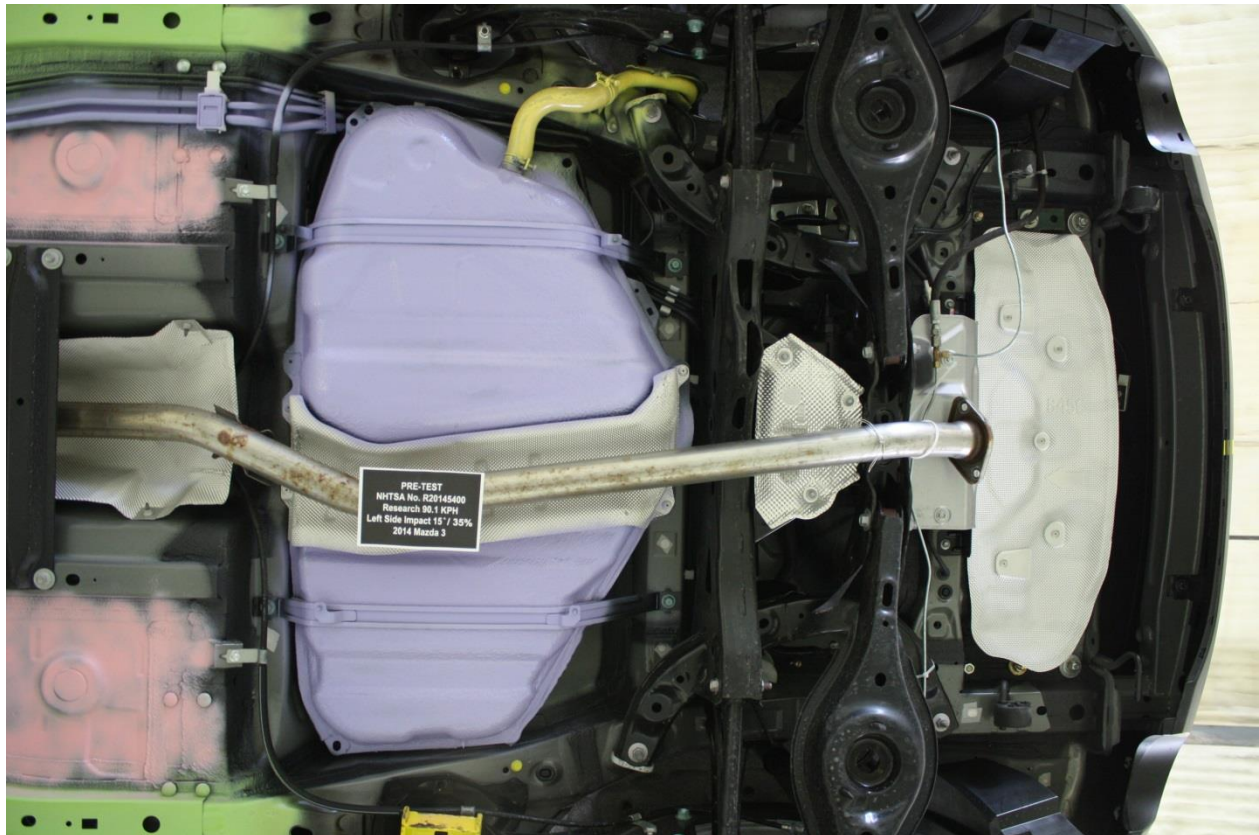
No. 130 Post-Test View of Front Underbody (perpendicular to vehicle)



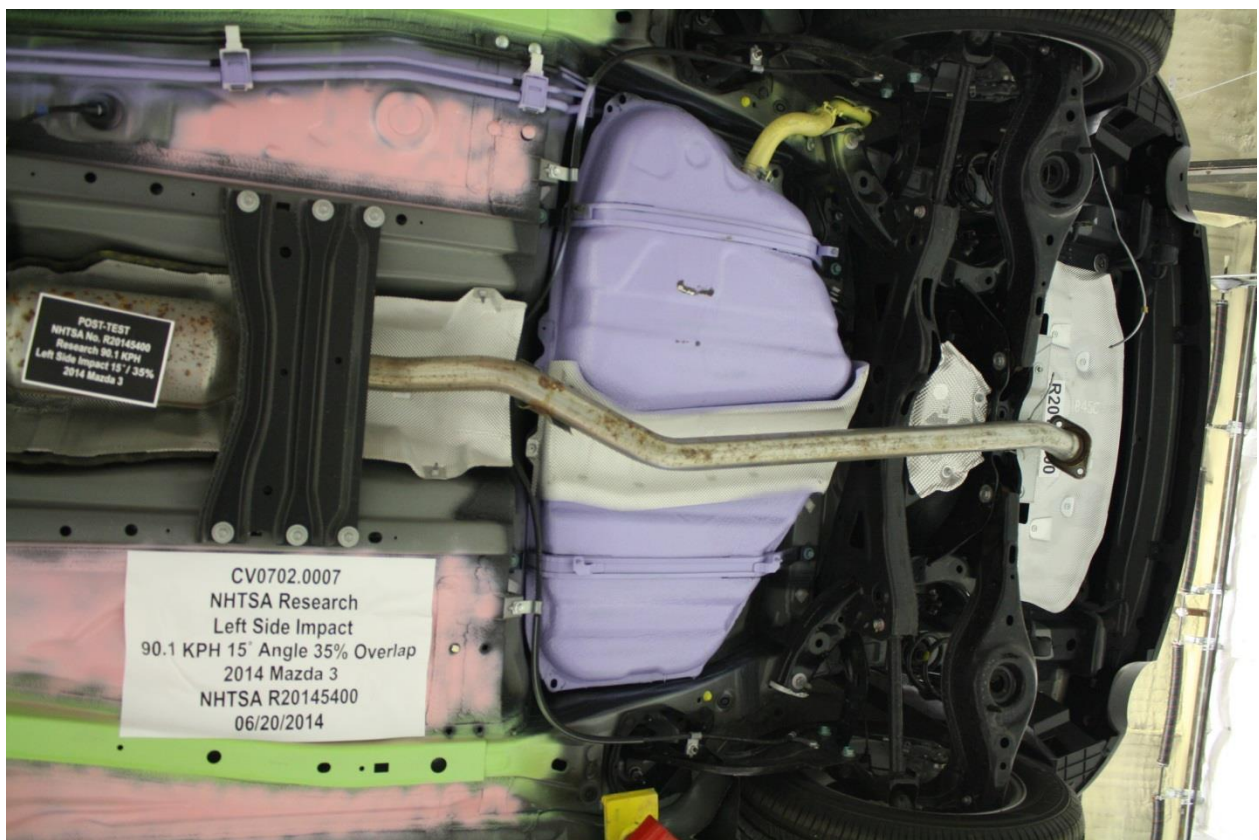
No. 131 Pre-Test View of Mid Underbody (perpendicular to vehicle)



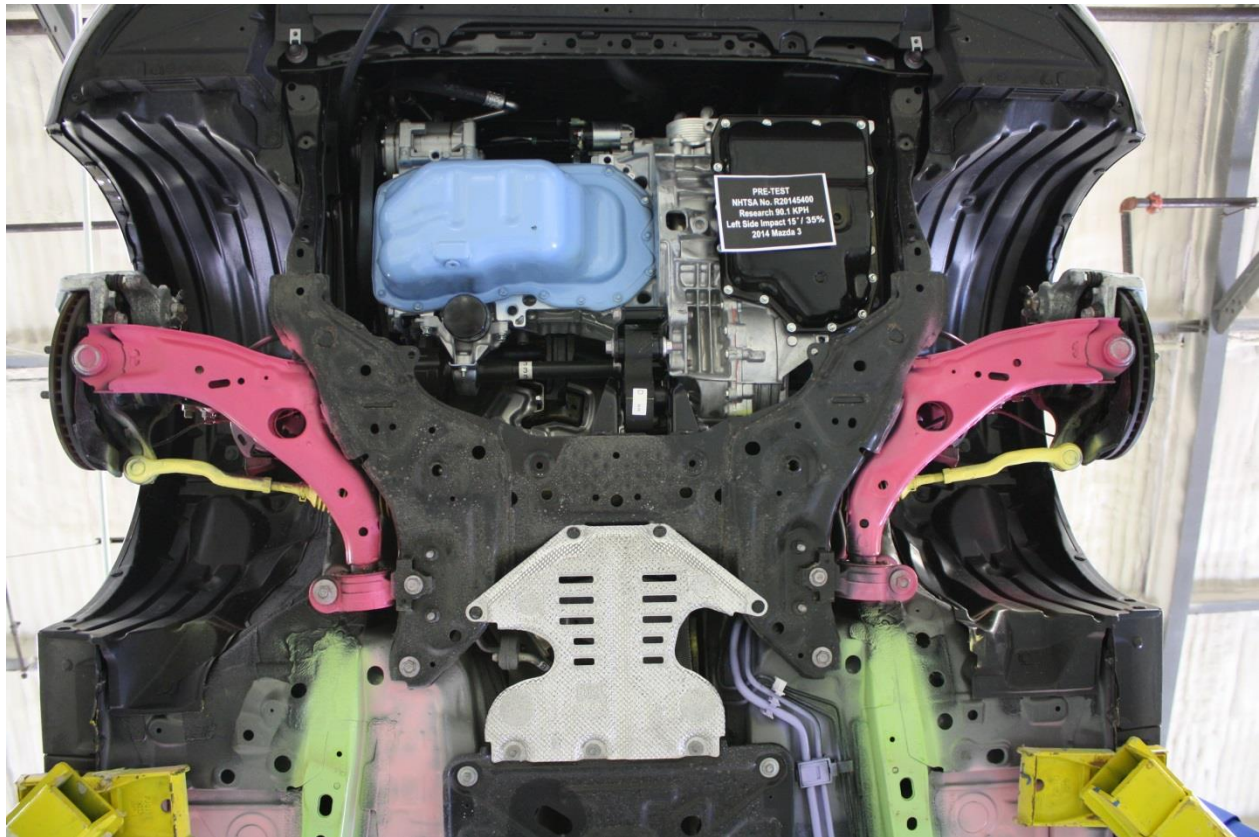
No. 132 Post-Test View of Mid Underbody (perpendicular to vehicle)



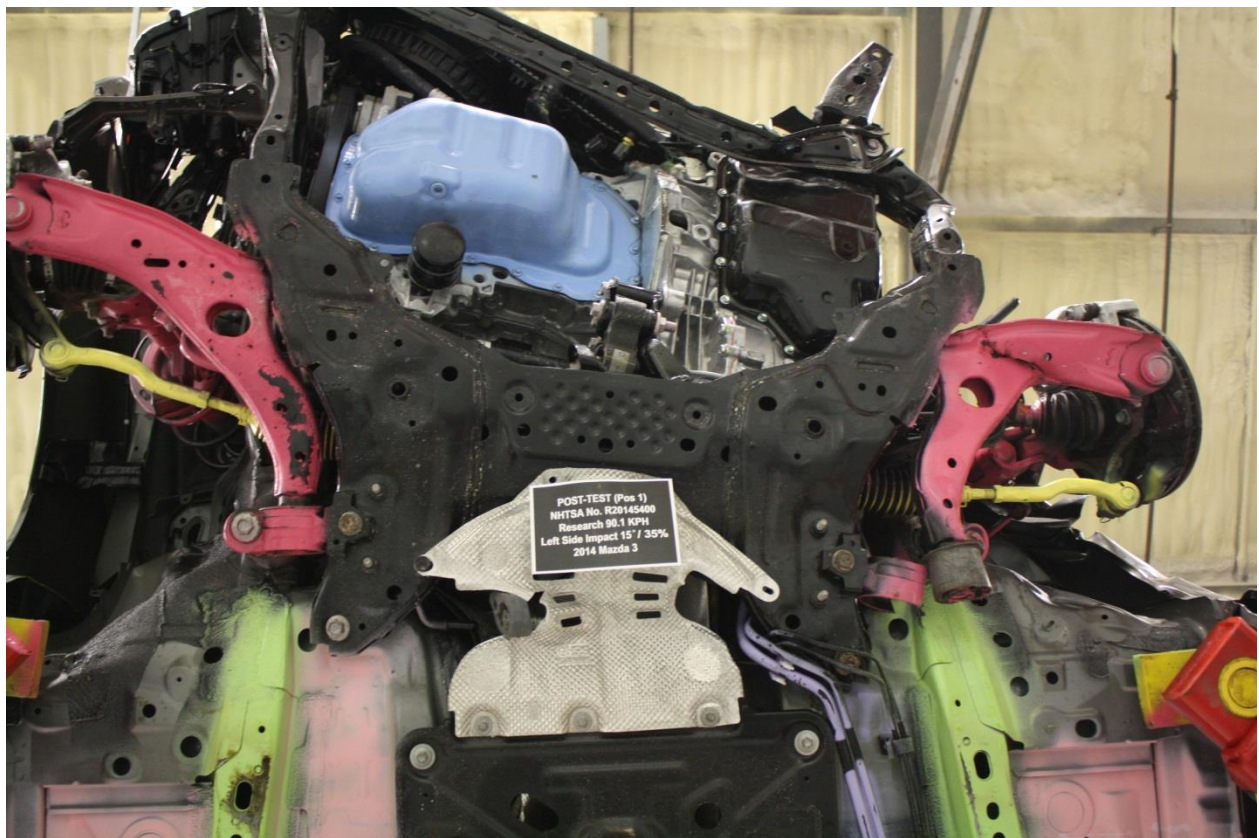
No. 133 Pre-Test View of Rear Underbody (perpendicular to vehicle)



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



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



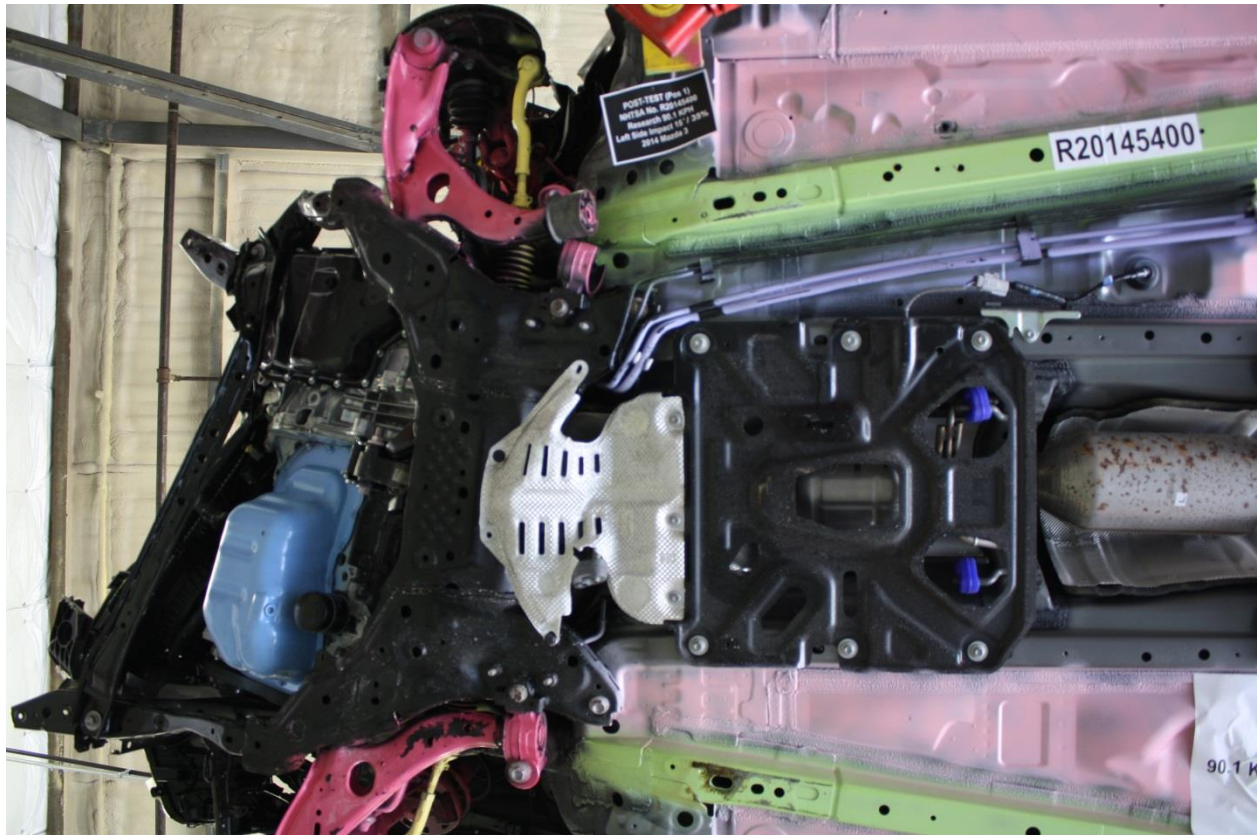
No. 136 Post-Test View of Steering rack and or sway bar



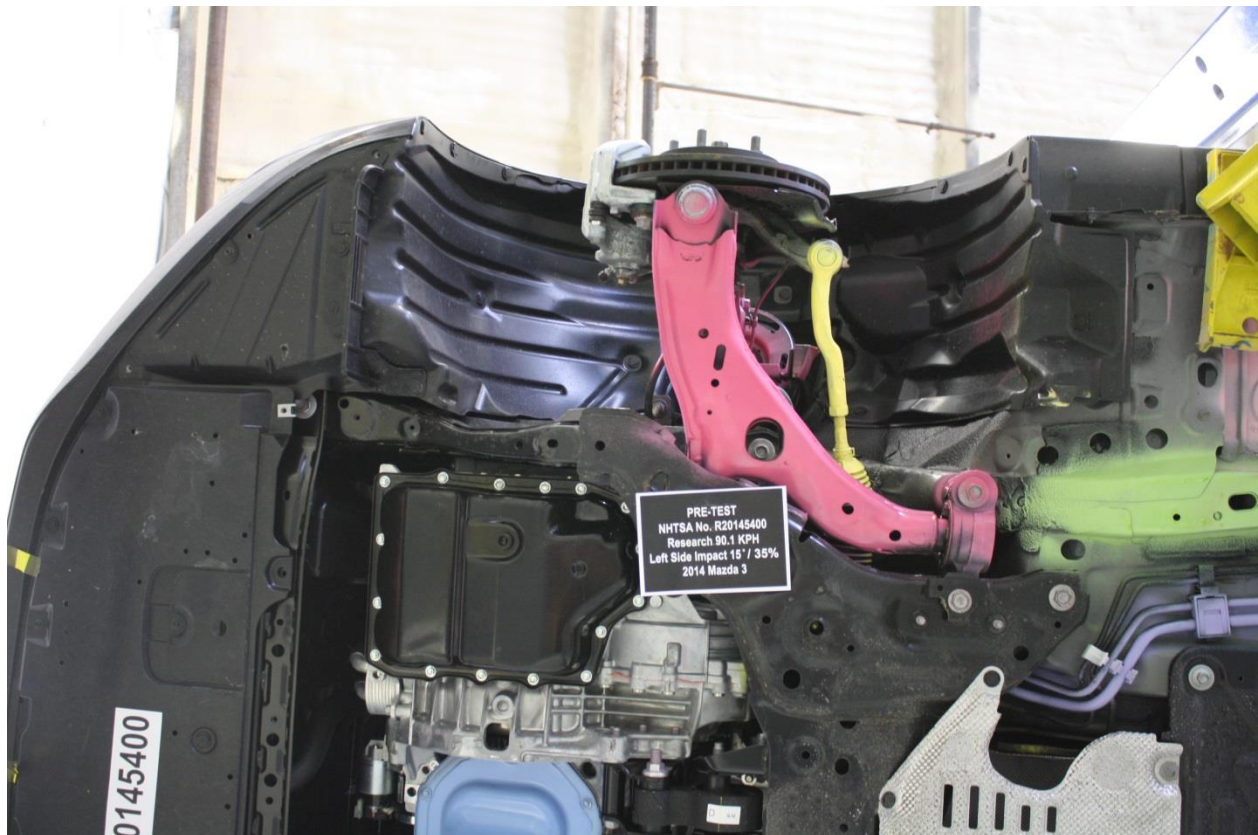
No. 137 Pre-Test Bumper to Rail Attachments and Crush Initiators



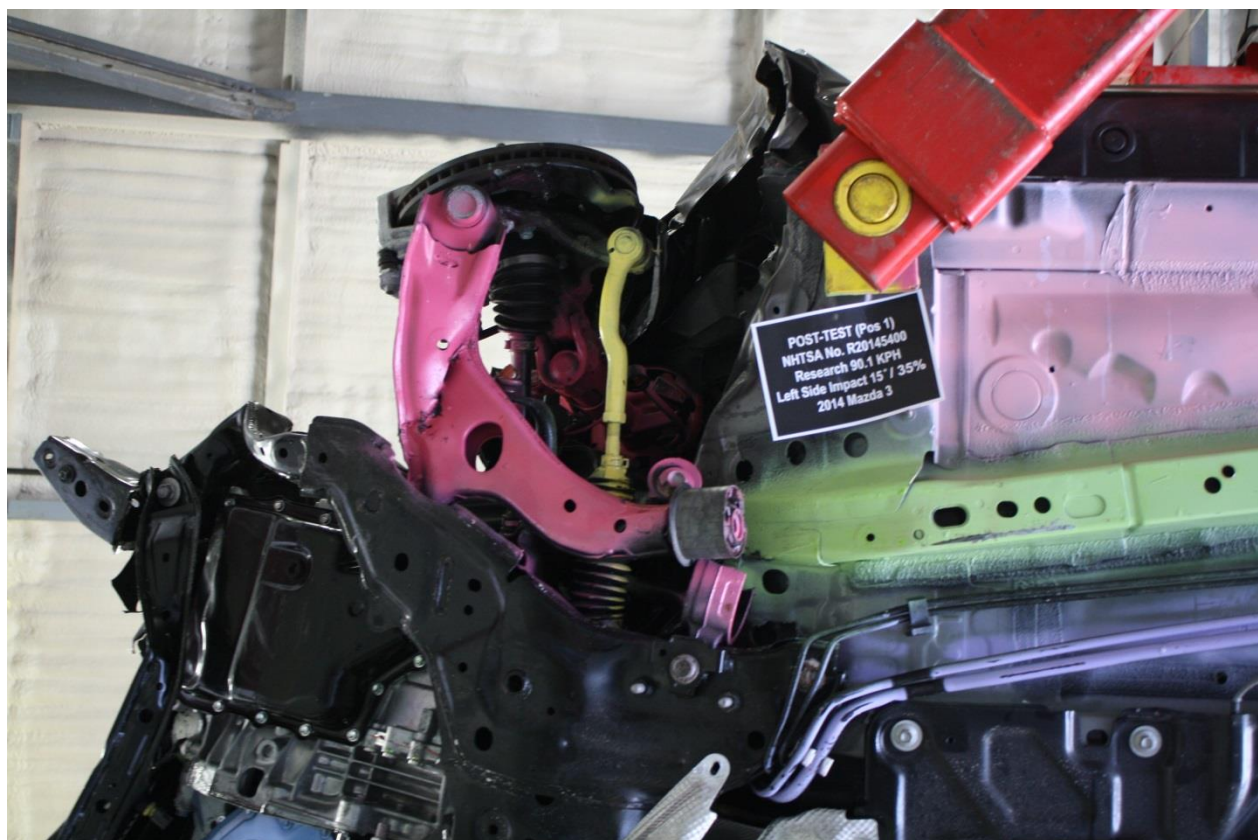
No. 138 Post-Test Bumper to Rail Attachments and Crush Initiators



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



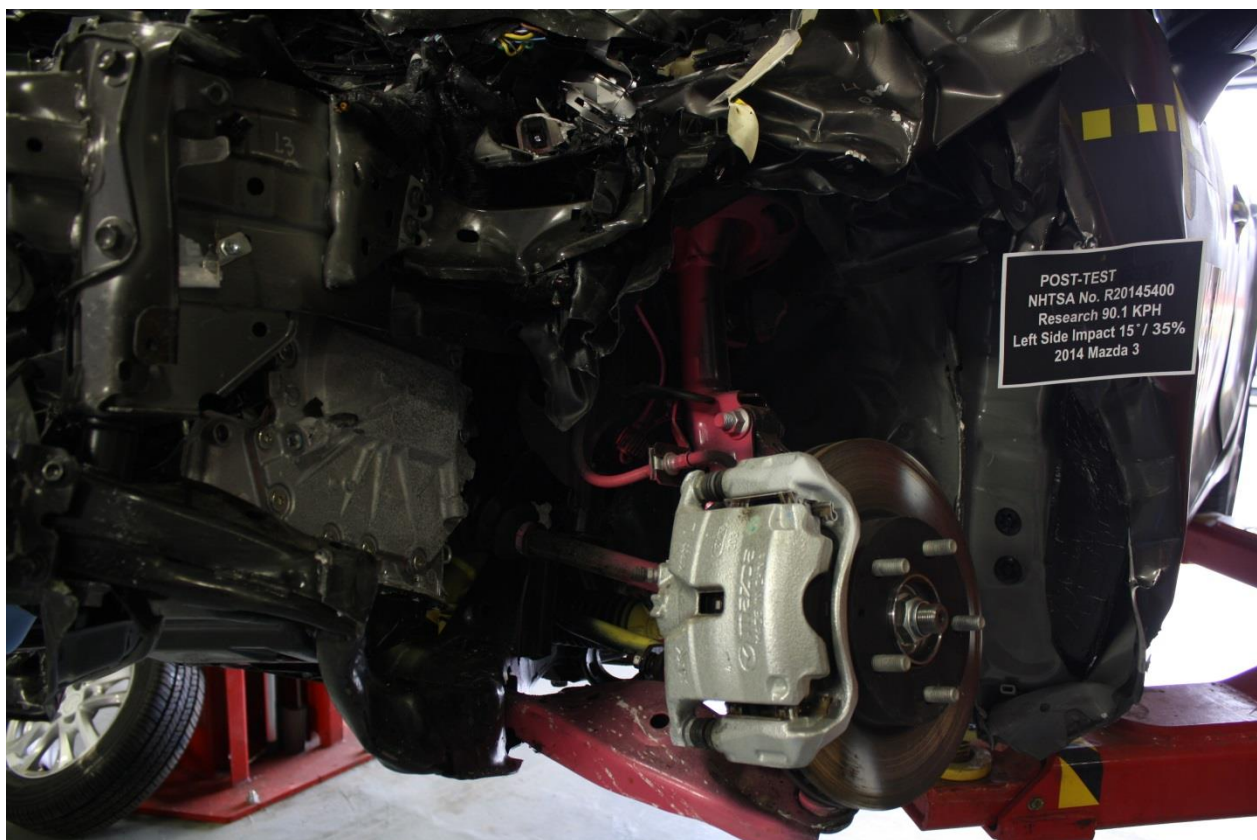
No. 140 Pre-Test Frame Rail with tire removed



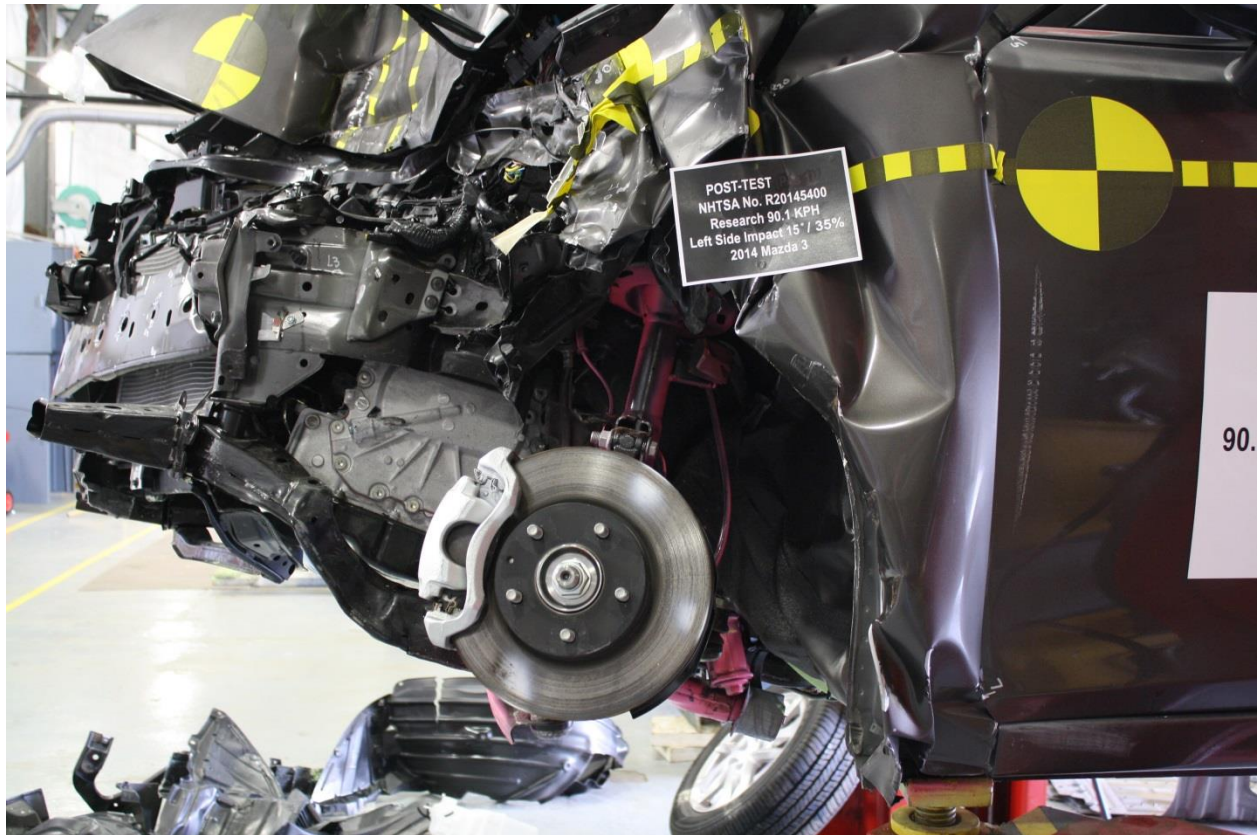
No. 141 Post-Test Frame Rail with tire removed



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



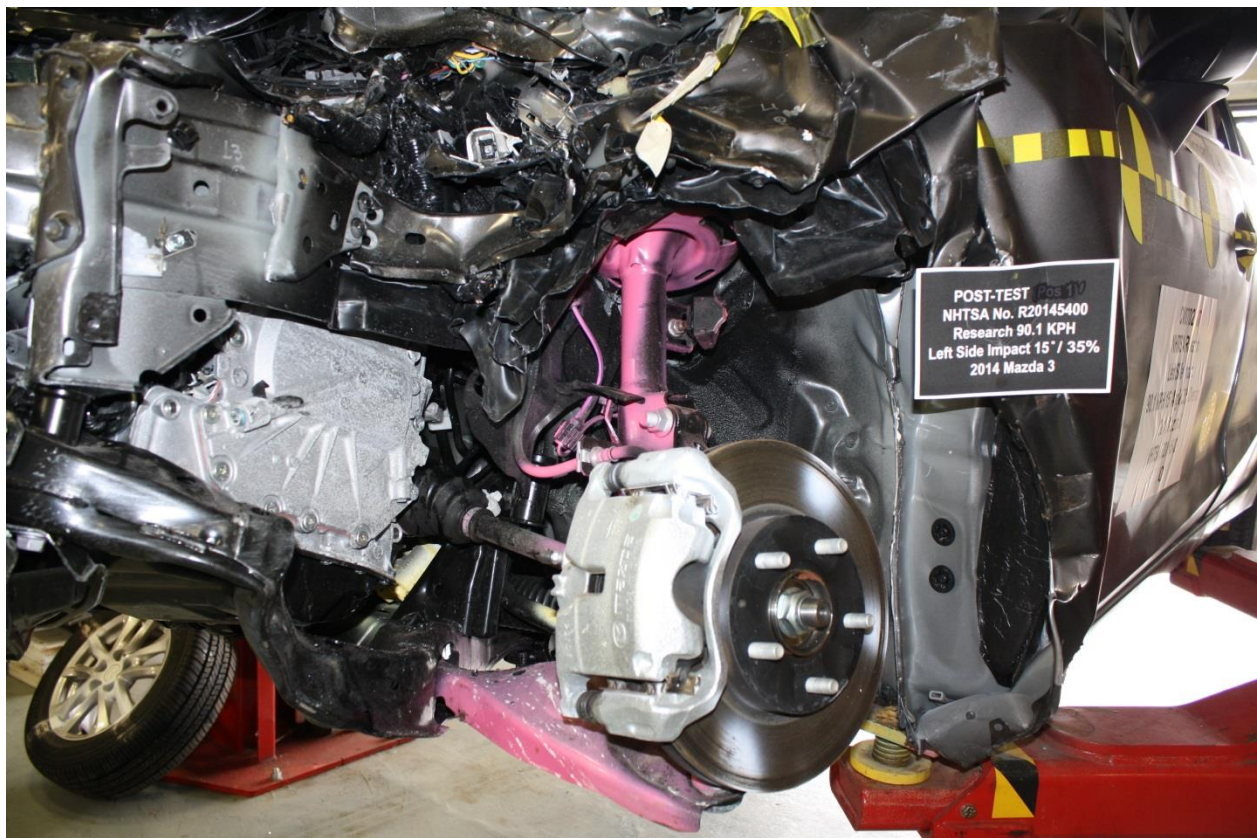
No. 144 Post-Test Side View of Front Driver Wheel Well w/ Tire Removed



No. 145 Post-Test Right Side 3/4 Rear View of the Front Driver Wheel Well w/ Tire Removed



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



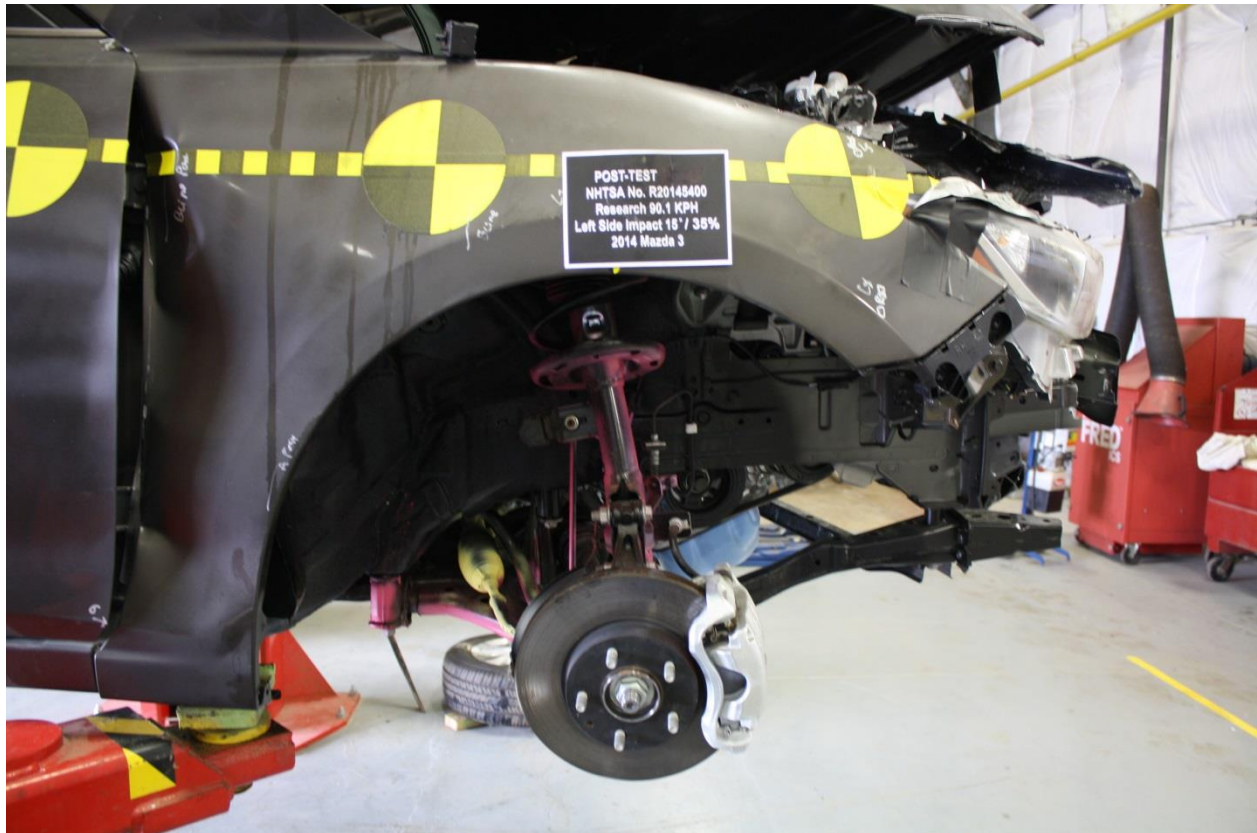
No. 147 Post-Test Right Side $\frac{3}{4}$ View of Front Driver Shotgun



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



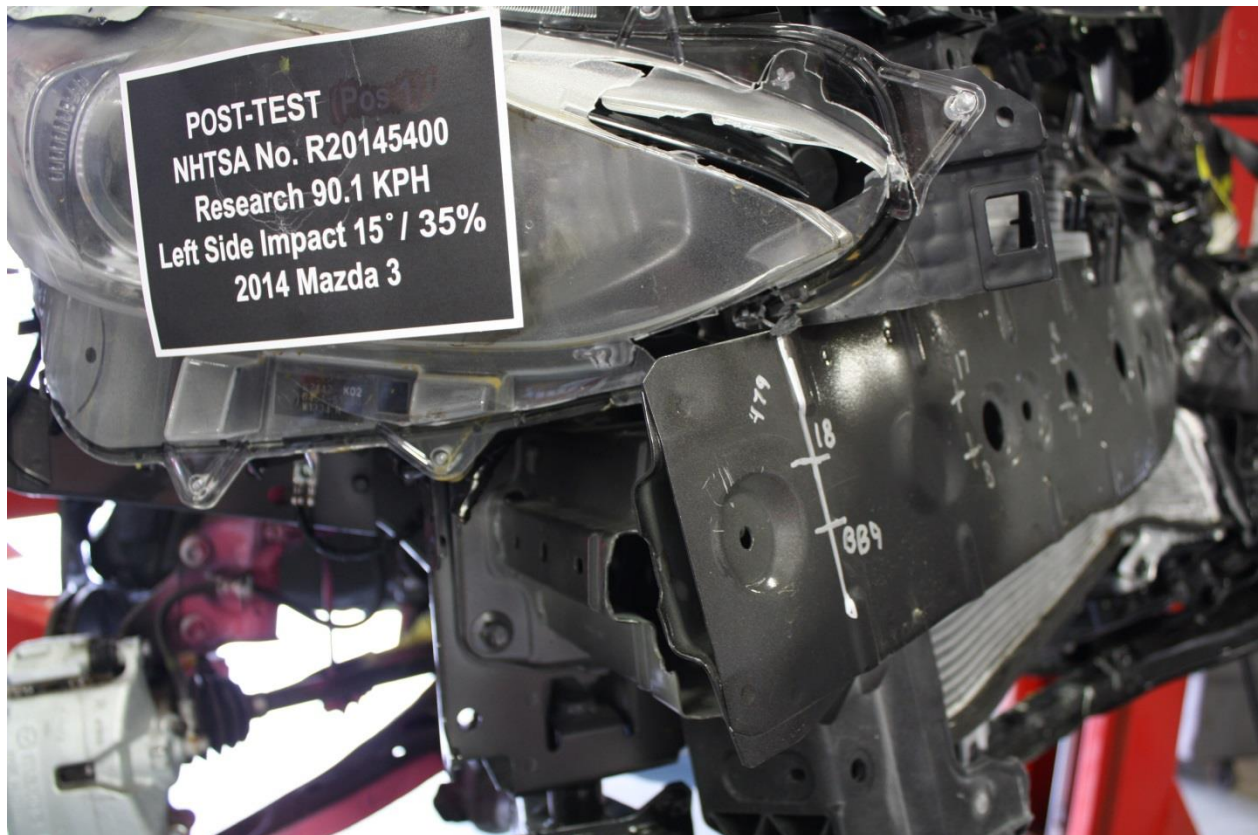
No. 149 Post-Test $\frac{3}{4}$ View of Front Passenger Wheel Well w/ Tire Removed



No. 150 Post-Test Side View of Front Passenger Wheel Well w/ Tire Removed



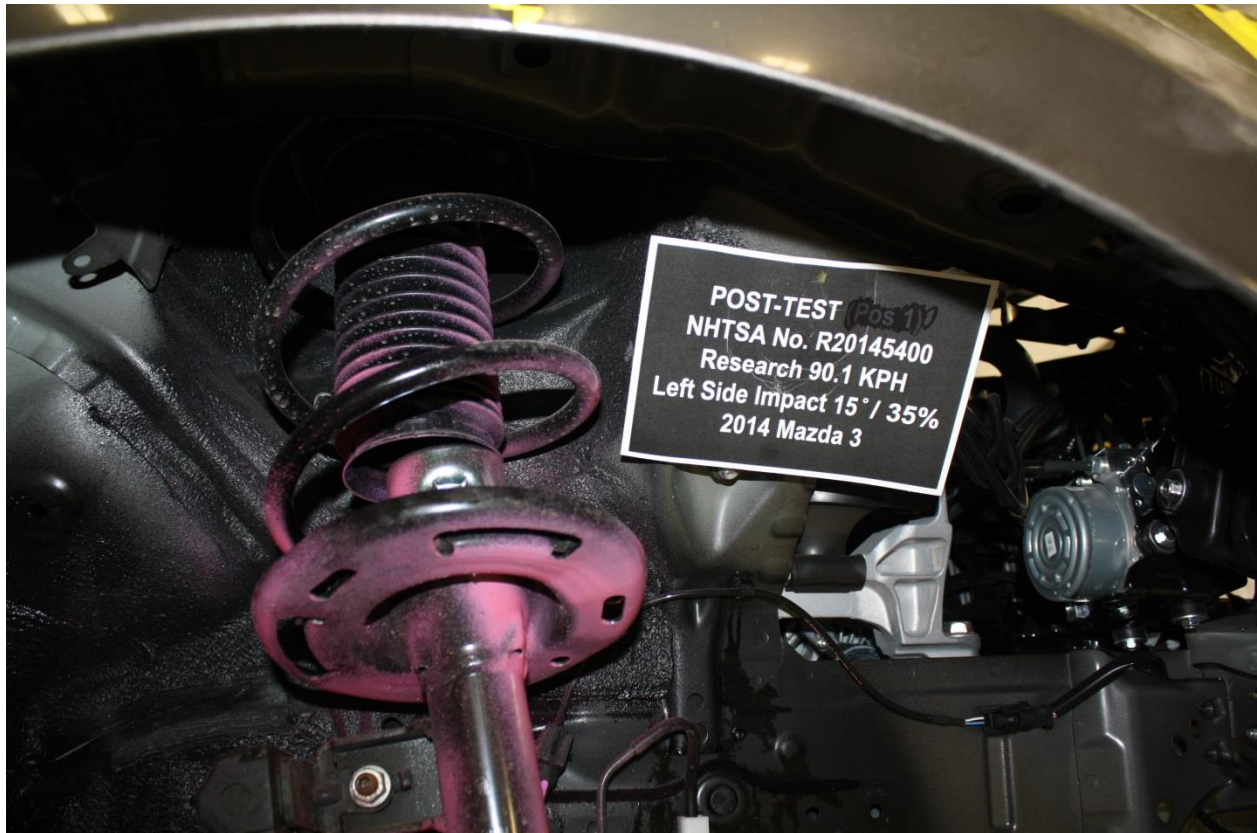
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No. 152 Post-Test Looking Down at the Front Passenger Shotgun



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



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No. 157 Post-Test View of Deformation of B pillar-Struck Side



No. 158 Post-Test View of Deformation of C pillar-Struck Side



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



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No. 163 Post-Test Left Side View of RMDB



No. 164 Pre-Test Right Side View of RMDB



No. 165 Post-Test Right Side View of RMDB



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



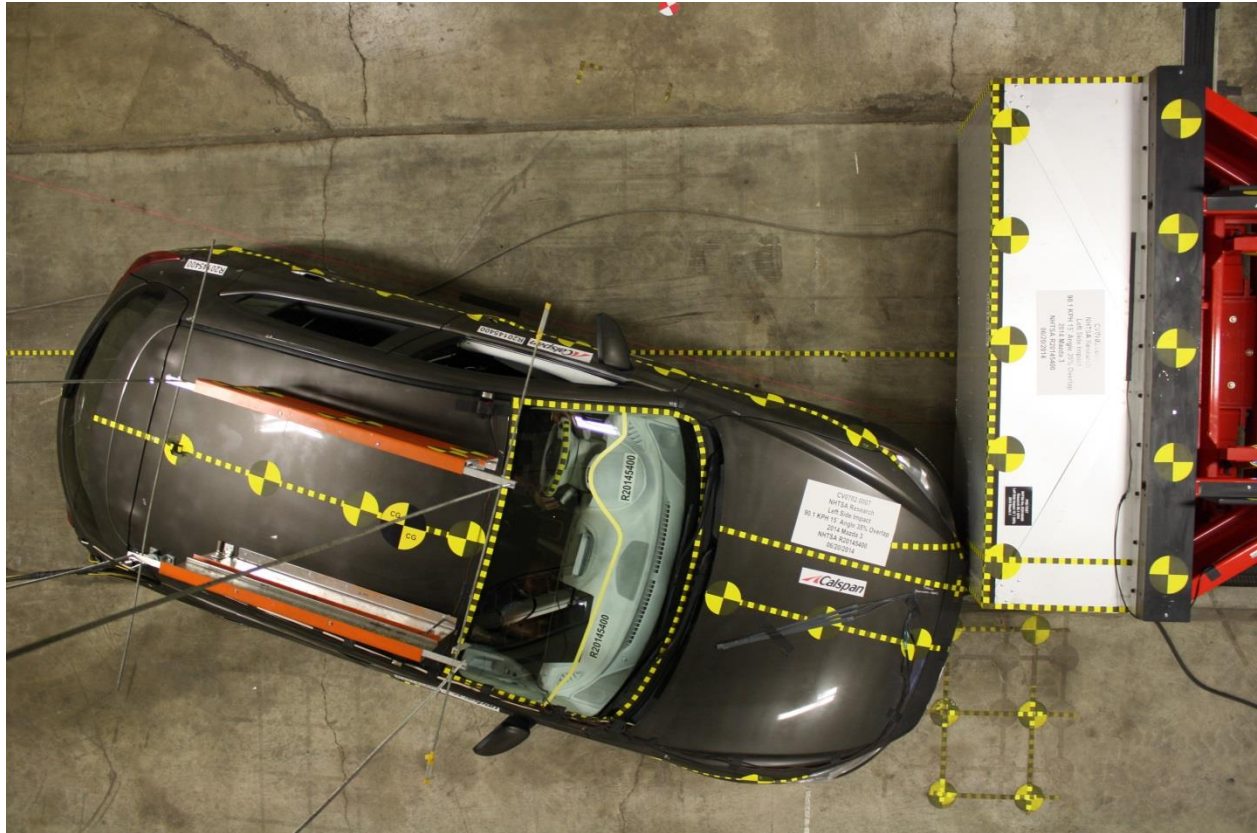
No. 171 Post-Test RMDB & Vehicle, Right Side



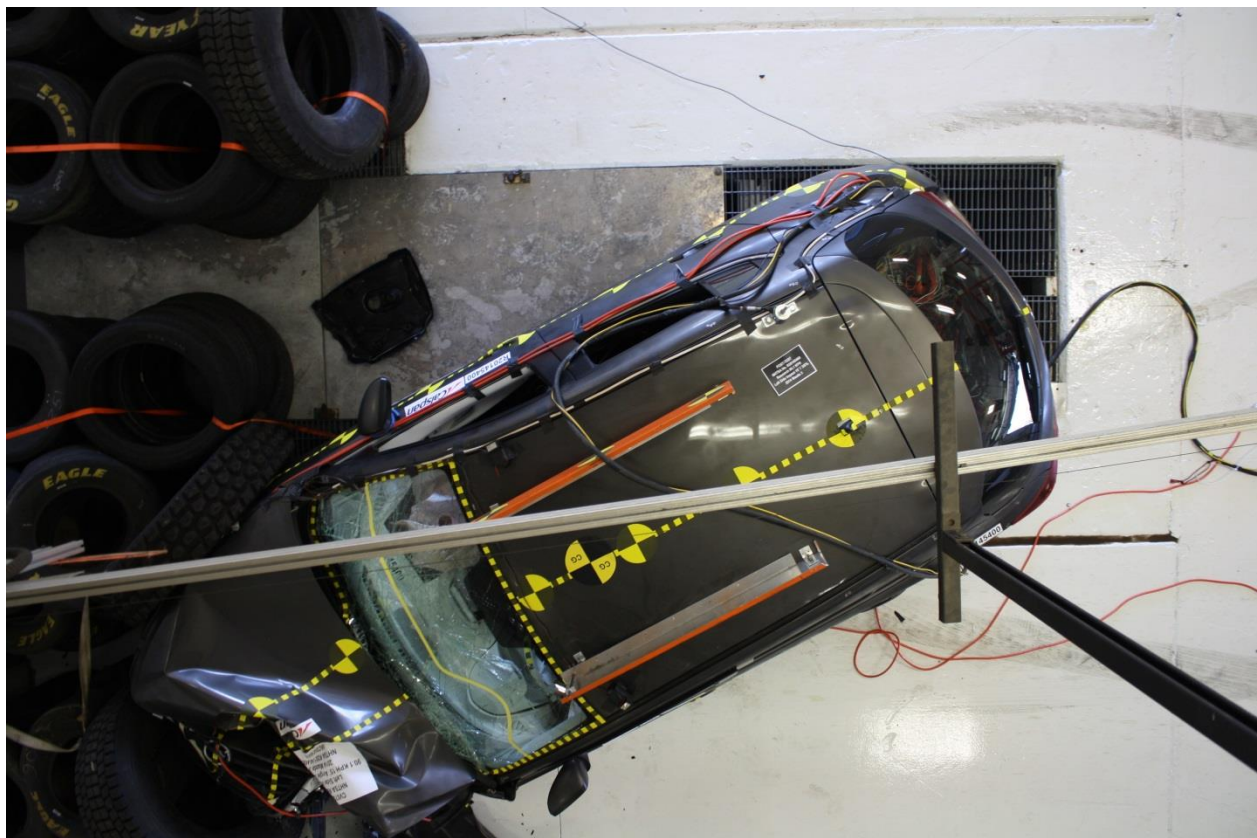
No. 172 Pre-Test RMDB & Vehicle, Left Side



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



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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



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No. 182 Vehicle at 180 Degrees on Static Rollover Device



No. 183 Vehicle at 270 Degrees on Static Rollover Device



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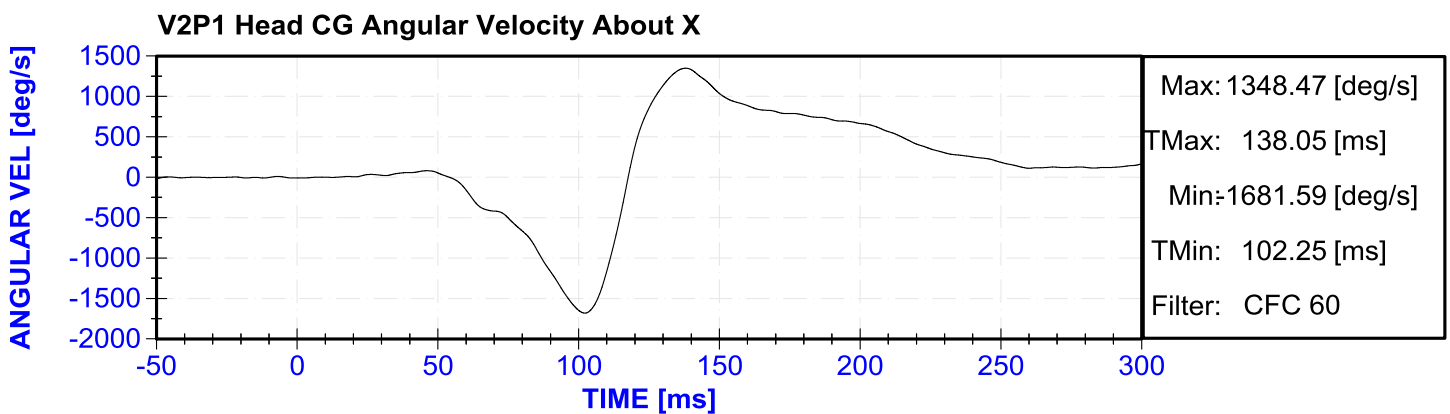
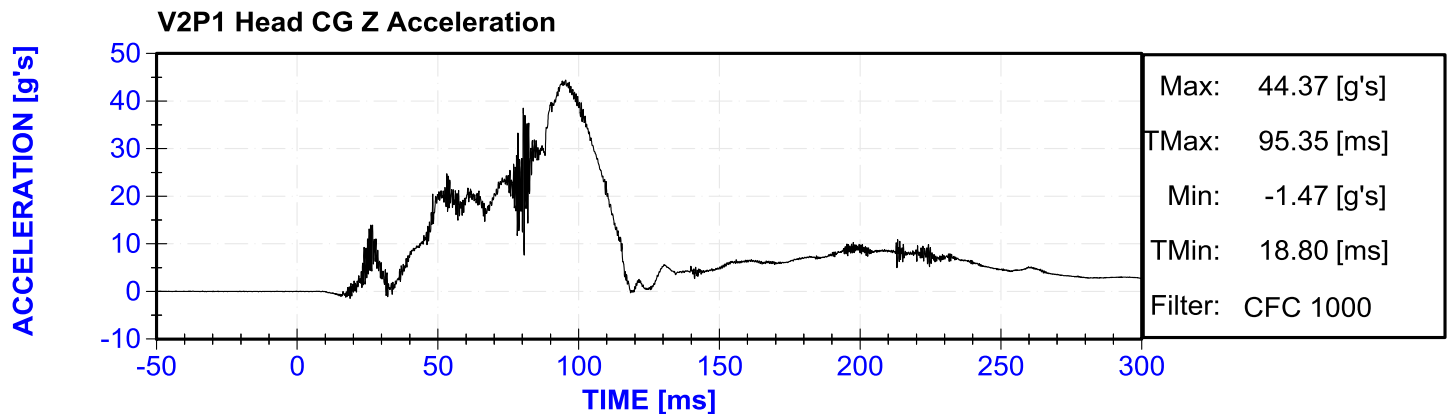
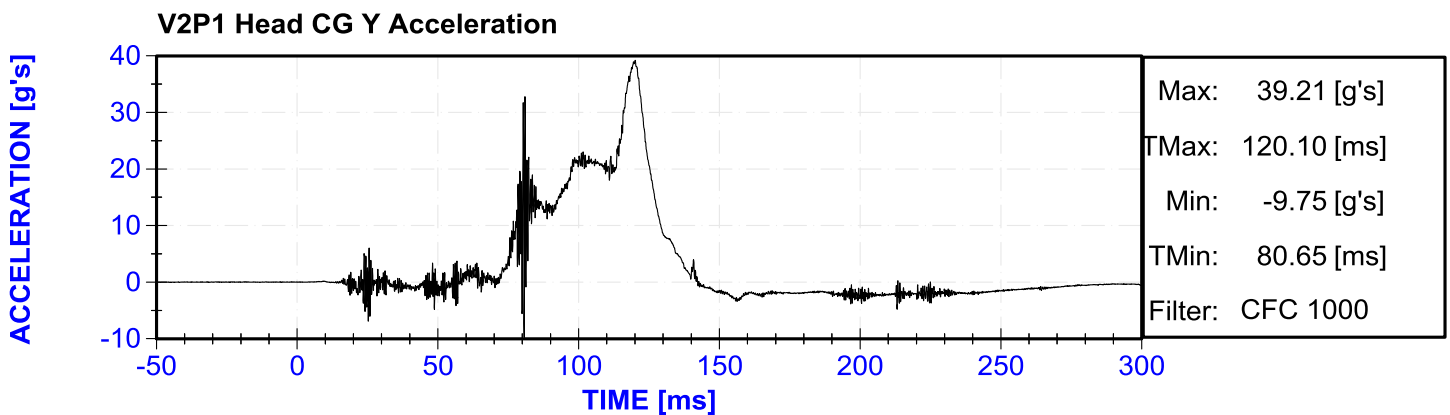
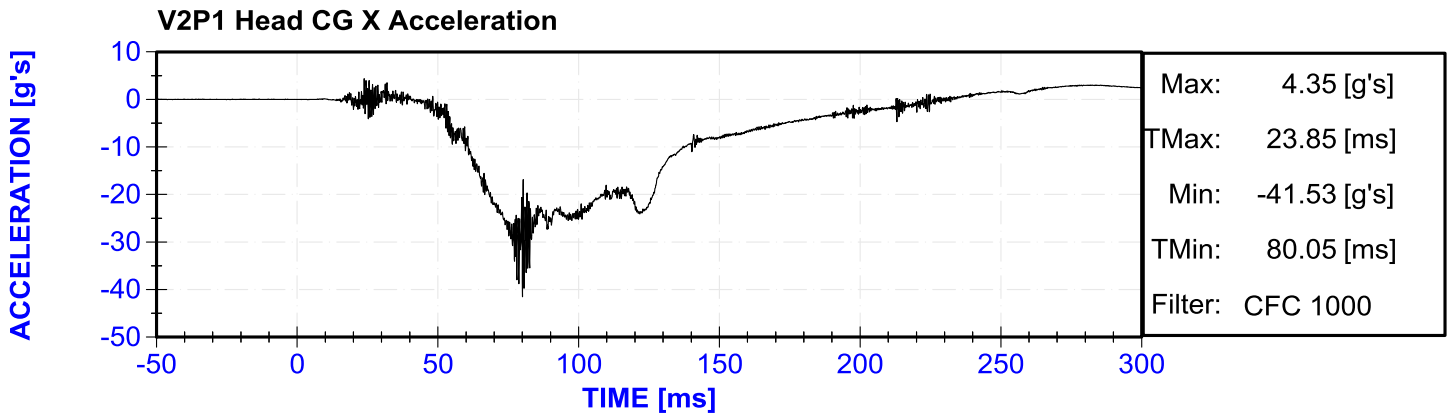
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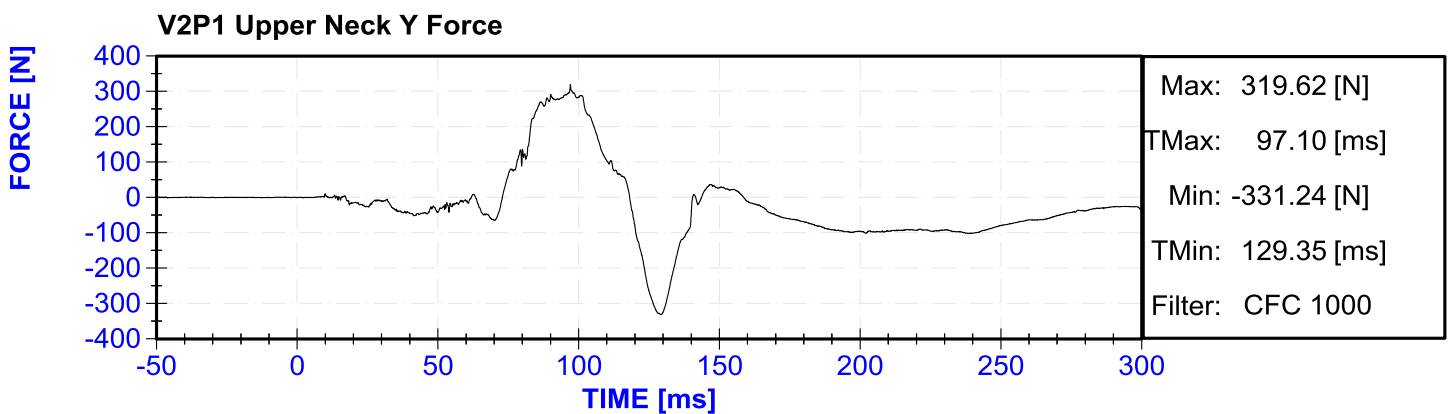
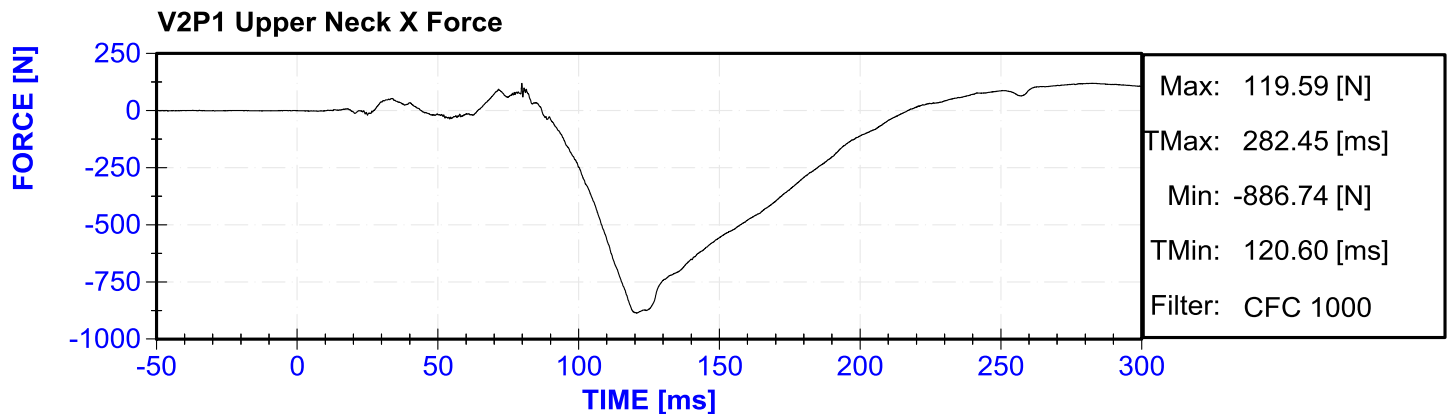
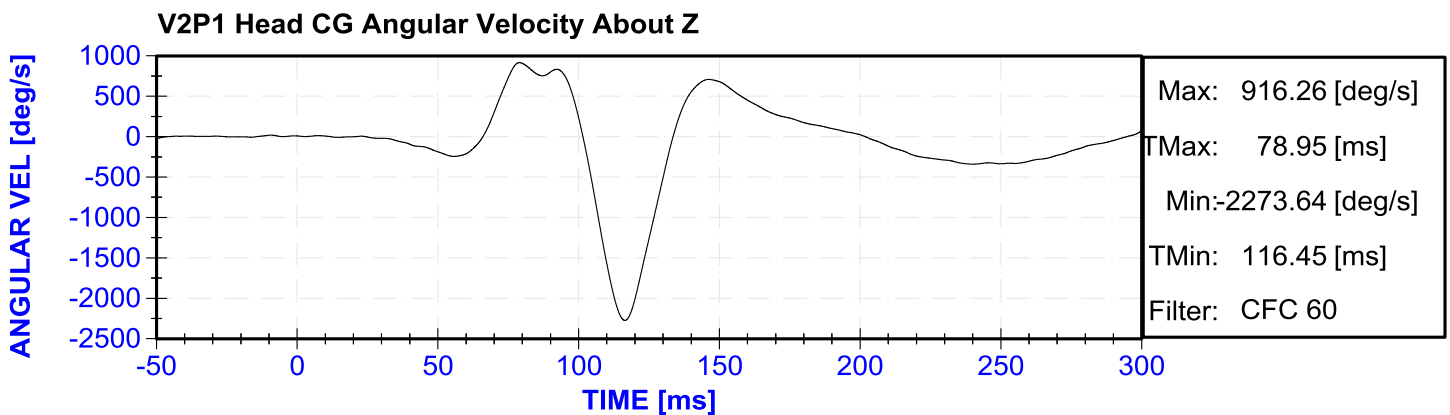
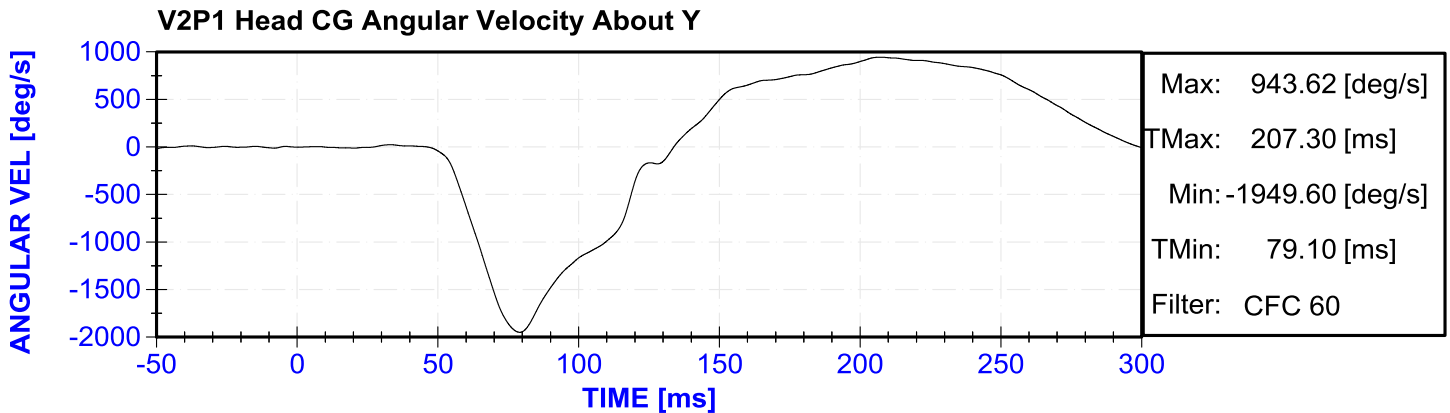
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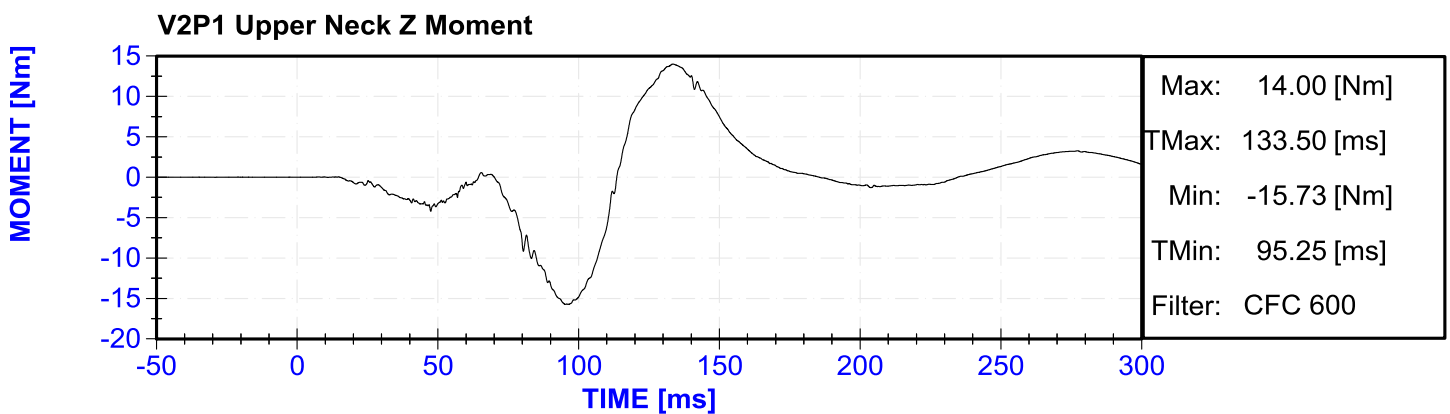
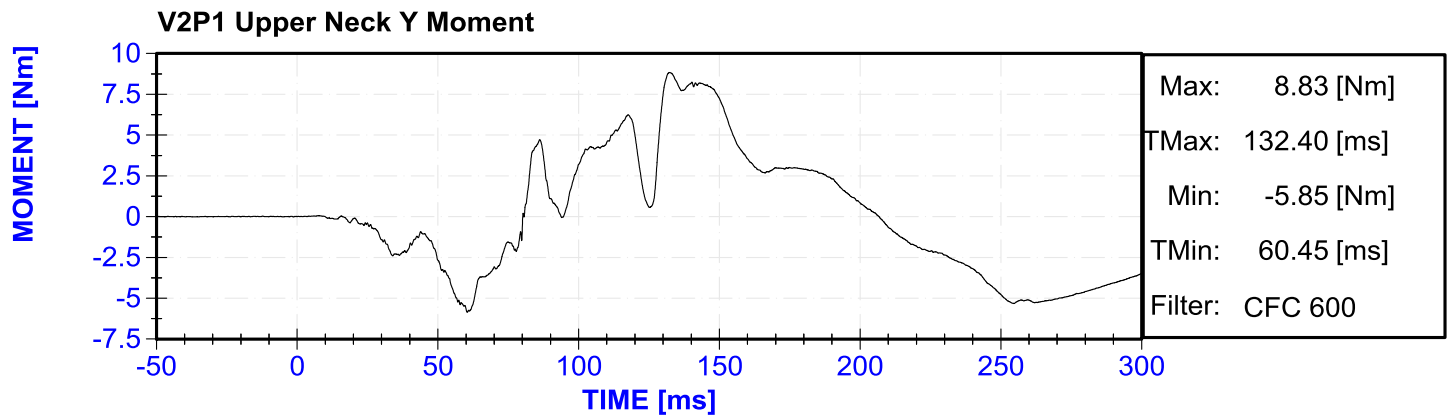
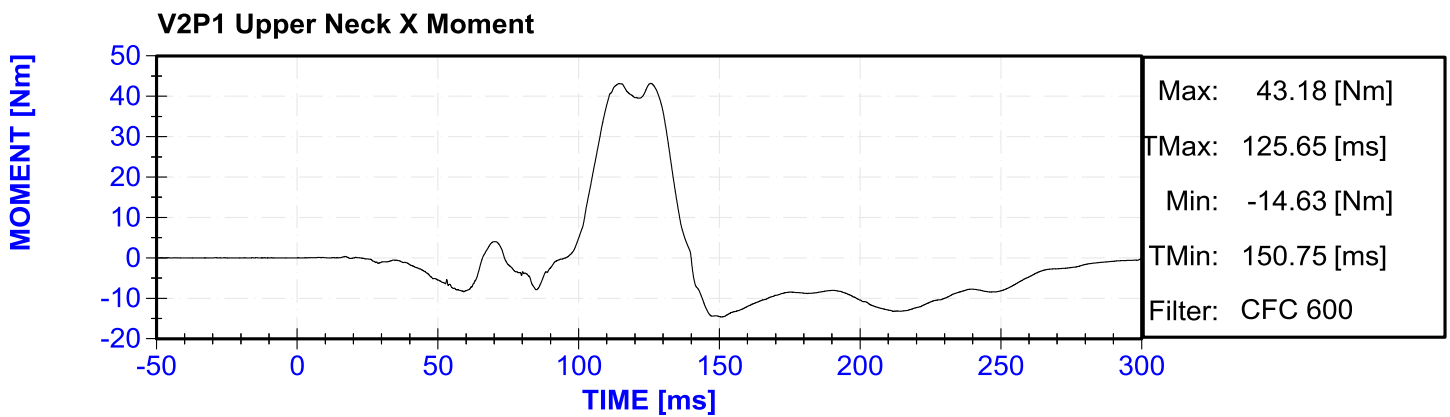
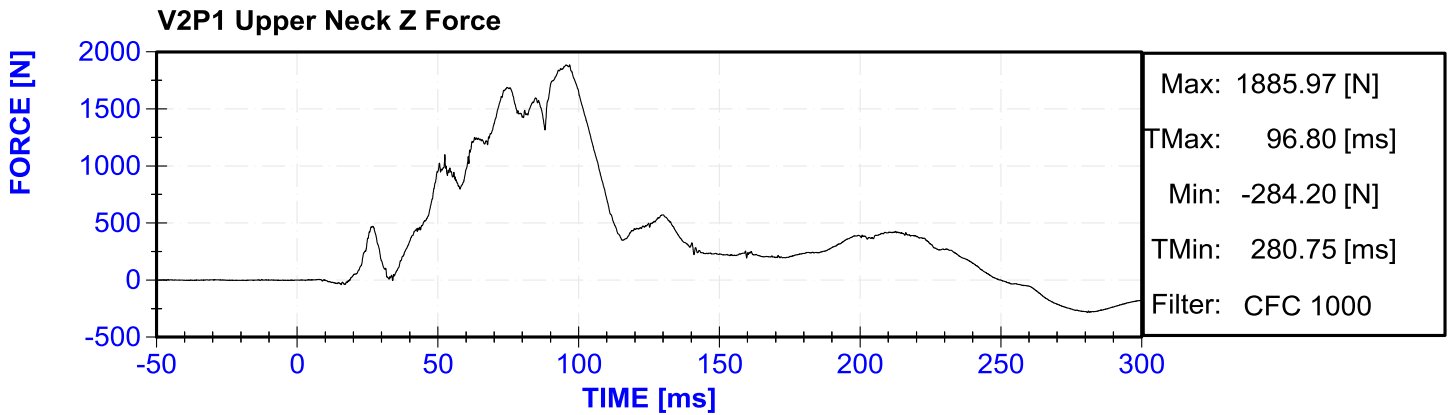
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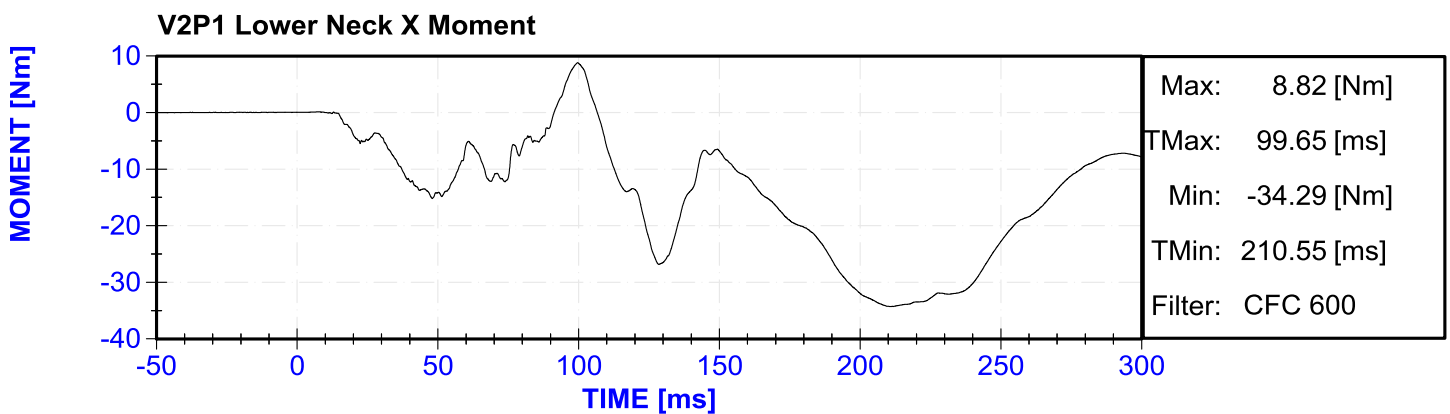
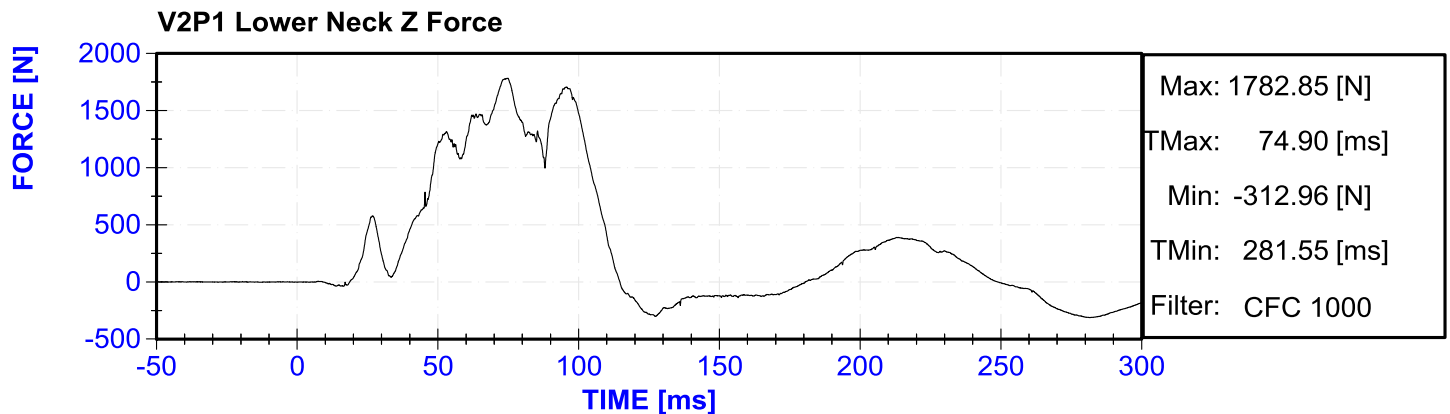
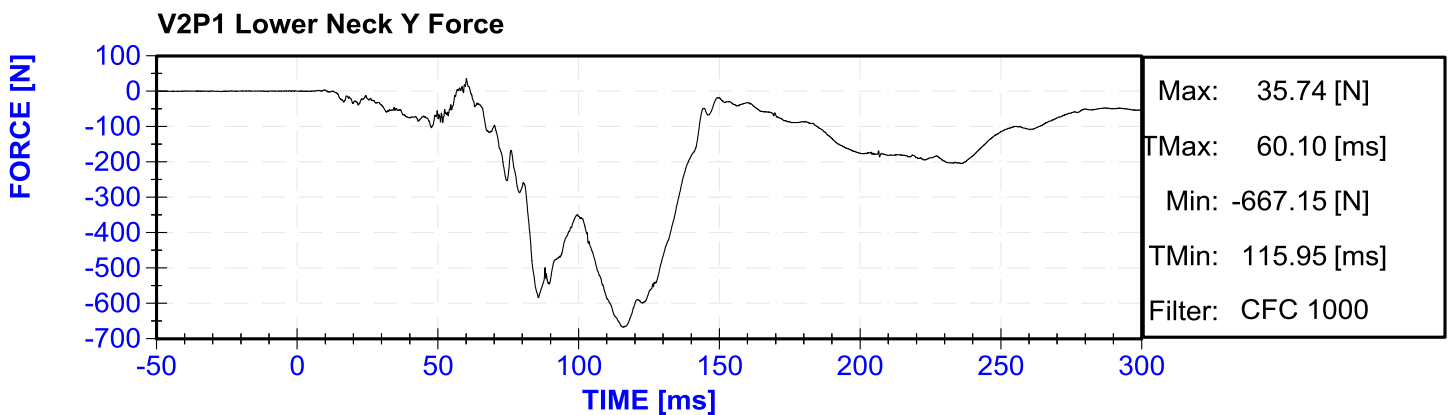
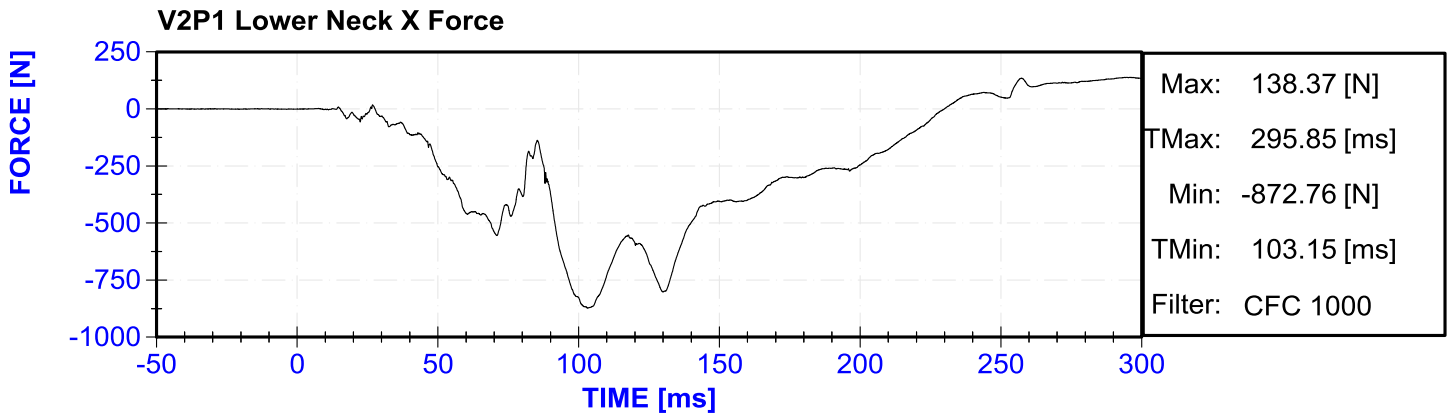
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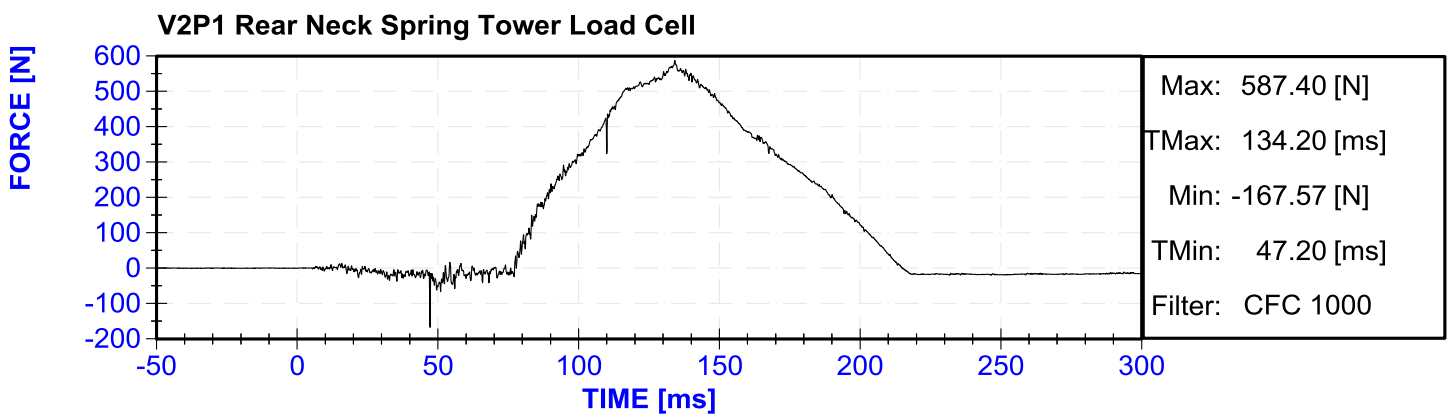
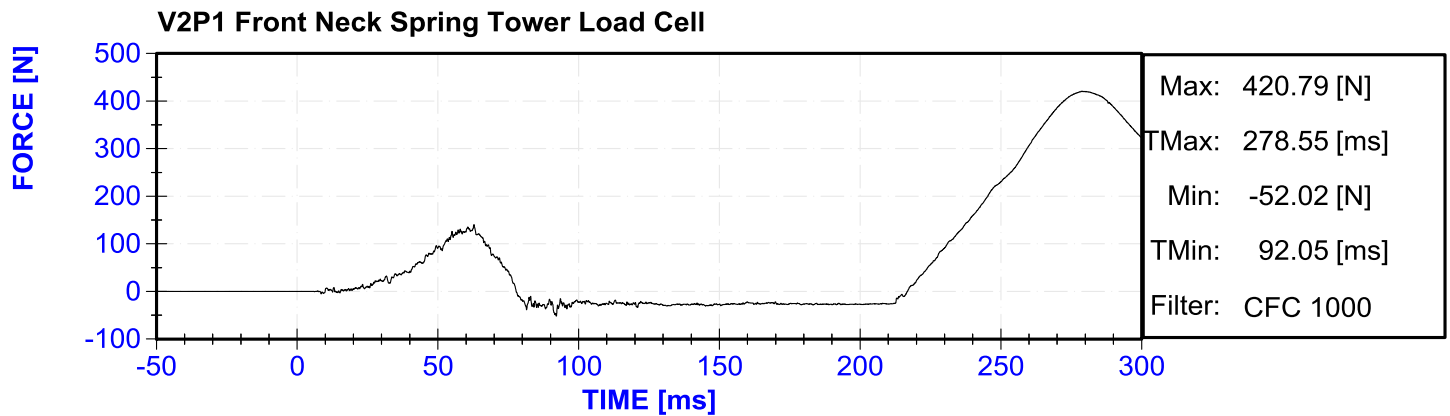
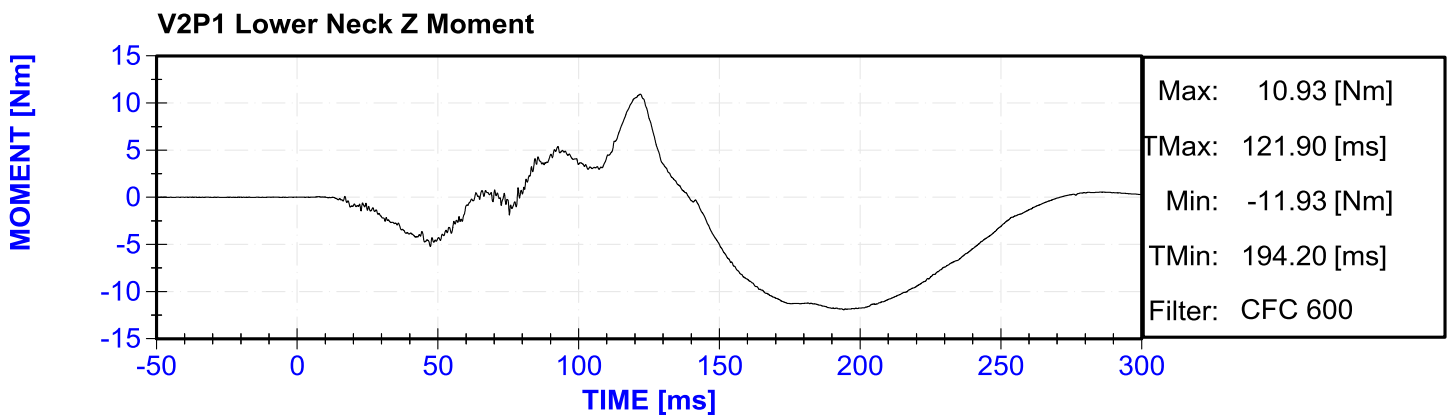
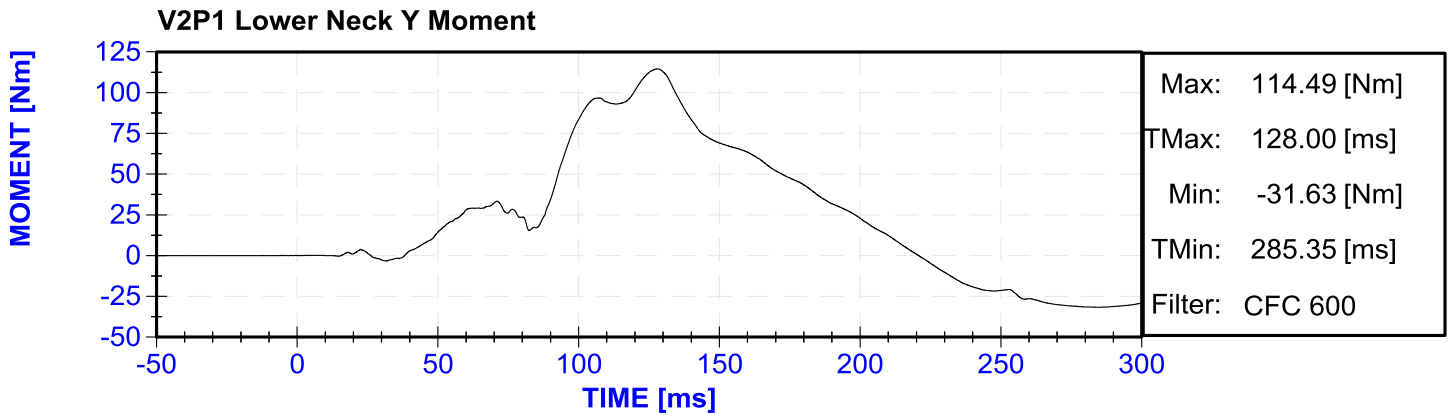
Plot 294	V2P2 Chest Right Lower Dy	B-81
Plot 295	V2P2 Chest Right Lower Dz	B-81
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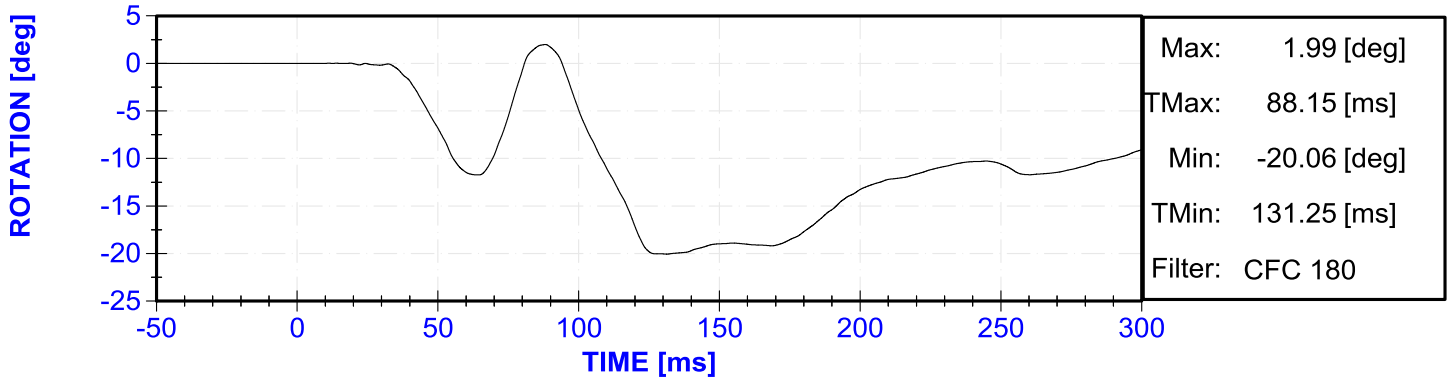




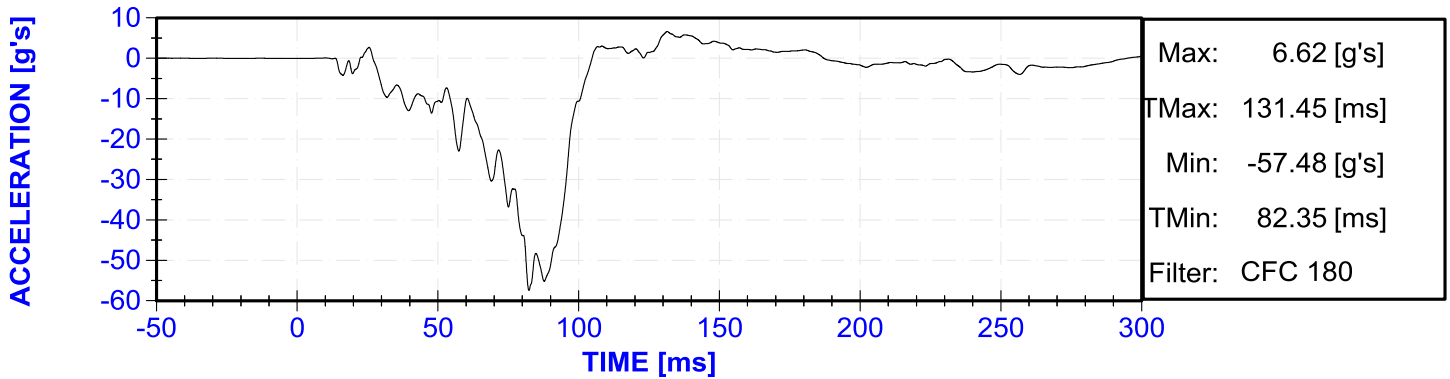




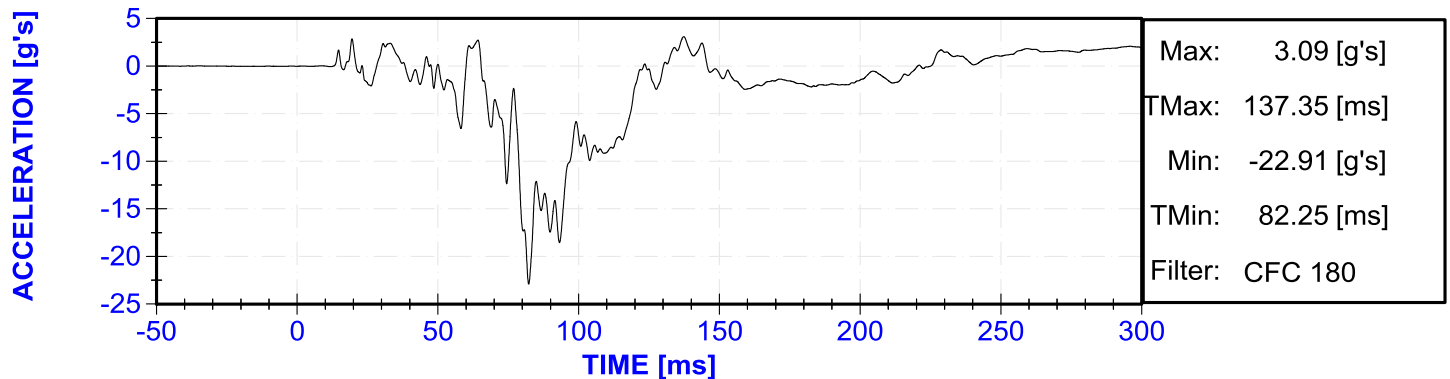
V2P1 Occipital Condyle Rotation Potentiometer



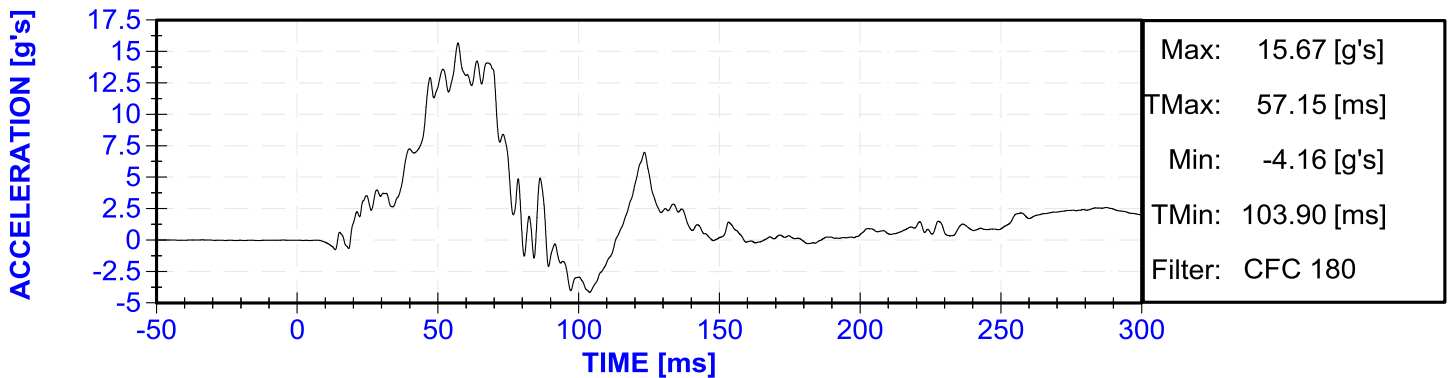
V2P1 T1 X Acceleration

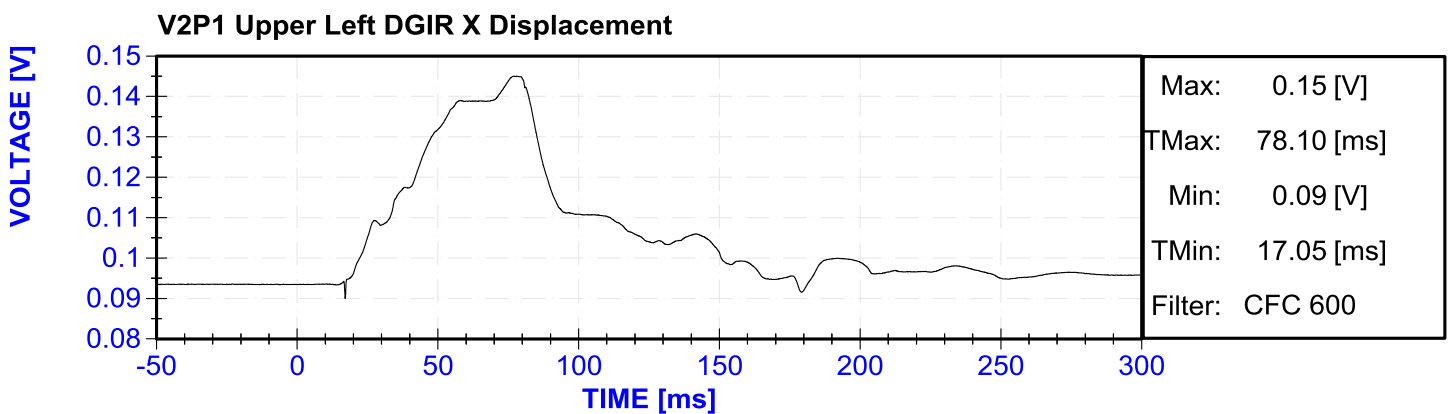
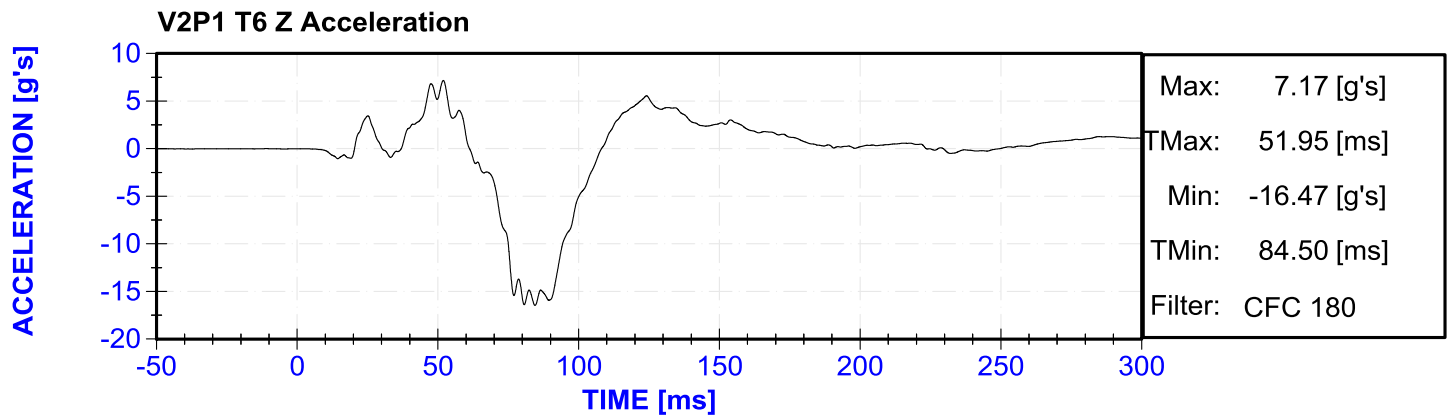
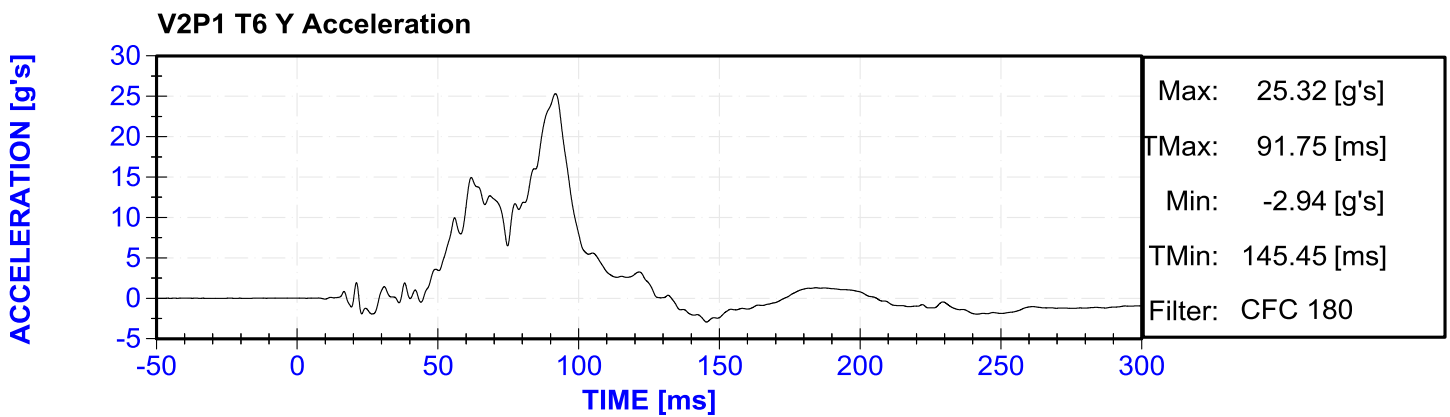
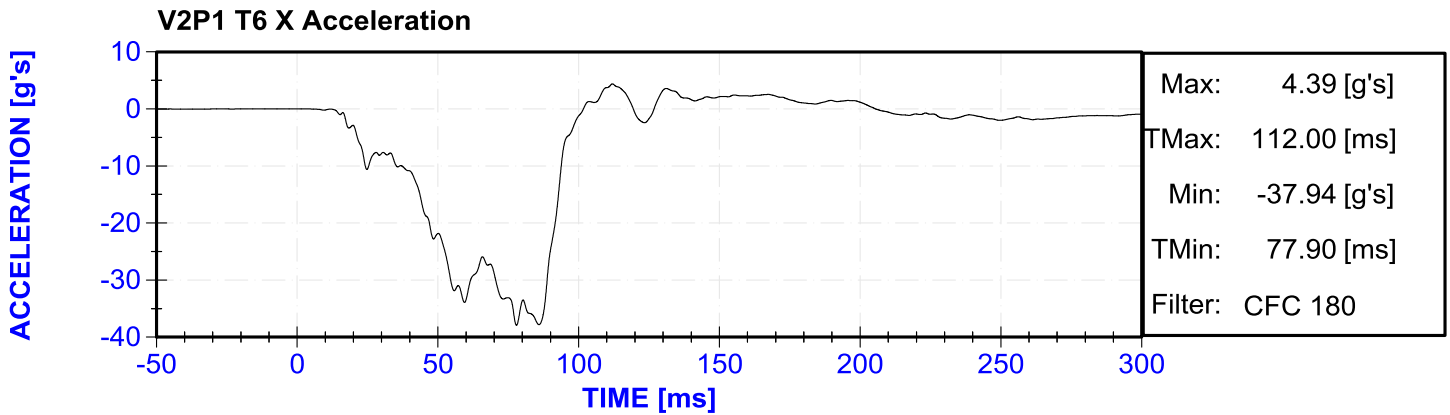


V2P1 T1 Y Acceleration

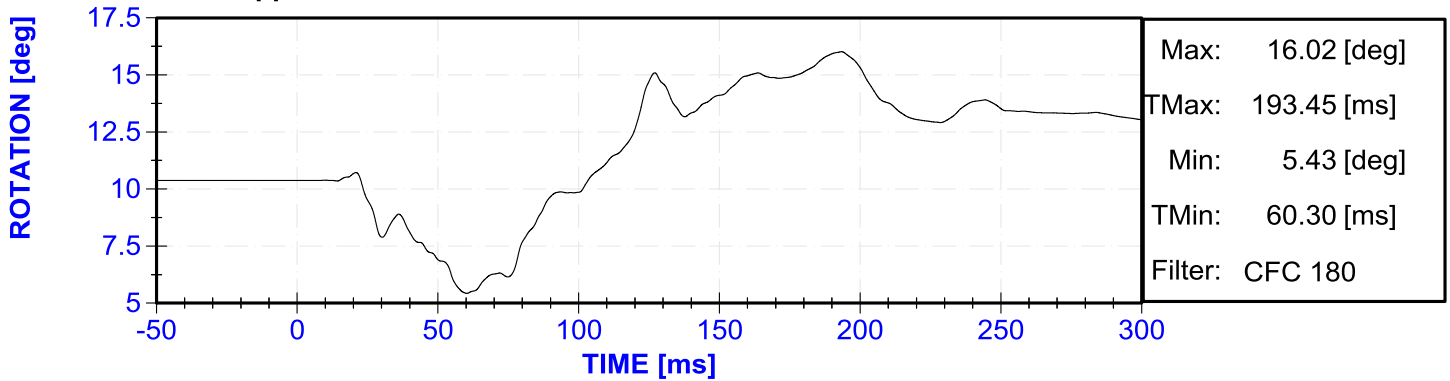


V2P1 T1 Z Acceleration

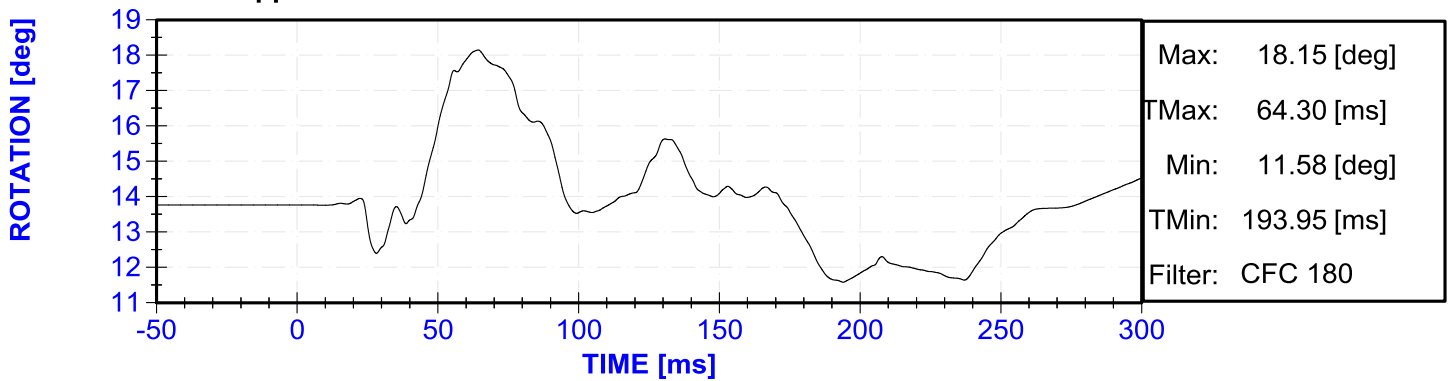




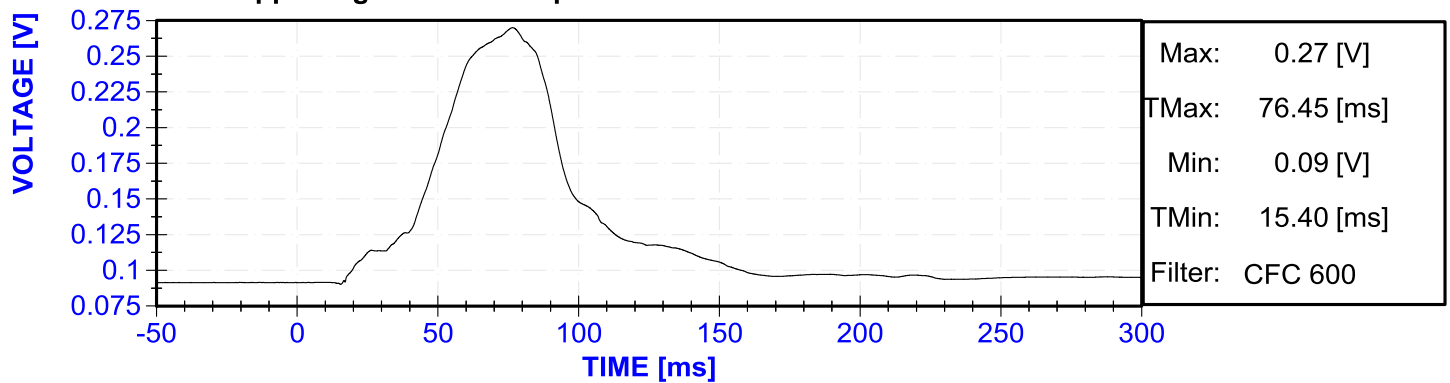
V2P1 Upper Left DGIR Y Rotation



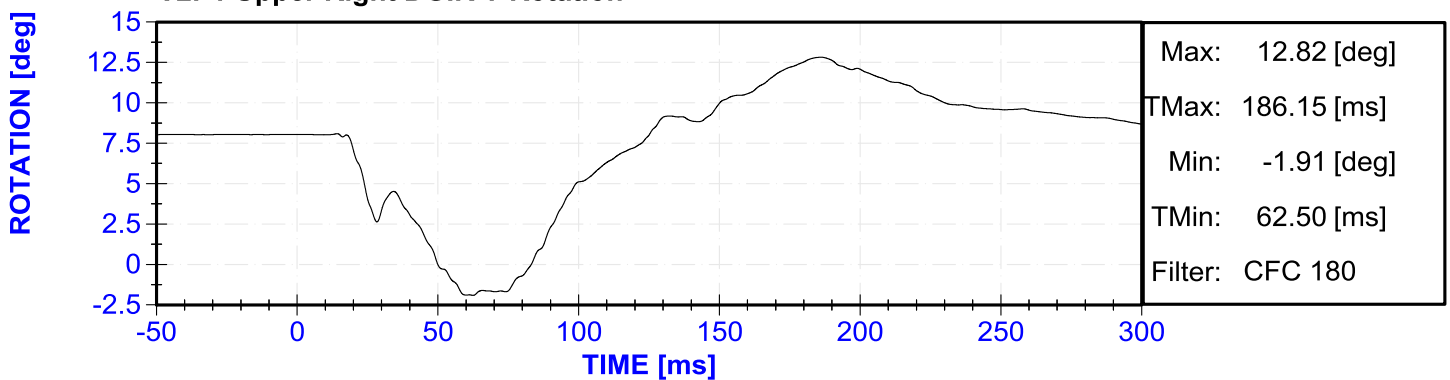
V2P1 Upper Left DGIR Z Rotation



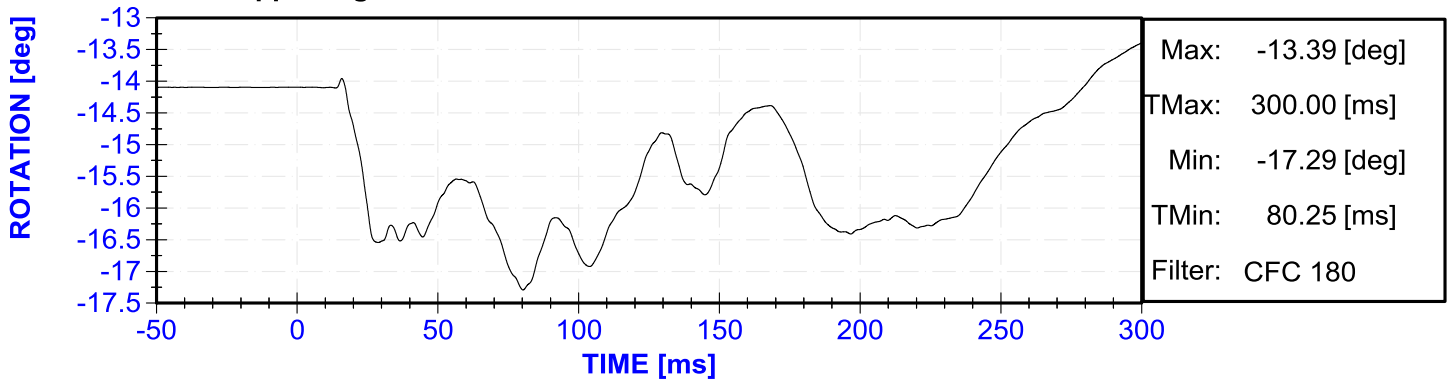
V2P1 Upper Right DGIR X Displacement



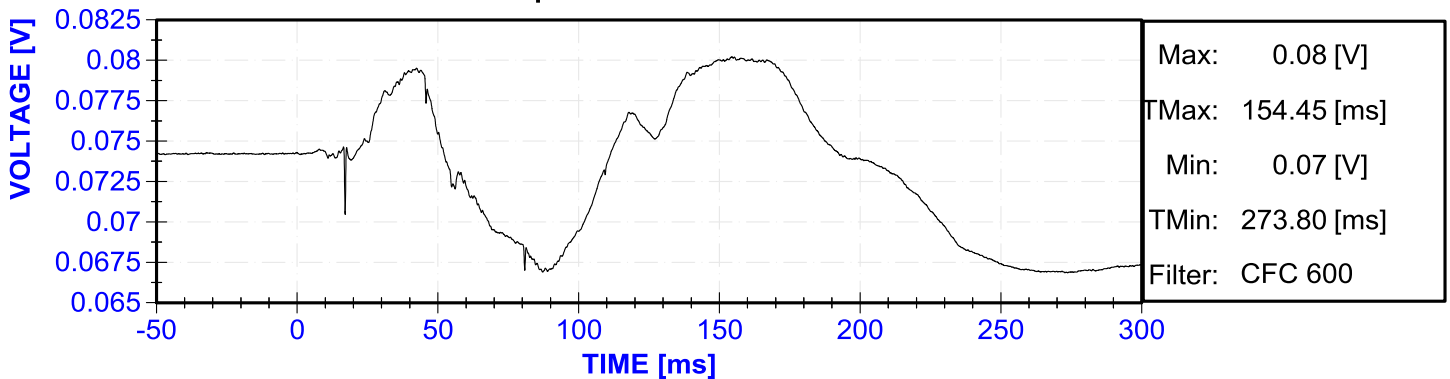
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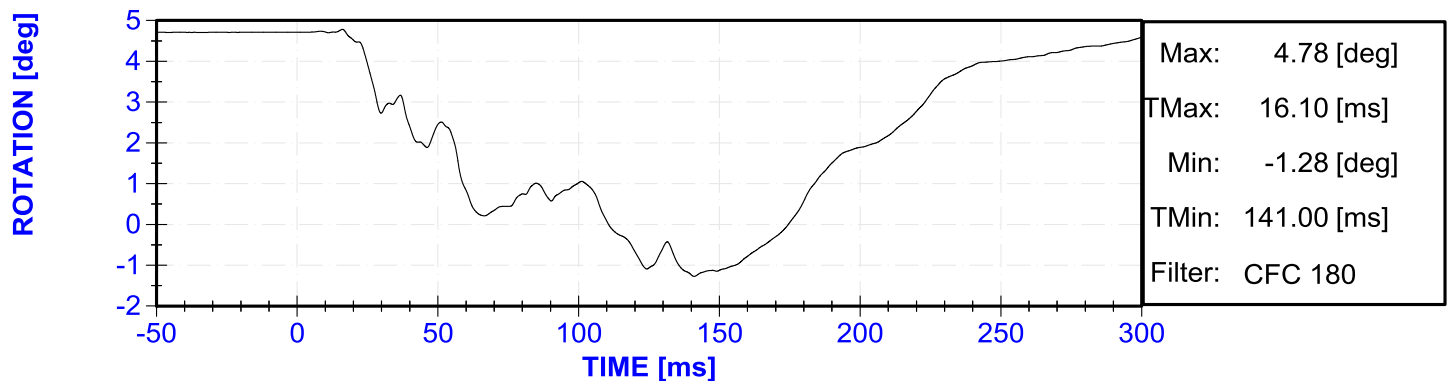
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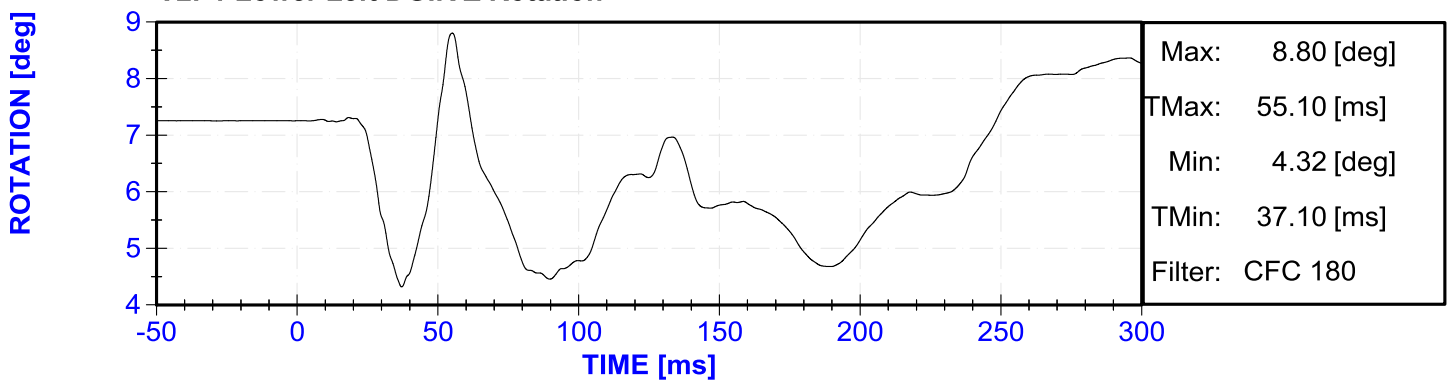
V2P1 Lower Left DGIR X Displacement



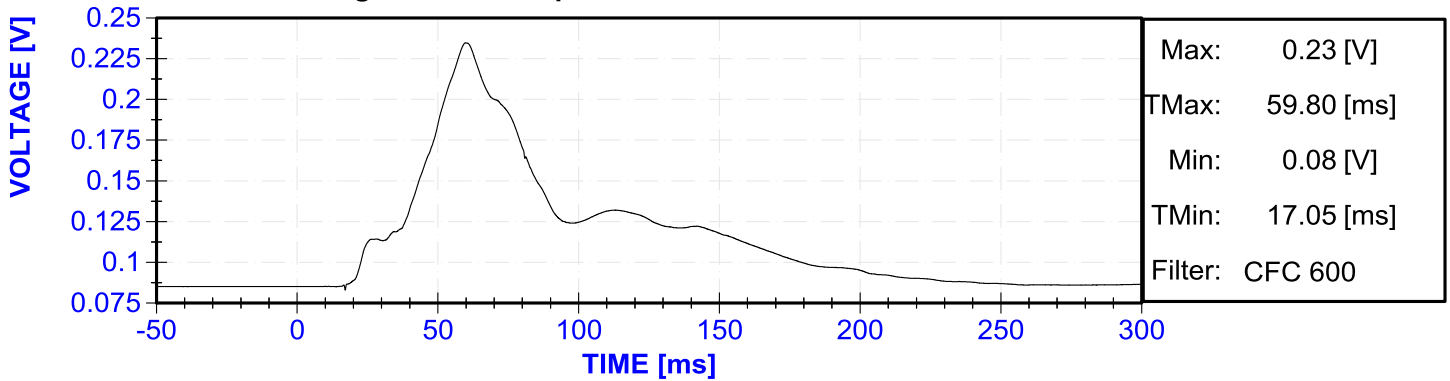
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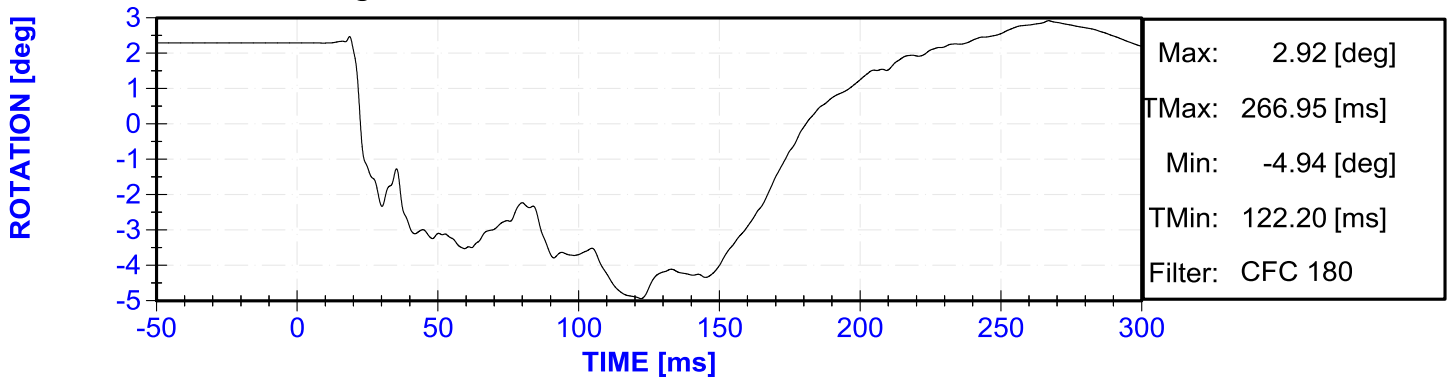
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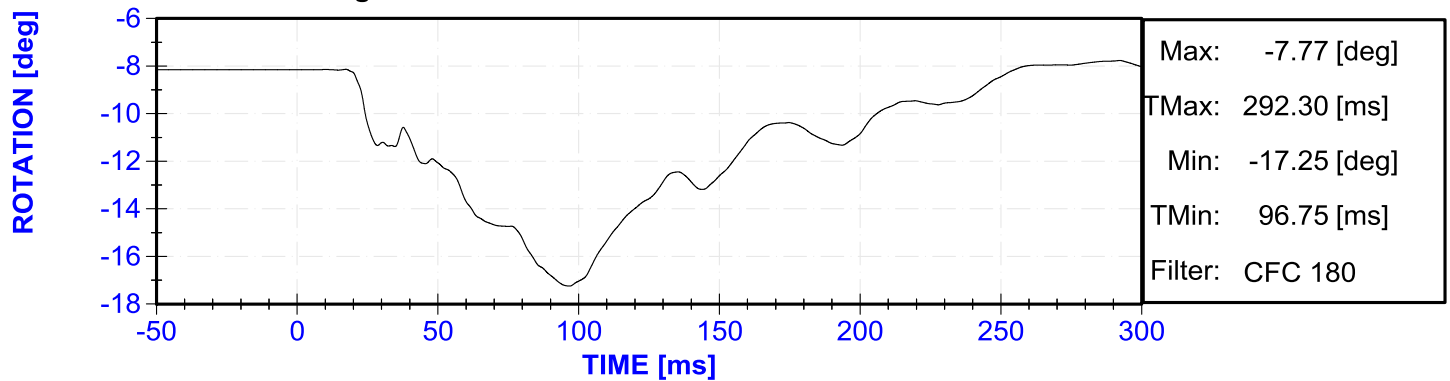
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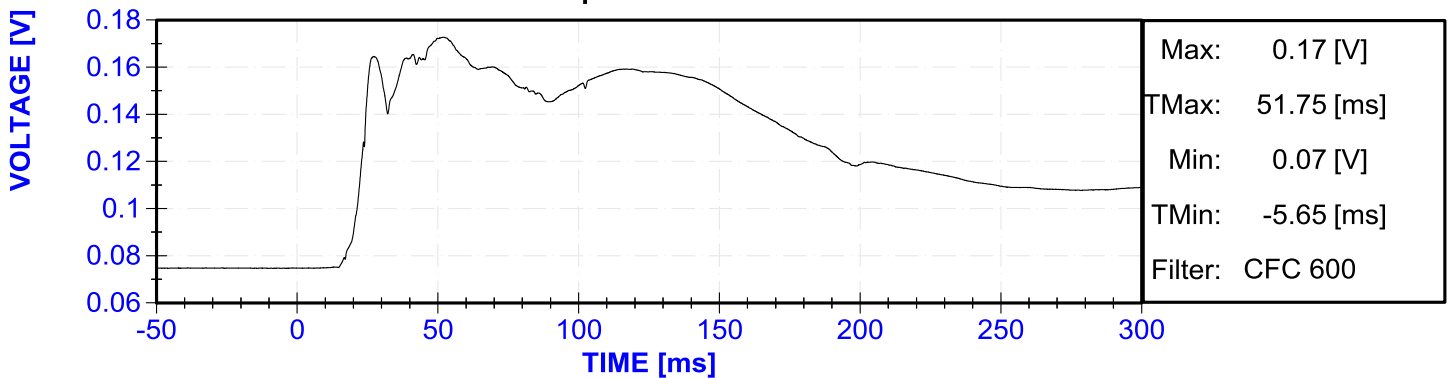
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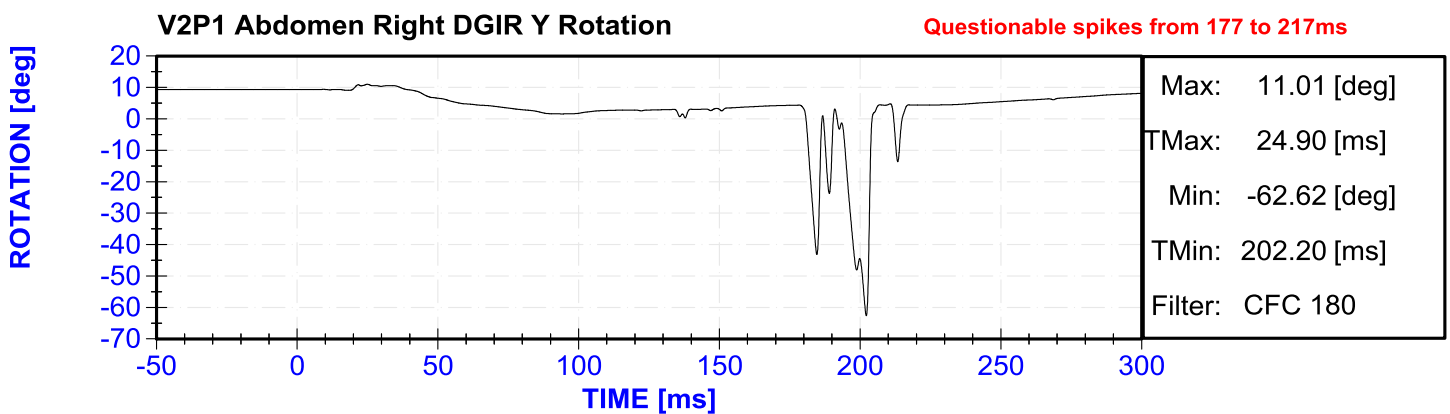
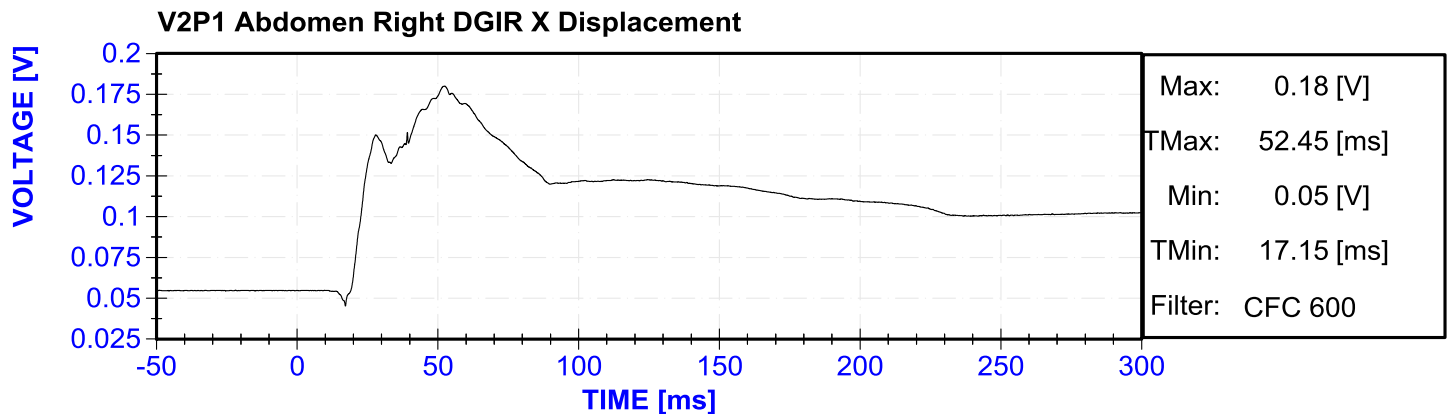
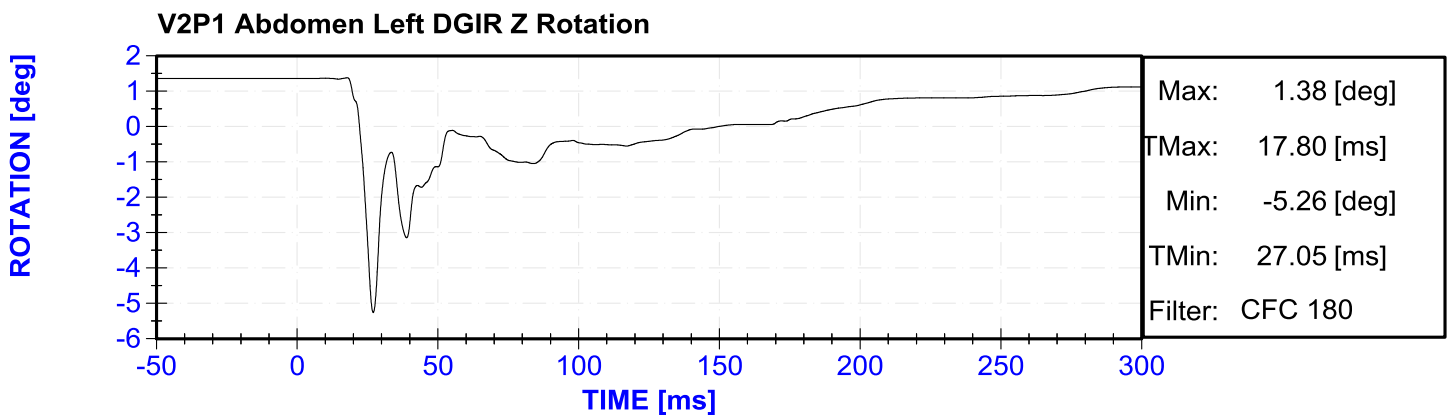
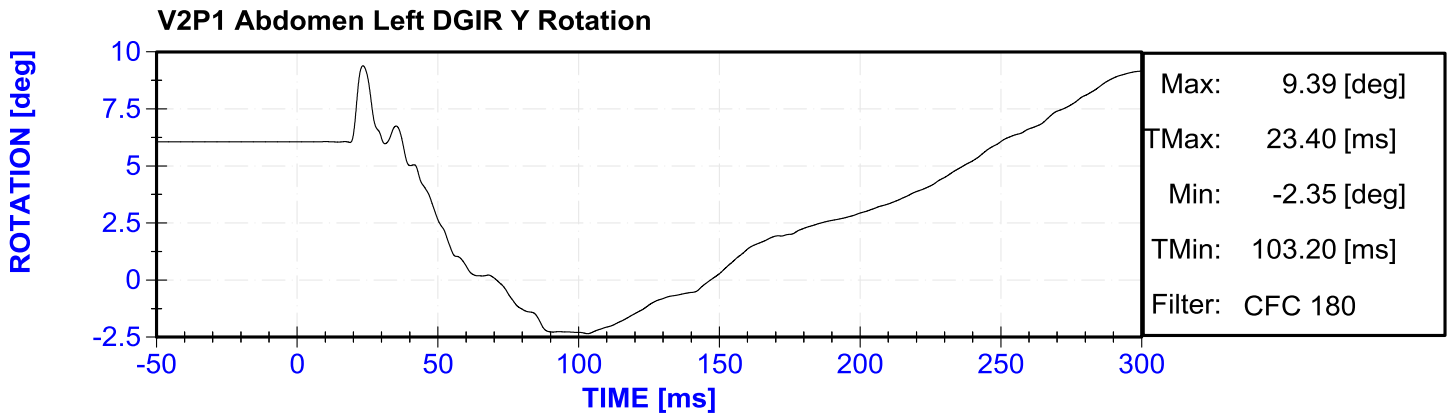


V2P1 Lower Right DGIR Z Rotation

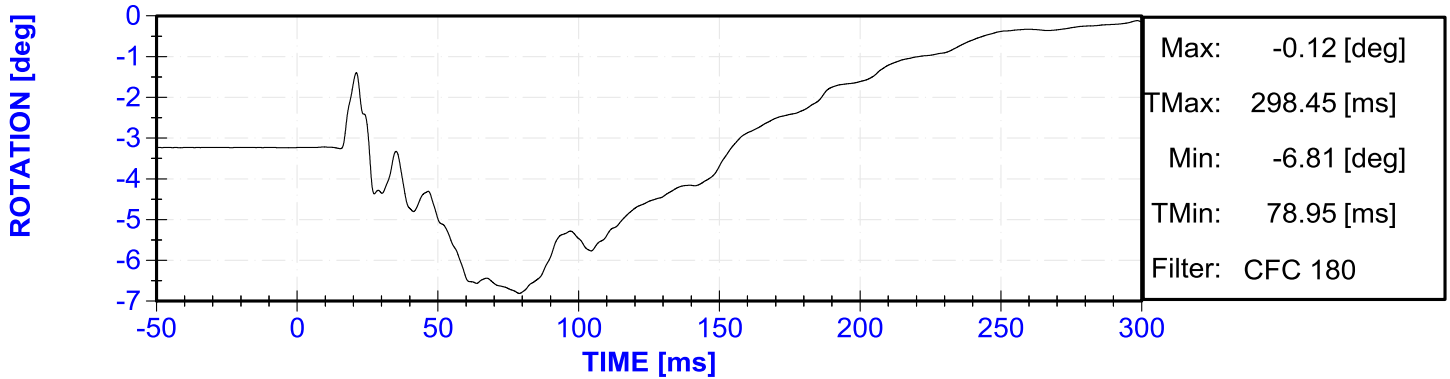


V2P1 Abdomen Left DGIR X Displacement

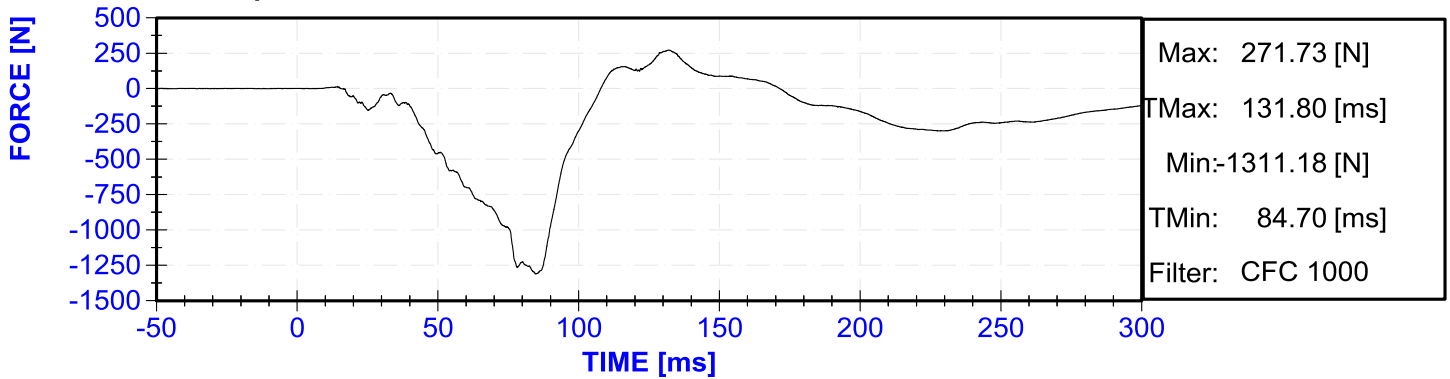




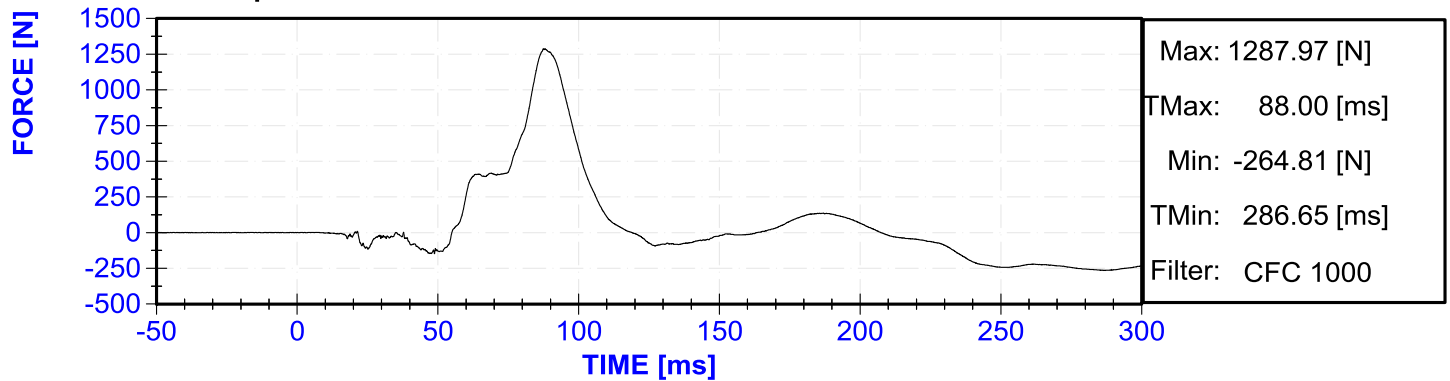
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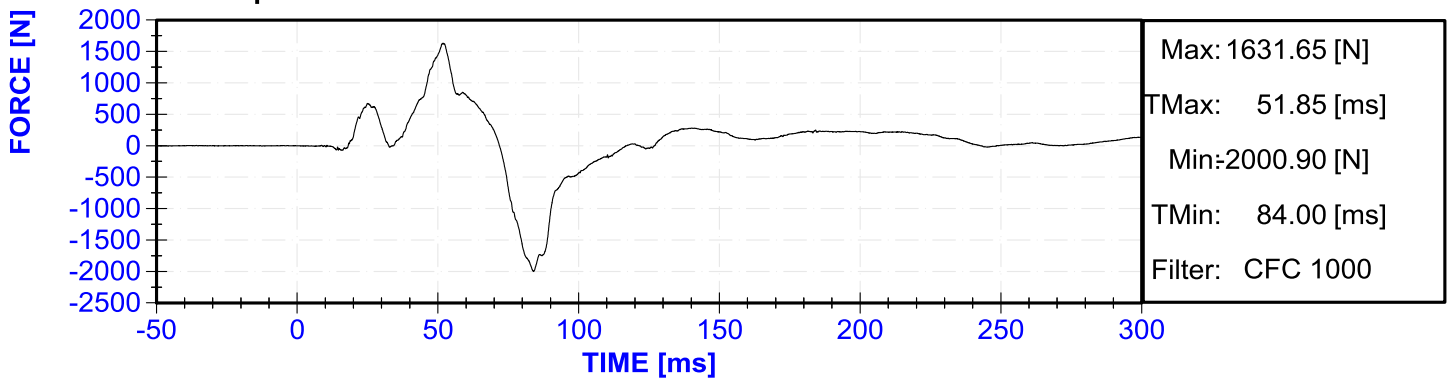
V2P1 Spine Force X

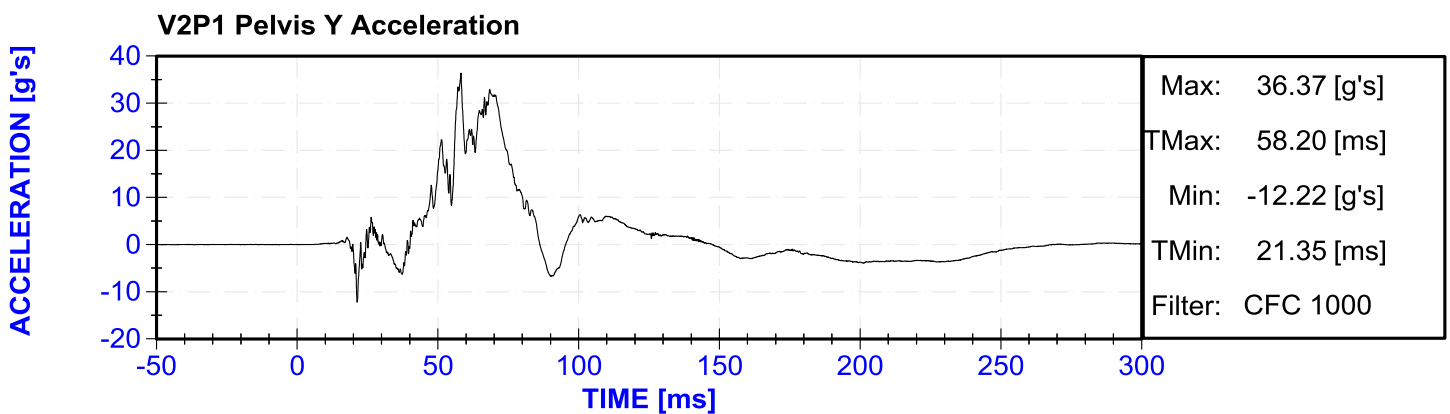
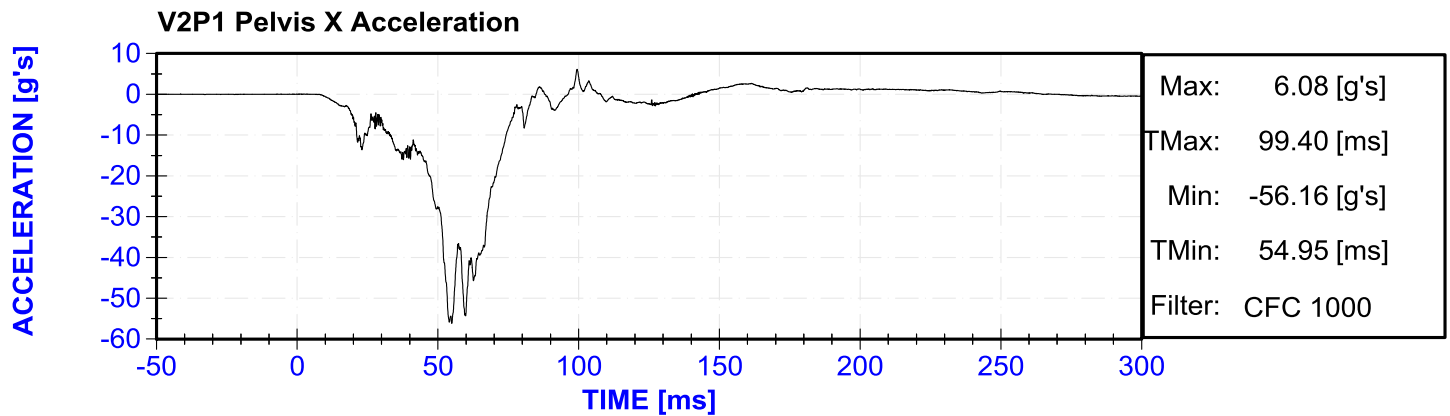
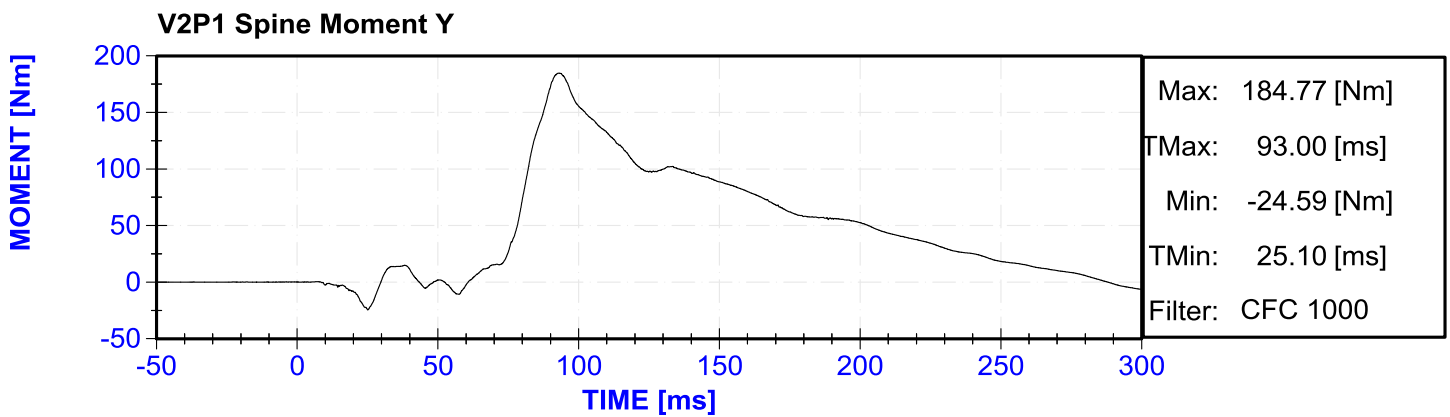
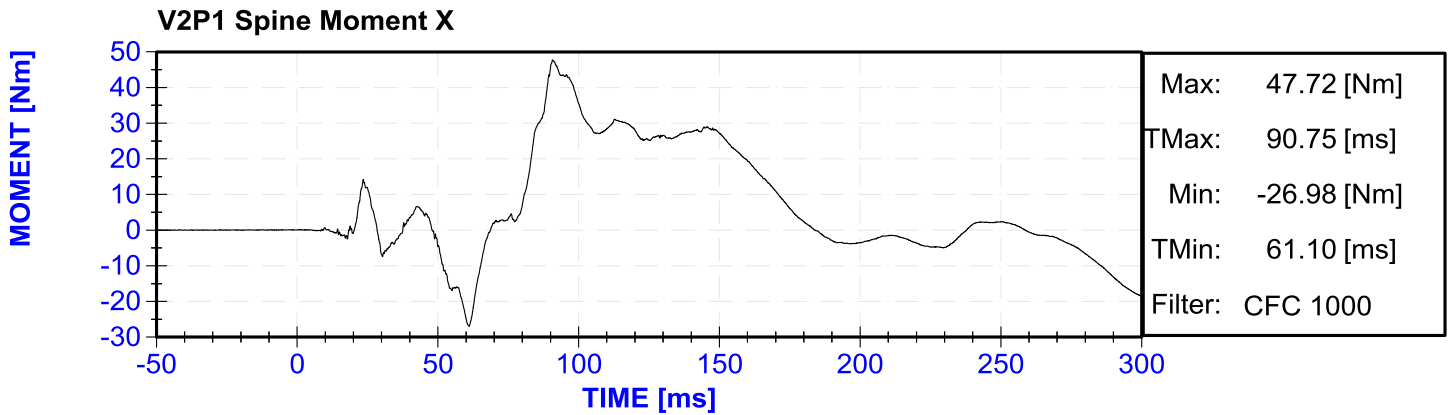


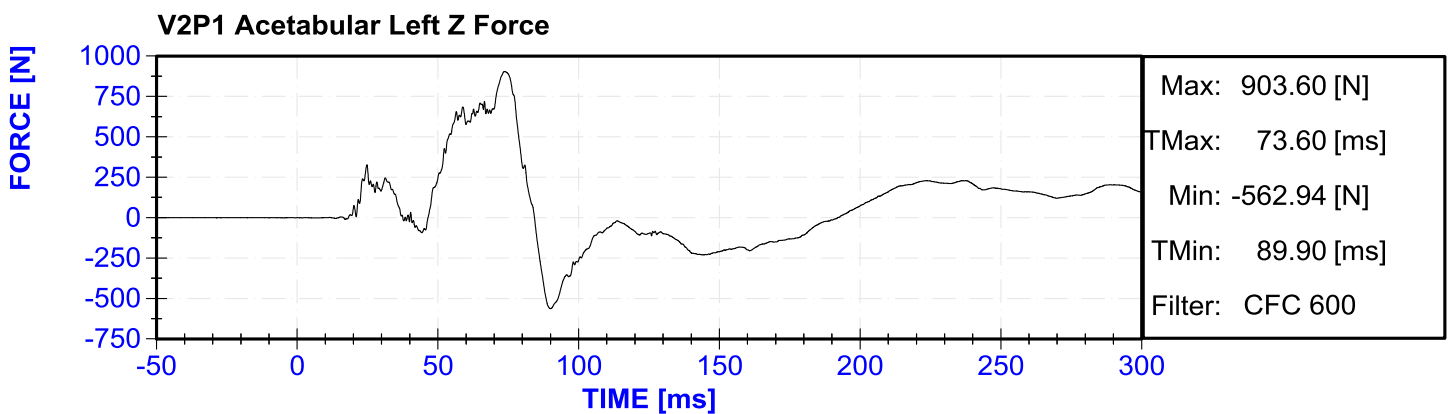
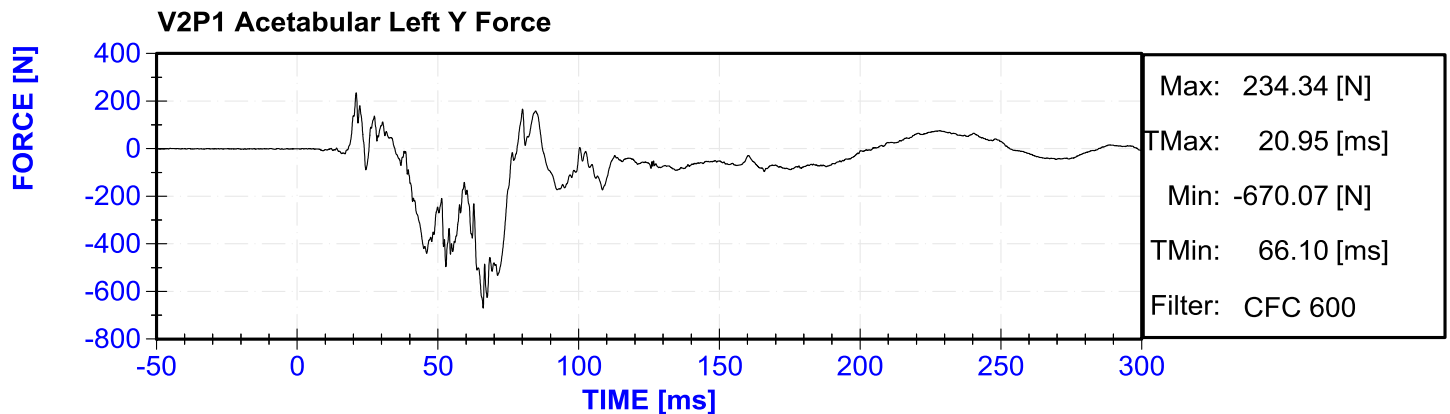
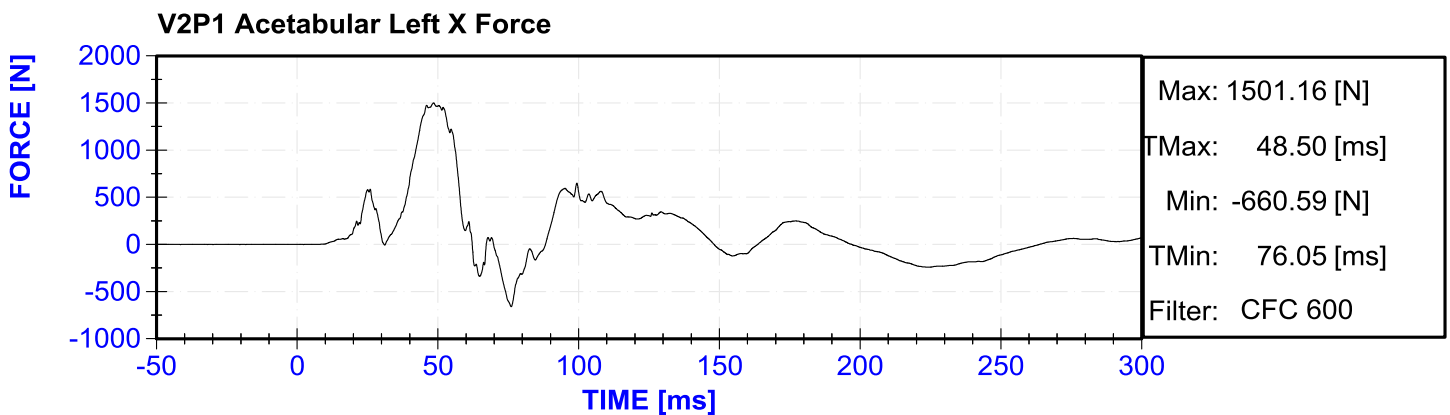
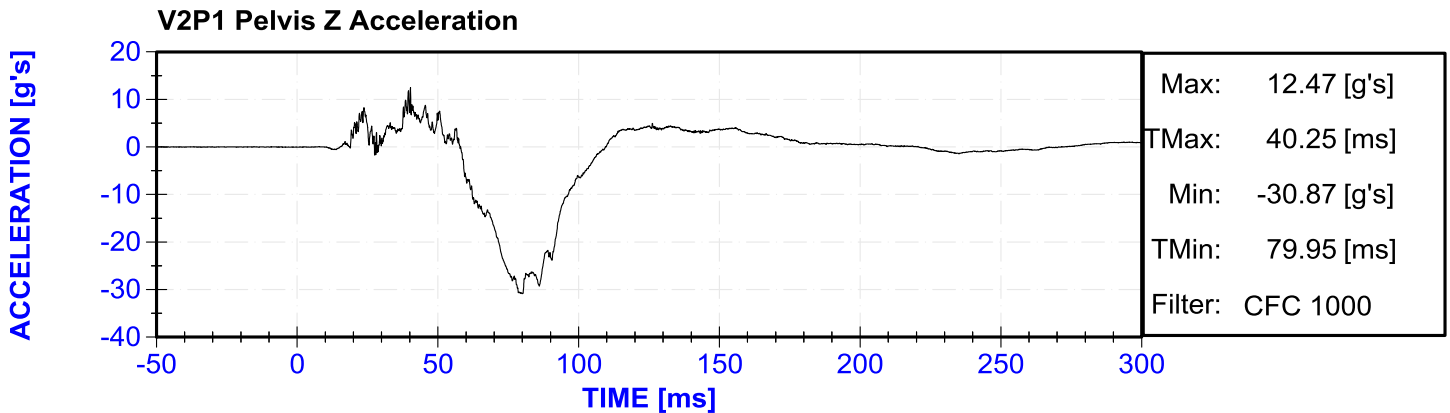
V2P1 Spine Force Y

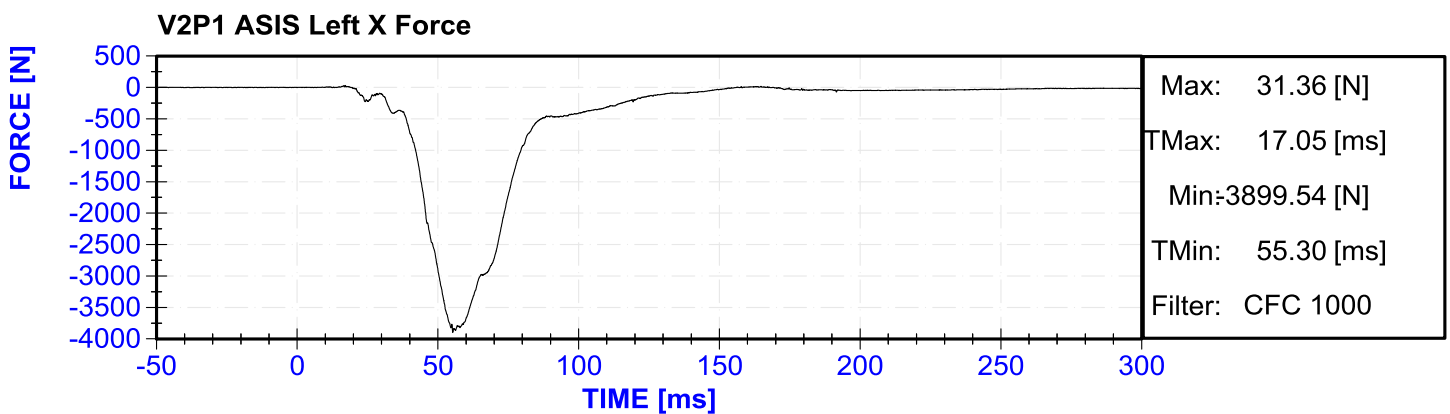
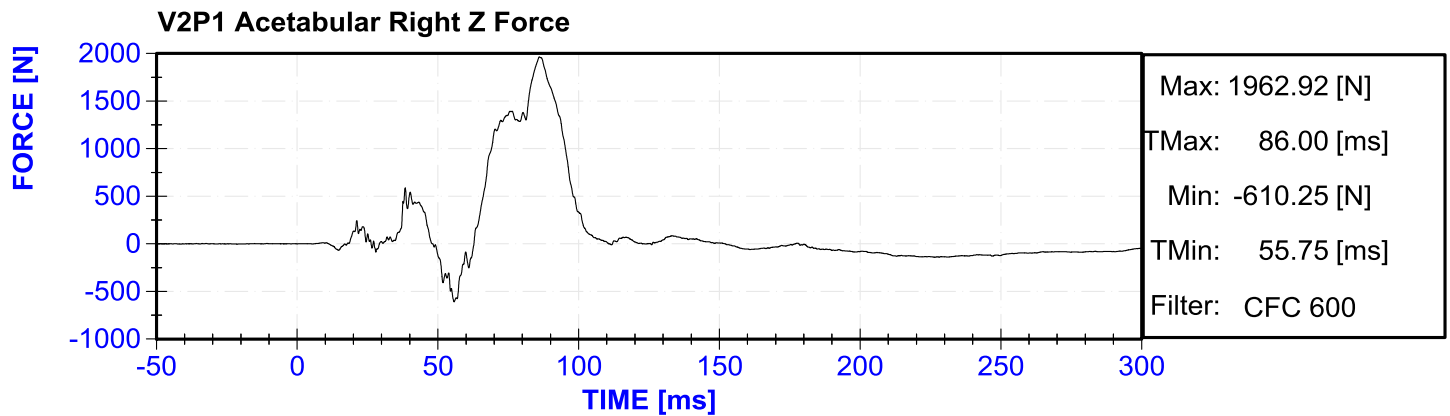
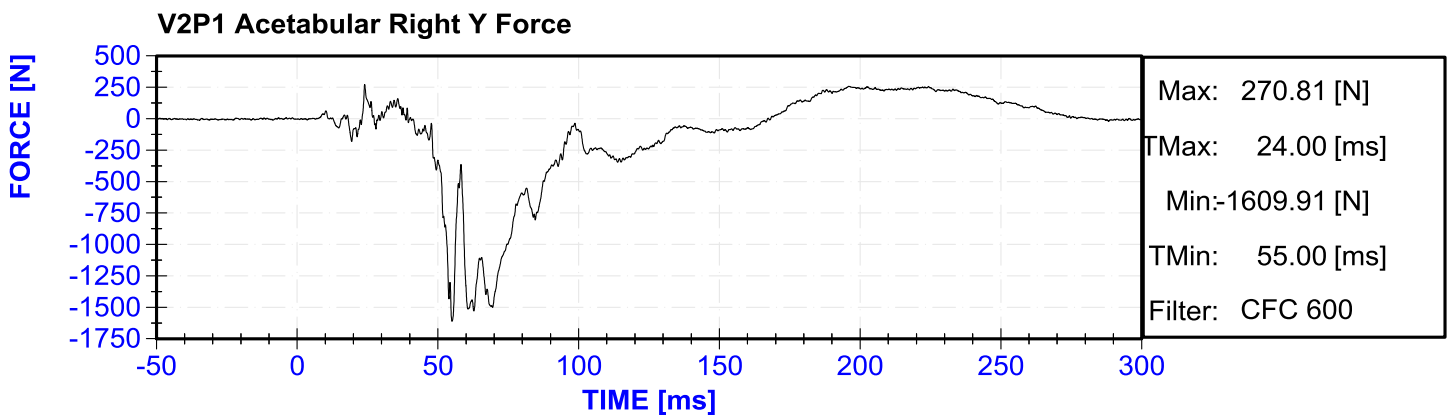
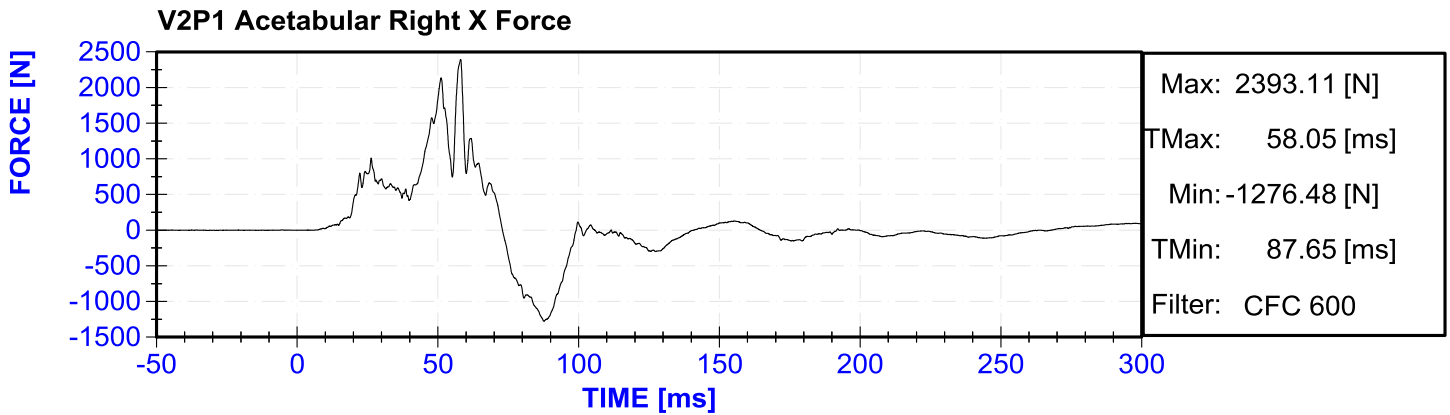


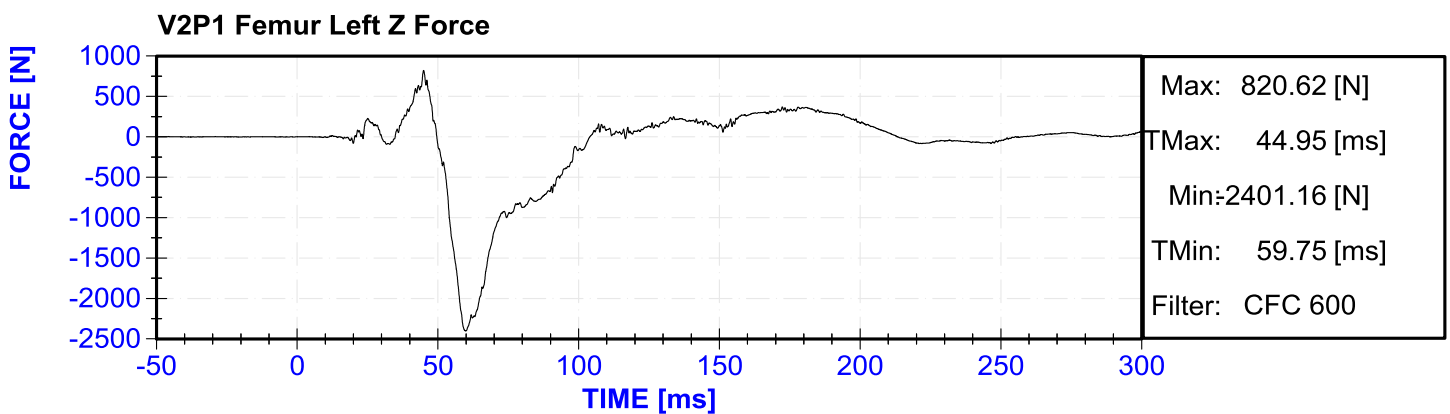
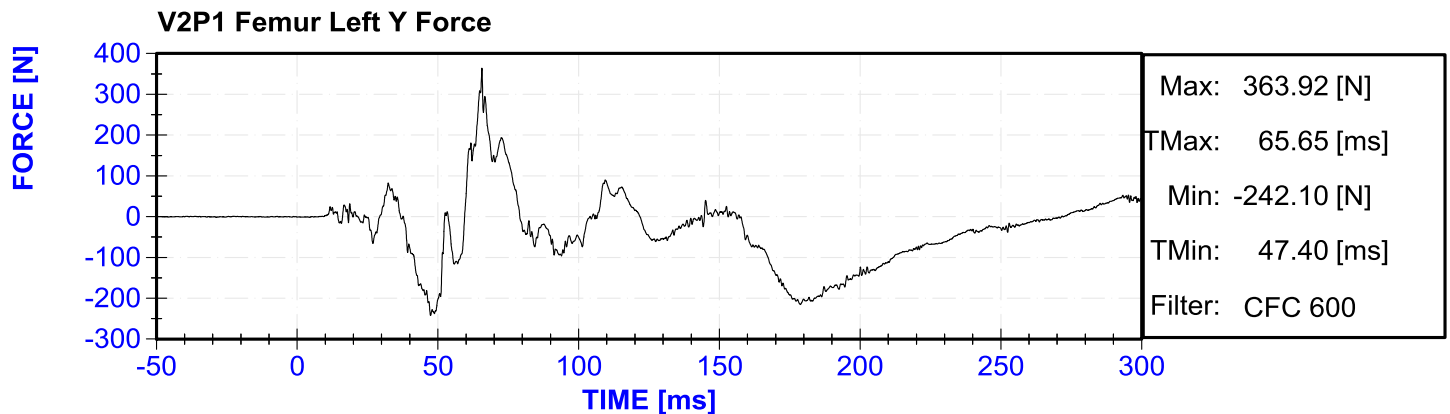
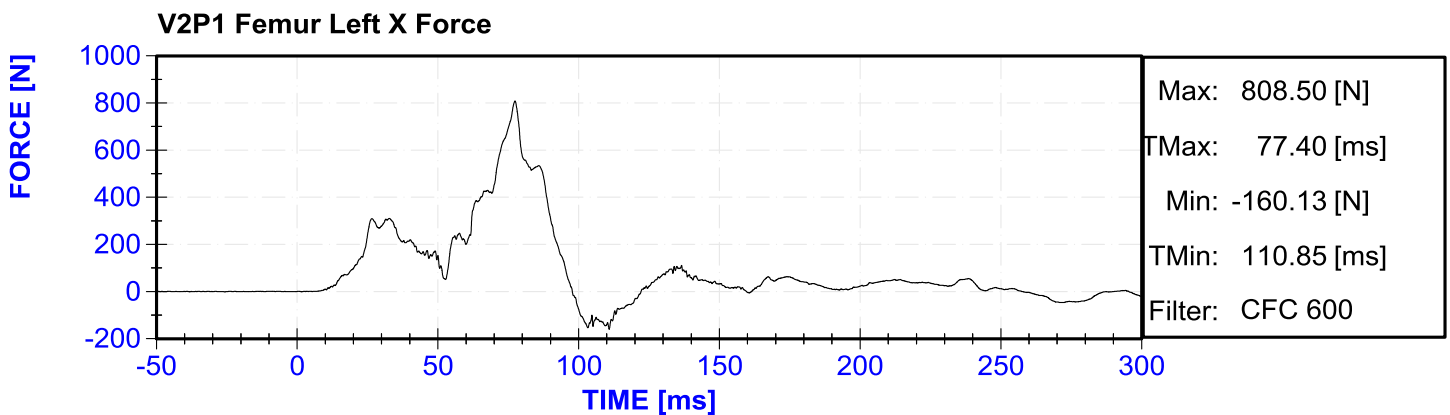
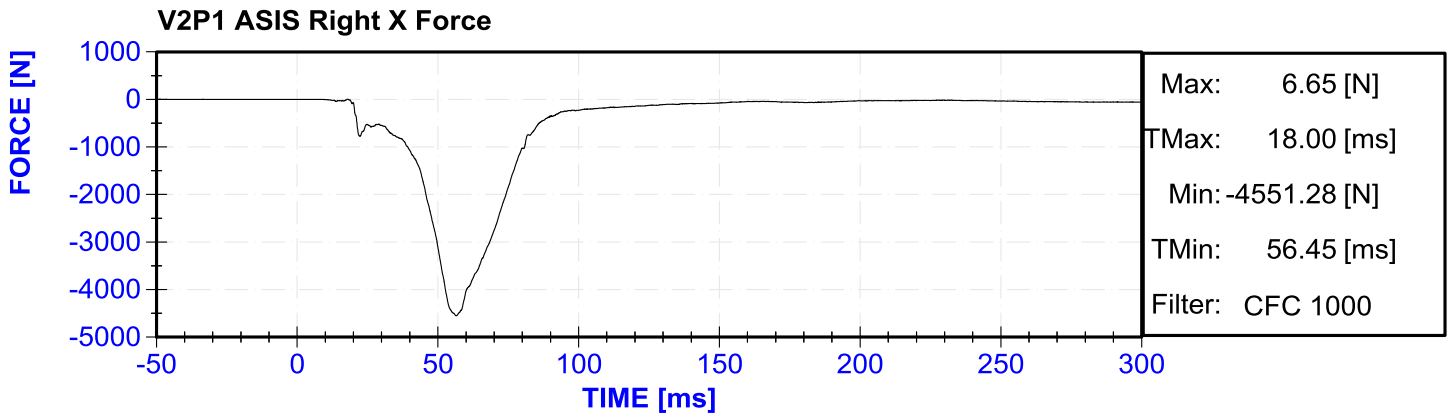
V2P1 Spine Force Z

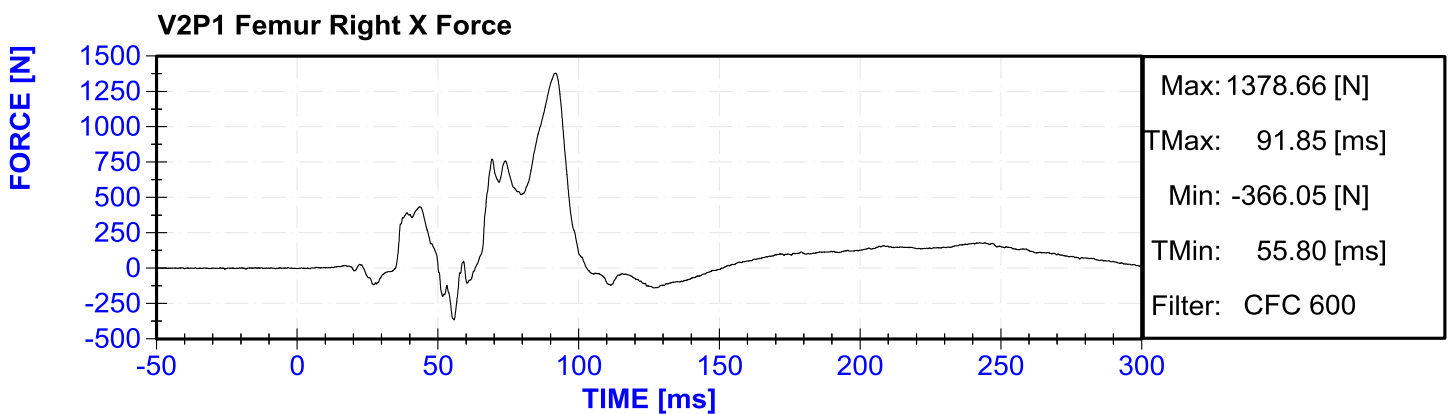
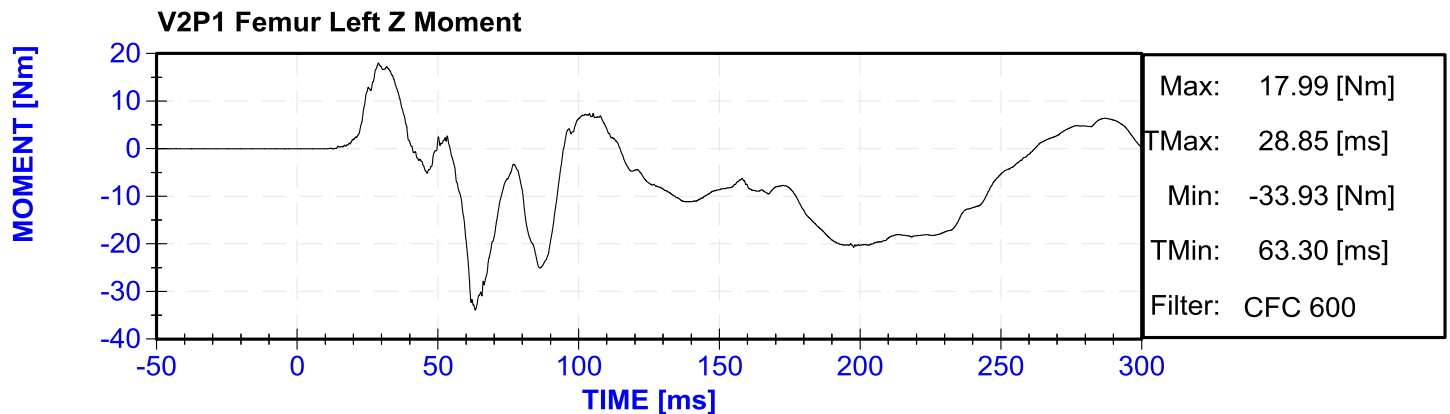
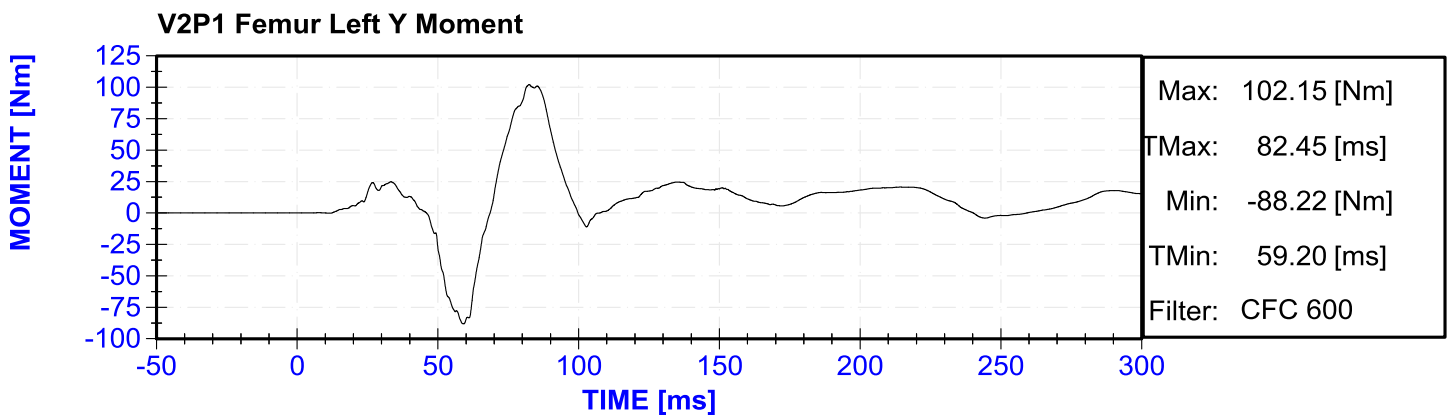
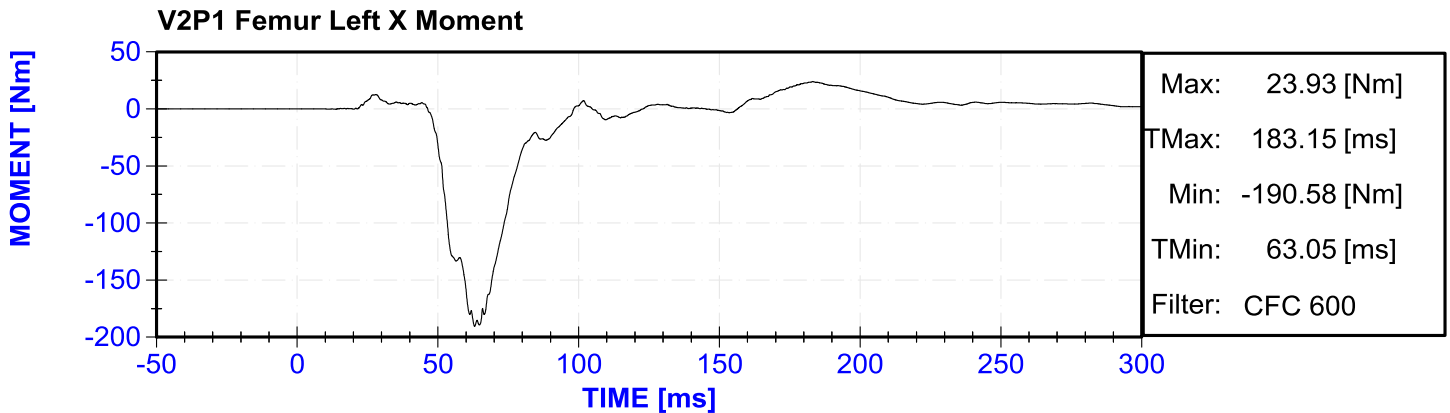


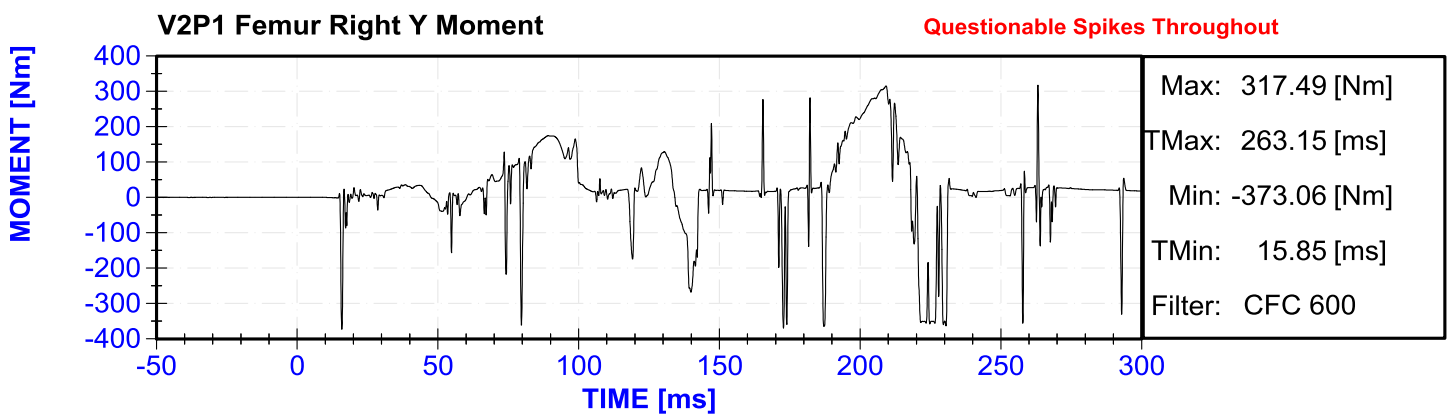
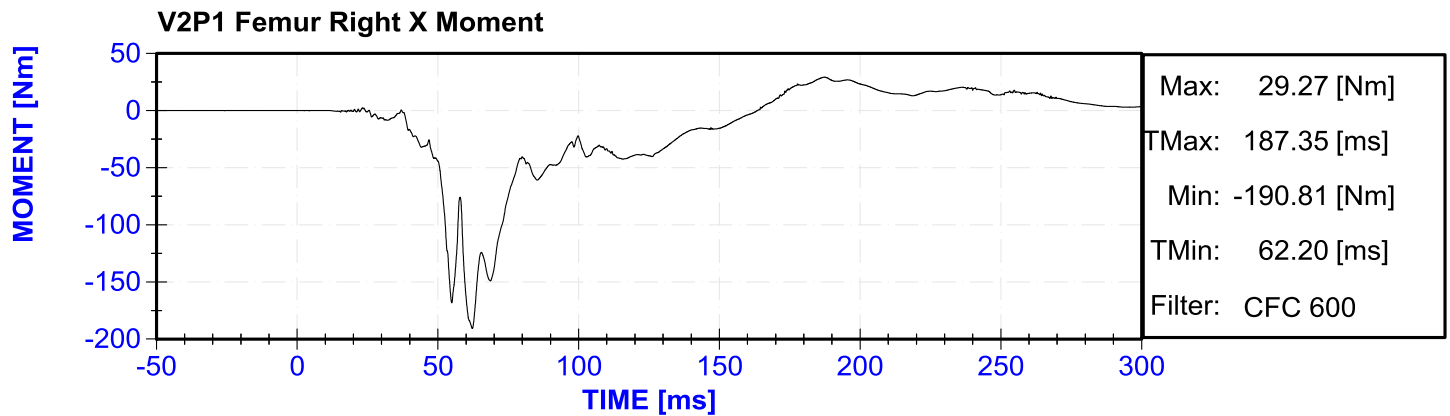
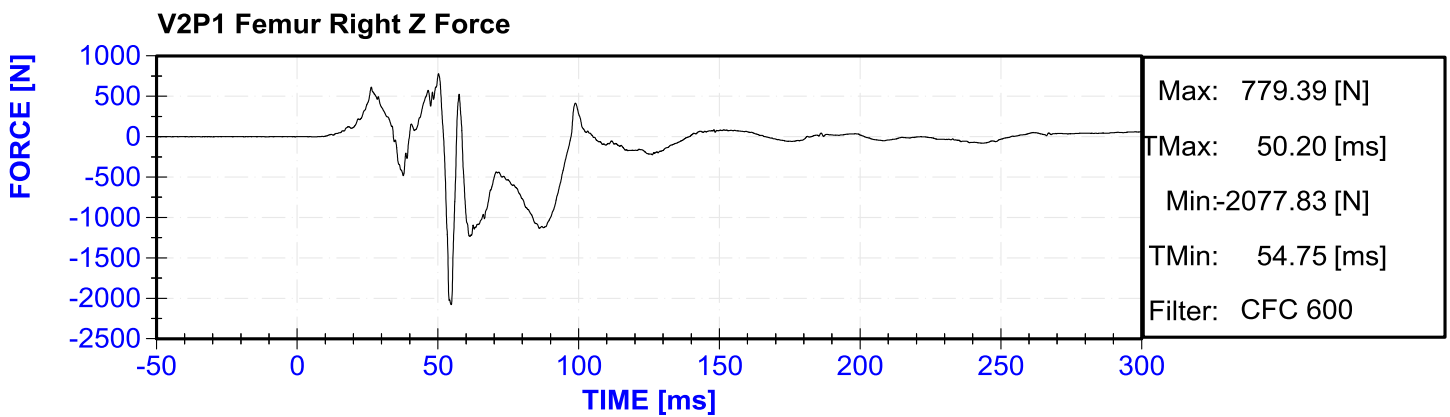
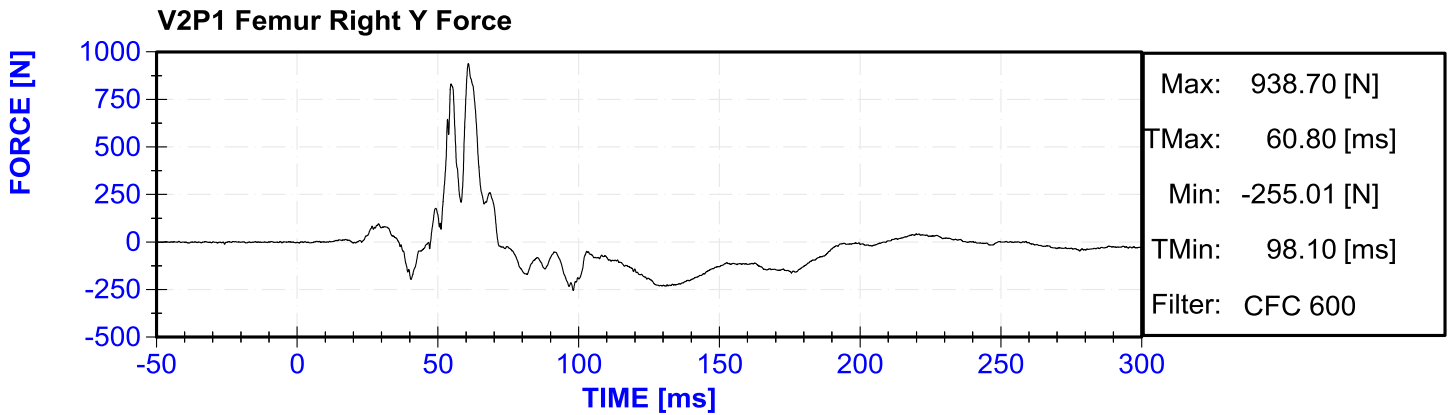


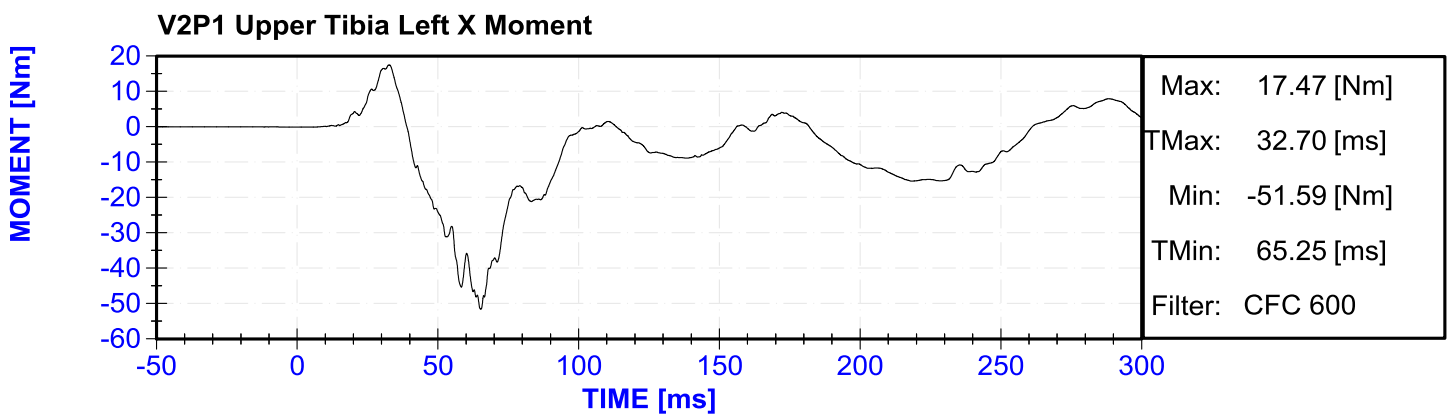
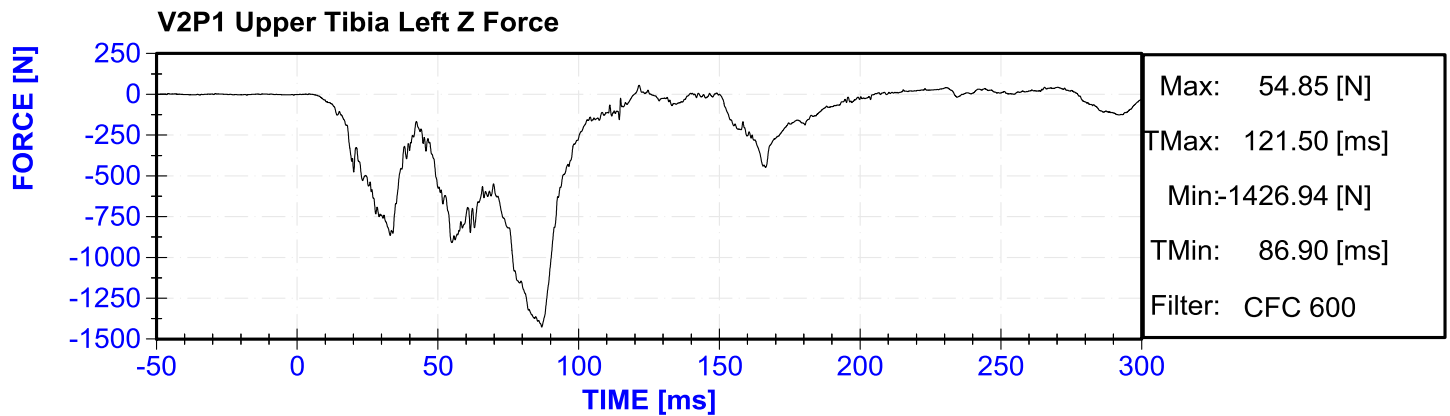
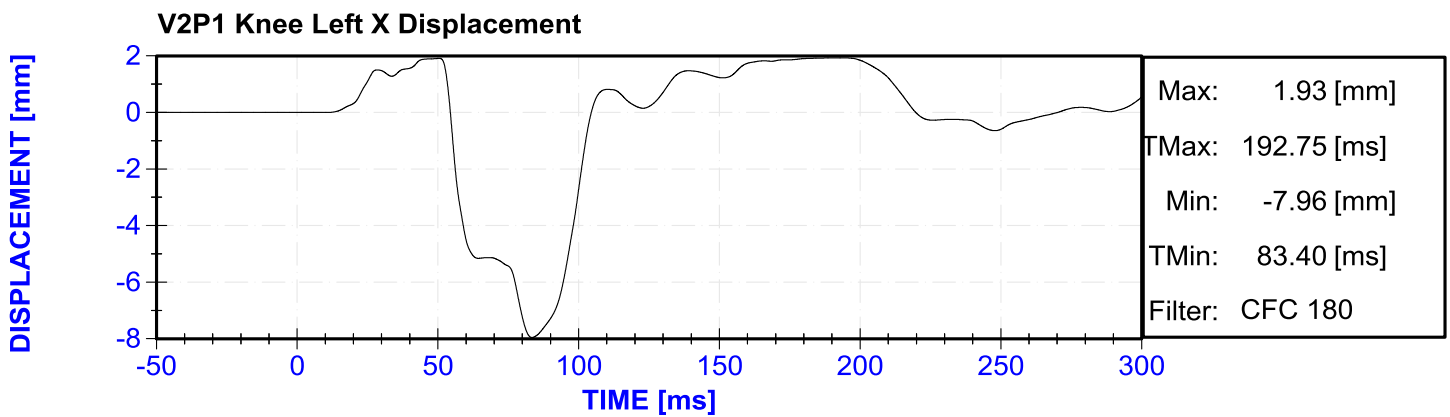
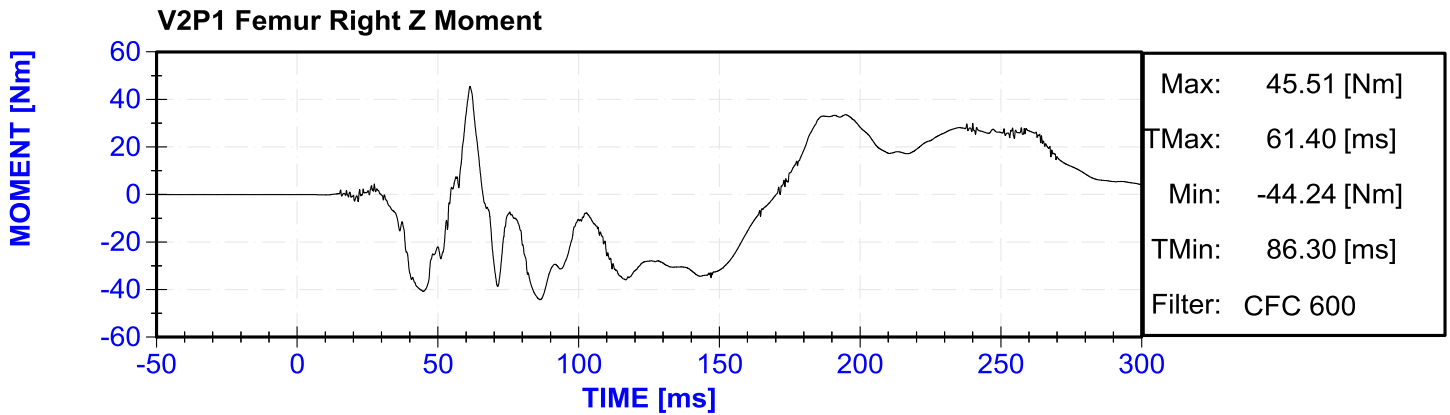


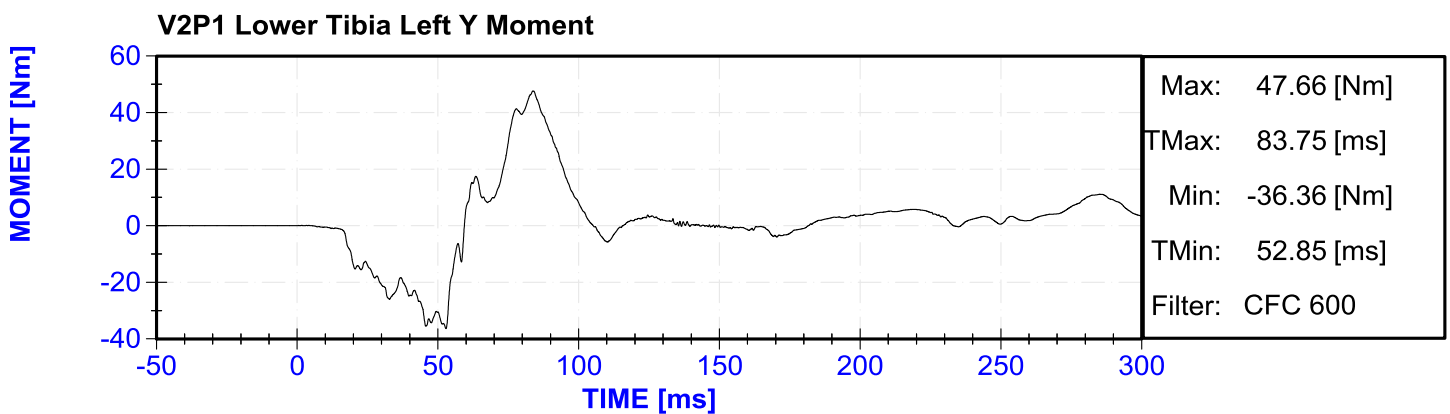
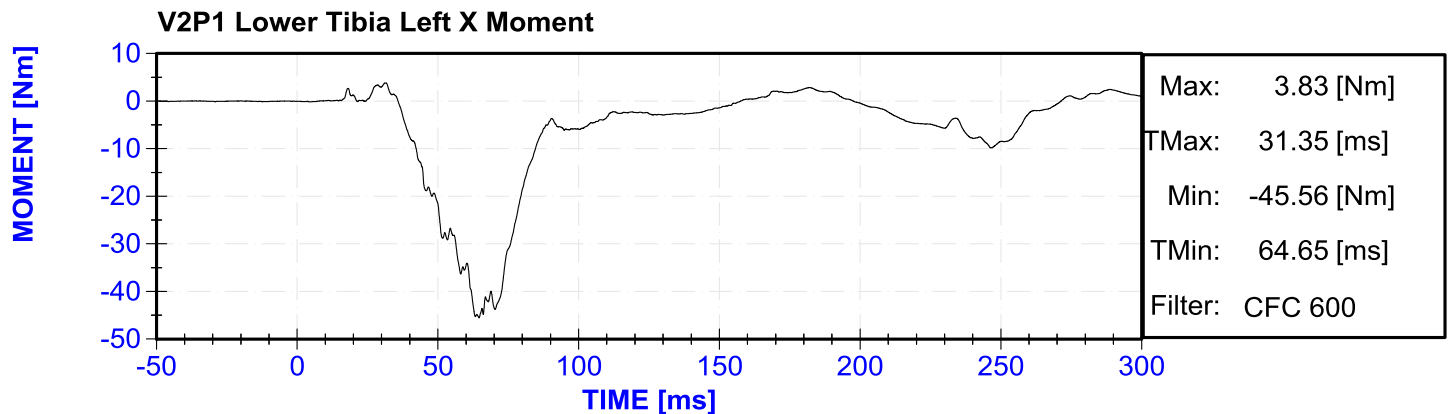
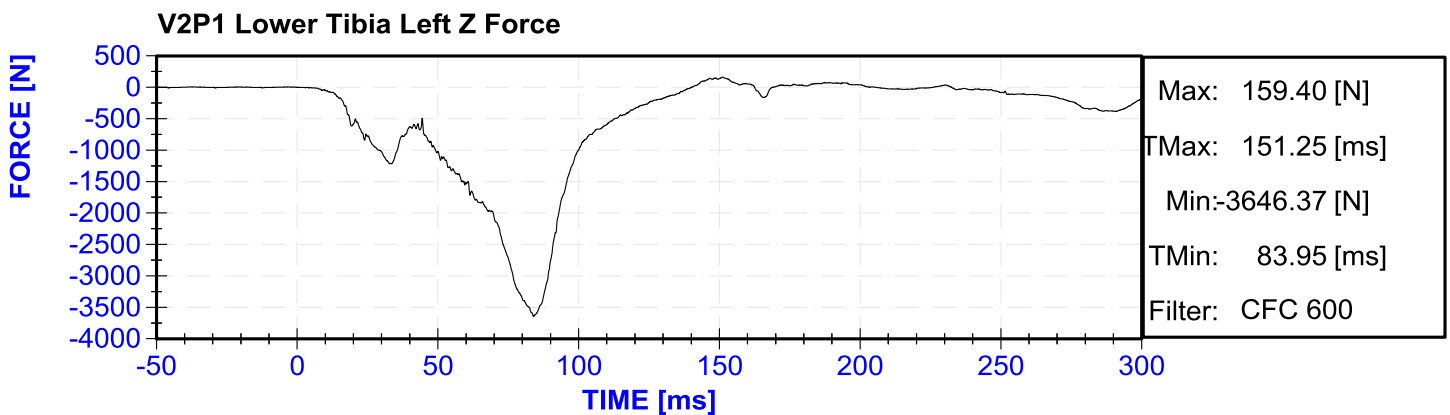
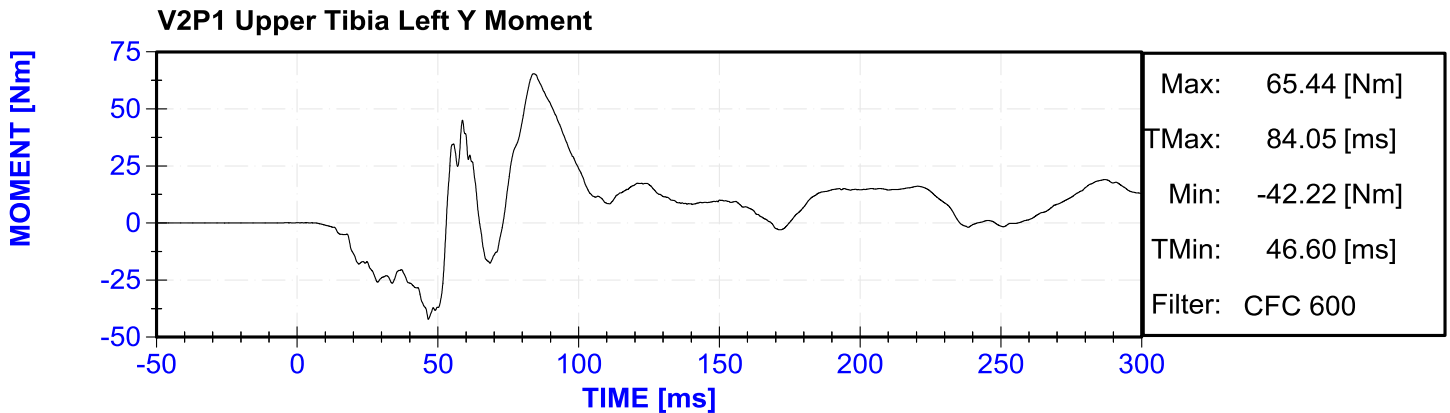


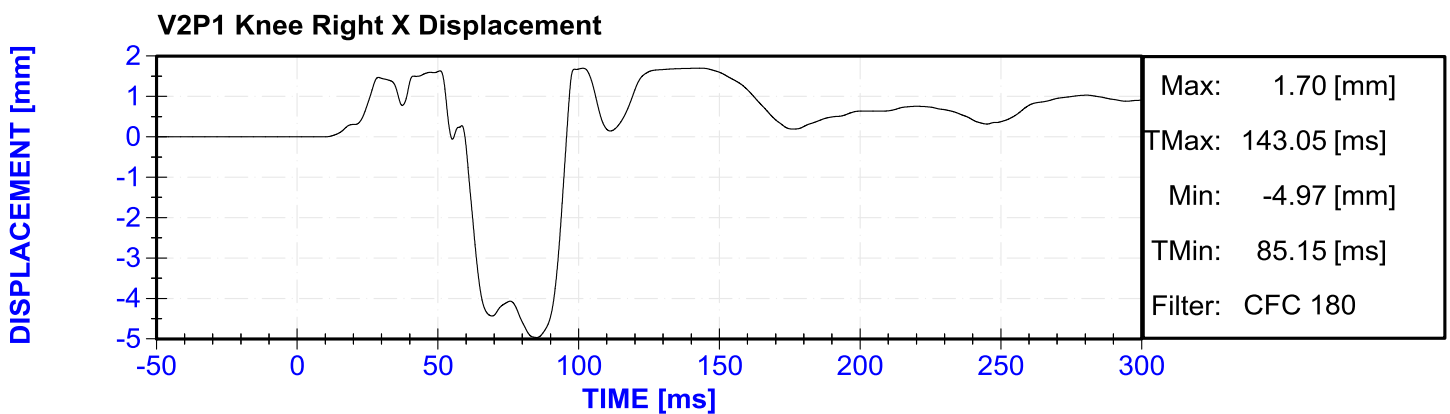
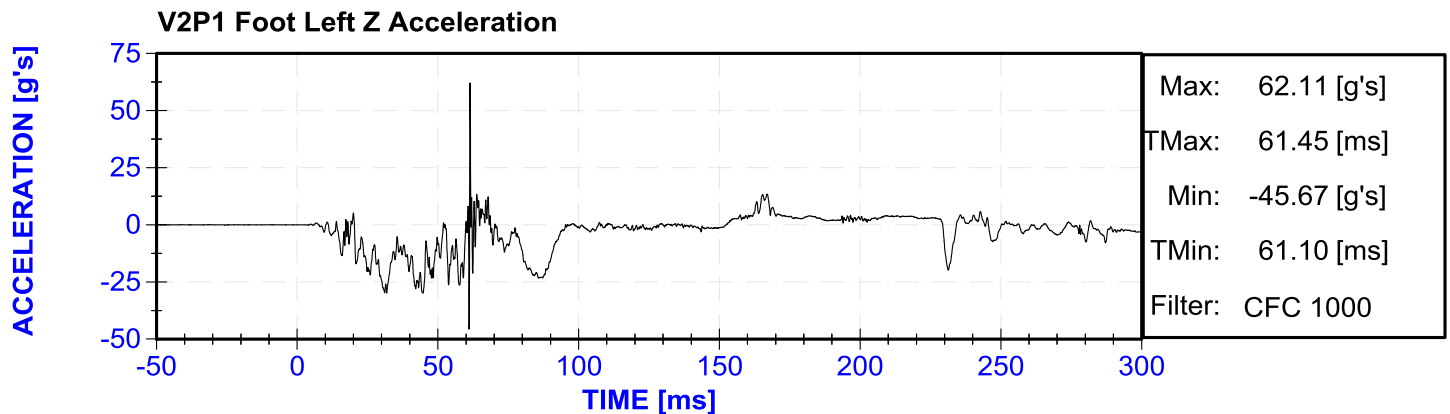
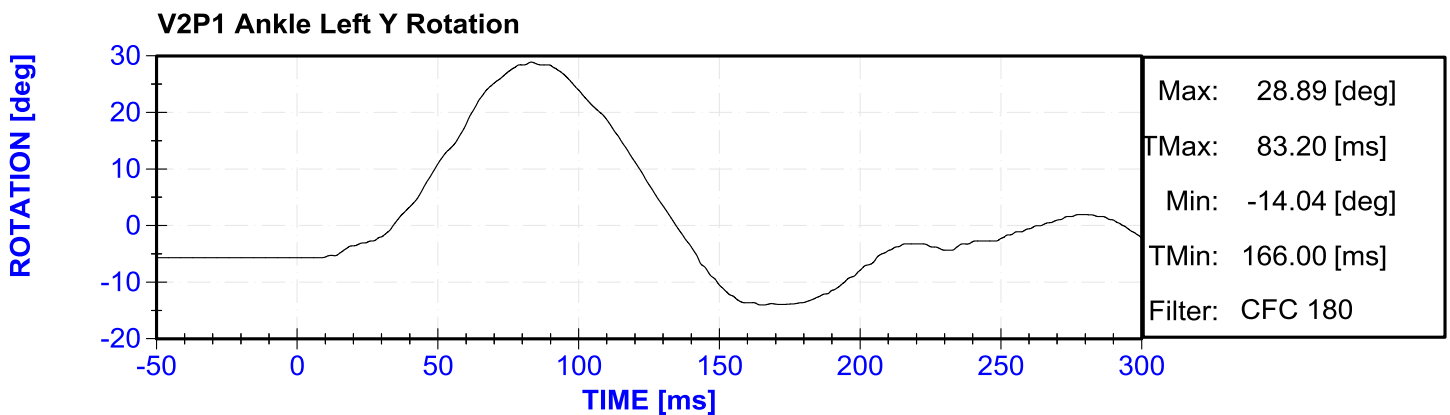
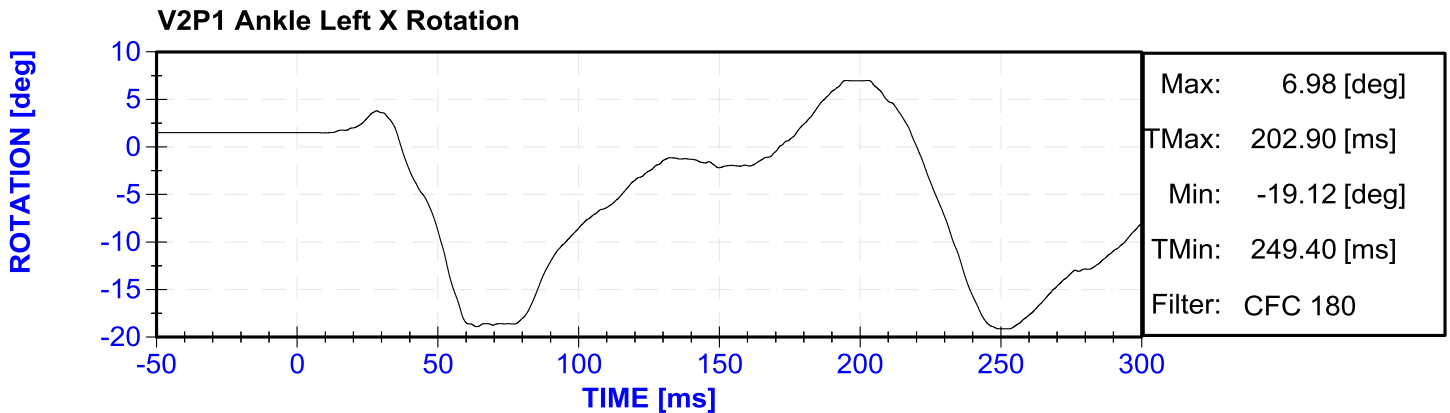


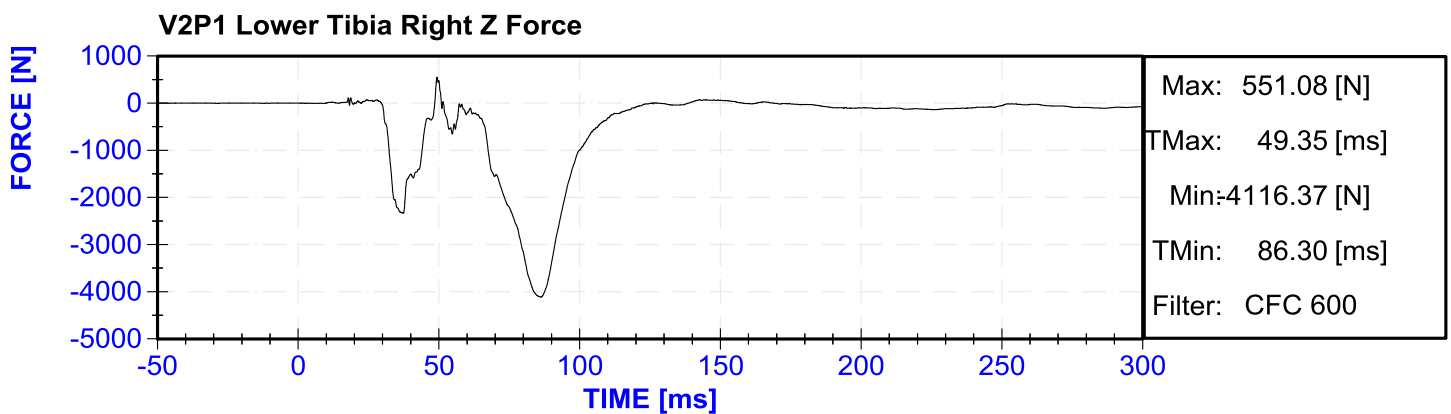
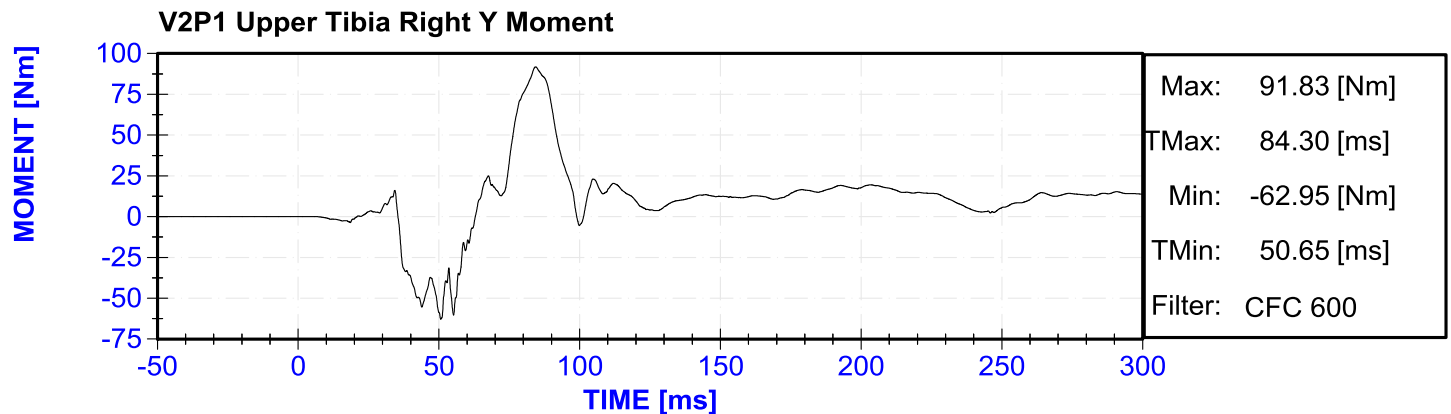
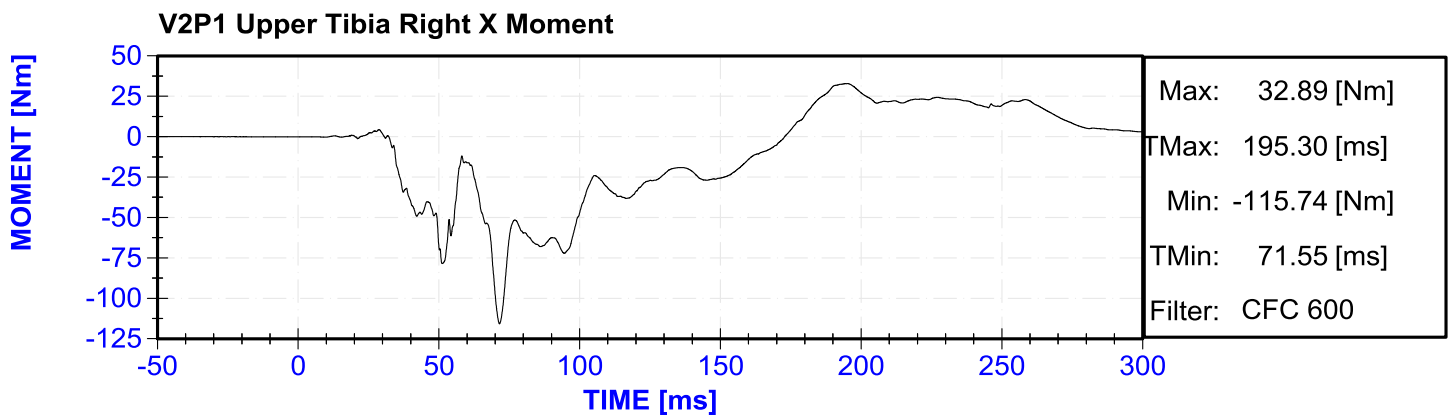
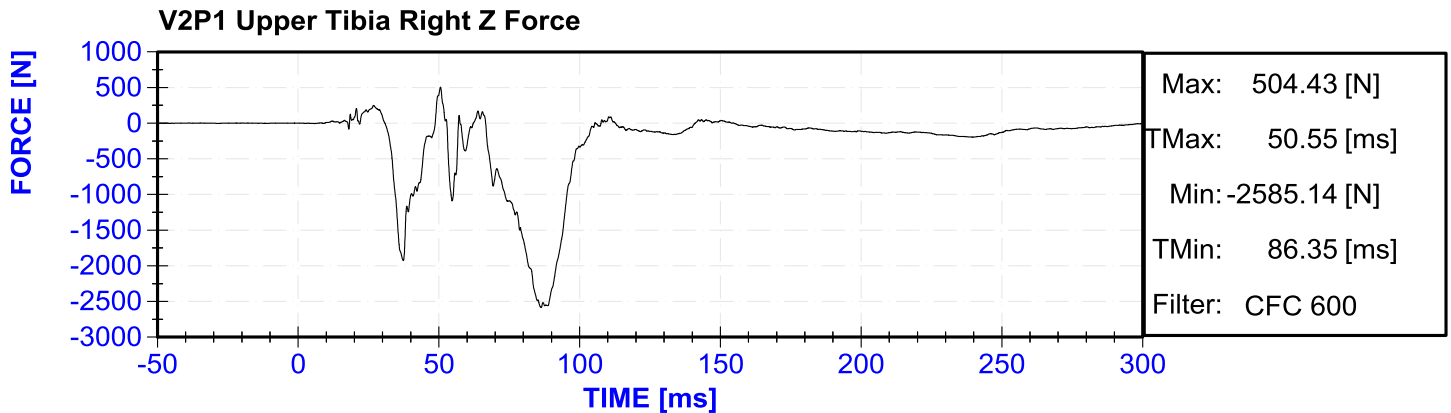


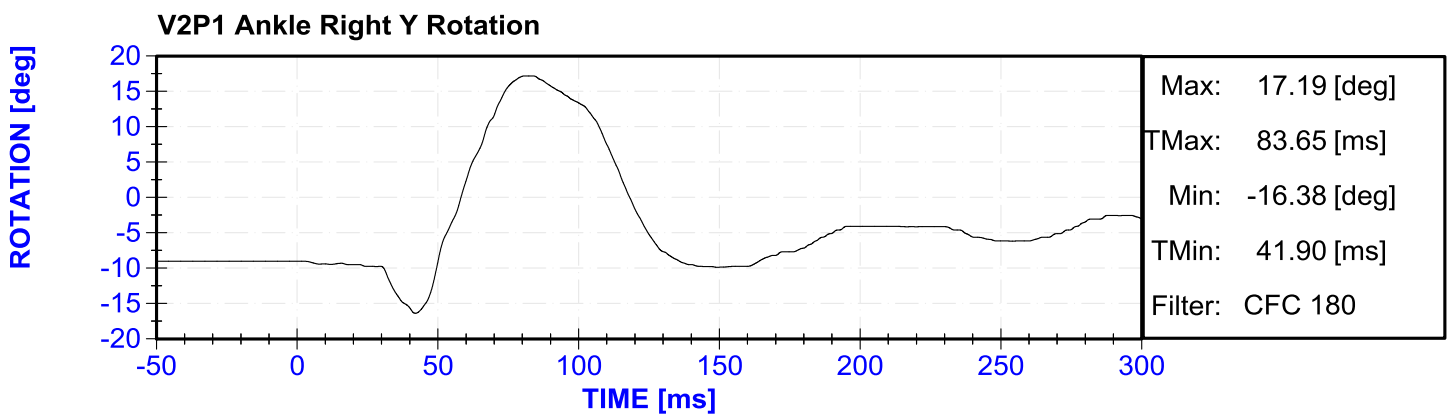
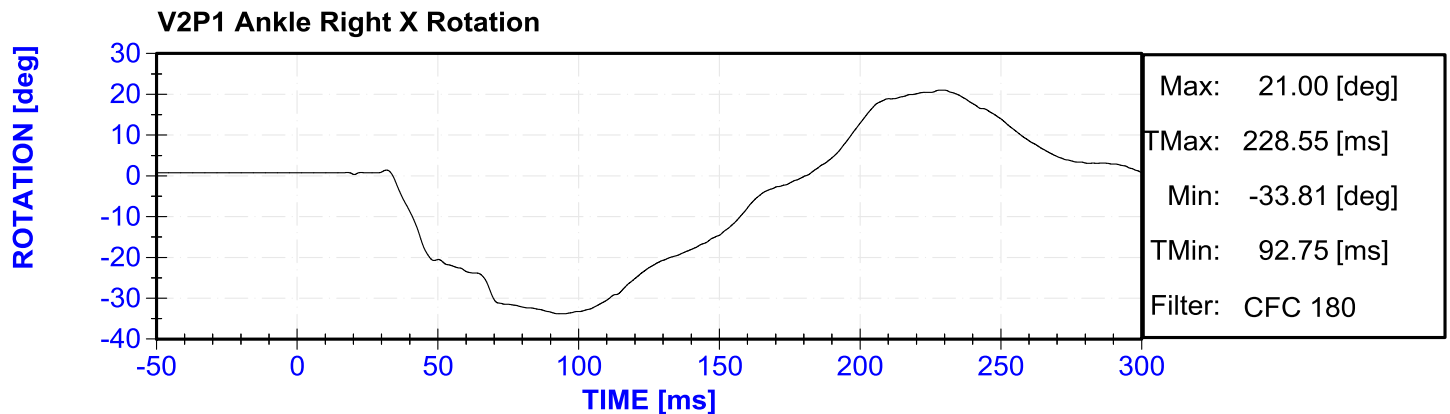
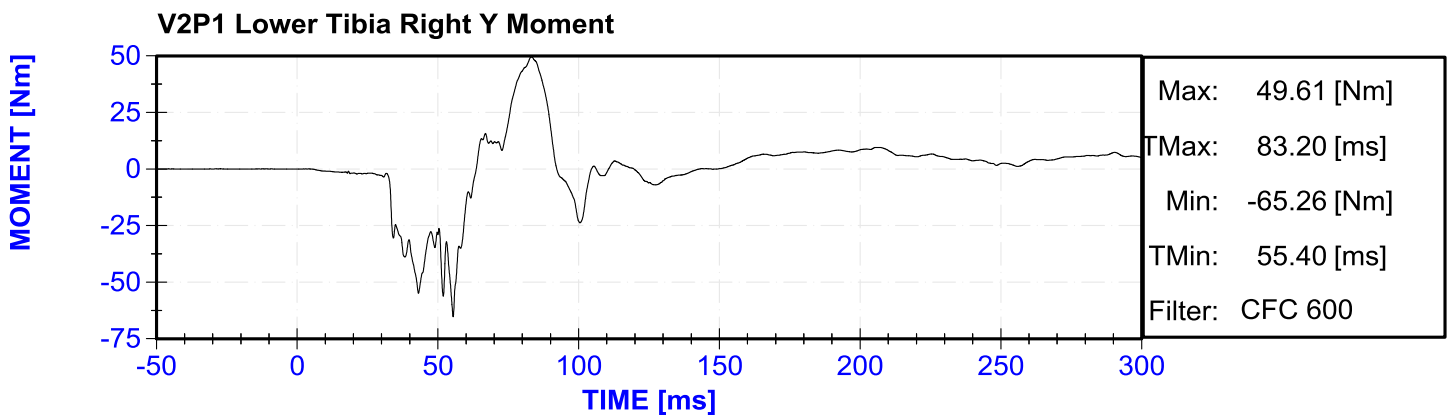
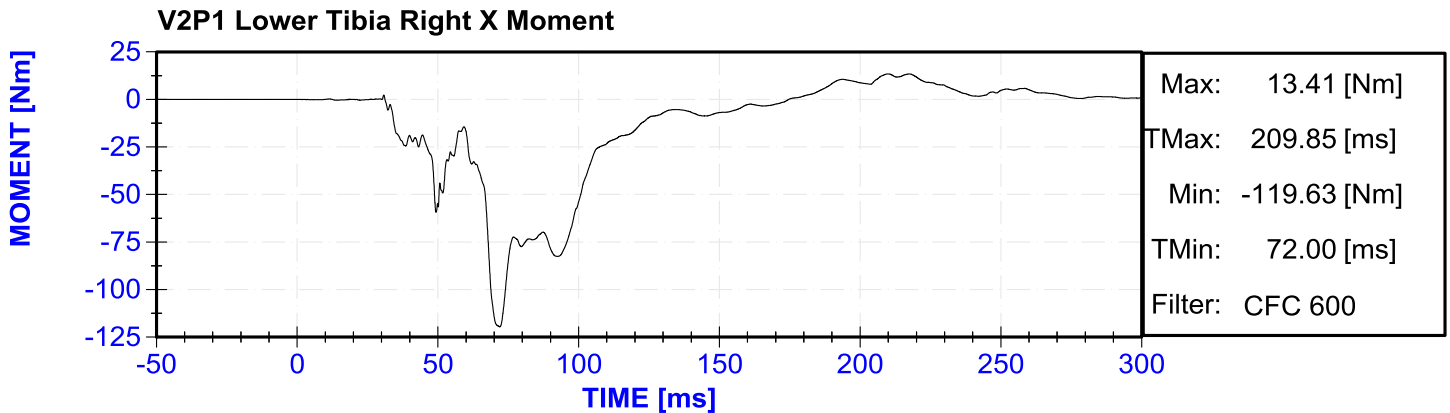




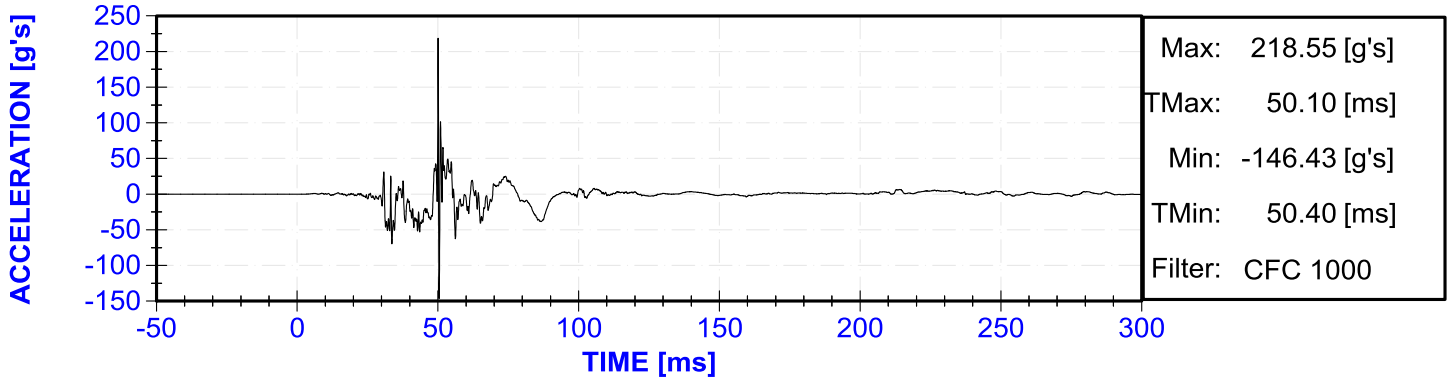




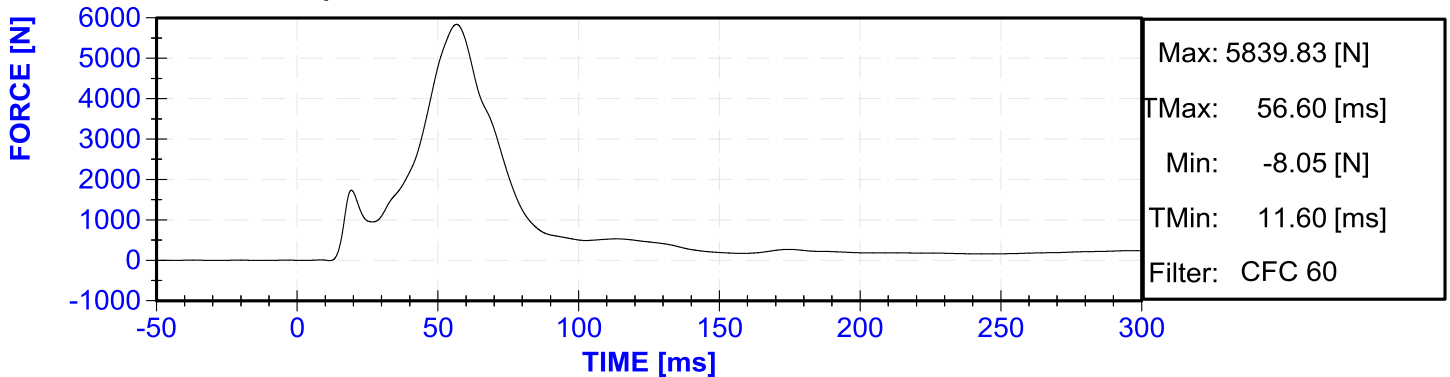




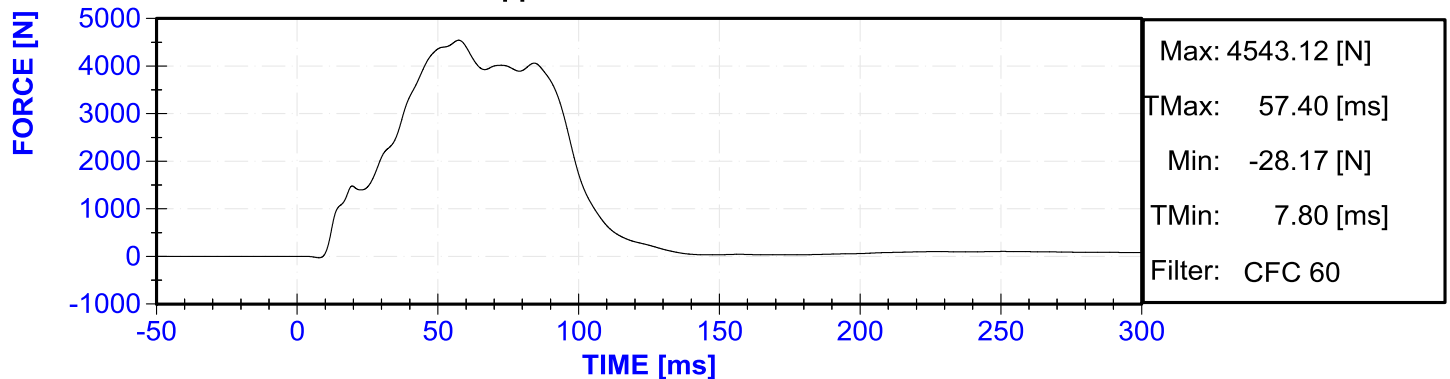
V2P1 Foot Right Z Acceleration



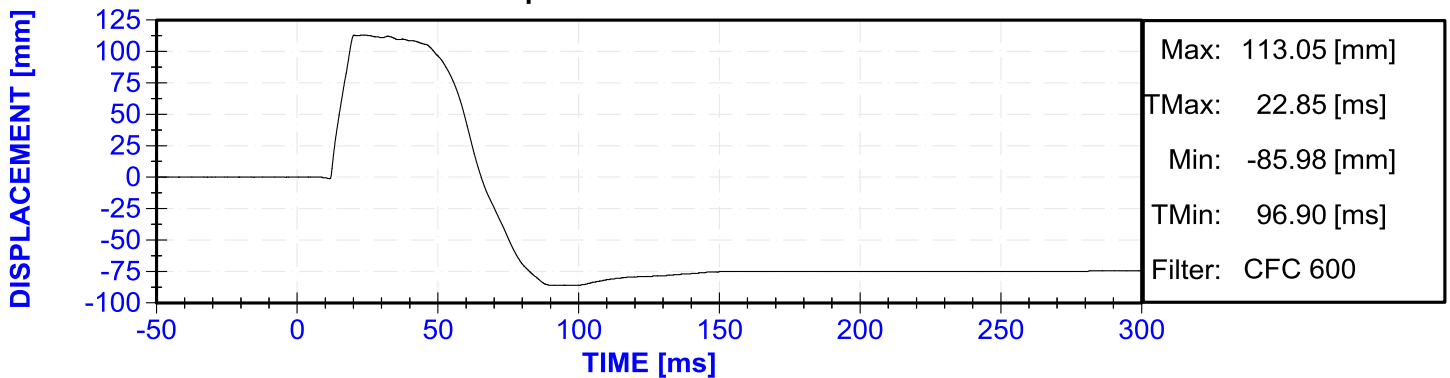
V2 Driver Lap Belt Force

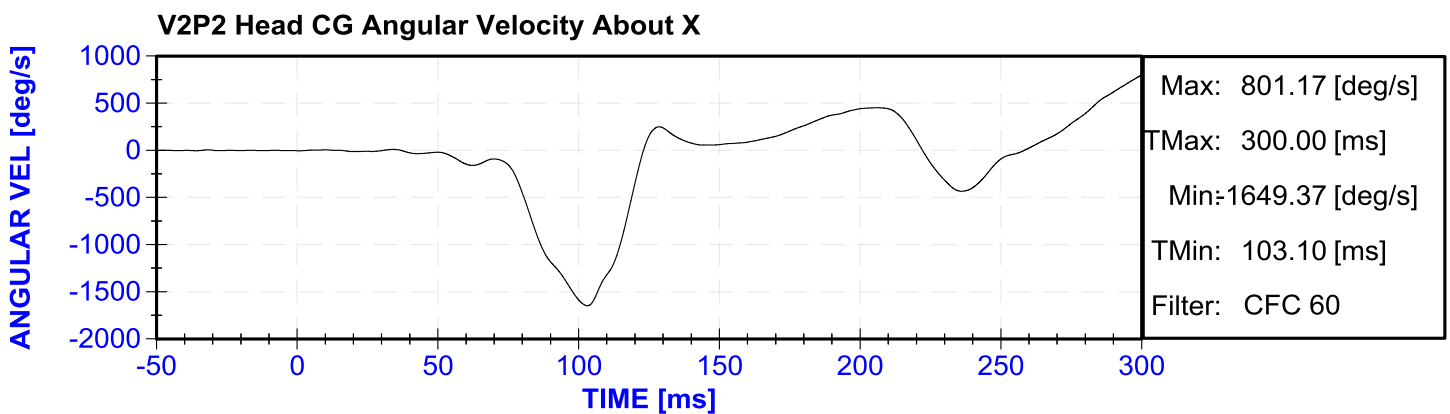
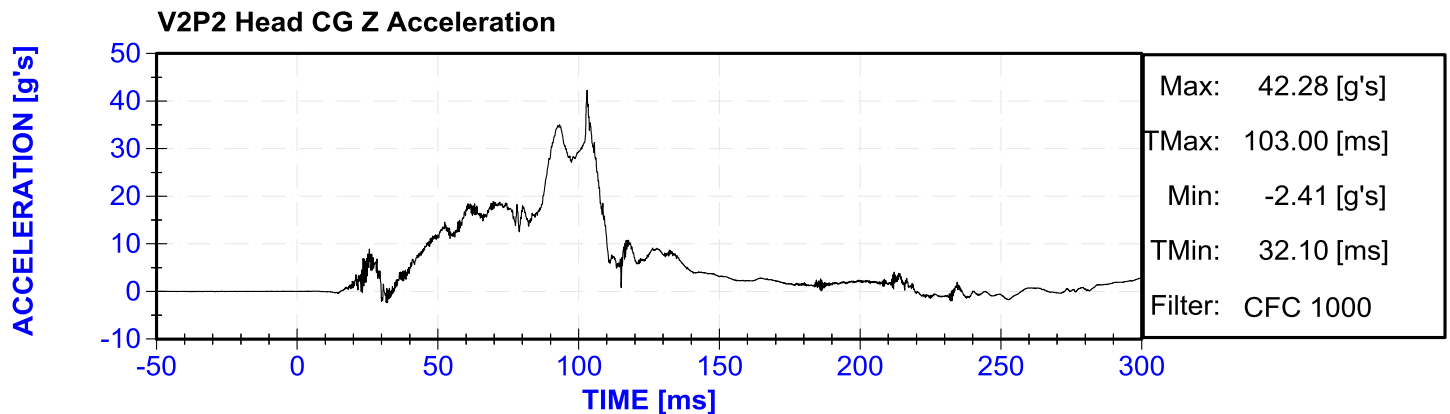
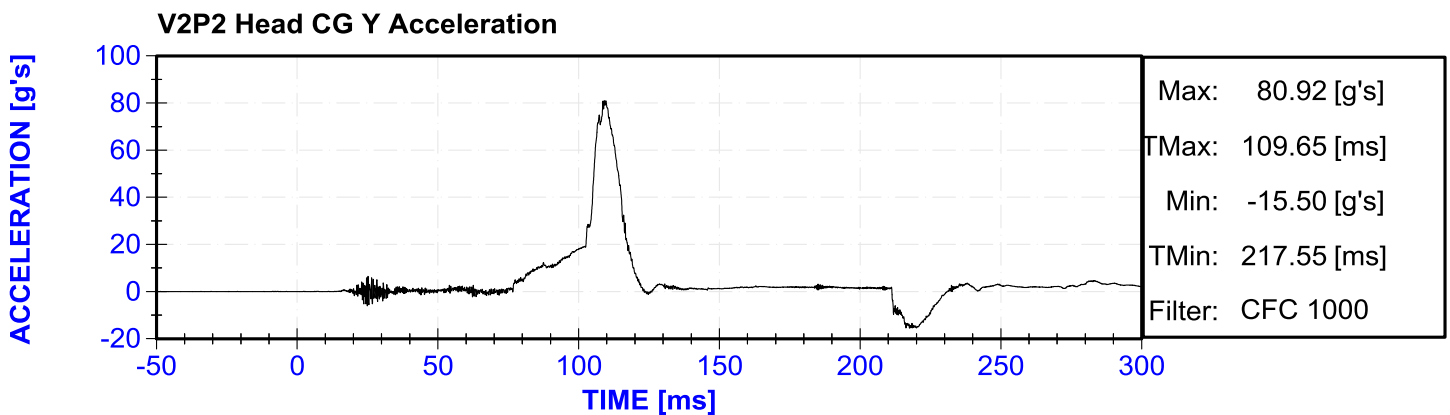
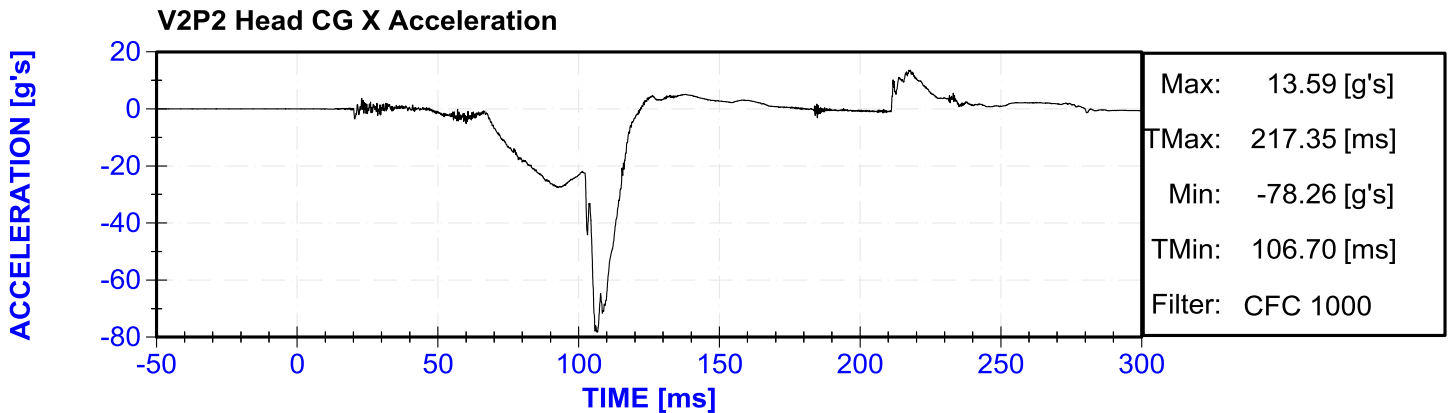


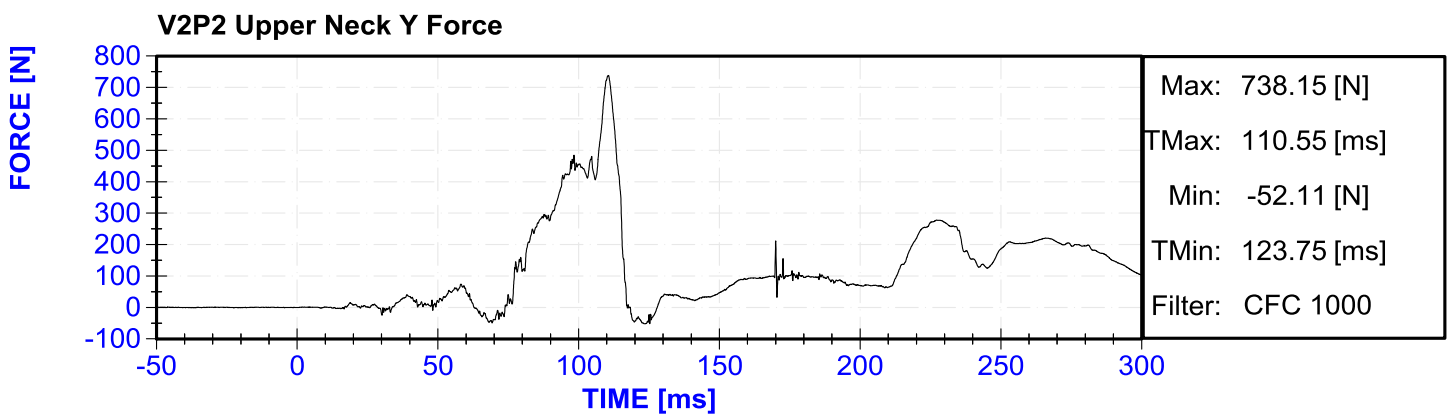
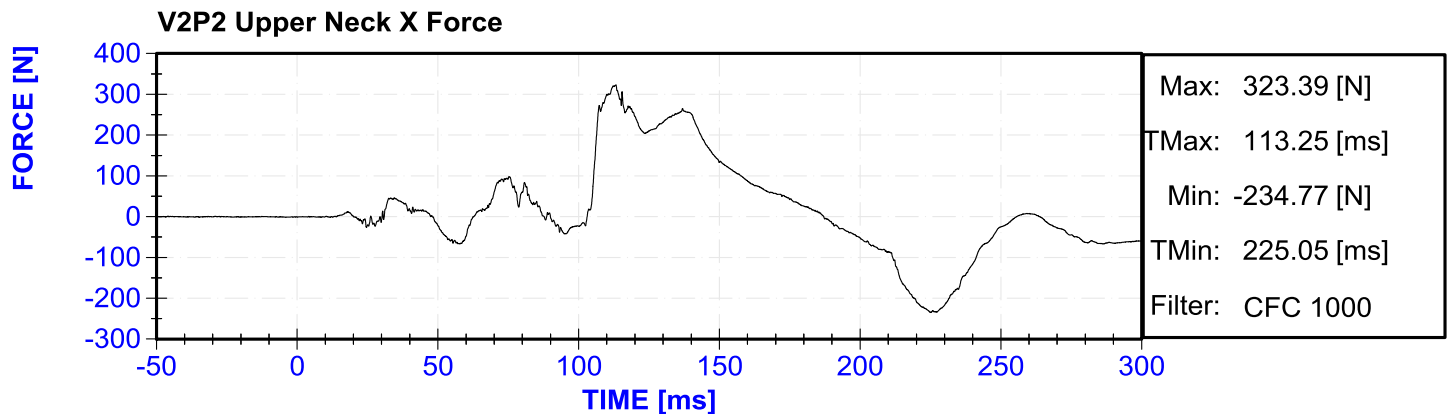
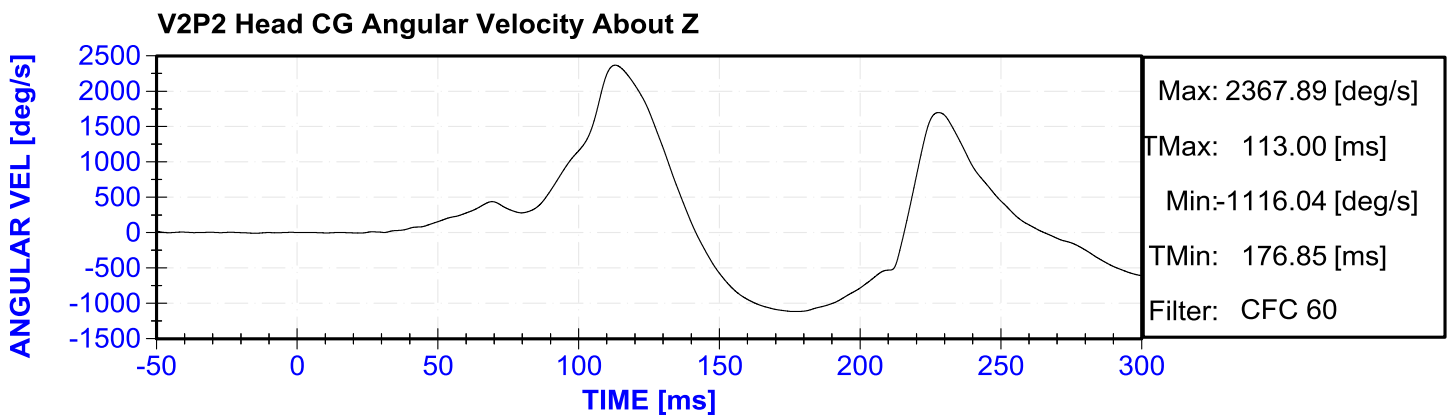
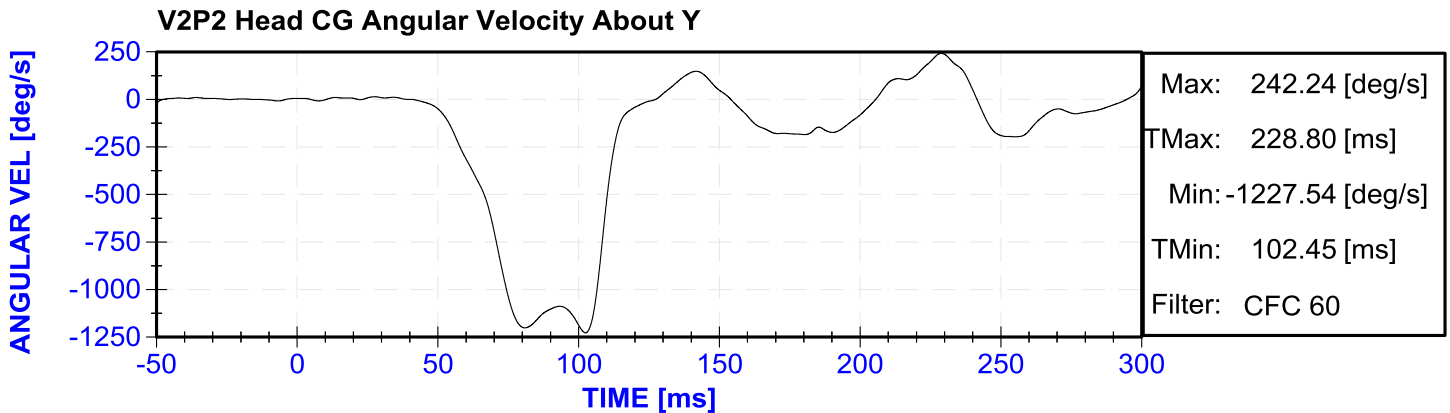
V2 Driver Shoulder Belt Upper Force

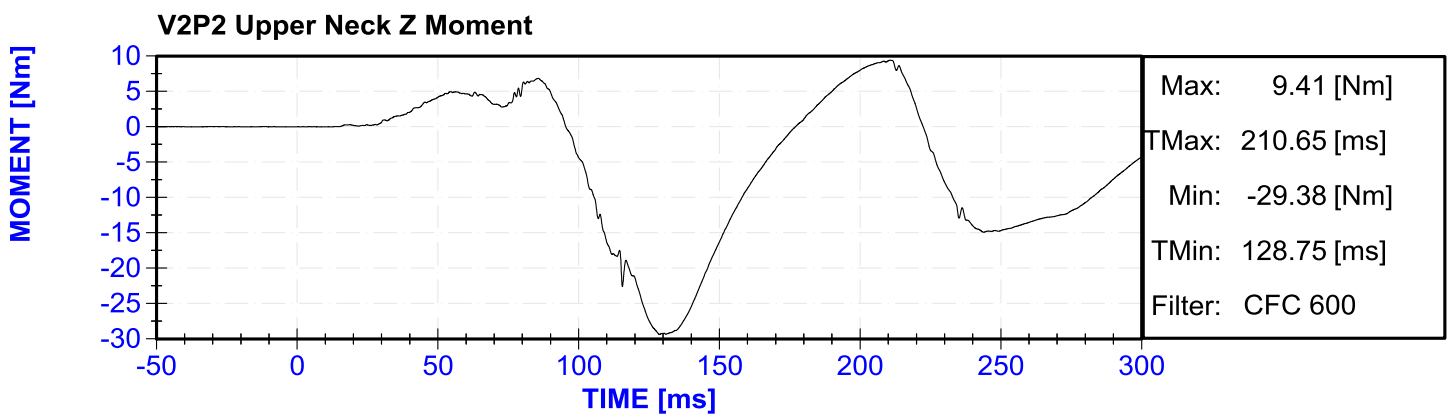
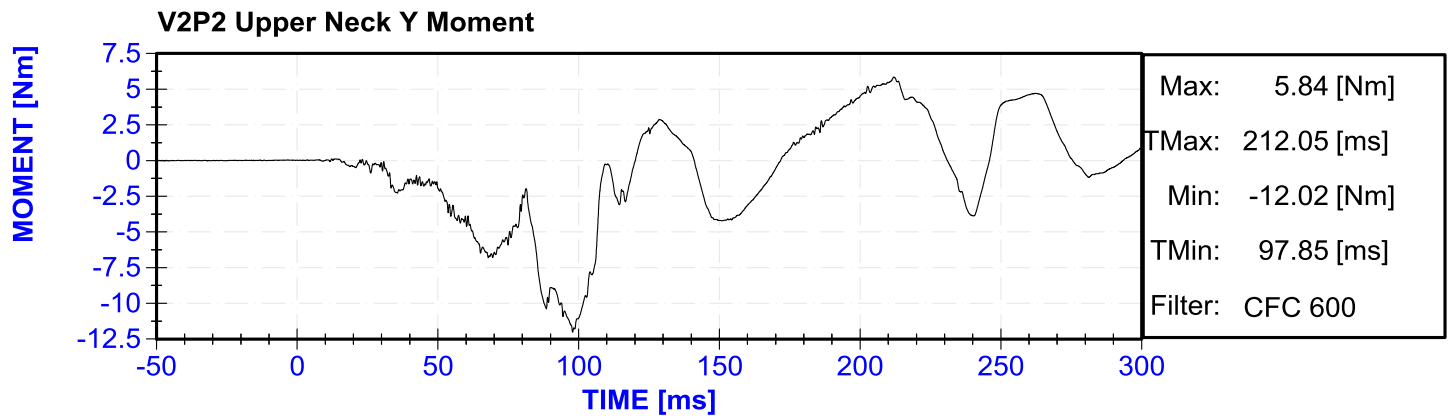
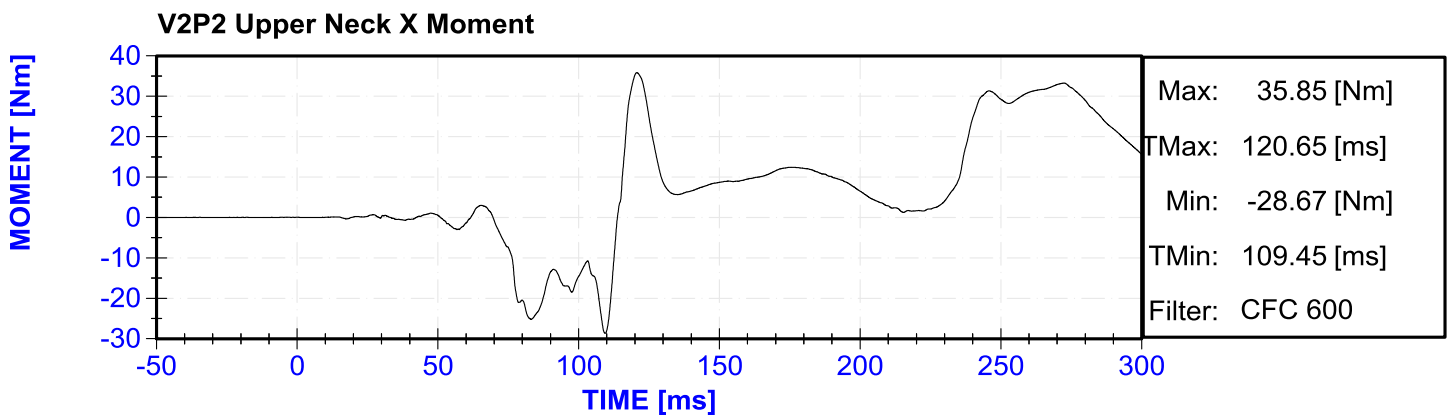
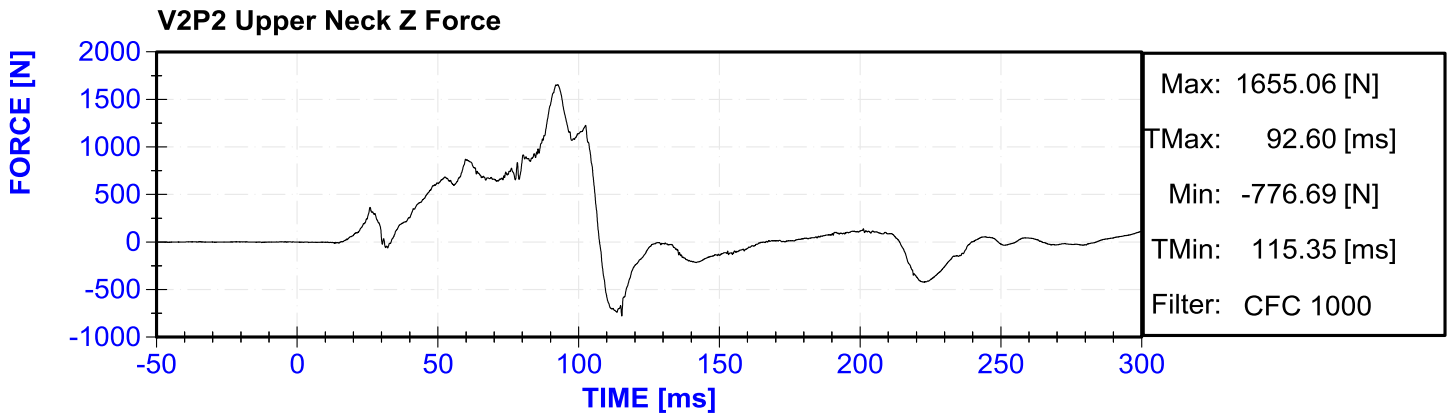


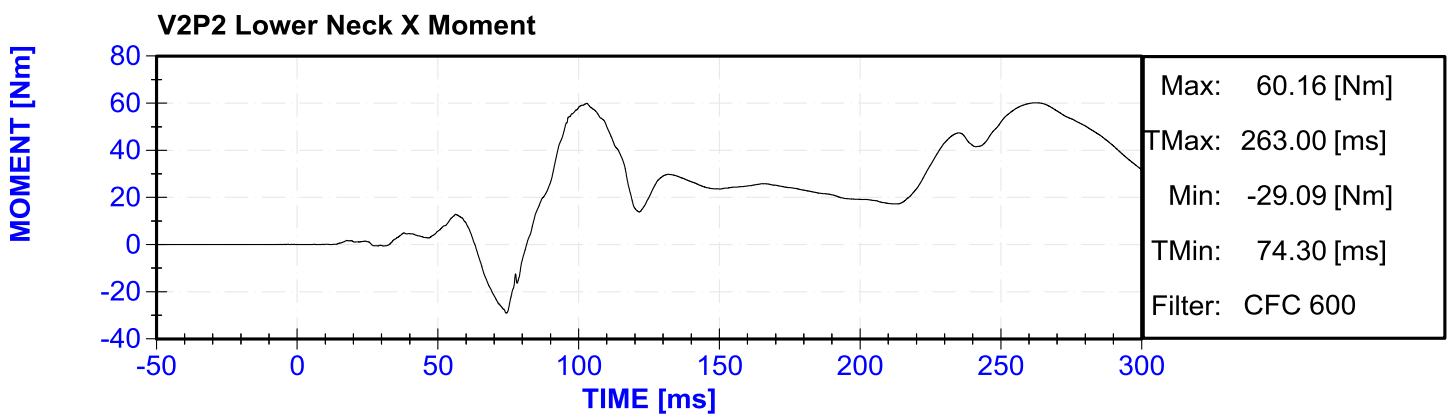
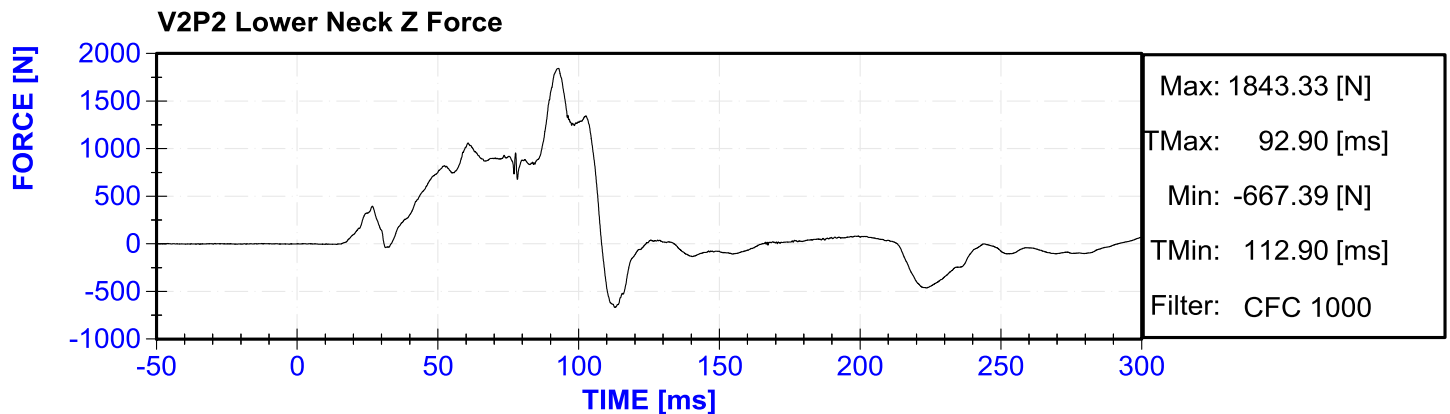
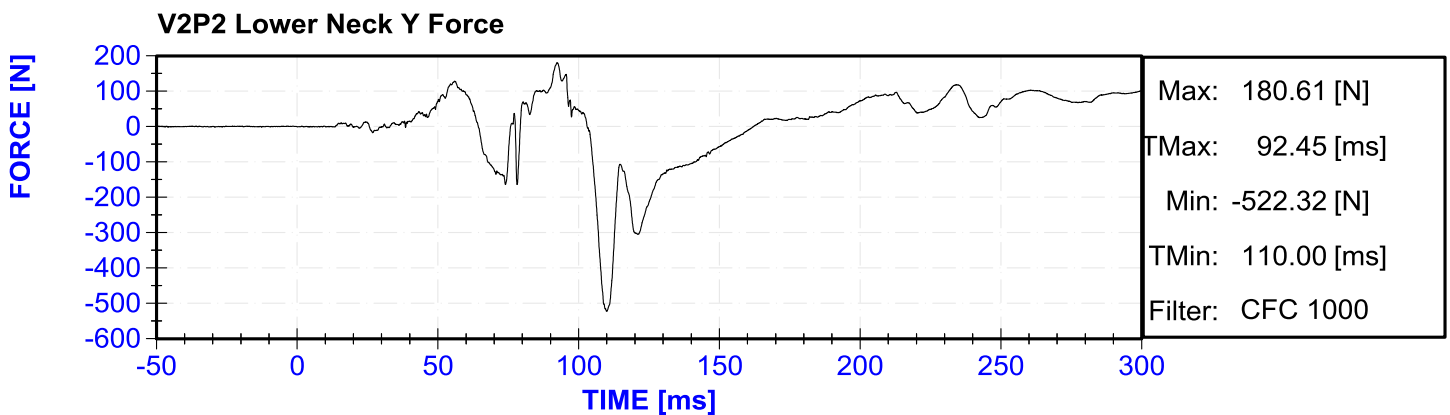
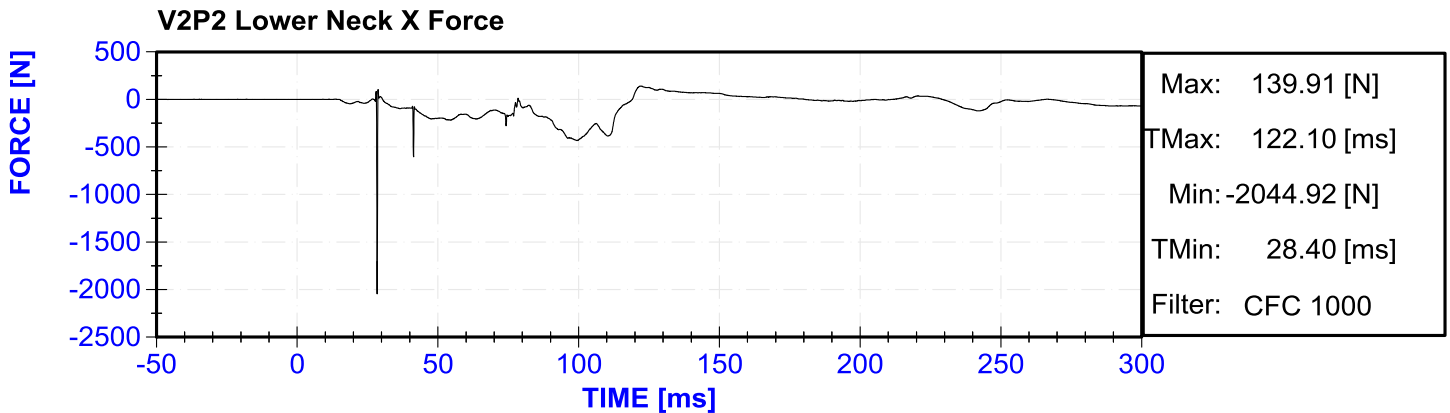
V2 Driver Shoulder Belt Displacement

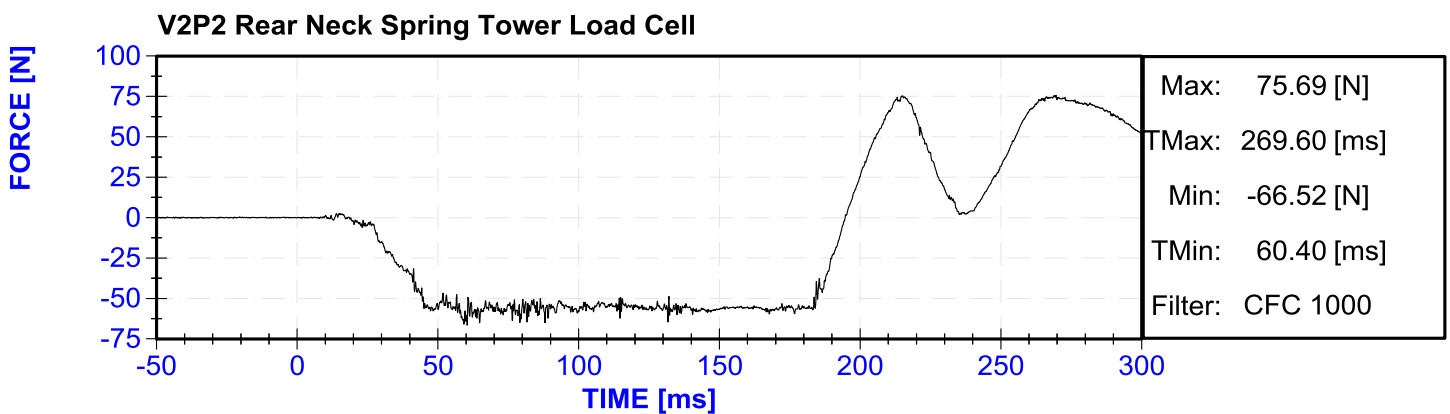
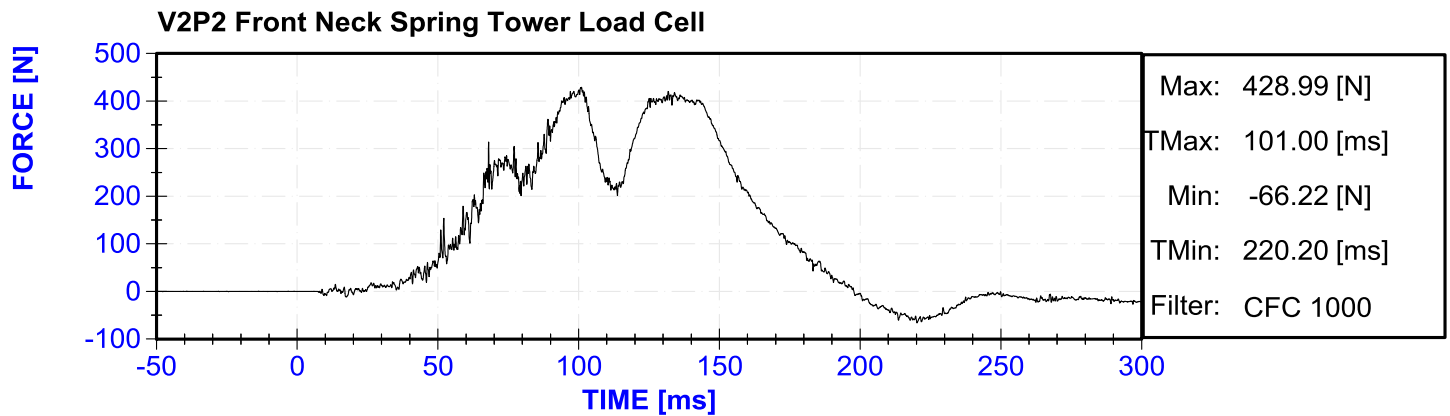
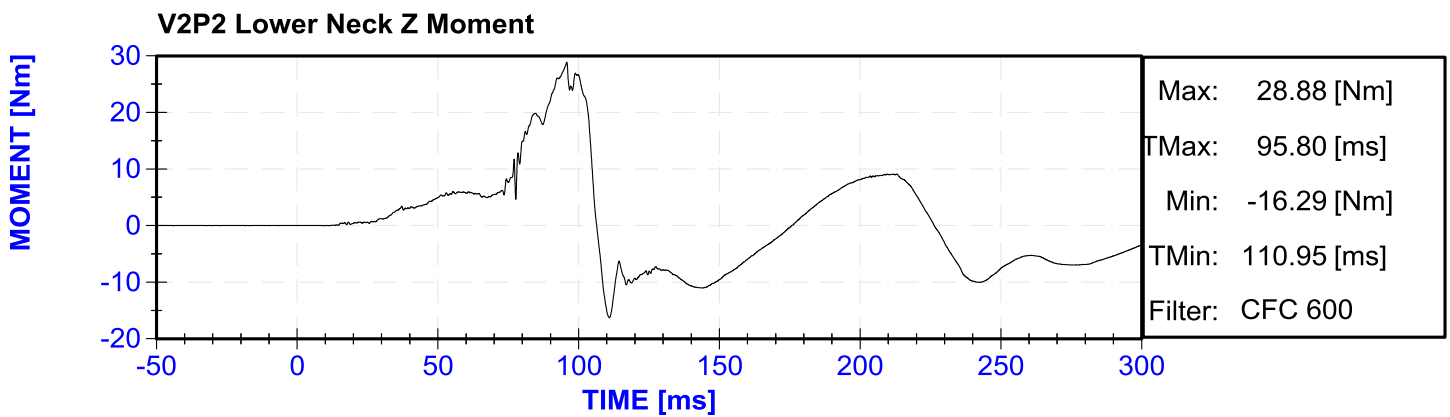
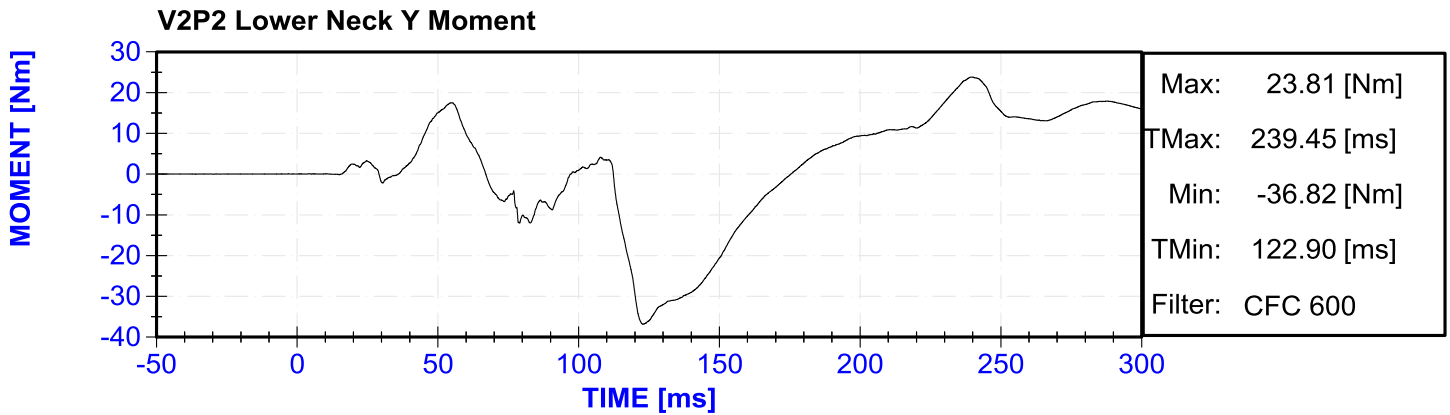




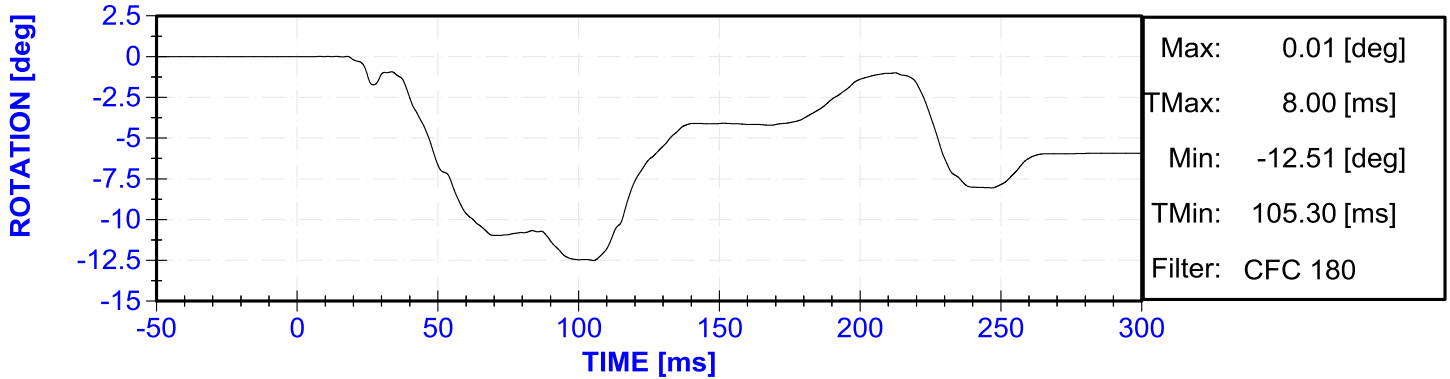




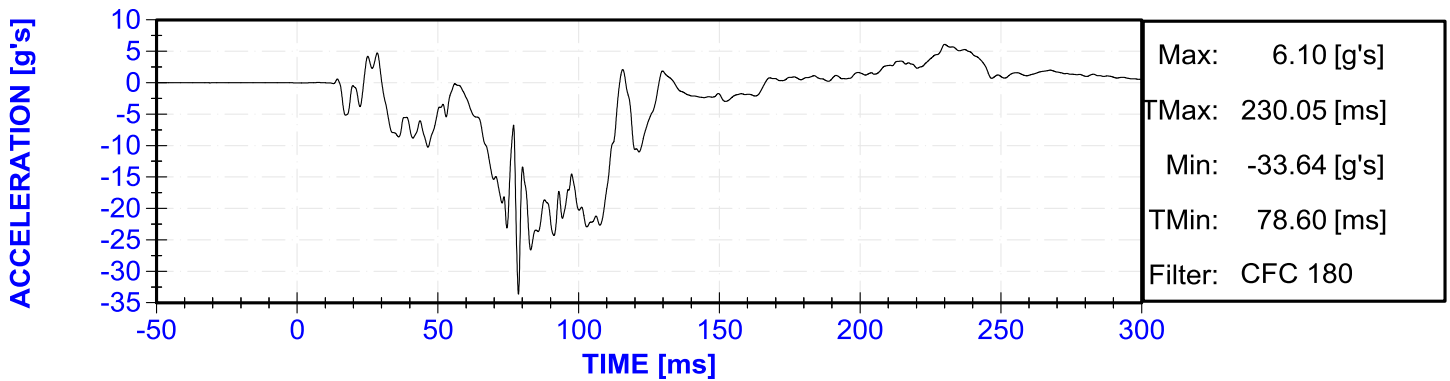




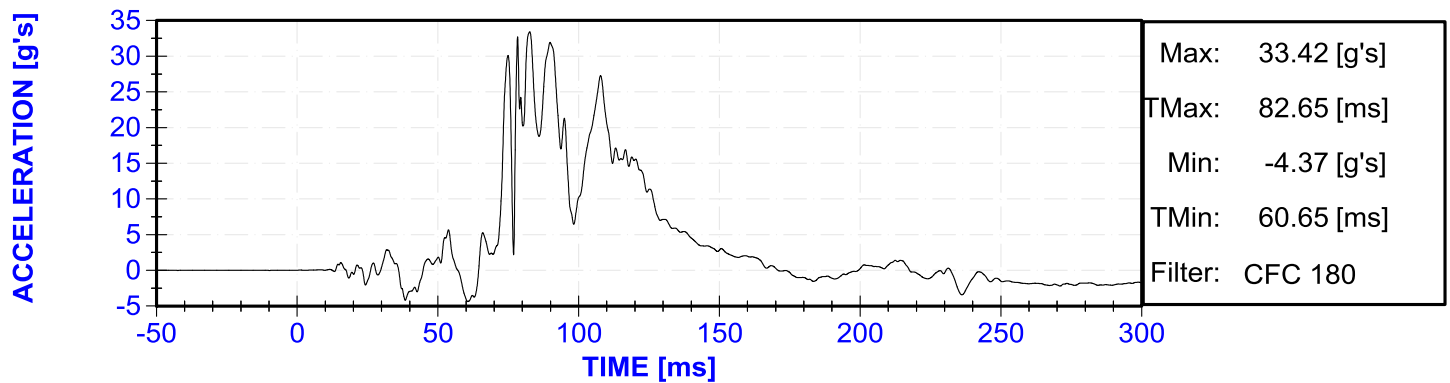
V2P2 Occipital Condyle Rotation Potentiometer



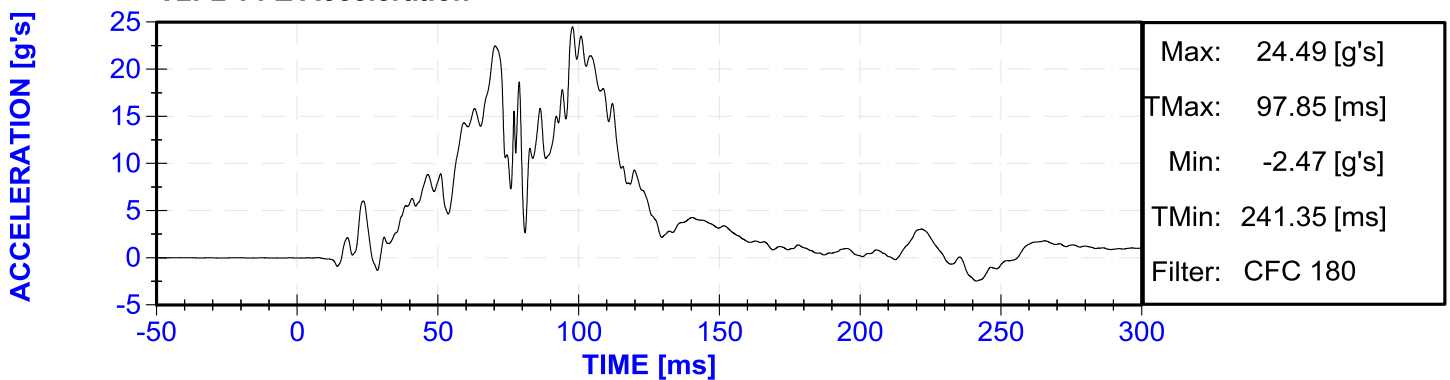
V2P2 T1 X Acceleration

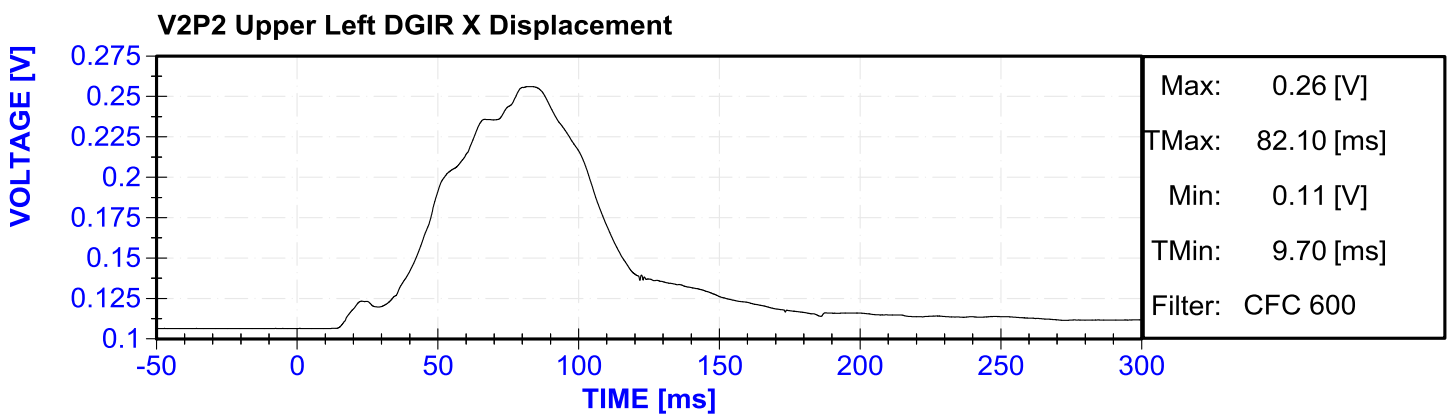
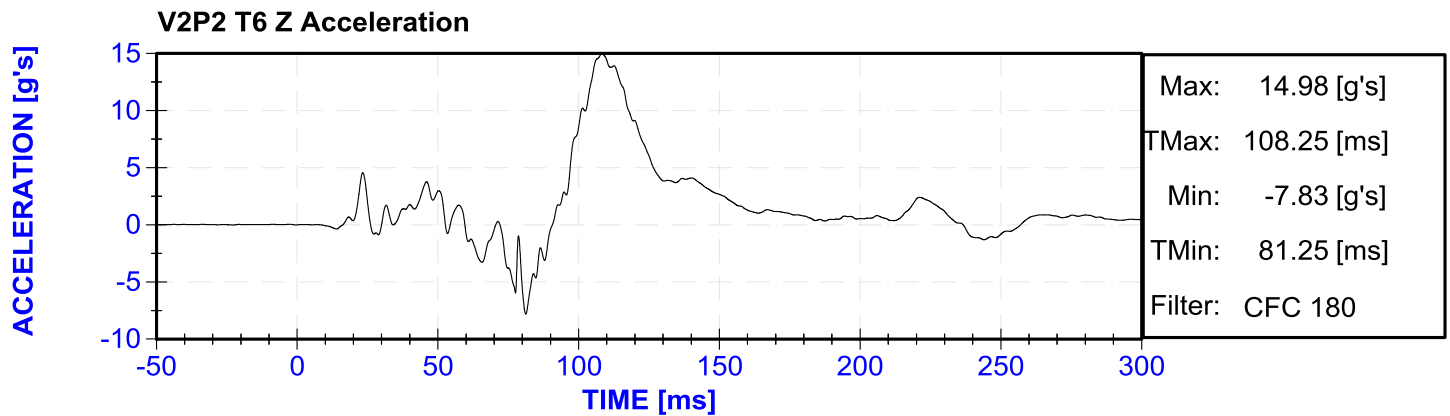
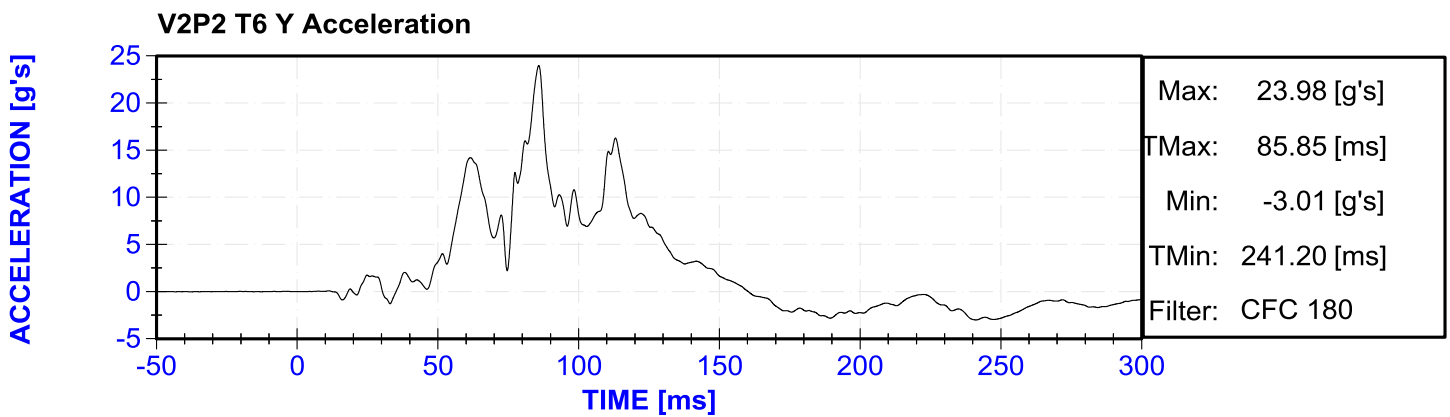
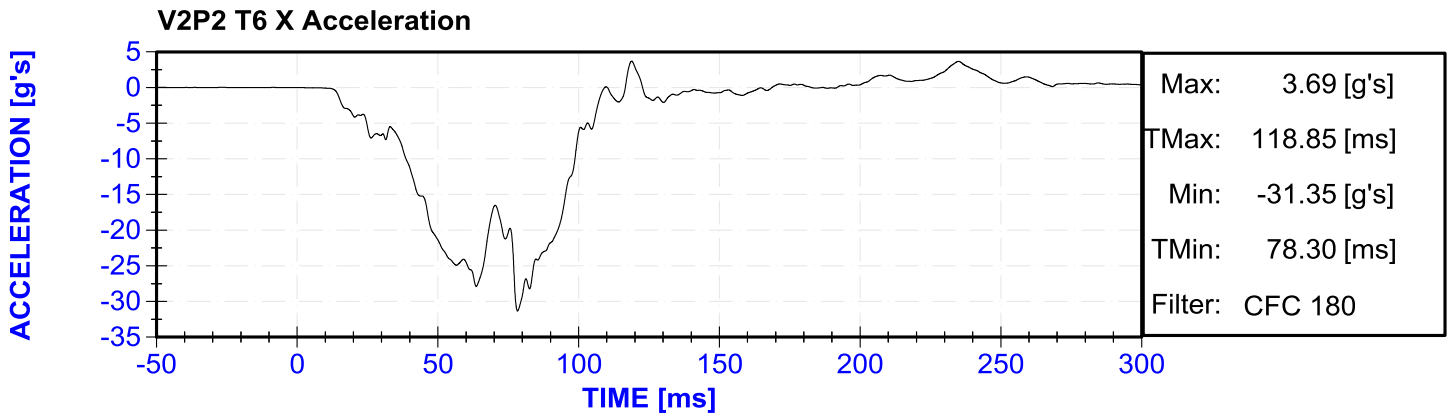


V2P2 T1 Y Acceleration

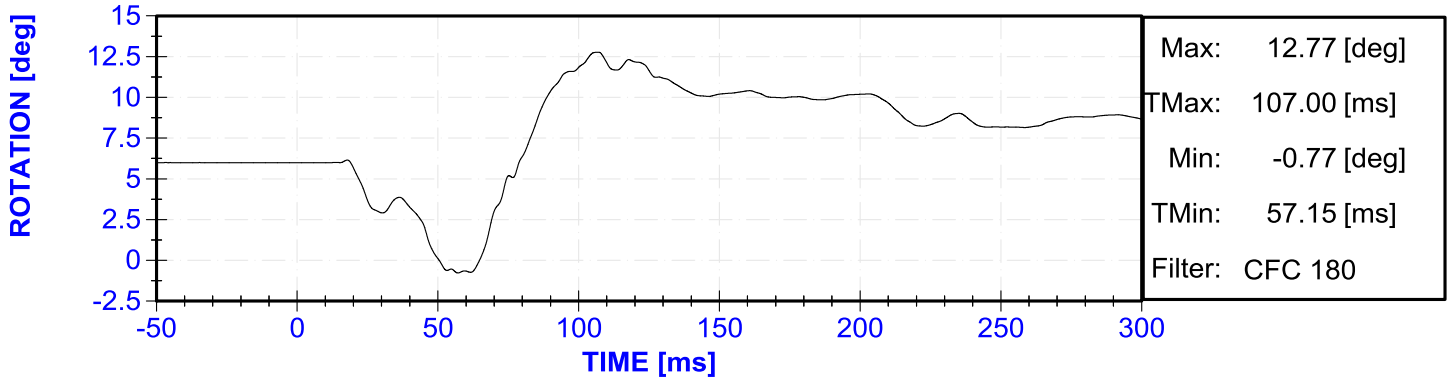


V2P2 T1 Z Acceleration

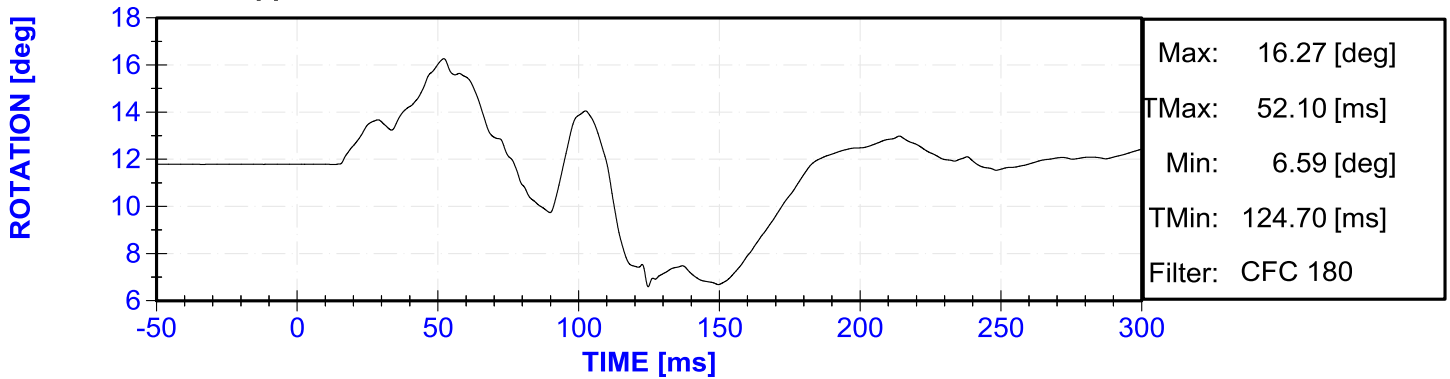




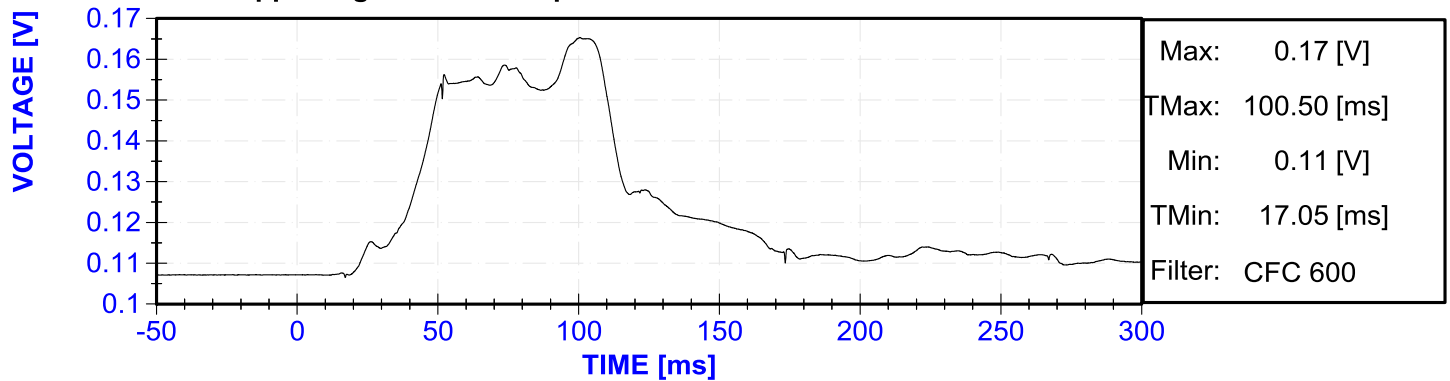
V2P2 Upper Left DGIR Y Rotation



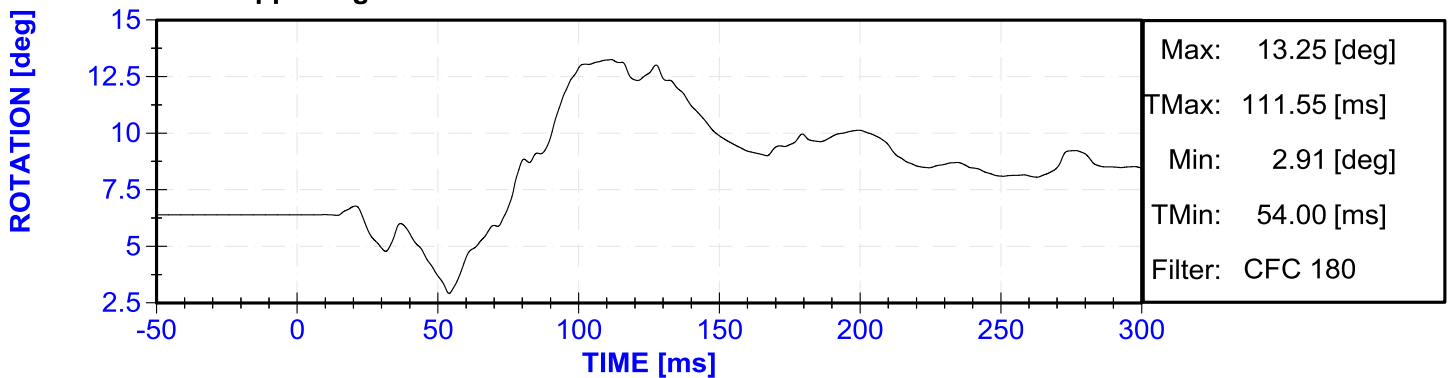
V2P2 Upper Left DGIR Z Rotation



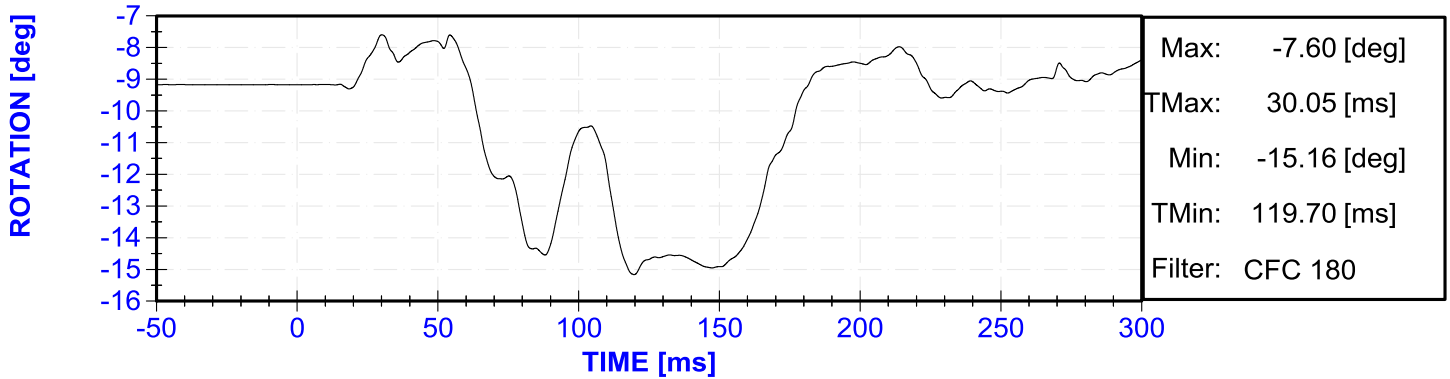
V2P2 Upper Right DGIR X Displacement



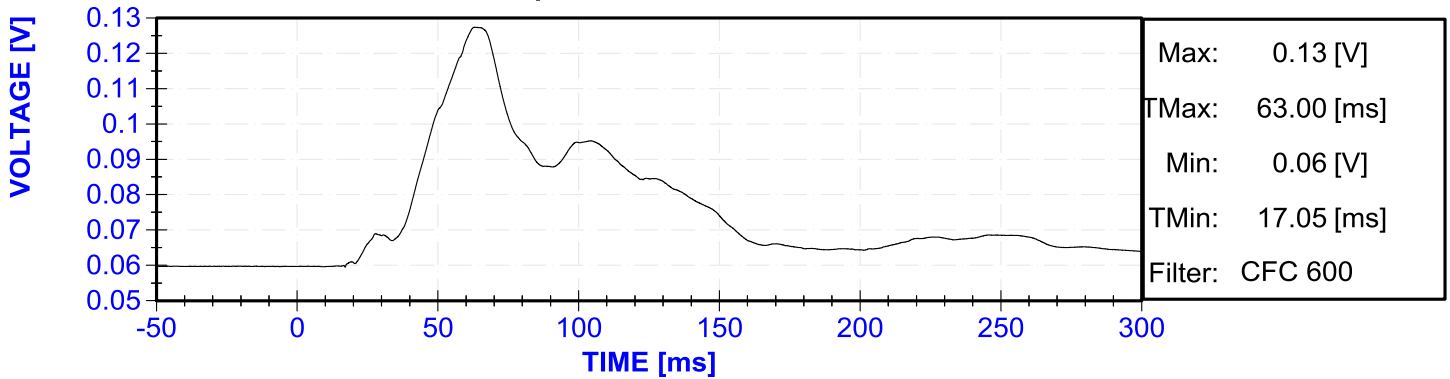
V2P2 Upper Right DGIR Y Rotation



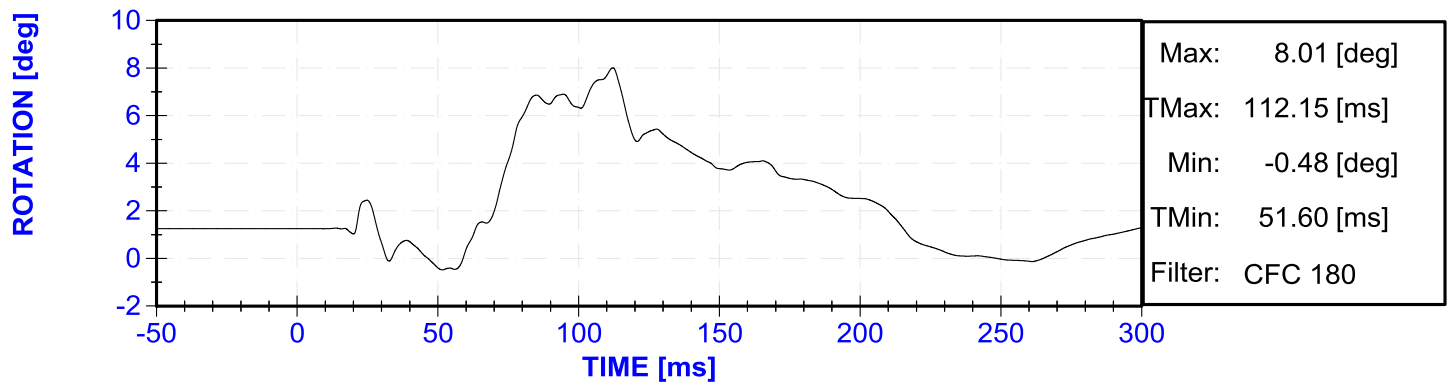
V2P2 Upper Right DGIR Z Rotation



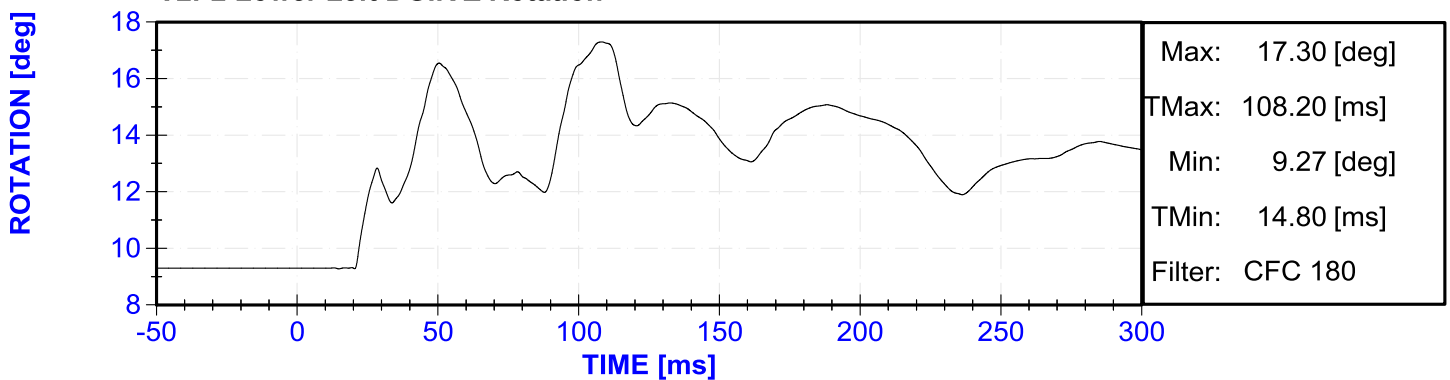
V2P2 Lower Left DGIR X Displacement



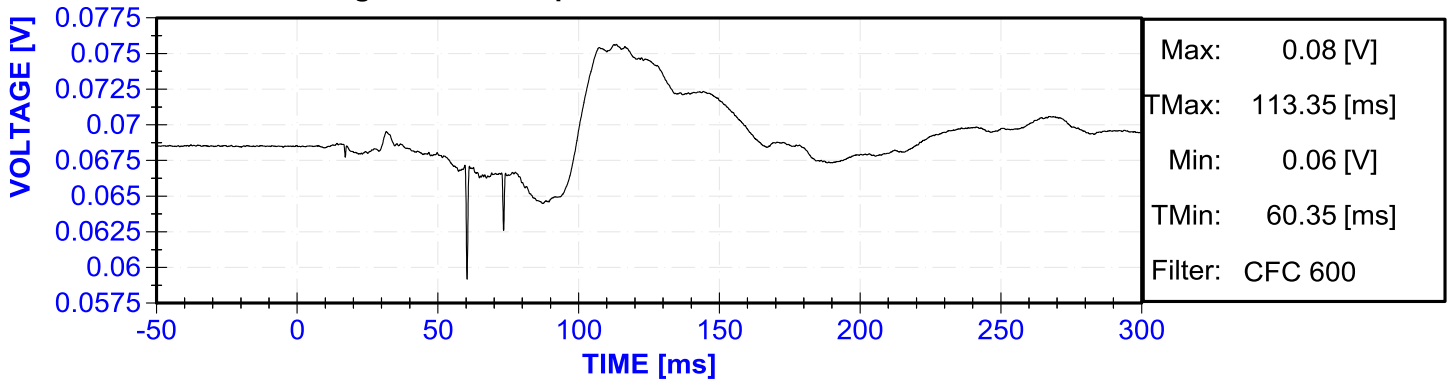
V2P2 Lower Left DGIR Y Rotation



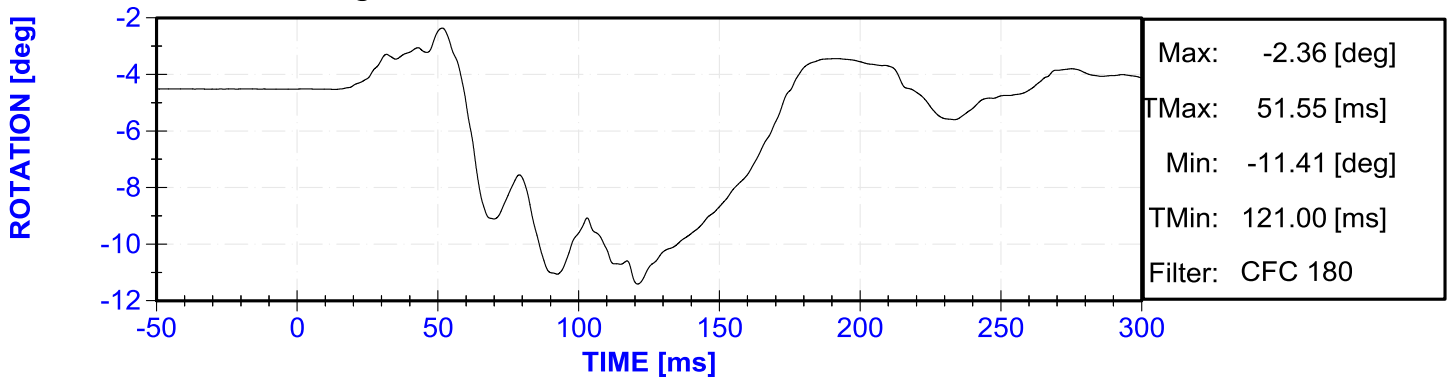
V2P2 Lower Left DGIR Z Rotation



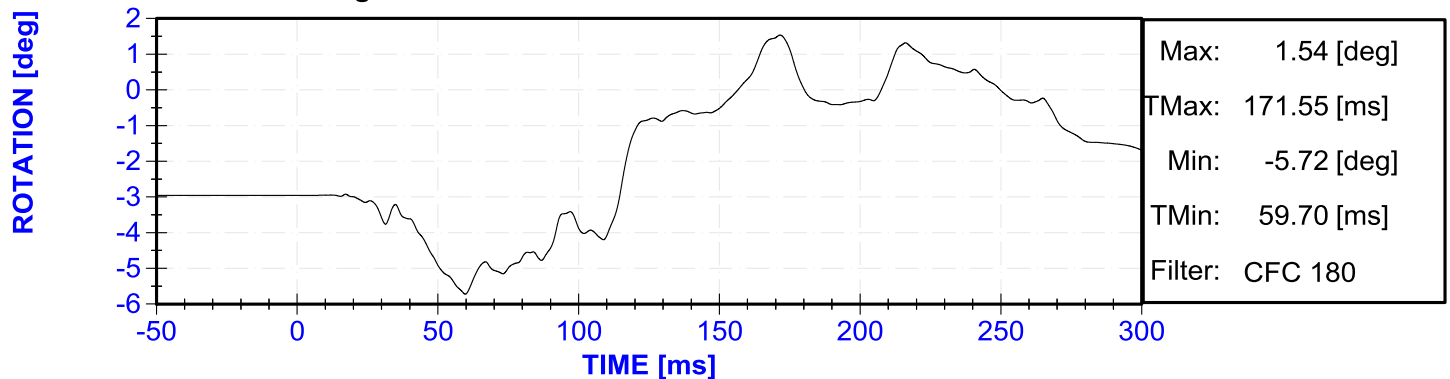
V2P2 Lower Right DGIR X Displacement



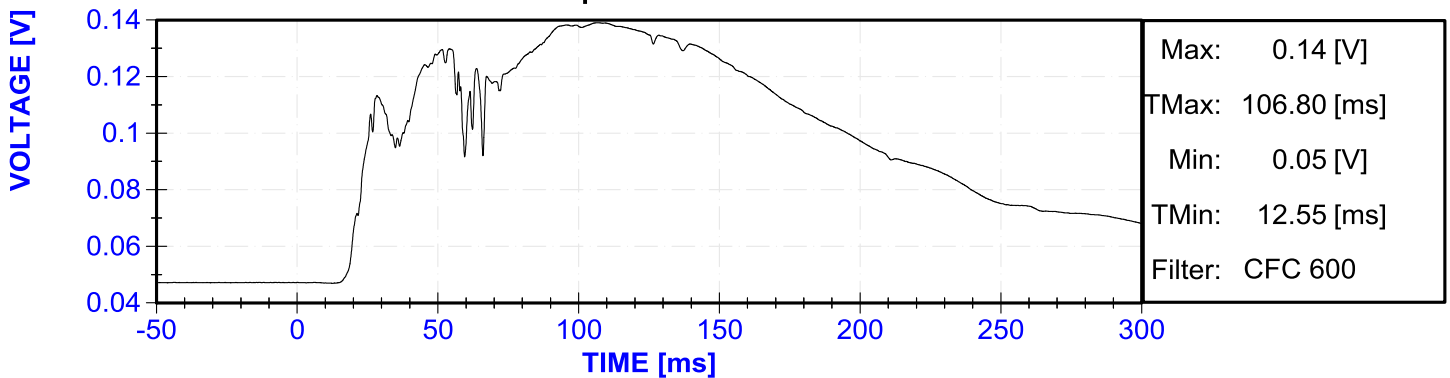
V2P2 Lower Right DGIR Y Rotation



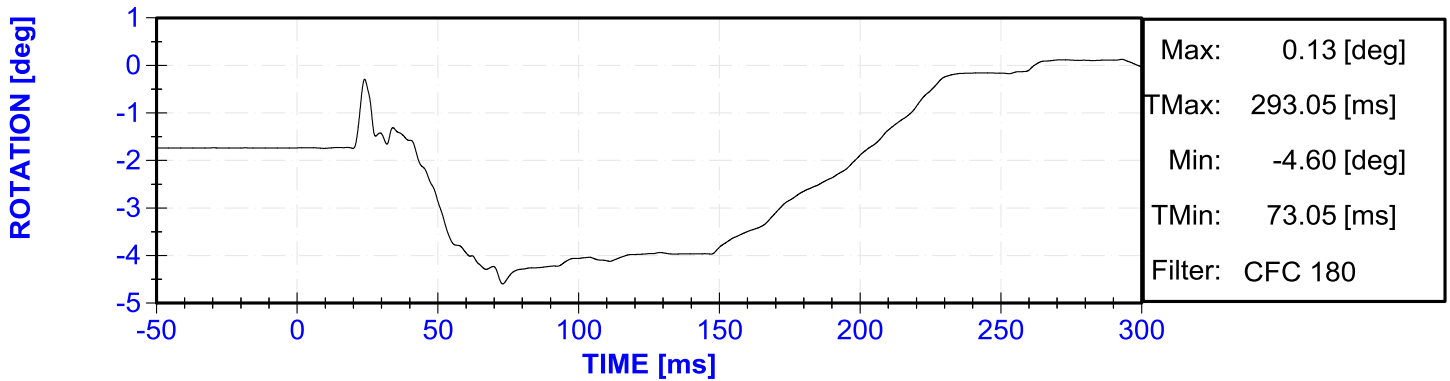
V2P2 Lower Right DGIR Z Rotation



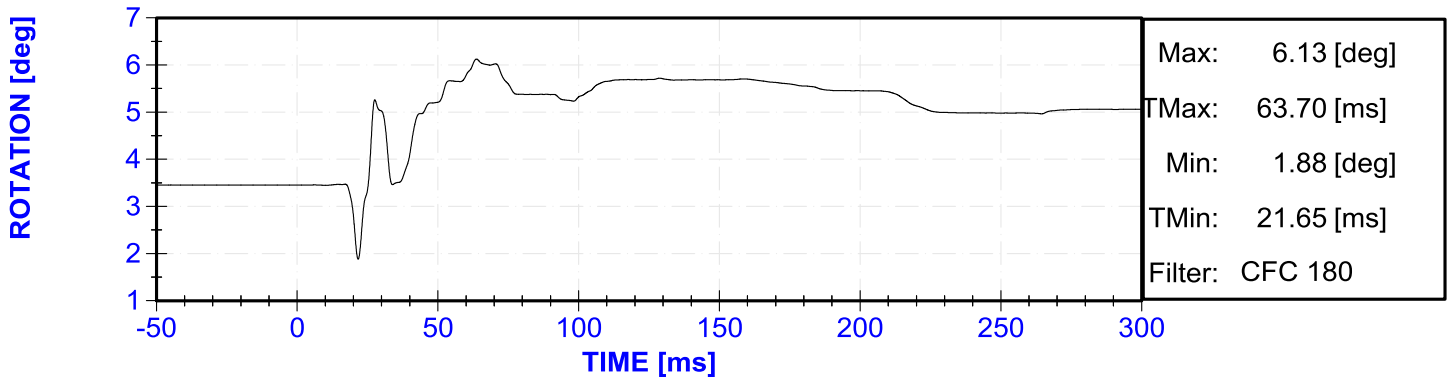
V2P2 Abdomen Left DGIR X Displacement



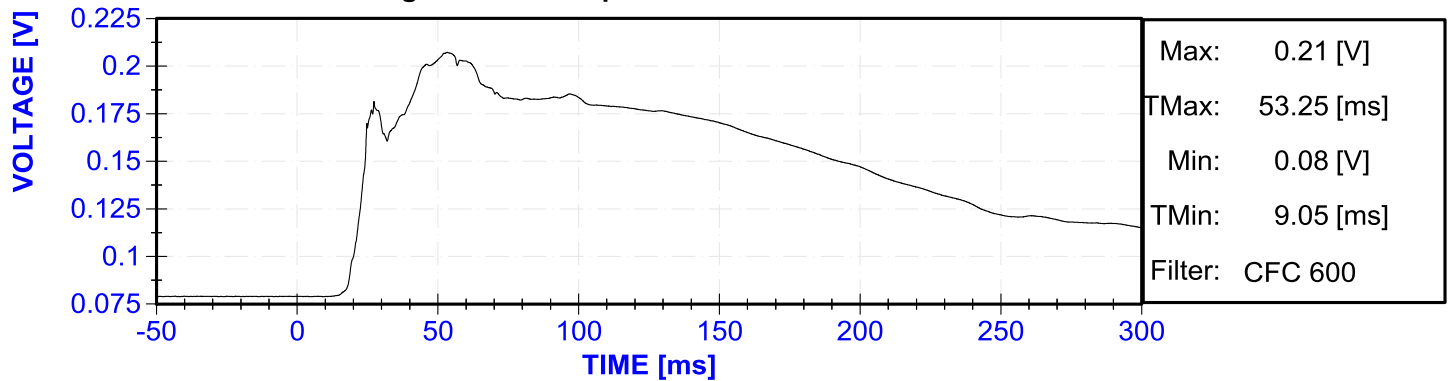
V2P2 Abdomen Left DGIR Y Rotation



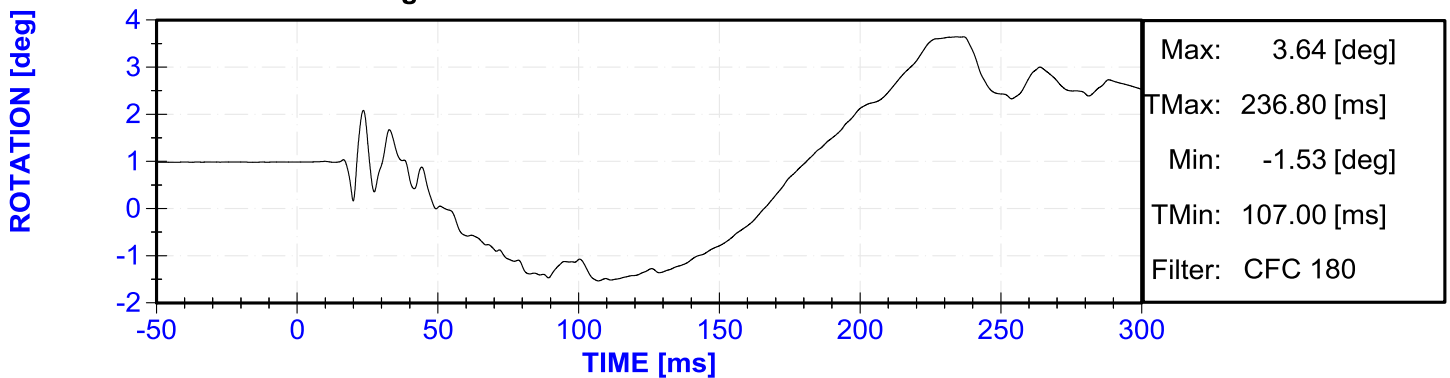
V2P2 Abdomen Left DGIR Z Rotation



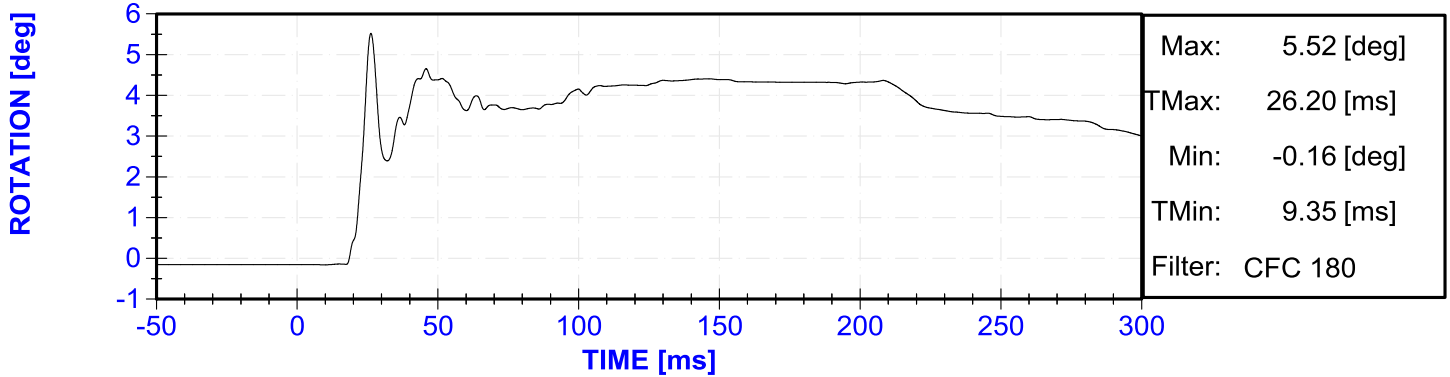
V2P2 Abdomen Right DGIR X Displacement



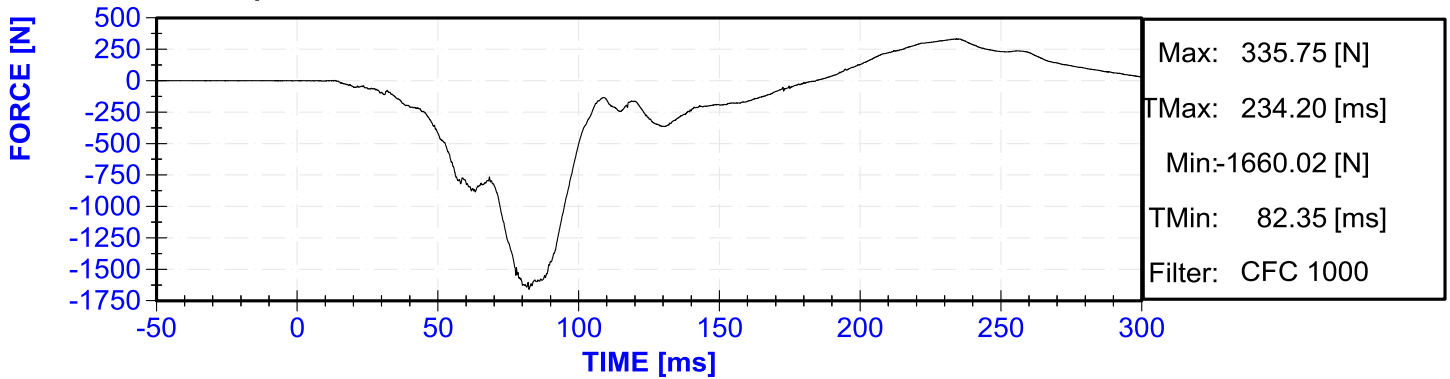
V2P2 Abdomen Right DGIR Y Rotation



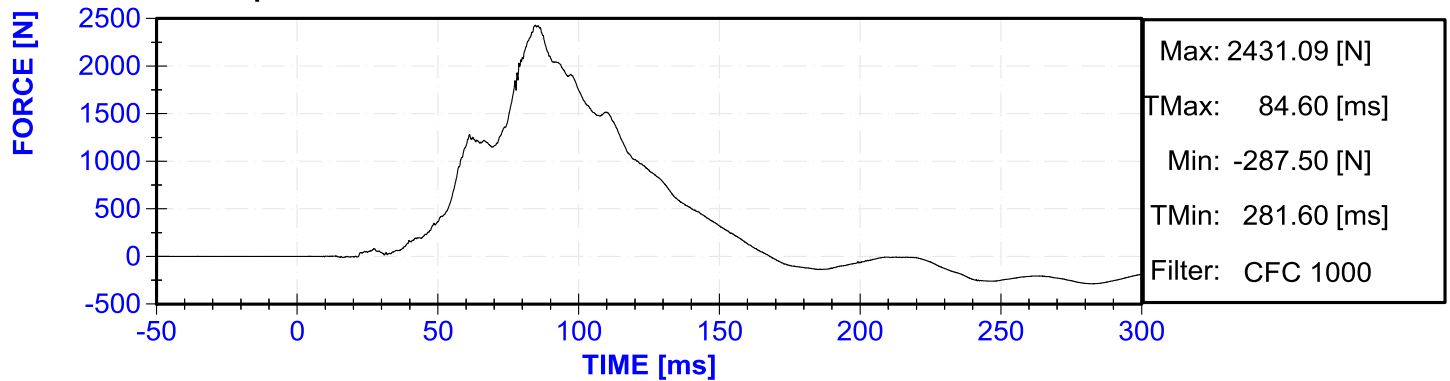
V2P2 Abdomen Right DGIR Z Rotation



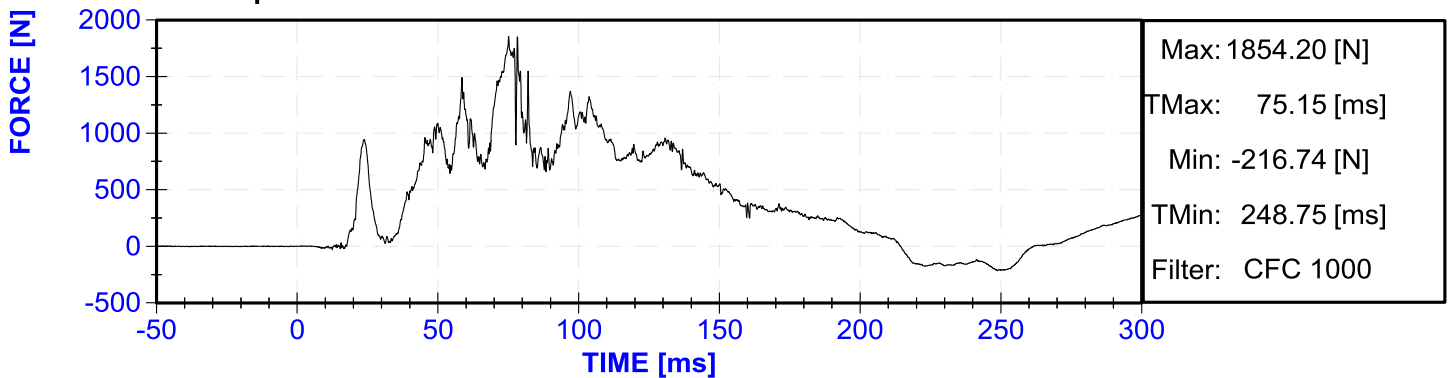
V2P2 Spine Force X

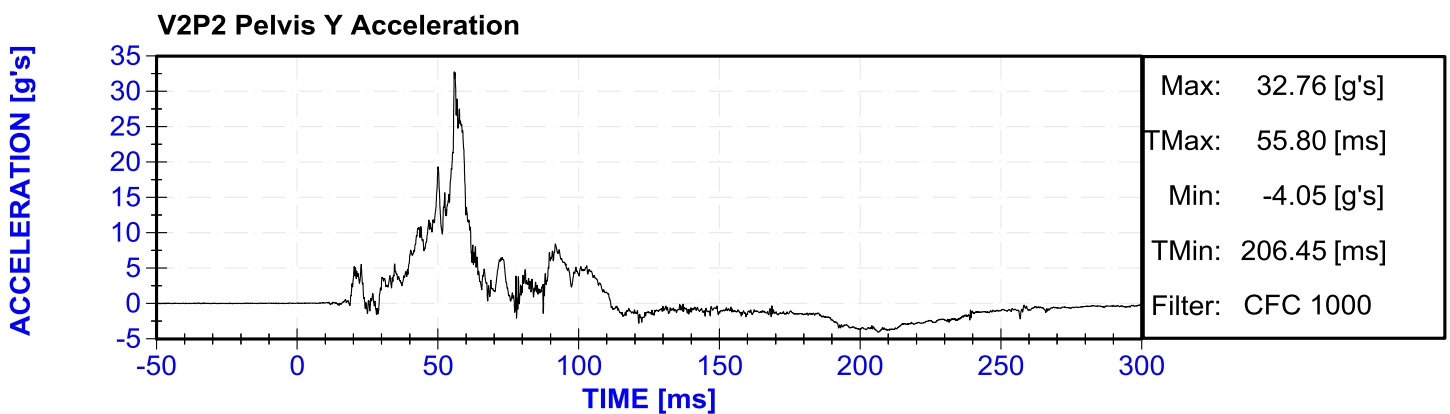
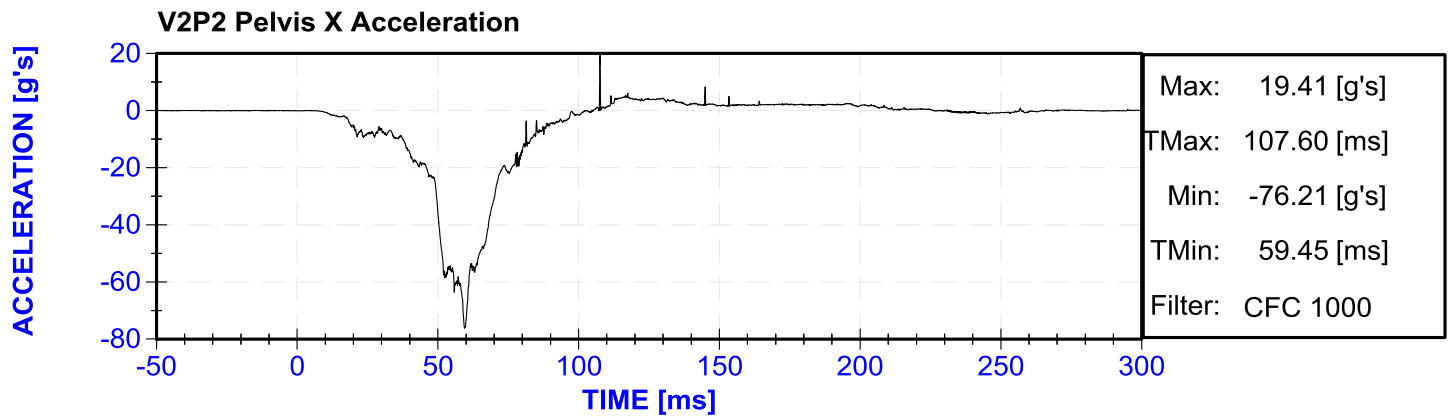
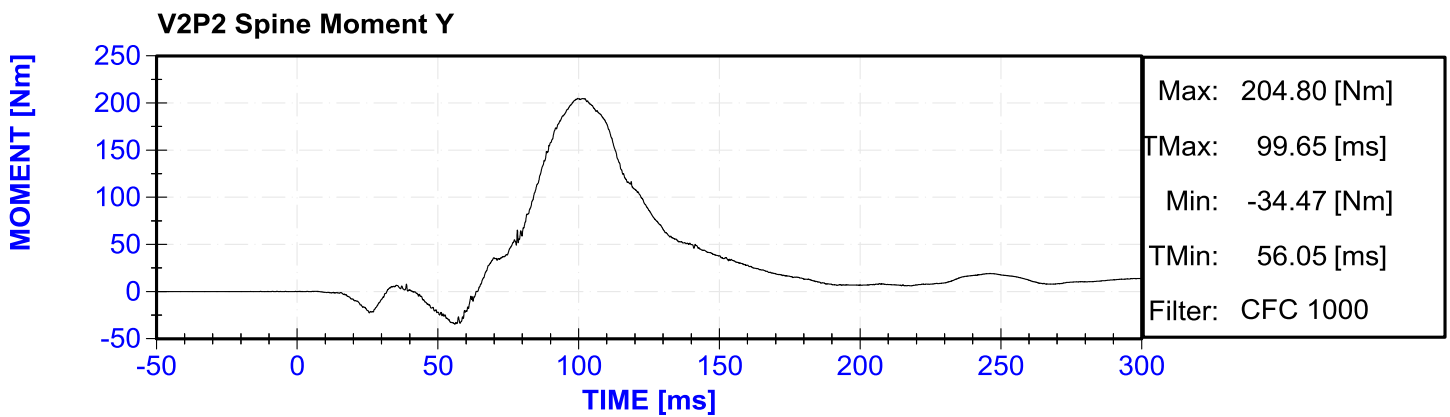
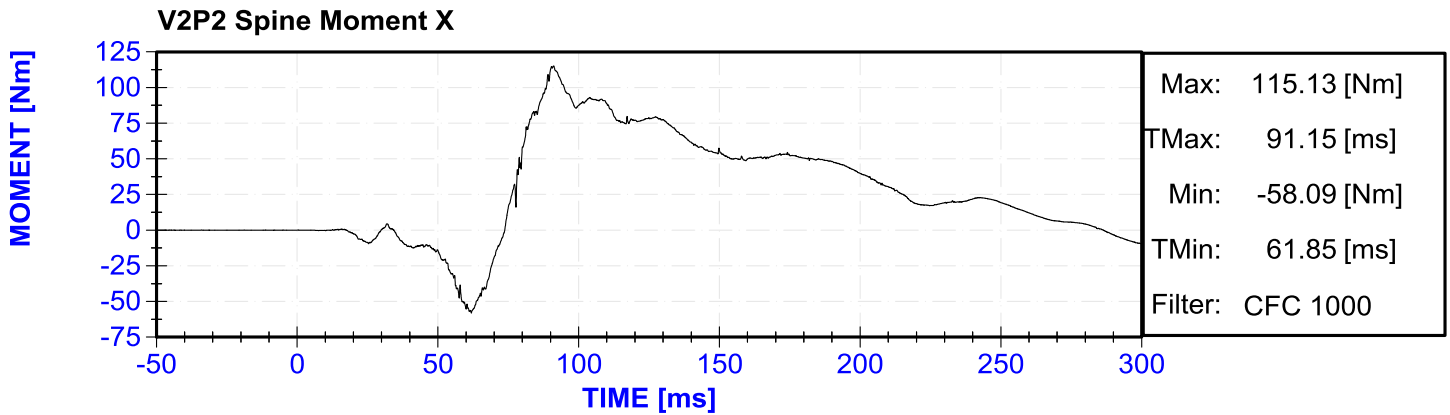


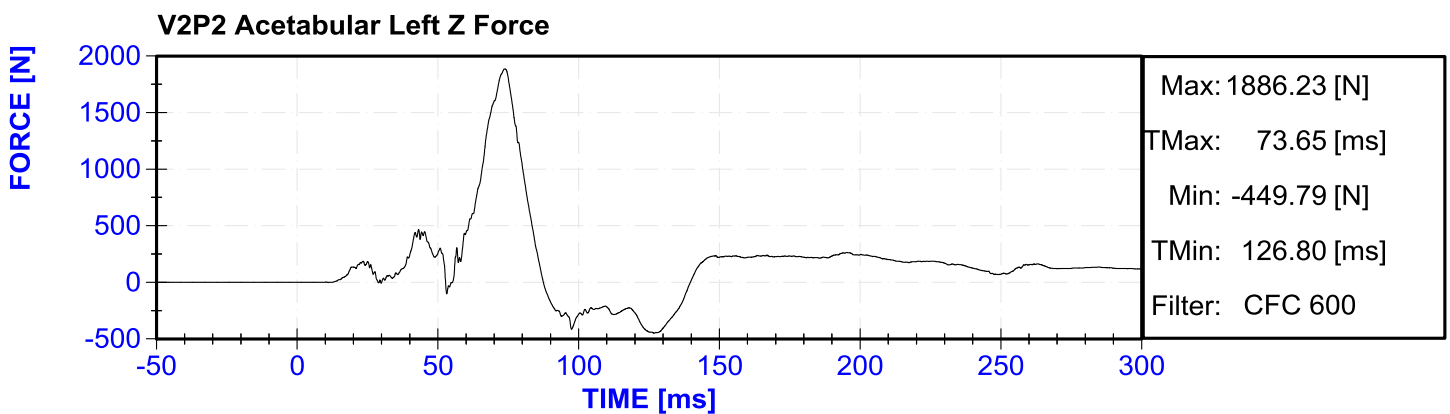
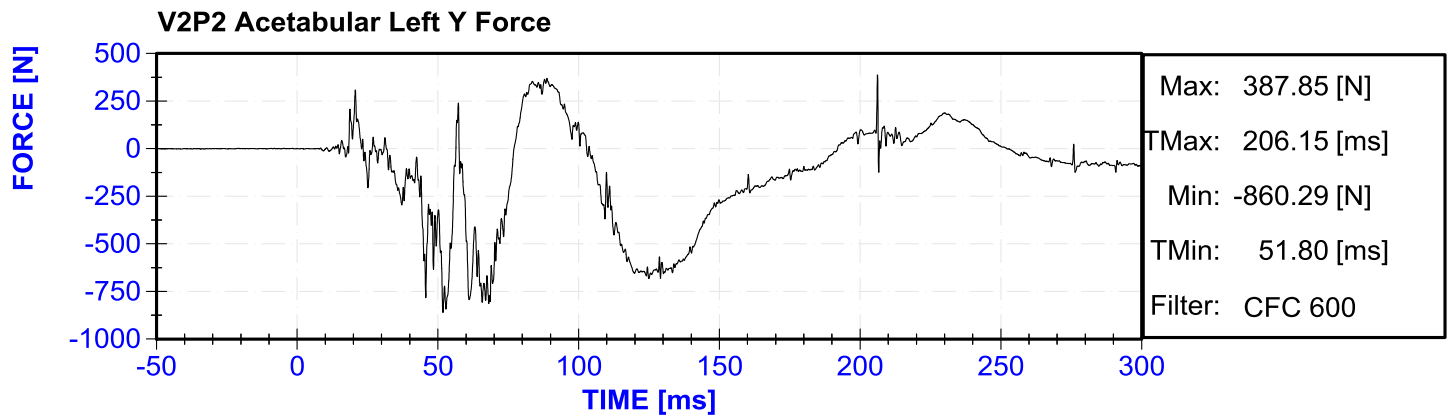
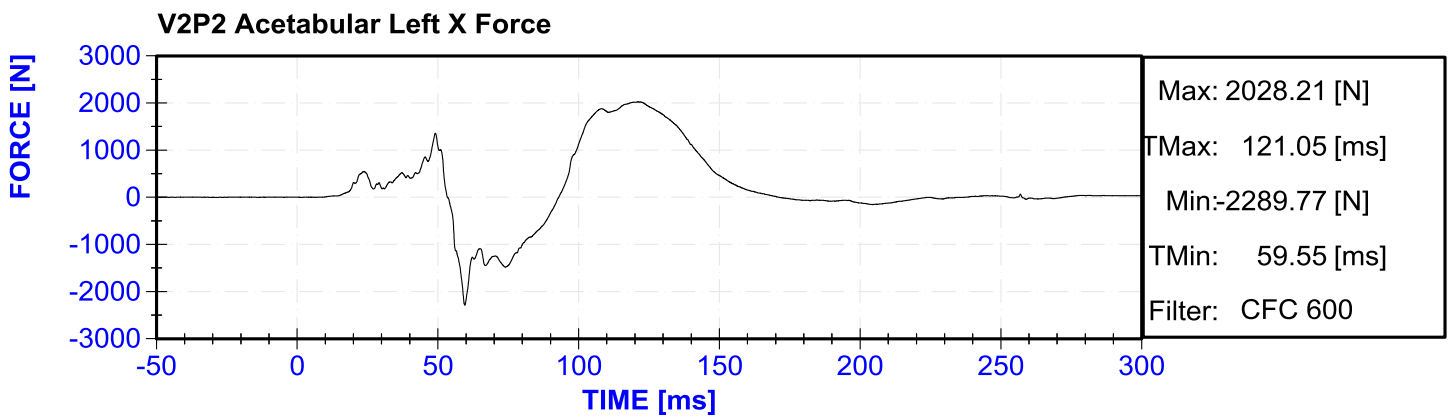
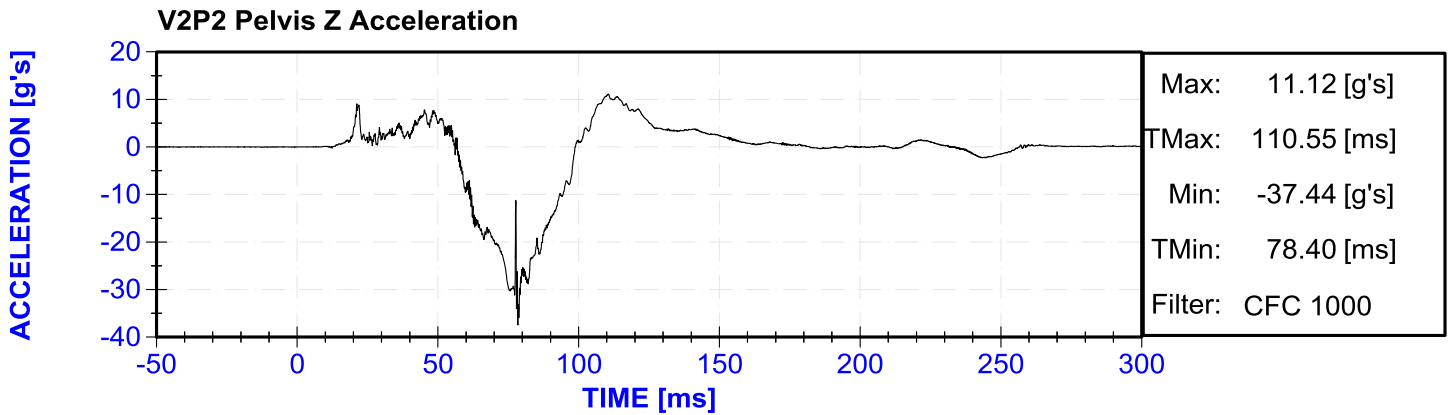
V2P2 Spine Force Y

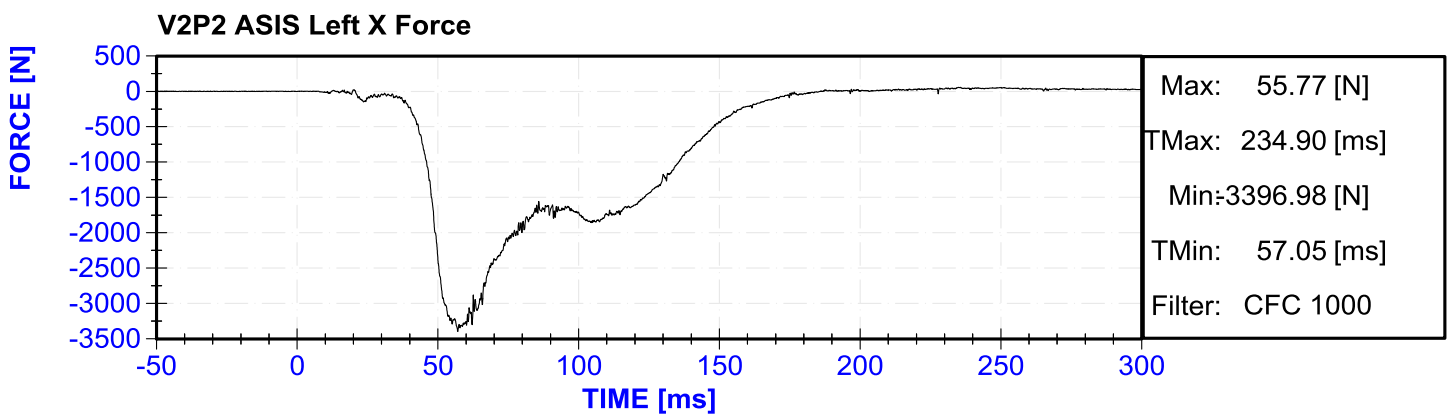
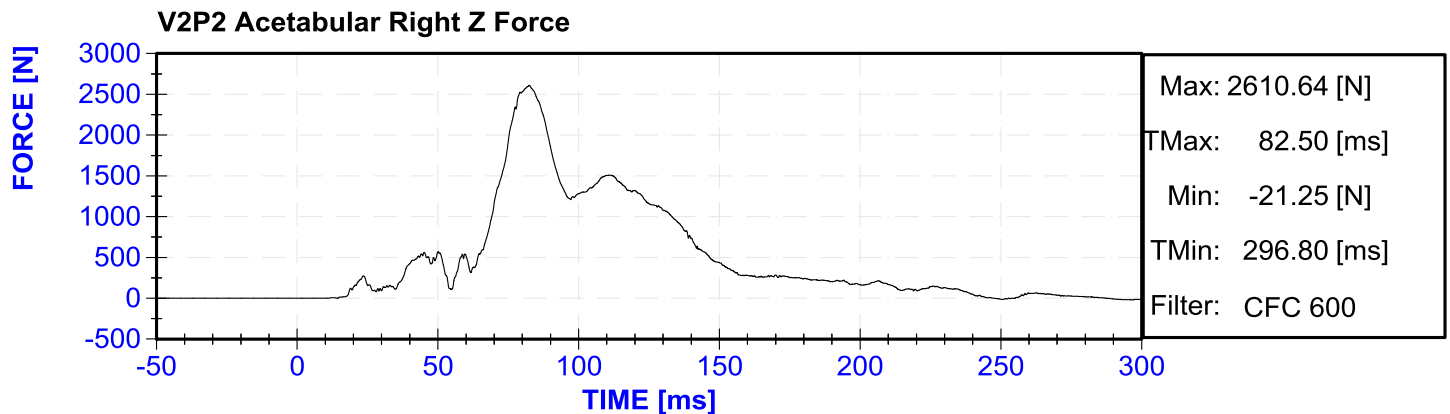
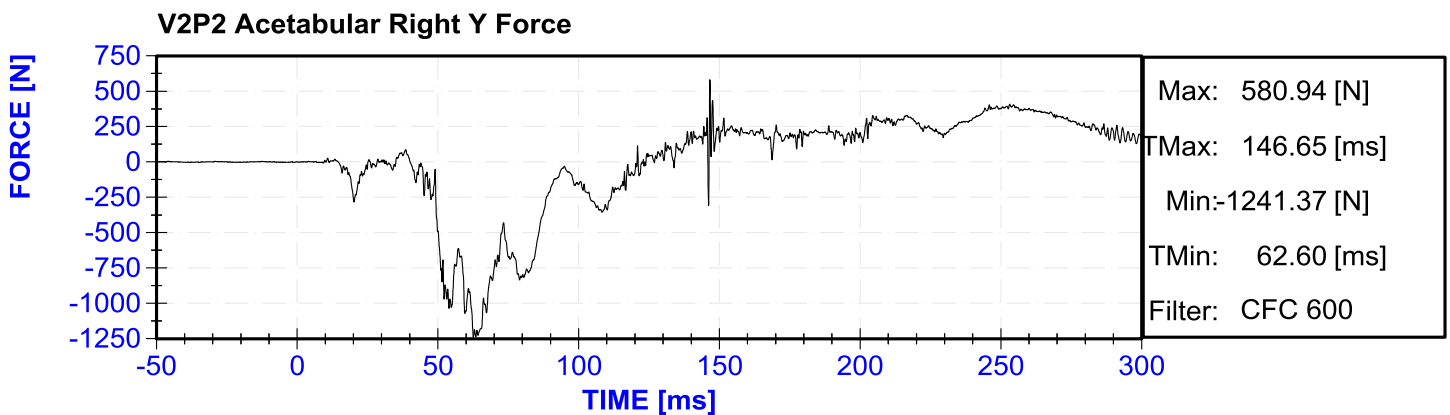
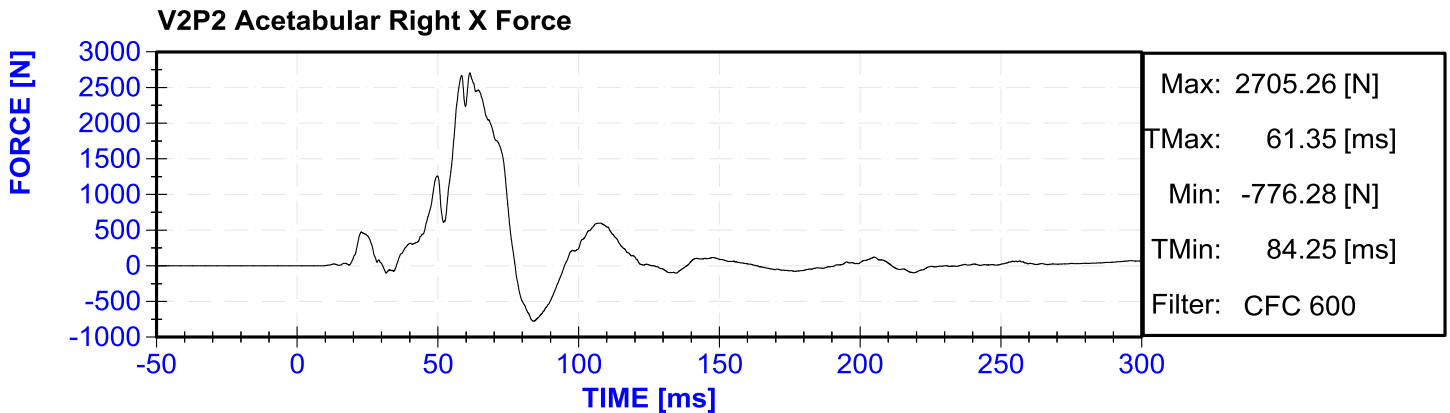


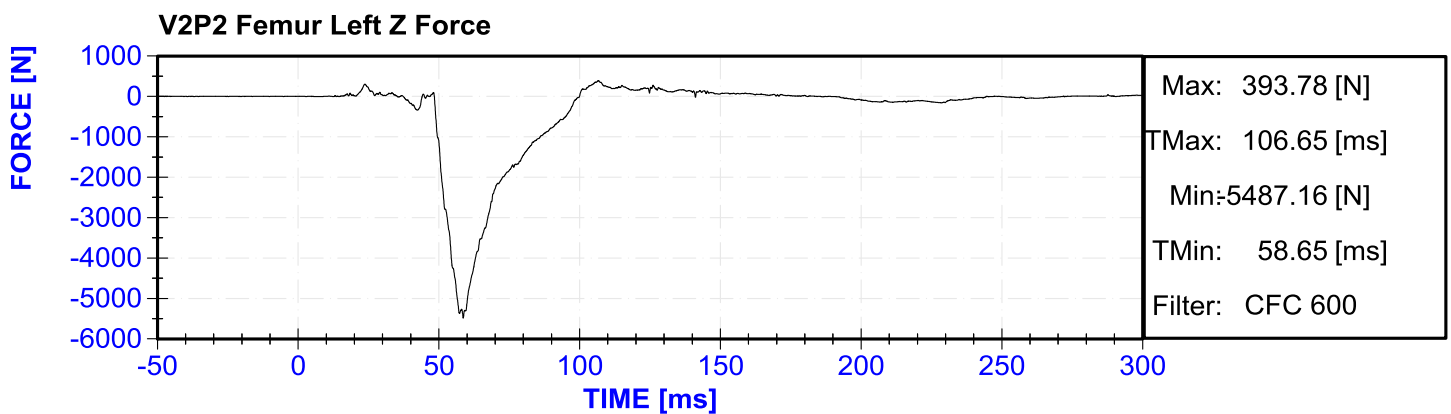
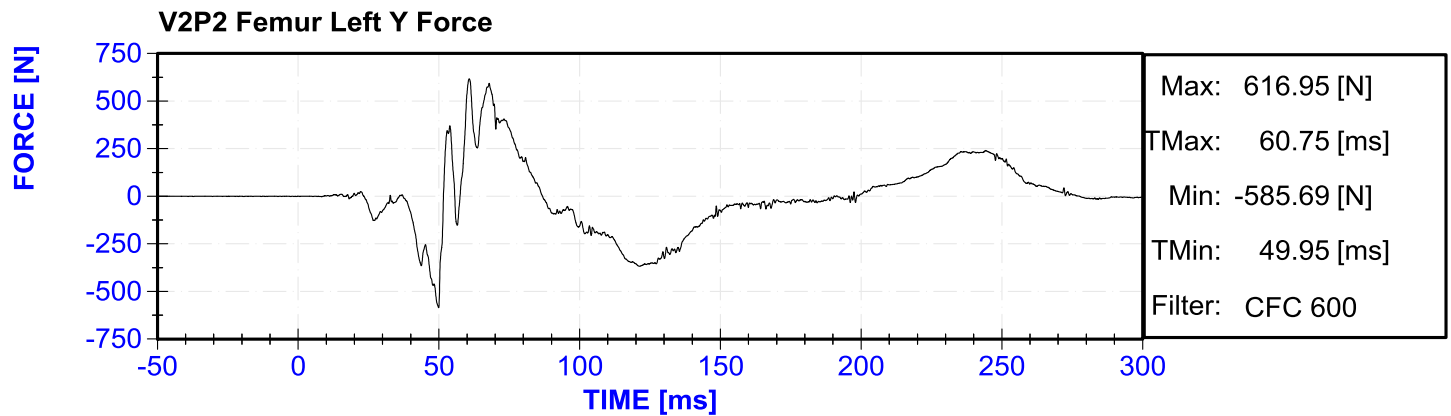
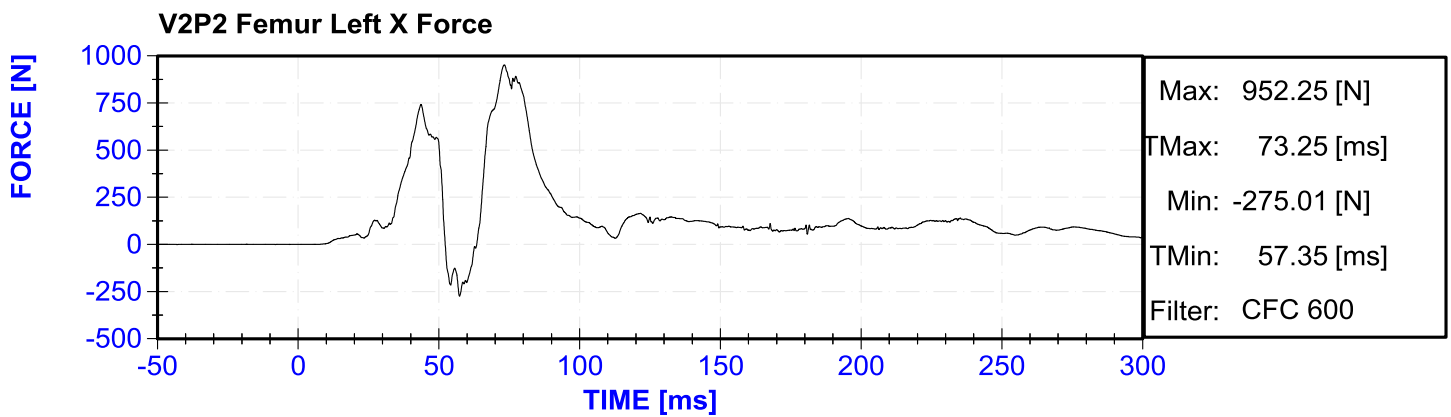
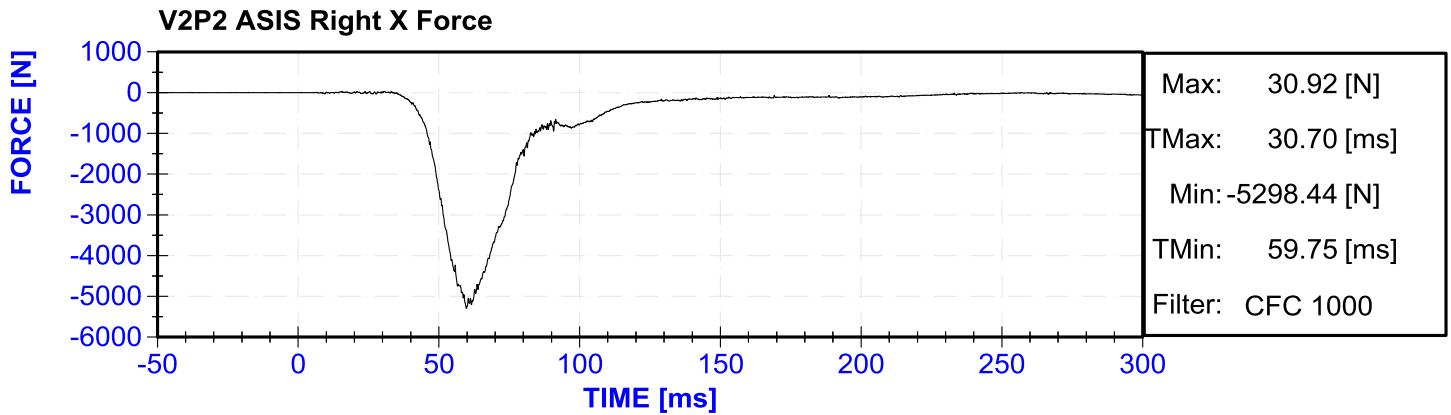
V2P2 Spine Force Z

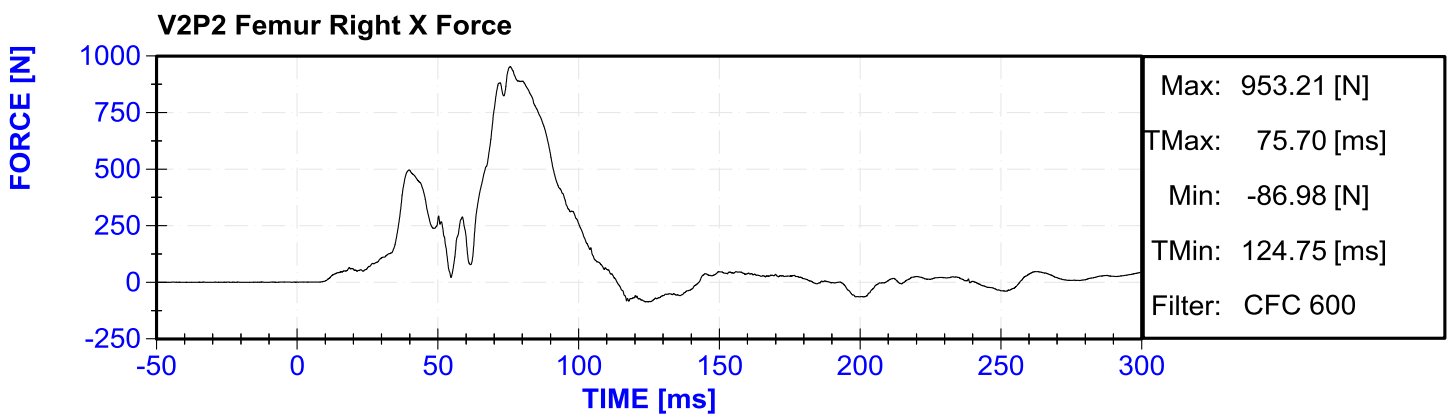
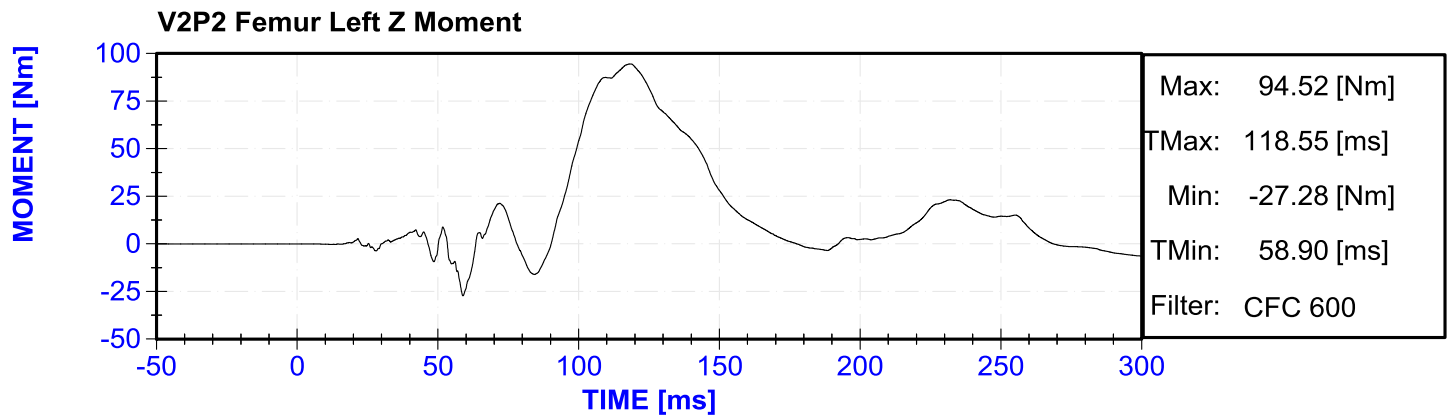
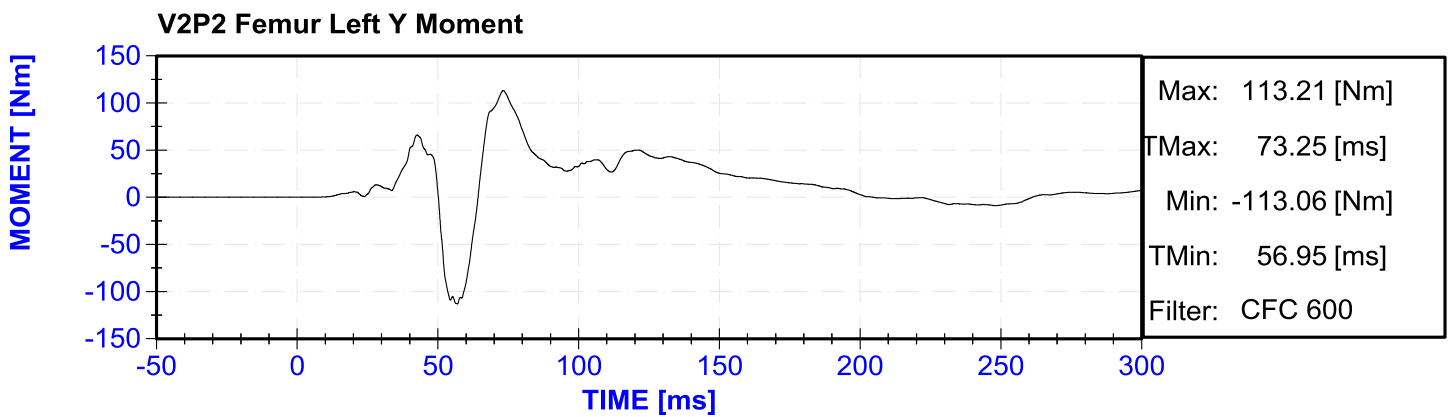
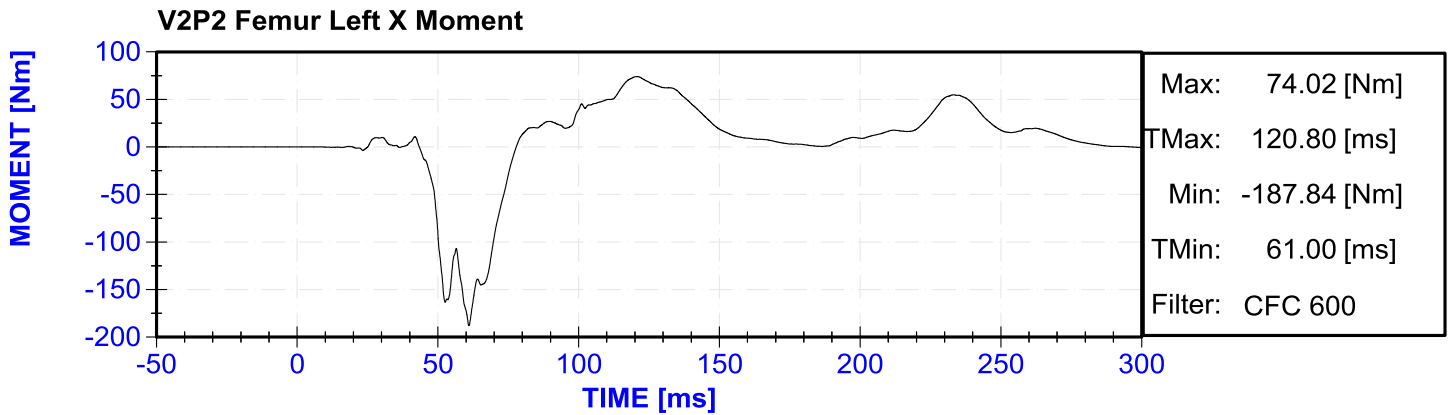


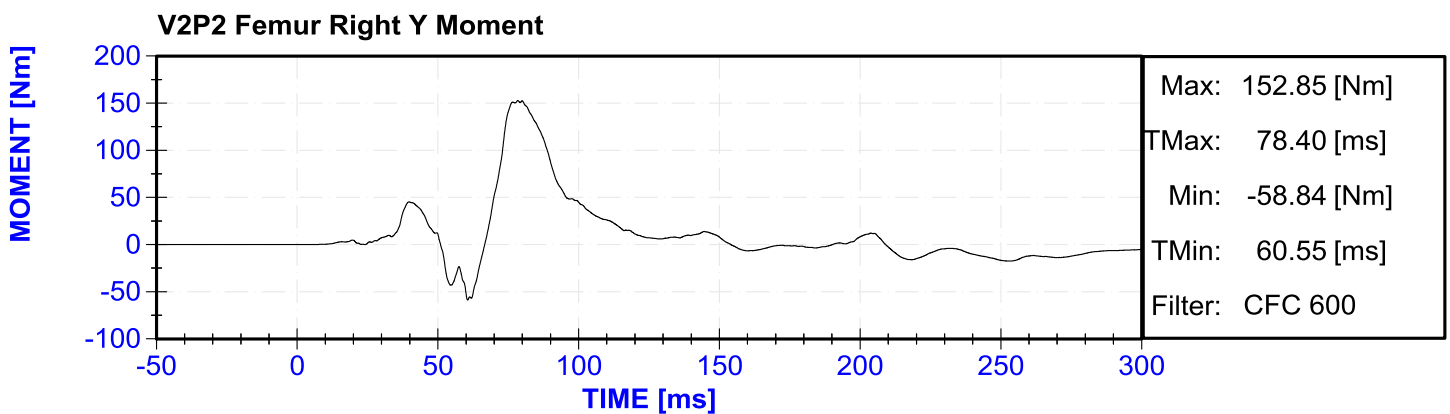
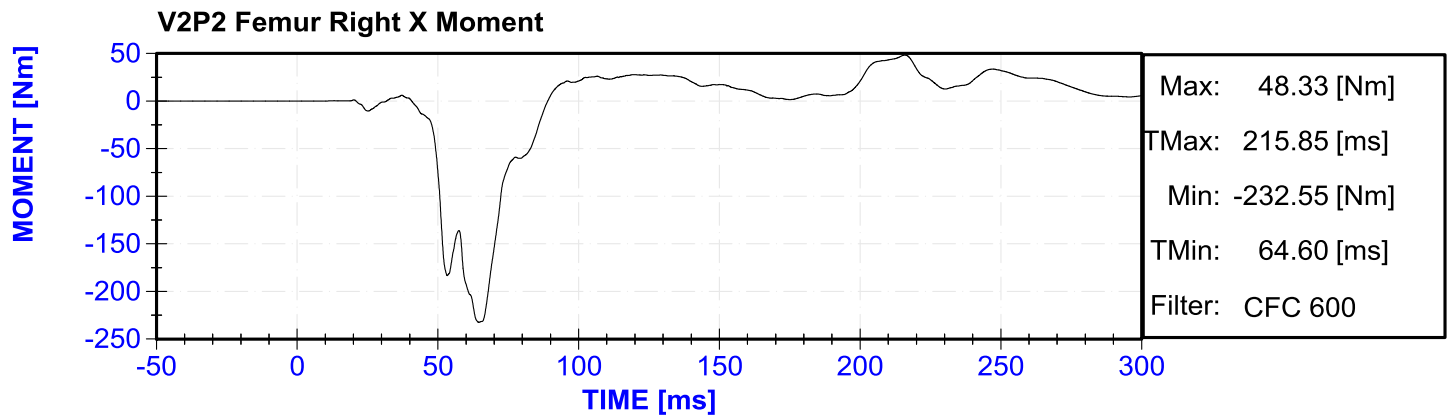
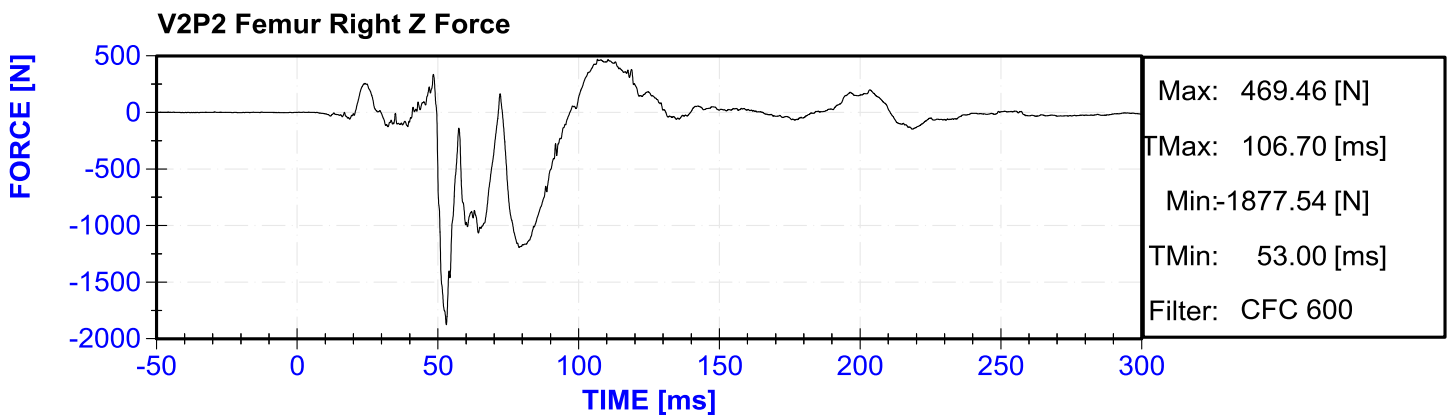
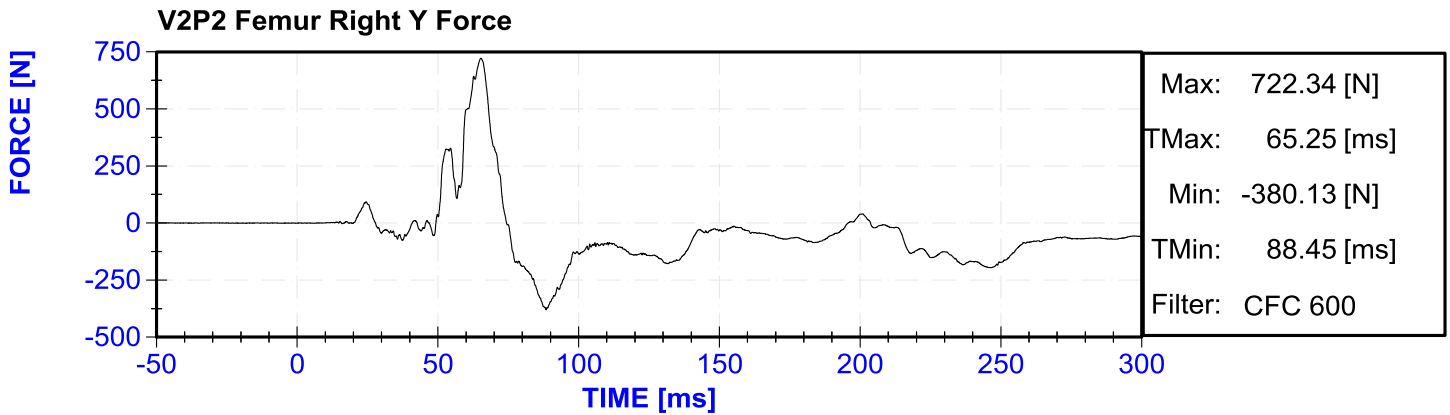


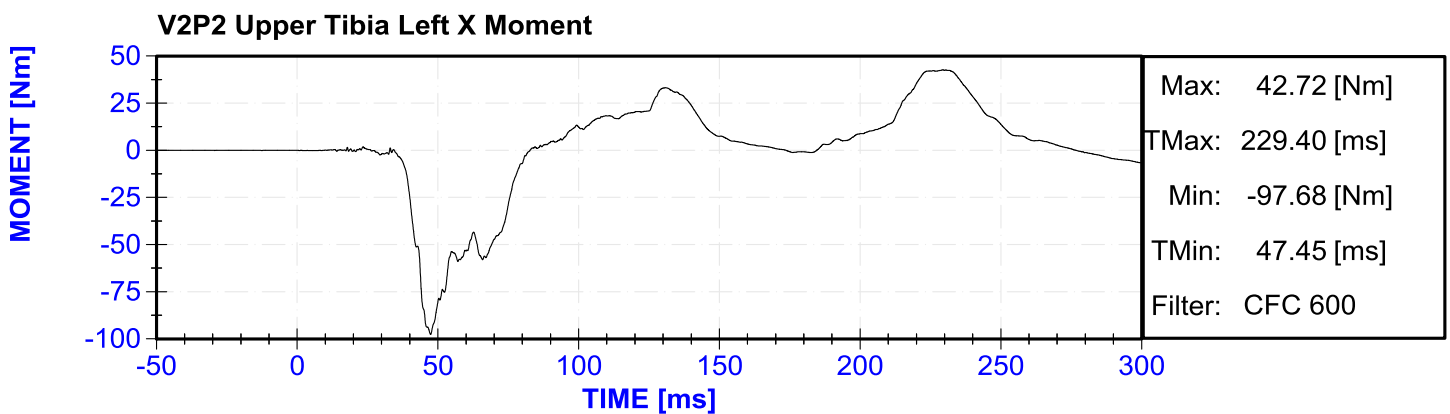
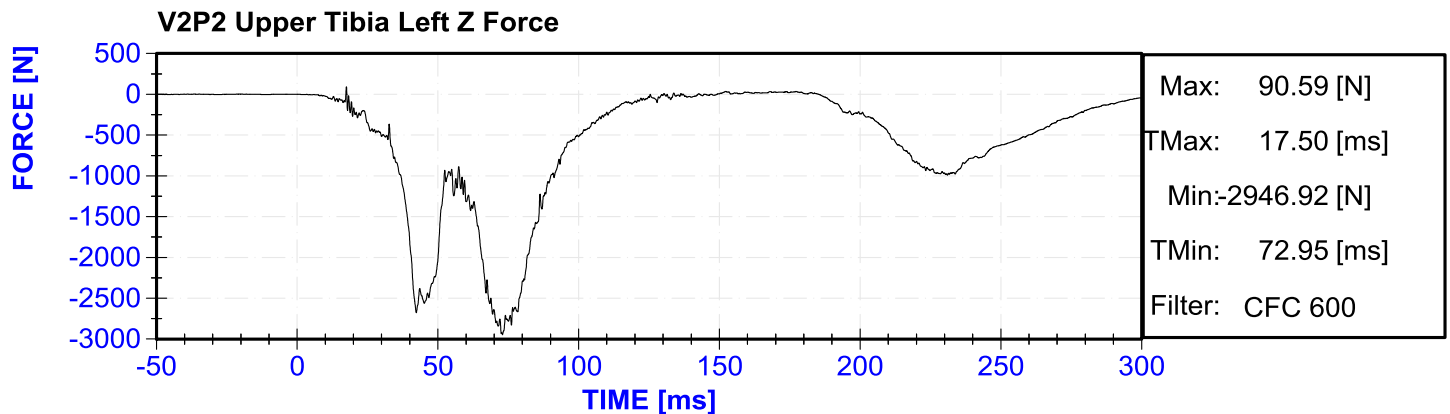
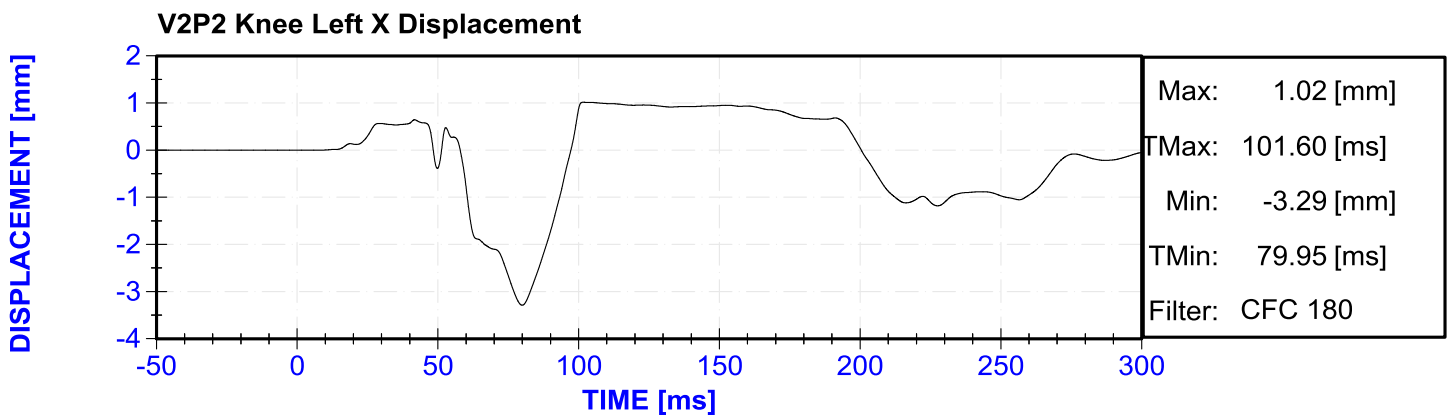
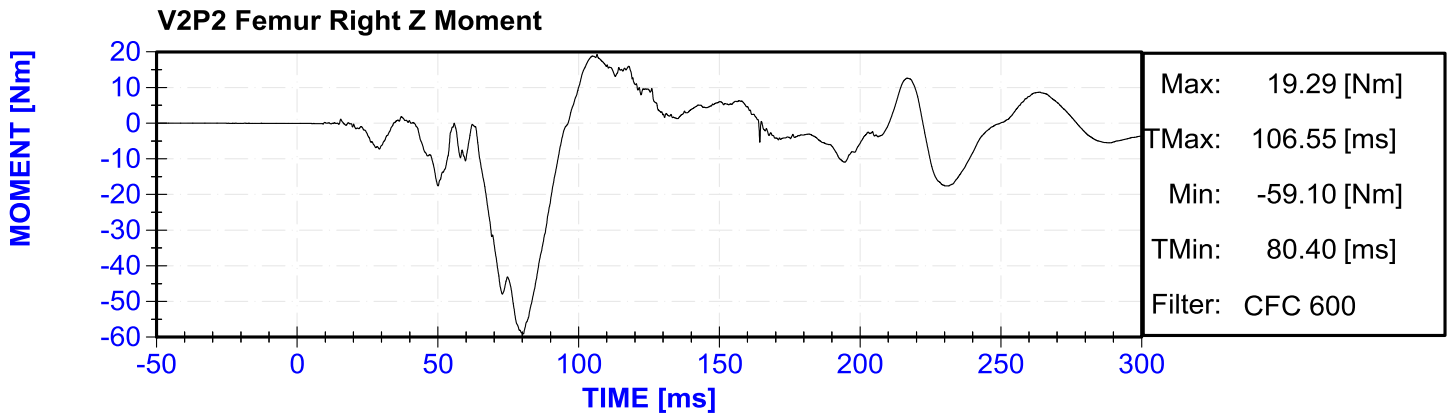




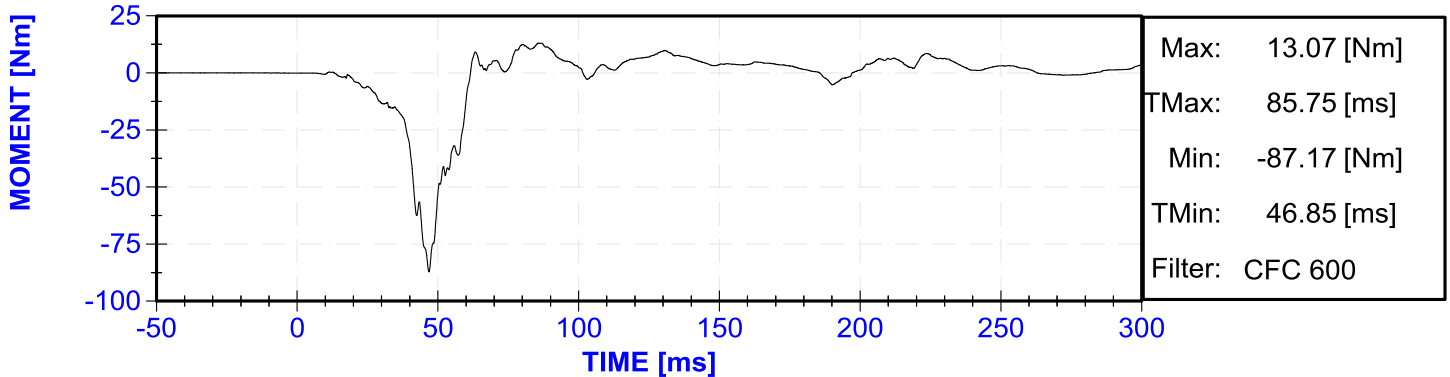




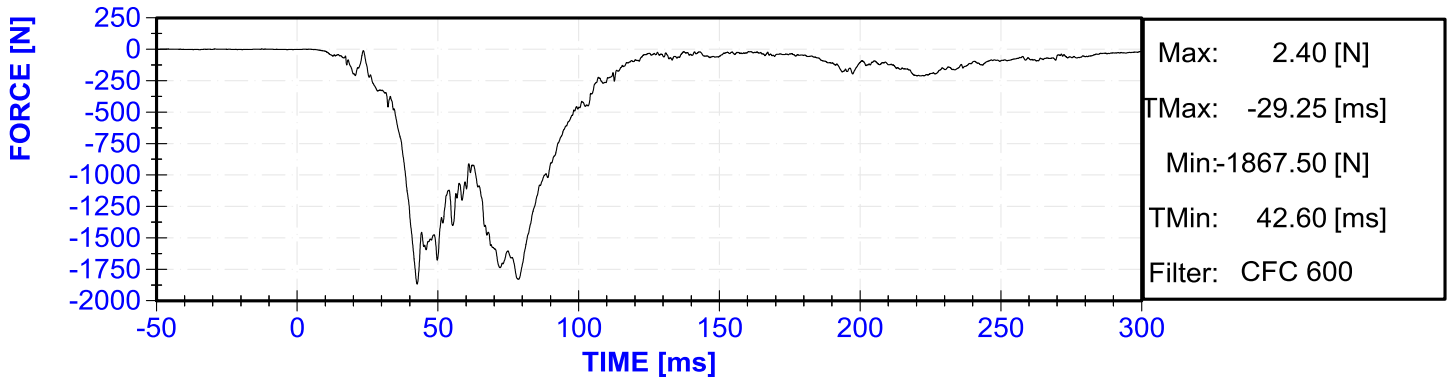




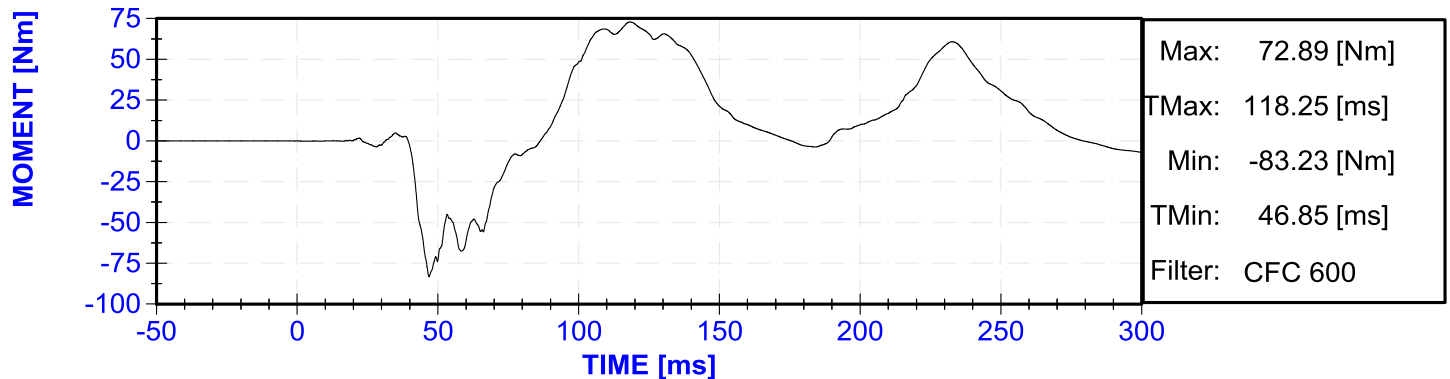
V2P2 Upper Tibia Left Y Moment



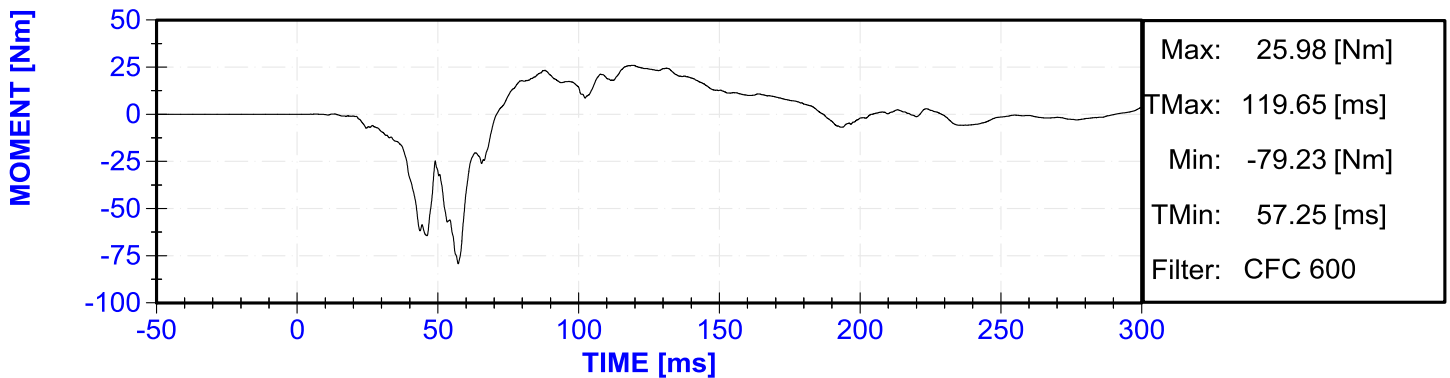
V2P2 Lower Tibia Left Z Force

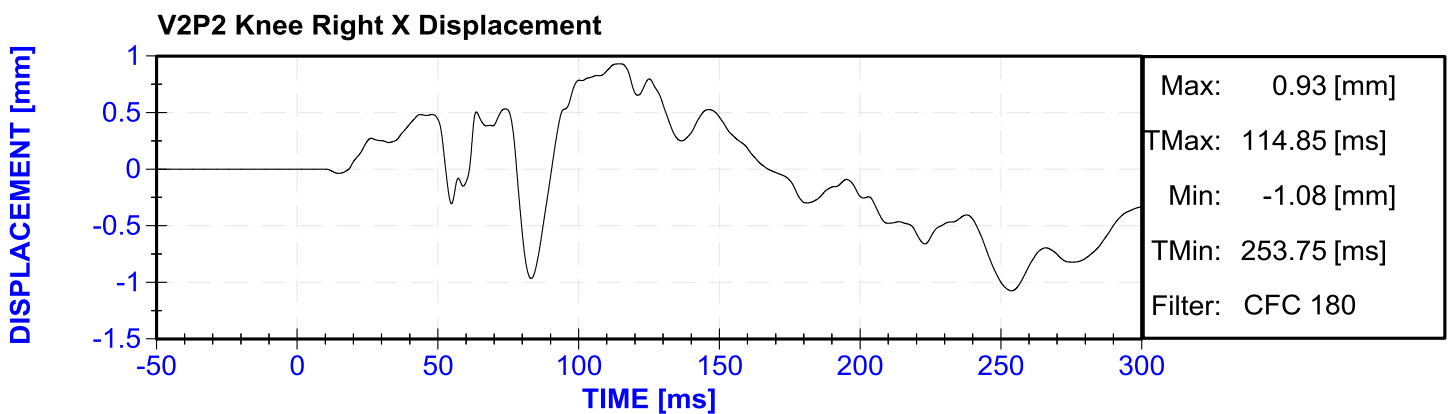
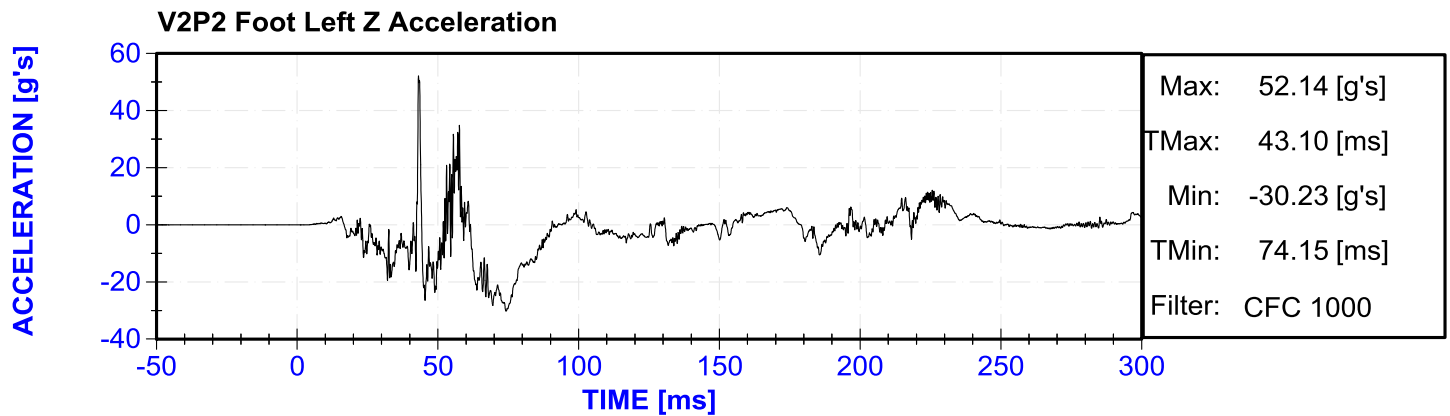
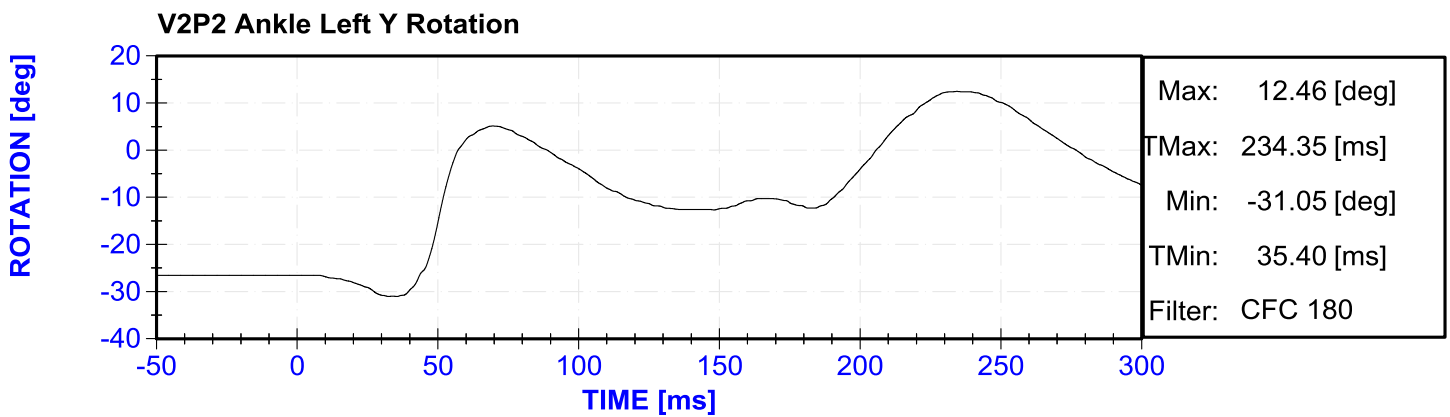
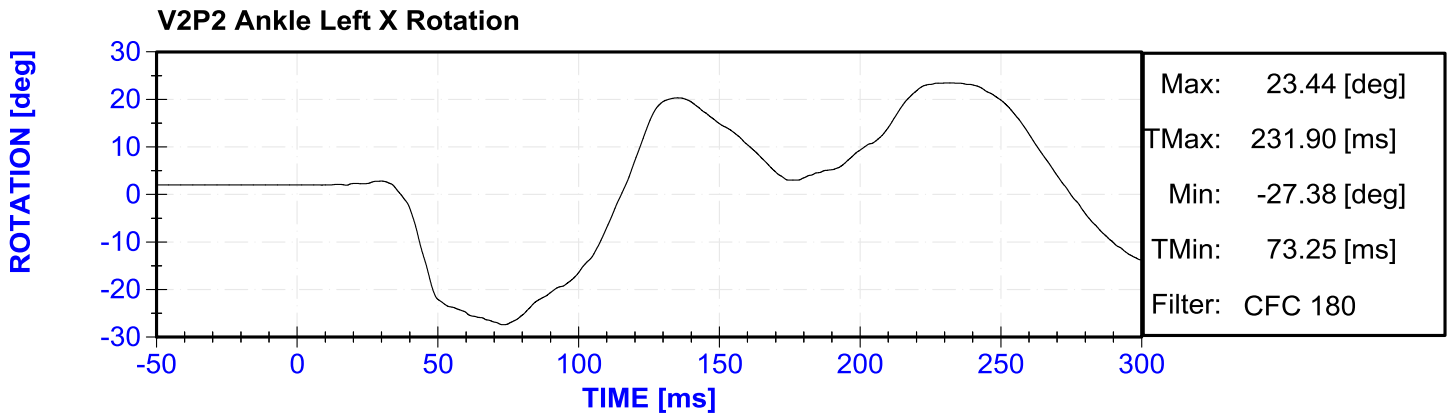


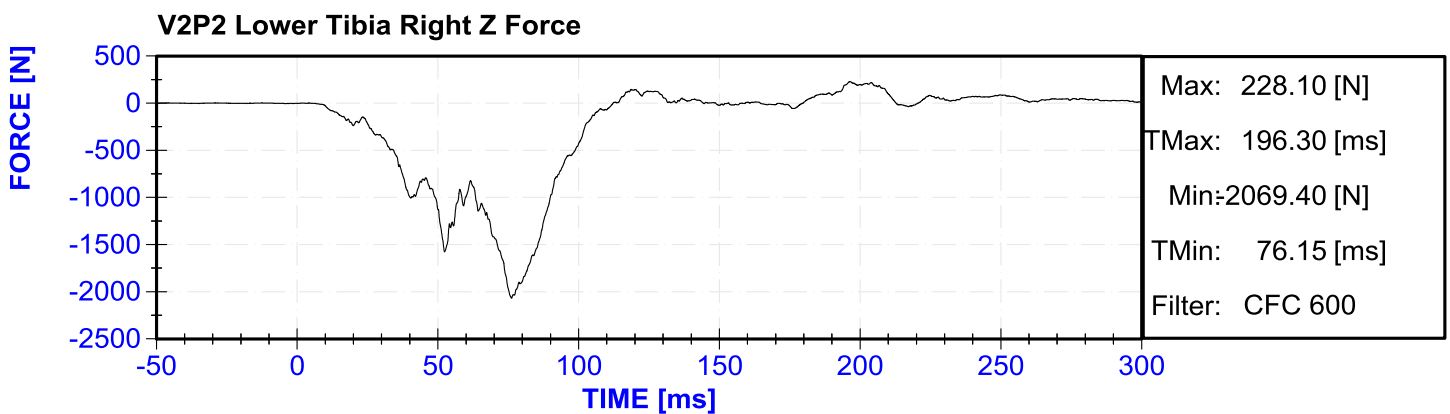
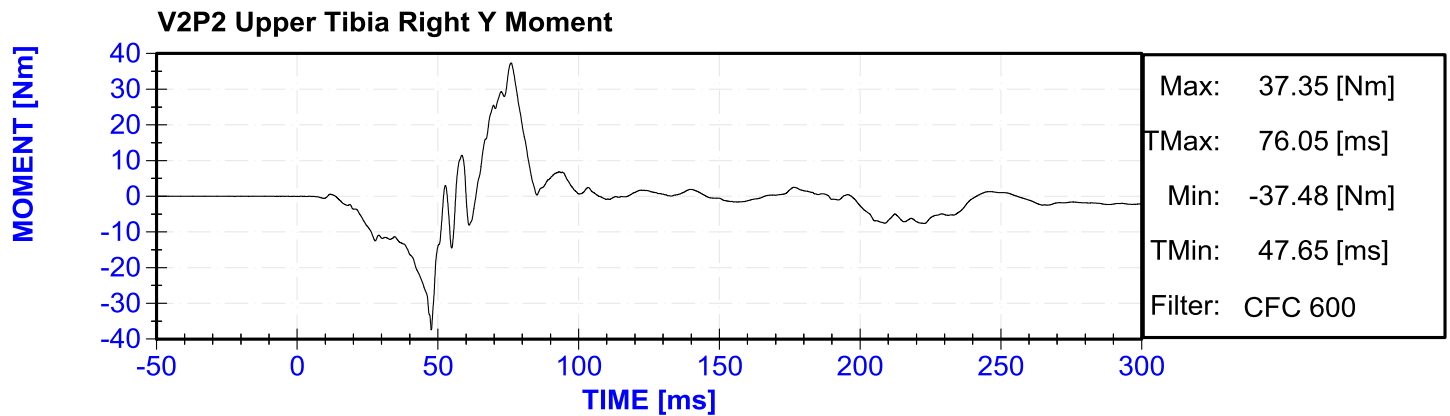
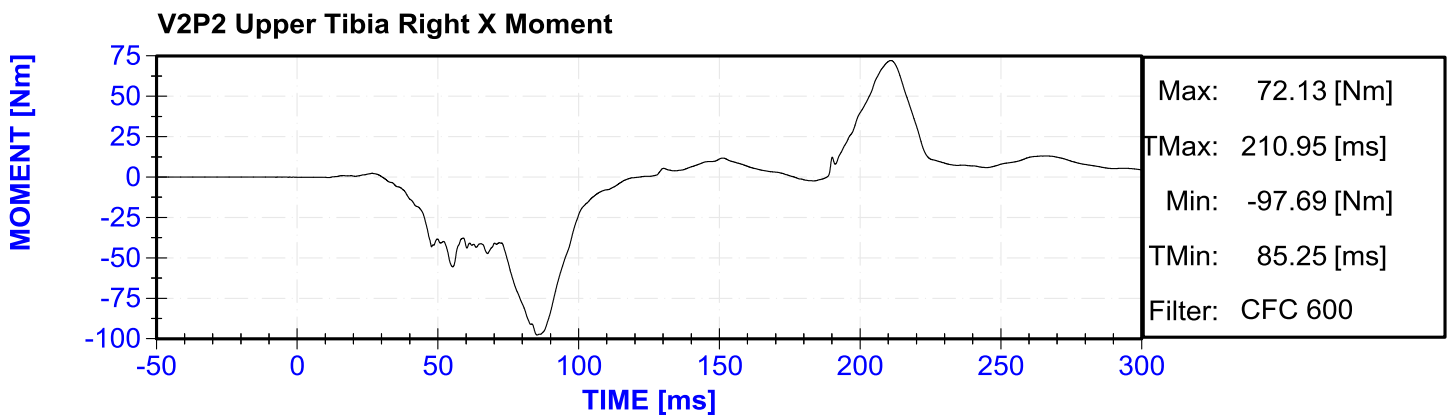
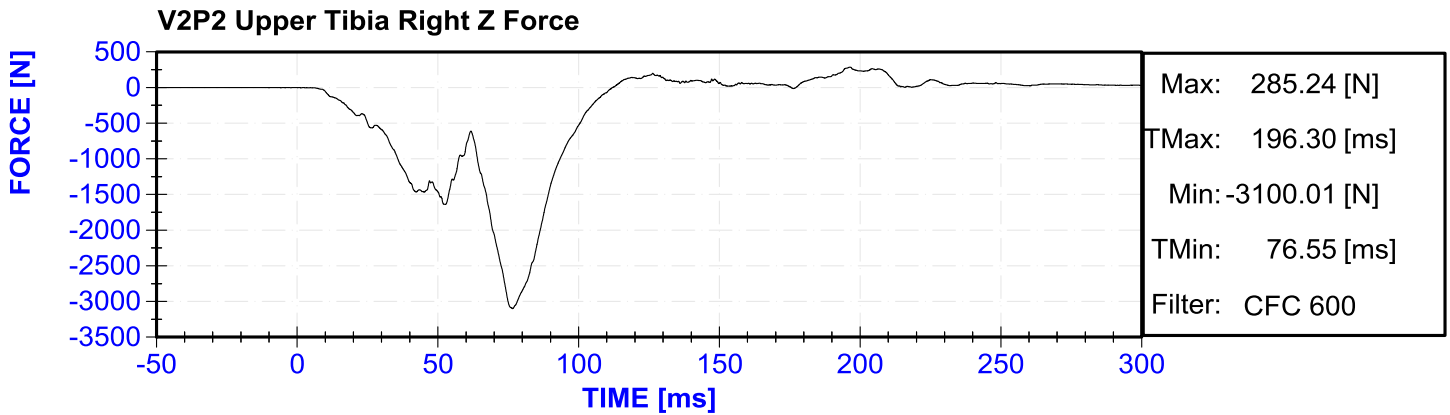
V2P2 Lower Tibia Left X Moment

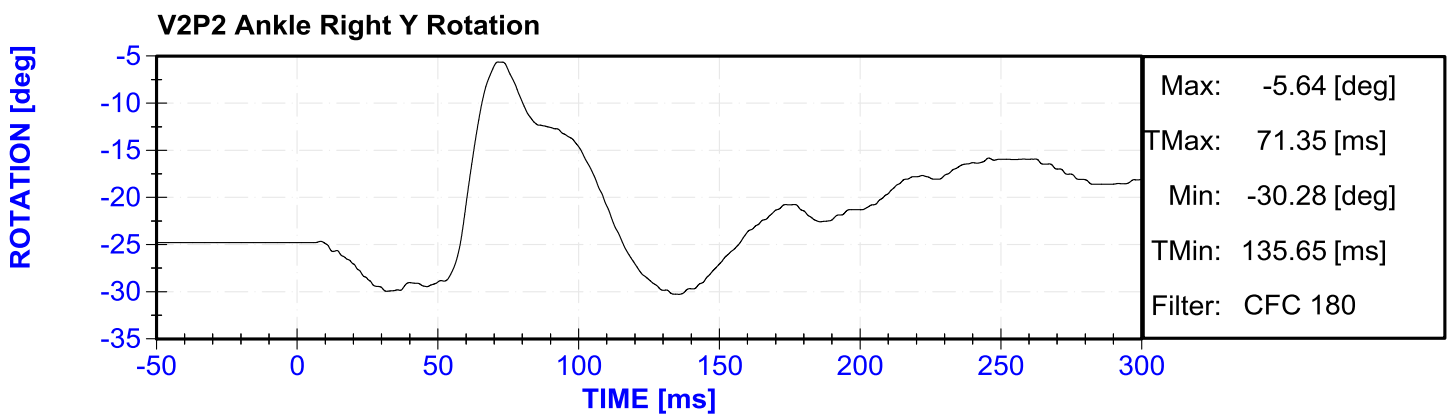
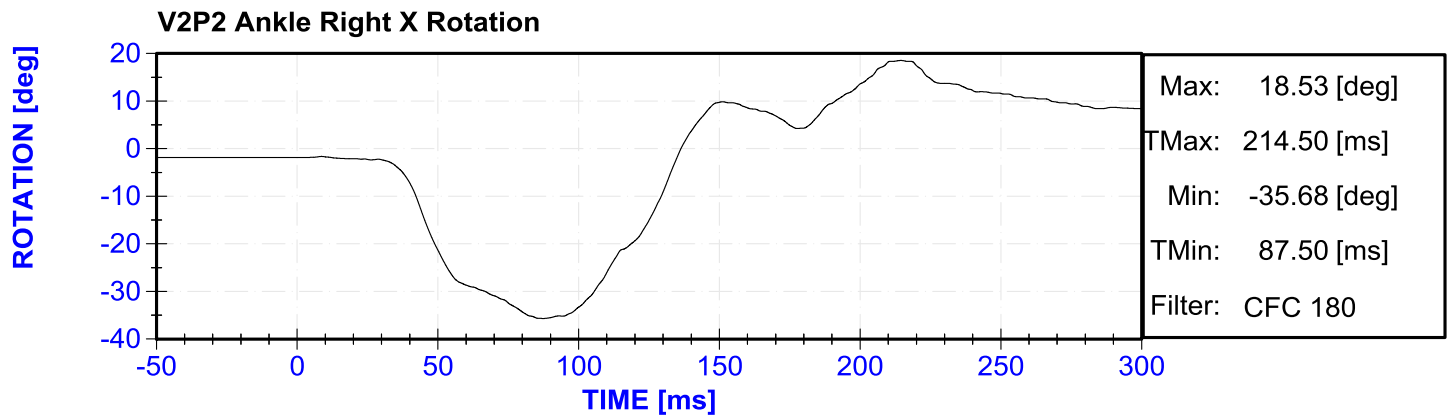
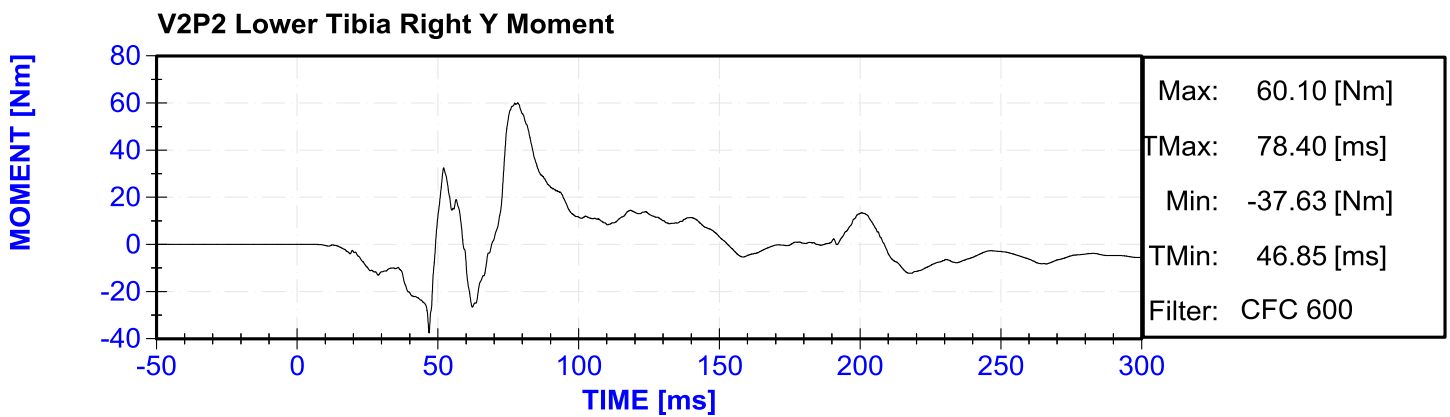
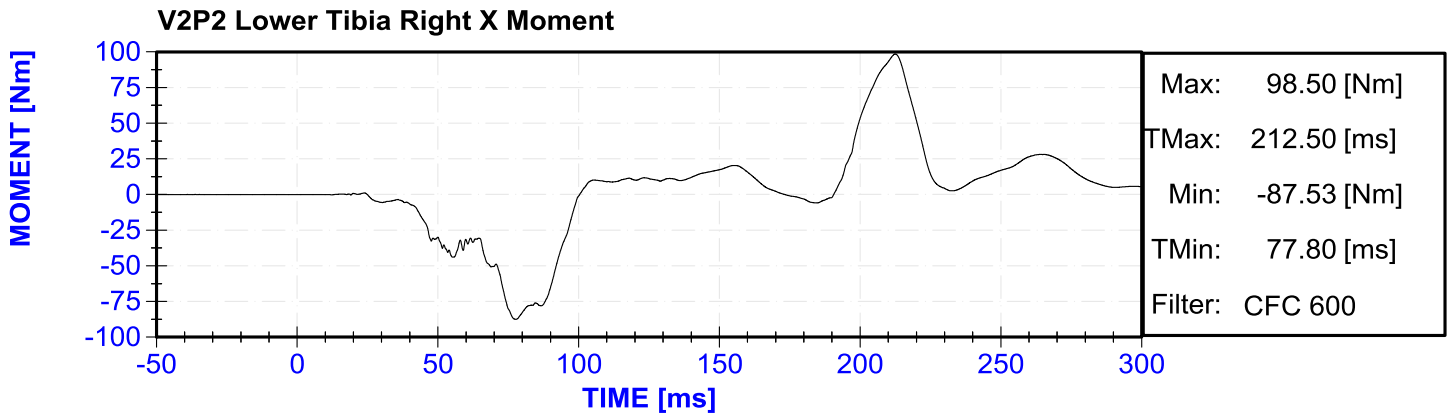


V2P2 Lower Tibia Left Y Moment

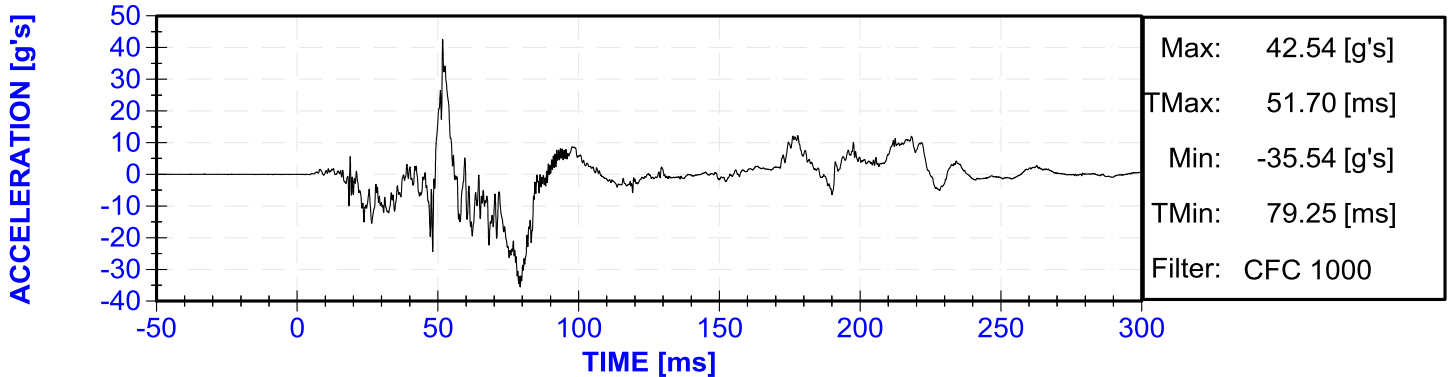




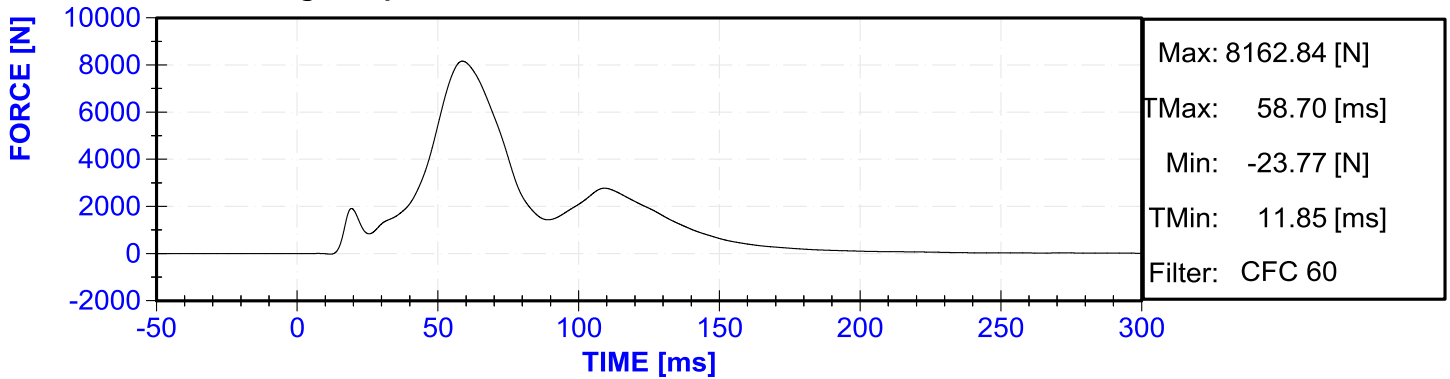




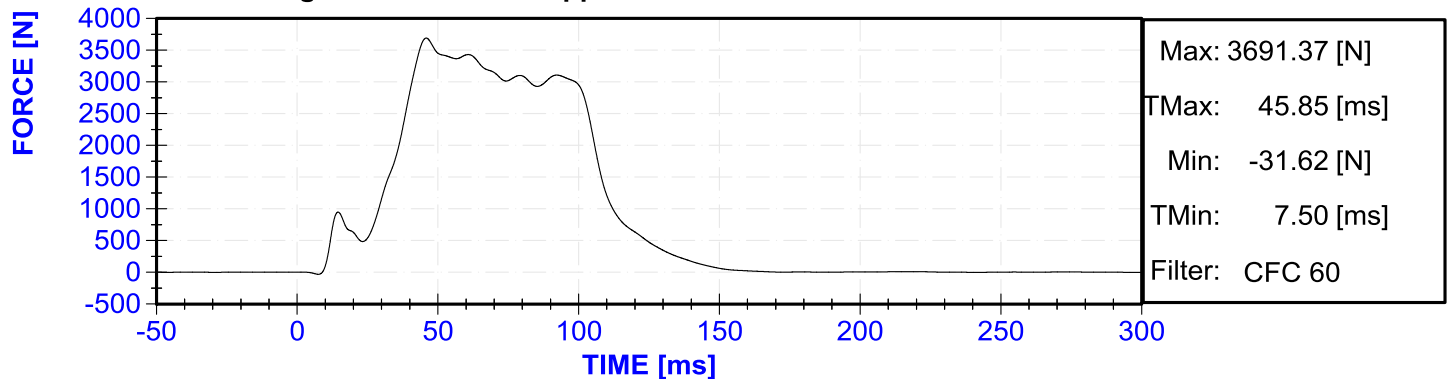
V2P2 Foot Right Z Acceleration



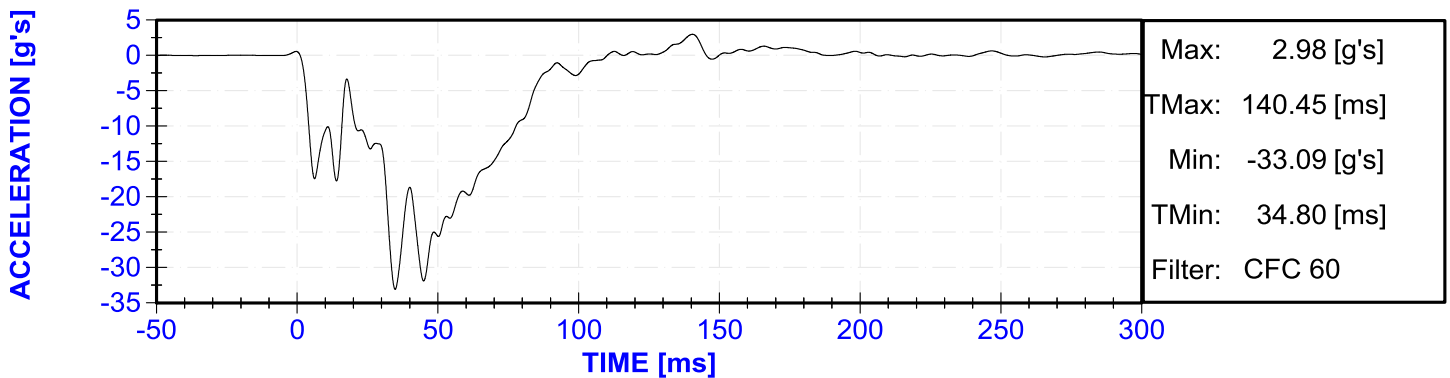
V2 Passenger Lap Belt Force

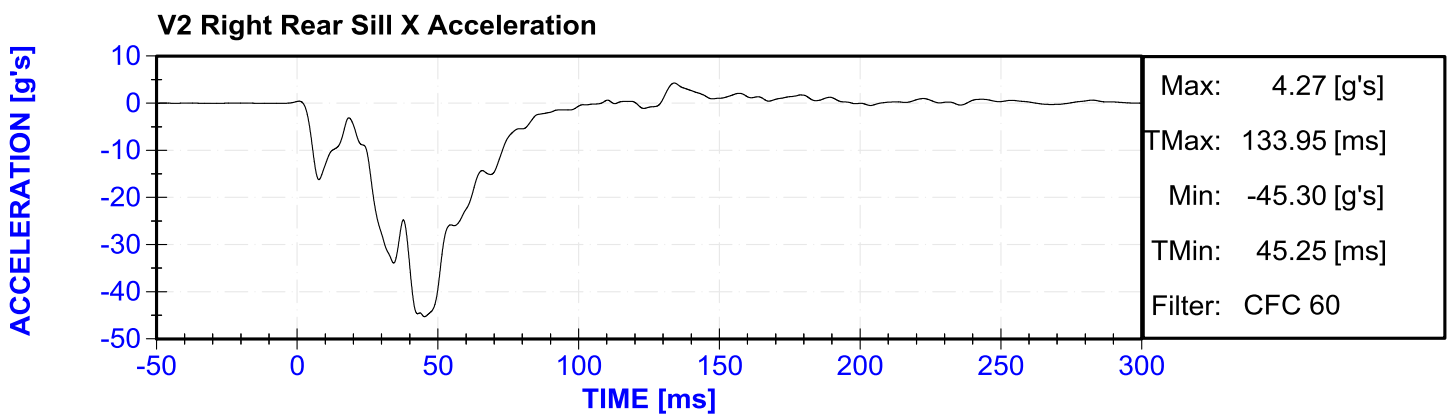
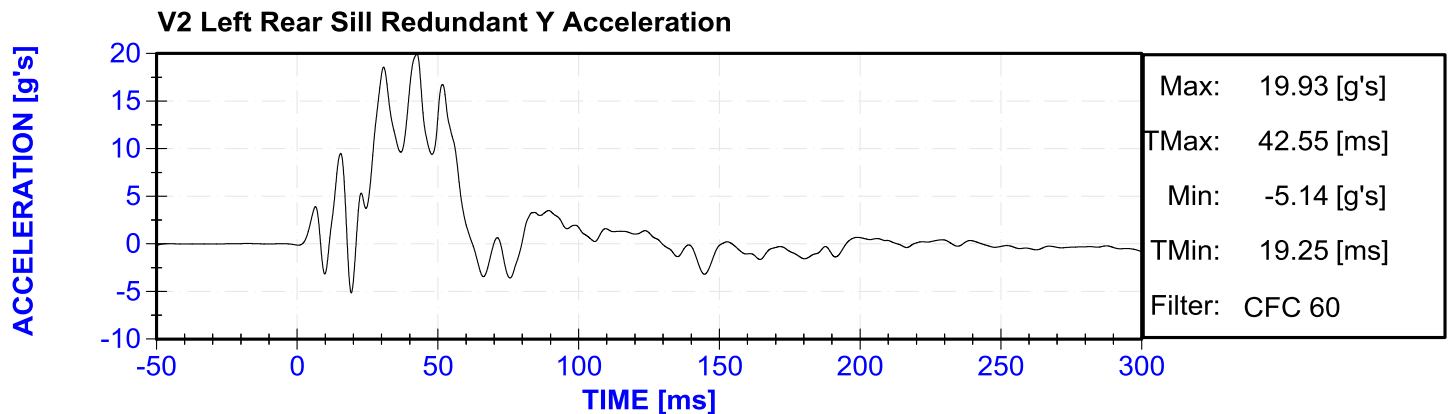
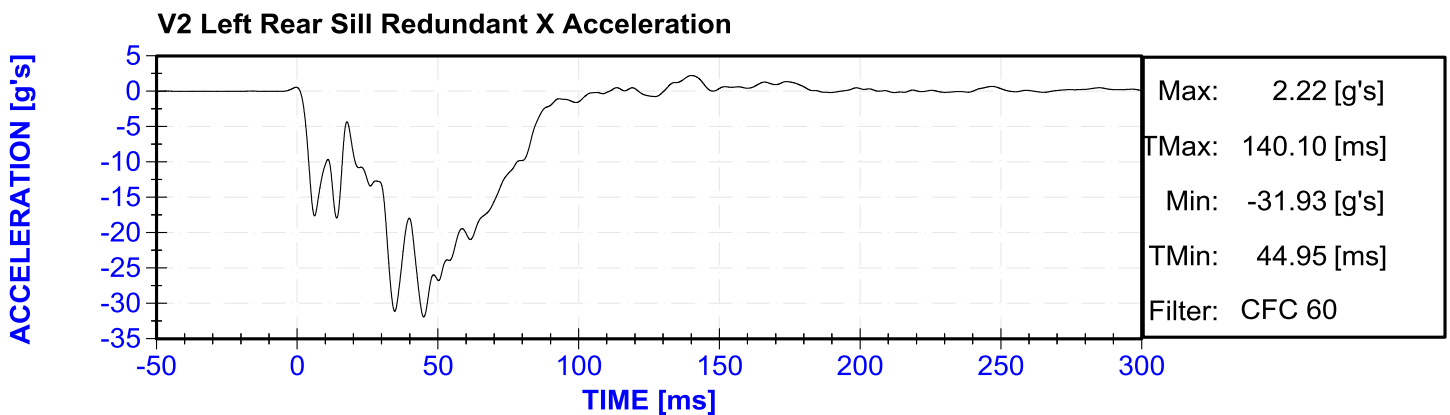
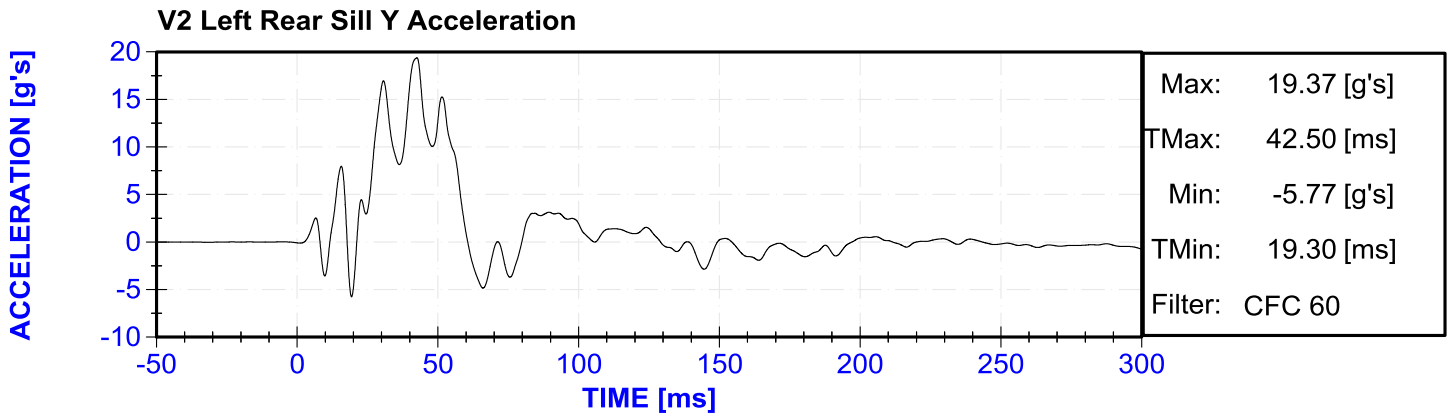


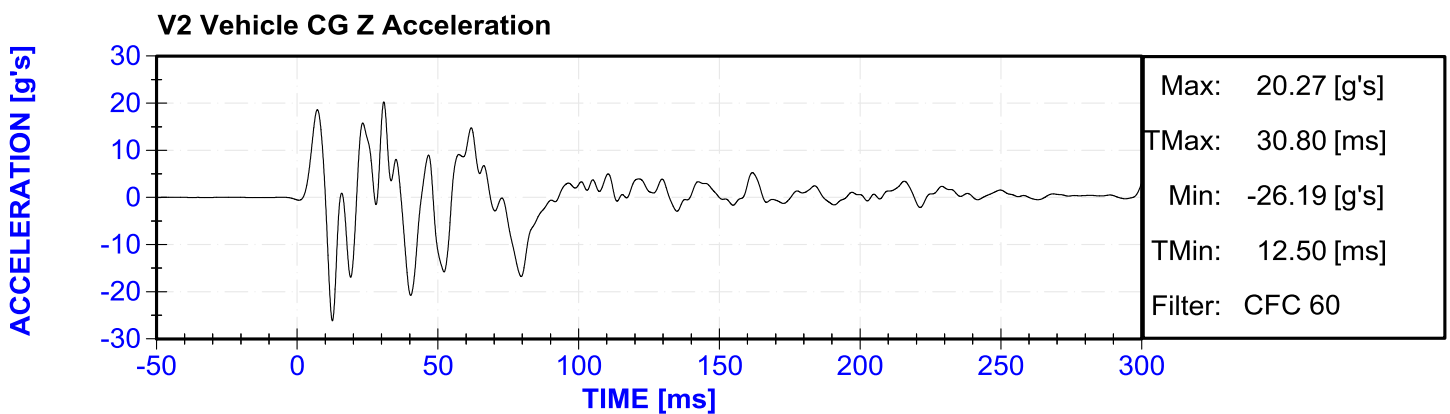
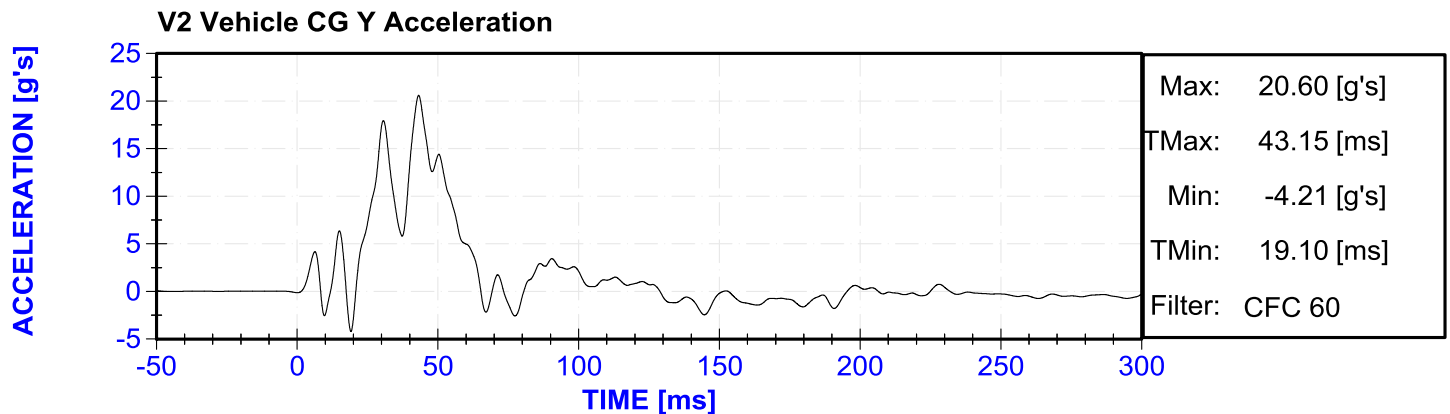
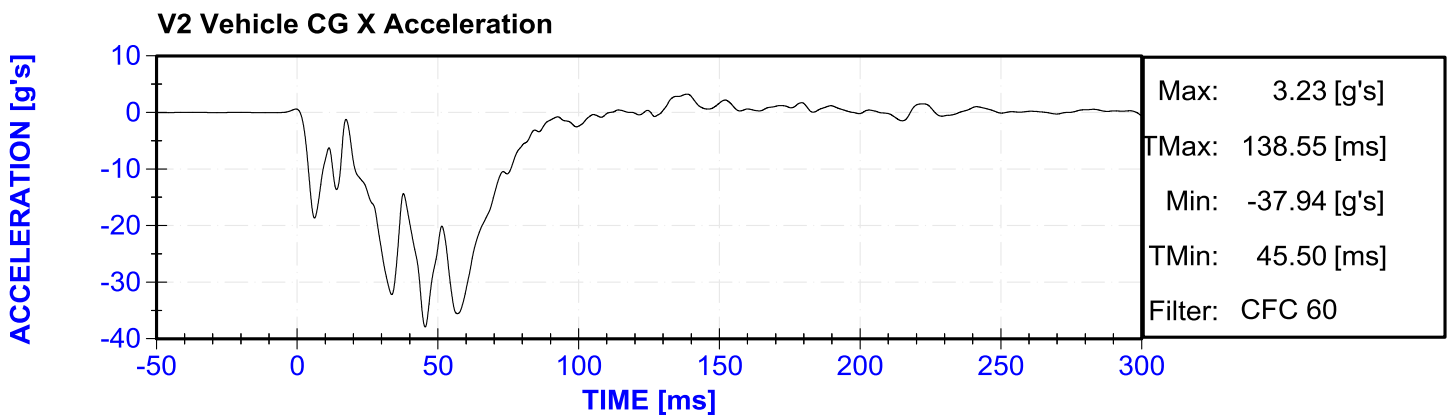
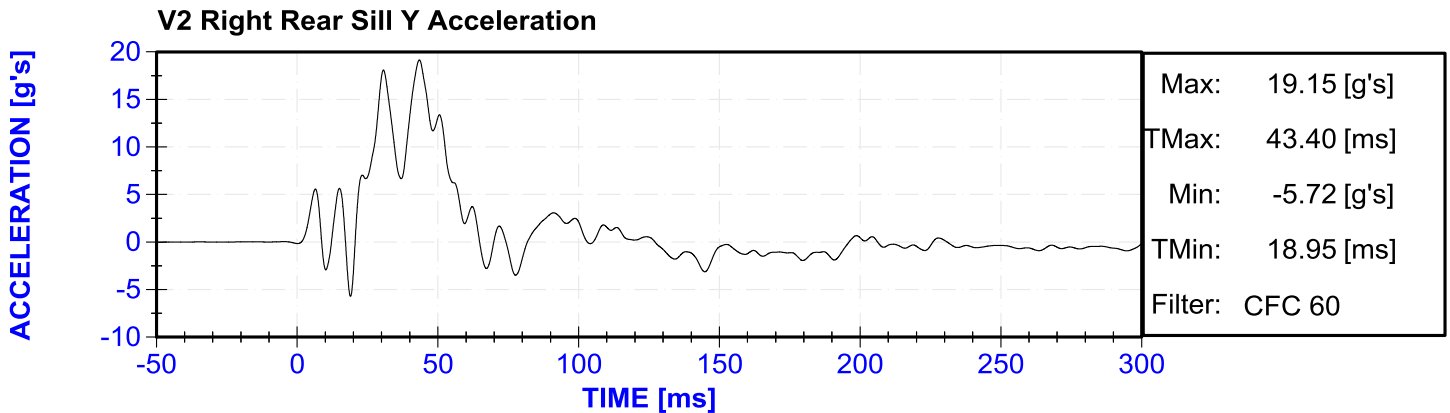
V2 Passenger Shoulder Belt Upper Force

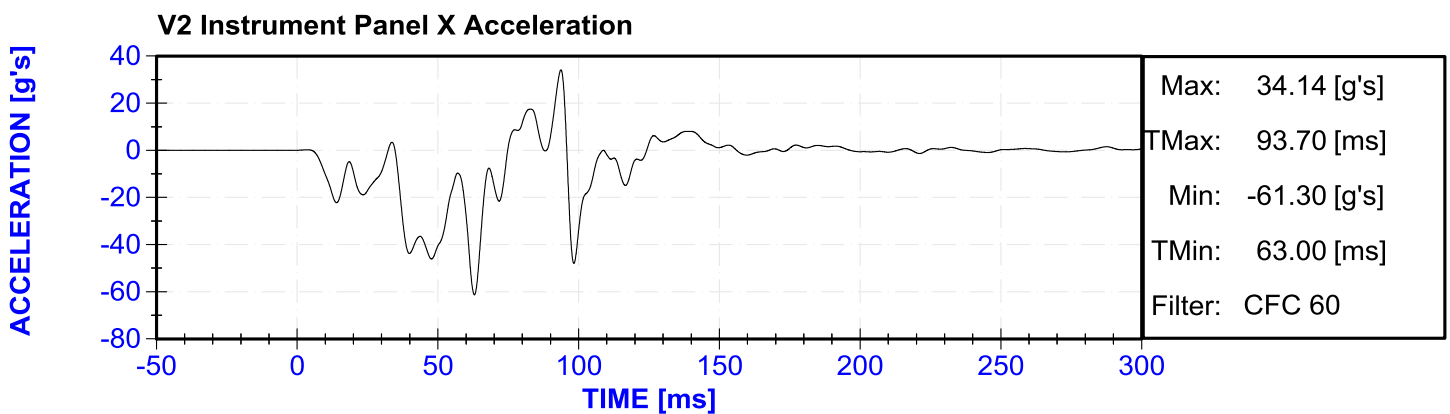
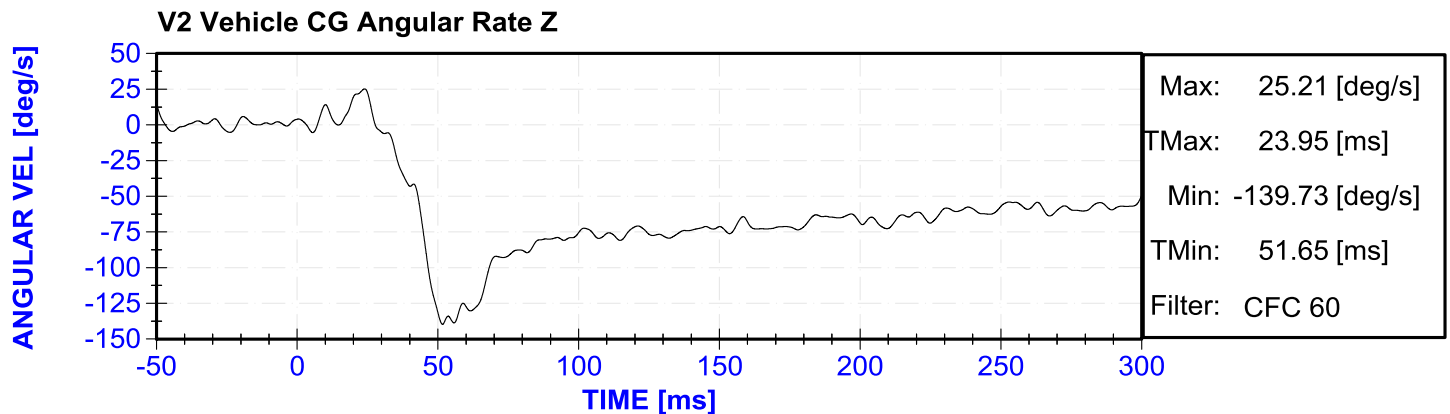
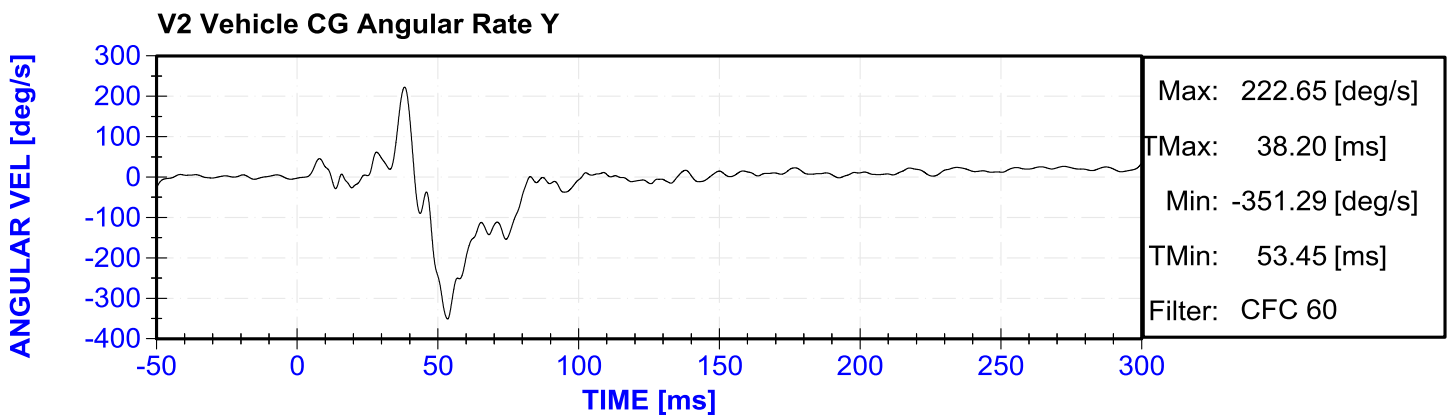
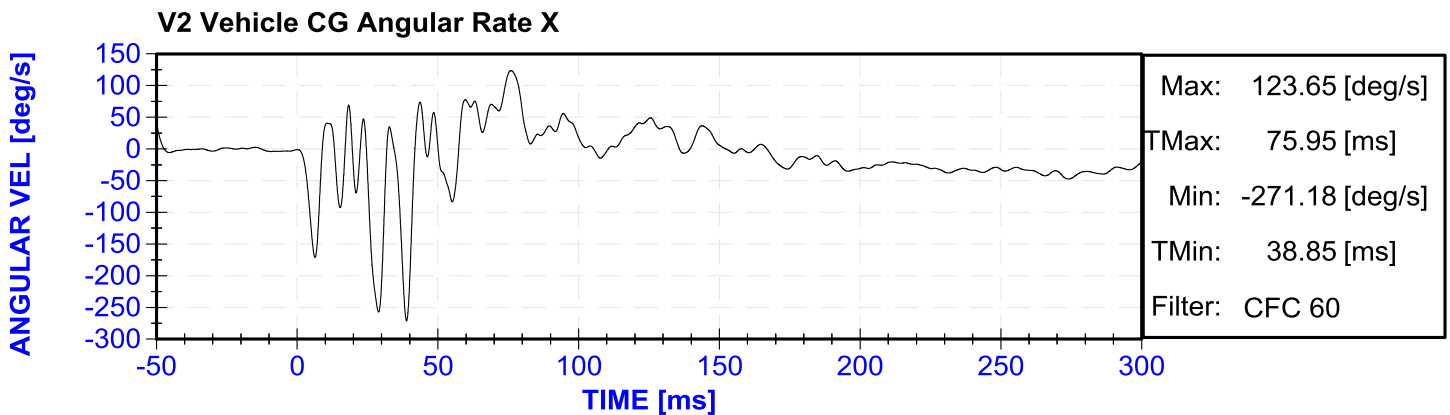


V2 Left Rear Sill X Acceleration

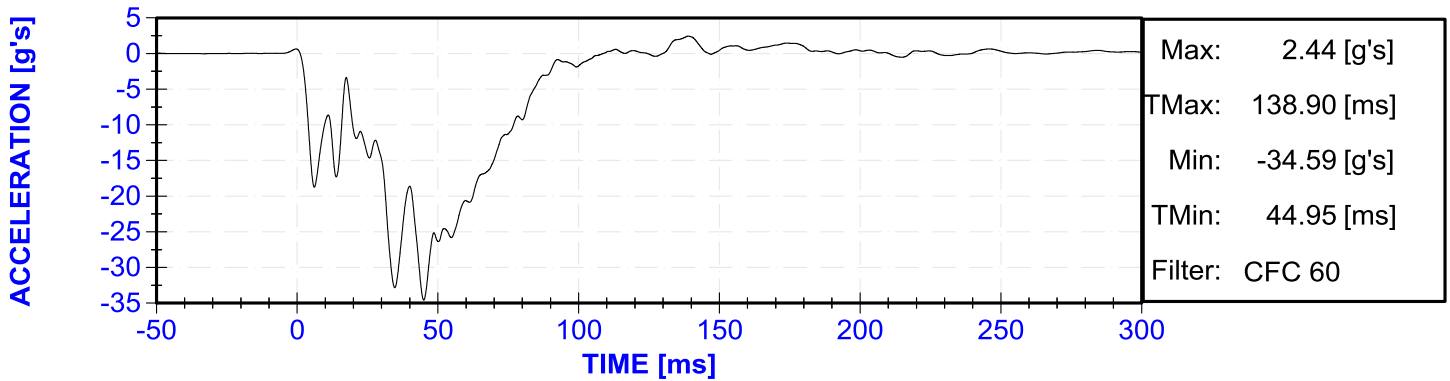




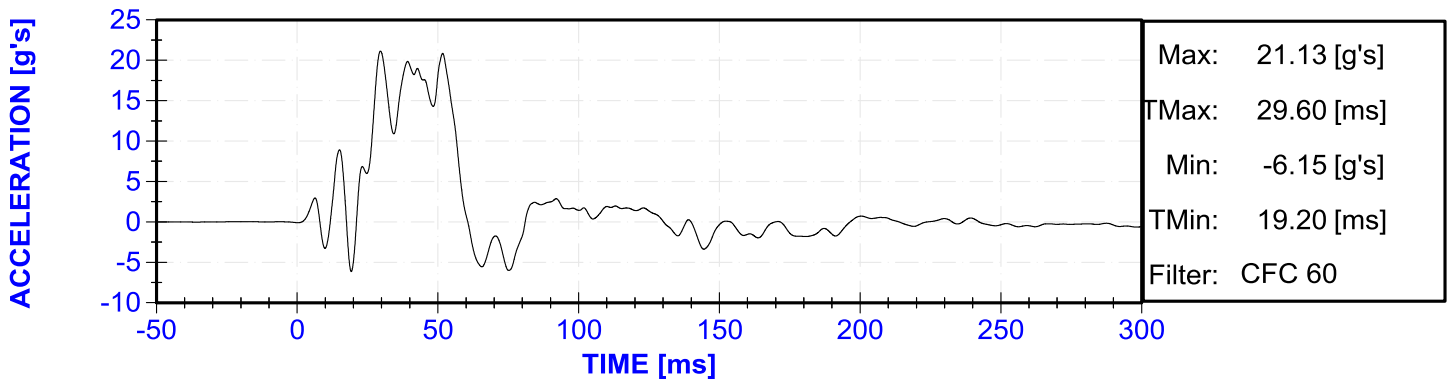




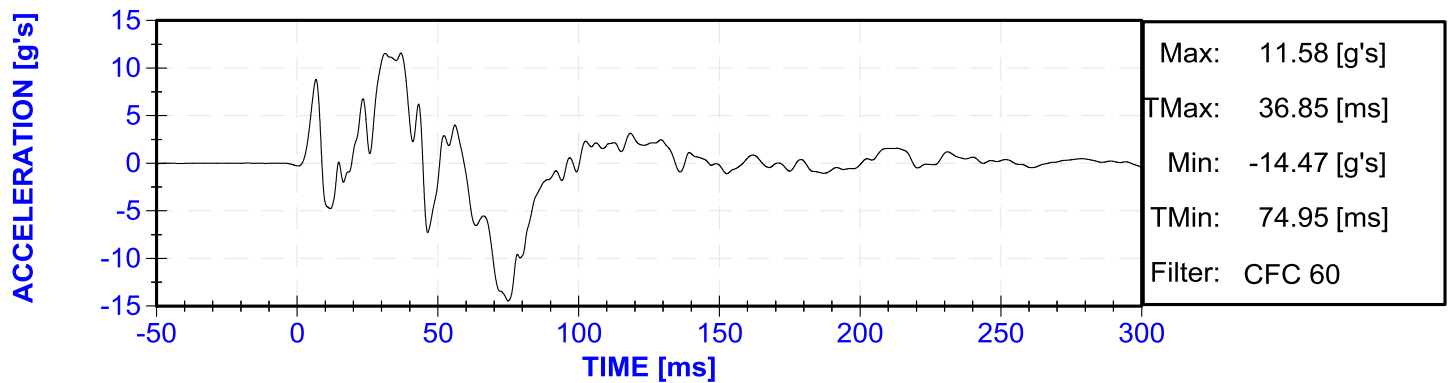
V2 Driver Seat Track X Acceleration



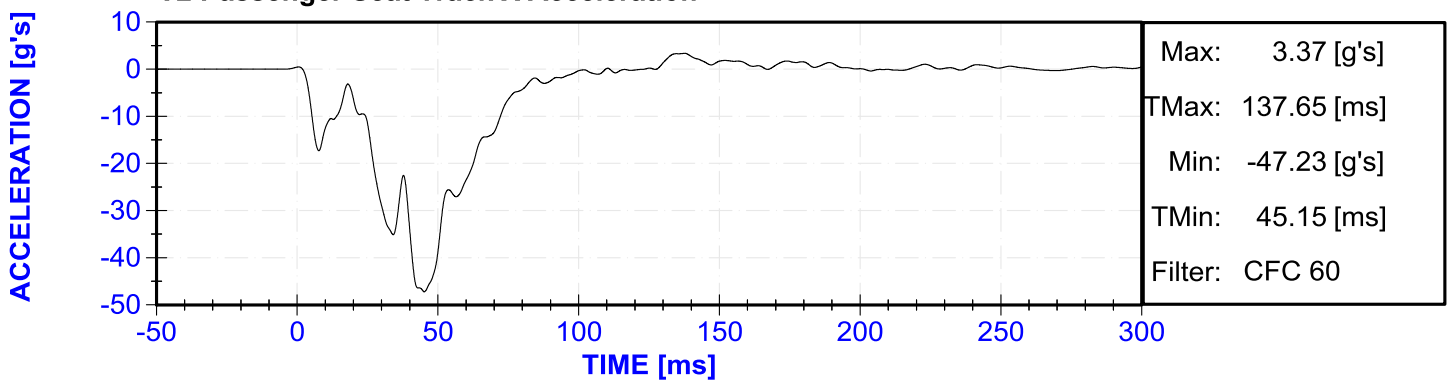
V2 Driver Seat Track Y Acceleration



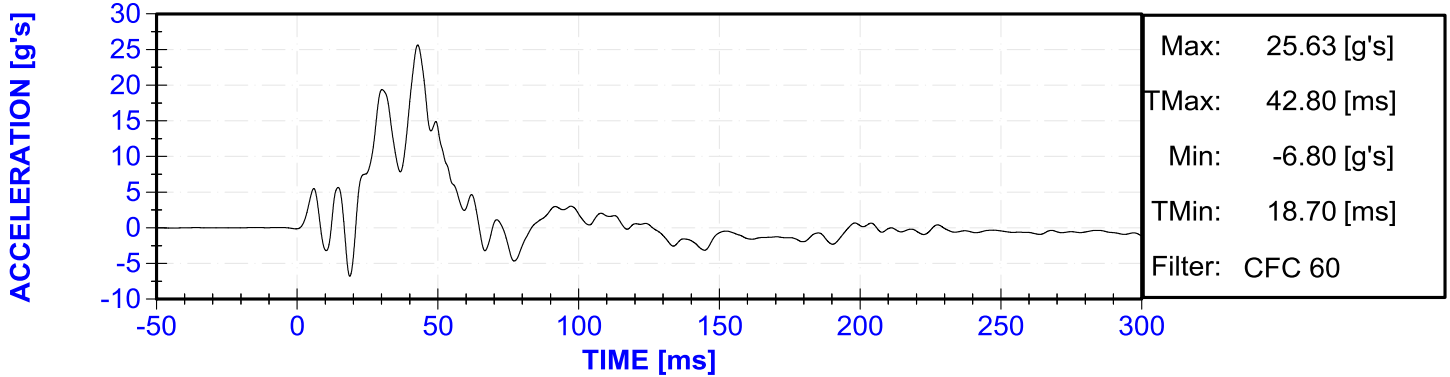
V2 Driver Seat Track Z Acceleration



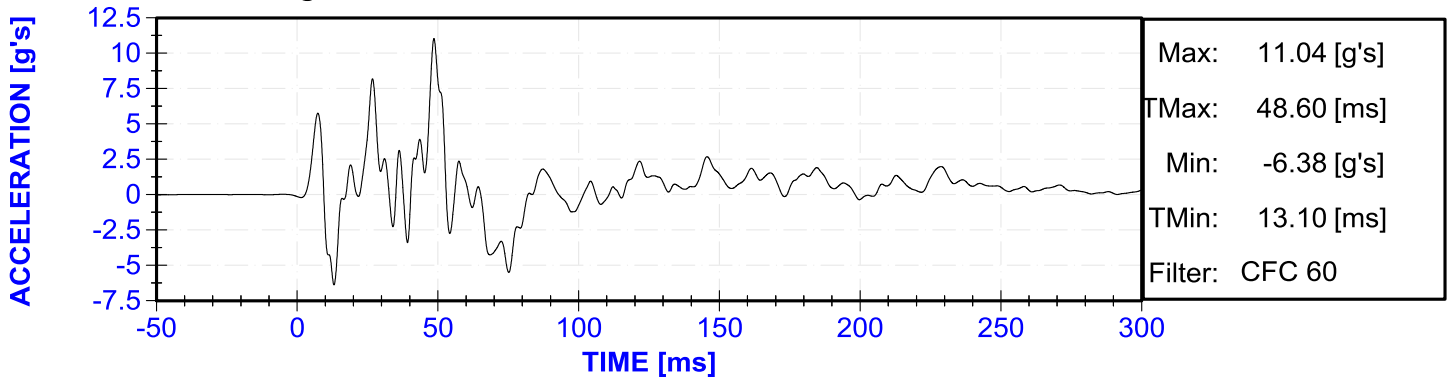
V2 Passenger Seat Track X Acceleration



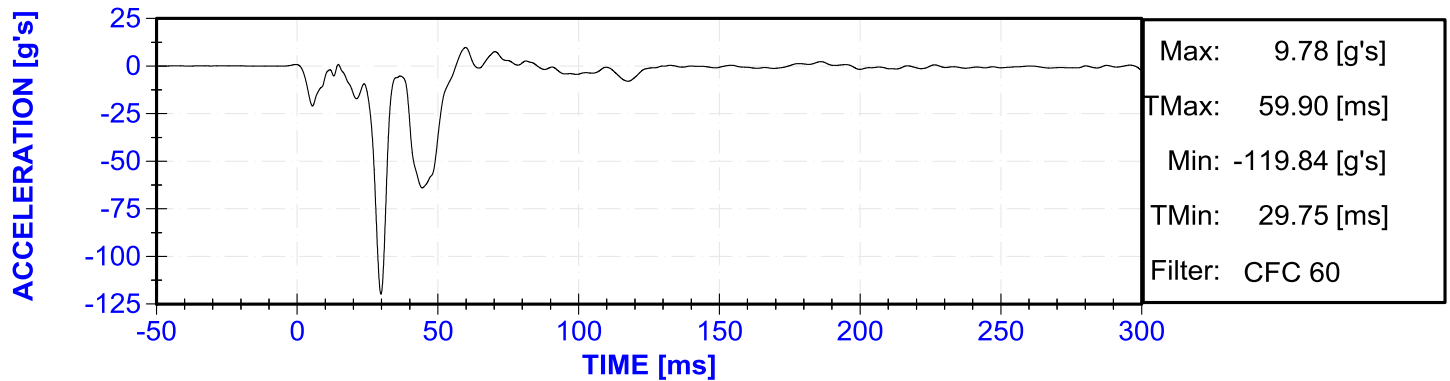
V2 Passenger Seat Track Y Acceleration



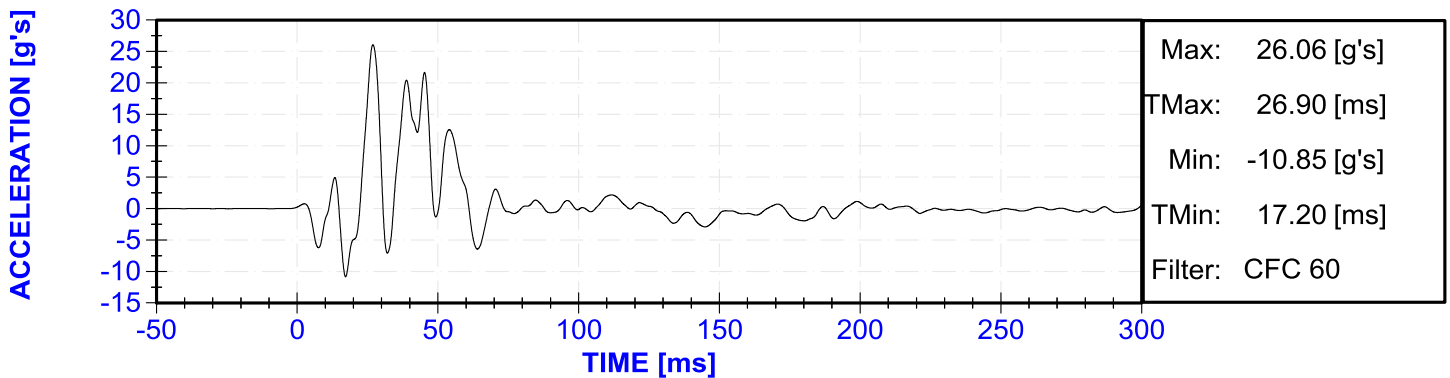
V2 Passenger Seat Track Z Acceleration



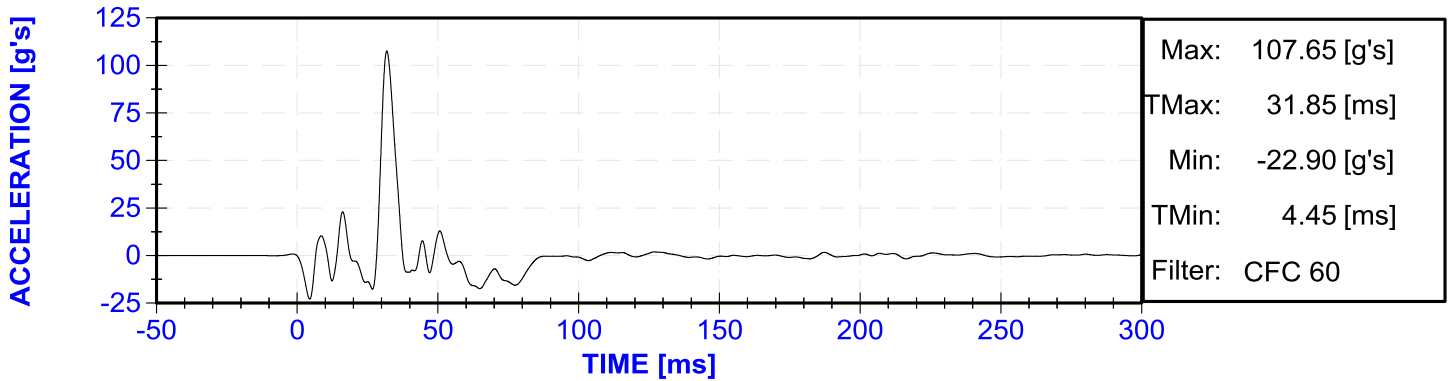
V2 Driver Floor Pan X Acceleration



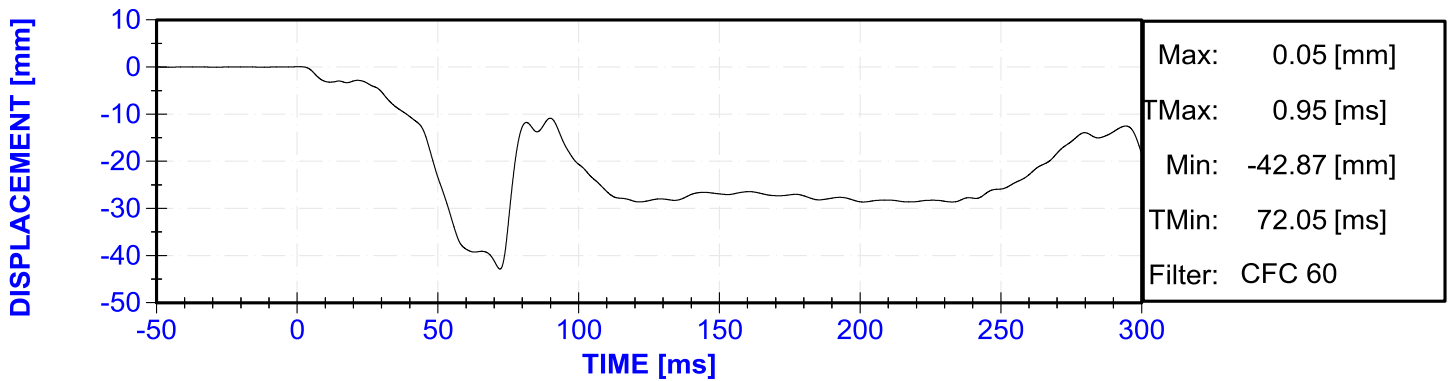
V2 Driver Floor Pan Y Acceleration



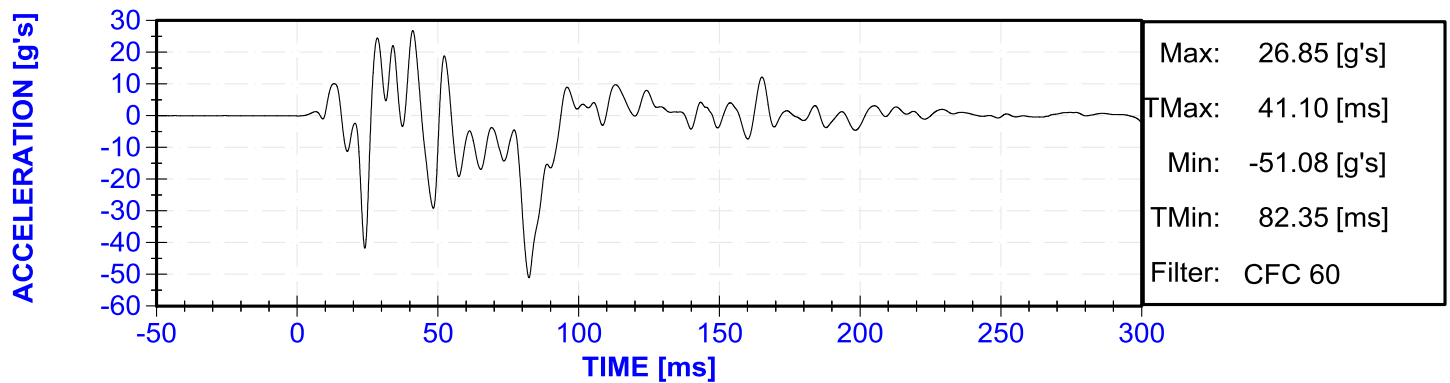
V2 Driver Floor Pan Z Acceleration



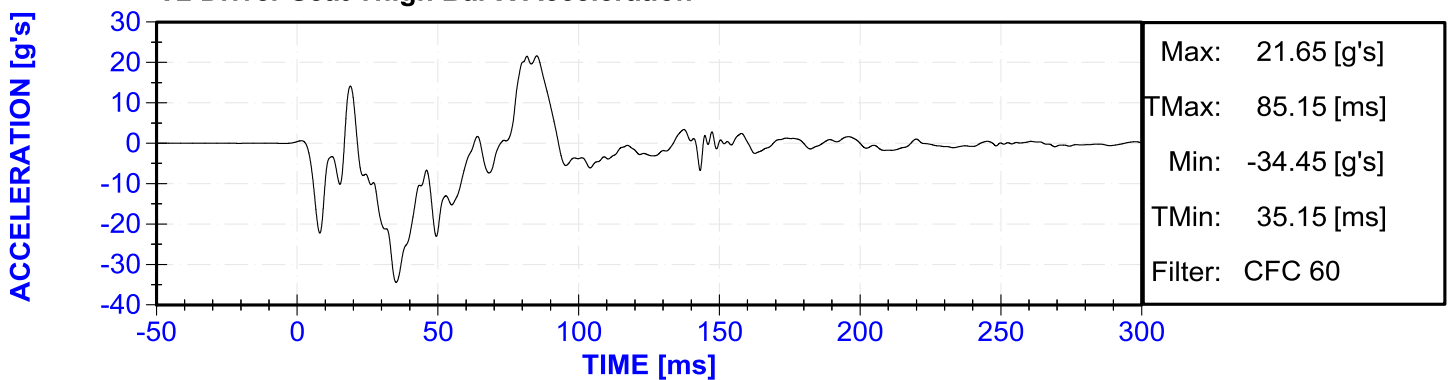
V2 Driver Floor Pan X Deflection

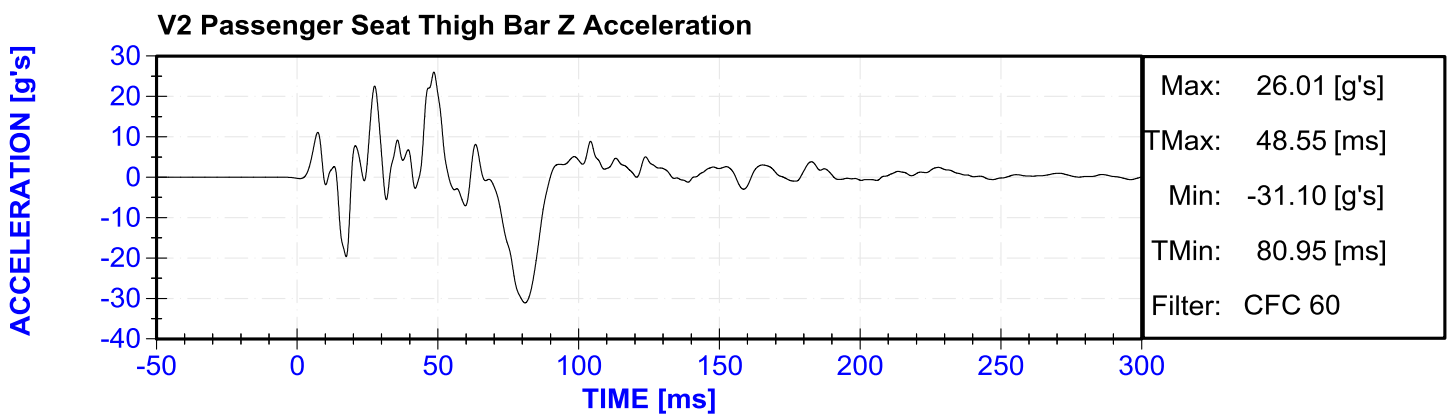
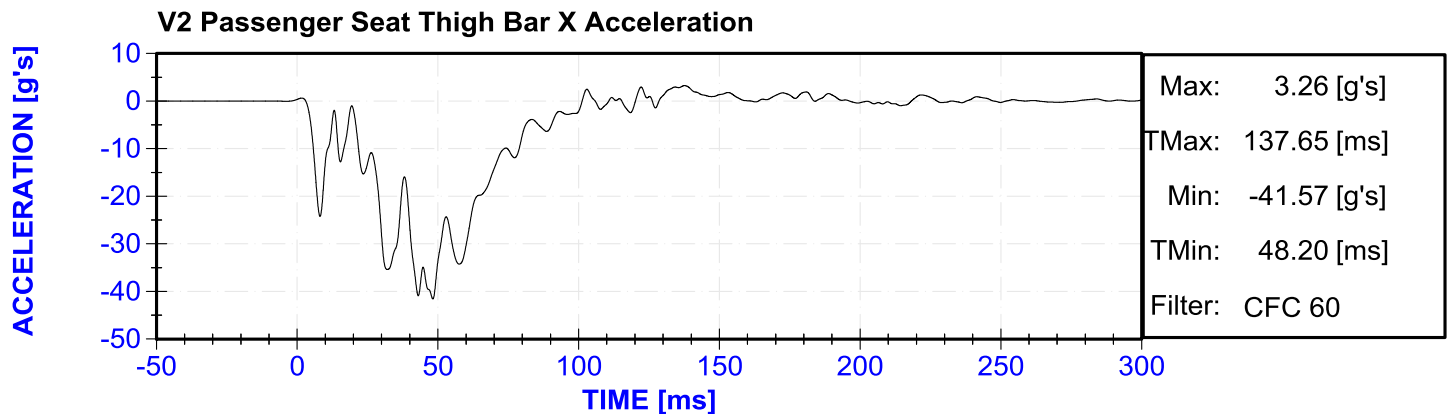
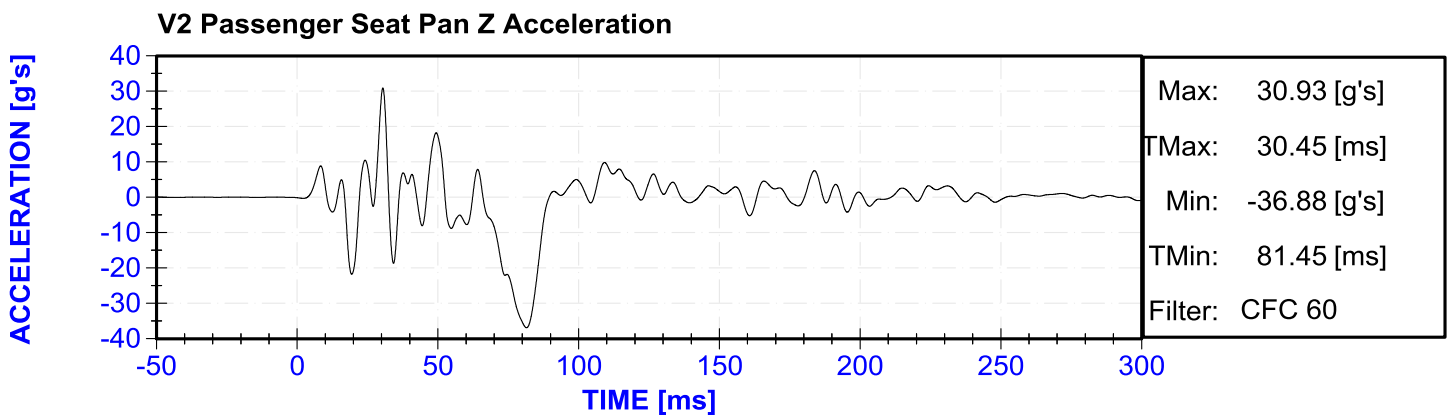
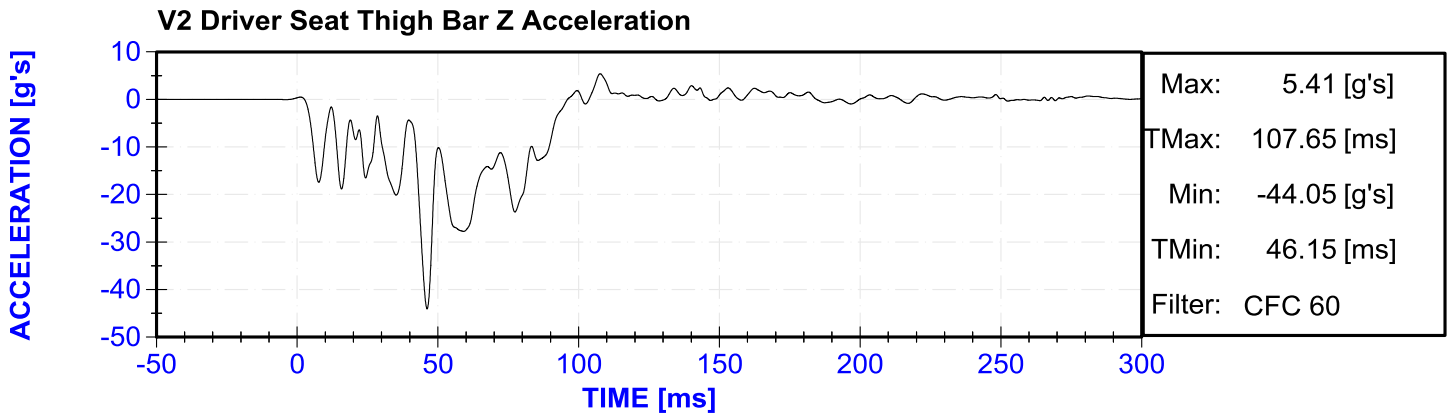


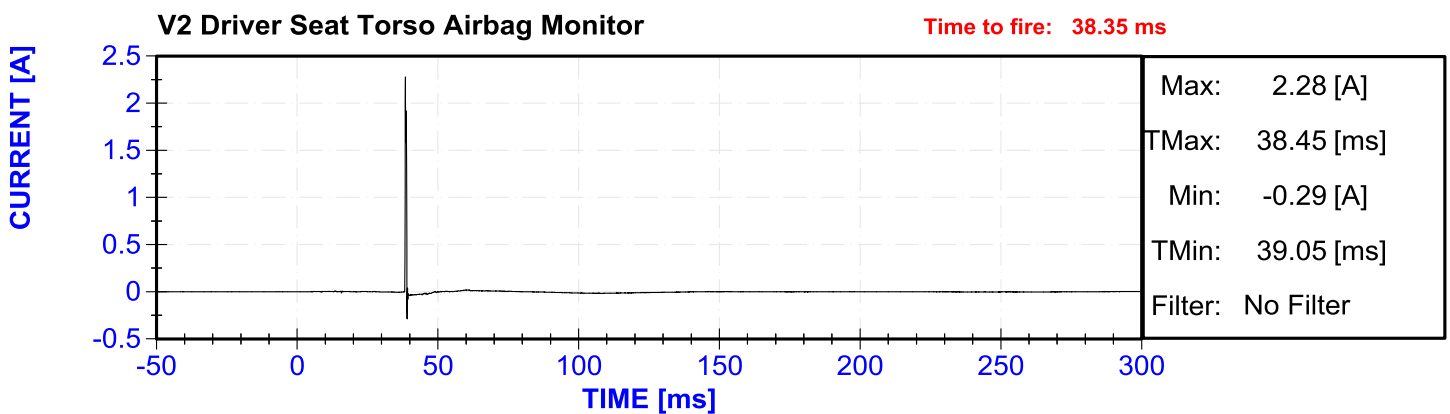
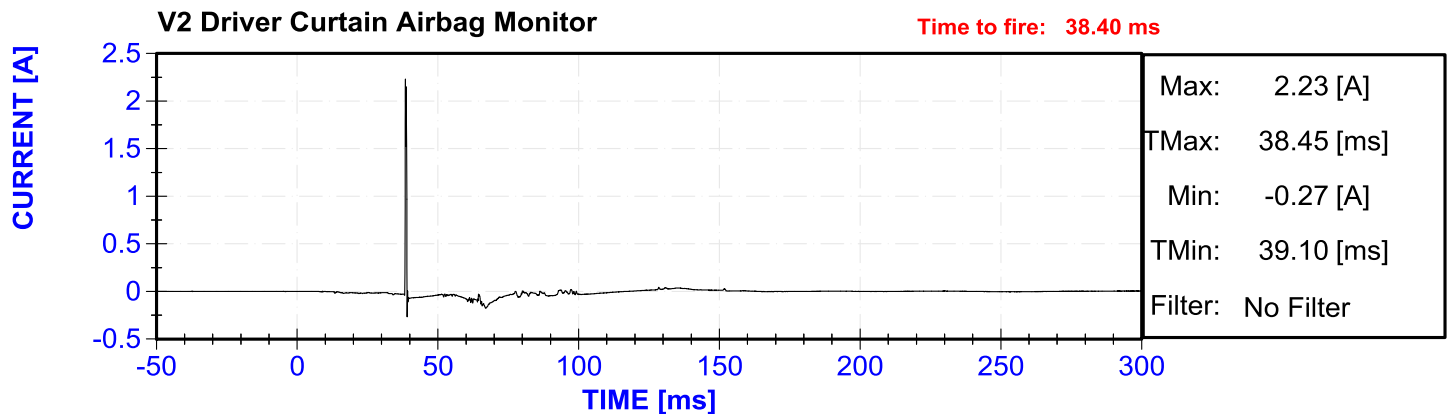
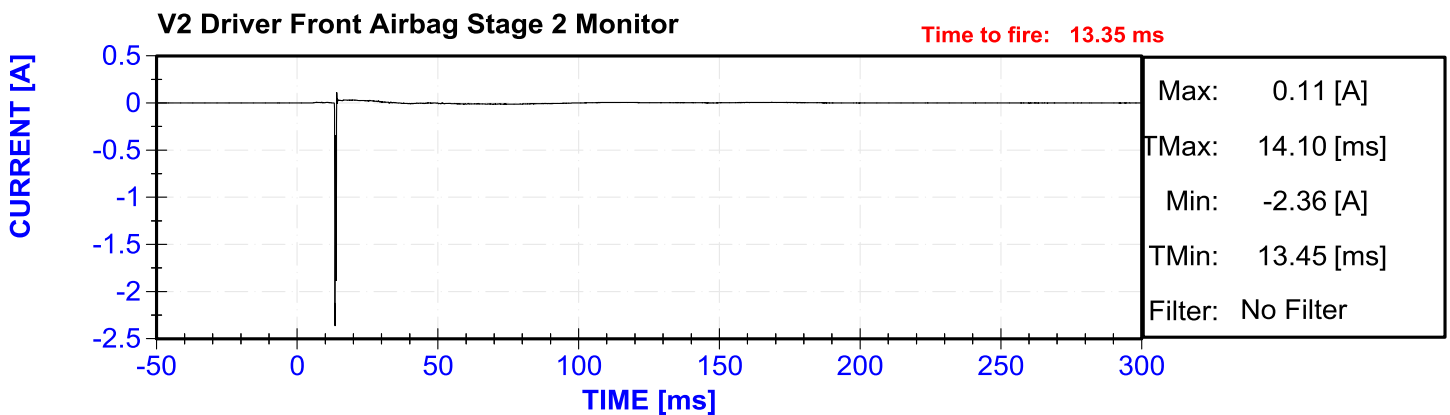
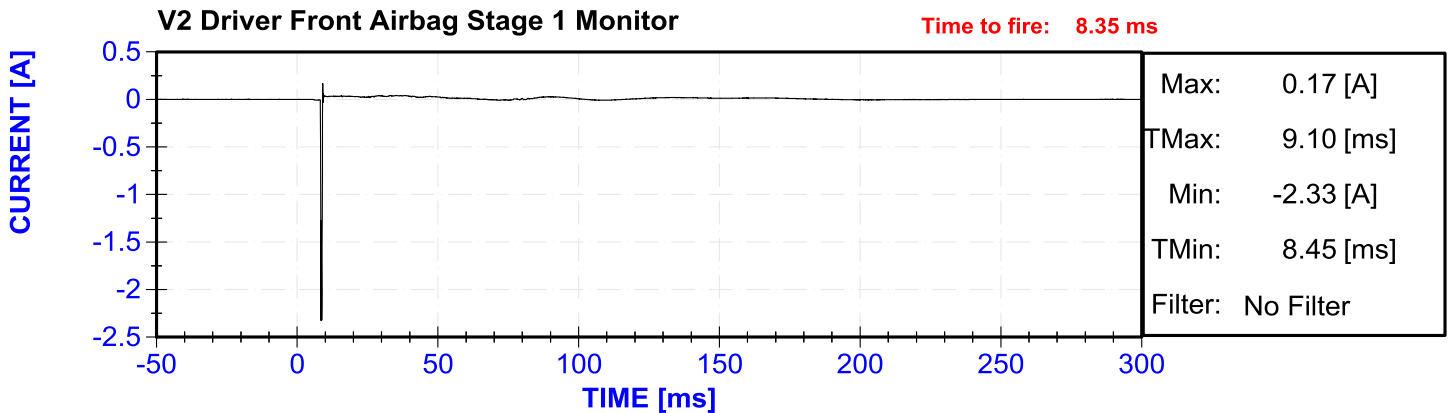
V2 Driver Seat Pan Z Acceleration

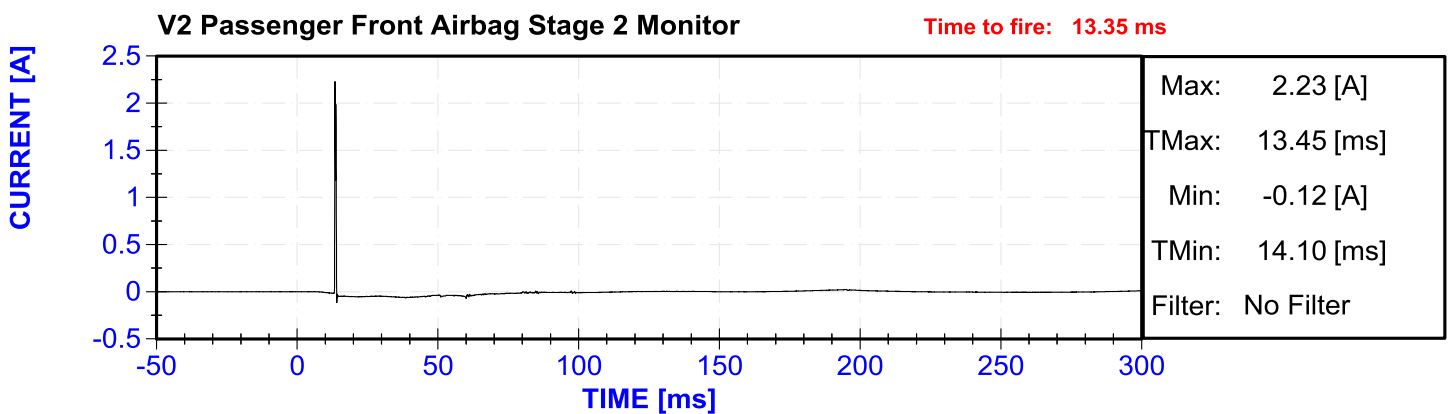
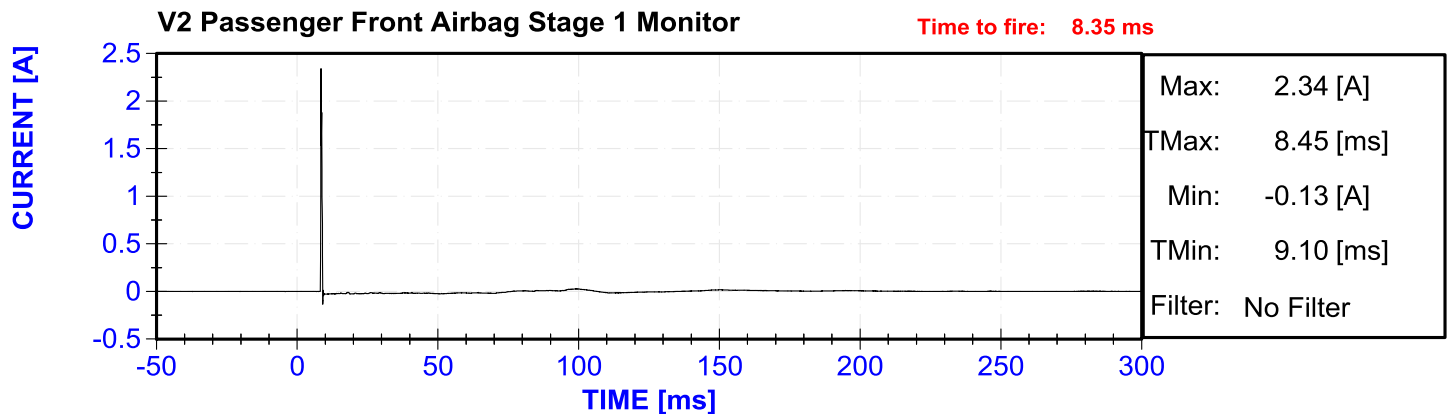
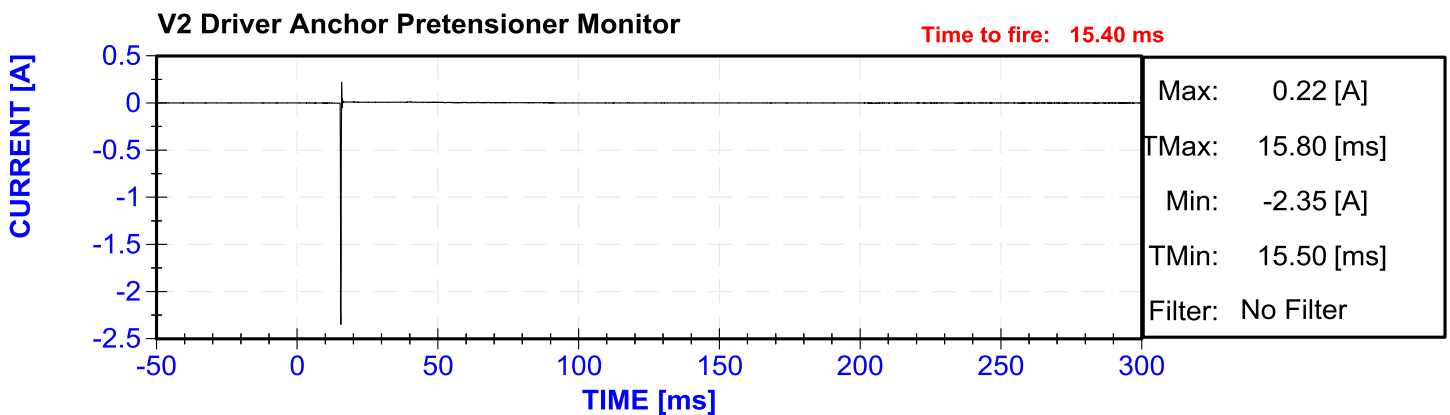
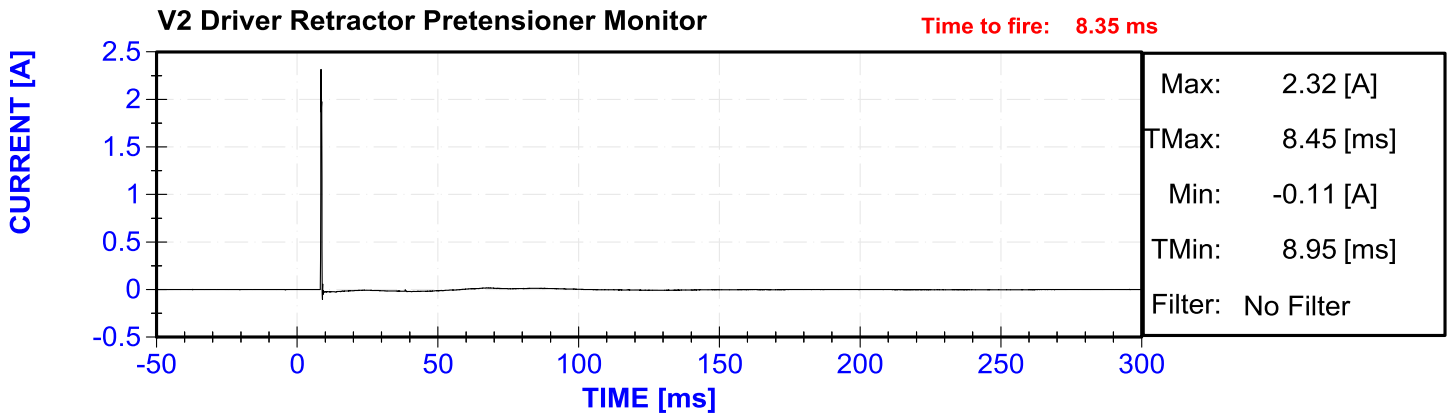


V2 Driver Seat Thigh Bar X Acceleration



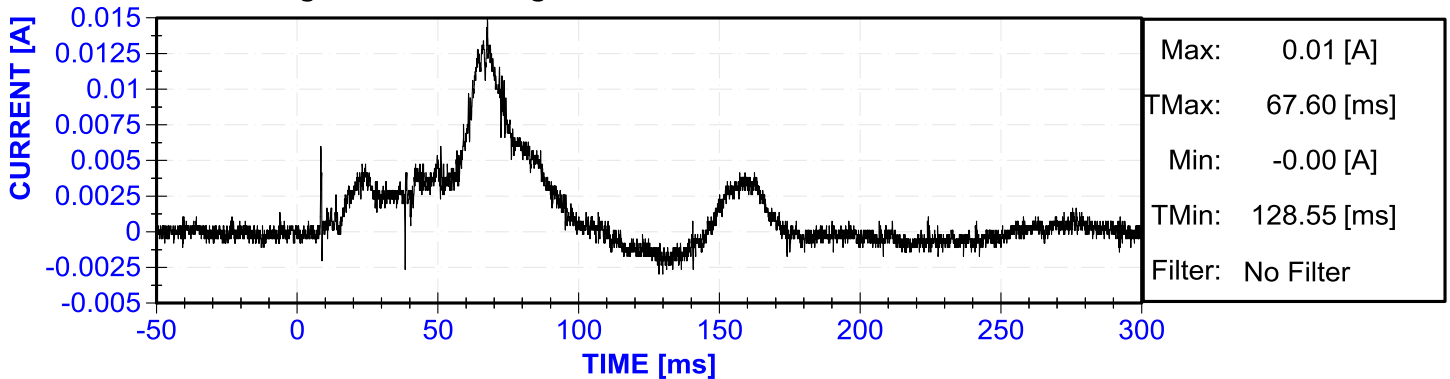






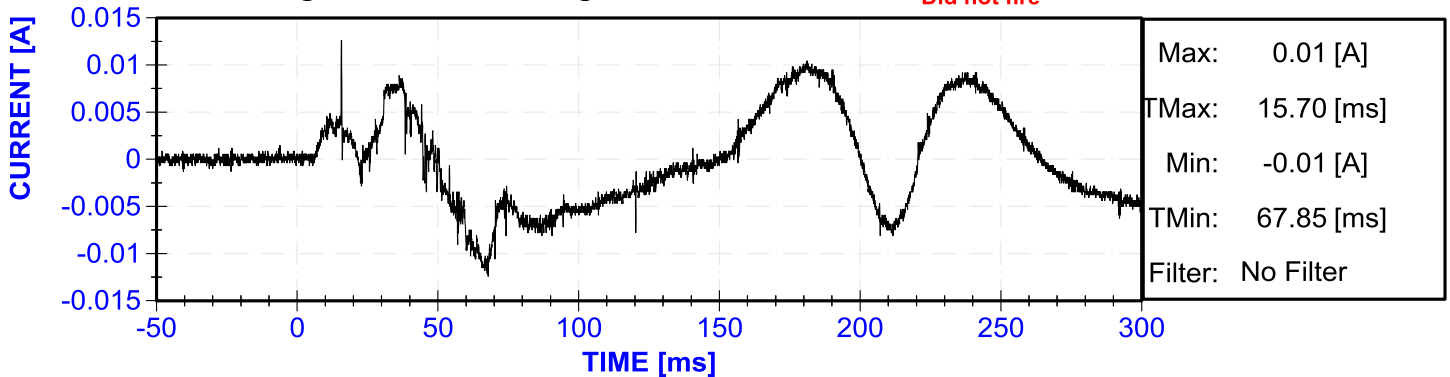
V2 Passenger Curtain Airbag Monitor

Did not fire



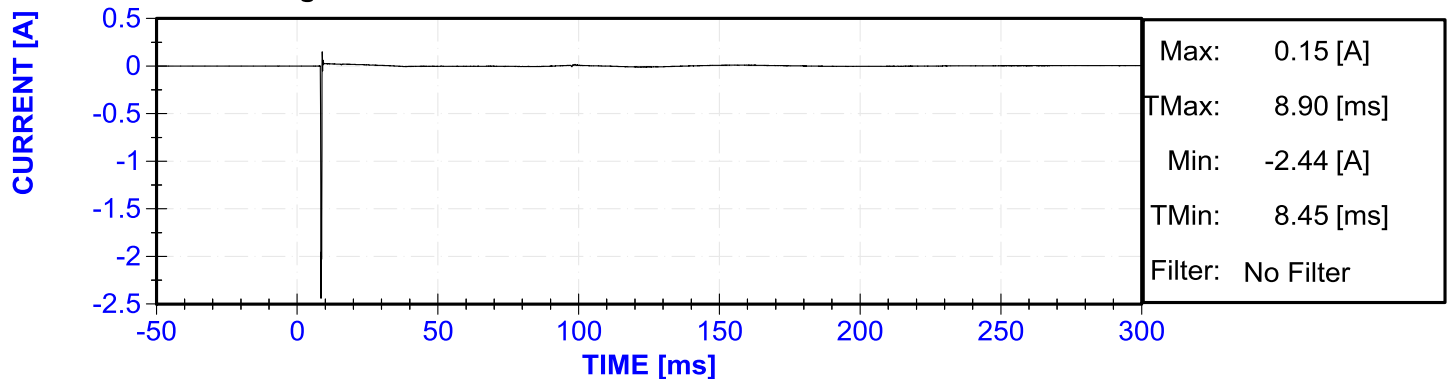
V2 Passenger Seat Torso Airbag Monitor

Did not fire



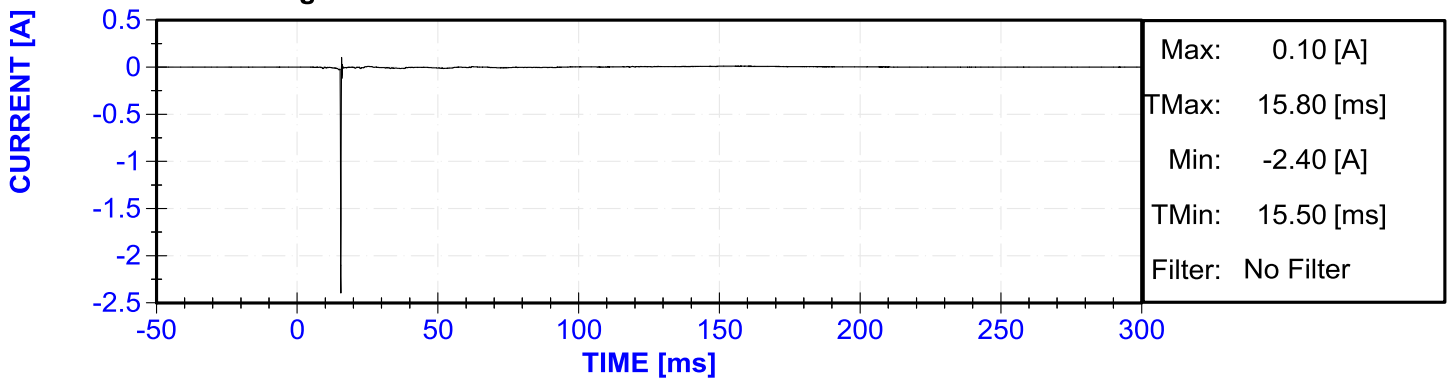
V2 Passenger Retractor Pretensioner Monitor

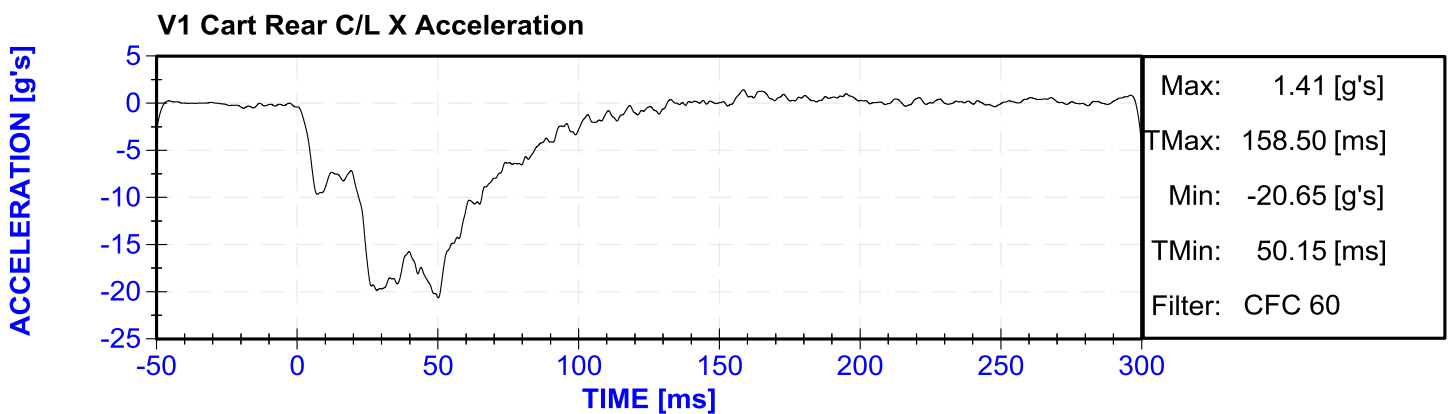
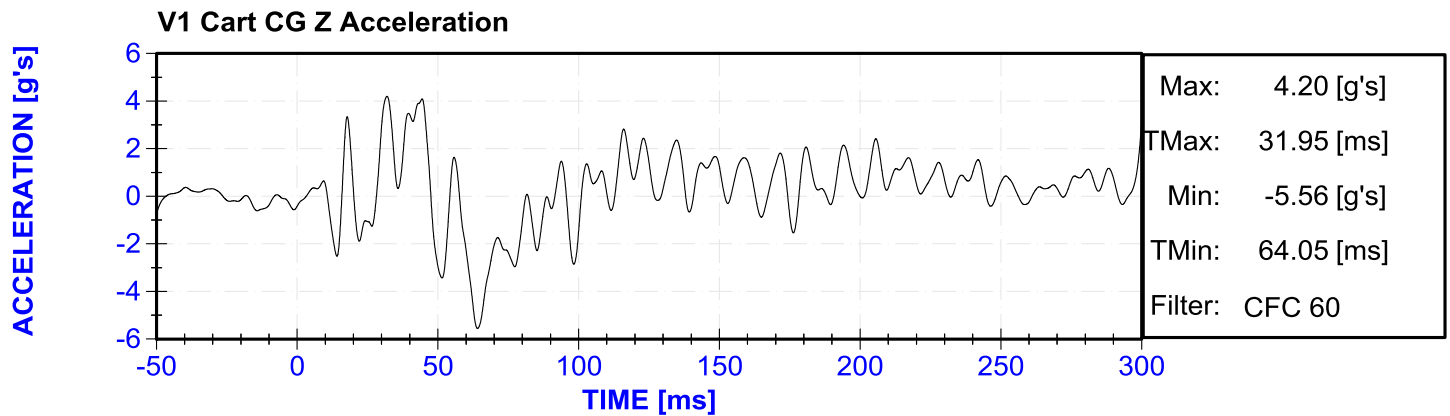
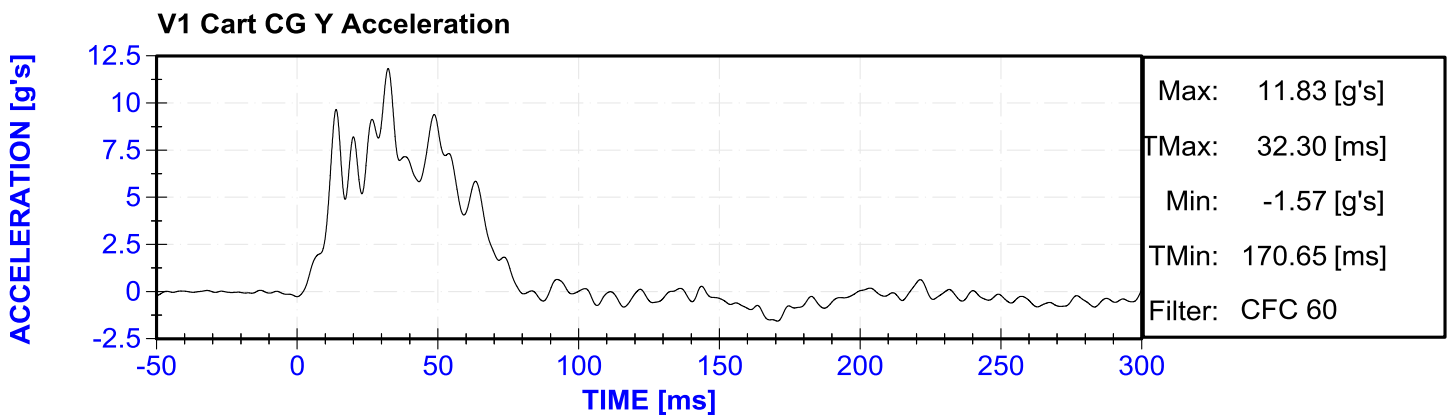
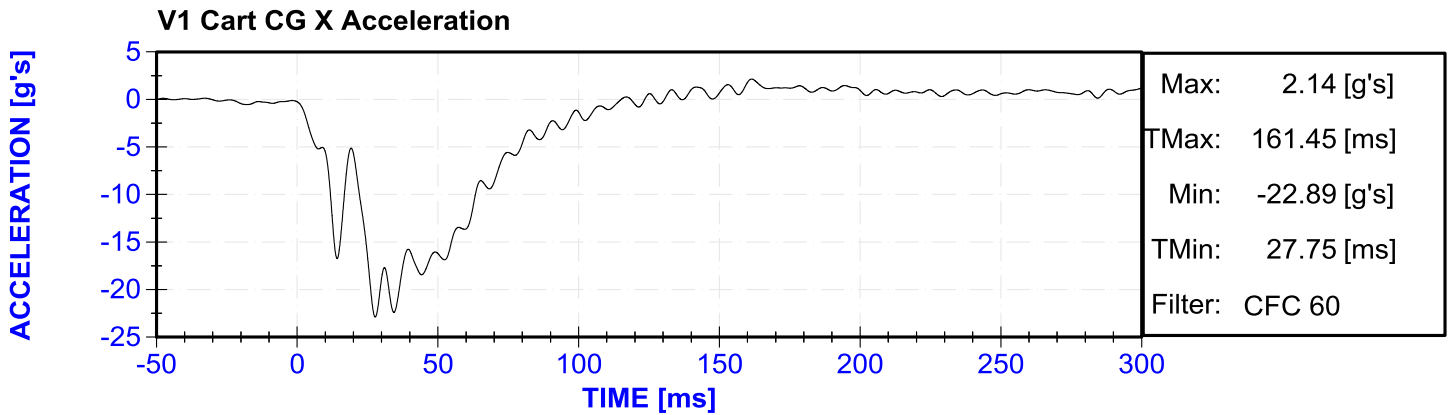
Time to fire: 8.35 ms

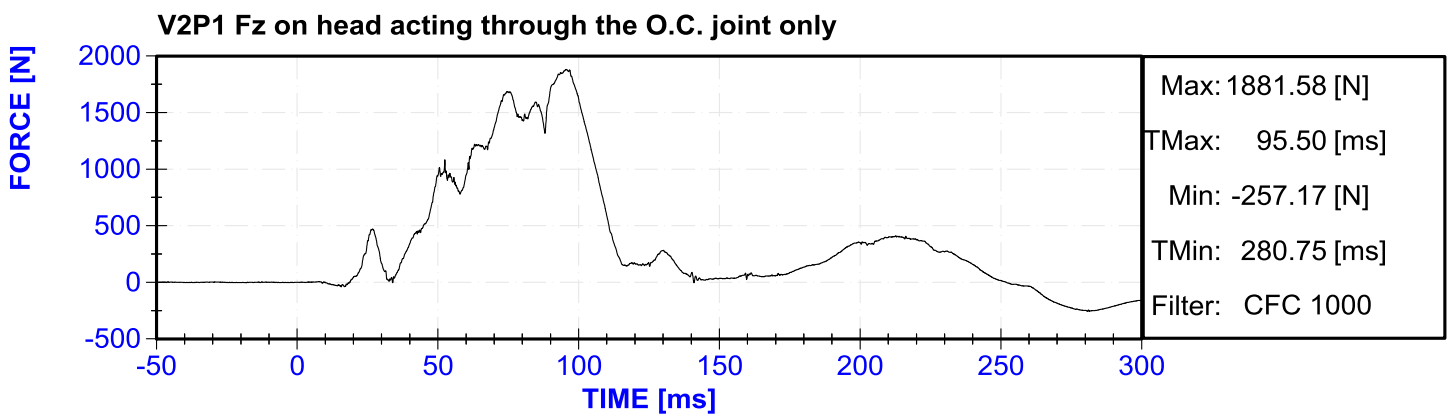
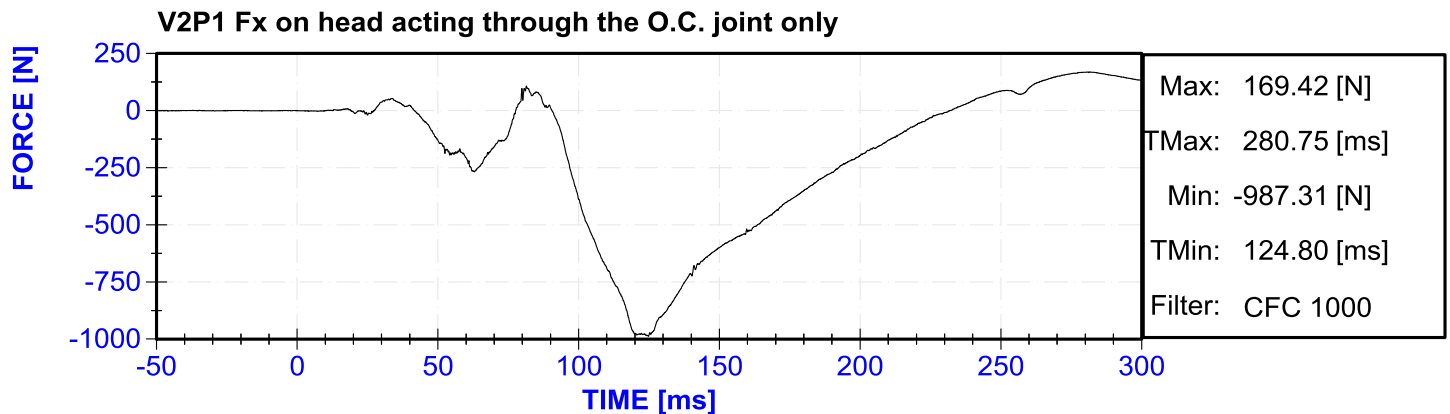
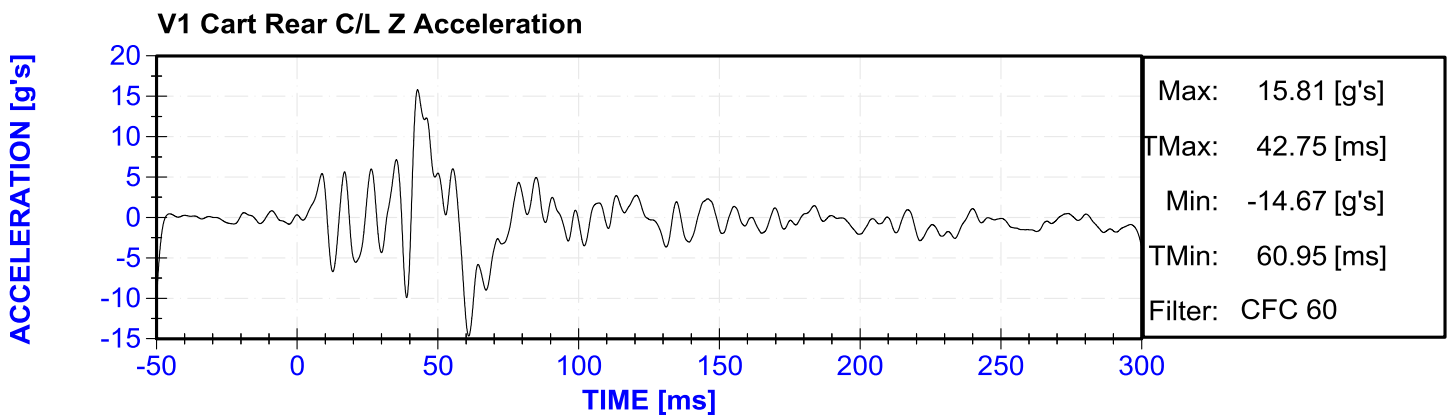
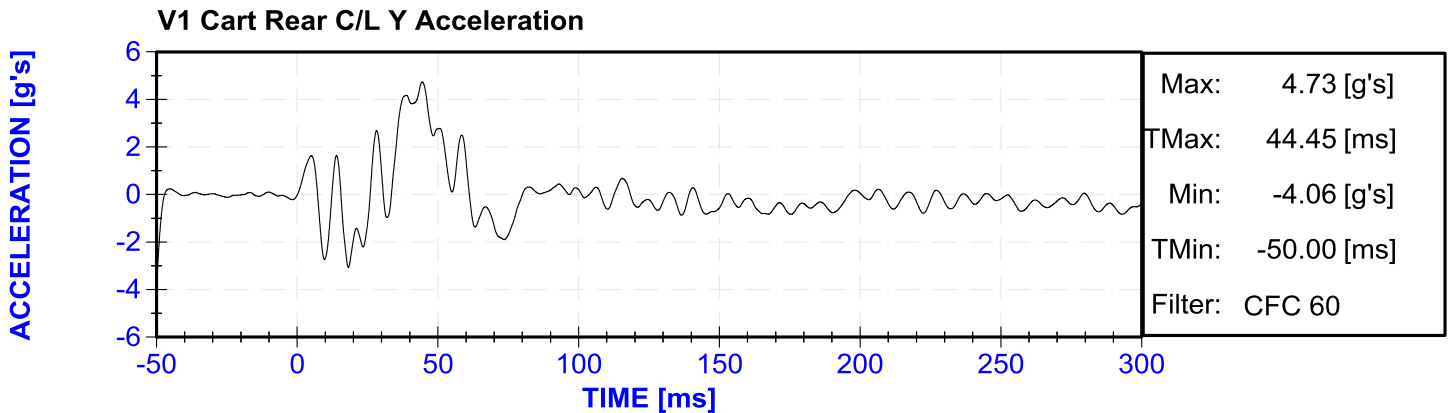


V2 Passenger Anchor Pretensioner Monitor

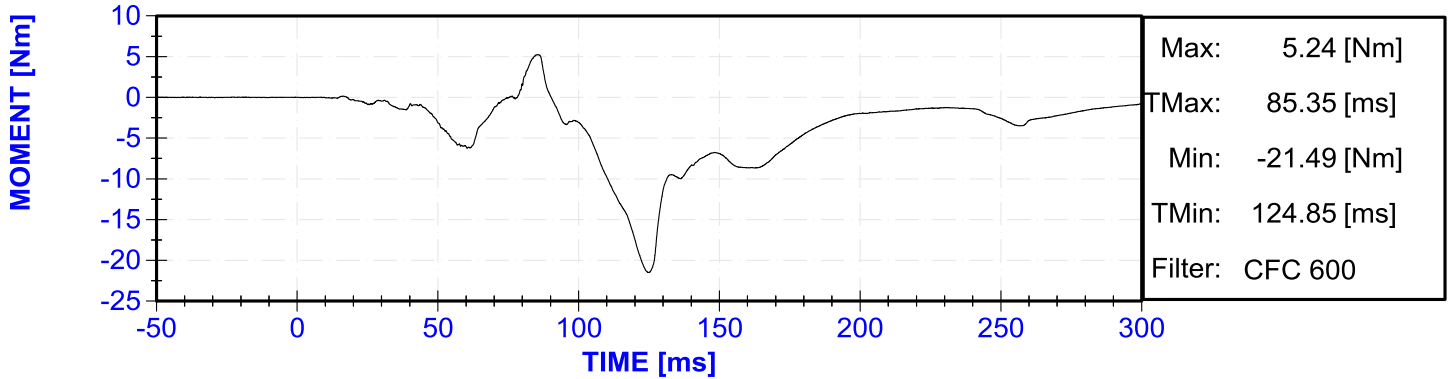
Time to fire: 15.40 ms



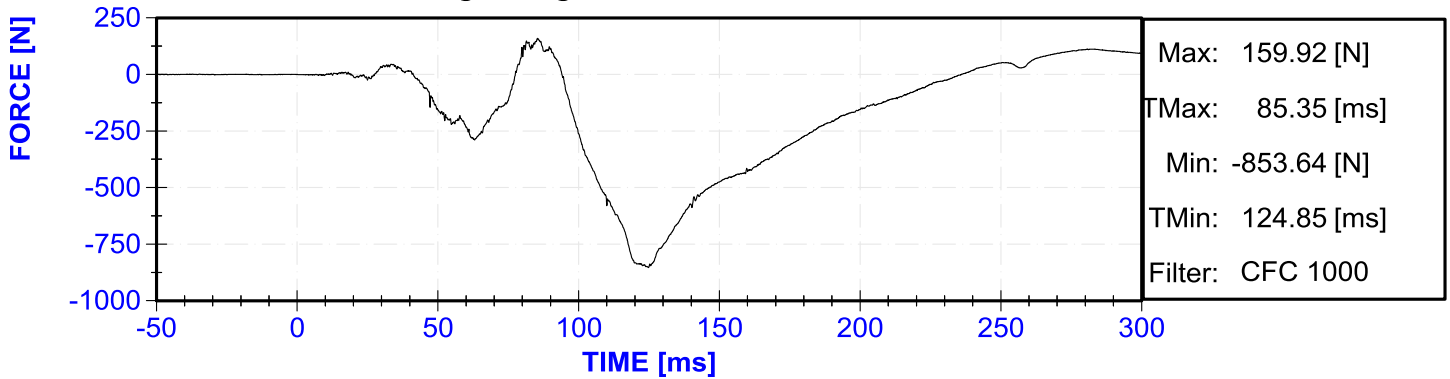




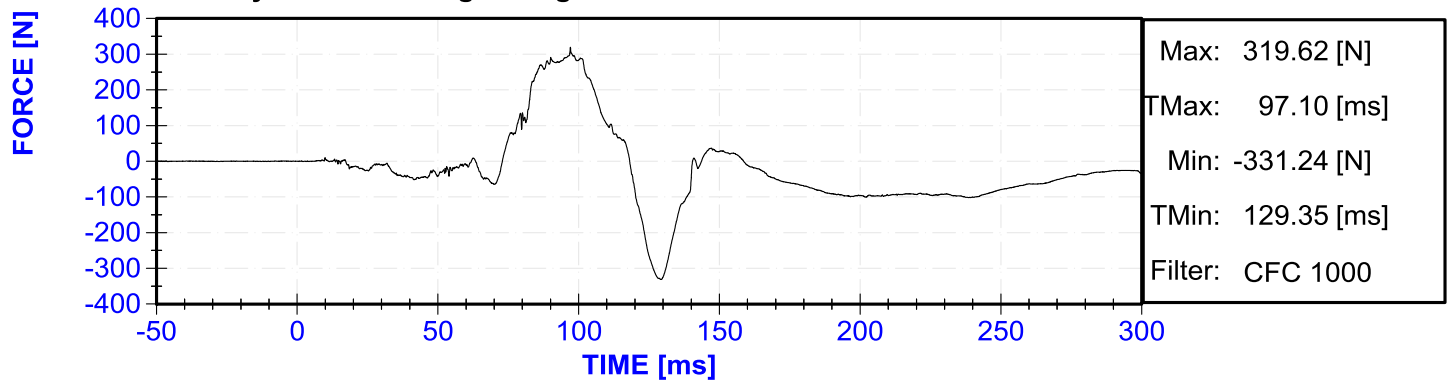
V2P1 My on head acting through the O.C. joint only



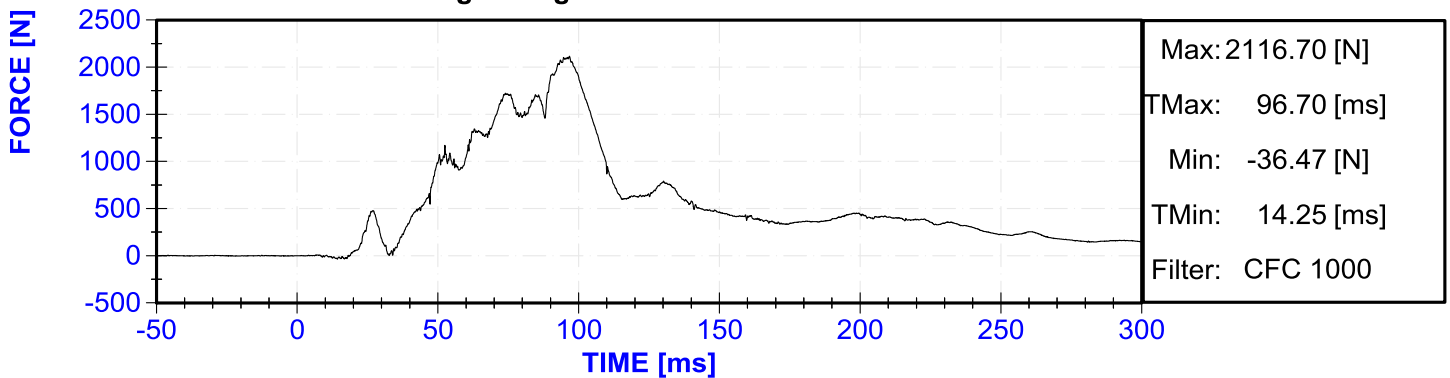
V2P1 Fx on head acting through the total neck section



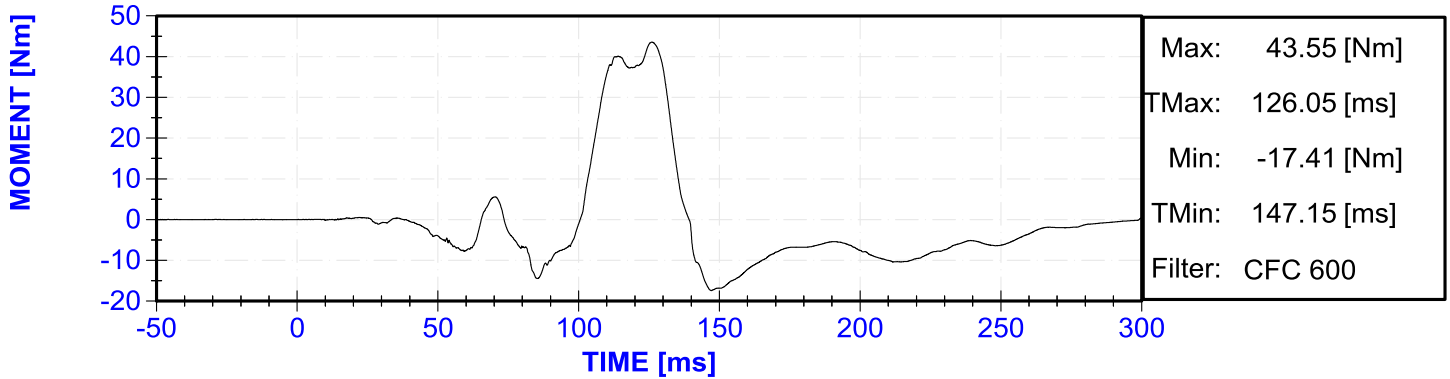
V2P1 Fy on head acting through the total neck section



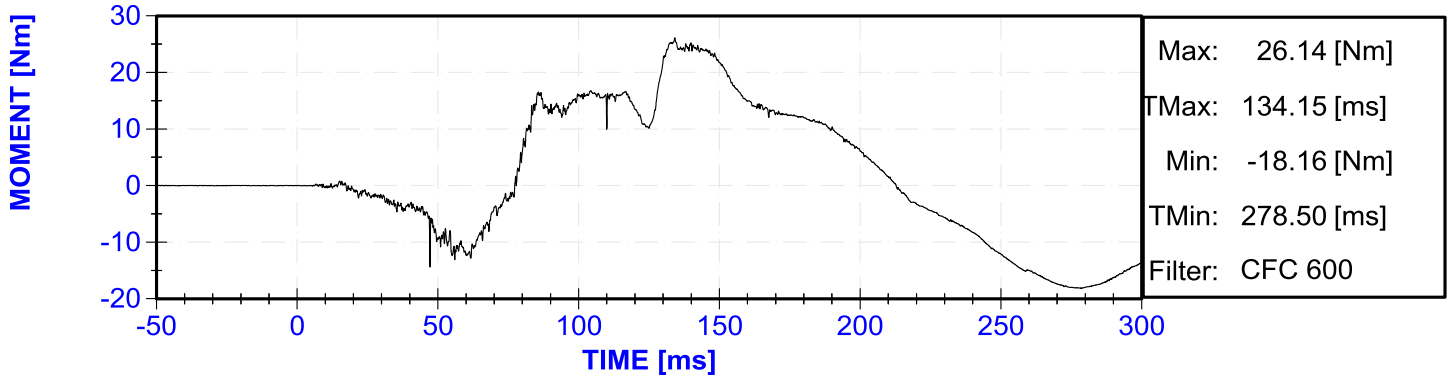
V2P1 Fz on head acting through the total neck section



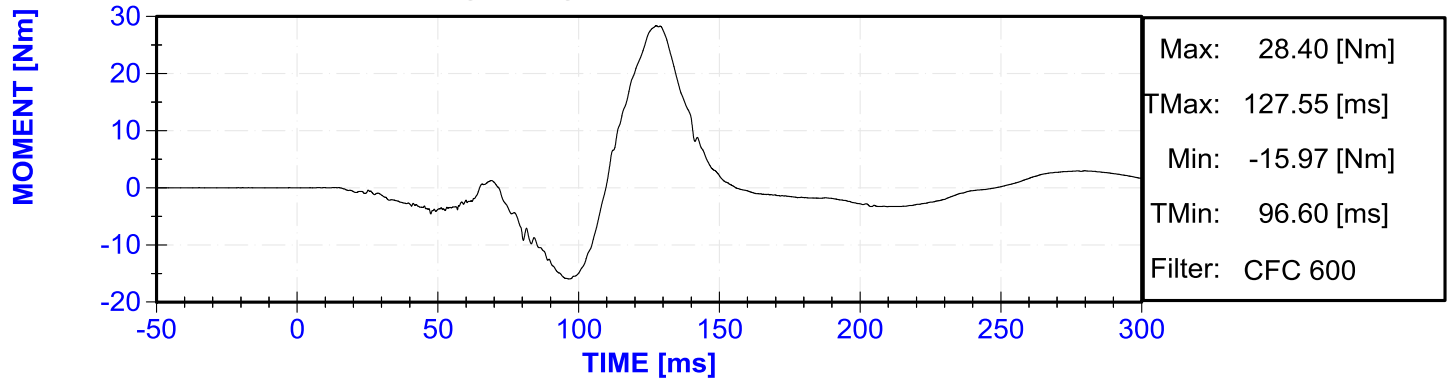
V2P1 Mx on head acting through the total neck section



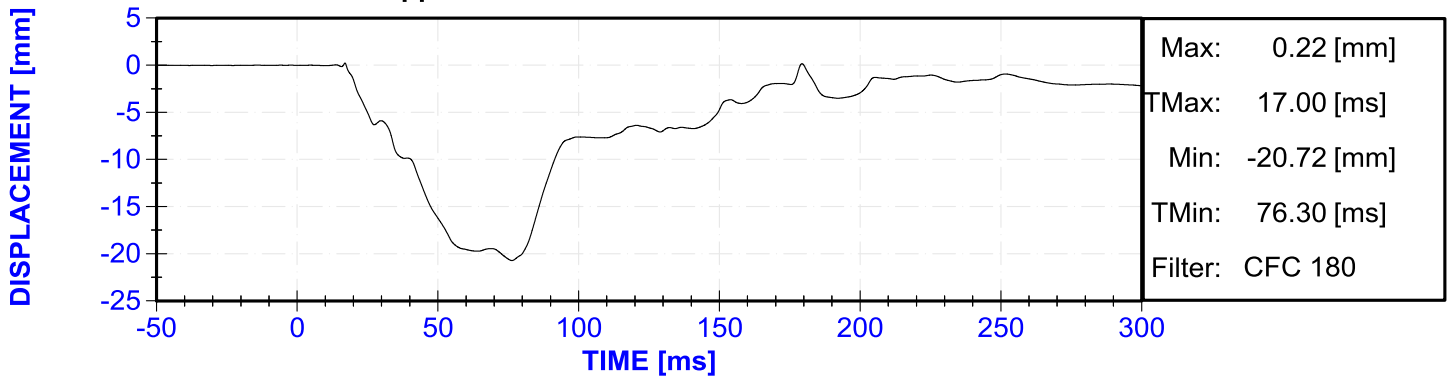
V2P1 My on head acting through the total neck section

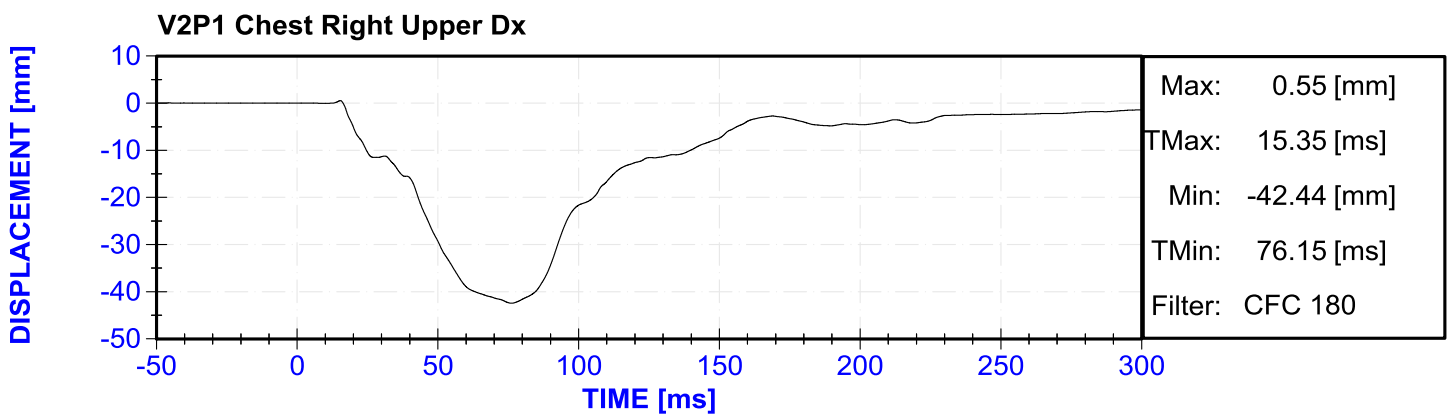
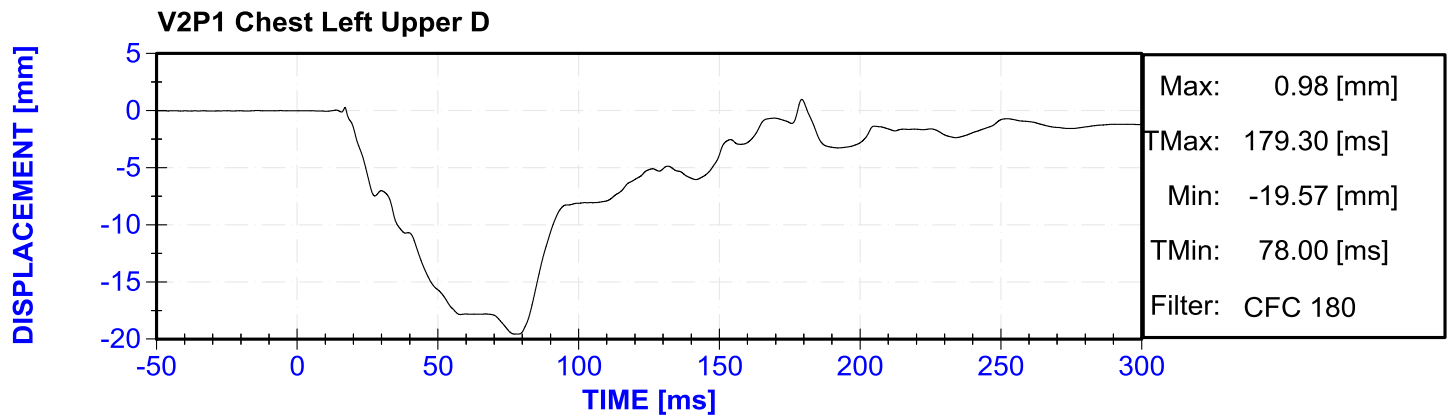
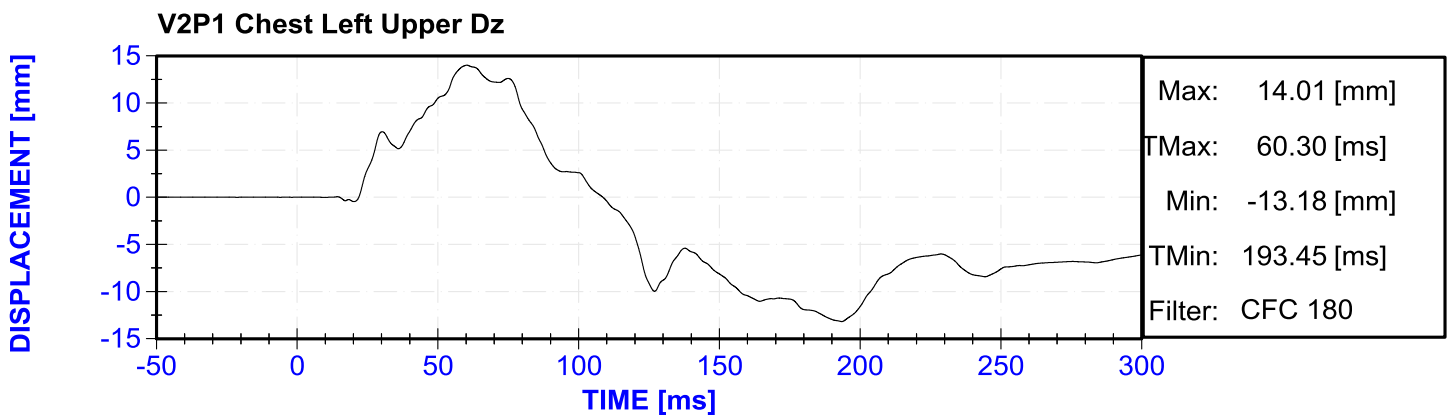
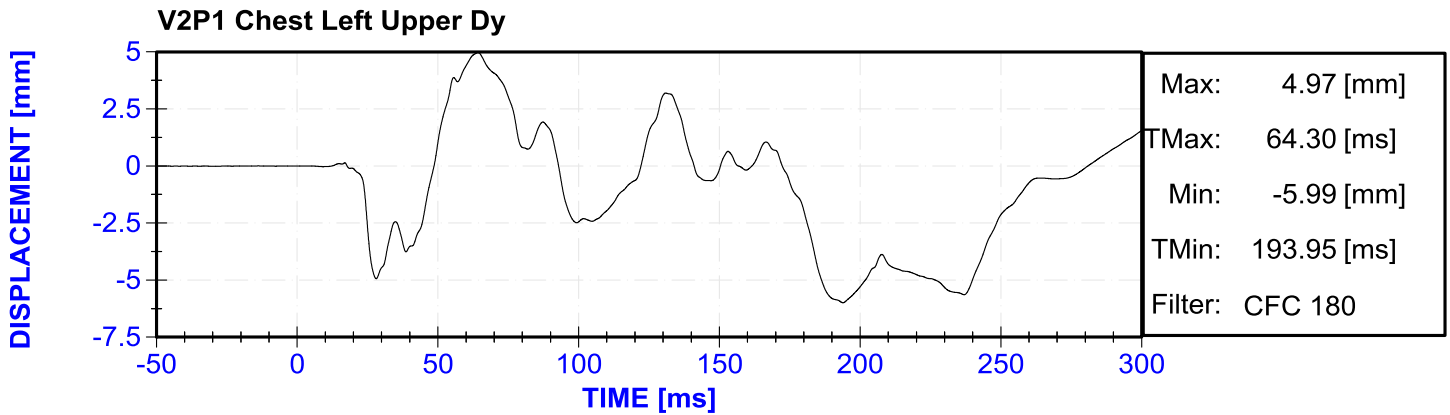


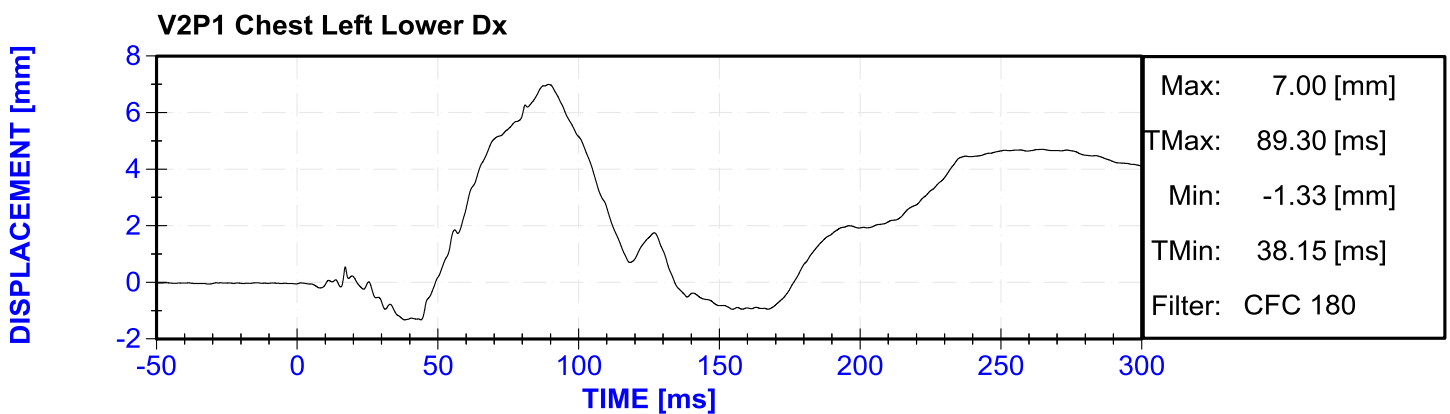
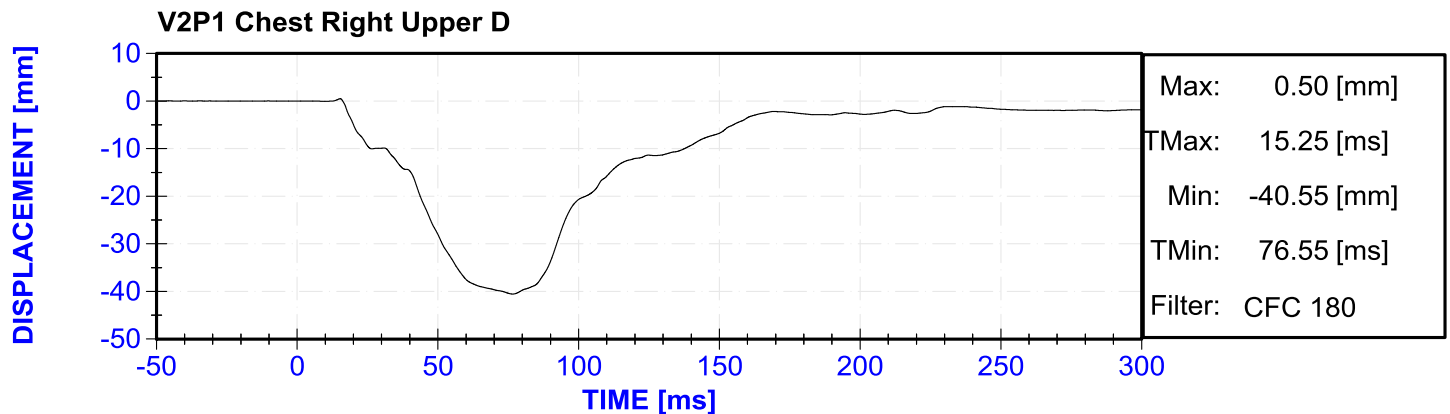
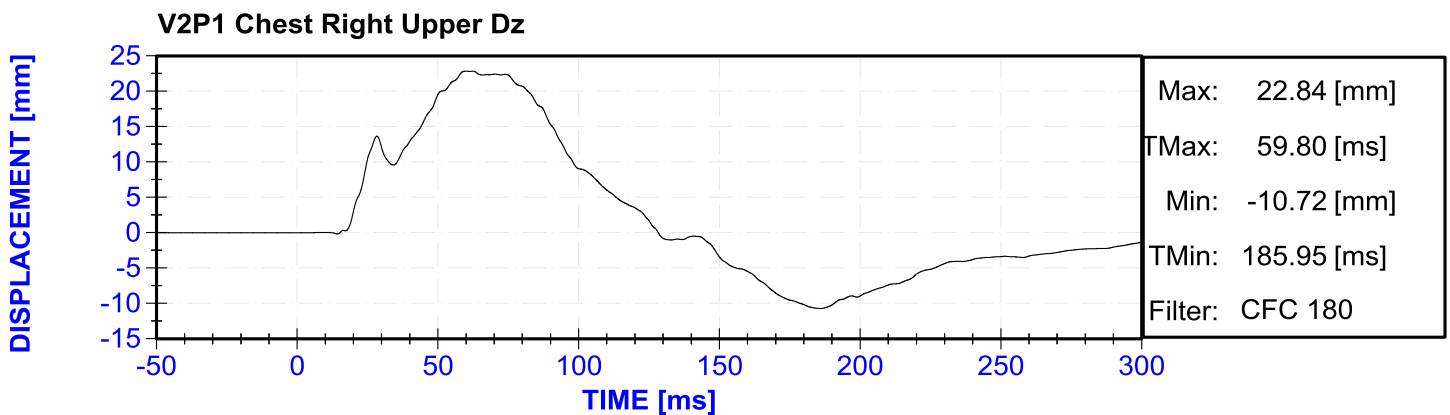
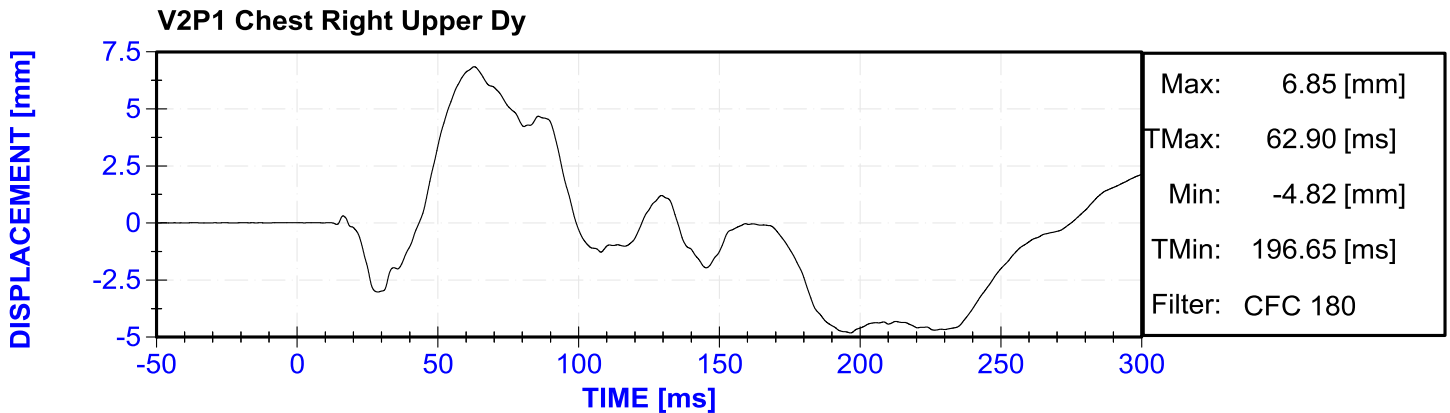
V2P1 Mz on head acting through the total neck section

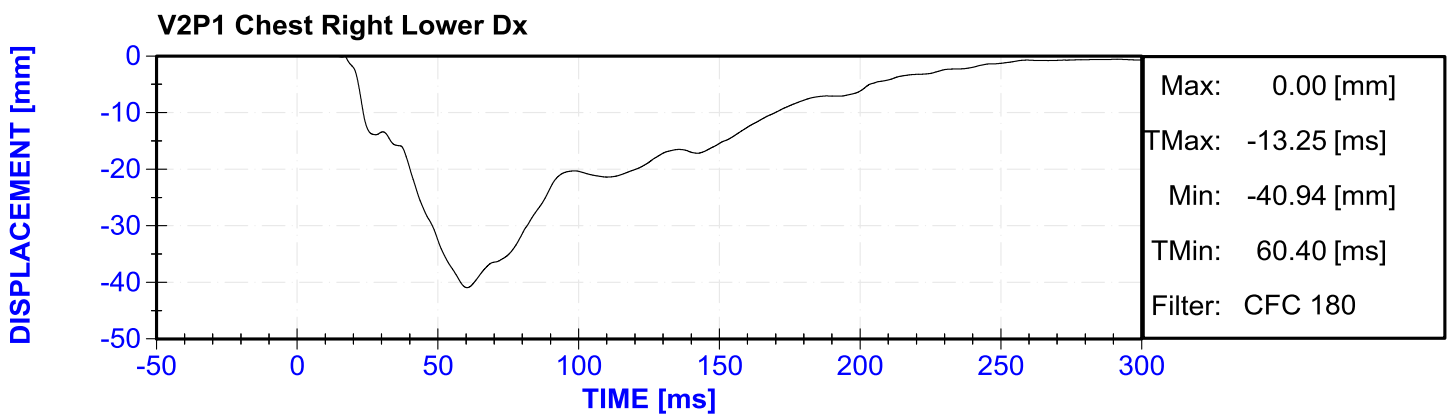
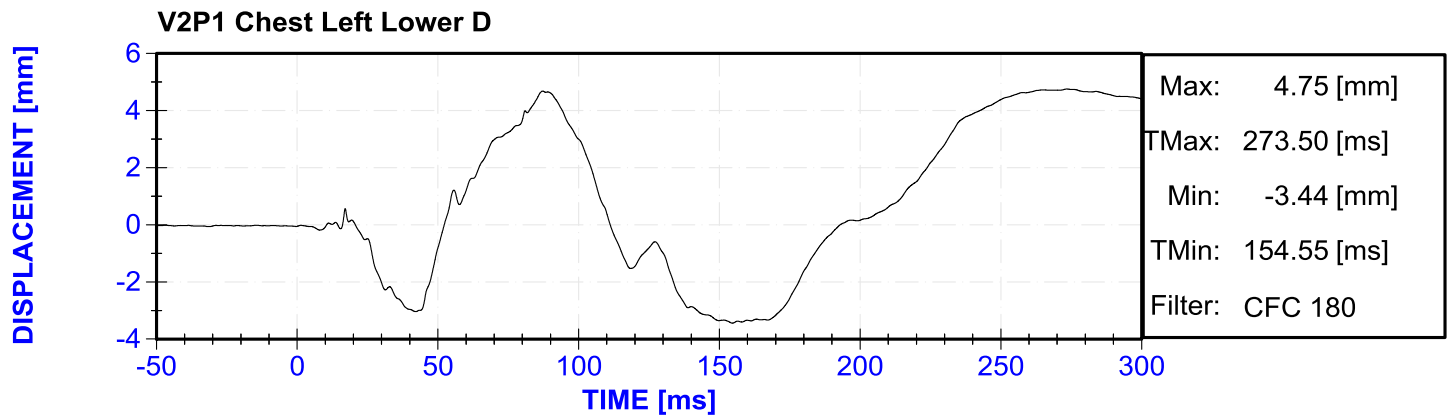
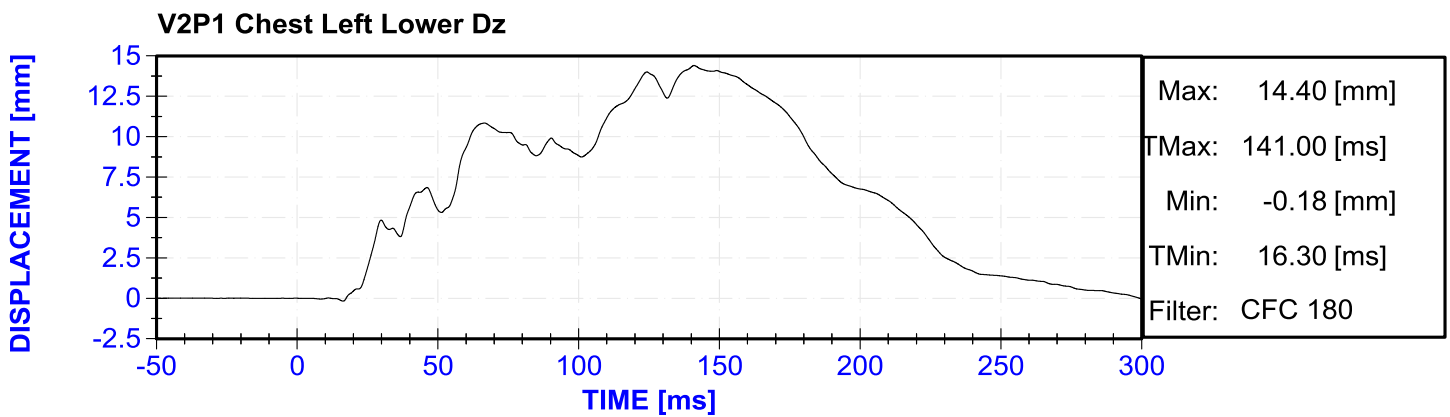
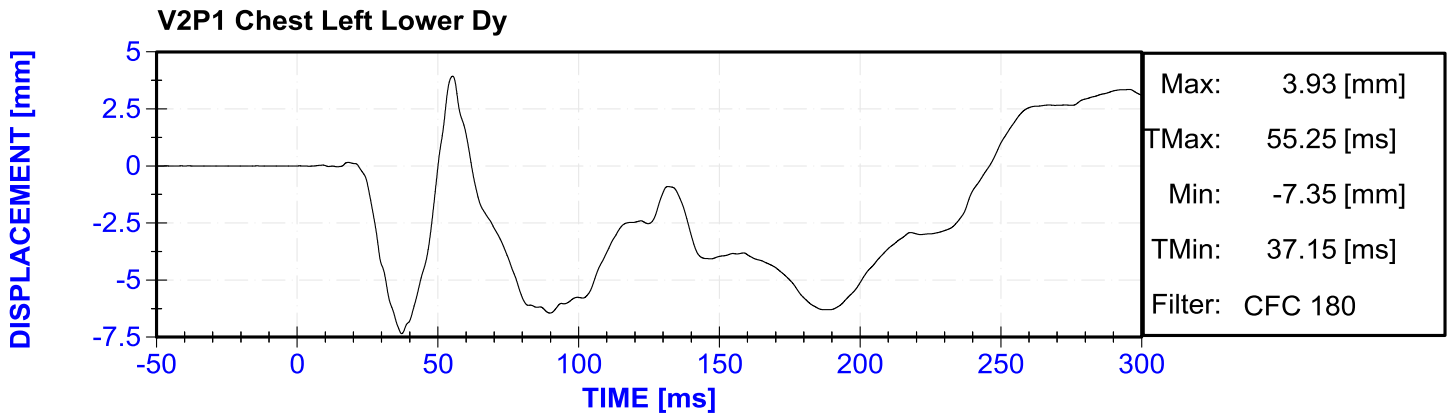


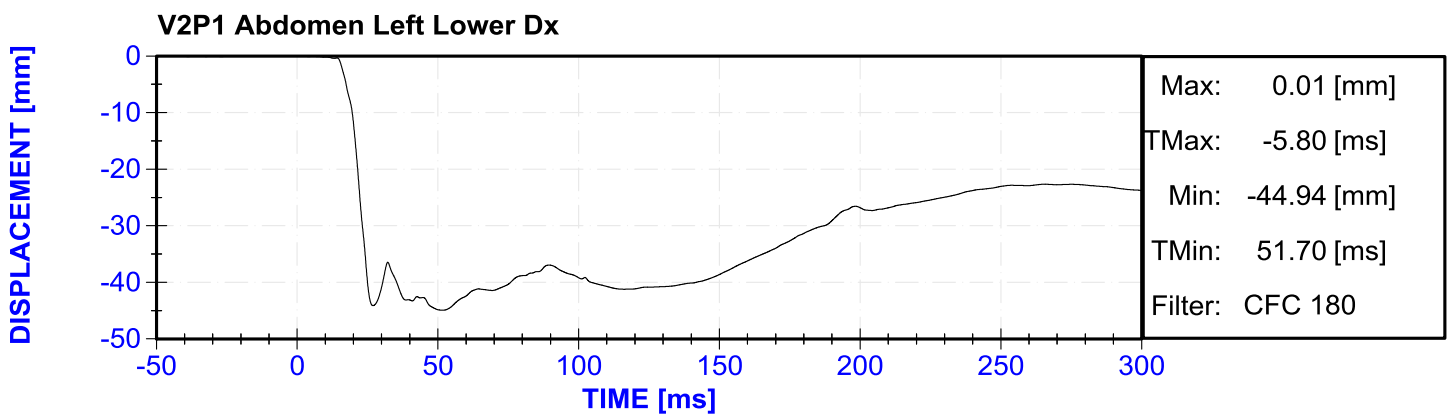
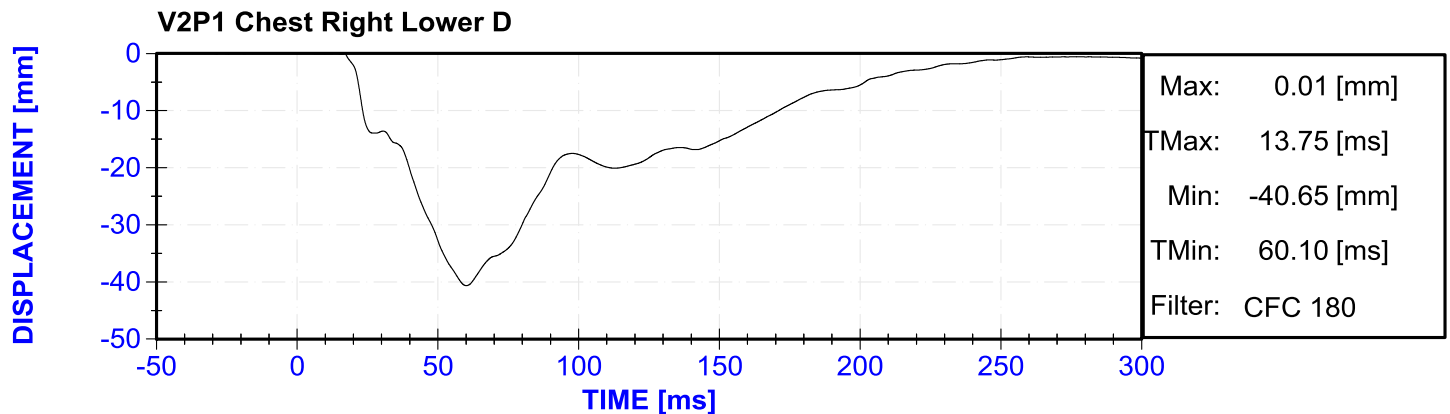
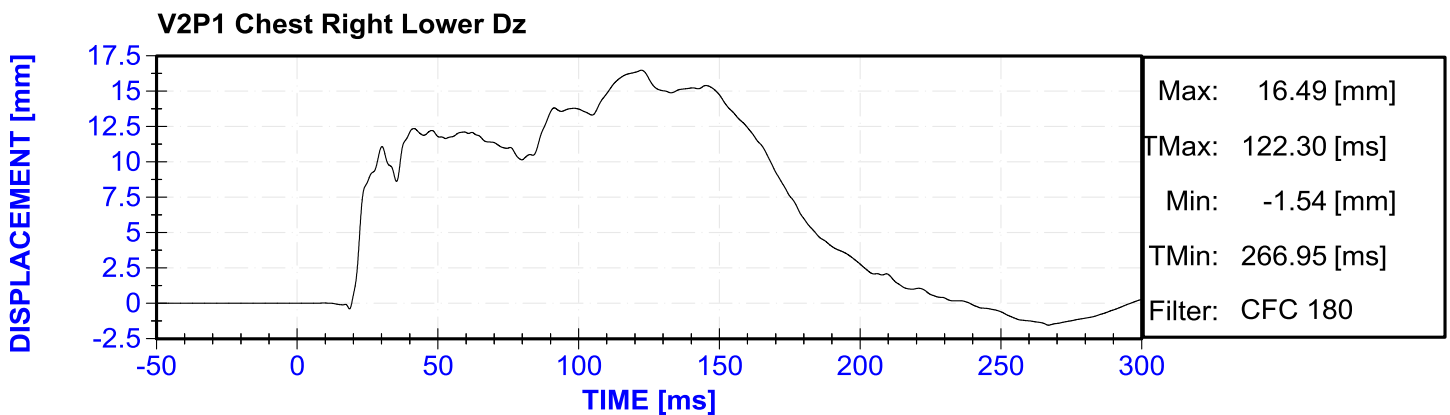
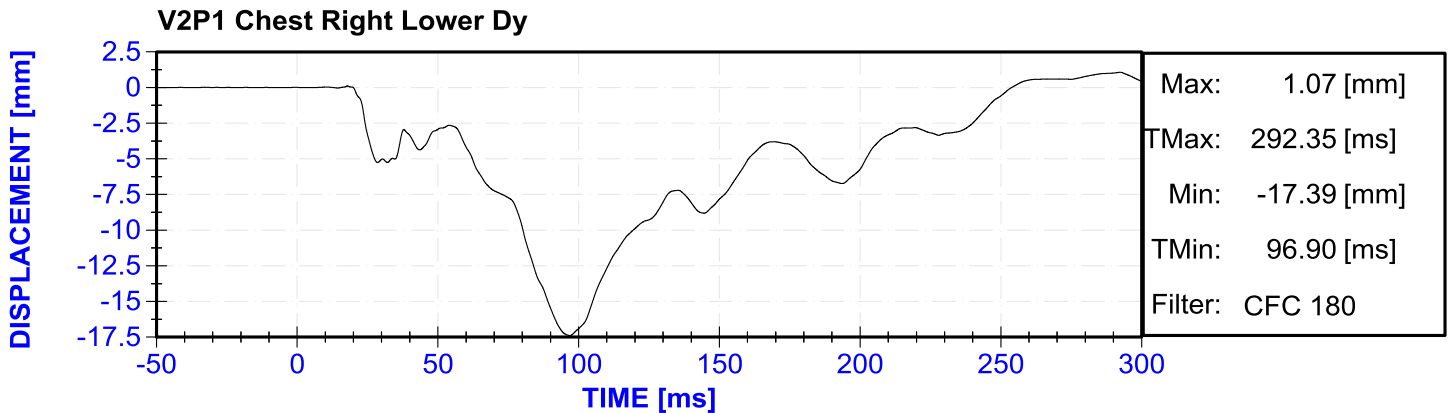
V2P1 Chest Left Upper Dx

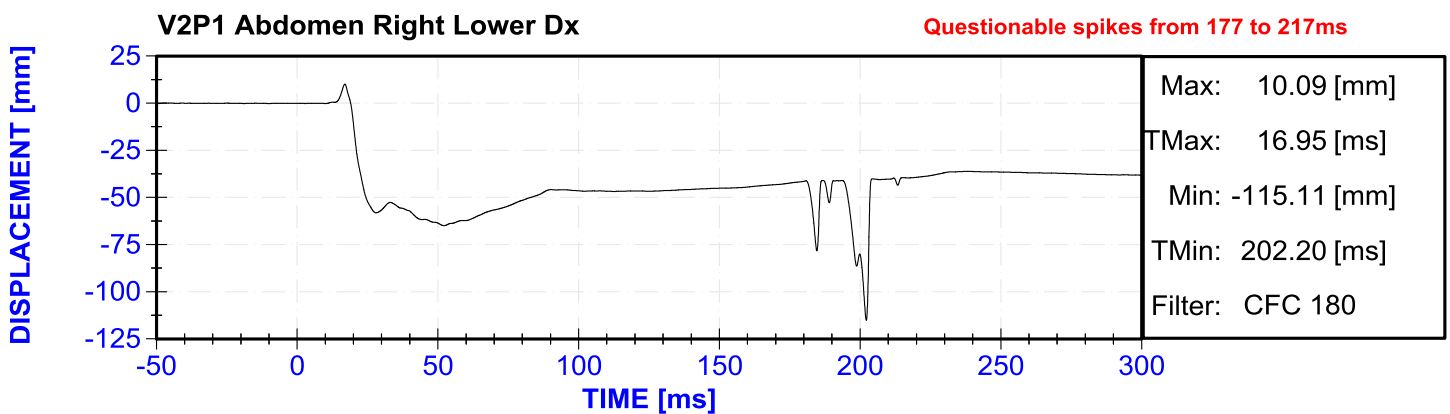
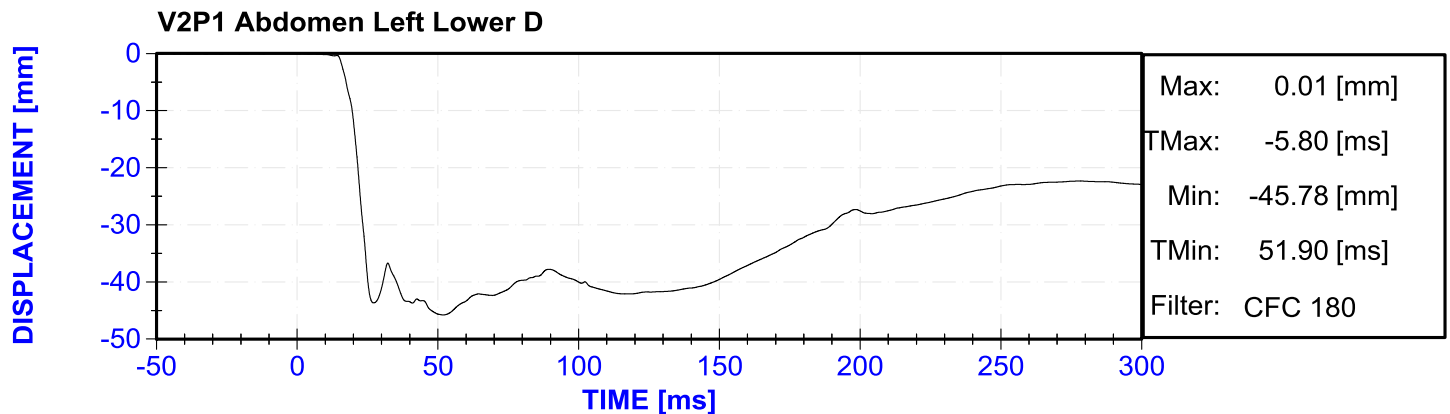
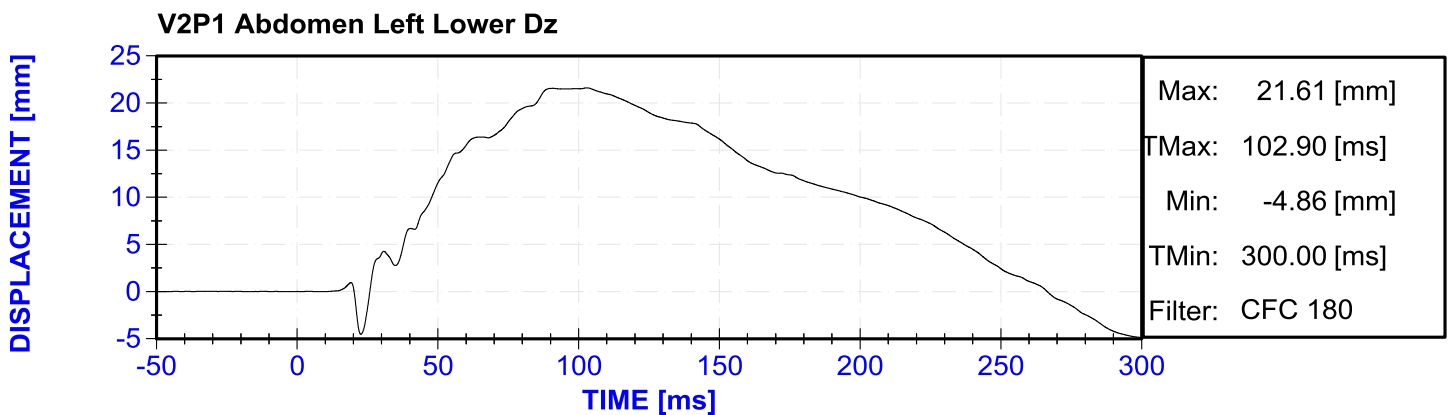
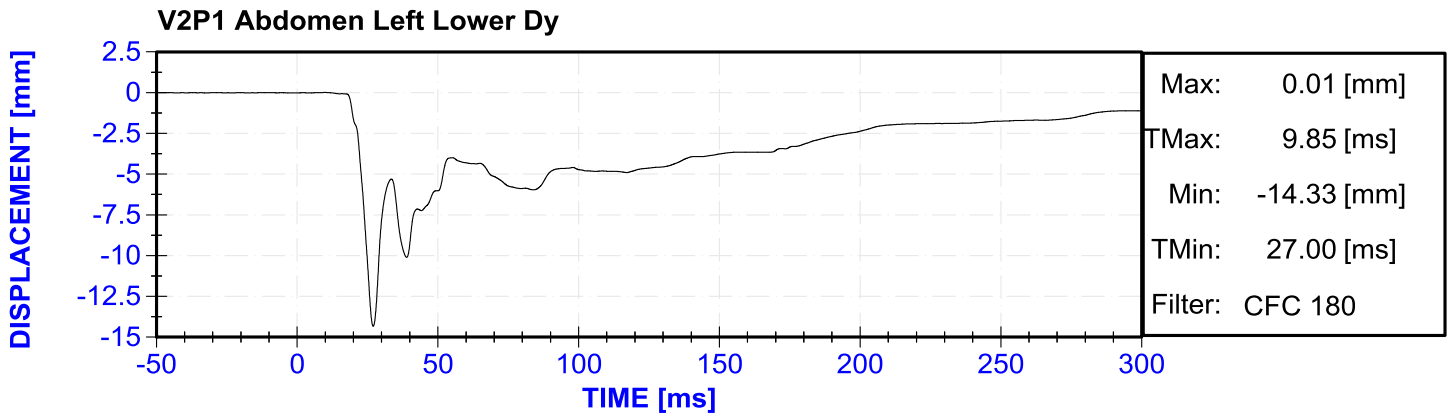


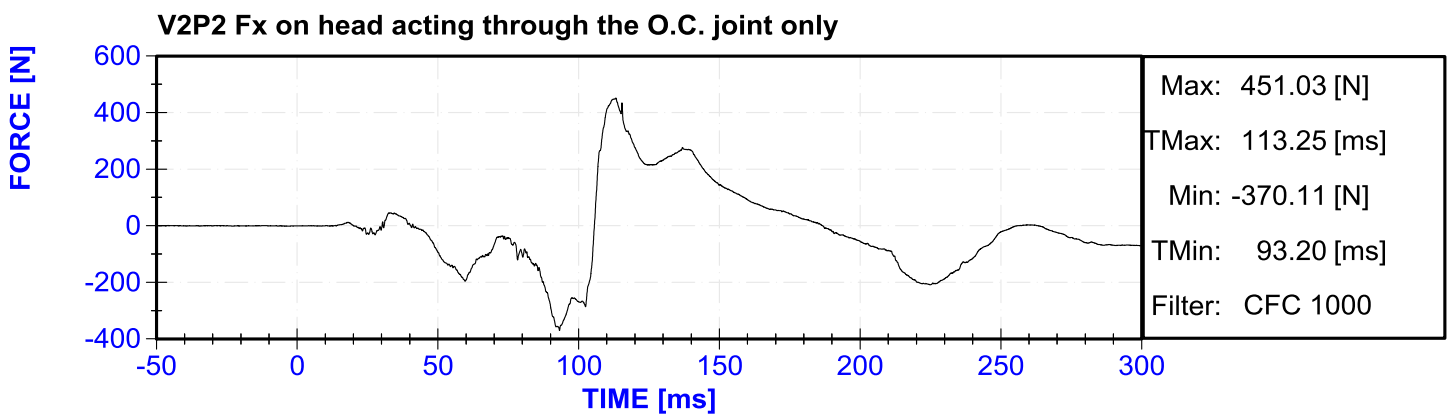
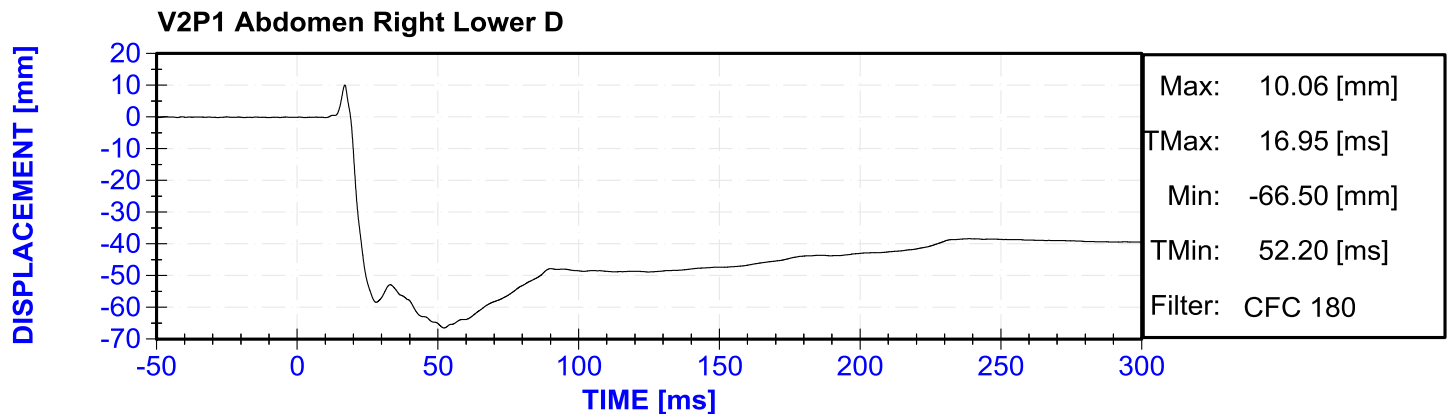
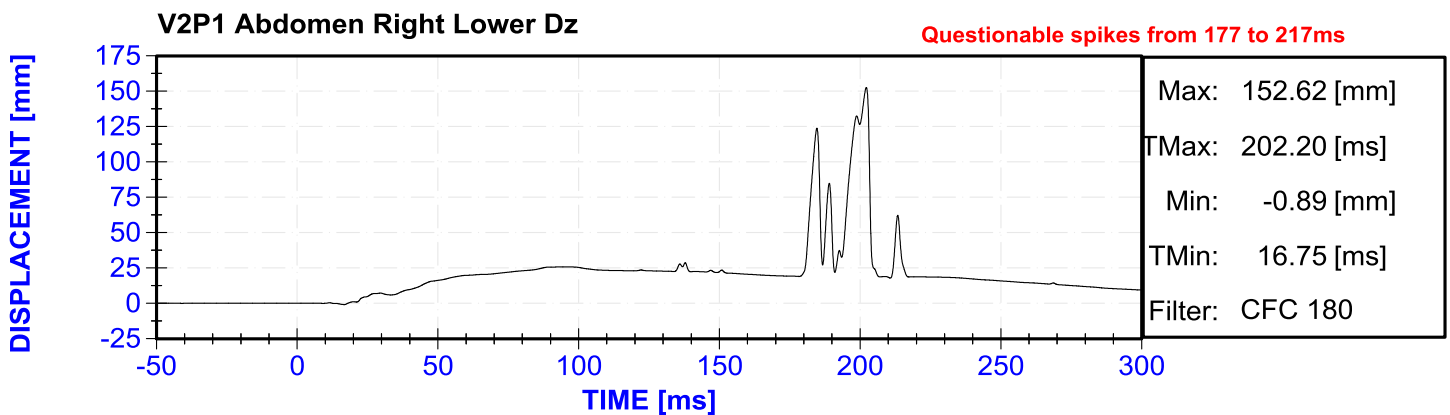
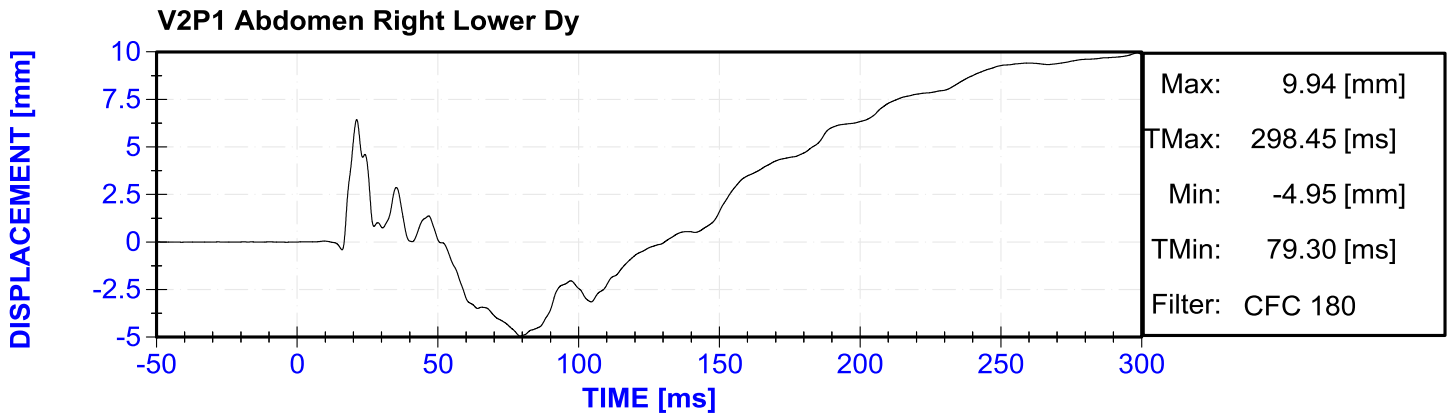




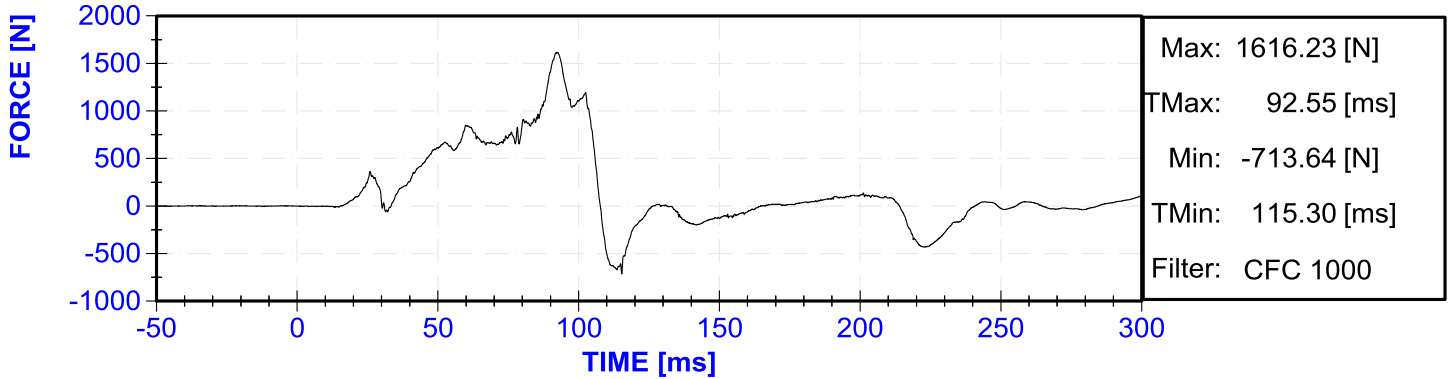




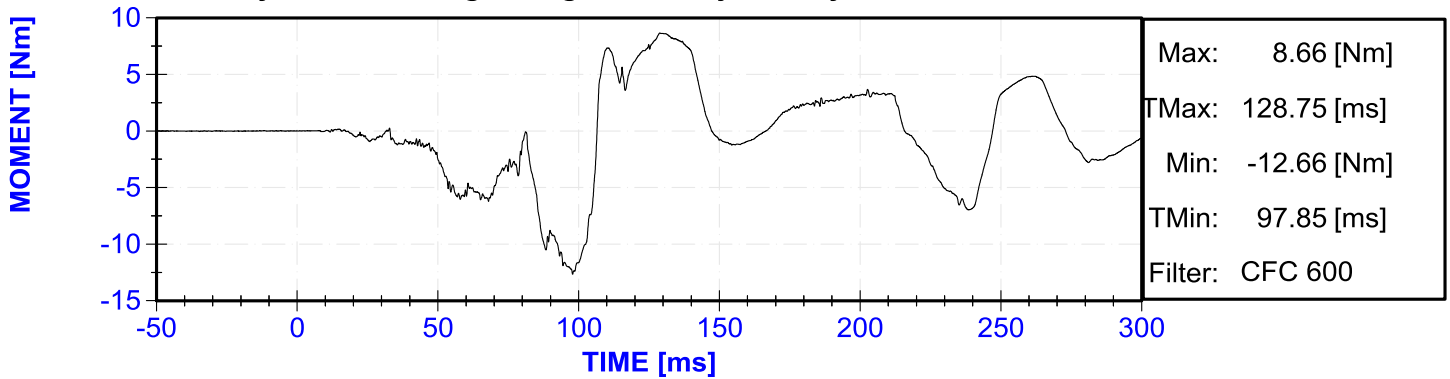




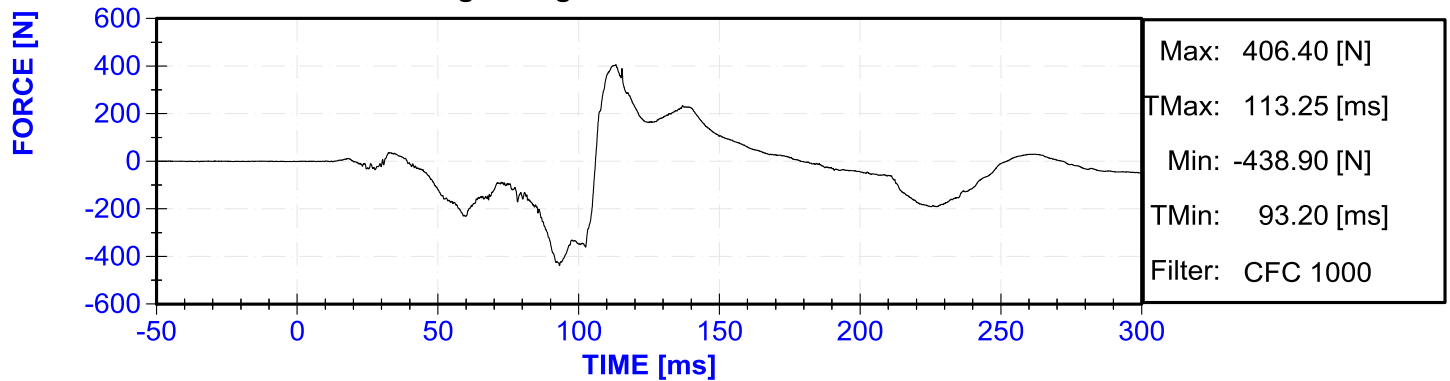
V2P2 Fz on head acting through the O.C. joint only



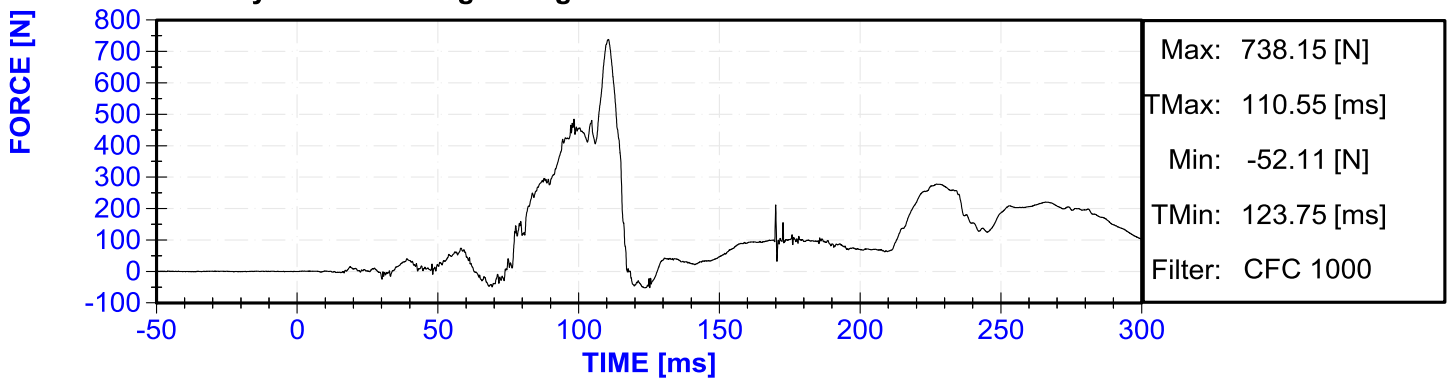
V2P2 My on head acting through the O.C. joint only



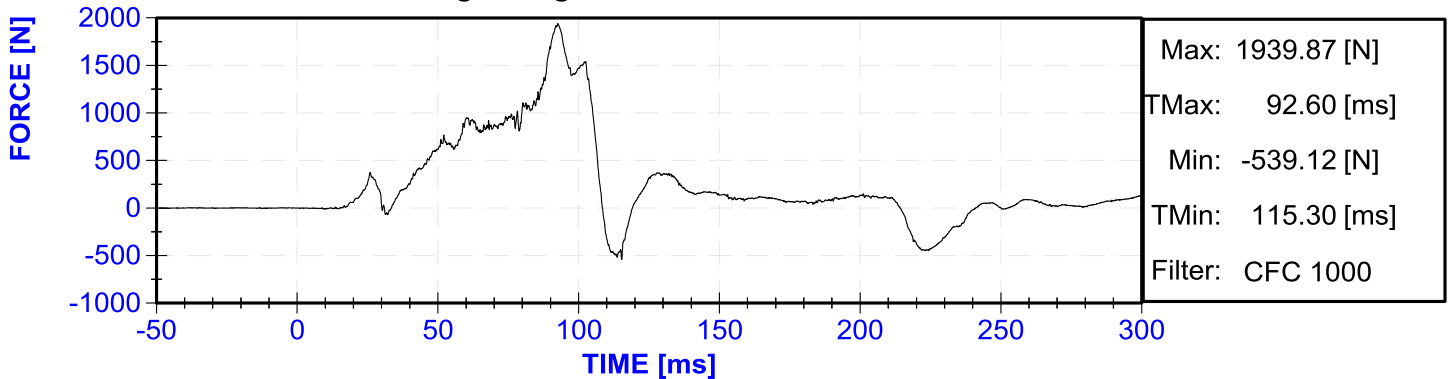
V2P2 Fx on head acting through the total neck section



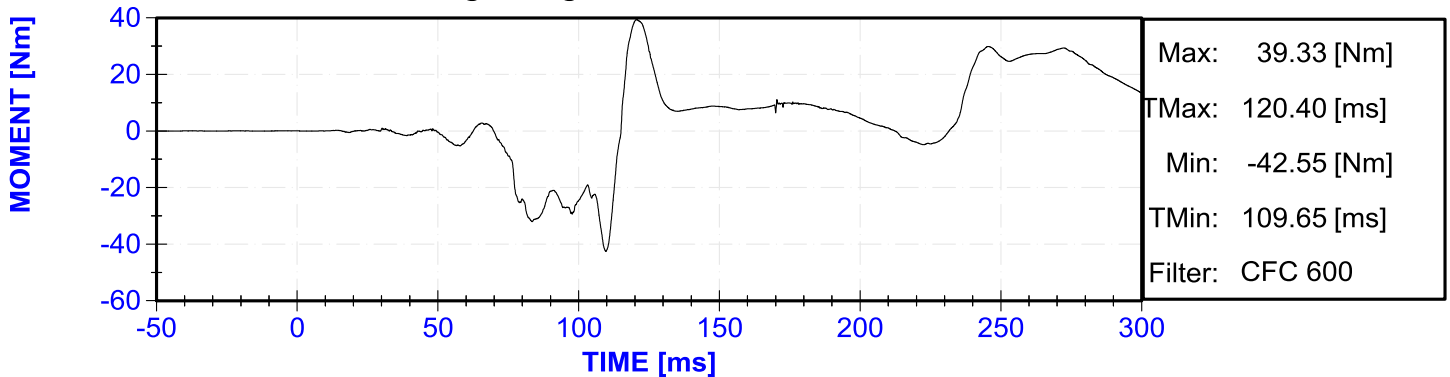
V2P2 Fy on head acting through the total neck section



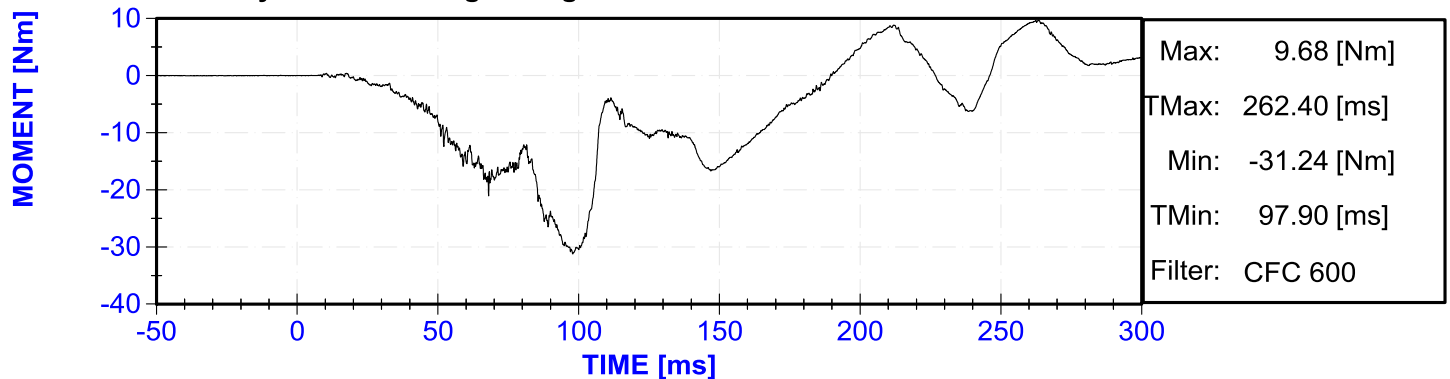
V2P2 Fz on head acting through the total neck section



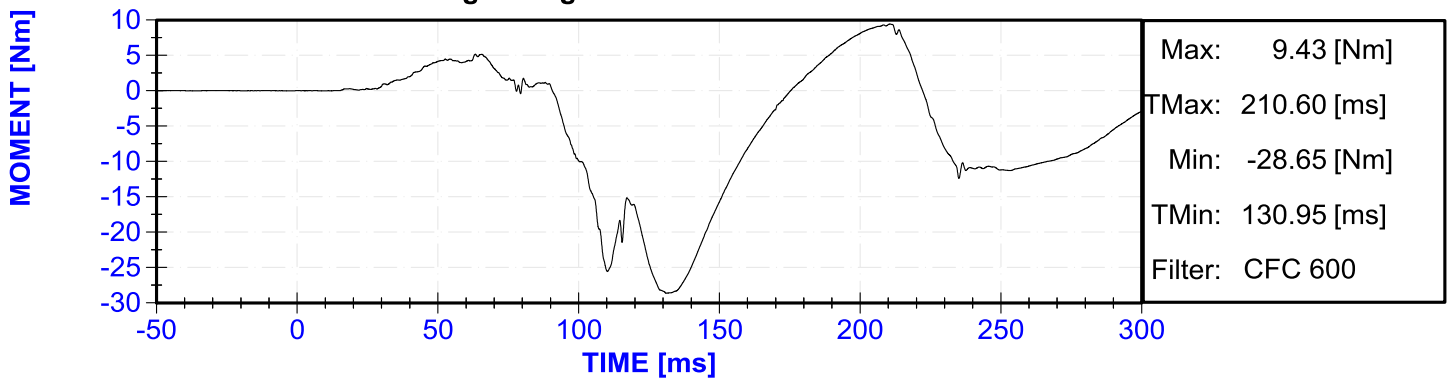
V2P2 Mx on head acting through the total neck section

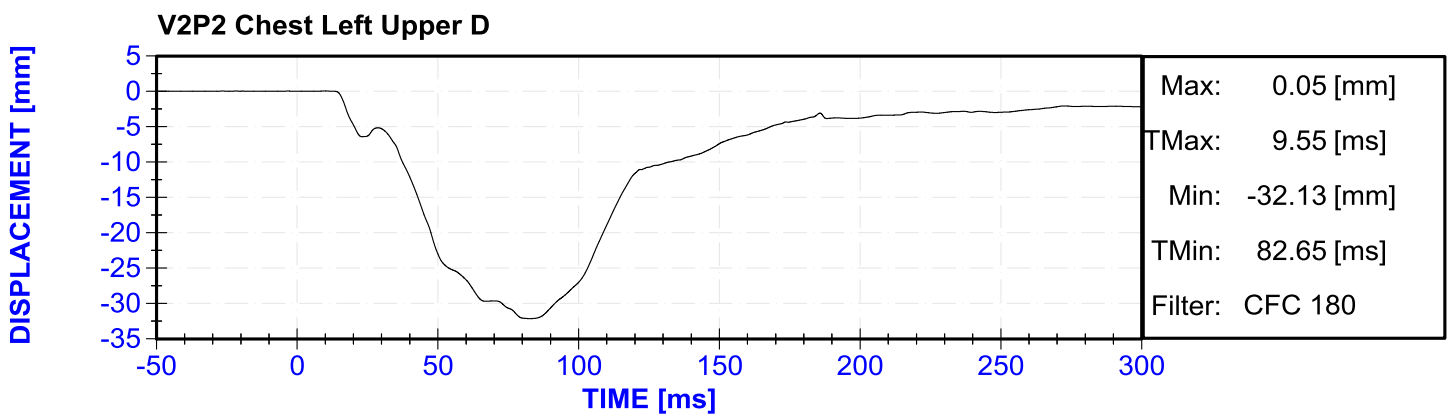
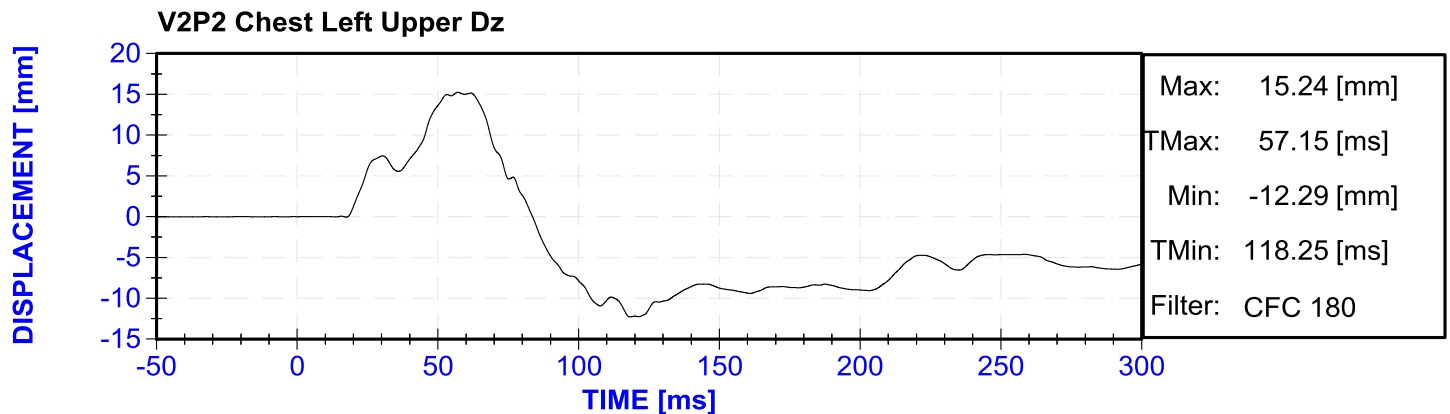
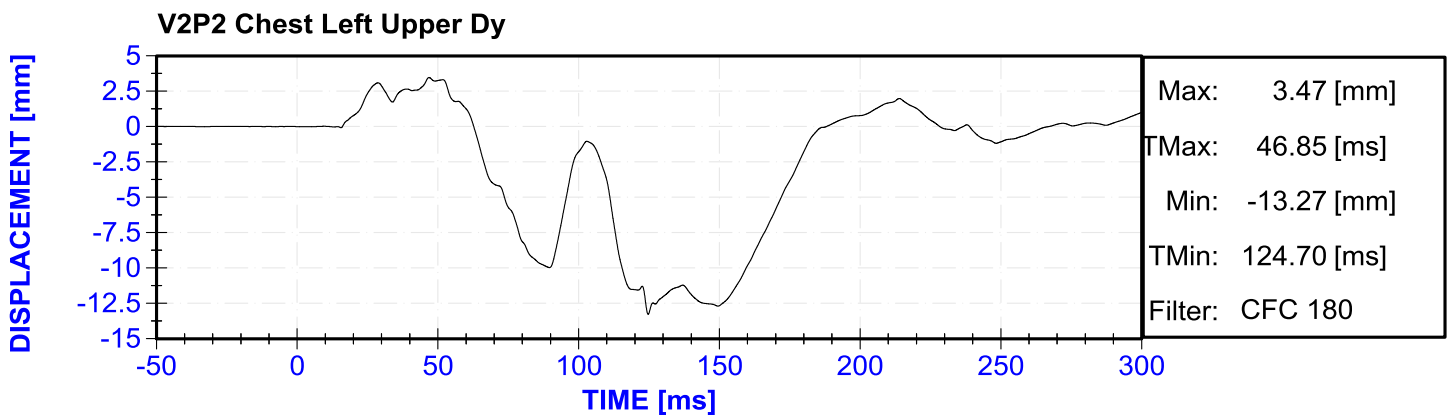
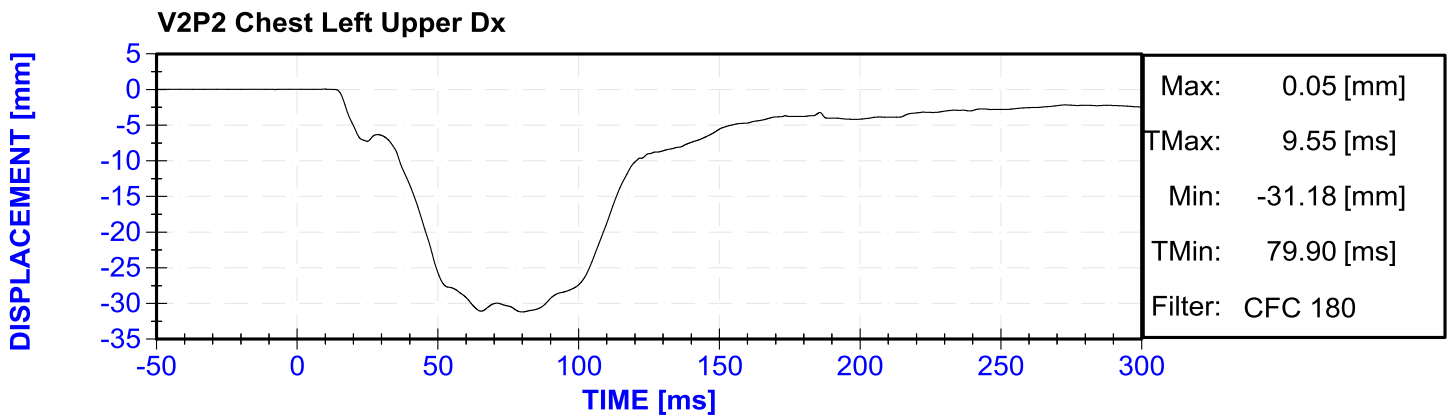


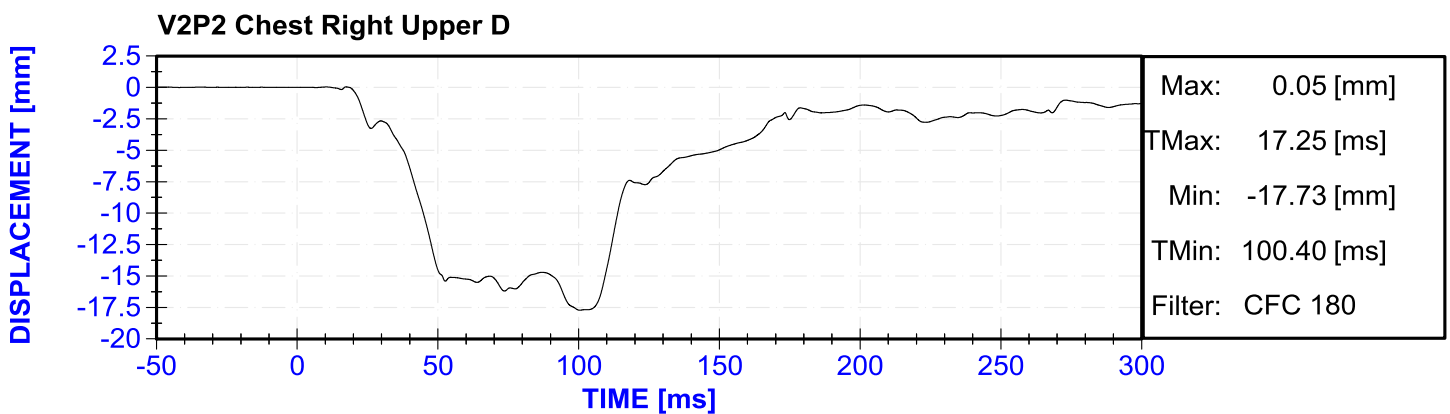
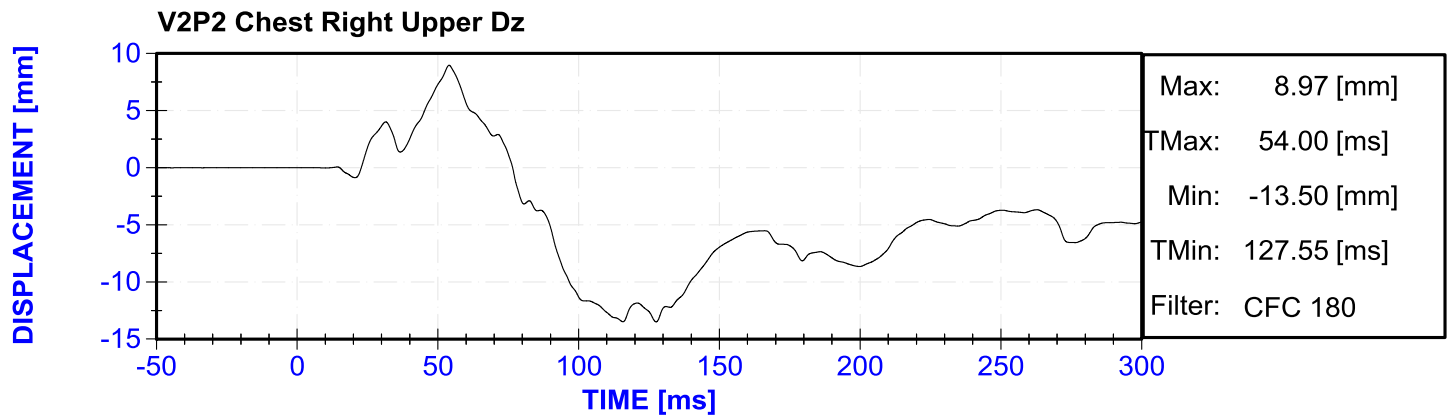
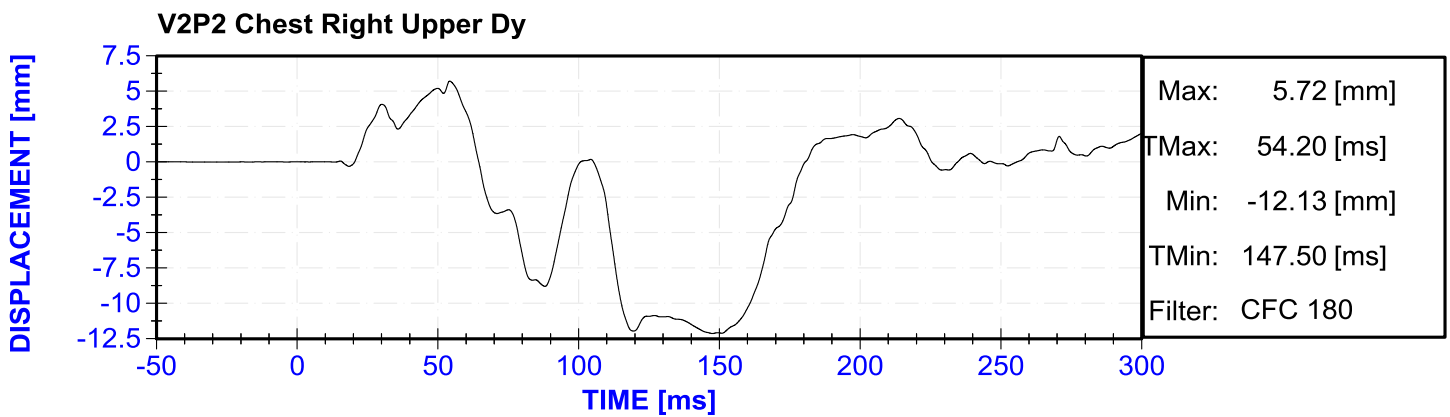
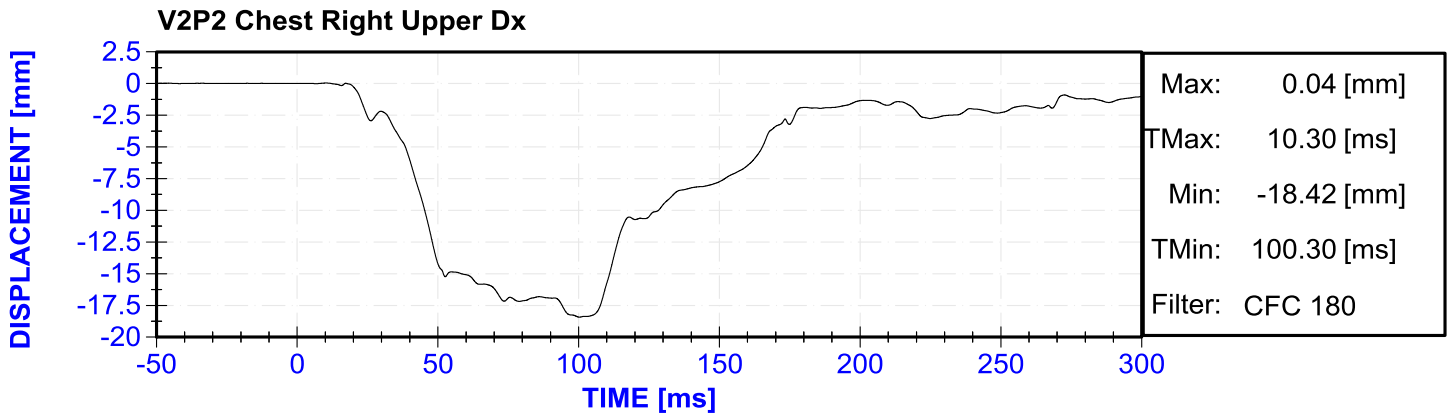
V2P2 My on head acting through the total neck section



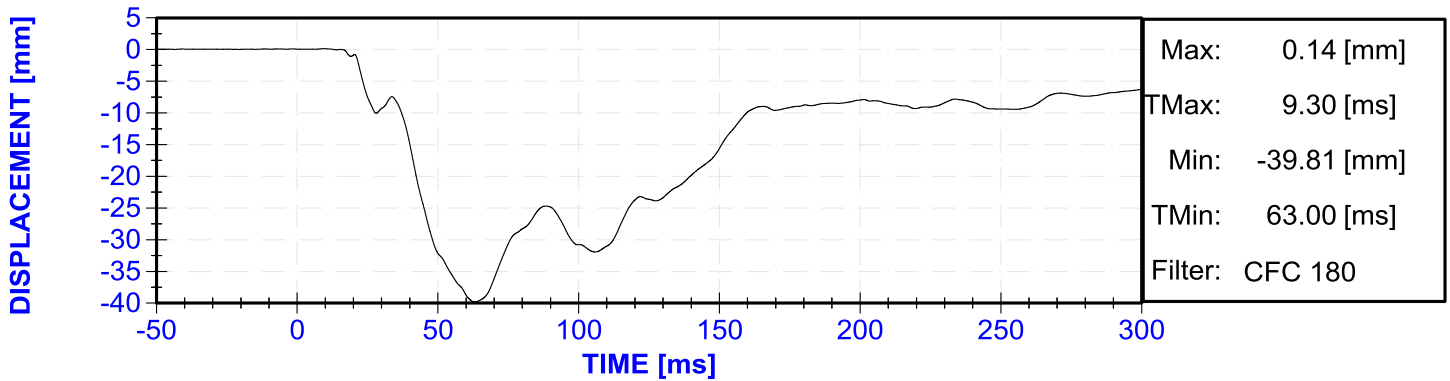
V2P2 Mz on head acting through the total neck section



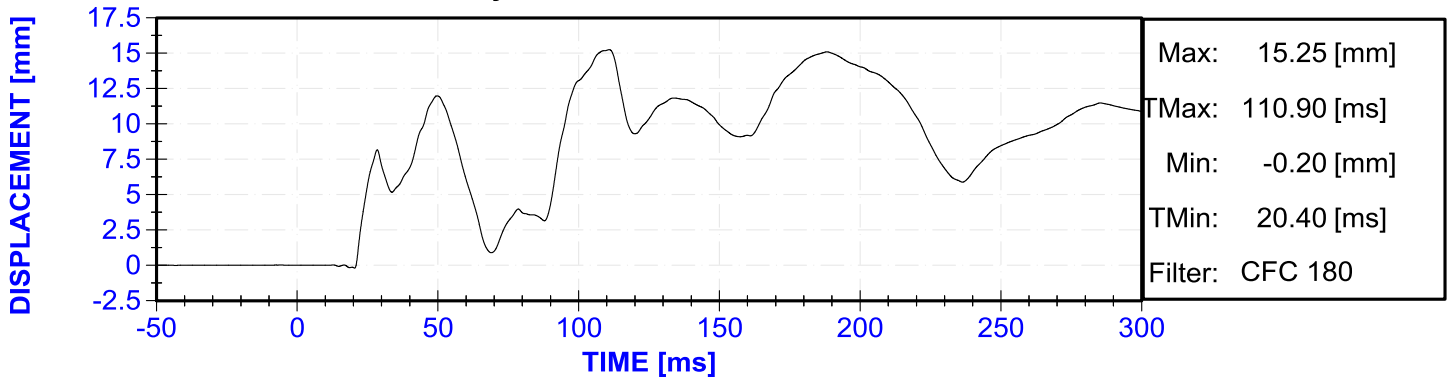




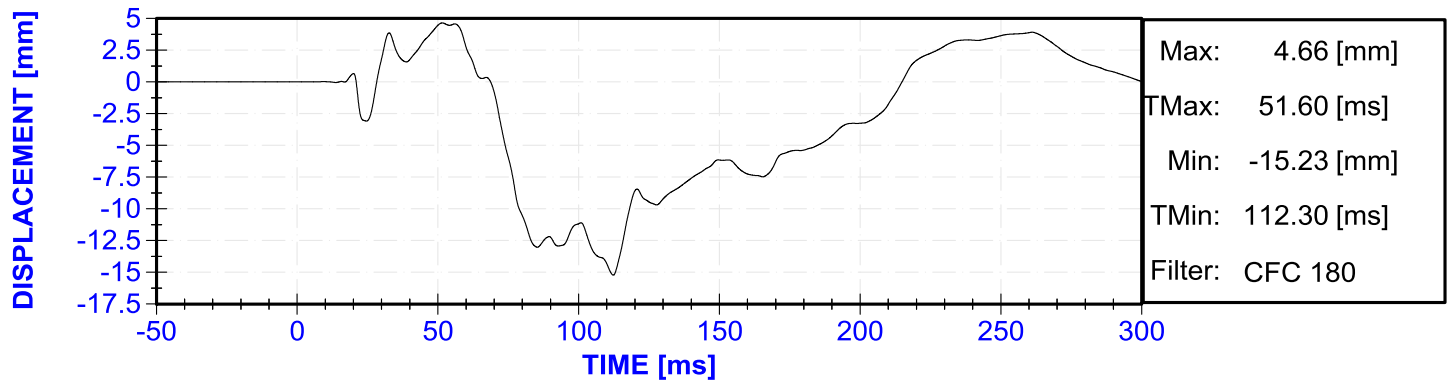
V2P2 Chest Left Lower Dx



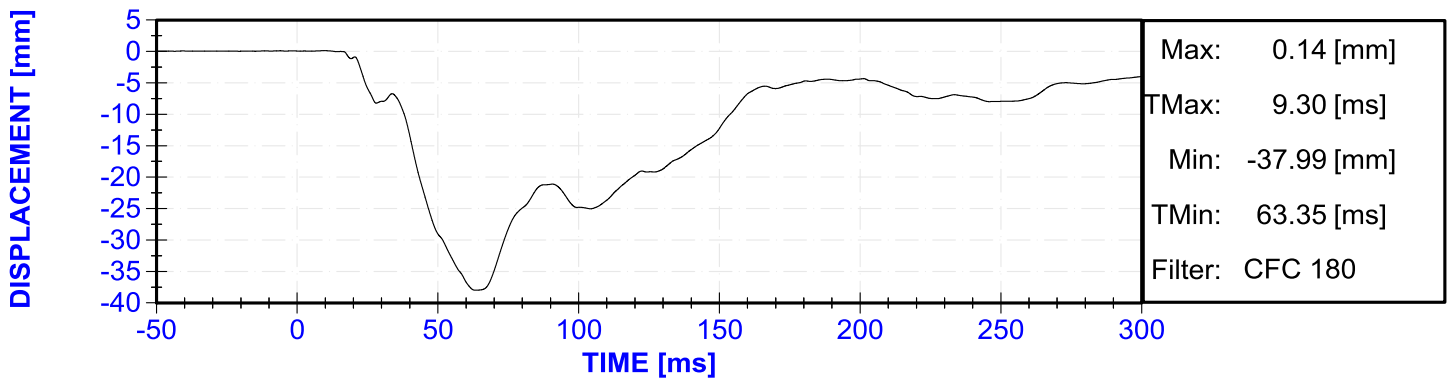
V2P2 Chest Left Lower Dy

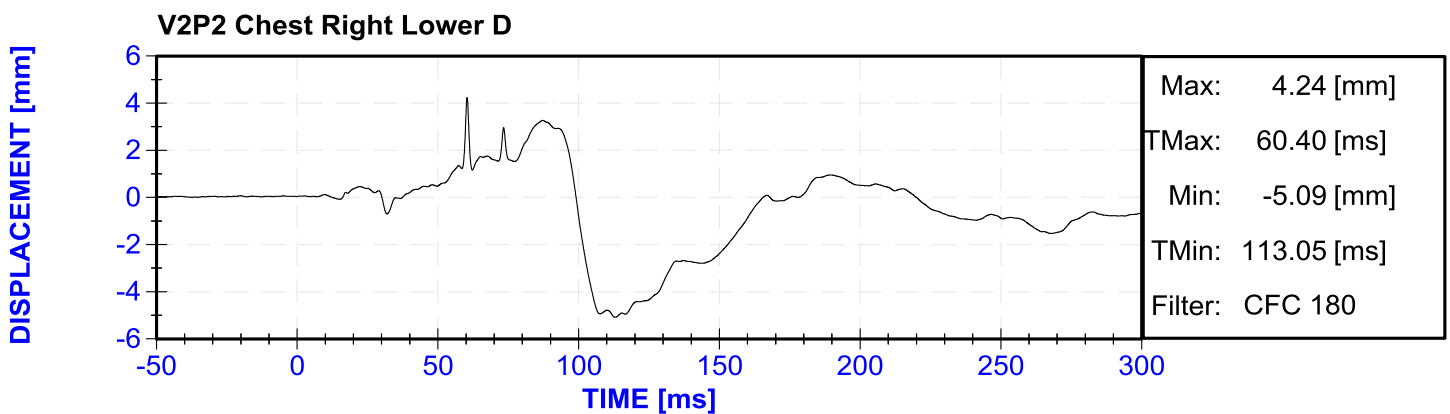
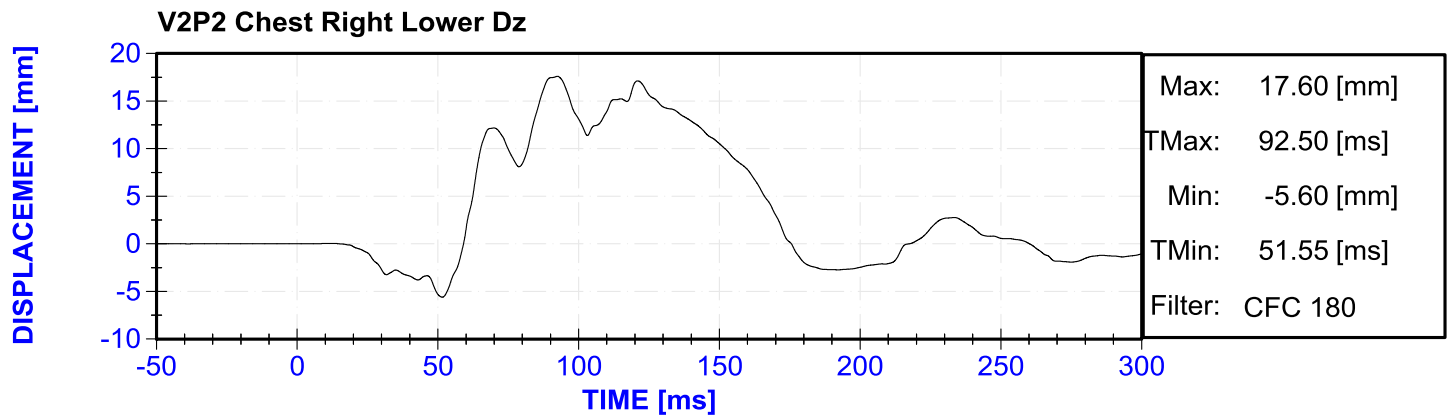
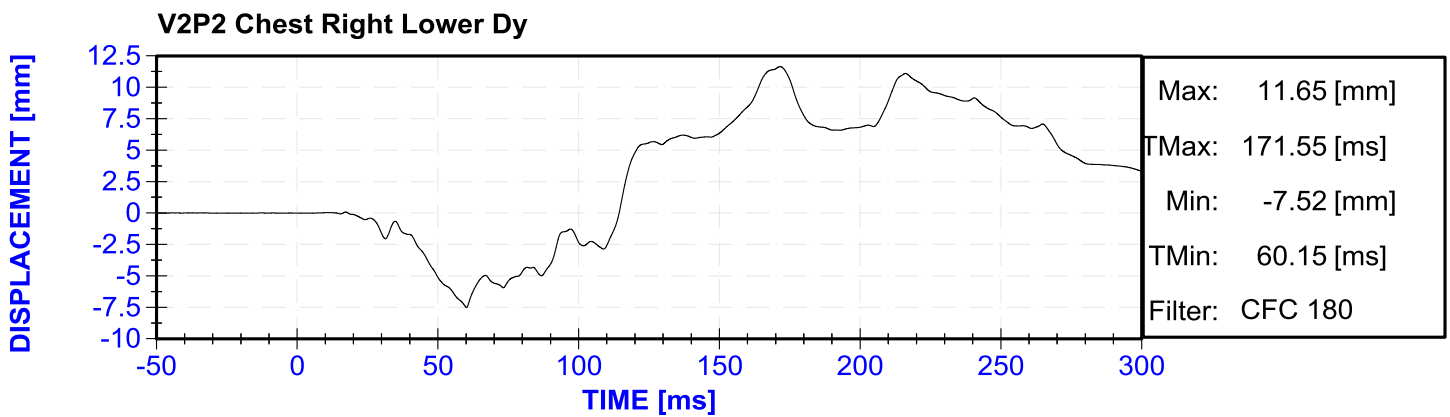
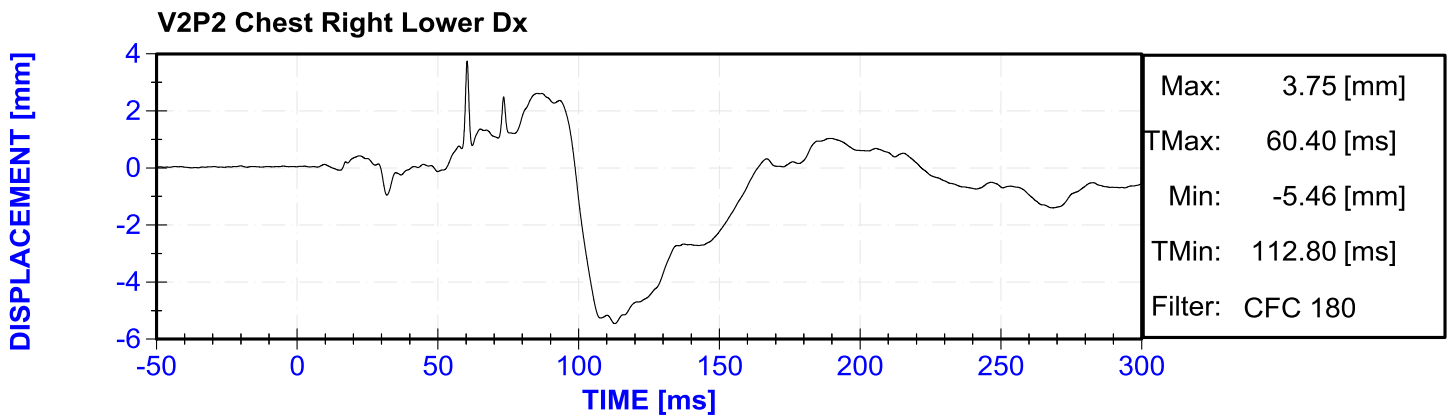


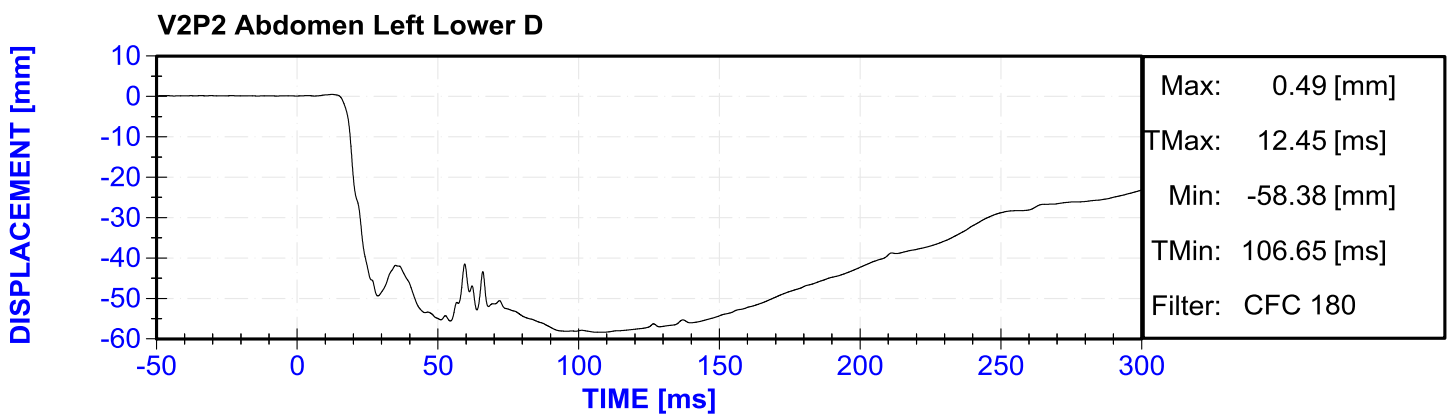
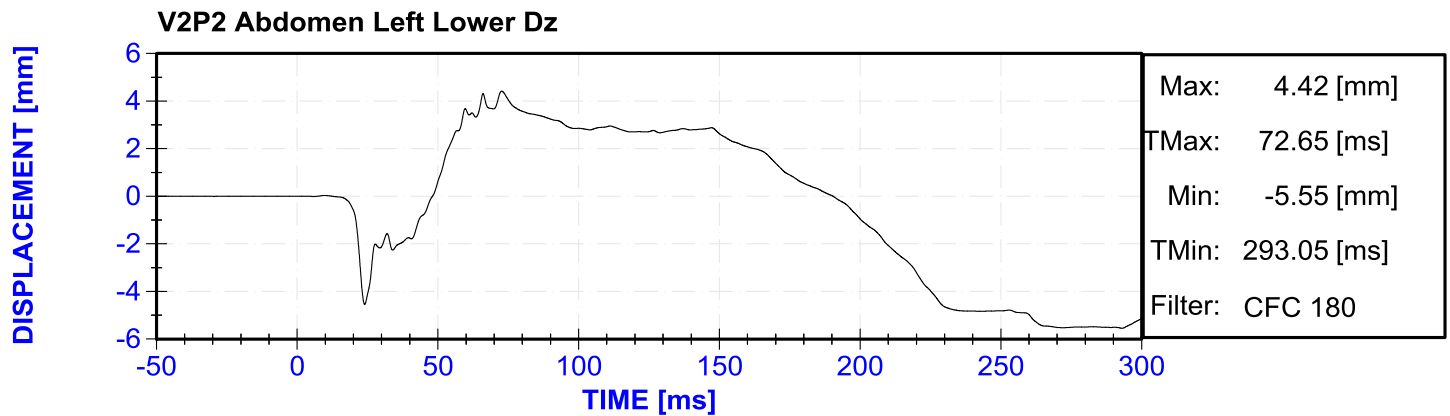
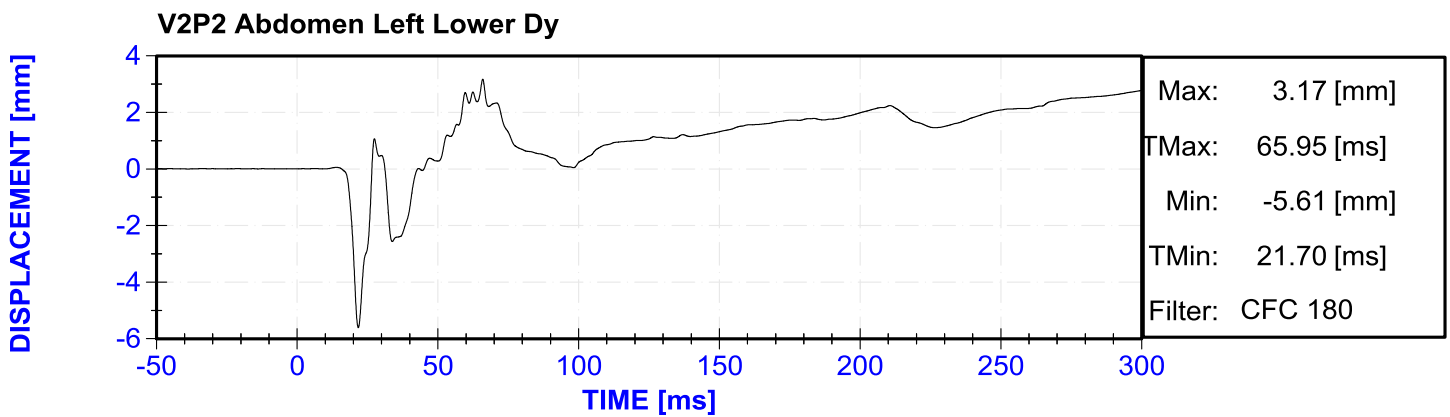
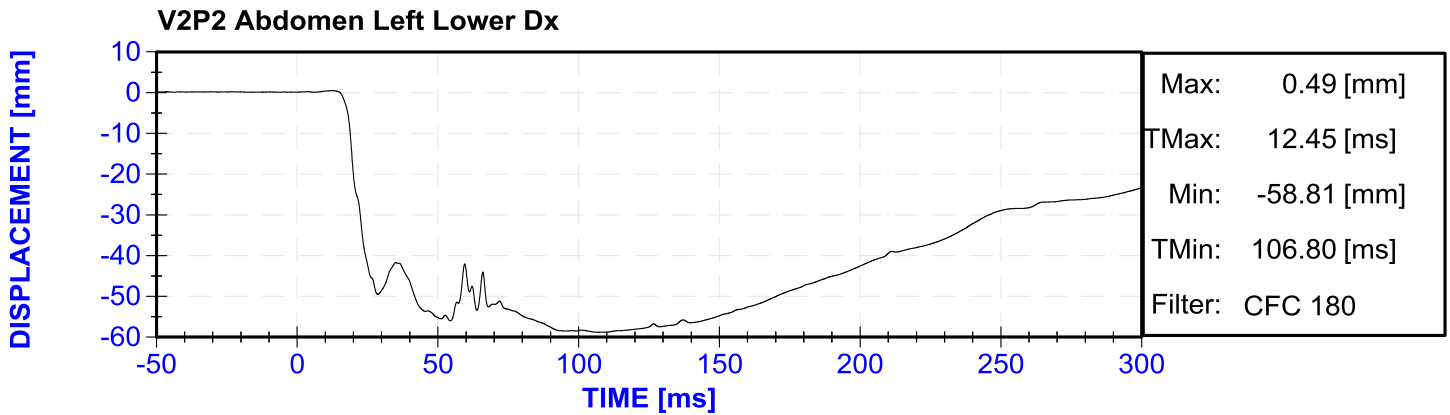
V2P2 Chest Left Lower Dz

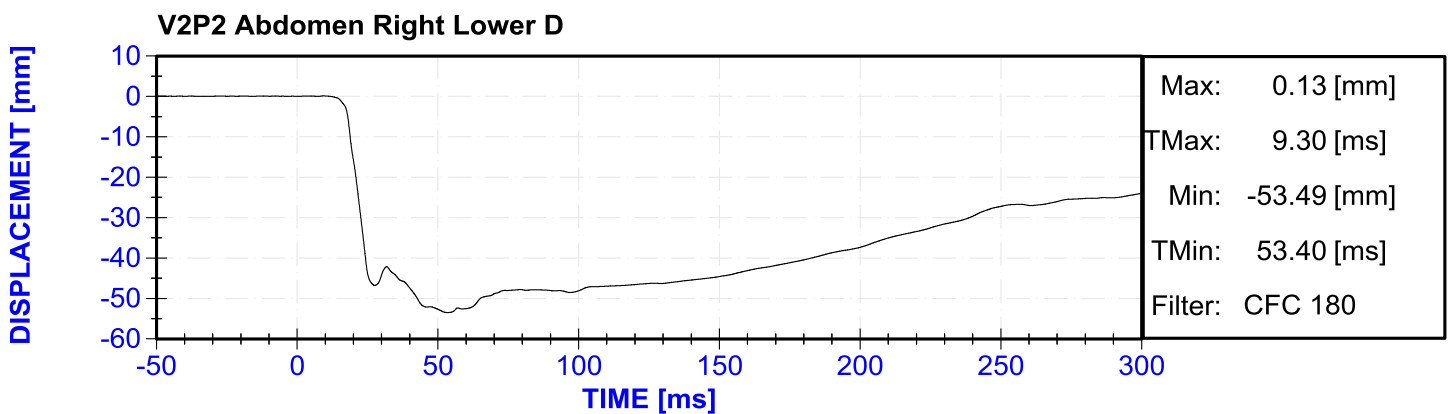
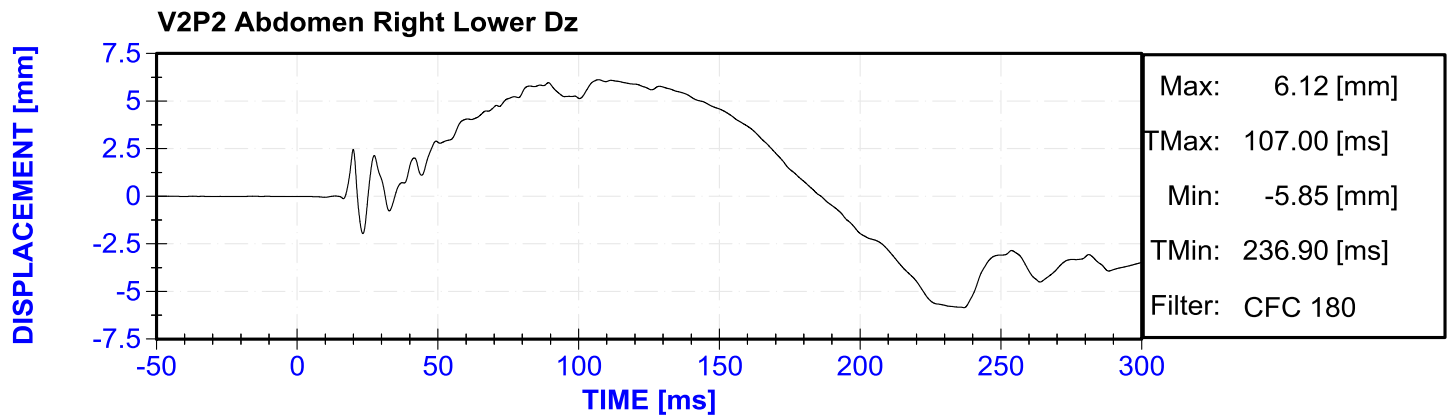
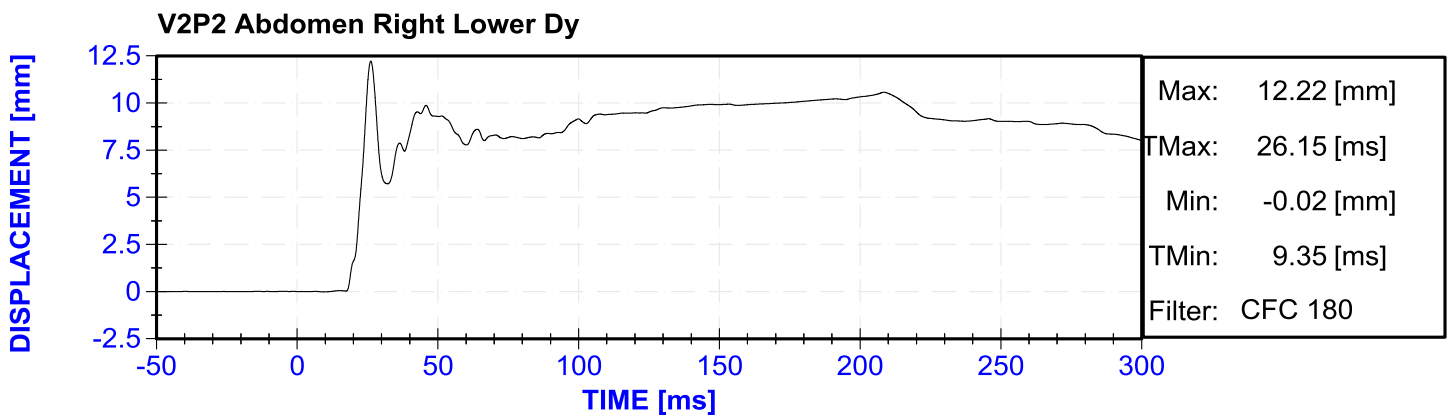
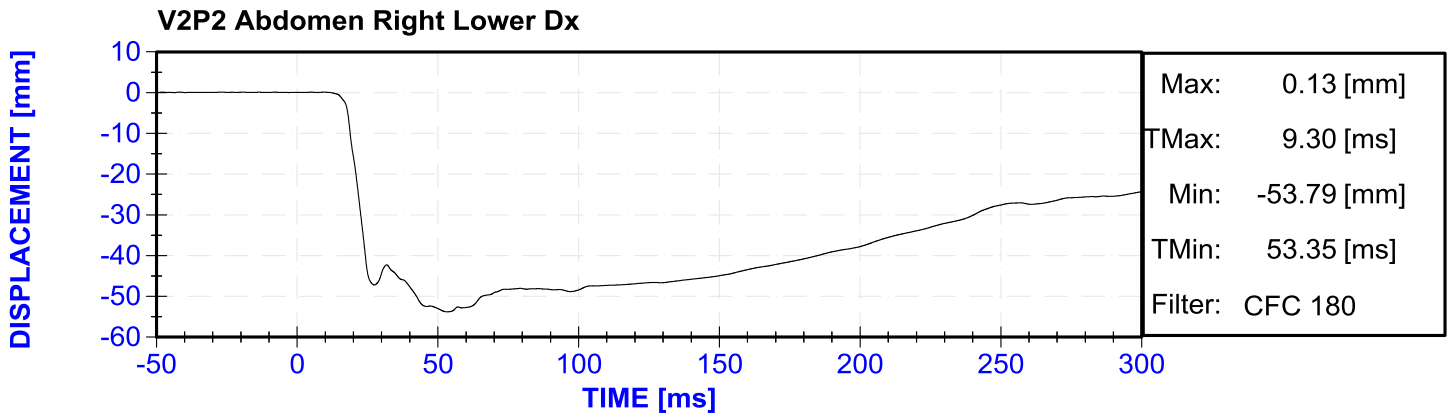


V2P2 Chest Left Lower D









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

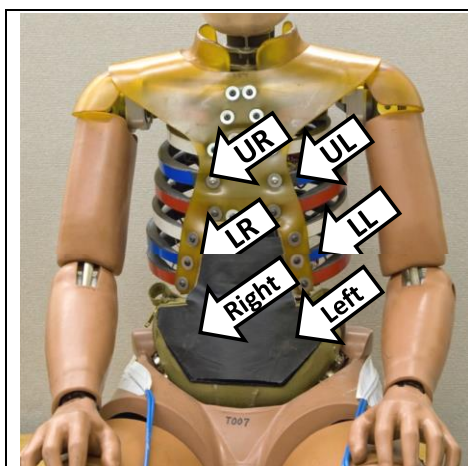


Figure 1. Manipulation to determine thoracic and abdominal IR-TRACC polarity.

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

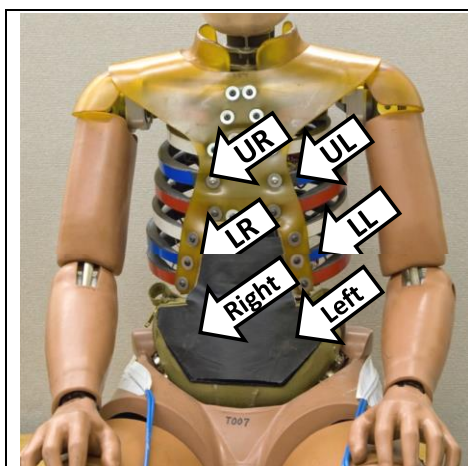


Figure 2. Manipulation to determine thoracic and abdominal IR-TRACC polarity.

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: 5/23/2014	
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 or Inspection: Certification performed in May 2014	
<u>Tests conducted since last full certification or inspection:</u> <u>Since last inspection:</u> None <u>Since last certification:</u> None	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> None	
<u>Physical evidence of damage:</u> See Report – Minor Damage	
<u>Anecdotal evidence of damage:</u> N/A	
<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
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
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	

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 

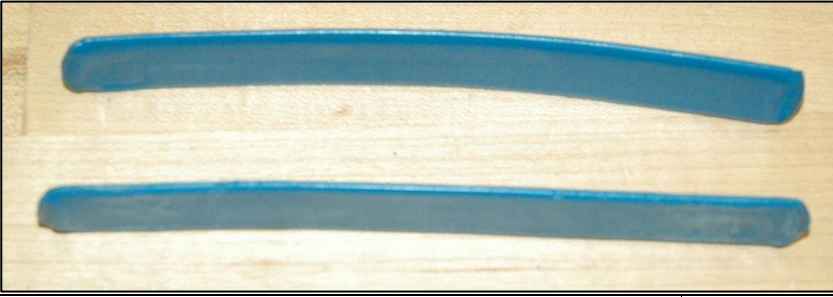
FEMUR	
Y / N	Acetabular load cells firmly attached
Y / N	Femur load cells firmly attached
Y / N	No evidence of deformation of knee slider bump stop
Y / N	No cuts, tears, or scuffing of knee flesh Knees are scuffed

	
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
Other	

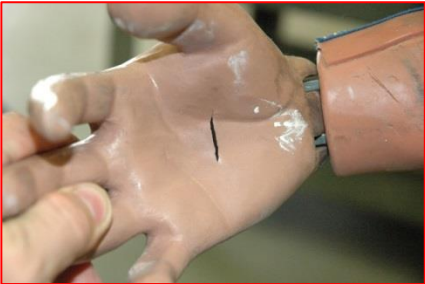
JACKET

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: 6/20/2014	
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: R20145400 – Mazda 3 Since last certification: R20145400 – 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, IRTACC 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 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	

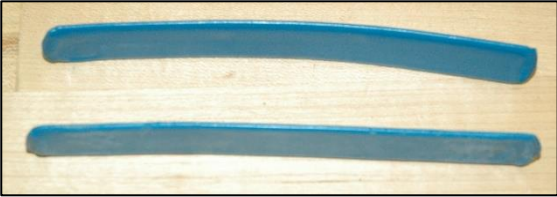
THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material
Y / N	No evidence of debonding between rib damping material and ribs
Y / N	CRUX anterior arms securely attached to anterior ribs
Y / N	CRUX posterior arms securely attached to double gimbals, spine
Y / N	Urethane 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 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	

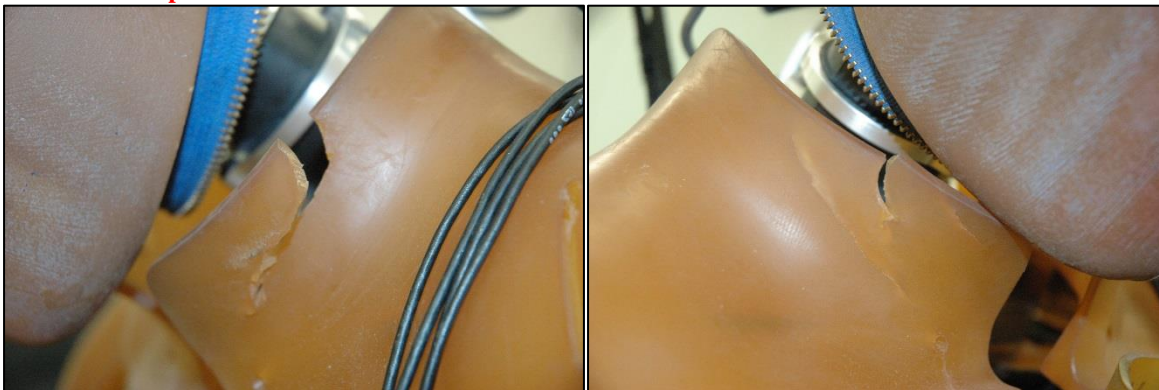
THOR Inspection Checklist

Date: 6/18/2014	
NHTSA Representative: James Saunders	
Inspection Reporter: 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 or Inspection: Certification performed in June 2014	
<u>Tests conducted since last full certification or inspection:</u> Since last inspection: None Since last certification: None	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> None	
<u>Physical evidence of damage:</u> See Report – Minor Damage	
<u>Anecdotal evidence of damage:</u> N/A	
<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

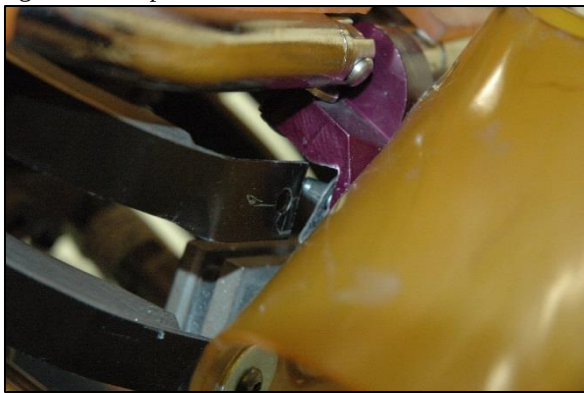
HEAD	
Y / N	Rear head cap mounts securely to head
Y / N	Head skin fits securely over skull
Y / N	Head skin shows no sign of tears or damage
Y / N	Interior components of skull cavity (ballast, accelerometer mount, accelerometers) securely attached
Y / N	Head securely mounted to OC joint

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. 
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. 

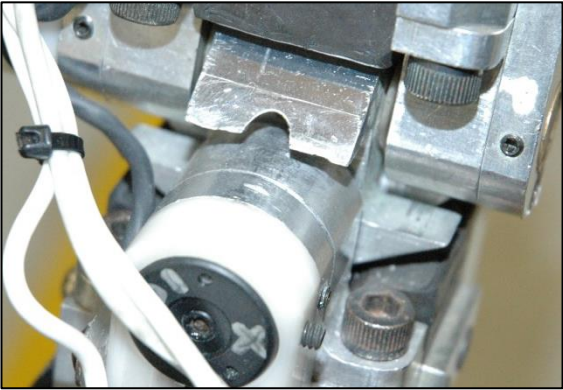
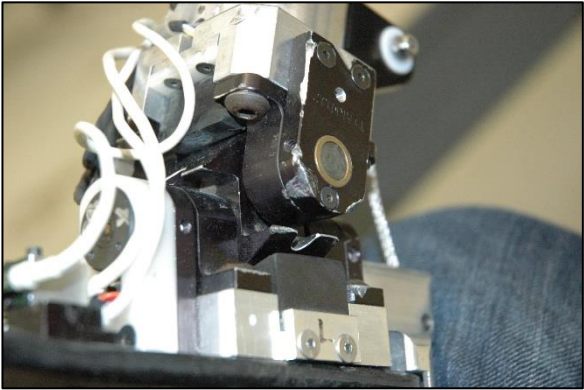
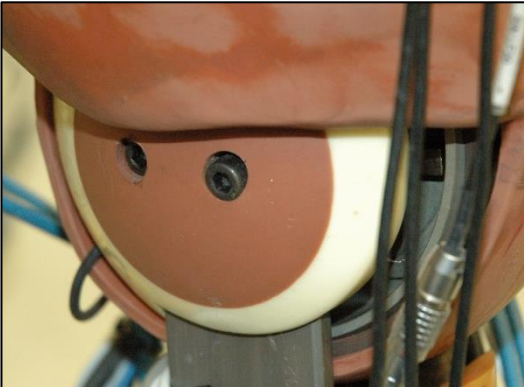
ABDOMEN	
Y / N	No evidence of tearing, cuts, or broken stitches in upper abdomen bag and zipper
Y / N	Upper abdomen insert securely attached to spine
Y / N	Upper abdomen insert shows no evidence of permanent set
Y / N	No evidence of tearing, cuts, or broken stitches in lower abdomen bag and zipper

		
	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	
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
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	

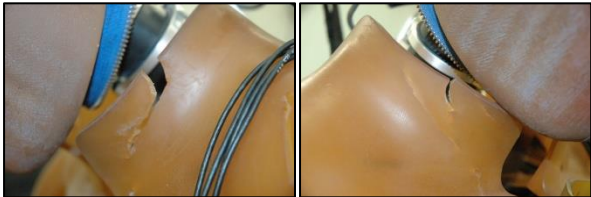
THOR Inspection Checklist

Date: 6/20/2014	
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: R20145400 – Mazda 3 Since last certification: R20145400 – 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.

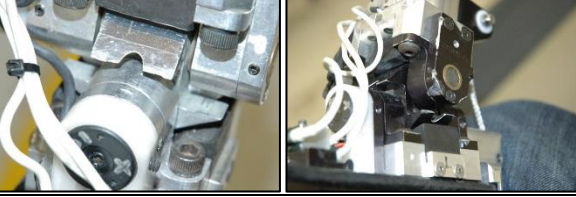
	 Bib is torn in the center near clavicle attachment. 
Y / N	Ribs securely attached to posterior spine
Y / N	Rib stiffeners show no evidence of bending (no gaps between ribs and stiffeners)
OTHER	T6 Accelerometer cable is torn at accelerometer. 

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	

Test Data/Sensor Repair Notes

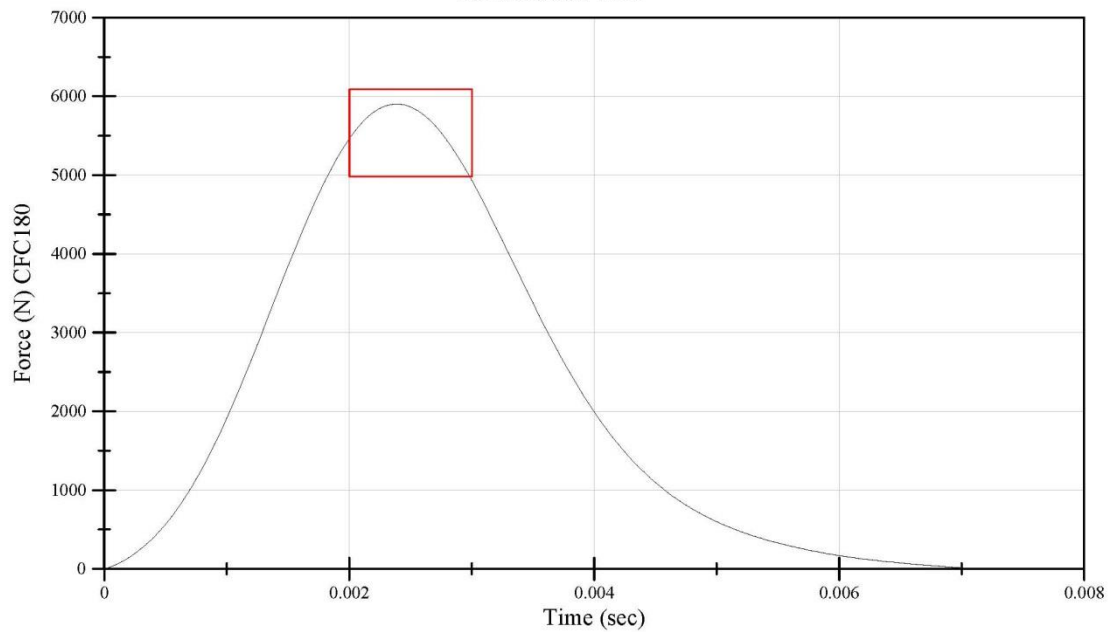
DUMMY CALIBRATIONS

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



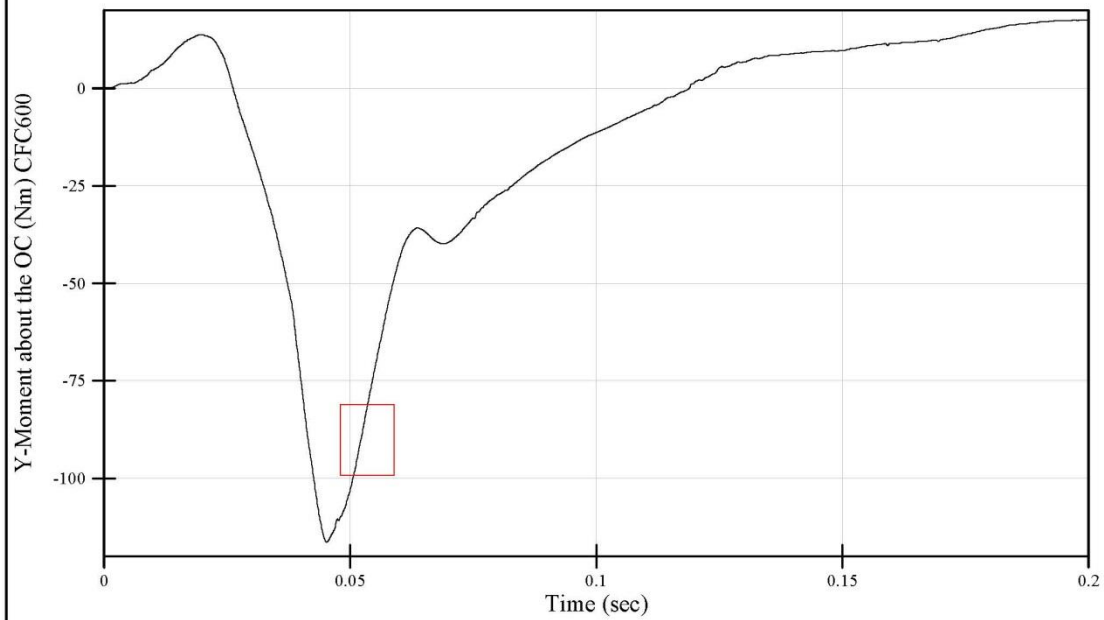
Software Version: 2.4

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

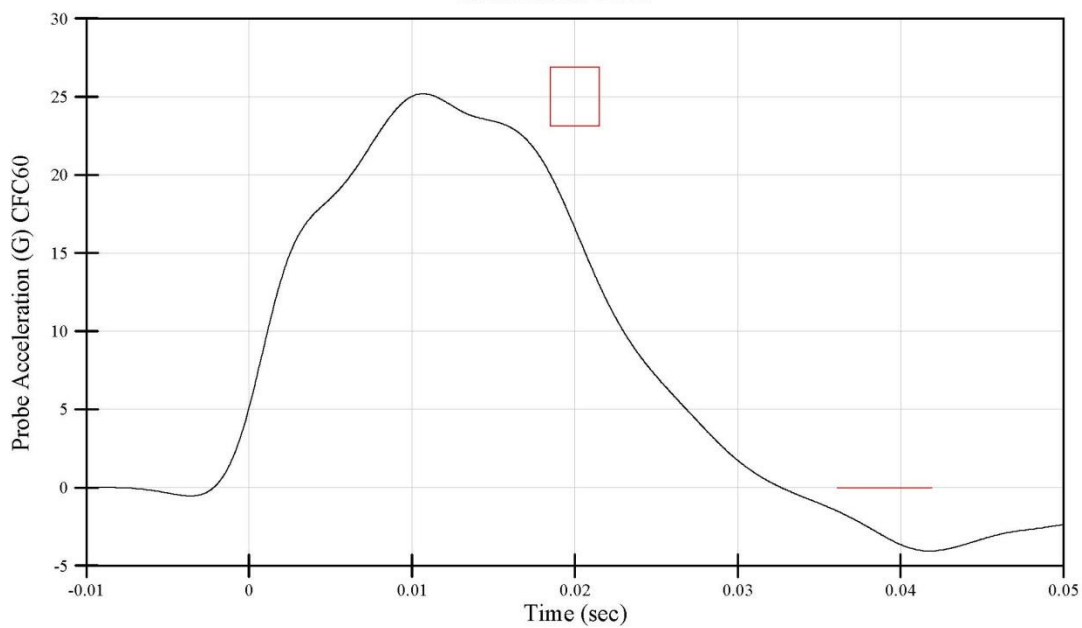


Software Version: 2.4

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

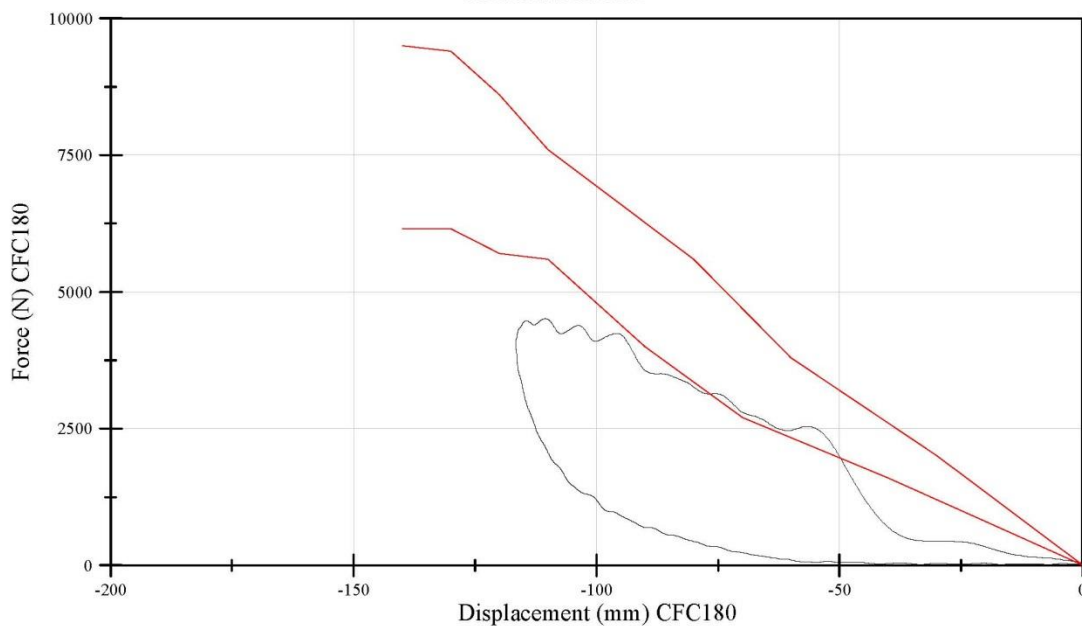


Software Version: 2.4

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

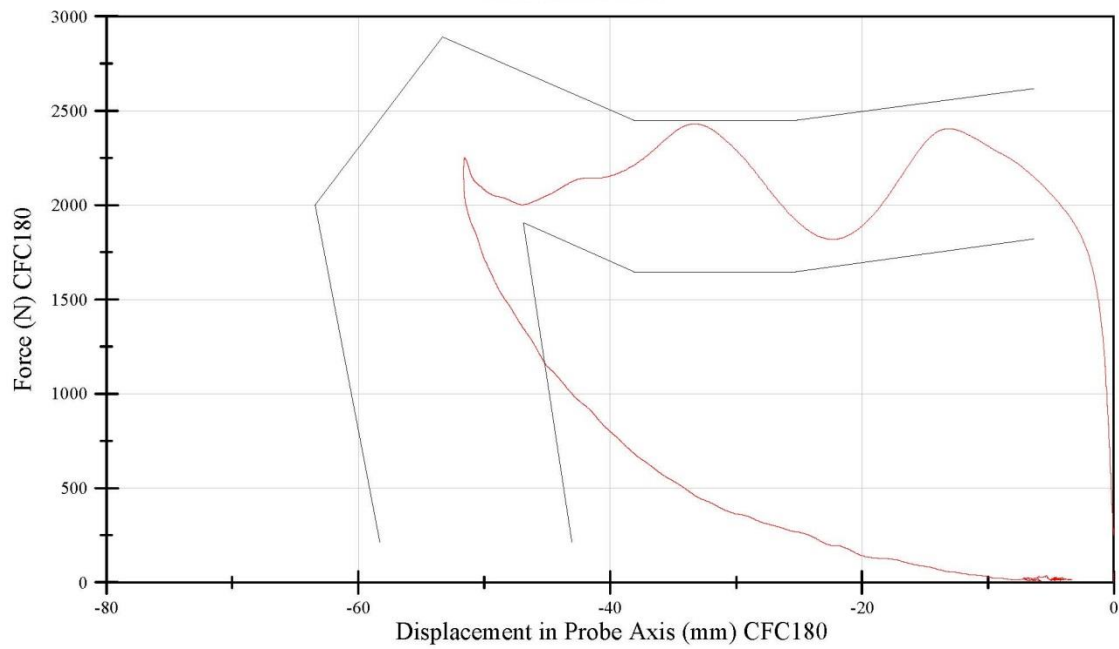


Software Version: 2.4

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

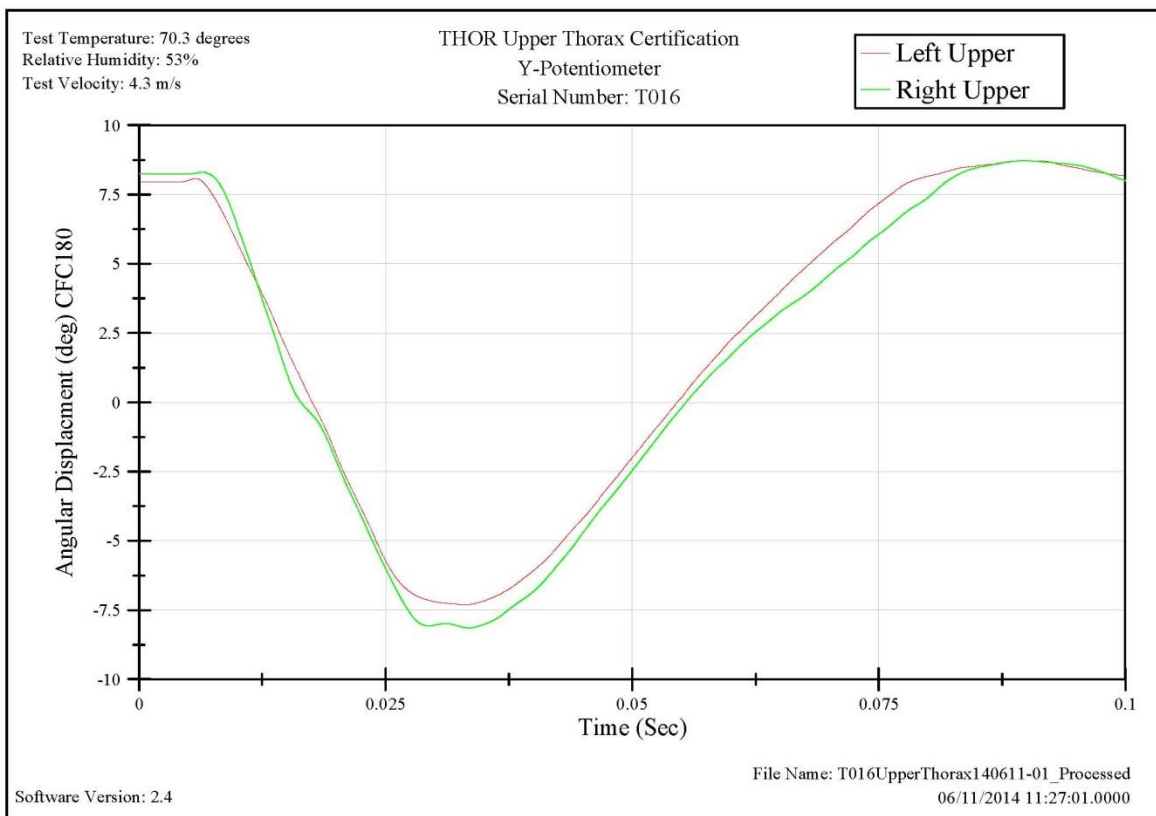
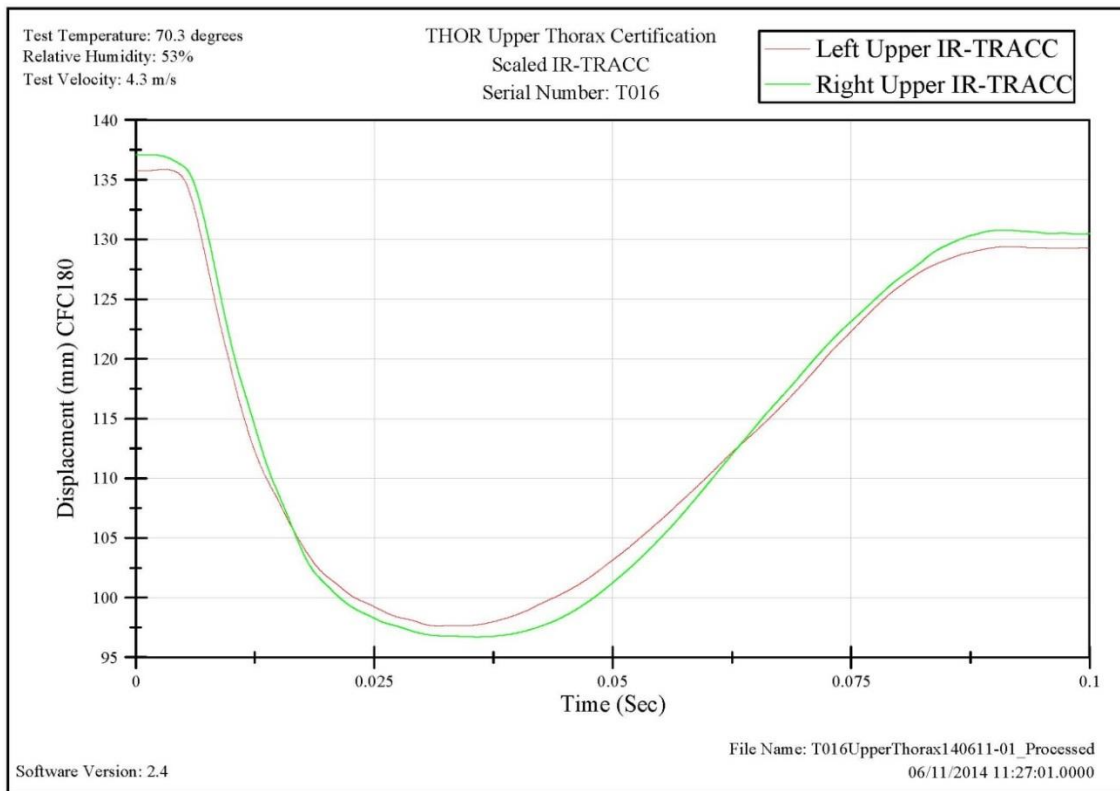
Test Temperature: 70.3 degrees
Relative Humidity: 53%
Test Velocity: 4.3 m/s

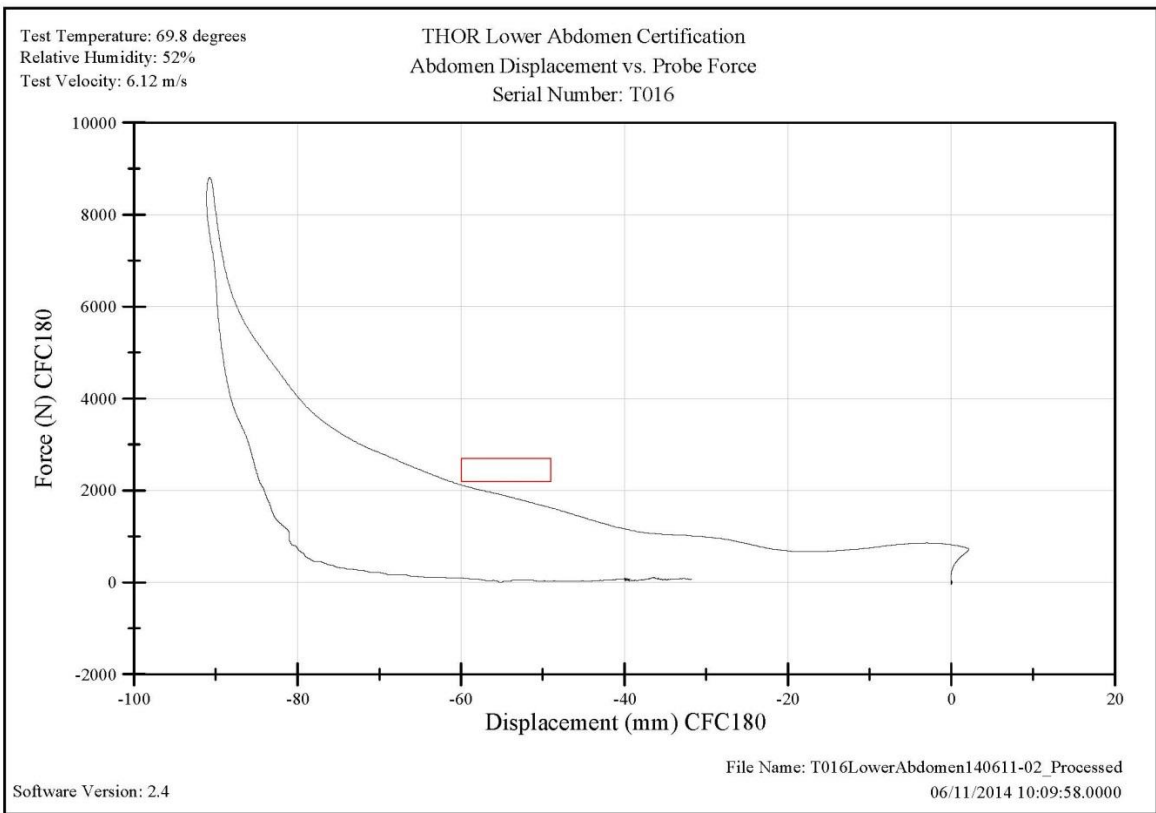
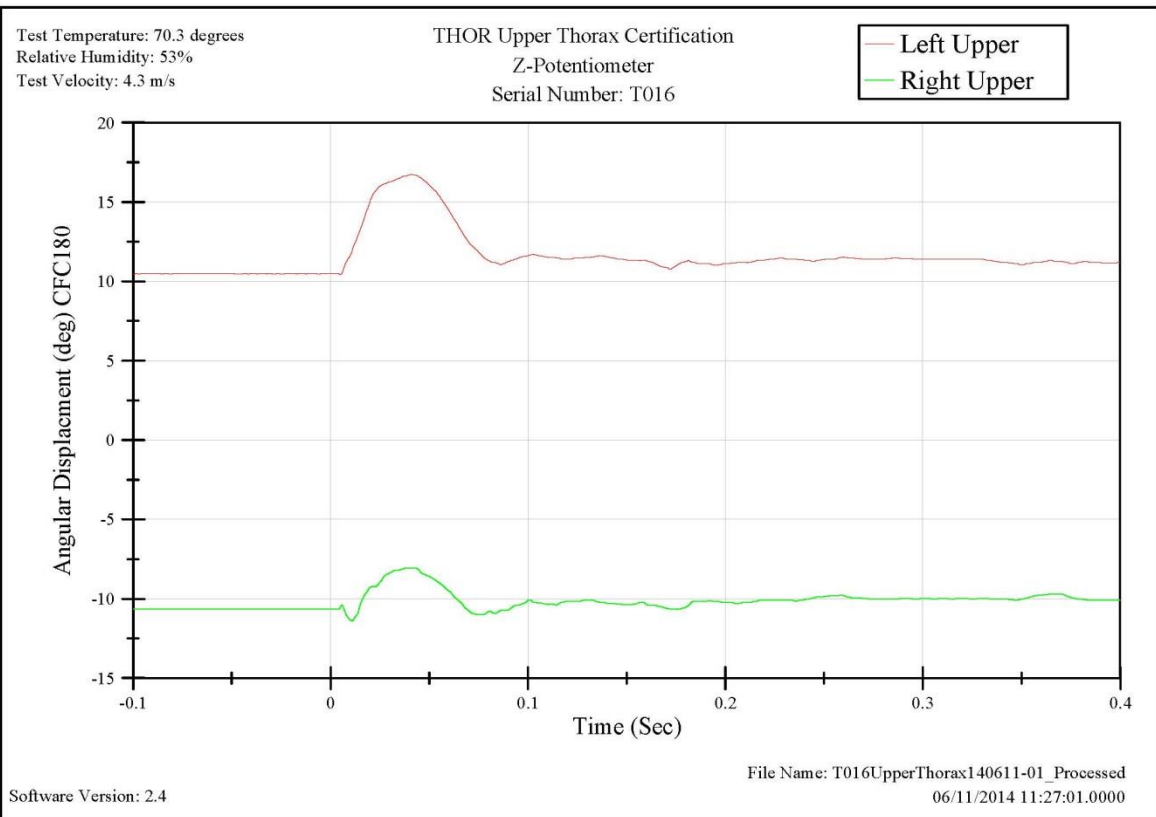
THOR Upper Thorax Certification
Thorax Response With Kroell Corridor
Serial Number: T016

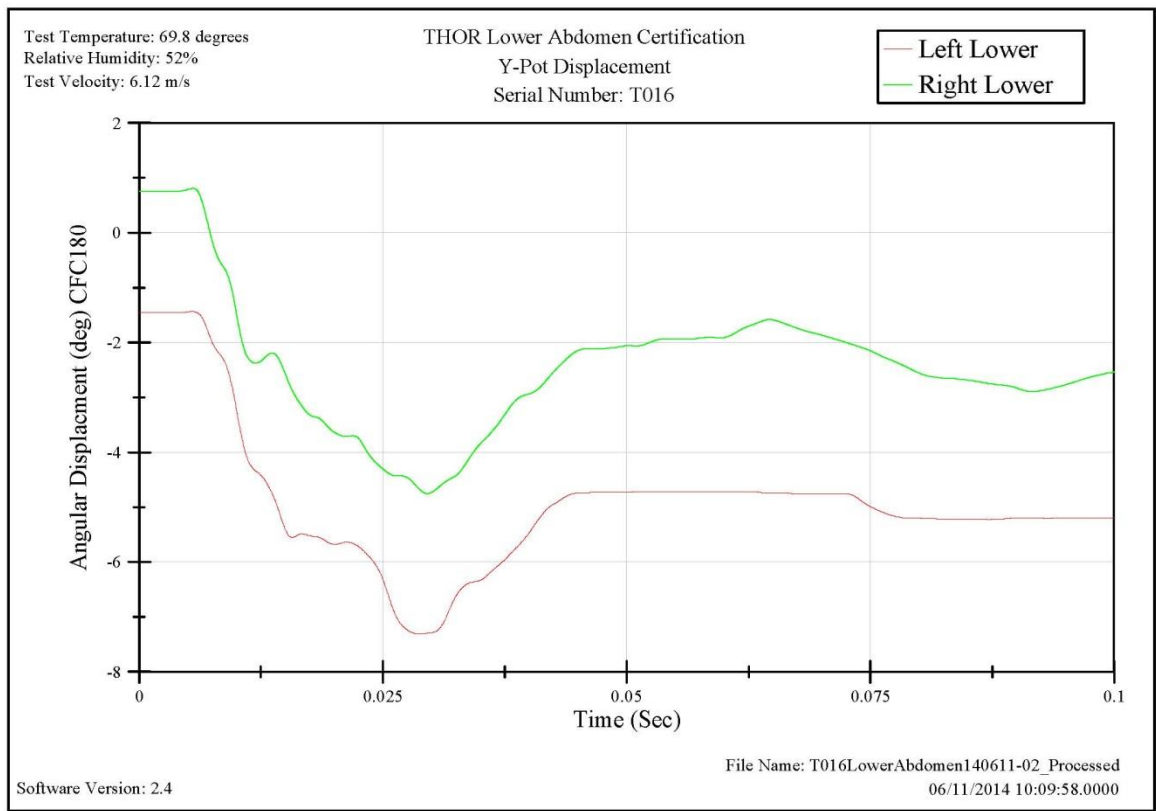
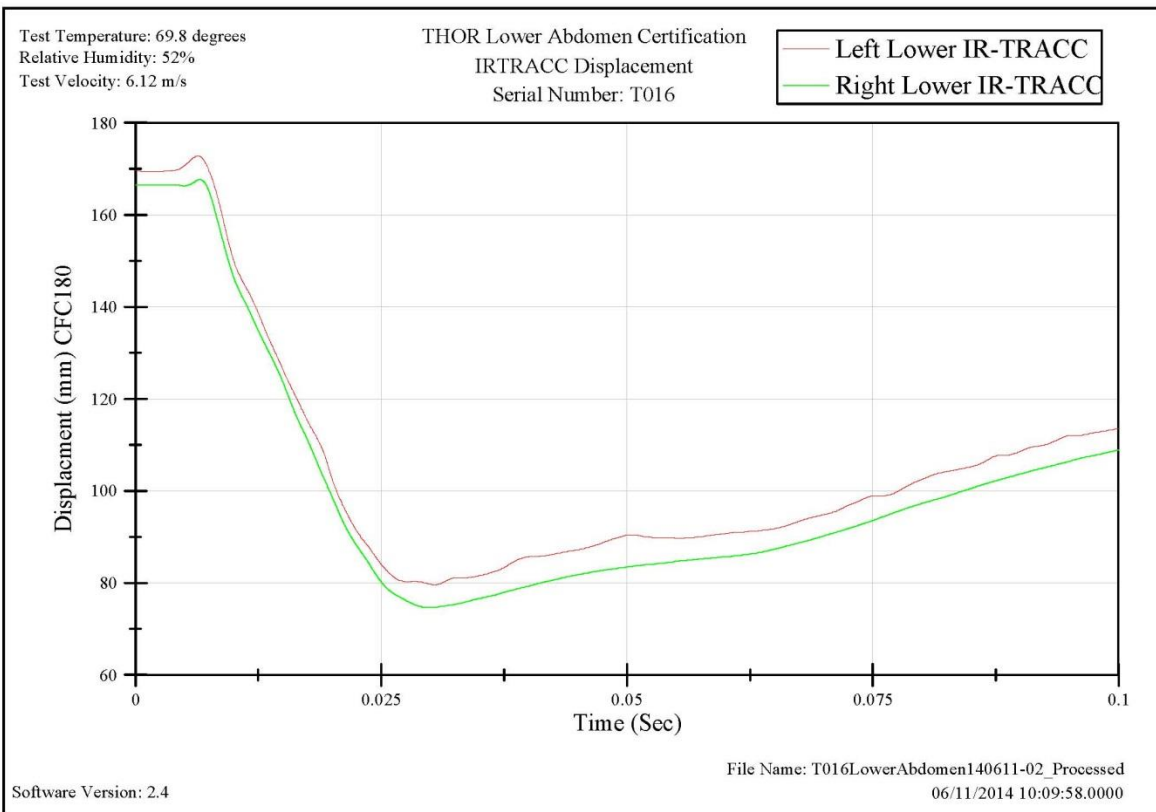


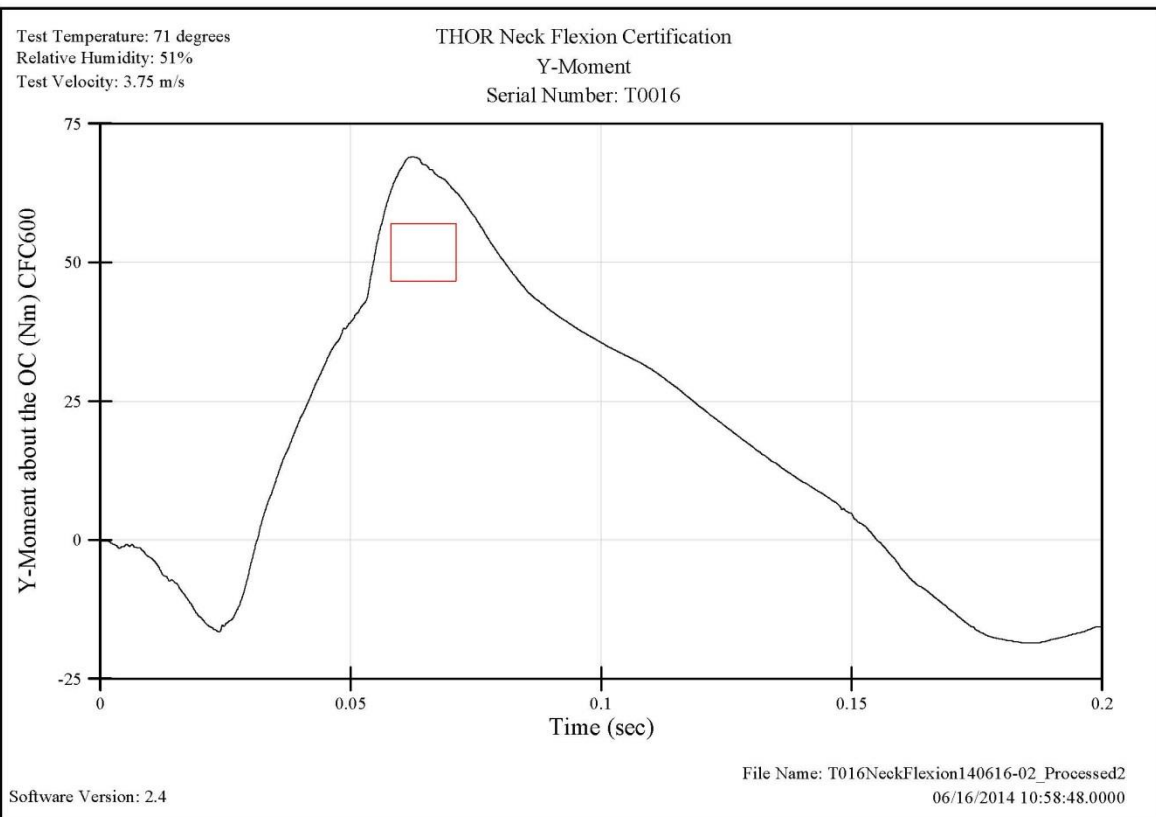
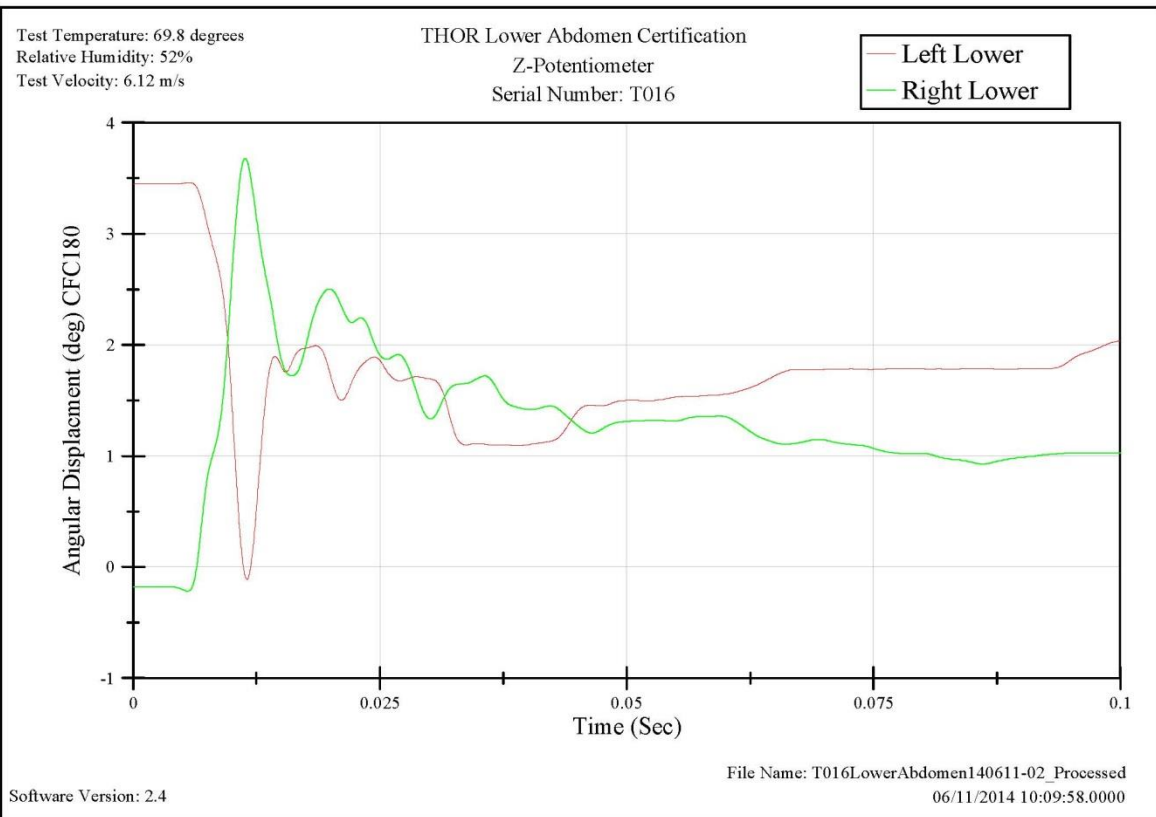
Software Version: 2.4

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



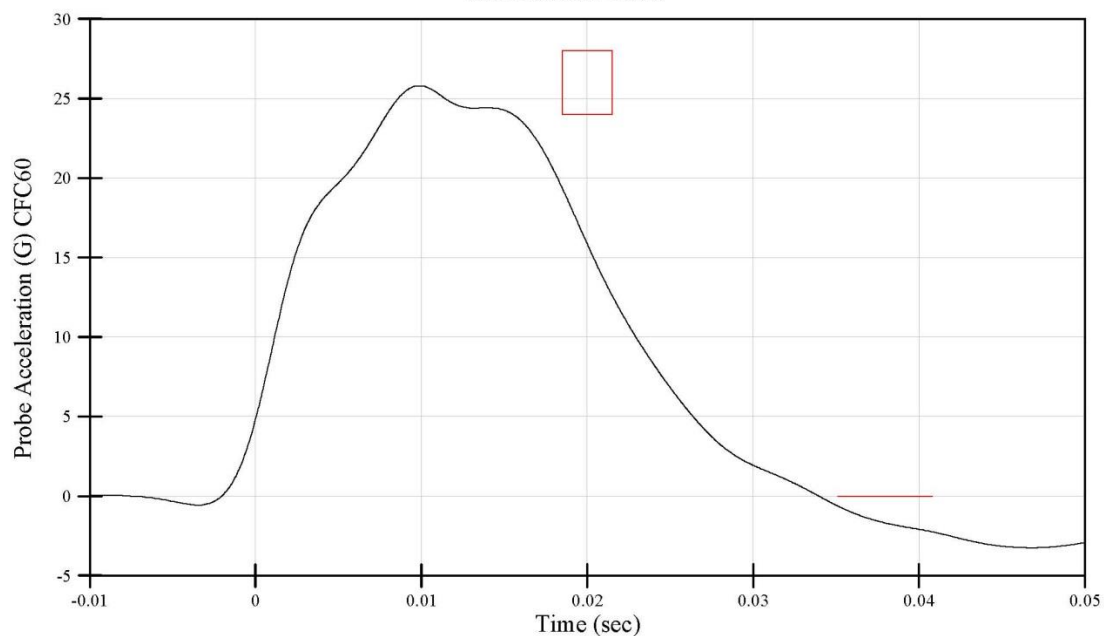






Test Temperature: 71 degrees
Relative Humidity: 51%
Test Velocity: 3.75 m/s

THOR Neck Flexion Certification
Probe Acceleration
Serial Number: T0016

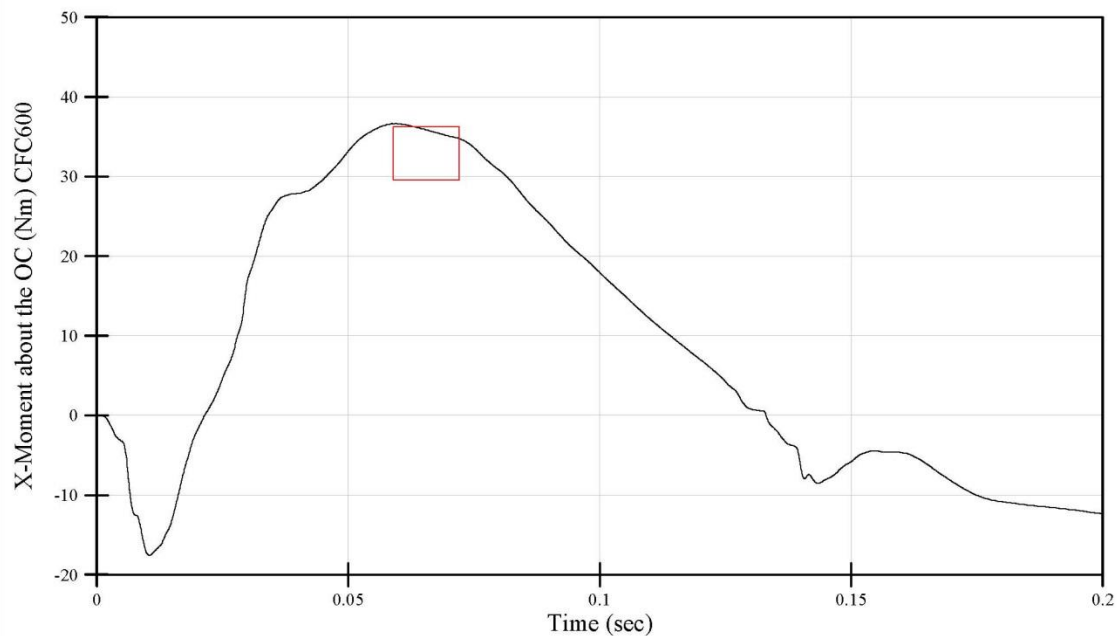


Software Version: 2.4

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



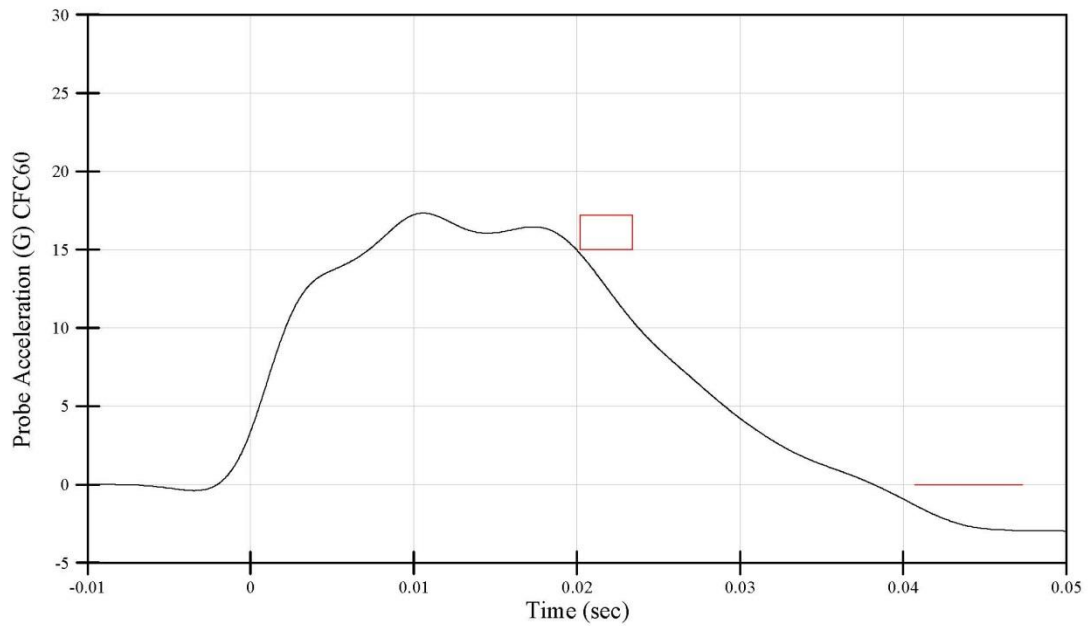
Software Version: 2.4

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



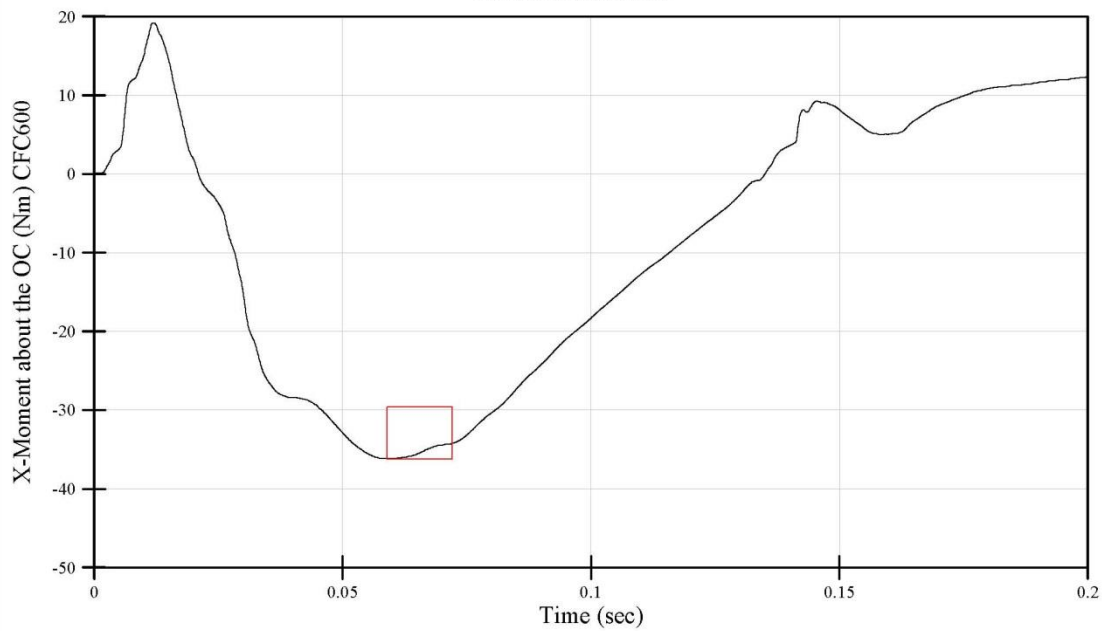
Software Version: 2.4

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



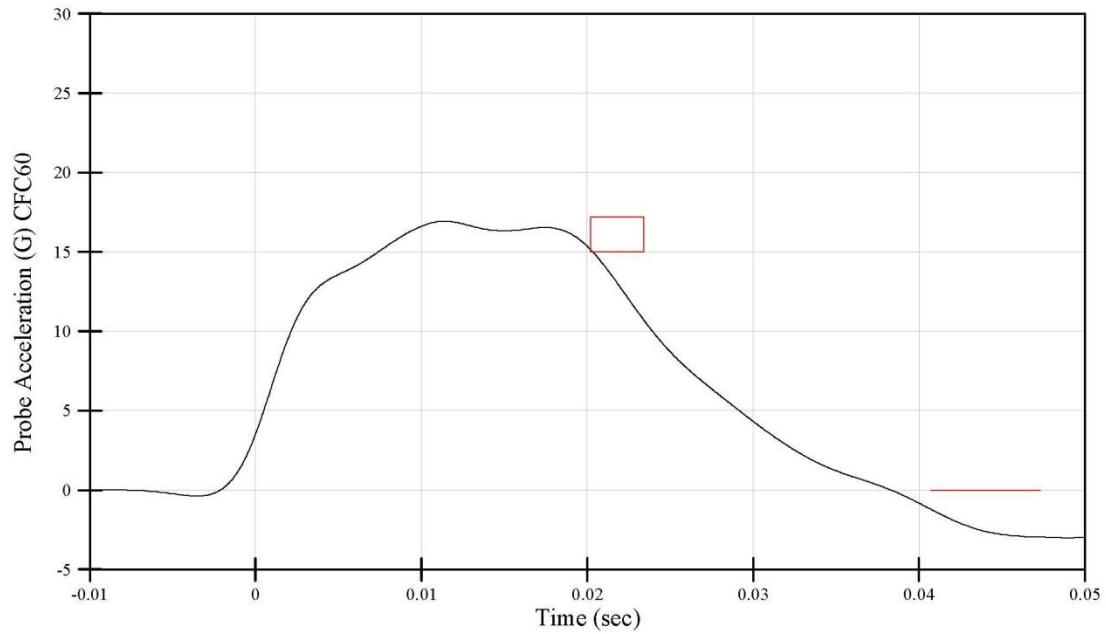
Software Version: 2.4

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



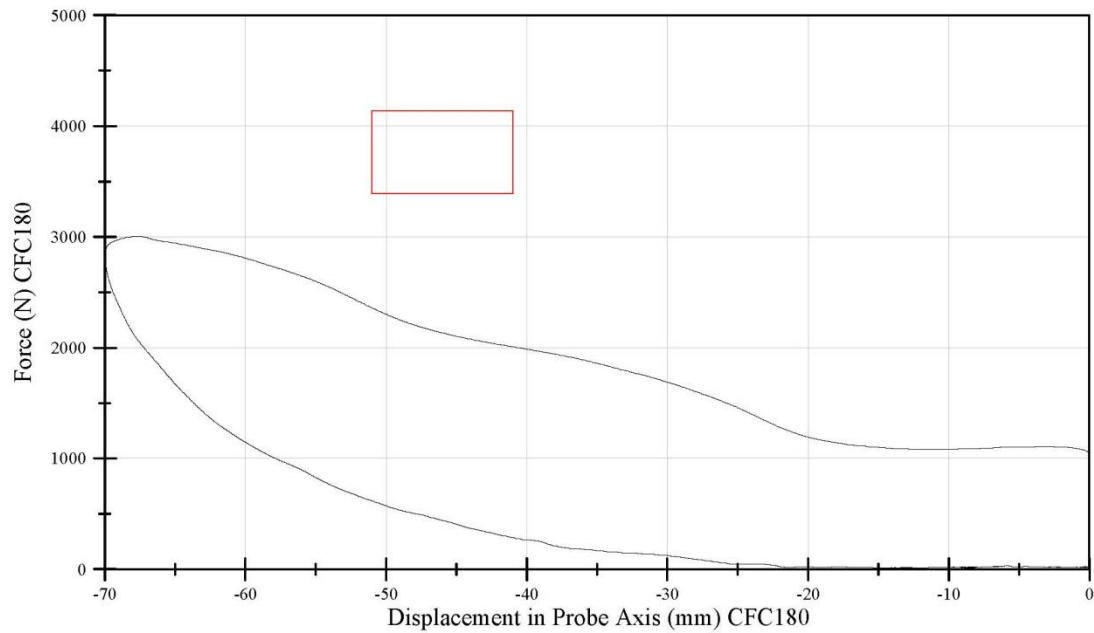
Software Version: 2.4

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

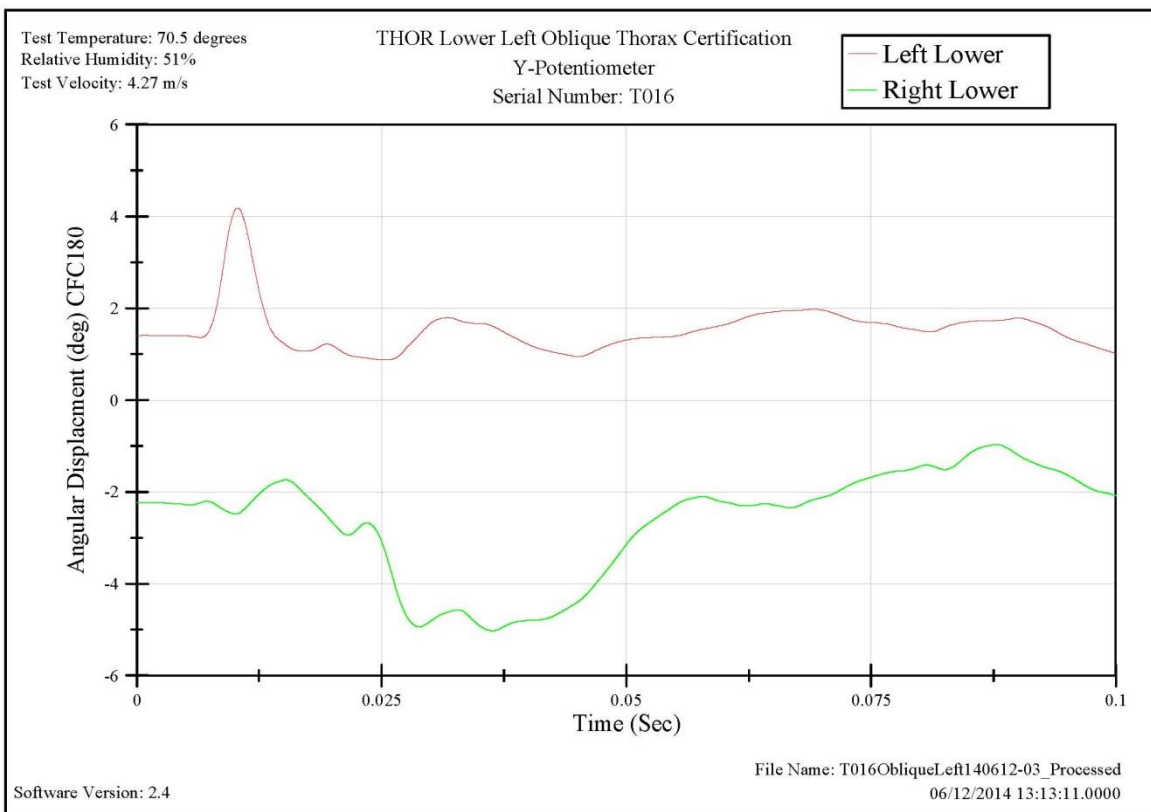
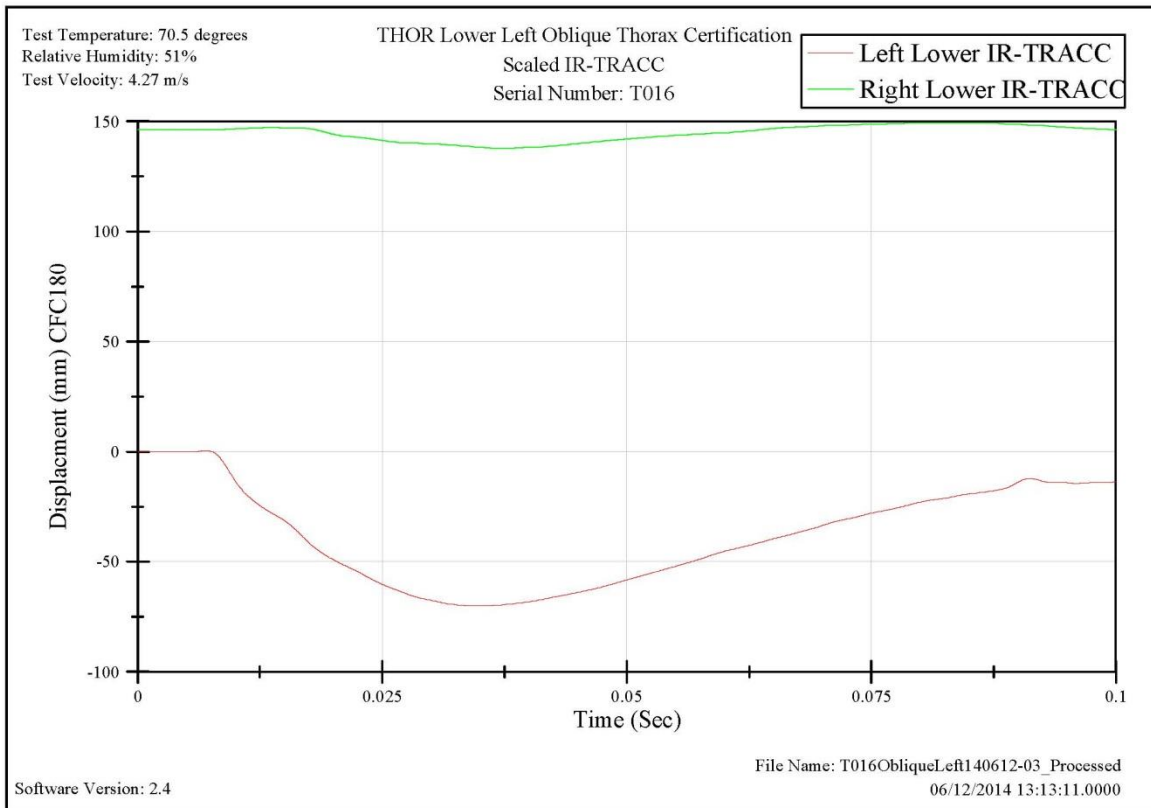
THOR Lower Left Oblique Thorax Certification

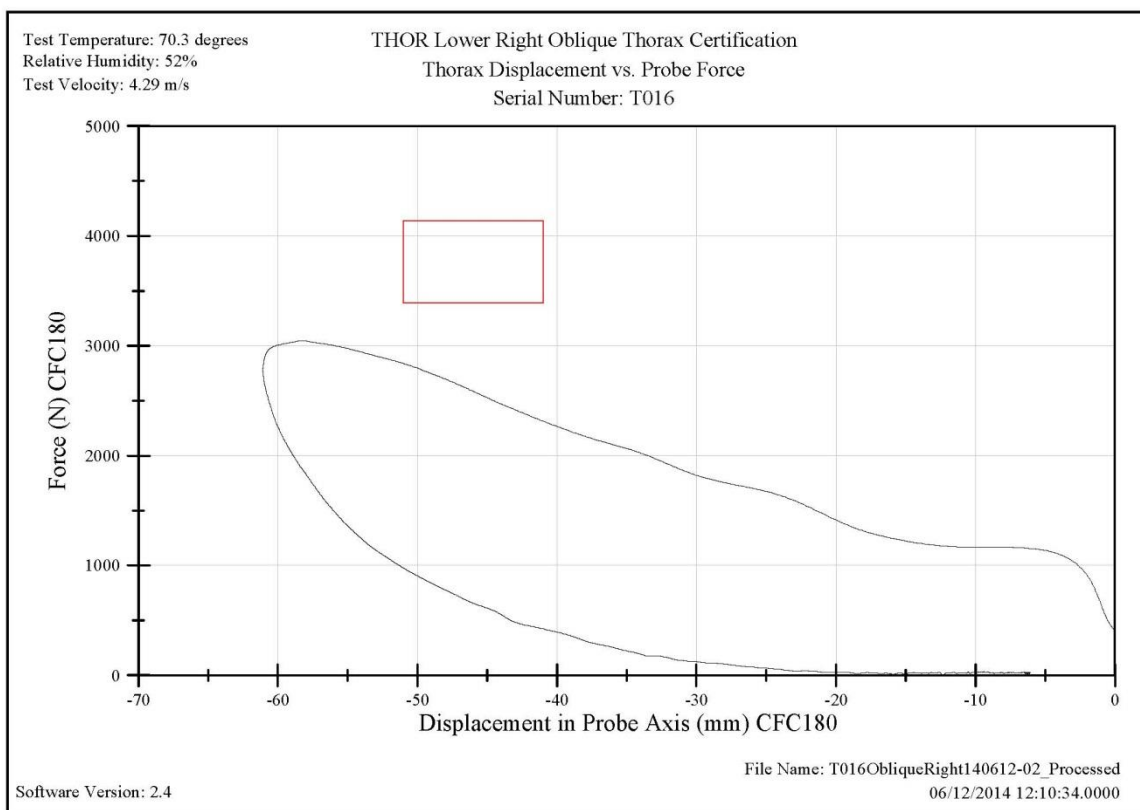
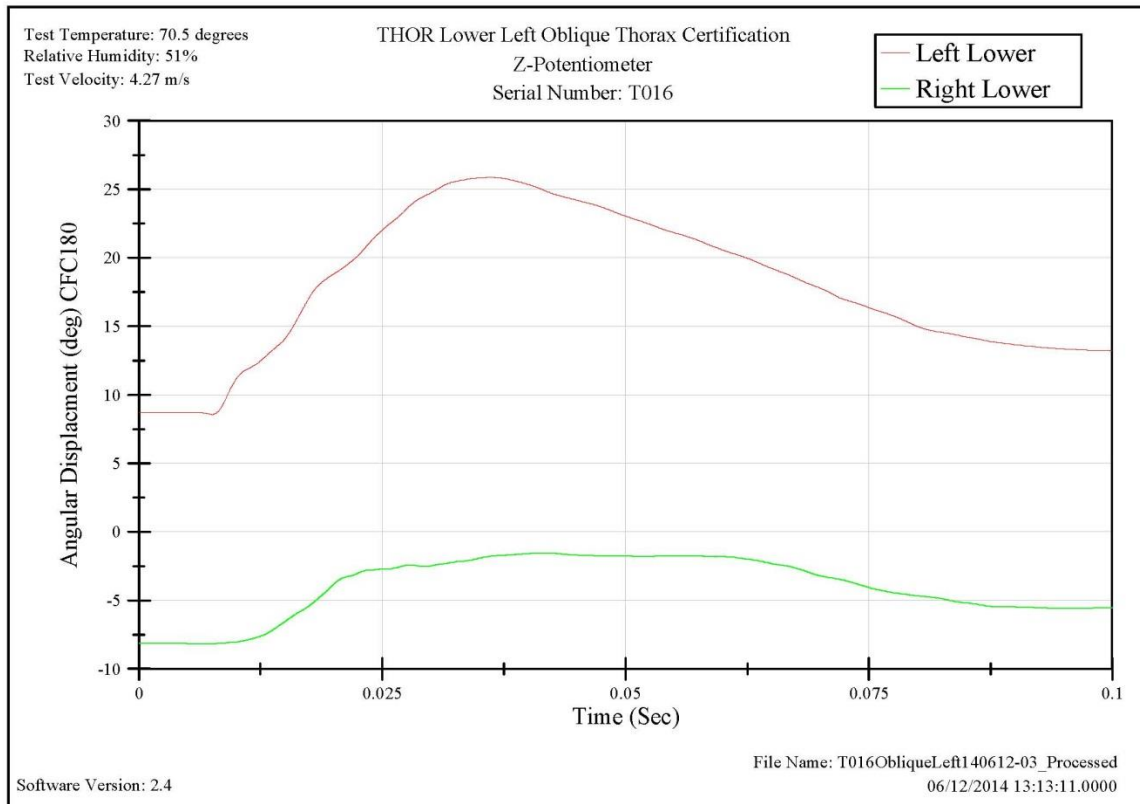
Thorax Displacement vs. Probe Force
Serial Number: T016

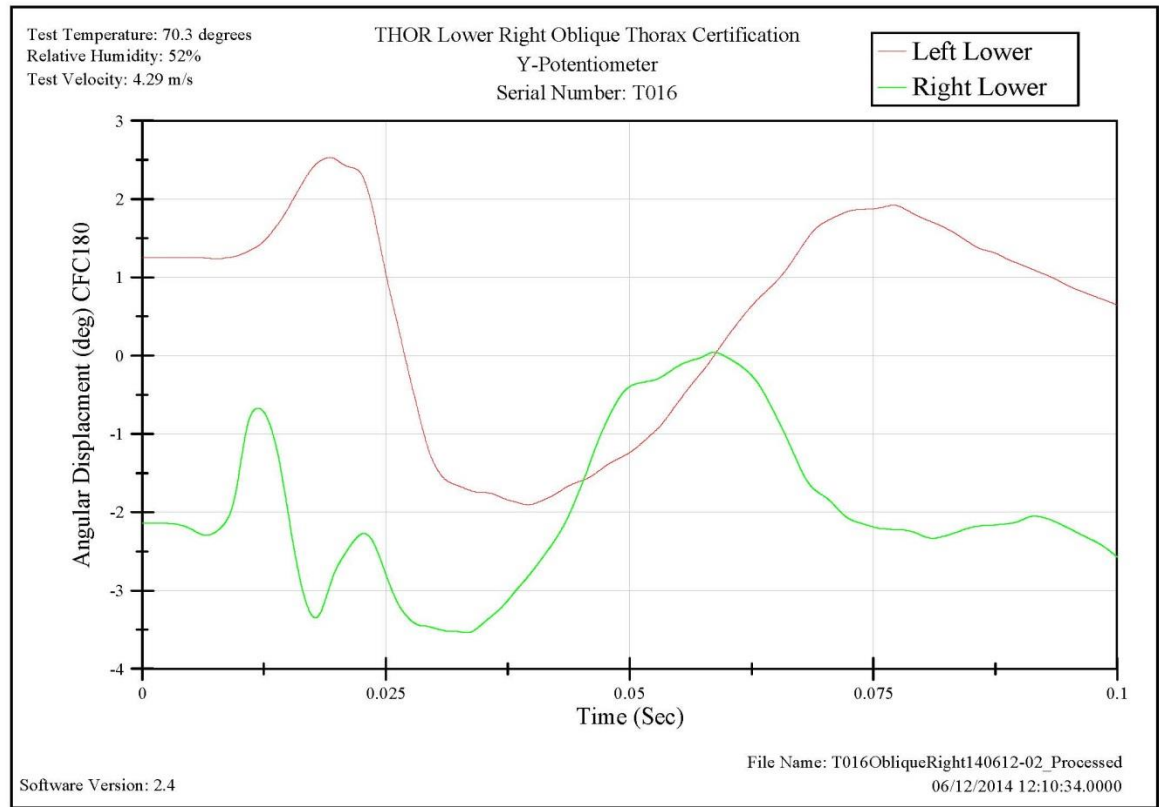
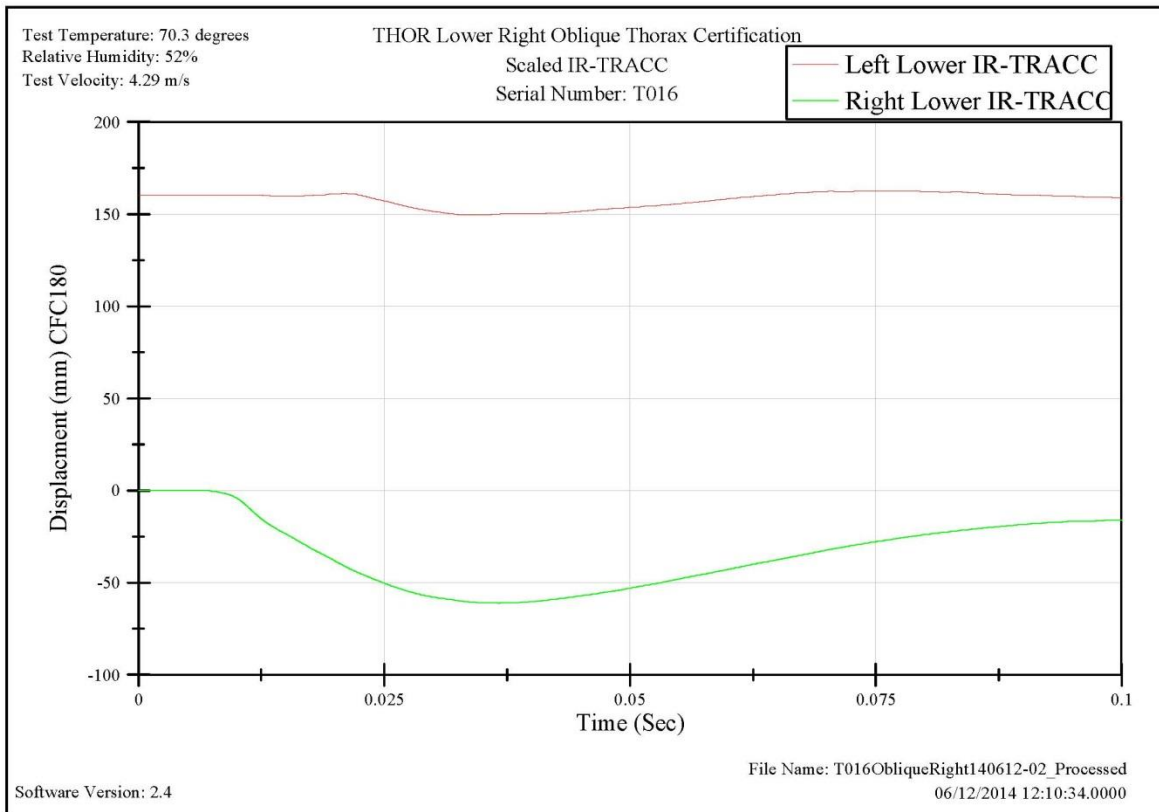


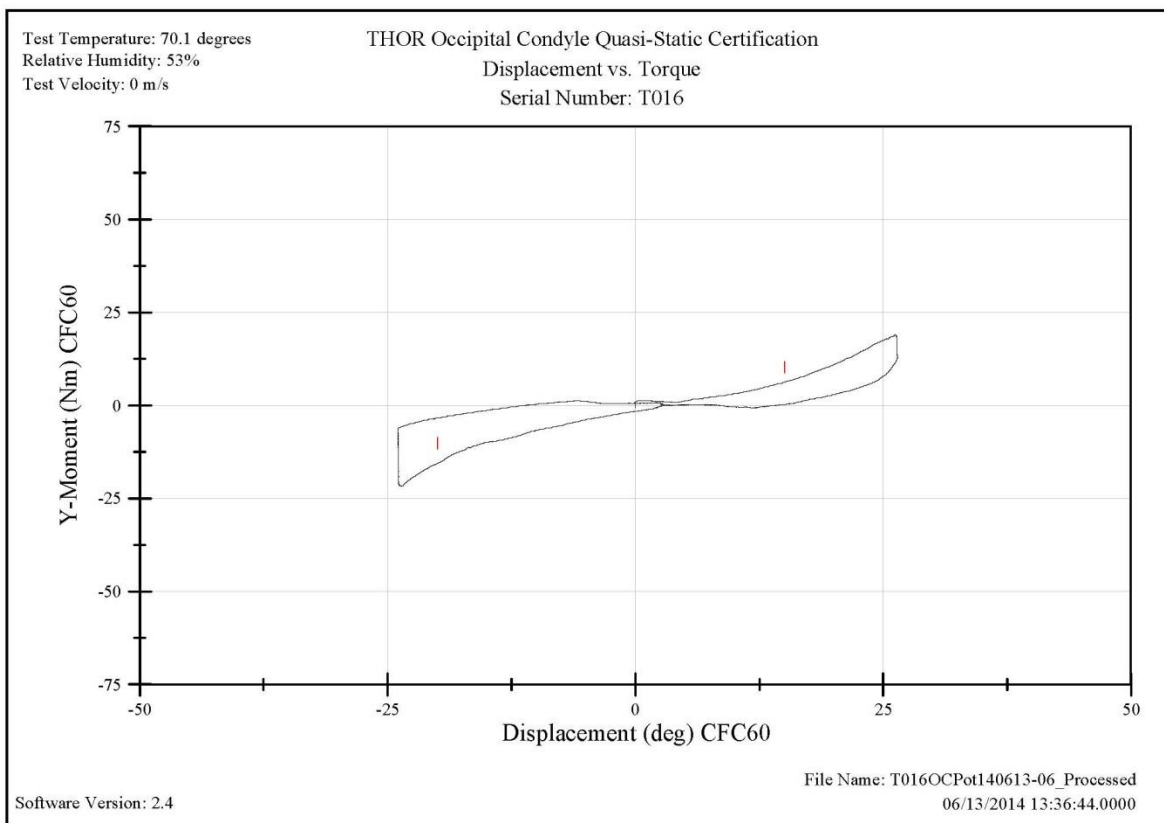
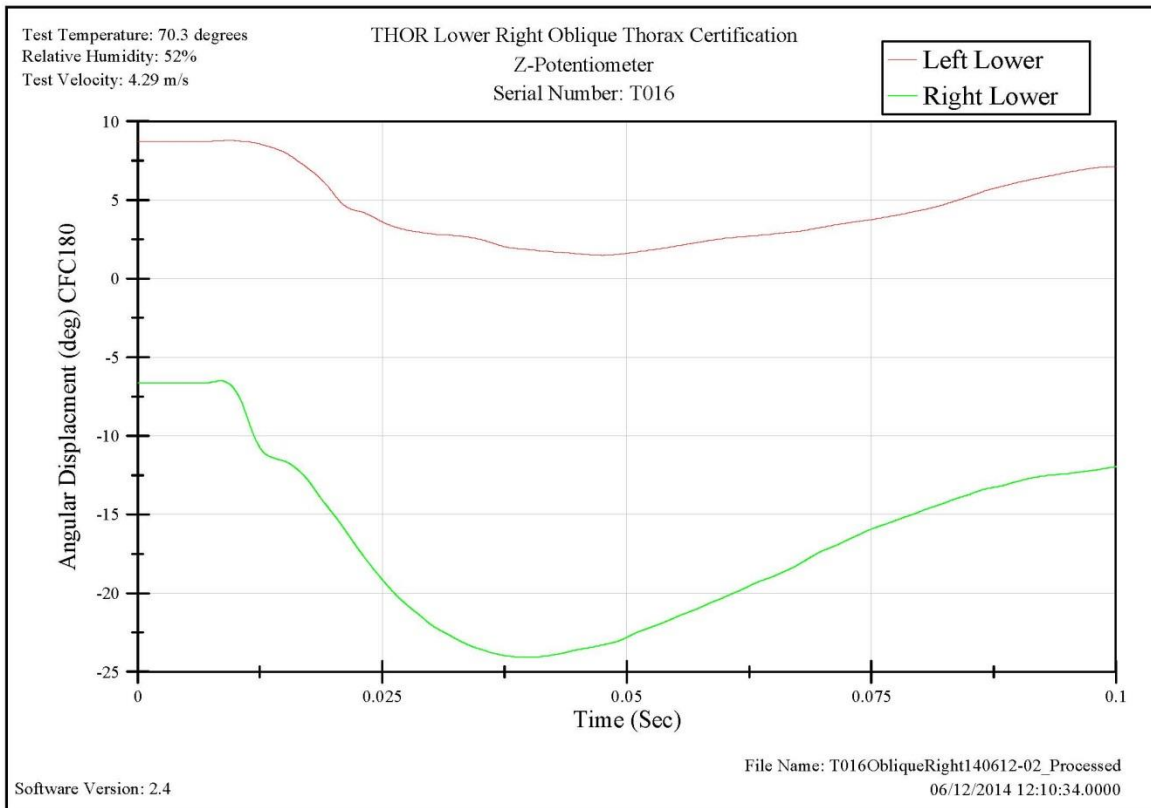
Software Version: 2.4

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



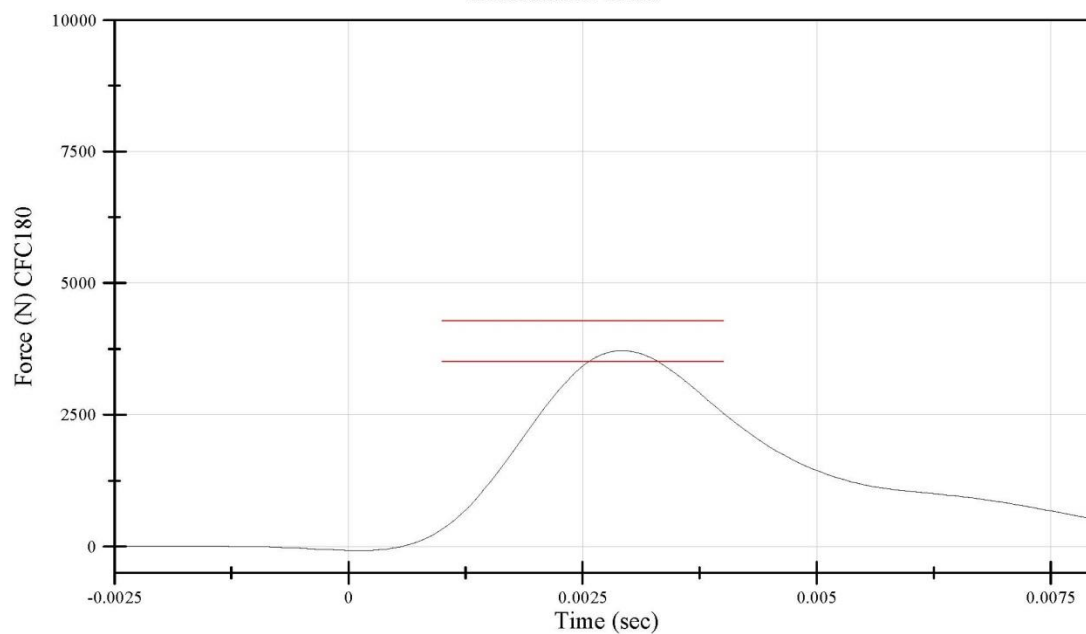






Test Temperature: 70.6 degrees
Relative Humidity: 52%
Test Velocity: 2.59 m/s

THOR Left Femur Certification
Probe Force
Serial Number: T0016

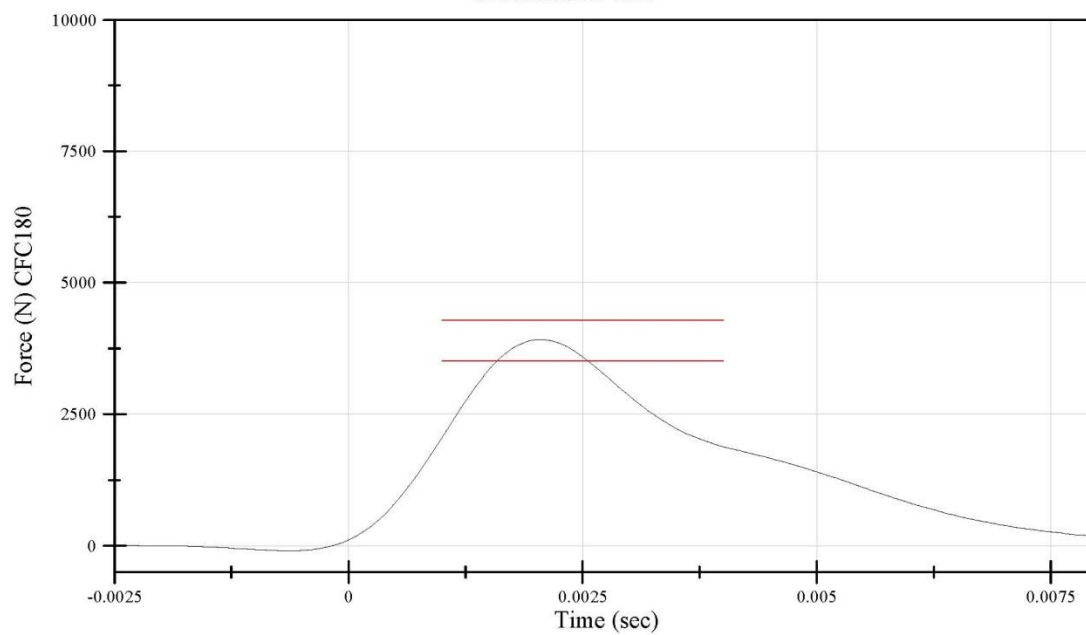


Software Version: 2.4

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

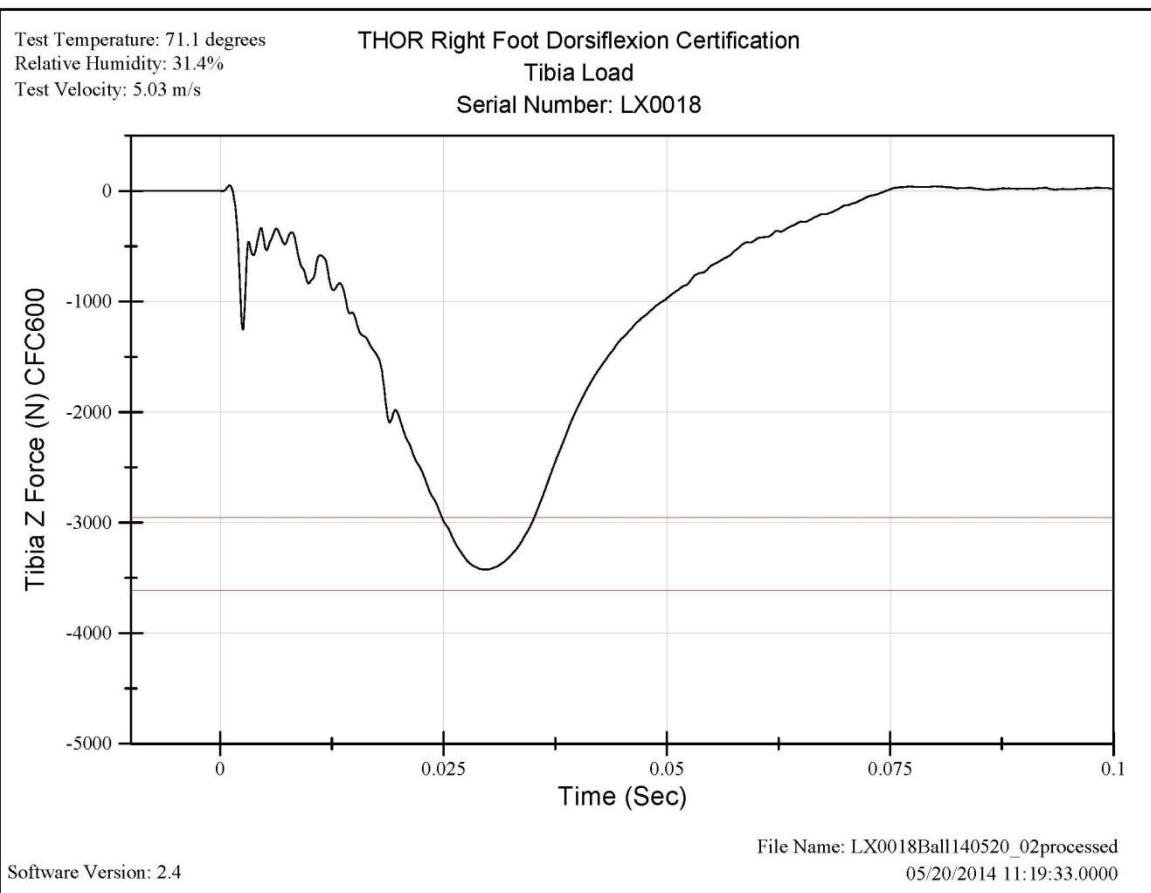
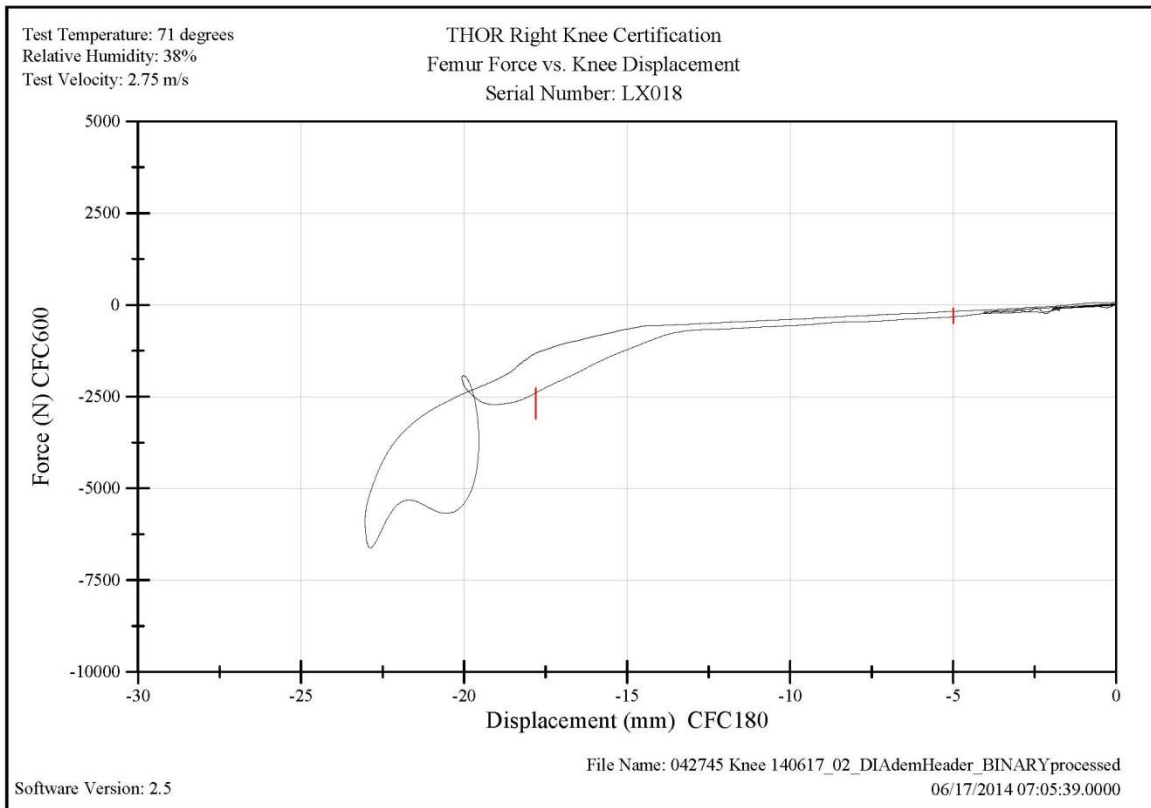
THOR Right Femur Certification
Probe Force
Serial Number: T016



Software Version: 2.4

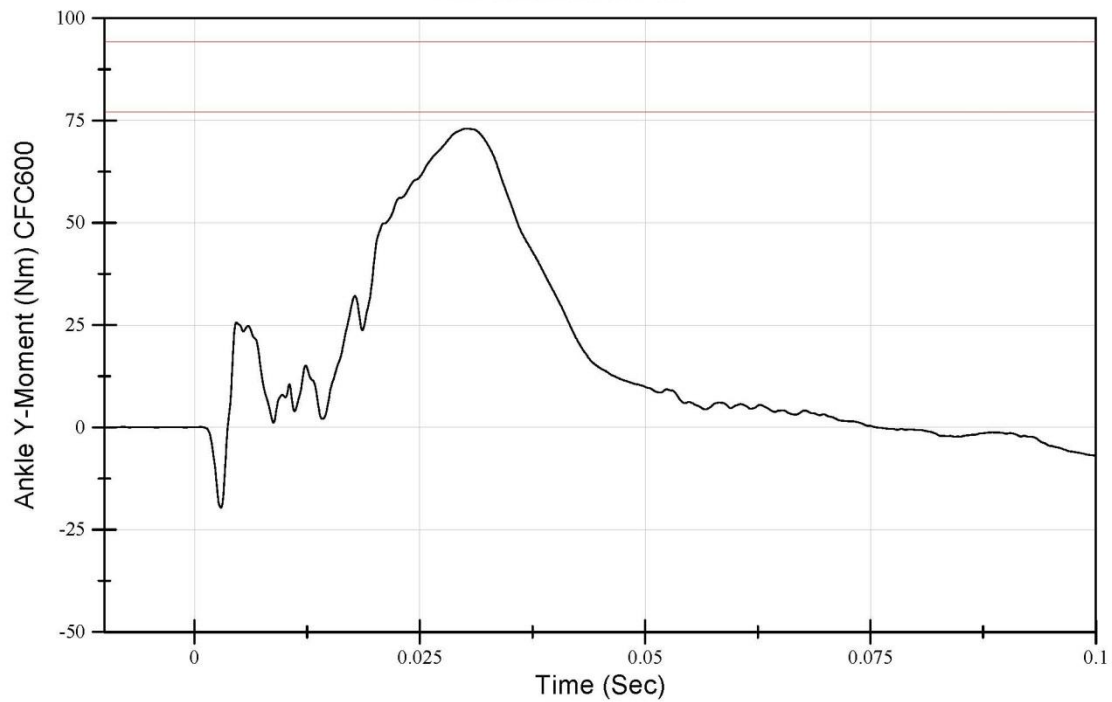
File Name: T016RightKnee140613-01_Processed
06/13/2014 16:14:24.0000

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

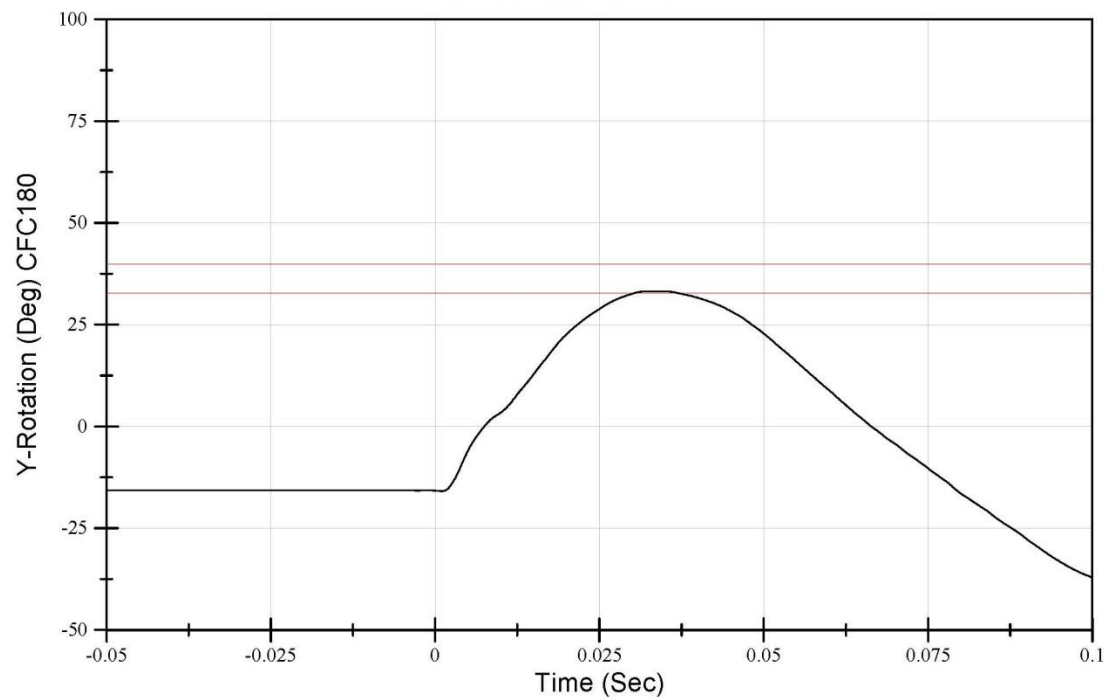


Software Version: 2.4

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

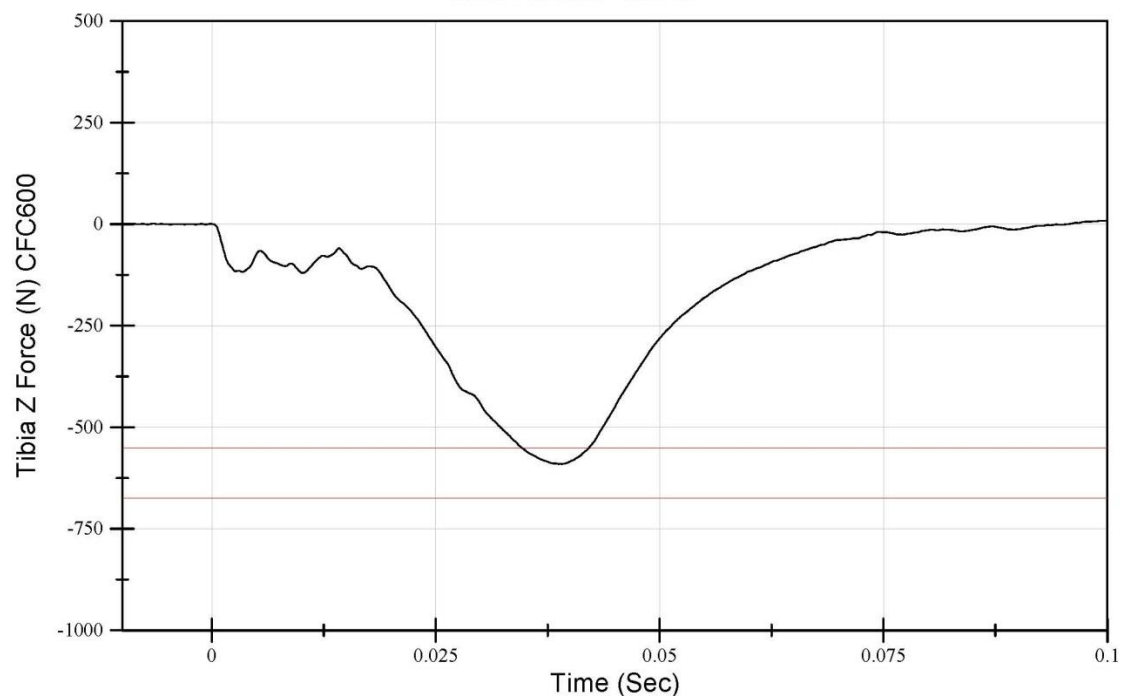


Software Version: 2.4

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

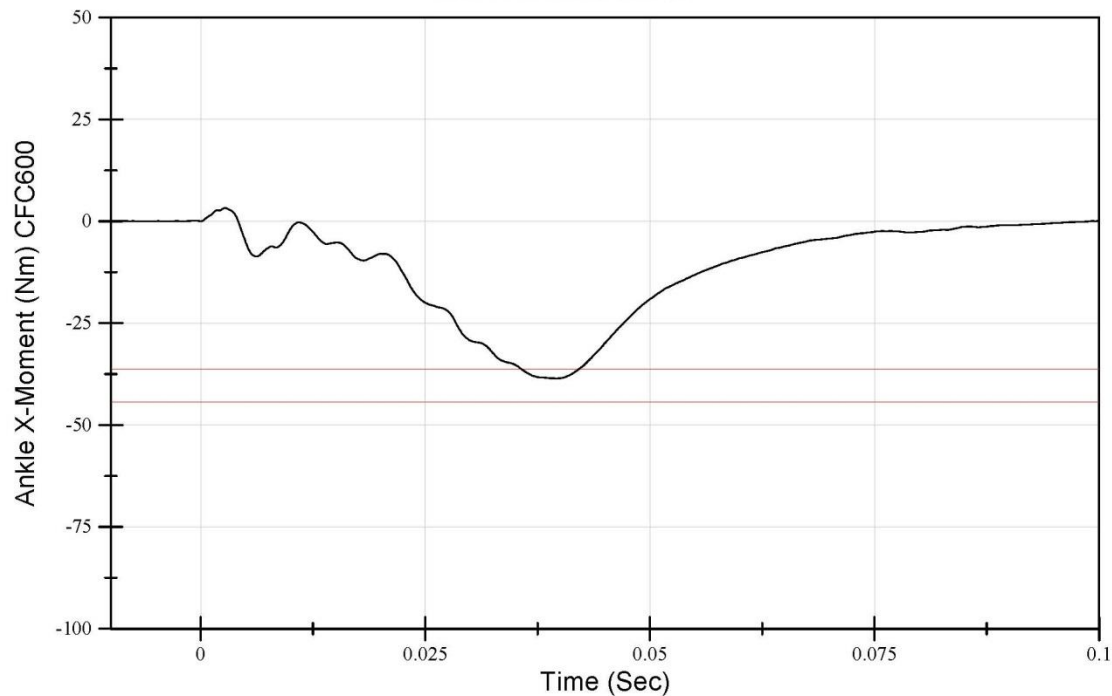


Software Version: 2.4

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

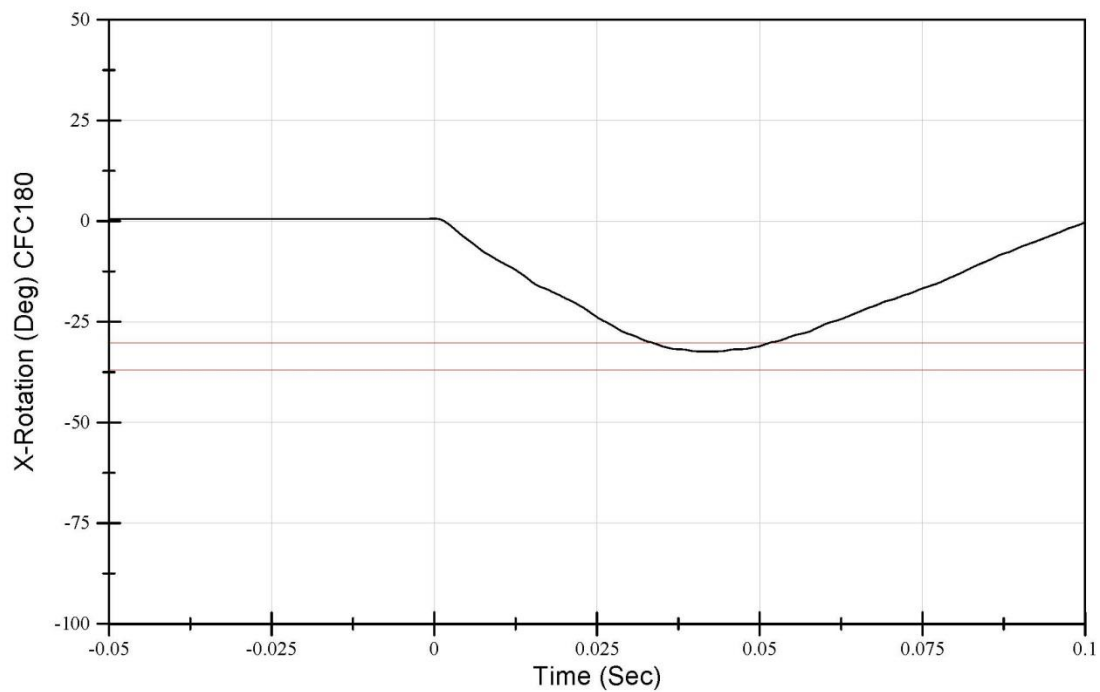


Software Version: 2.4

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

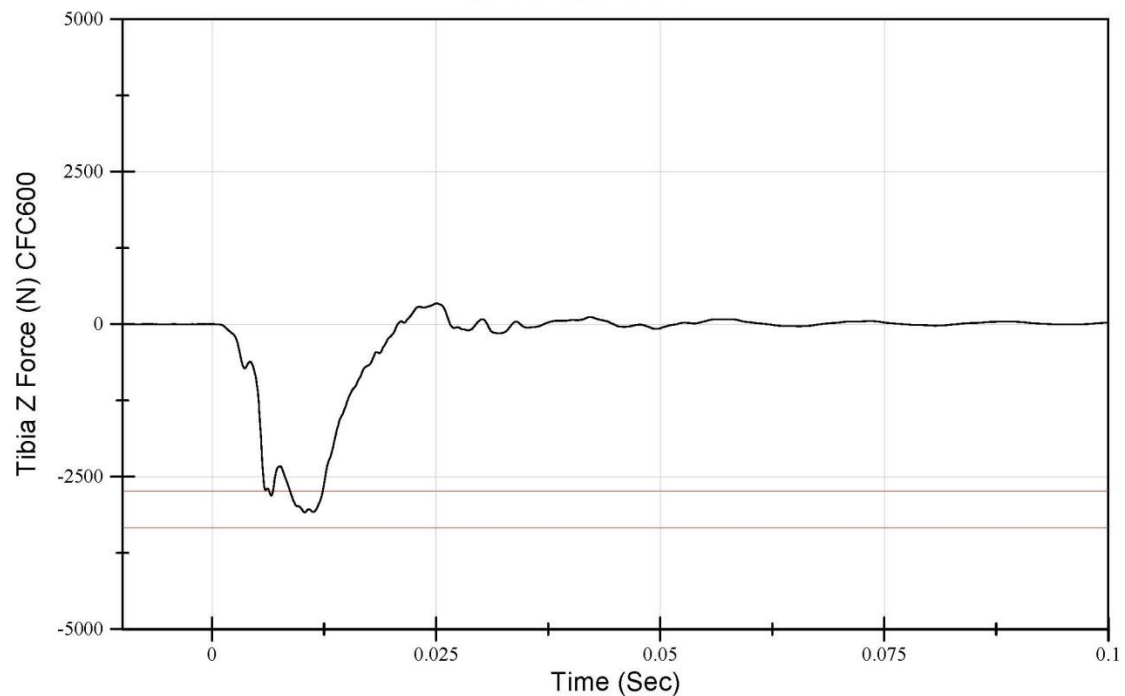


Software Version: 2.4

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

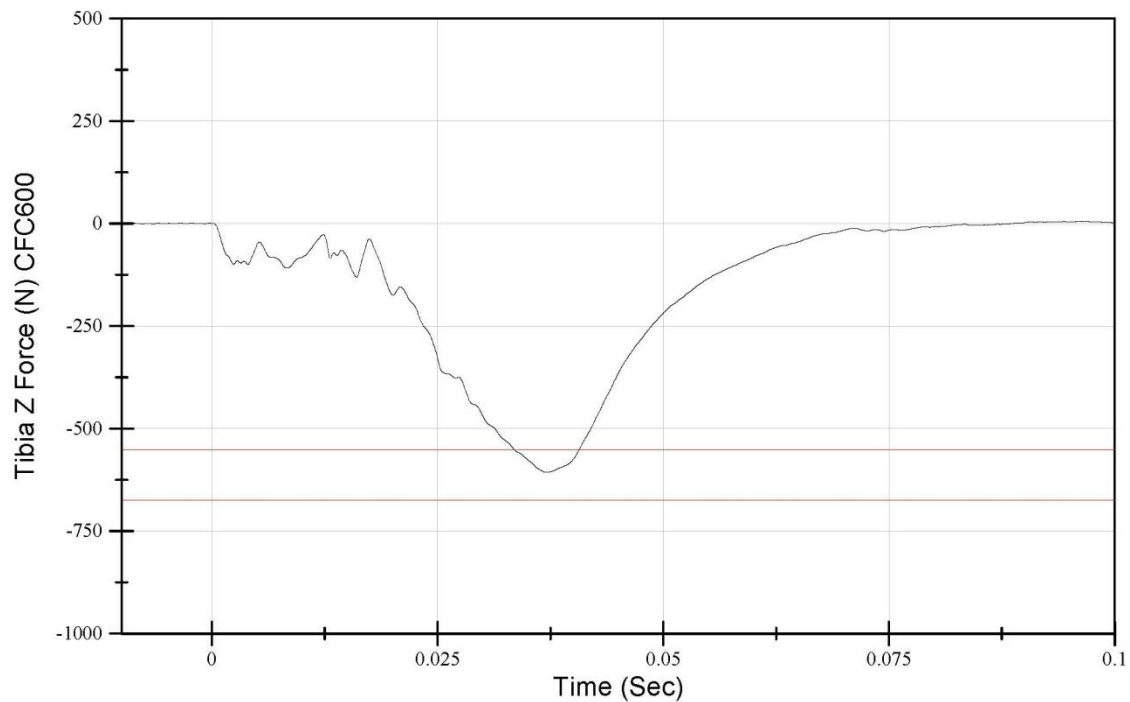


Software Version: 2.4

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

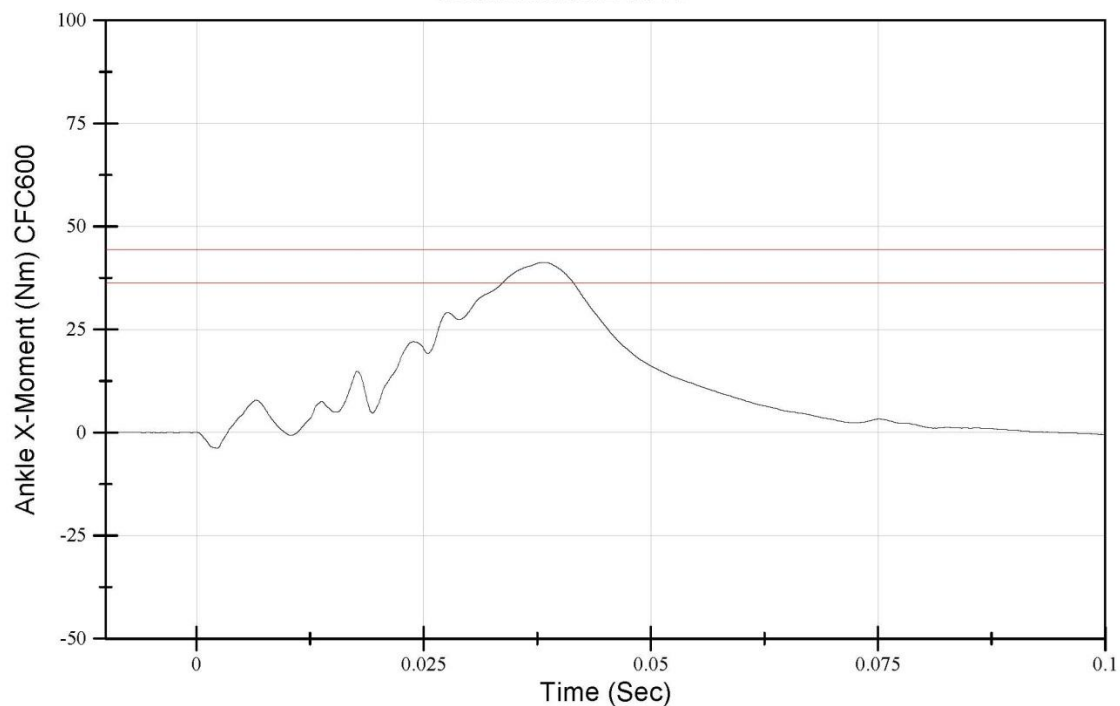


Software Version: 2.4

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

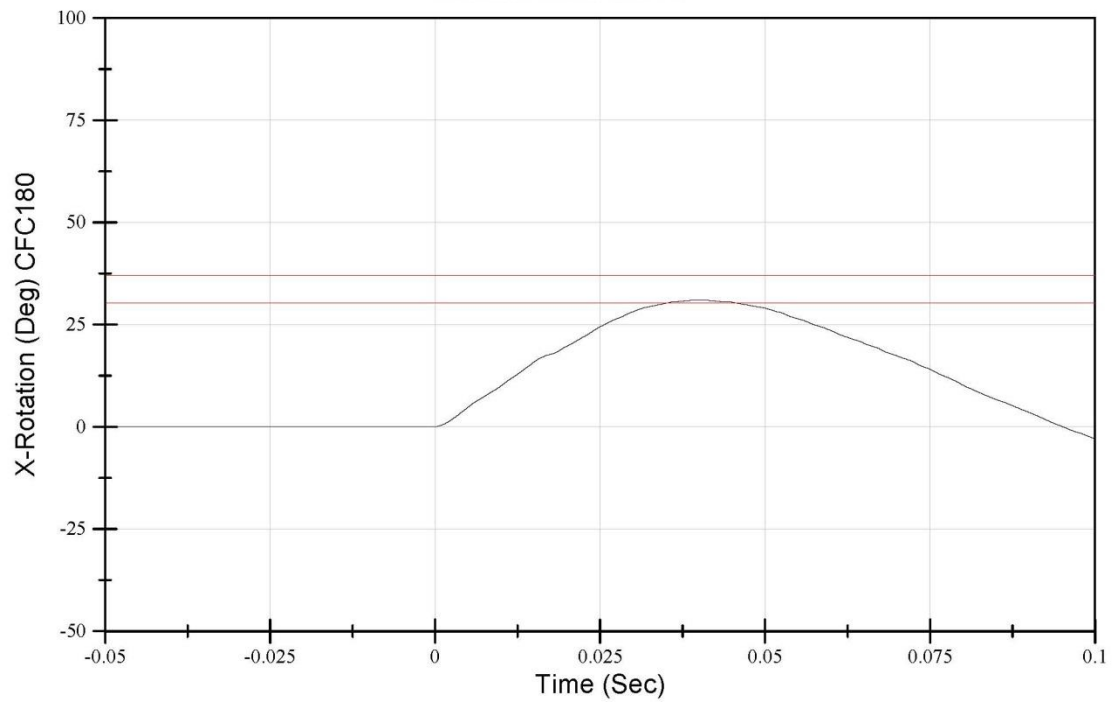


Software Version: 2.4

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

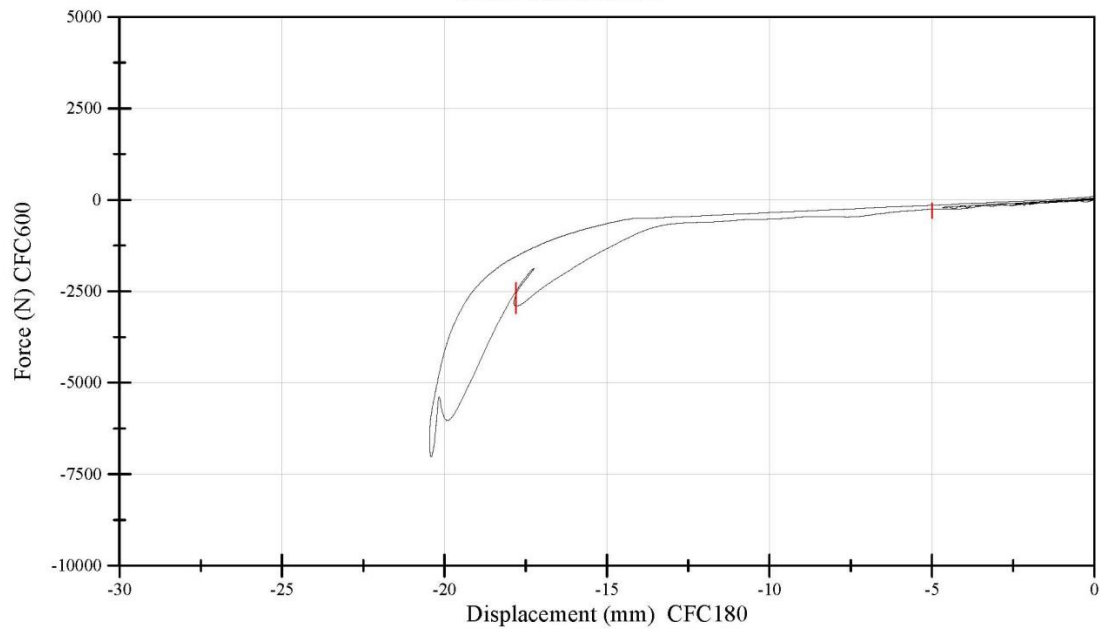


Software Version: 2.4

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

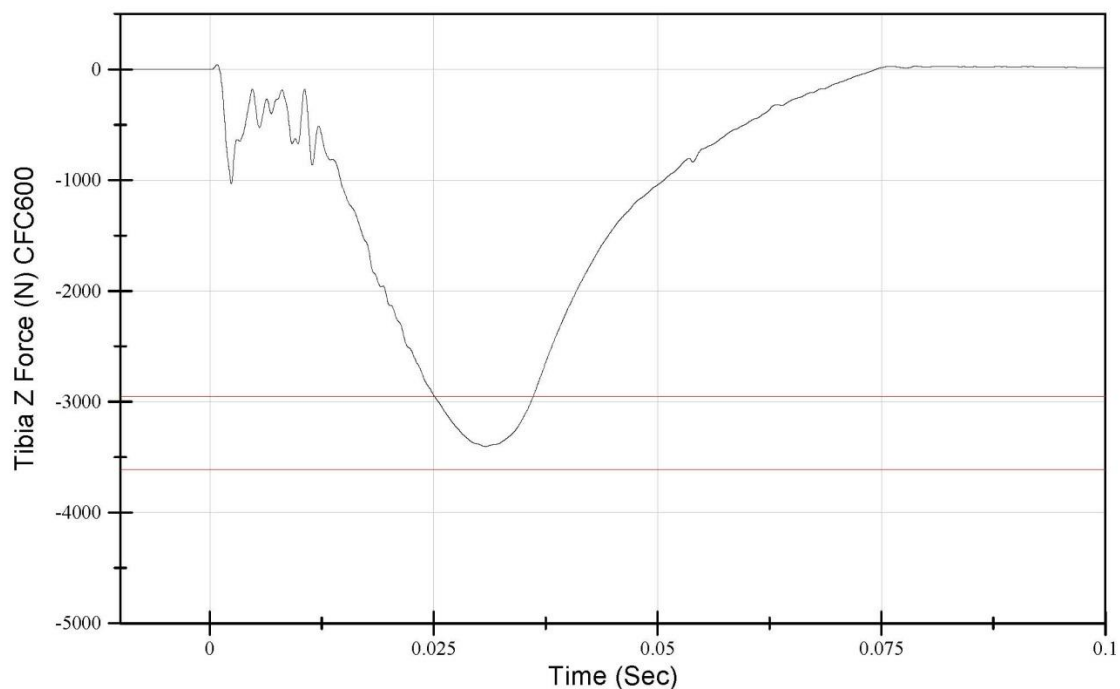


Software Version: 2.5

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

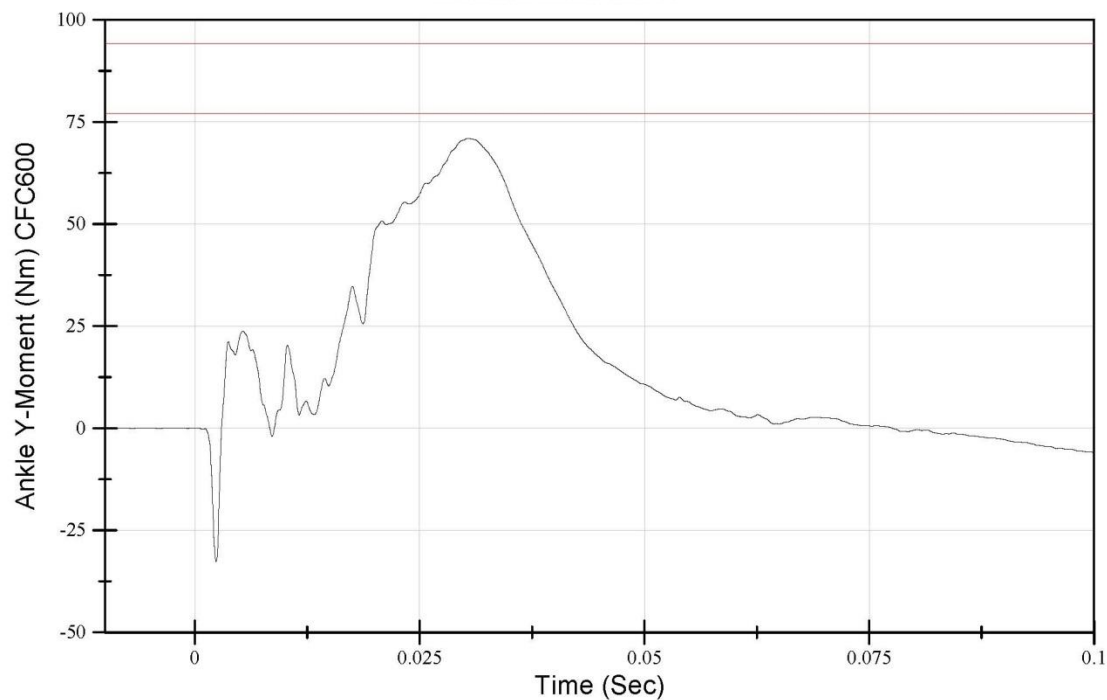


Software Version: 2.4

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

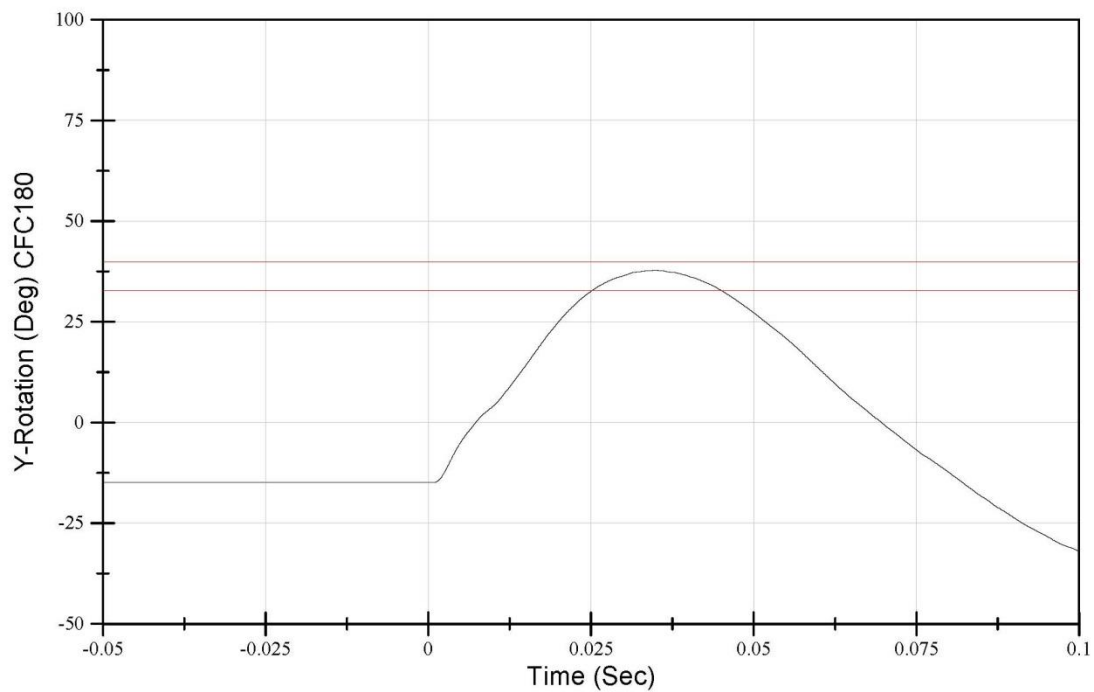


Software Version: 2.4

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

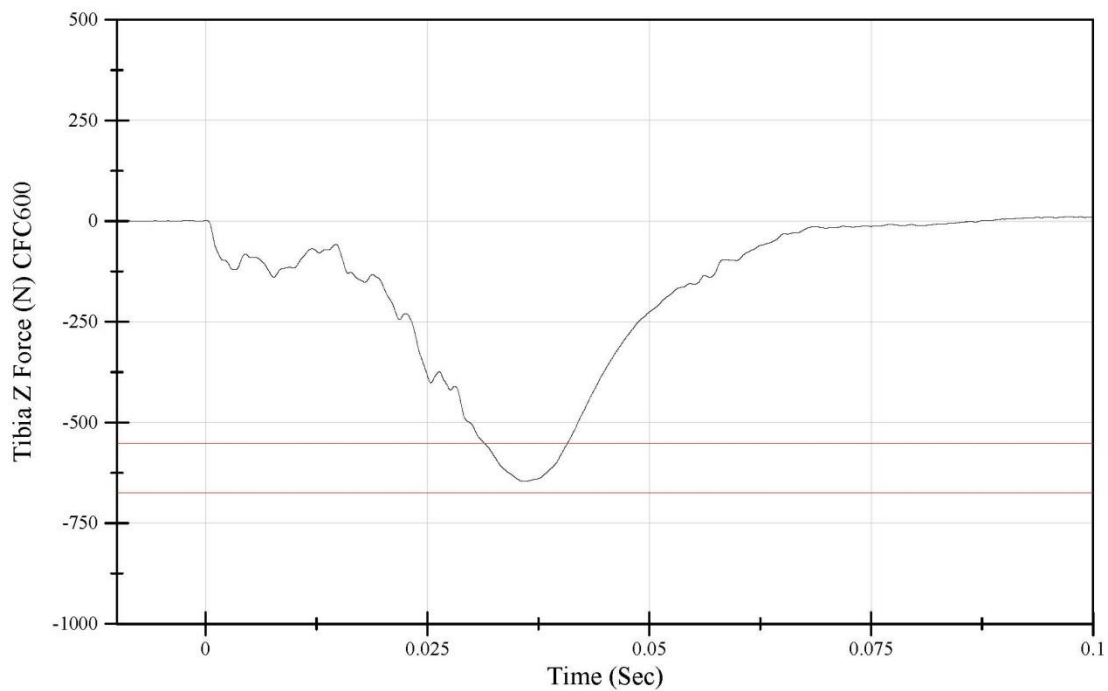


Software Version: 2.4

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

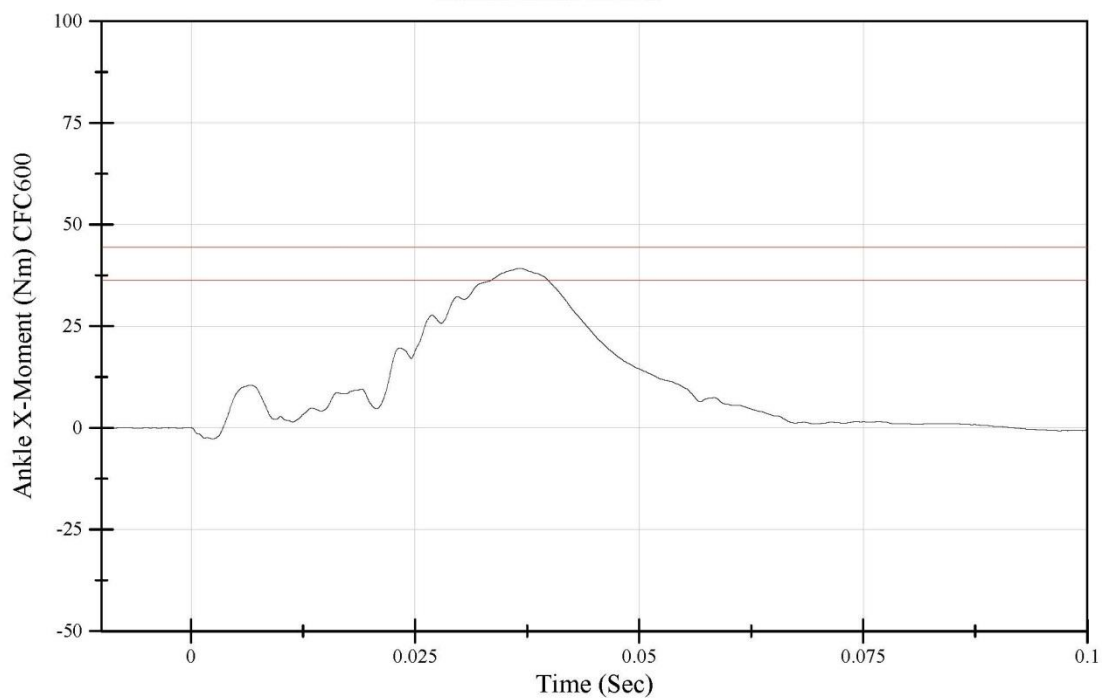


Software Version: 2.4

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

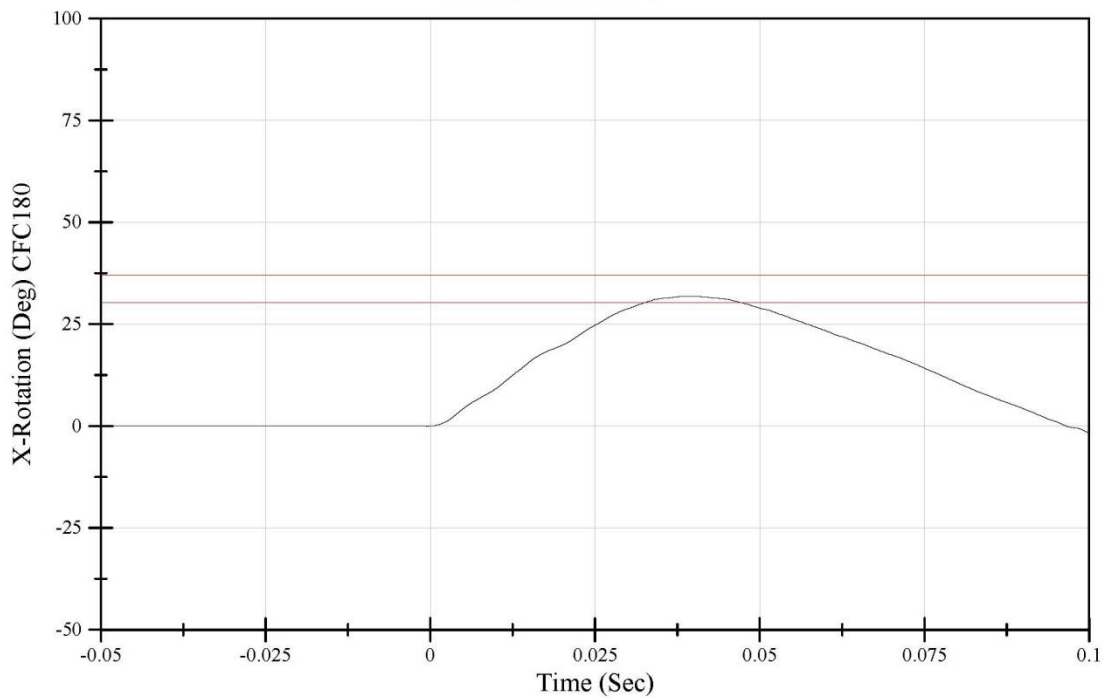


Software Version: 2.4

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

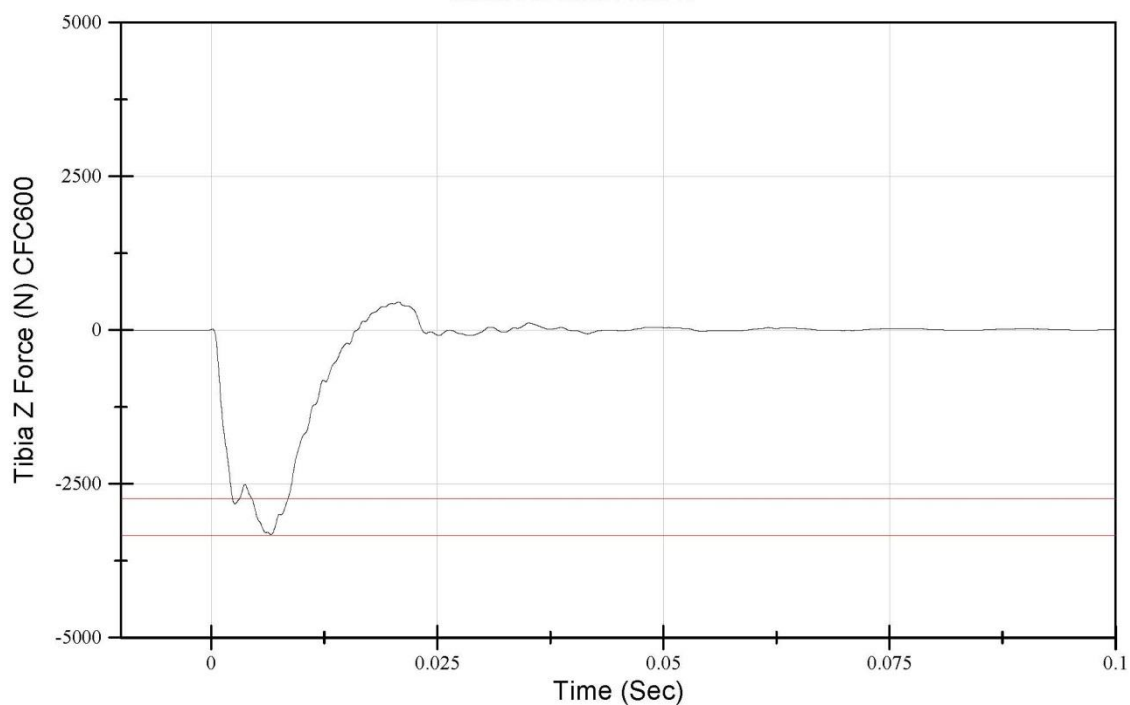


Software Version: 2.4

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

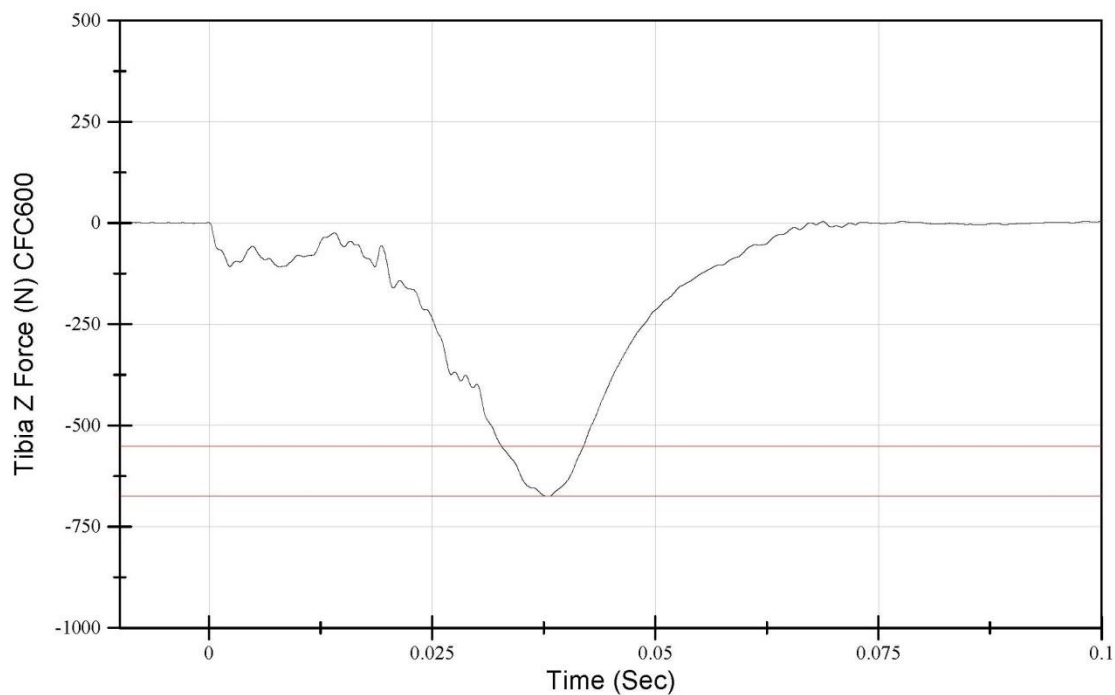


Software Version: 2.4

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

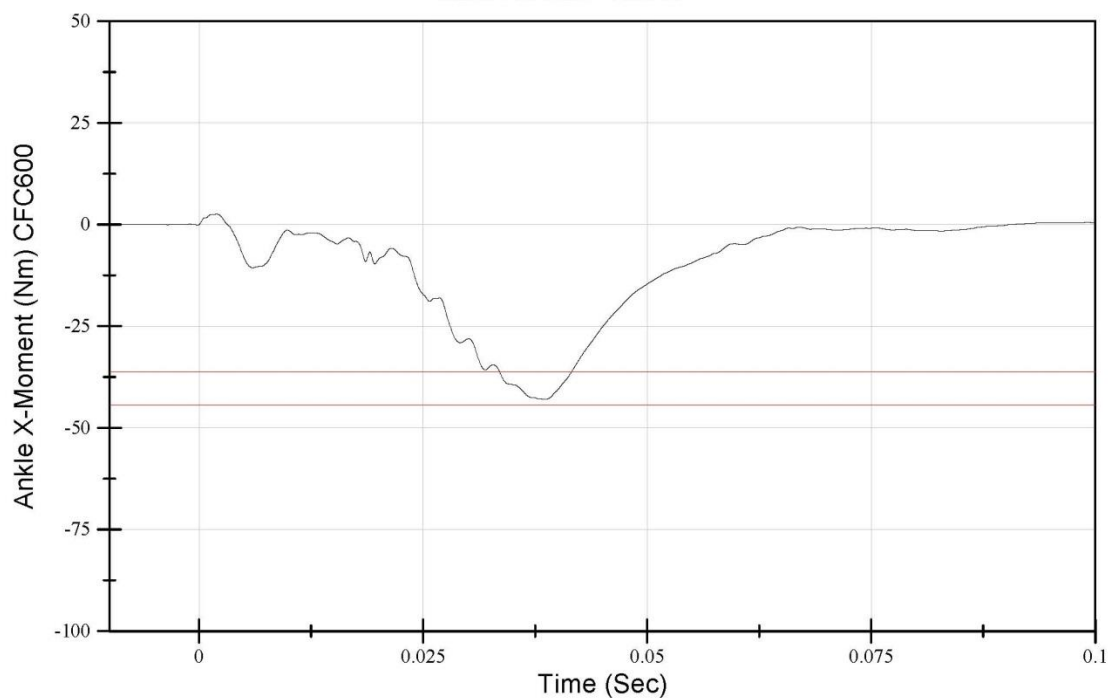


Software Version: 2.4

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

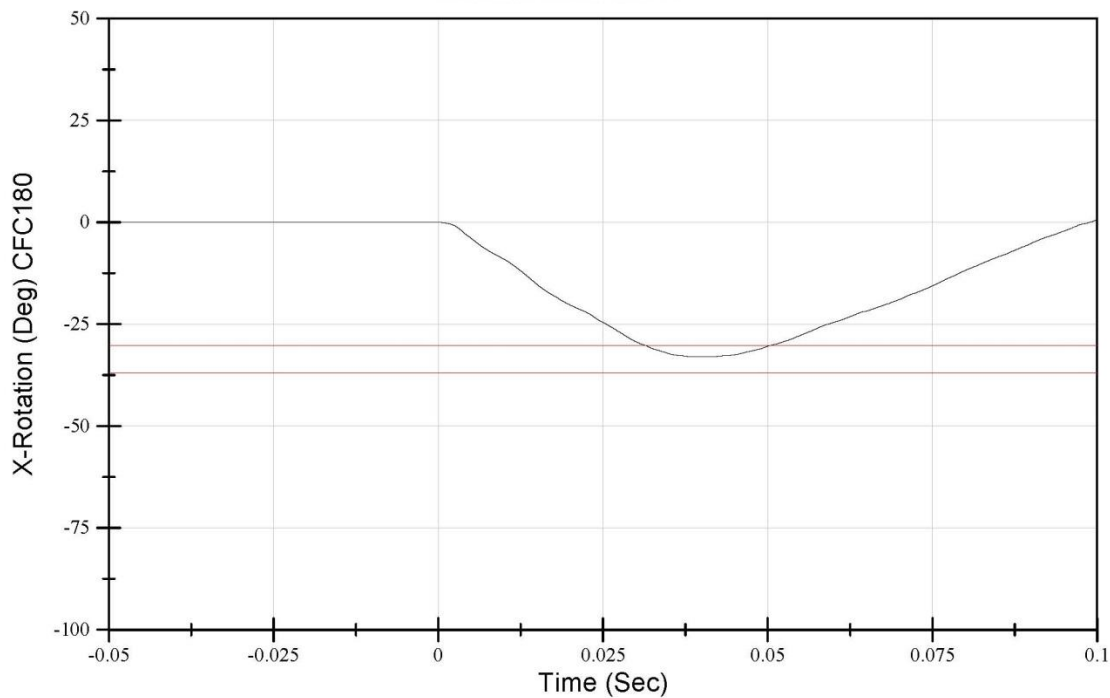


Software Version: 2.4

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

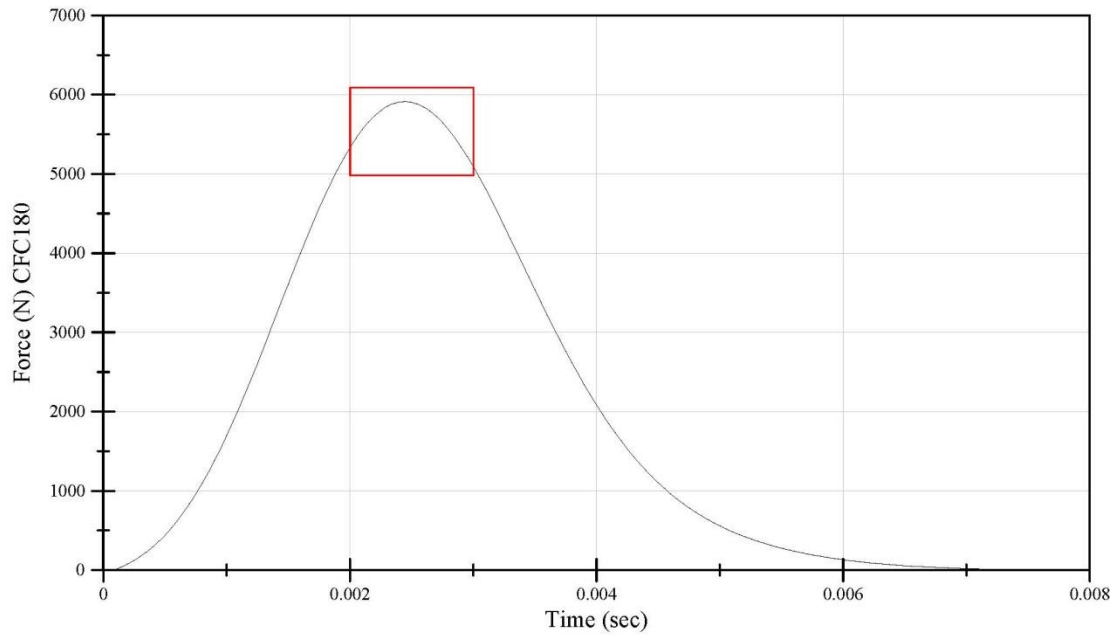
File Name: LX0019Inversion140521_03processed
05/21/2014 08:53:35.0000

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



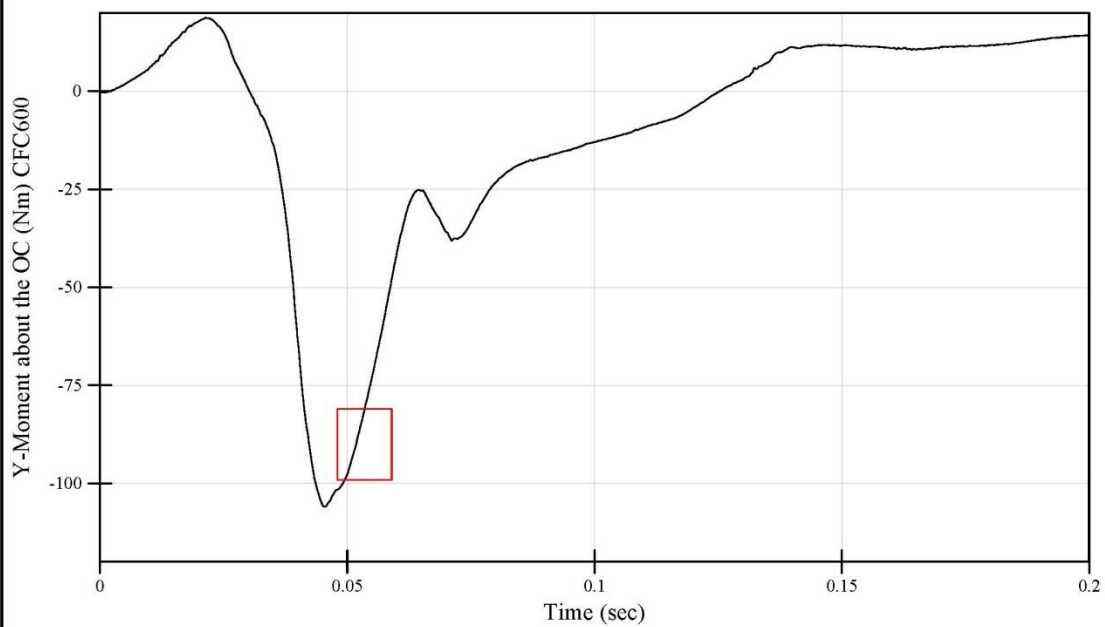
Software Version: 2.4

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

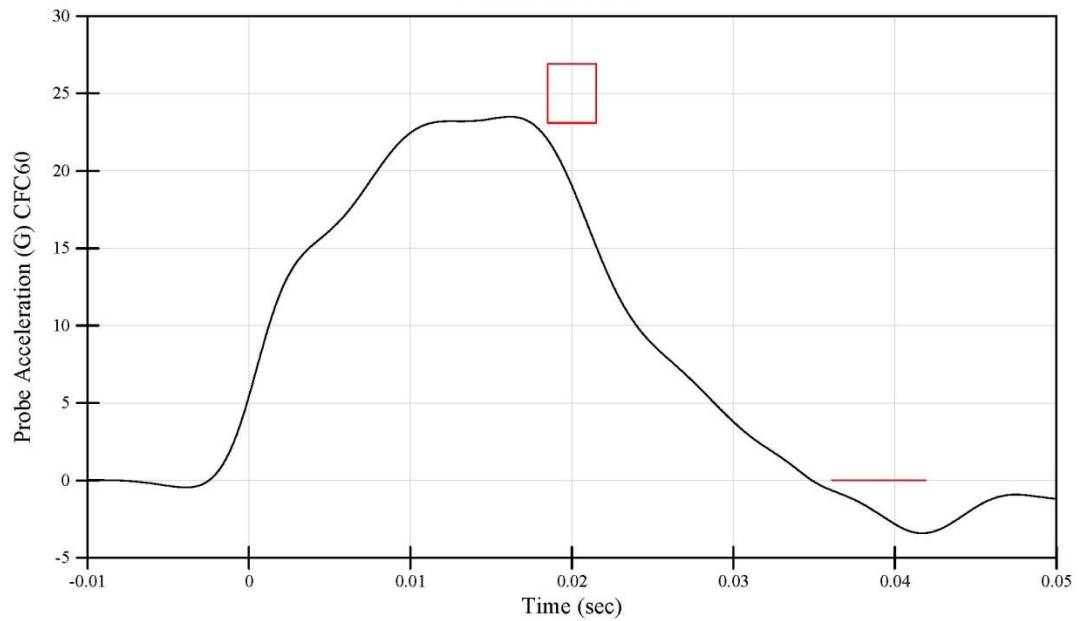


Software Version: 2.4

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

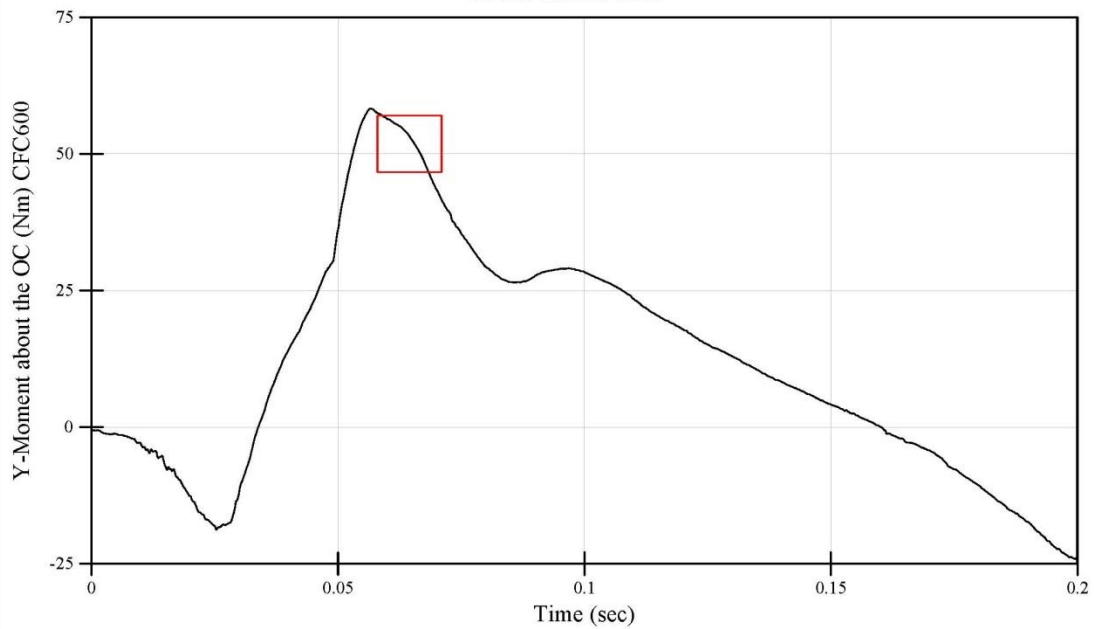


Software Version: 2.4

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

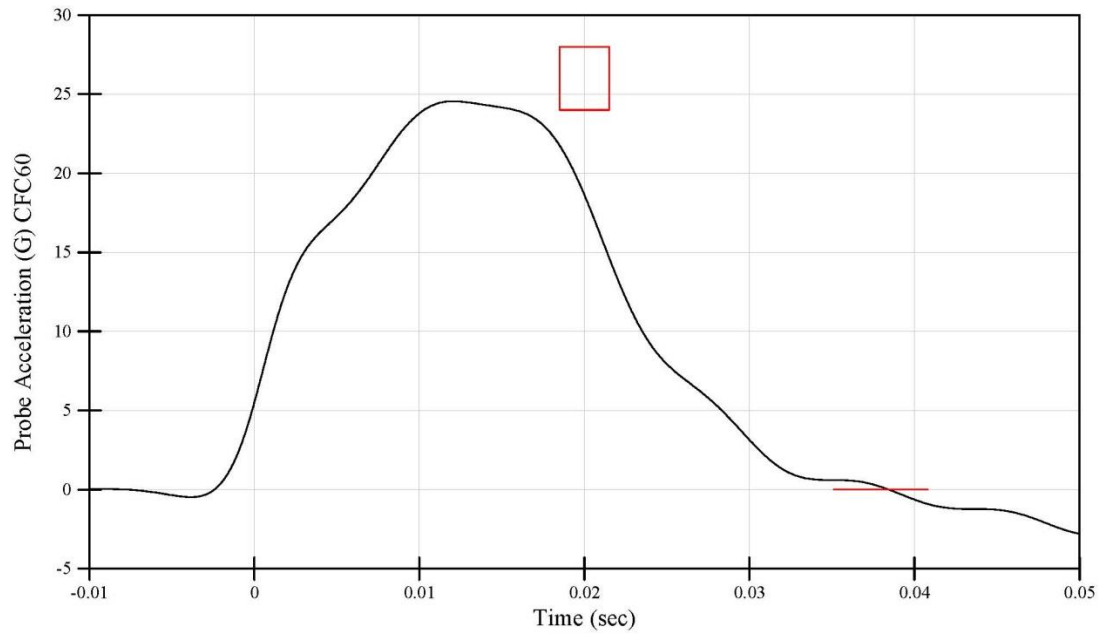


Software Version: 2.4

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

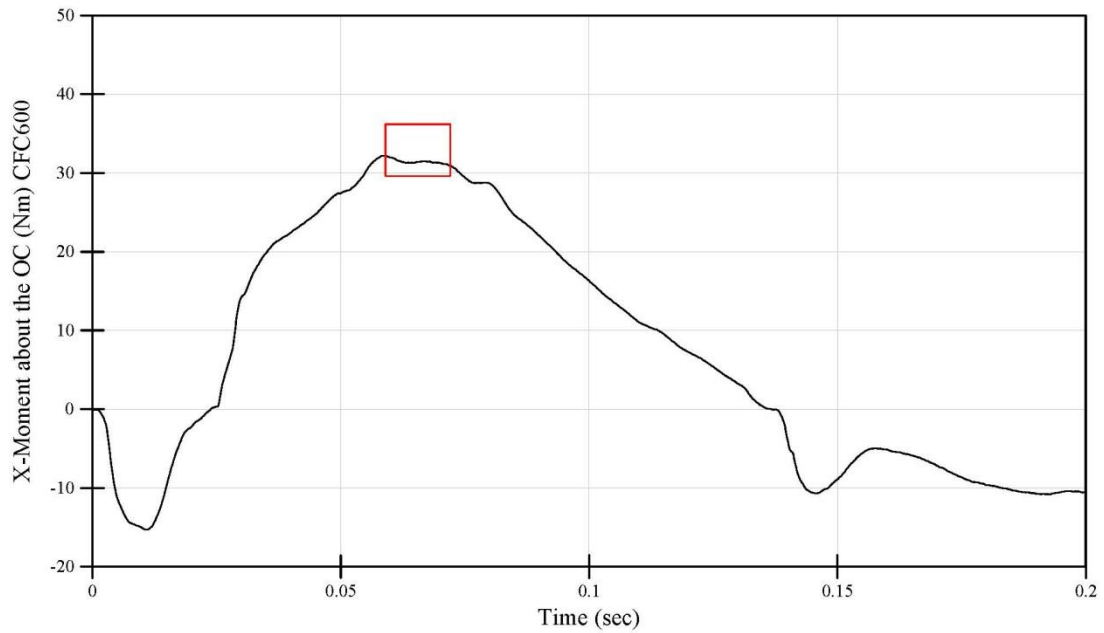


Software Version: 2.4

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

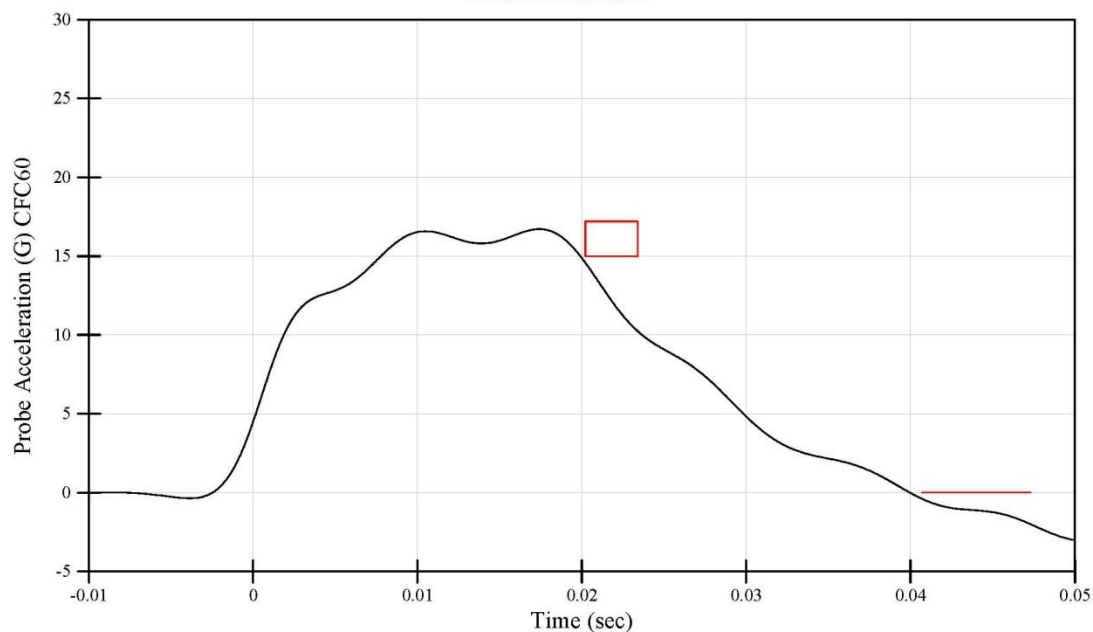


Software Version: 2.4

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

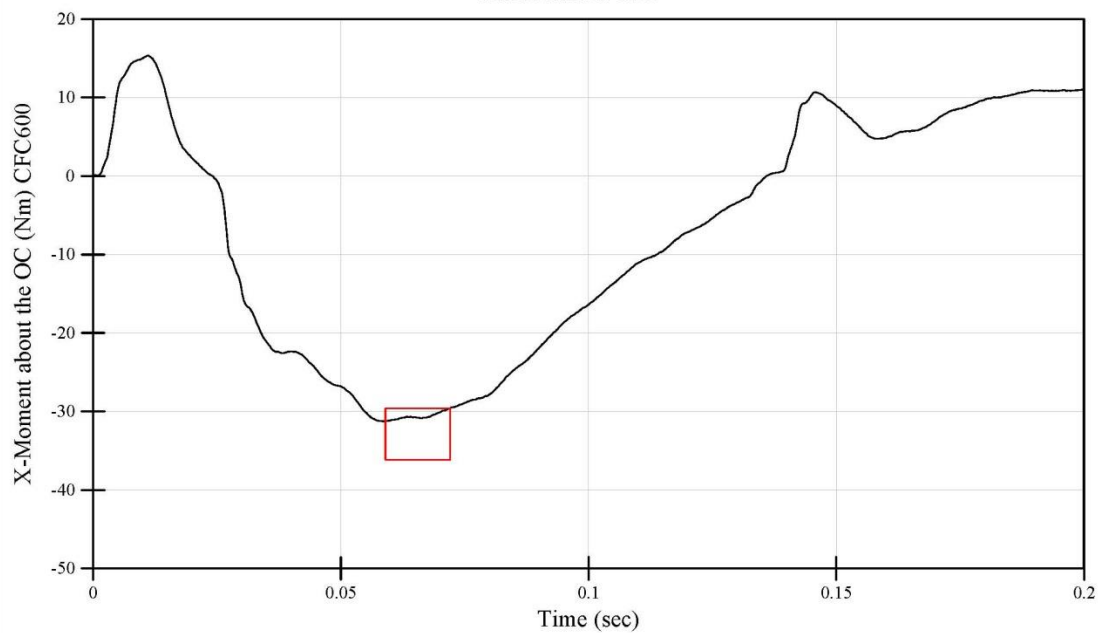


Software Version: 2.4

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



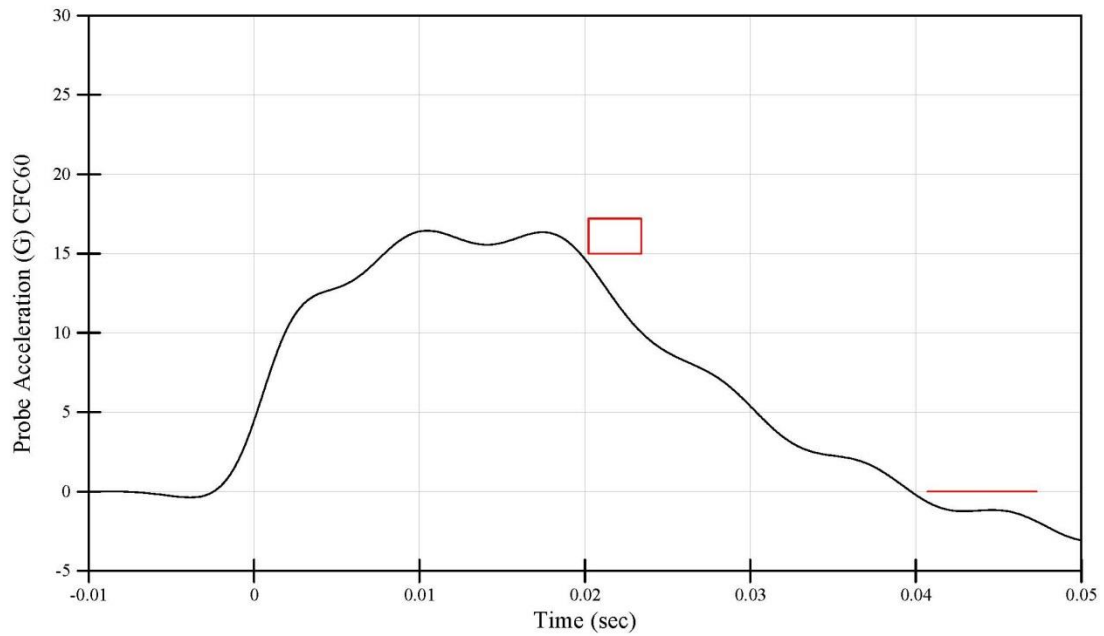
Software Version: 2.4

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

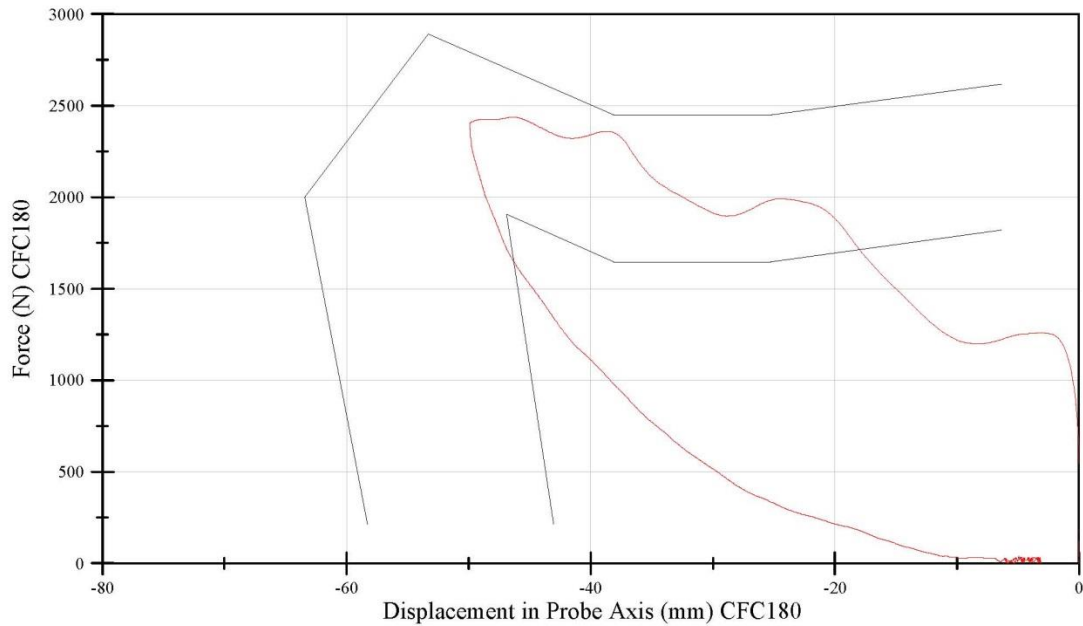


Software Version: 2.4

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05/19/2014 09:29:56.0000

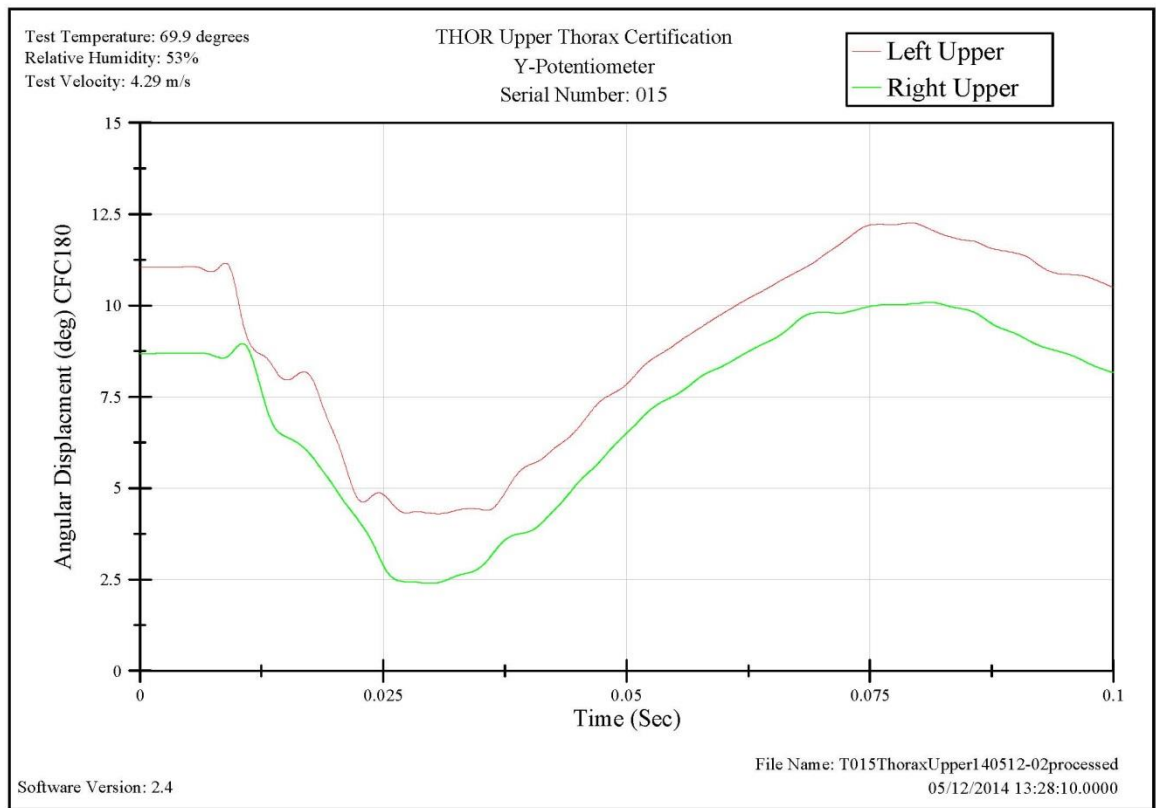
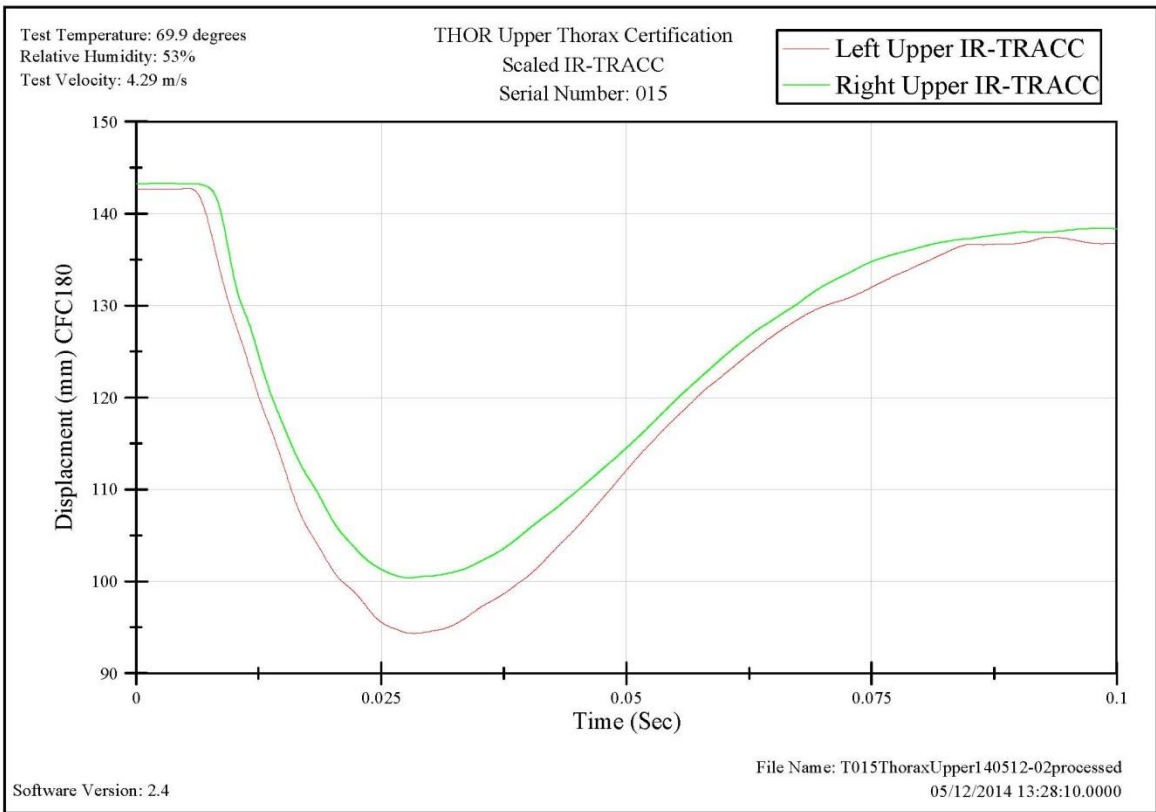
Test Temperature: 69.9 degrees
Relative Humidity: 53%
Test Velocity: 4.29 m/s

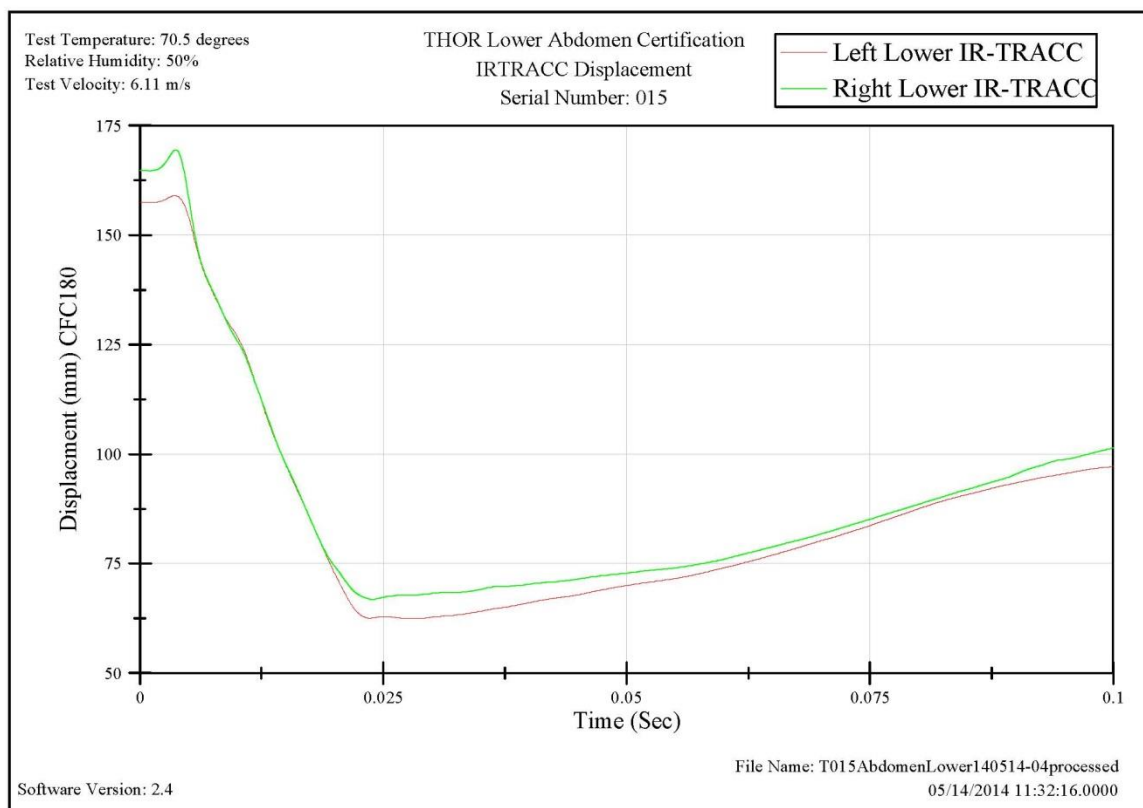
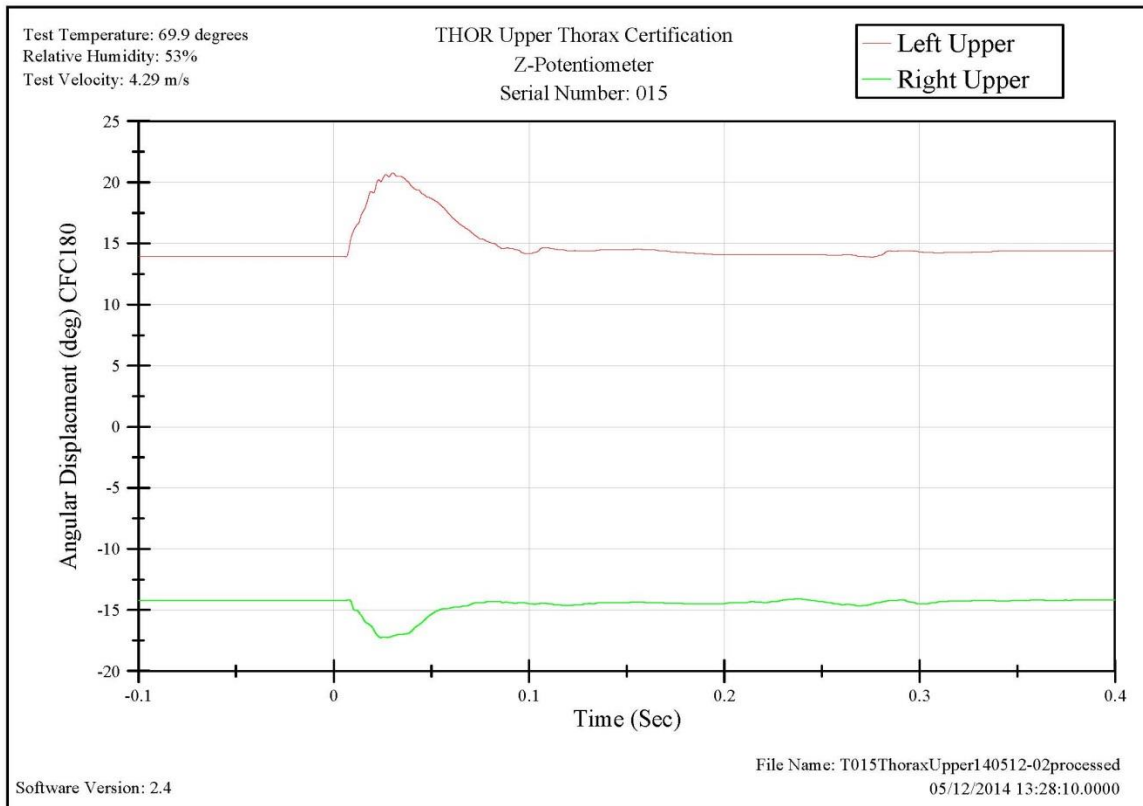
THOR Upper Thorax Certification Thorax Response With Kroell Corridor Serial Number: 015

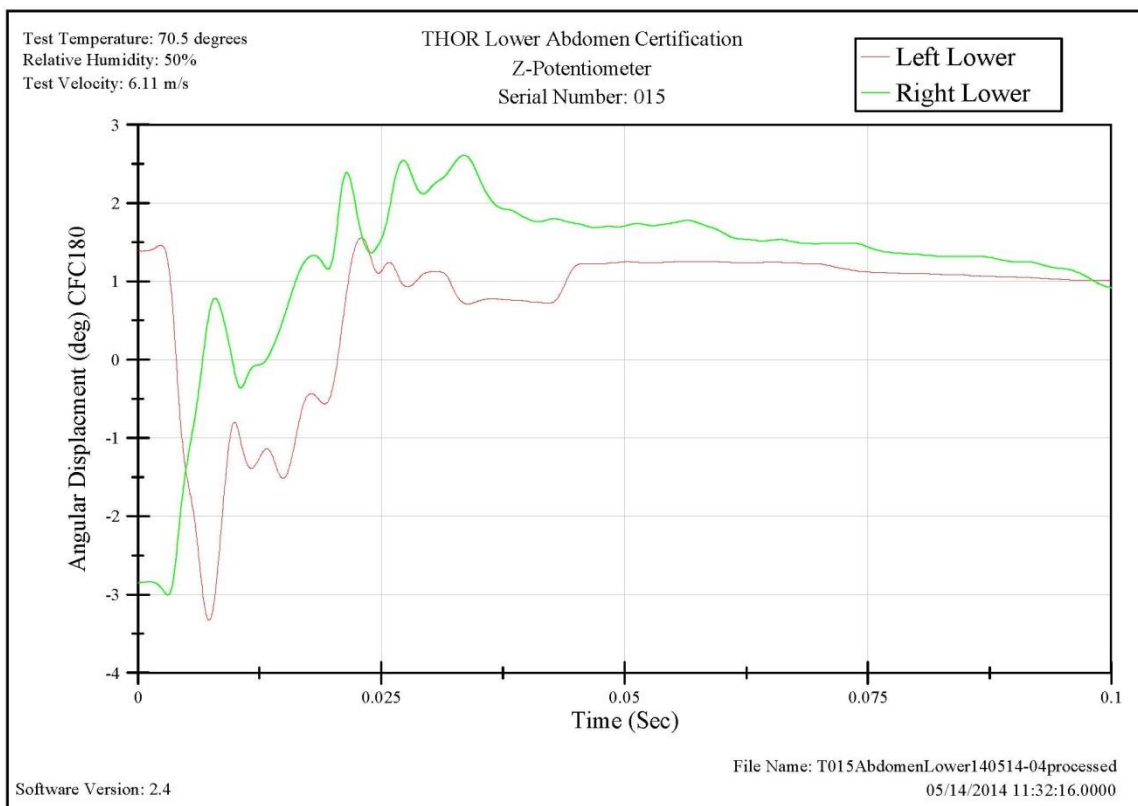
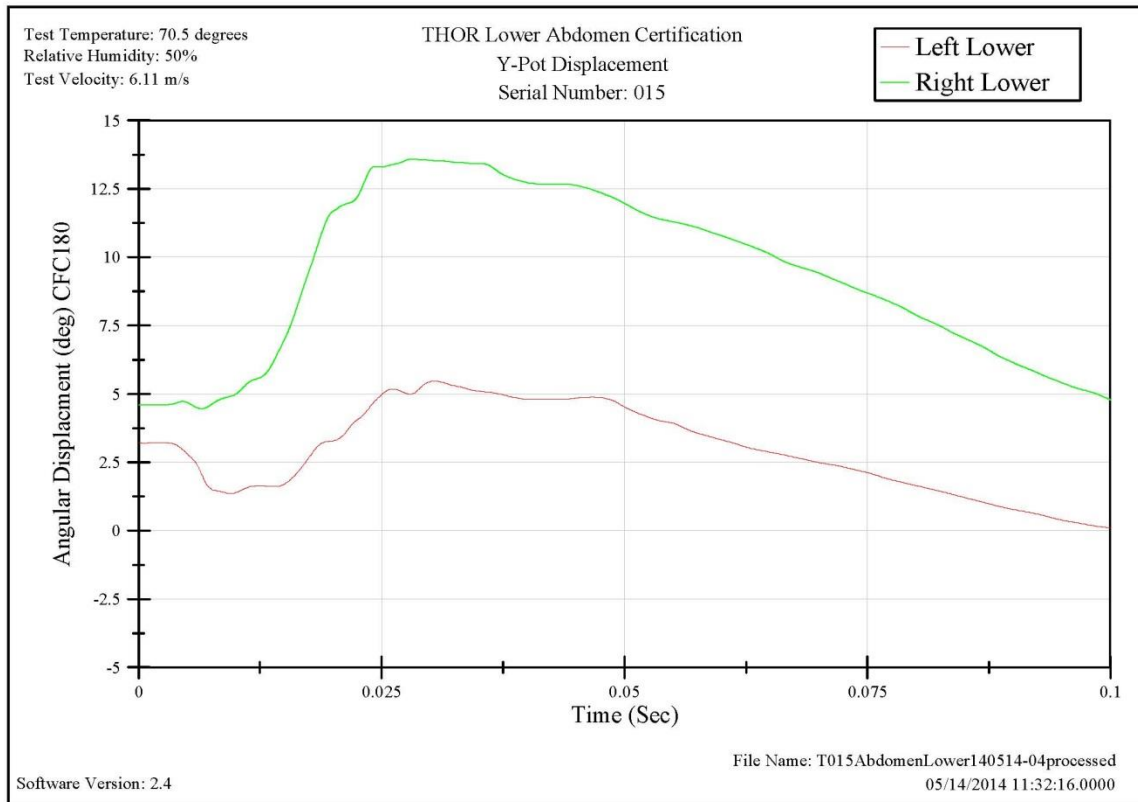


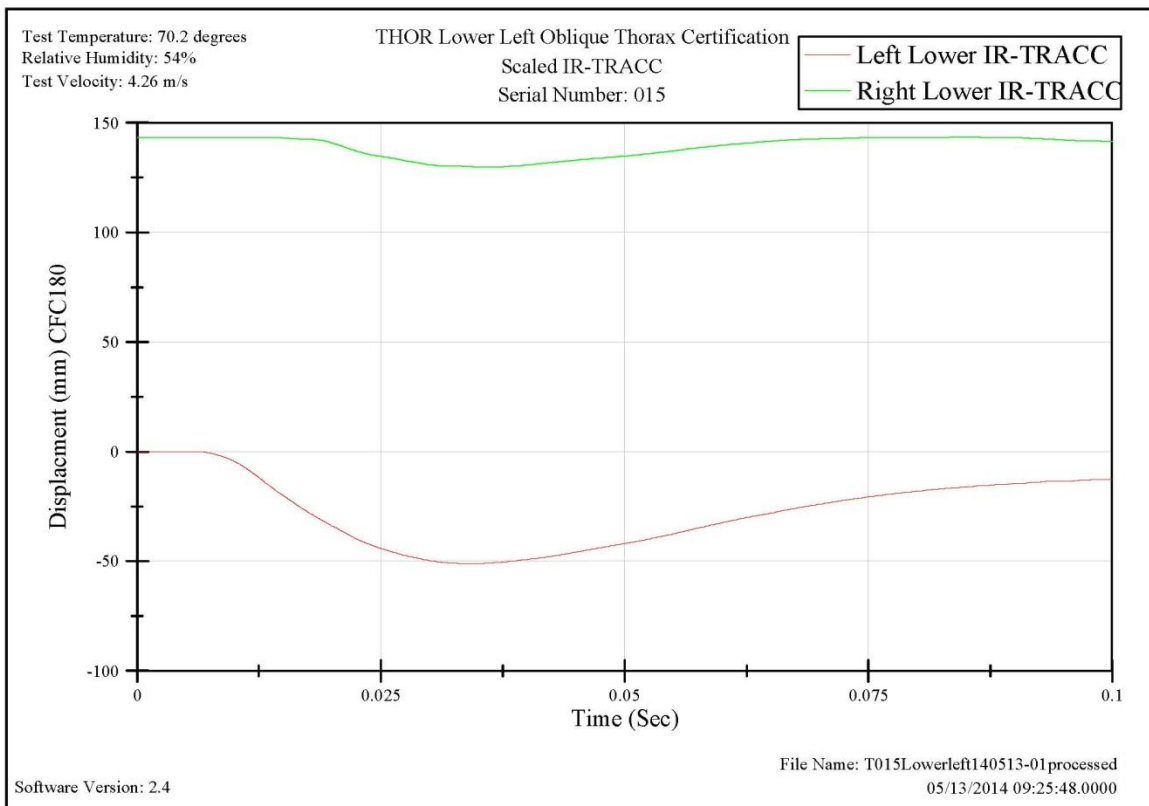
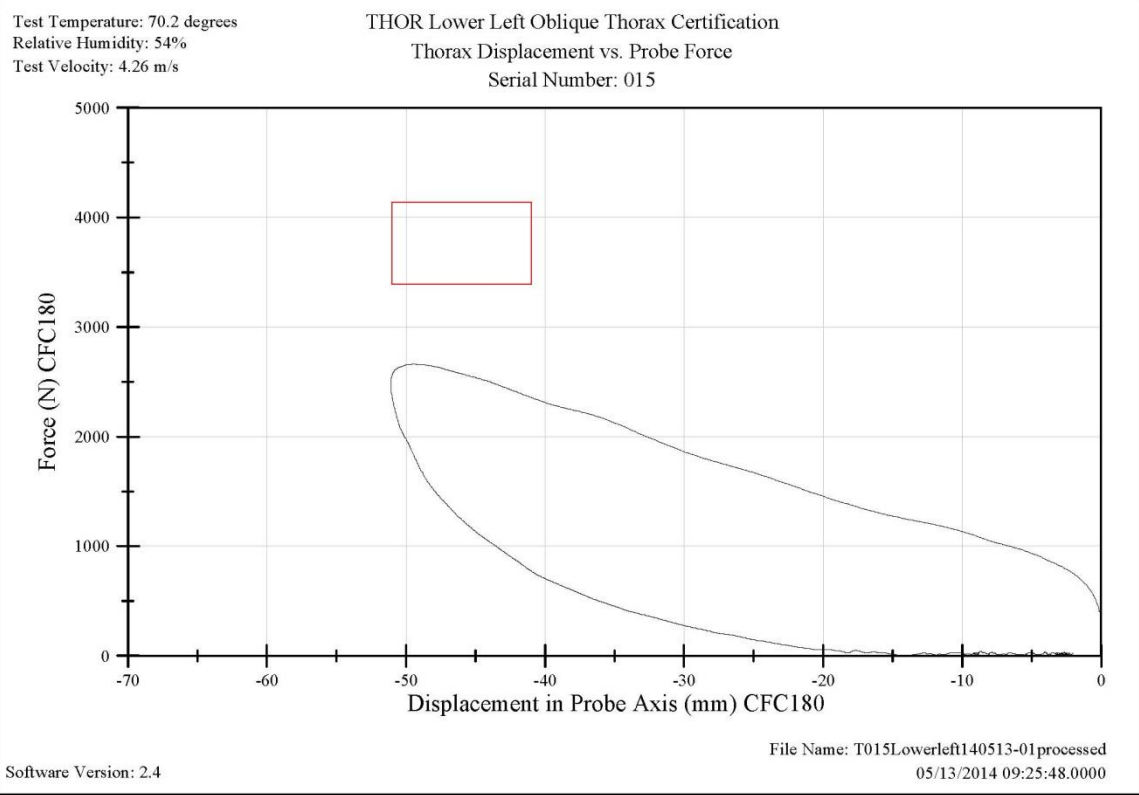
Software Version: 2.4

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



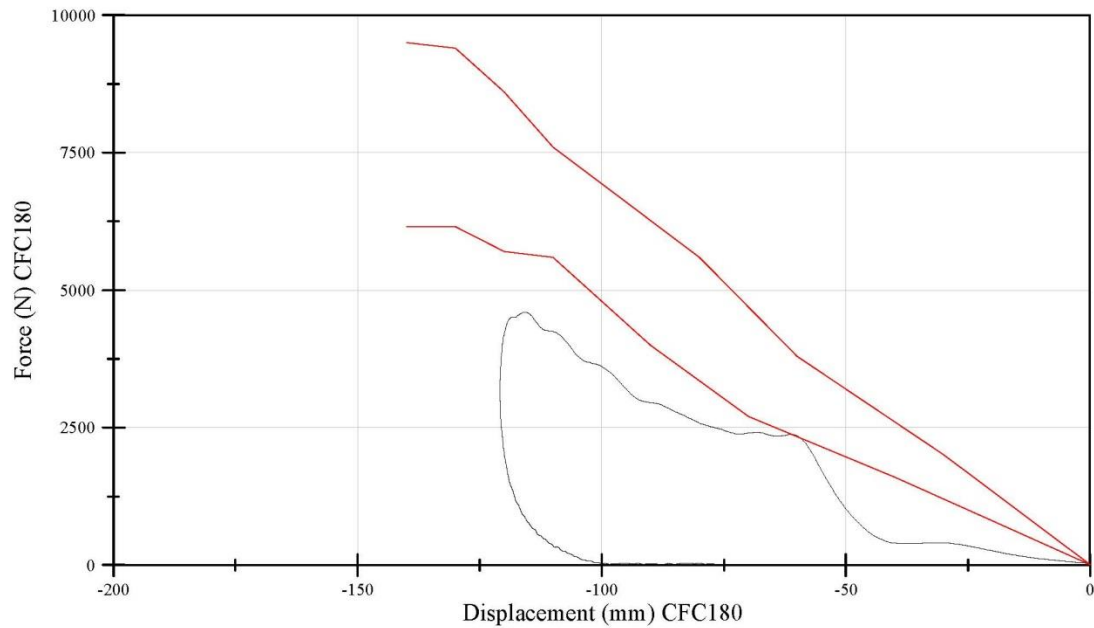






Test Temperature: 68.9 degrees
Relative Humidity: 51%
Test Velocity: 6.64 m/s

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

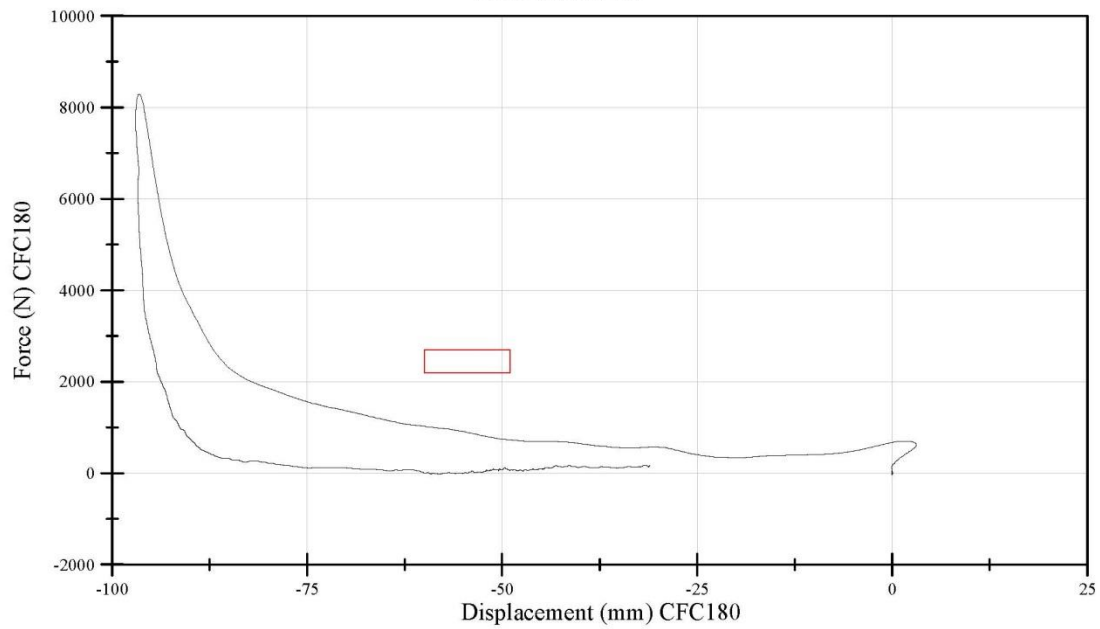


Software Version: 2.4

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

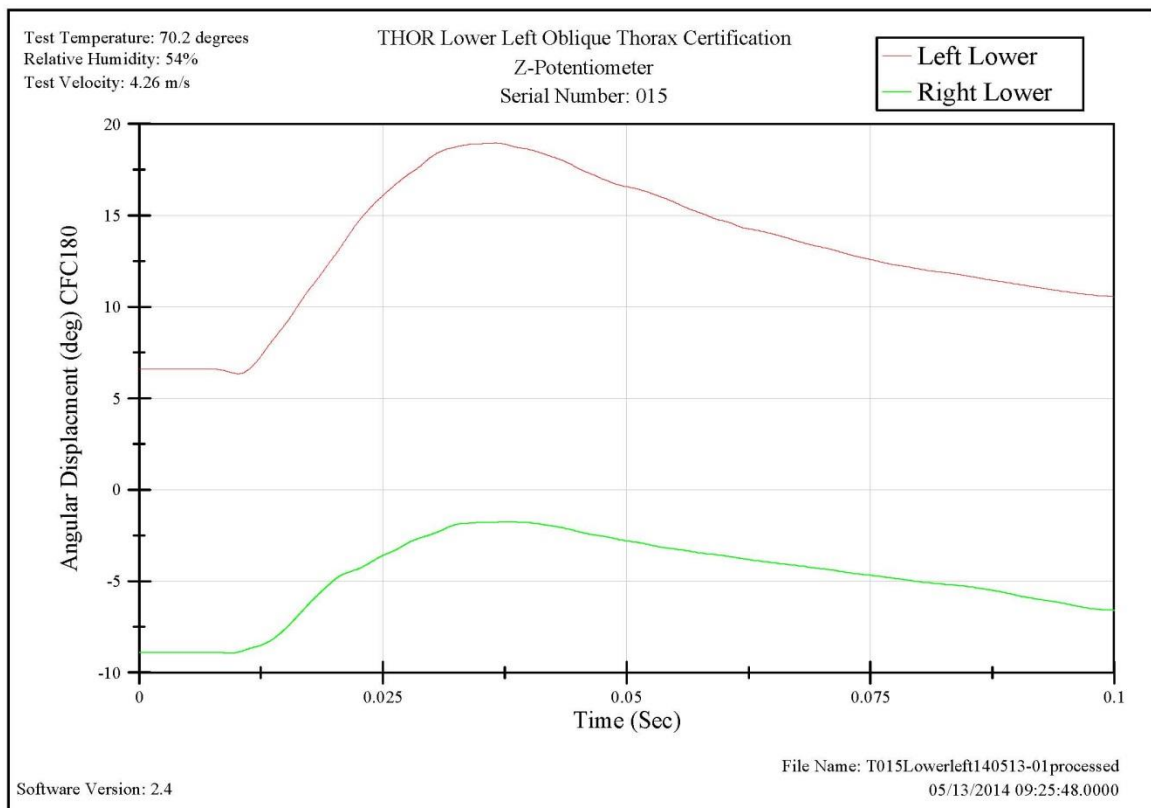
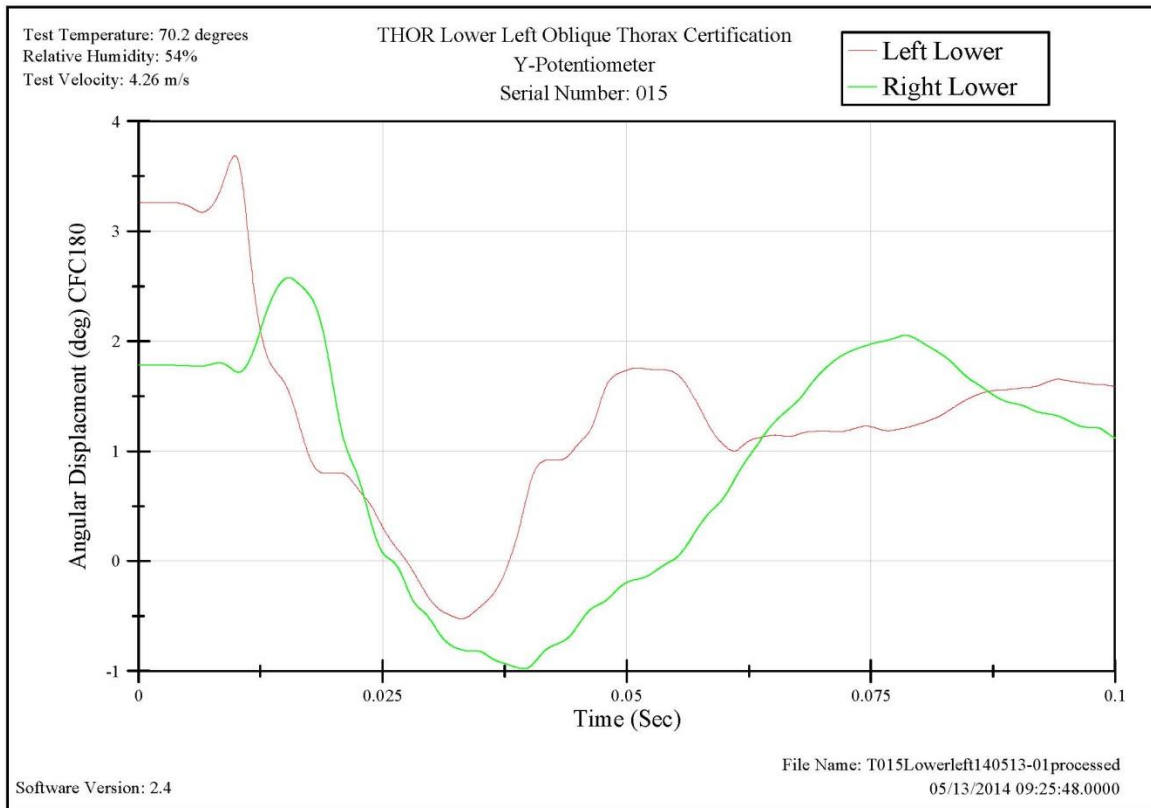
Test Temperature: 70.5 degrees
Relative Humidity: 50%
Test Velocity: 6.11 m/s

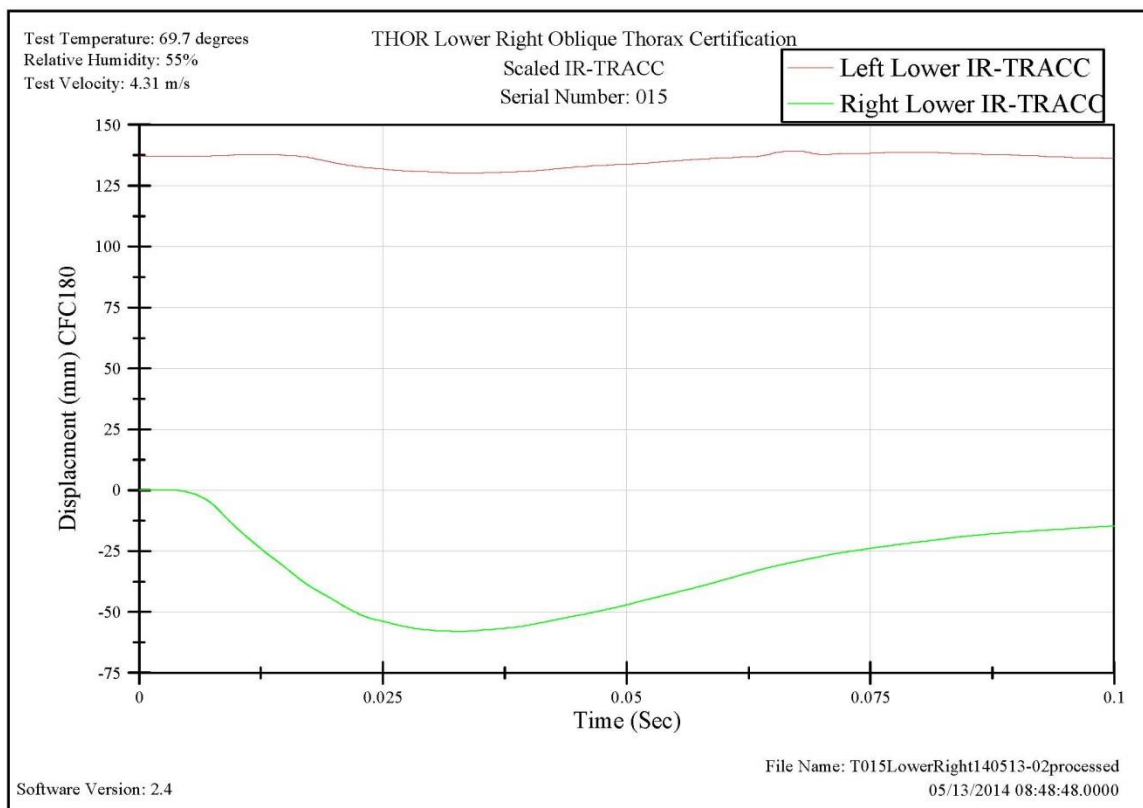
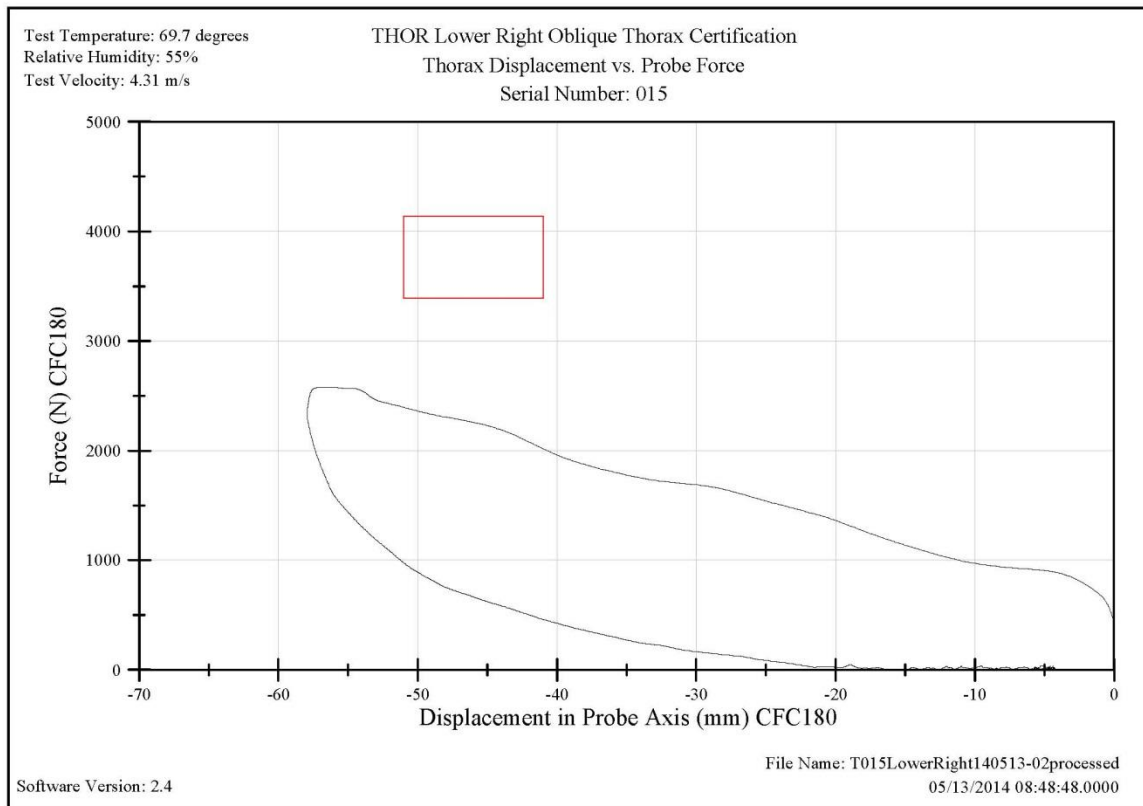
THOR Lower Abdomen Certification
Abdomen Displacement vs. Probe Force
Serial Number: 015

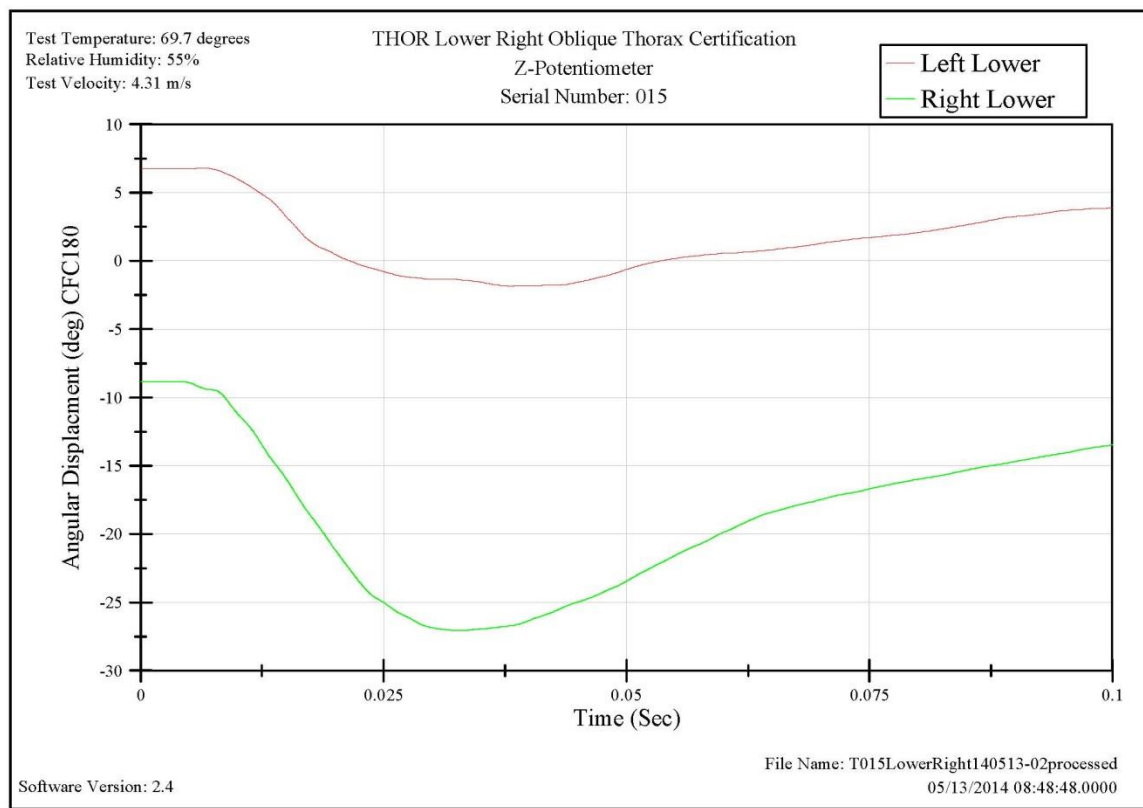
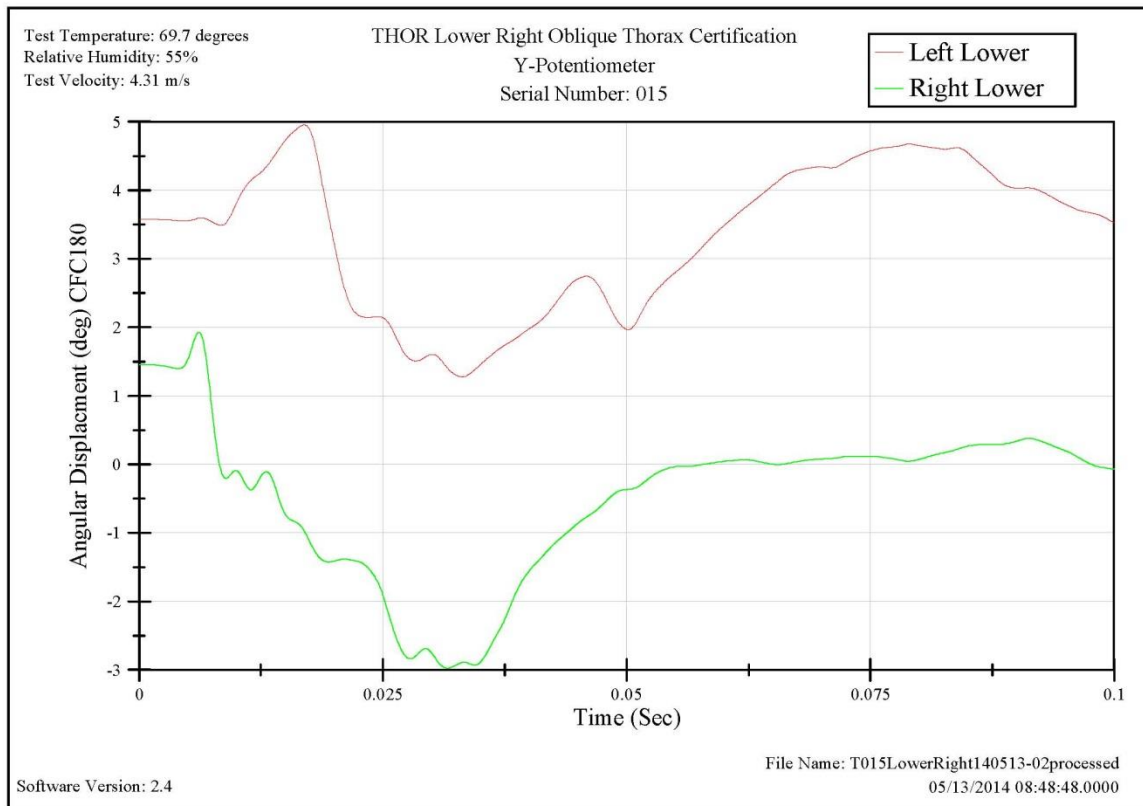


Software Version: 2.4

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

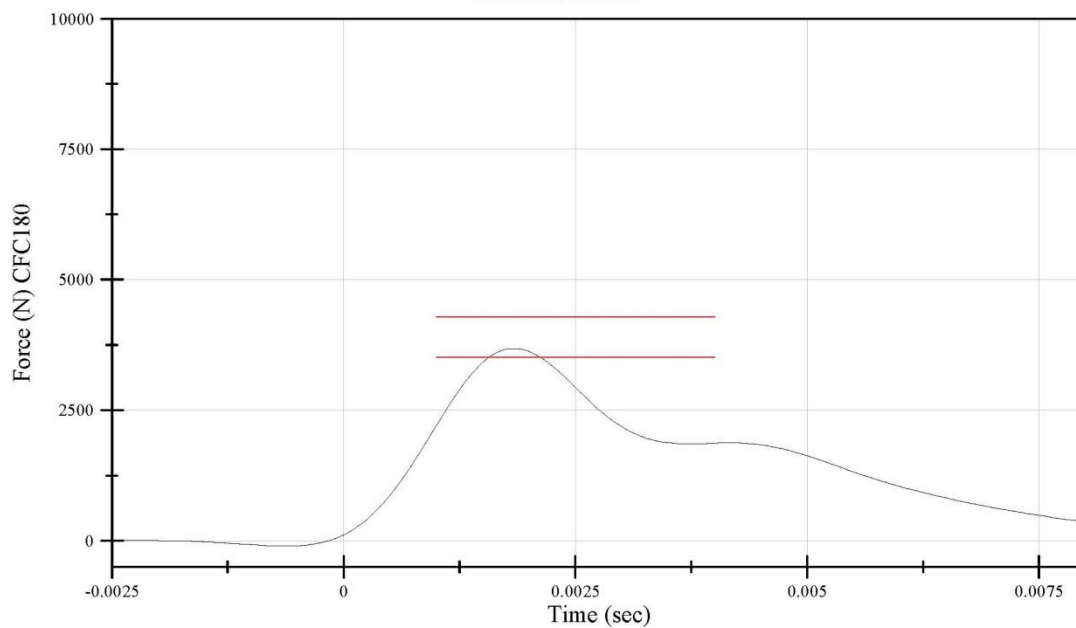






Test Temperature: 69.9 degrees
Relative Humidity: 53%
Test Velocity: 2.65 m/s

THOR Left Femur Certification
Probe Force
Serial Number: 015

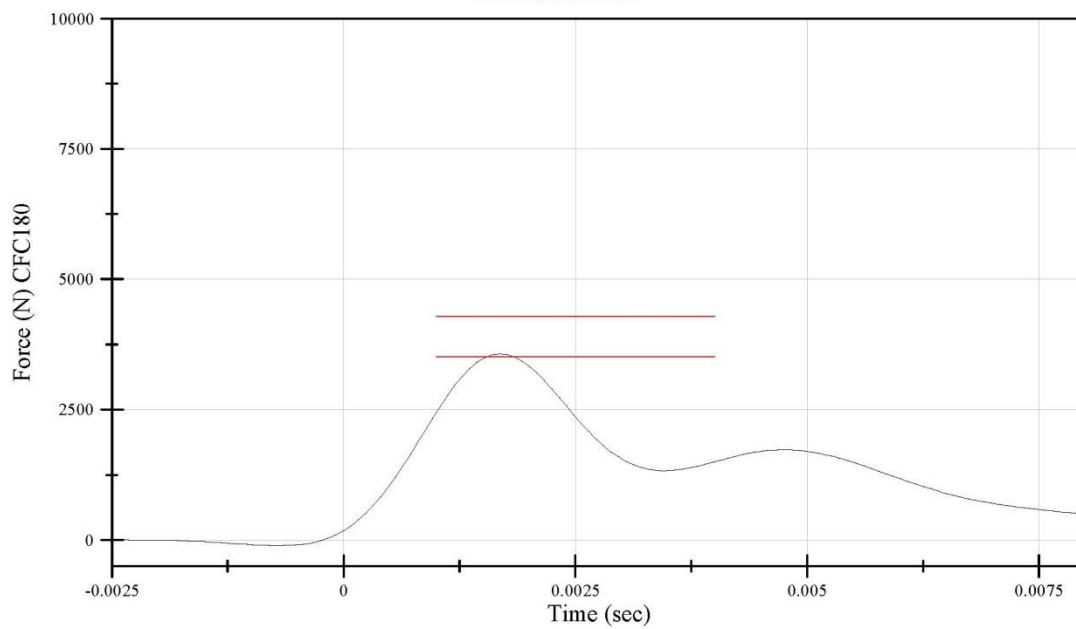


Software Version: 2.4

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

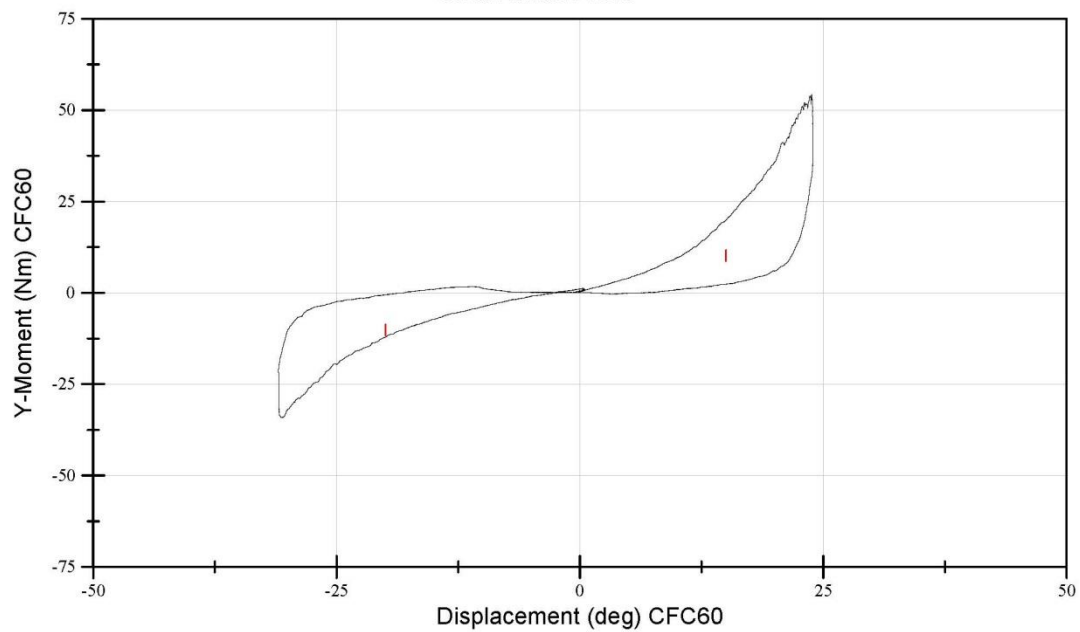


Software Version: 2.4

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



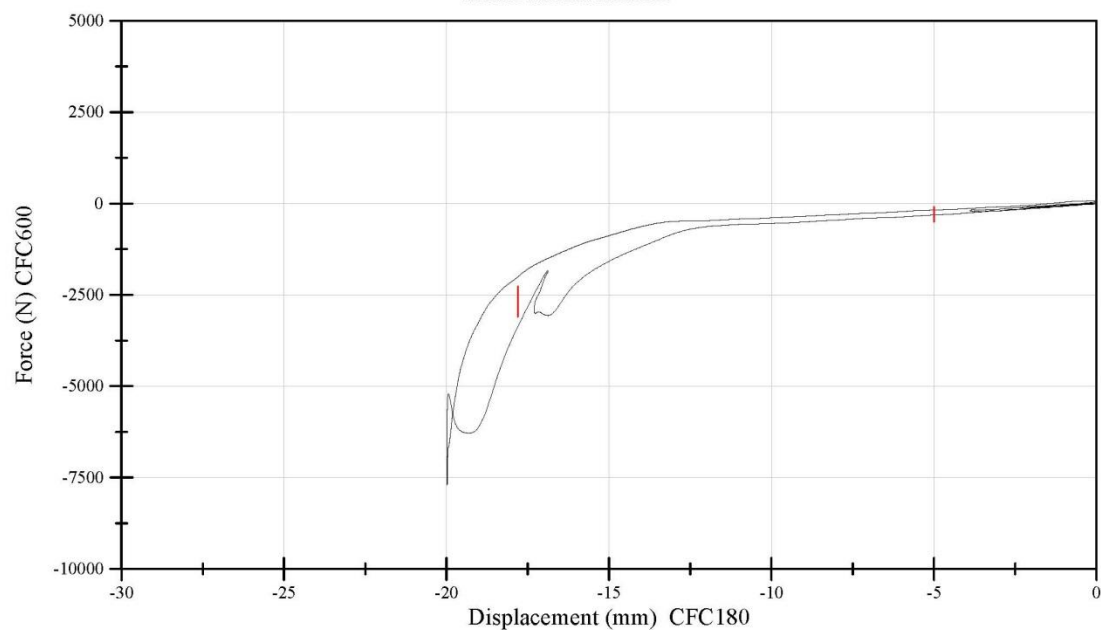
Software Version: 2.4

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

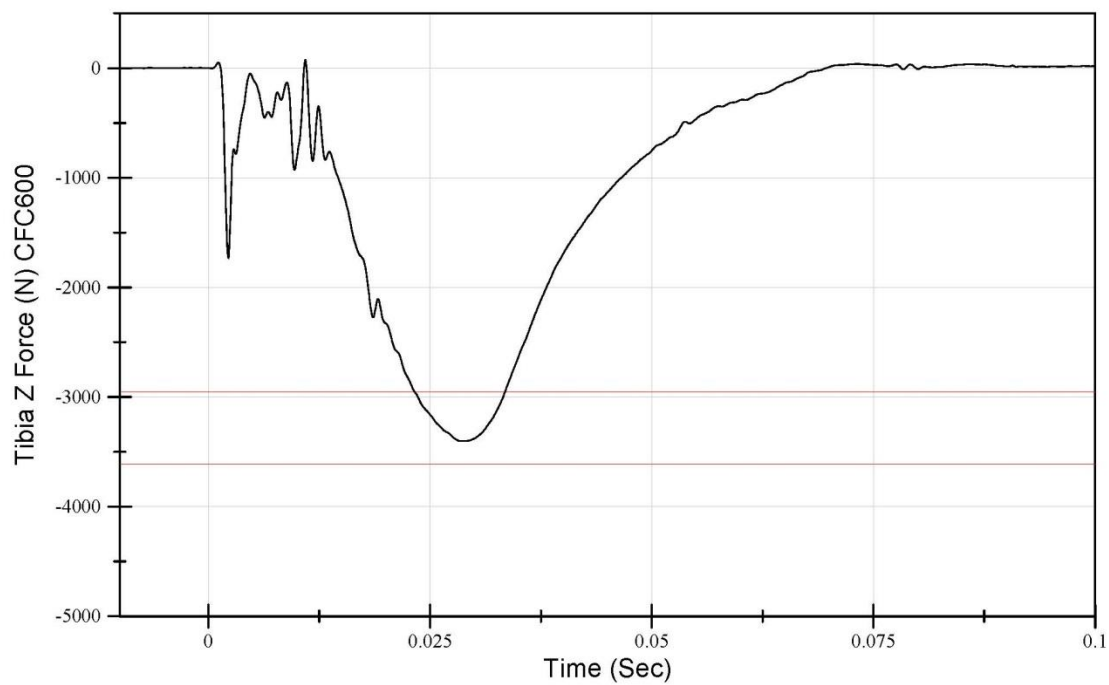


Software Version: 2.4

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

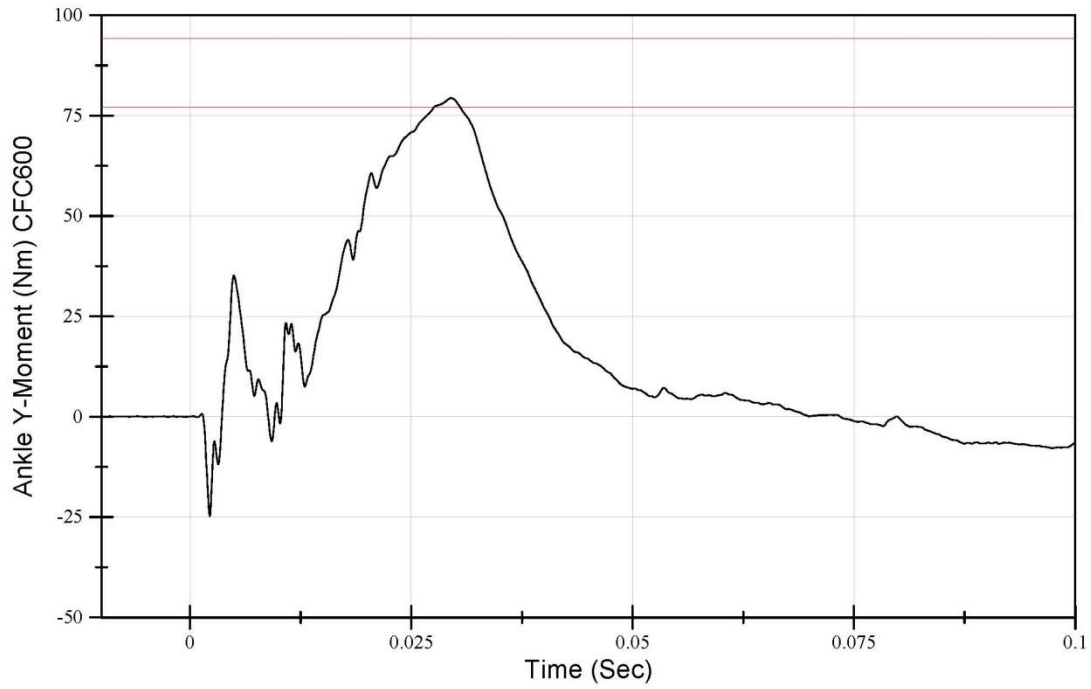


Software Version: 2.4

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

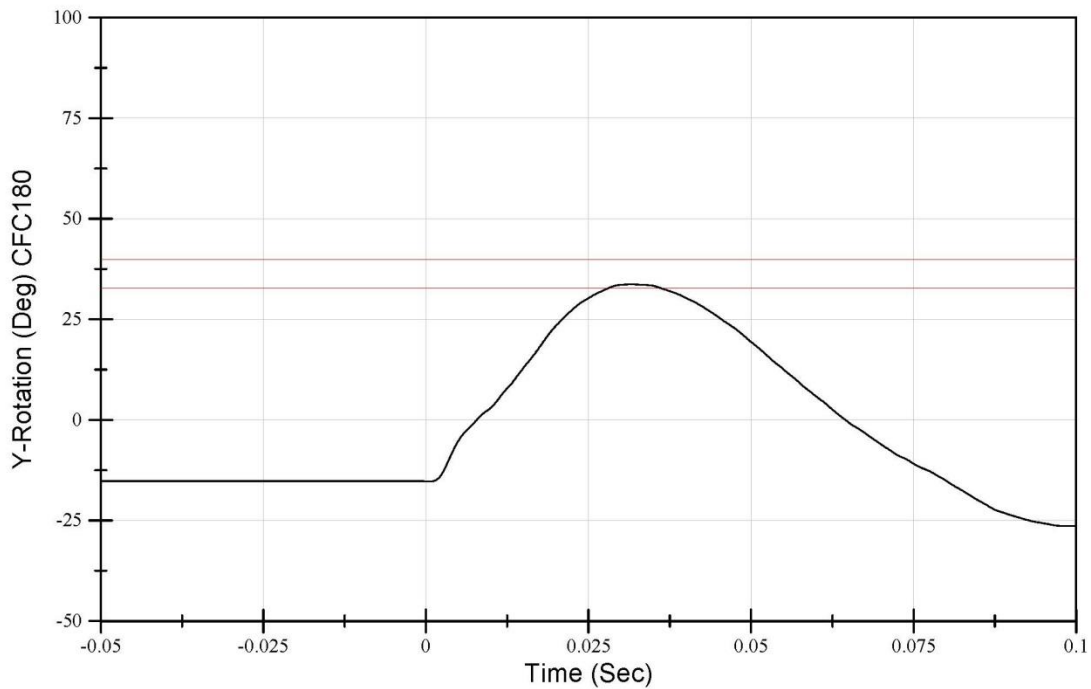


Software Version: 2.4

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

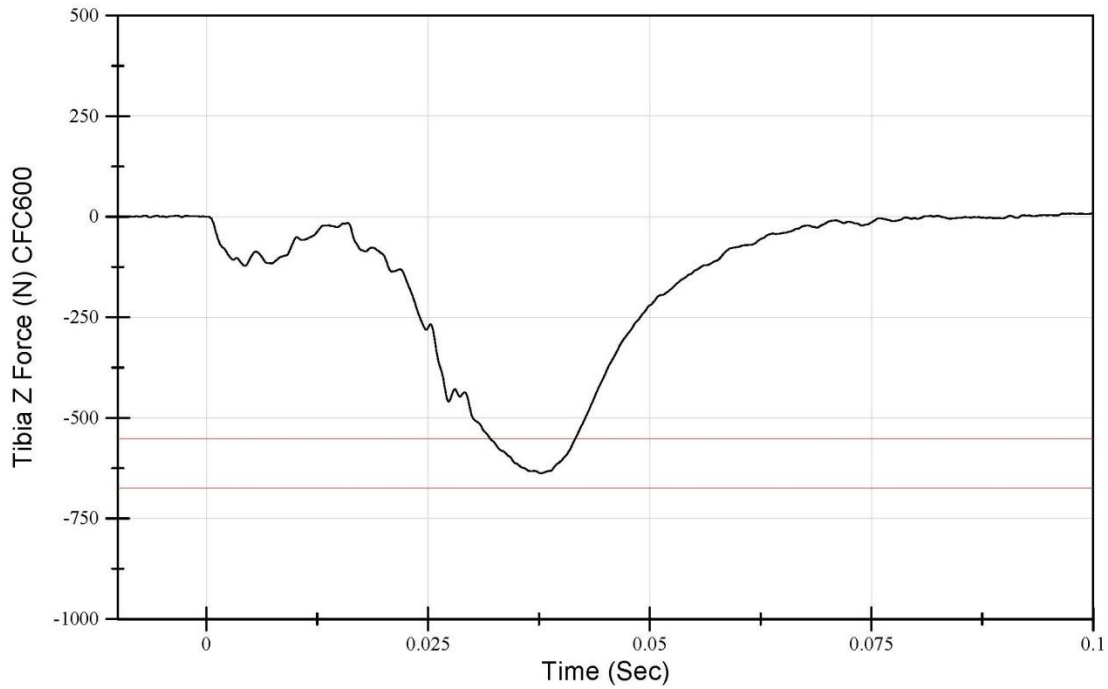


Software Version: 2.4

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

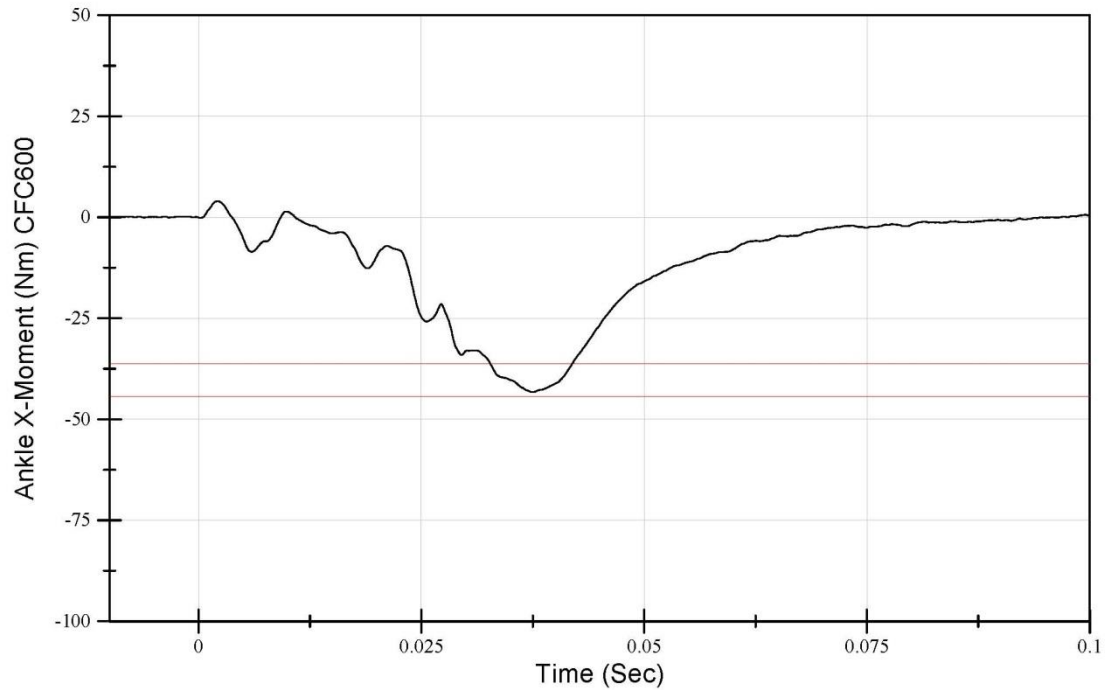


Software Version: 2.4

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

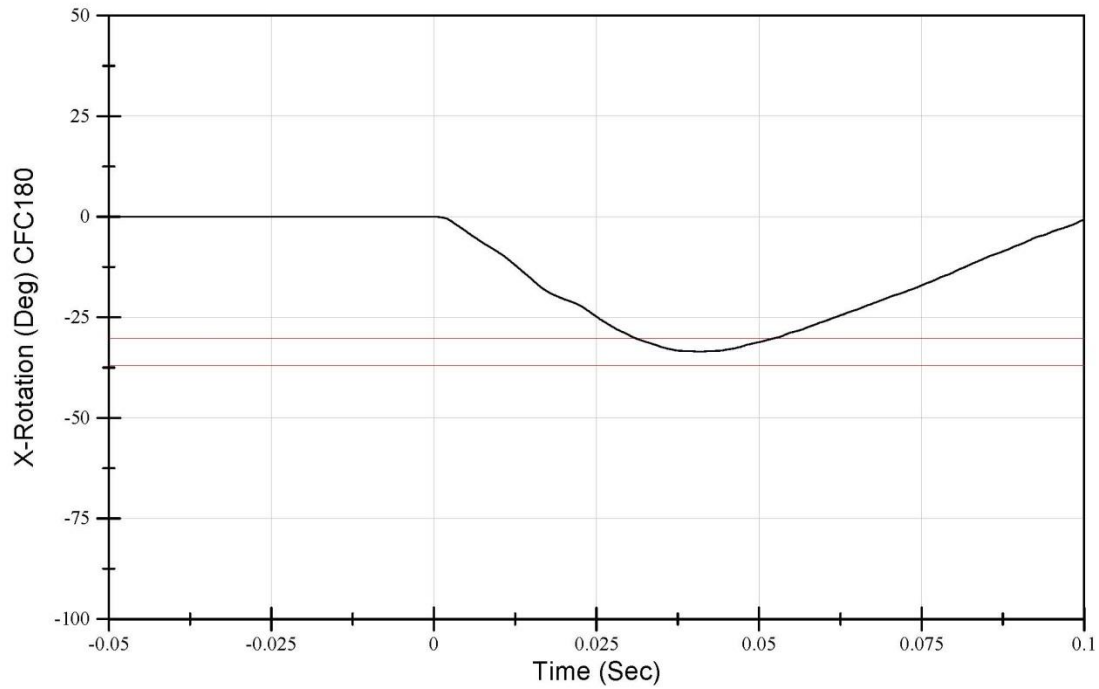


Software Version: 2.4

File Name: LX0038Eversion140423_01_DIADEMHeader_BINARYprocessed
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Test Temperature: 71.2 degrees
Relative Humidity: 32%
Test Velocity: 2 m/s

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

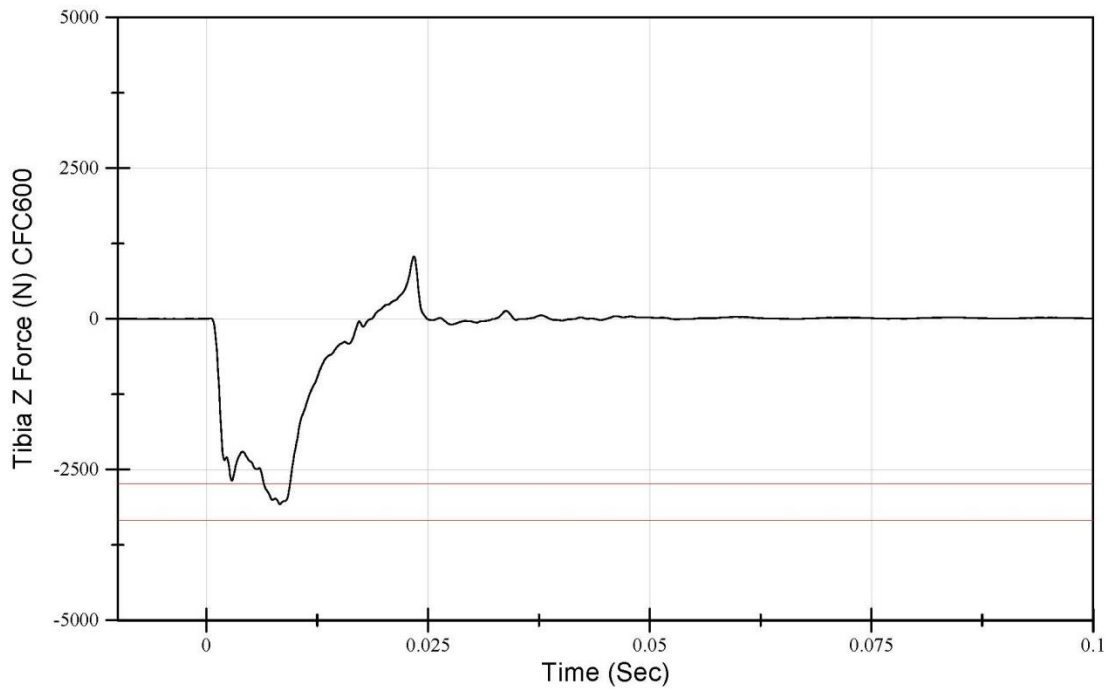


Software Version: 2.4

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

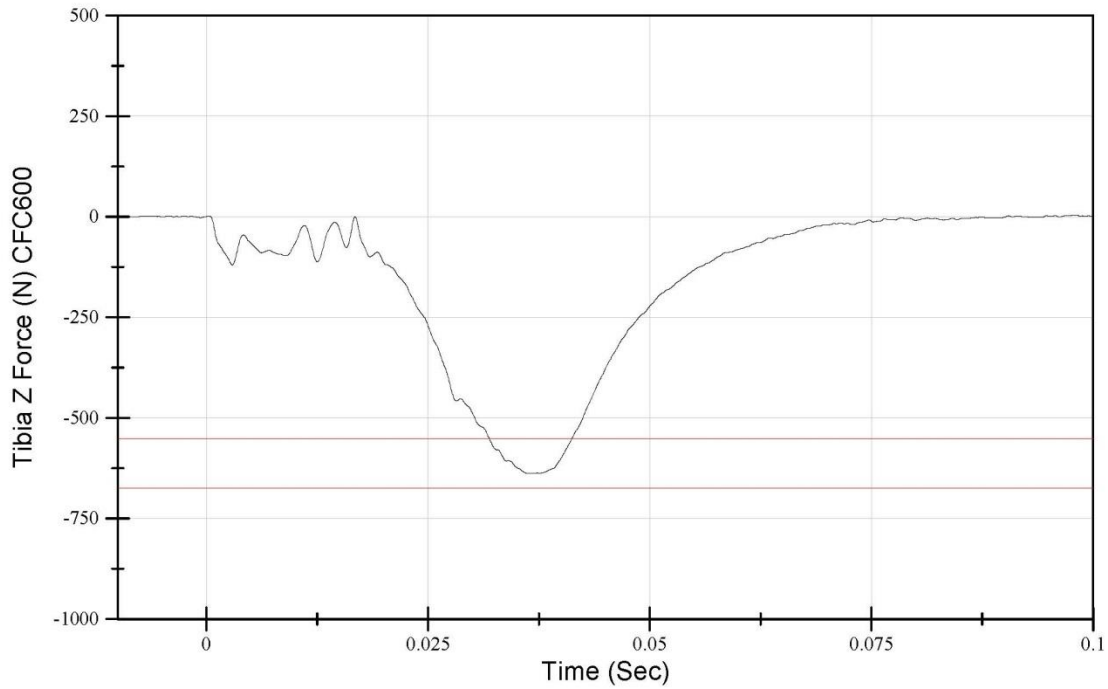


Software Version: 2.4

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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

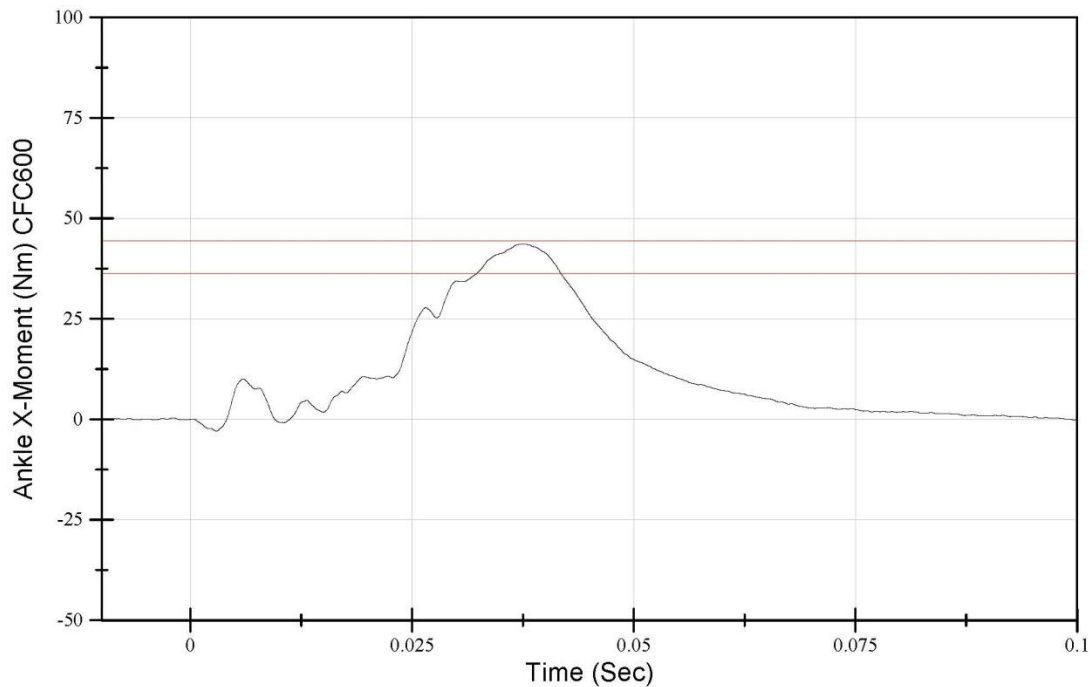


Software Version: 2.4

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

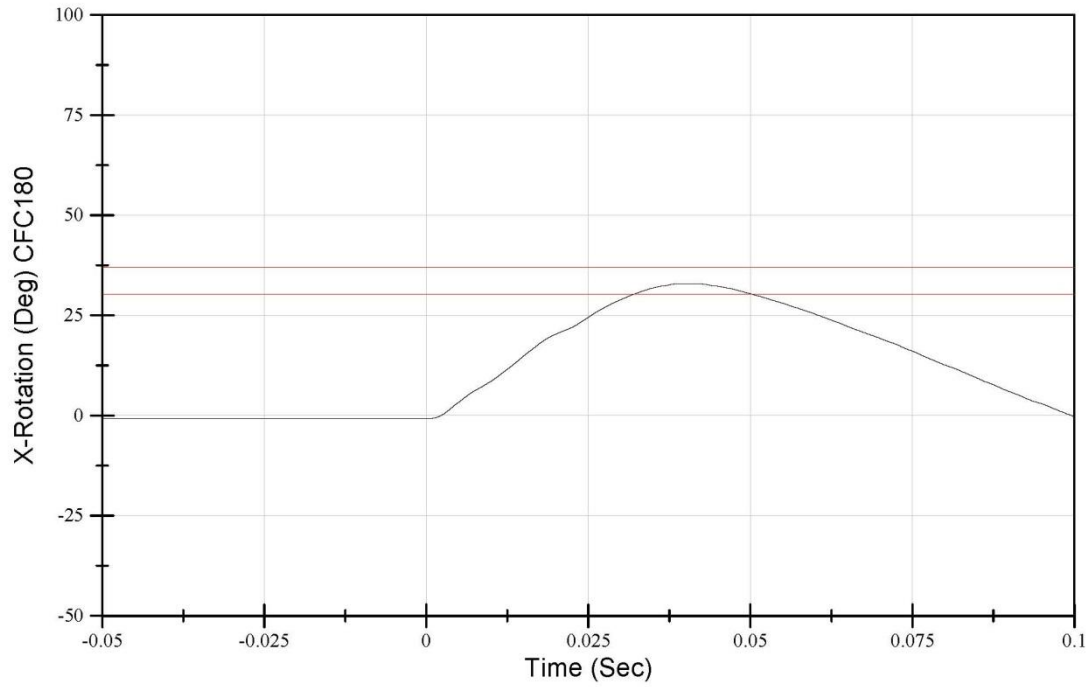


Software Version: 2.4

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

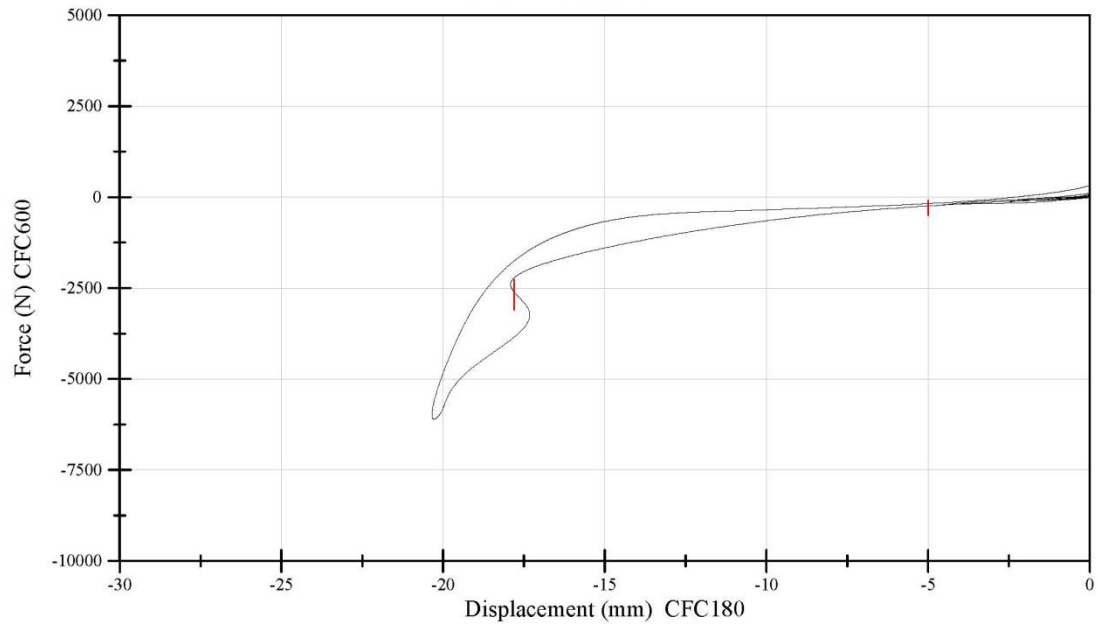


Software Version: 2.4

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

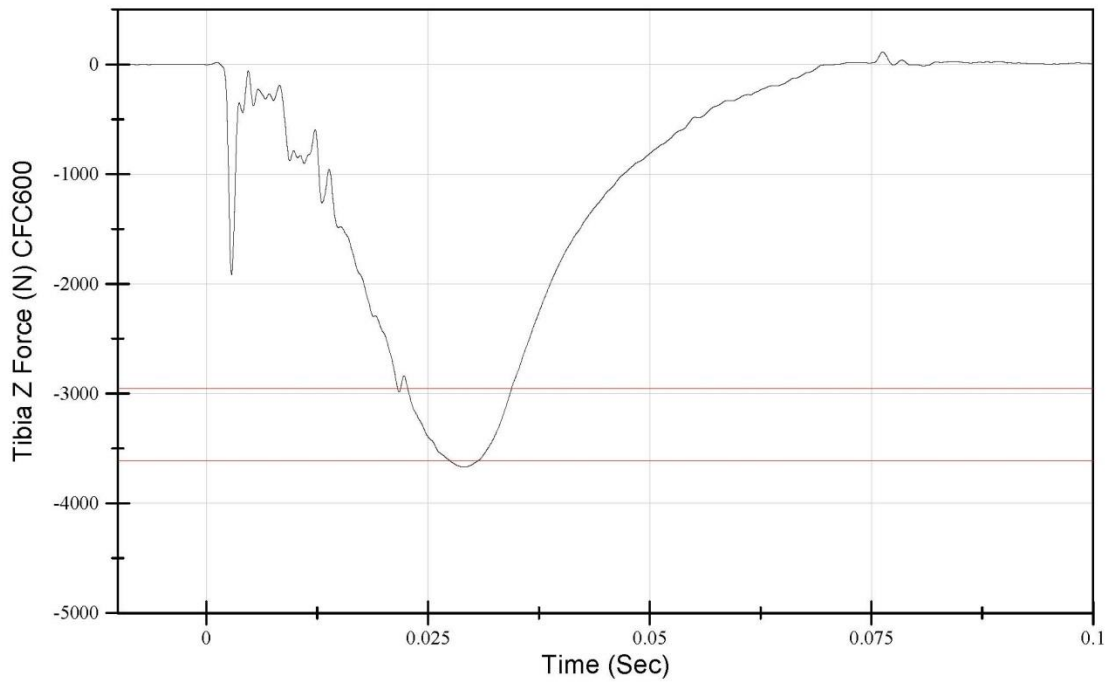


Software Version: 2.4

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

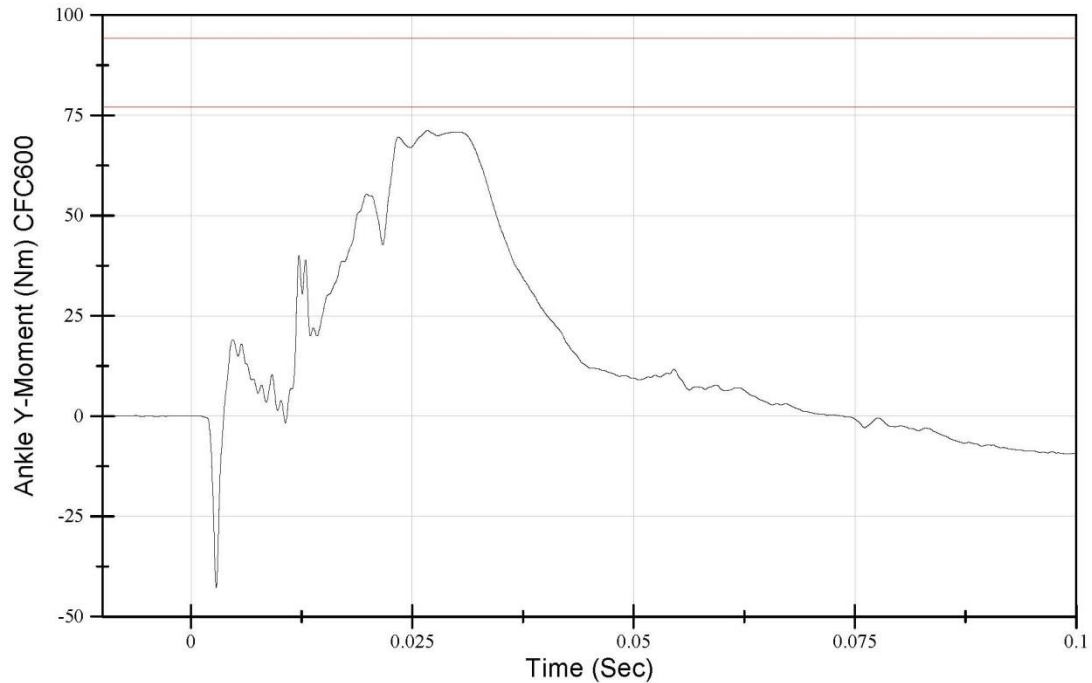


Software Version: 2.4

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

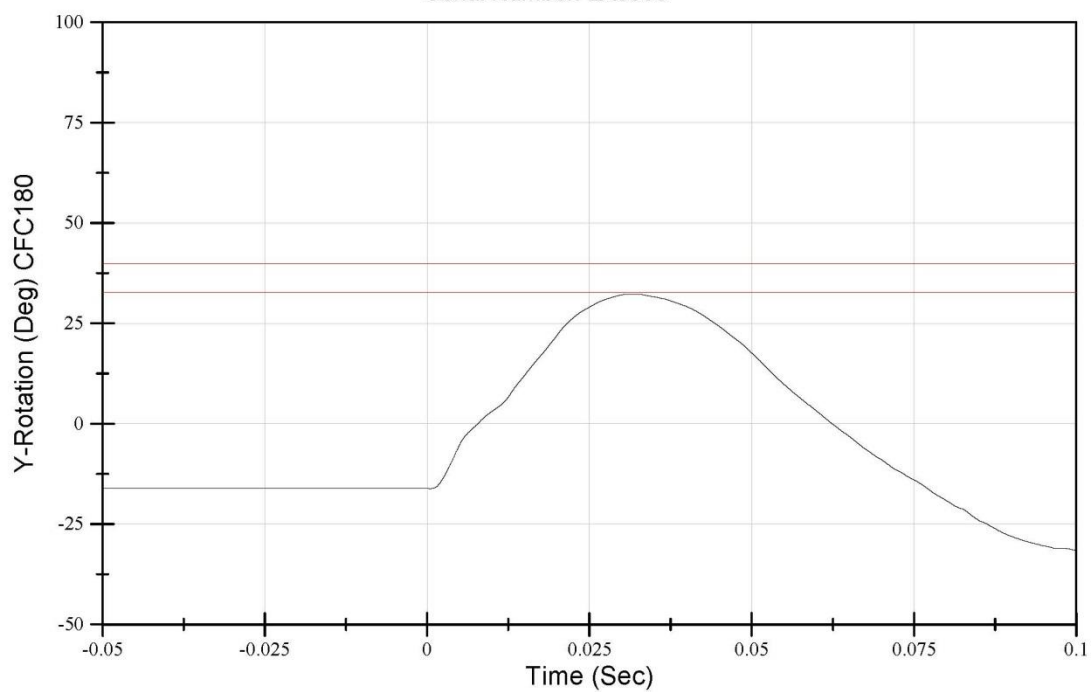


Software Version: 2.4

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

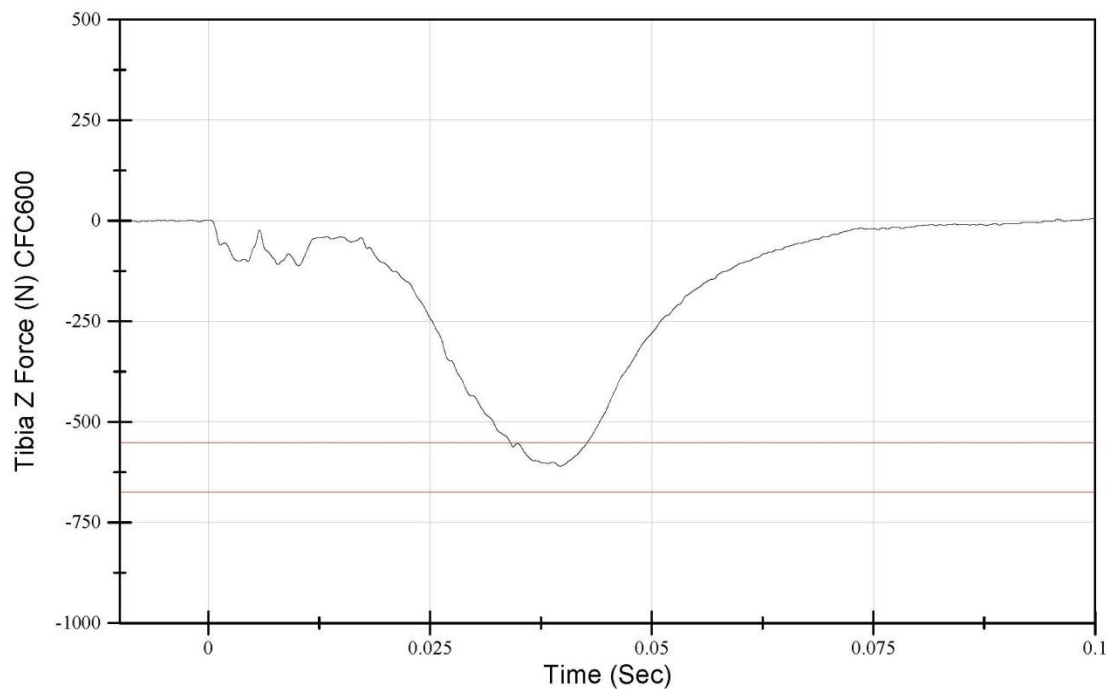


Software Version: 2.4

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

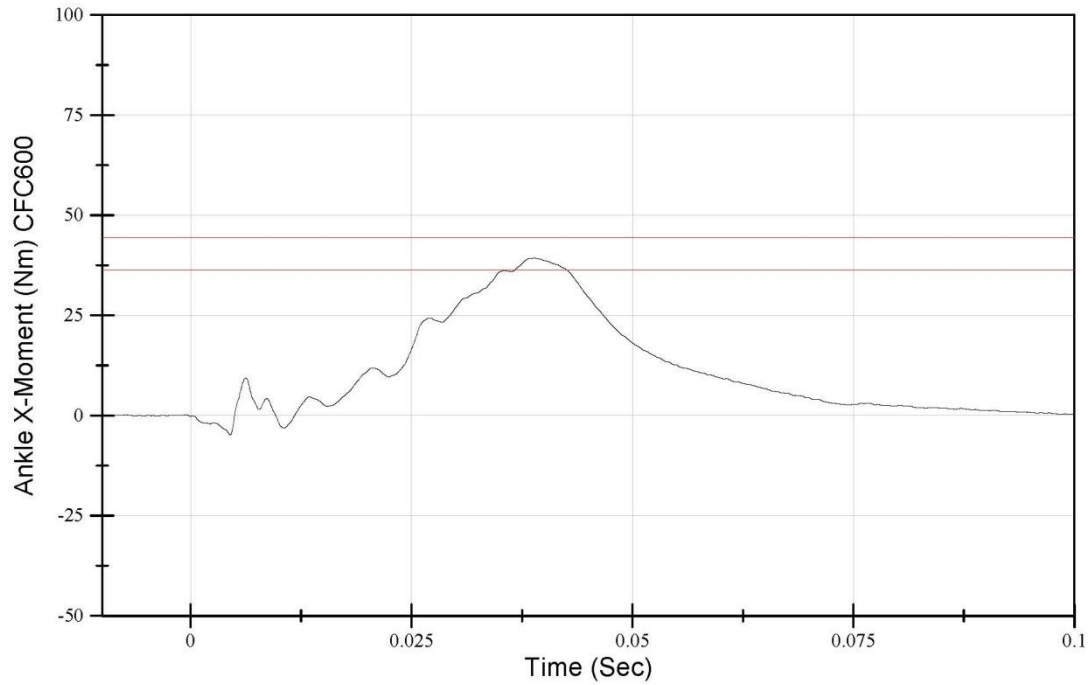


Software Version: 2.4

File Name: LX0039Eversion140422_01_DIADEMHeader_BINARYprocessed
04/22/2014 15:14:32.0000

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

THOR Left Foot Eversion Certification
Ankle Moment
Serial Number: LX0039

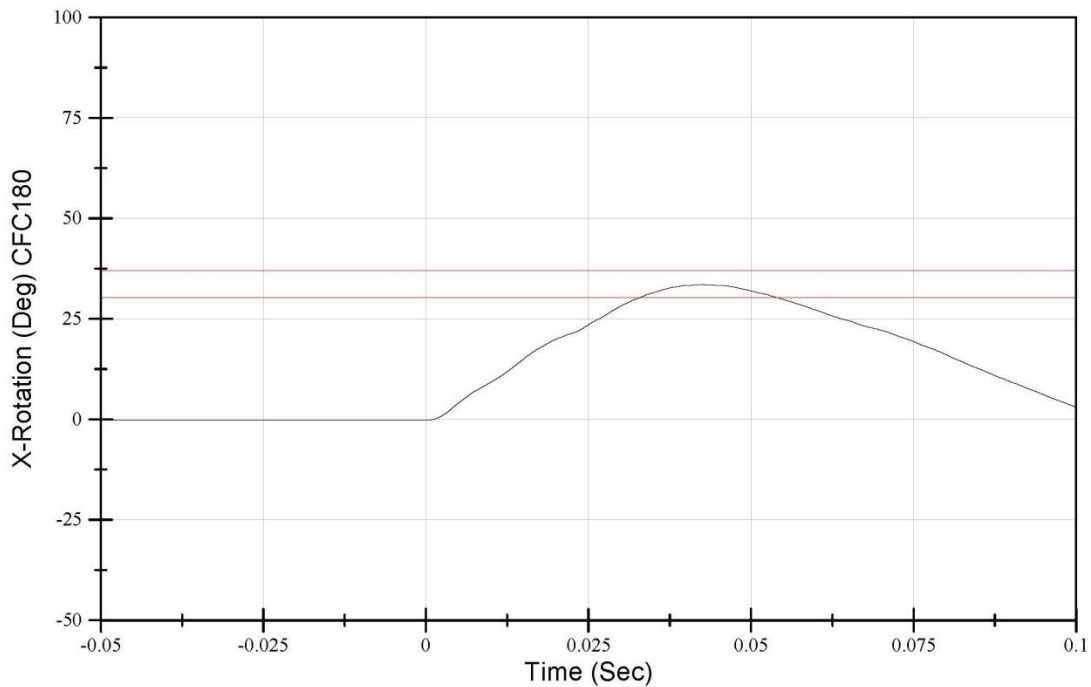


Software Version: 2.4

File Name: LX0039Eversion140422_01_DIADEMHeader_BINARYprocessed
04/22/2014 15:14:32.0000

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

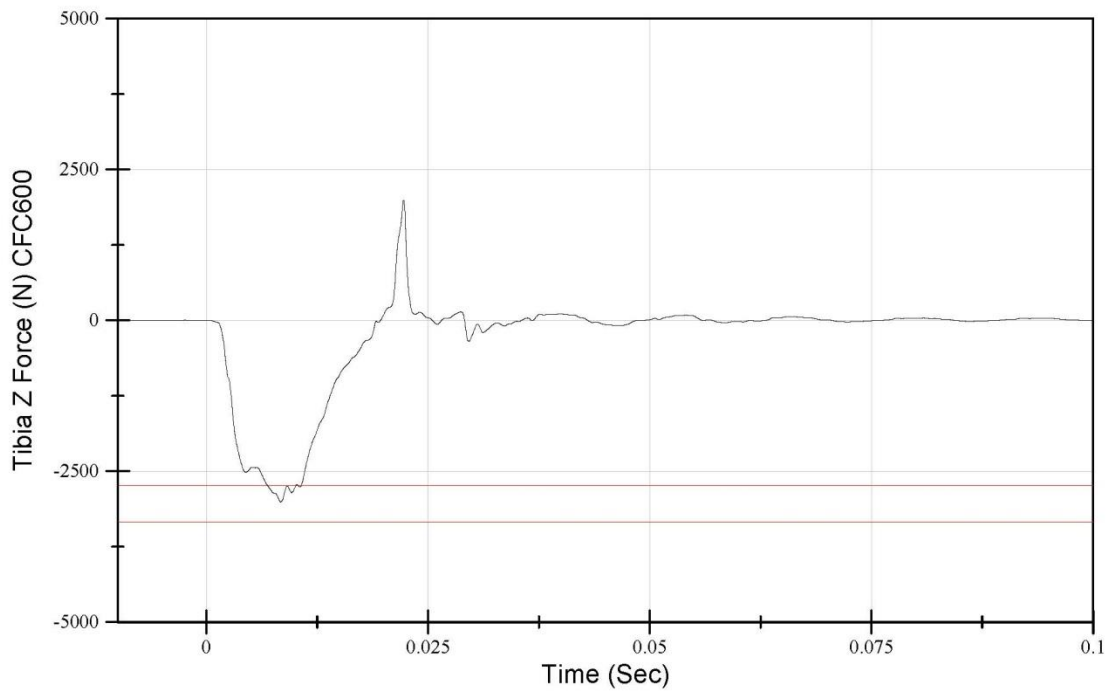


Software Version: 2.4

File Name: LX0039Eversion140422_01_DIADEMHeader_BINARYprocessed
04/22/2014 15:14:32.0000

Test Temperature: 71 degrees
Relative Humidity: 32%
Test Velocity: 4.03 m/s

THOR Left Foot Heel Certification
Tibia Load
Serial Number: LX0039

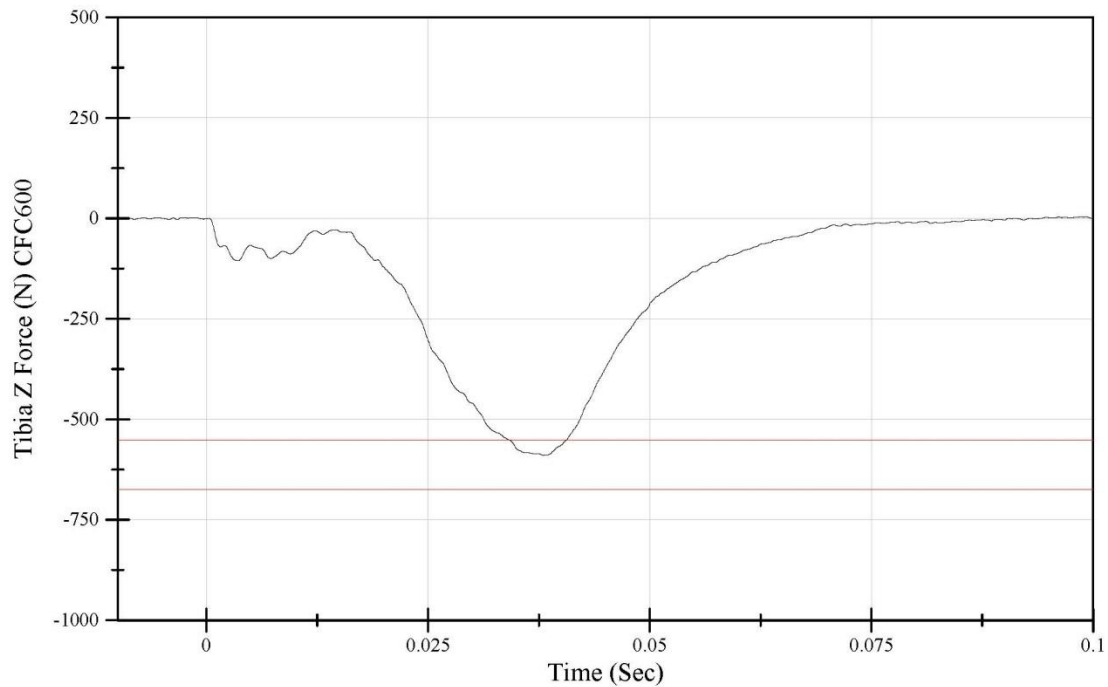


Software Version: 2.4

File Name: LX0039Heel140423_01_DIADEMHeader_BINARYprocessed
04/23/2014 07:47:37.0000

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

THOR Left Foot Inversion Certification
Tibia Load
Serial Number: LX0039

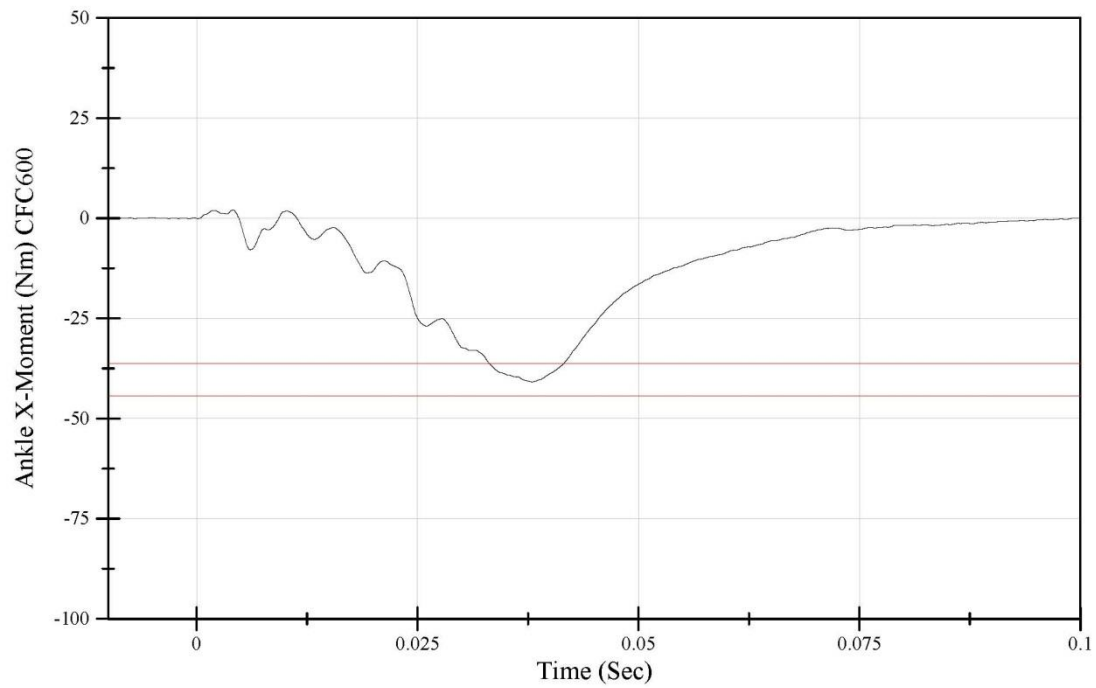


Software Version: 2.4

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 Moment
Serial Number: LX0039

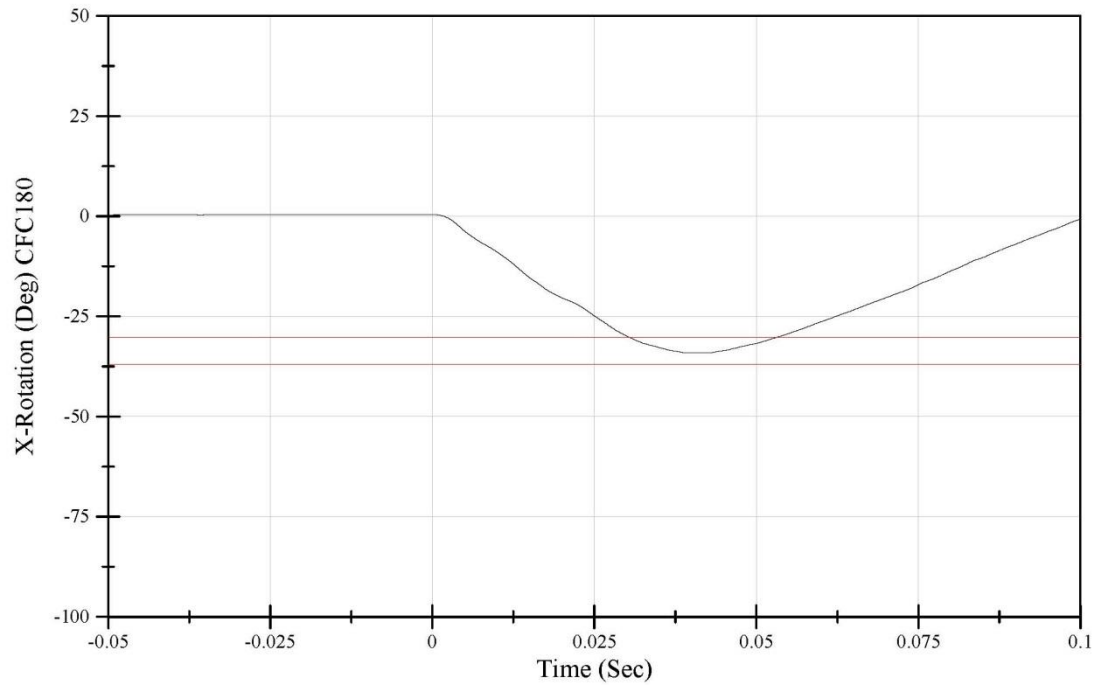


Software Version: 2.4

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

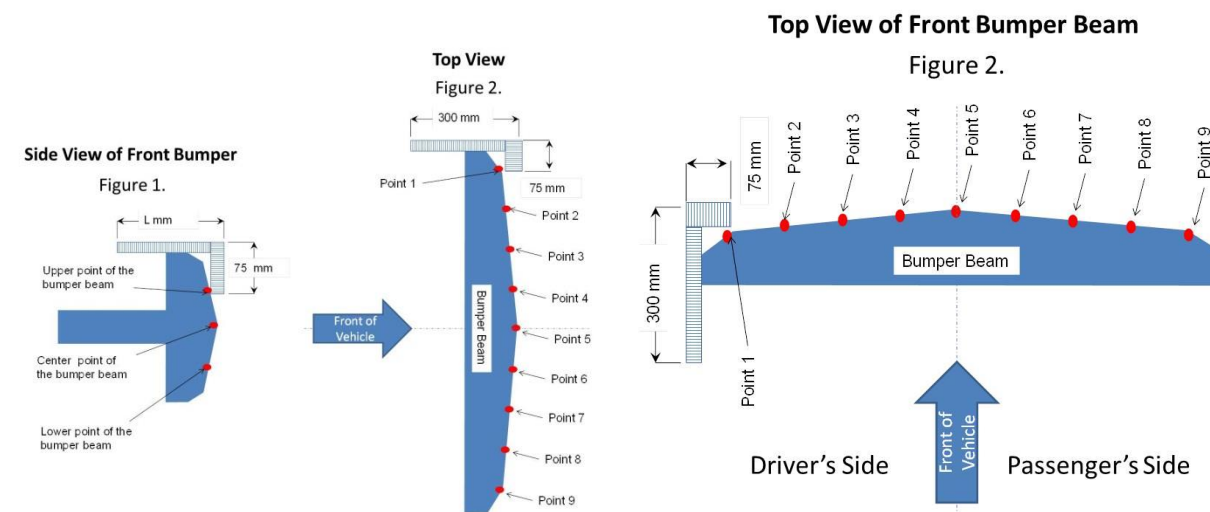
The Brake Pedal Reference Point is the x, y, and z location of the geometric center of the brake pedal pad (top surface) in the VCS.

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.

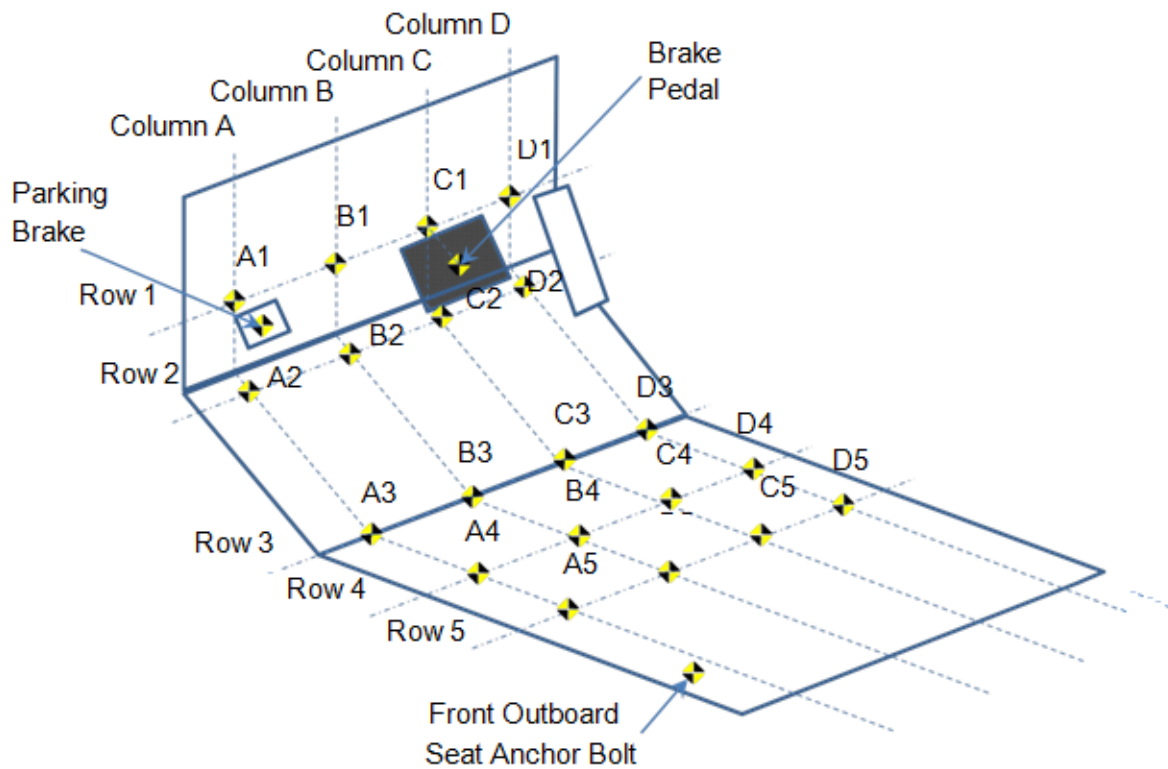
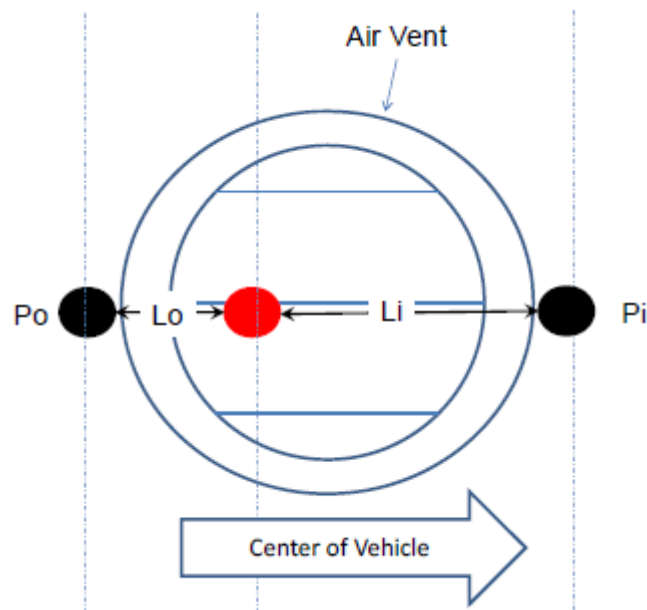


Figure 22: Lower interior intrusion measurements

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.

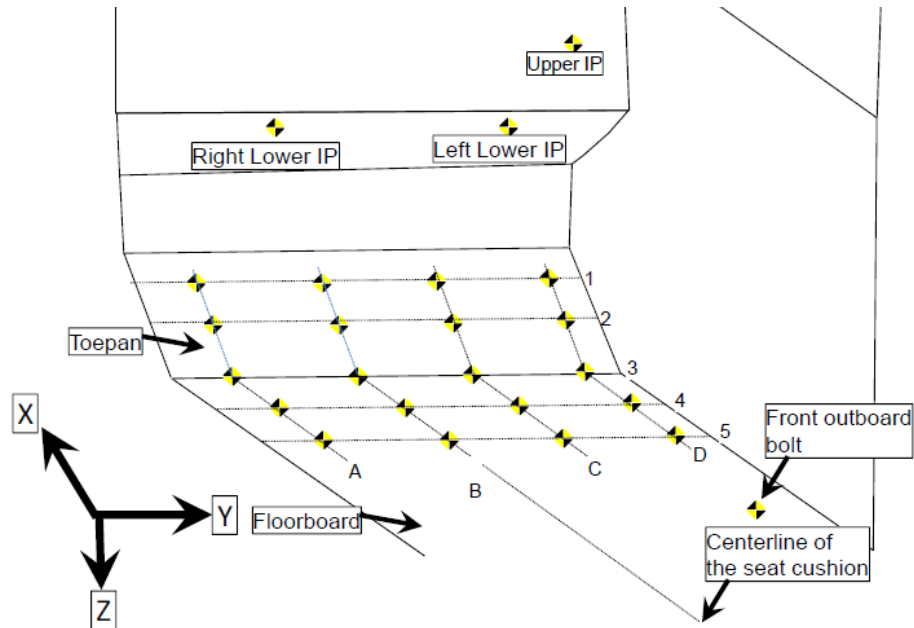


Figure 24: Passenger side lower interior measurements

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

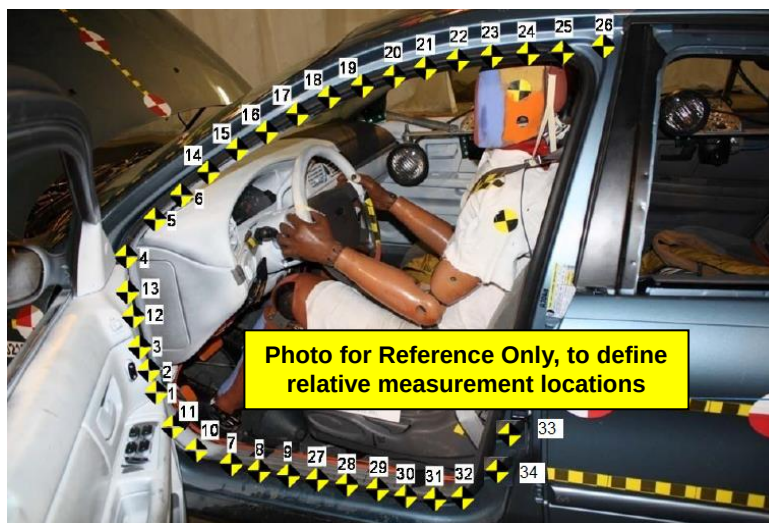


Figure 25: Driver Door Measurements

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.

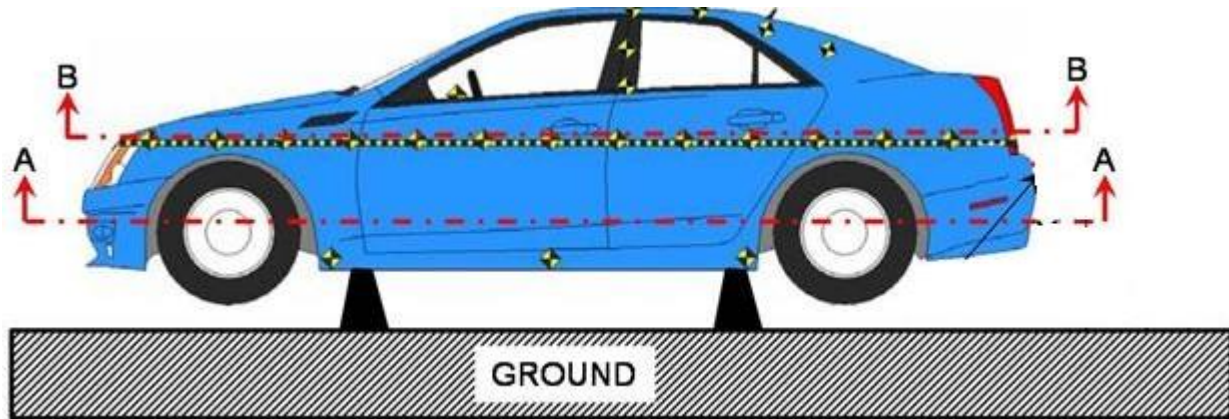


Figure 26: Pre-Test Vehicle Profile

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.

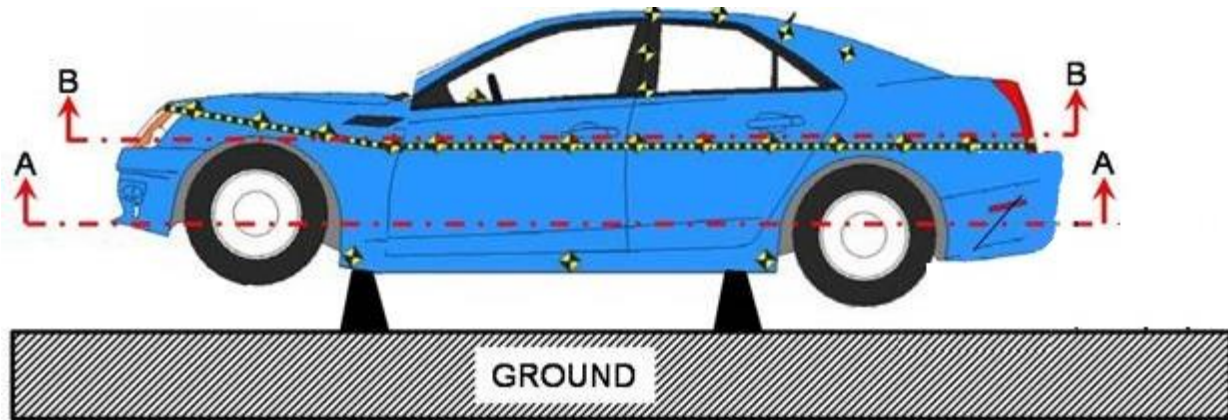
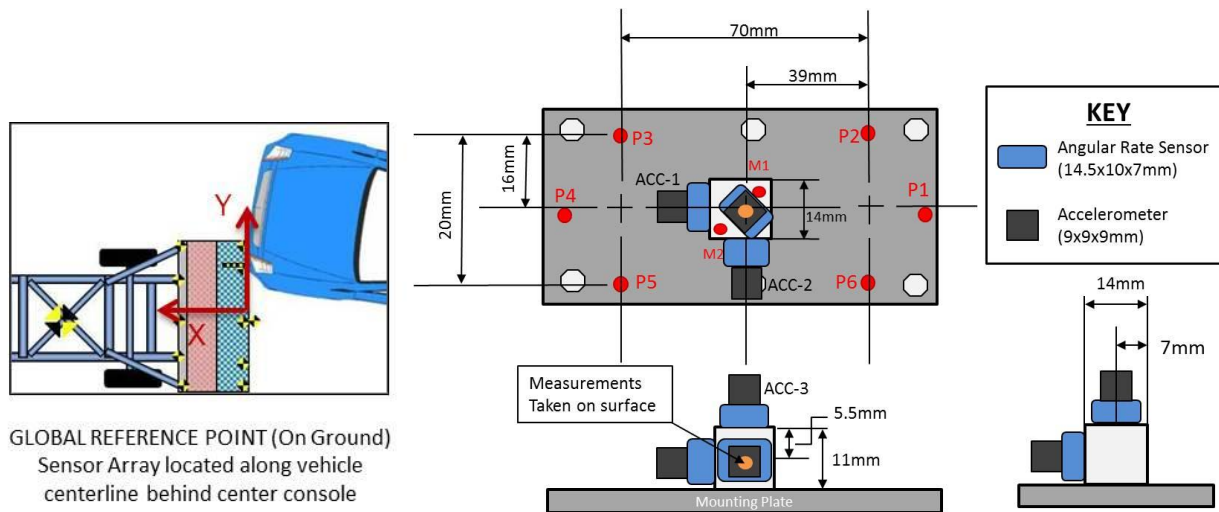


Figure 27: Post-Test Vehicle Profile

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