REPORT NUMBER: R&D-CAL-12-006

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

2013 FORD TAURUS

90.1KPH, 15 DEGREE ANGLE, 35% OVERLAP

TEST DATE: 12/15/2012

NHTSA No: R20130026

CALSPAN CORPORATION
TRANSPORTATION TEST OPERATIONS
P.O. BOX 400
BUFFALO, NEW YORK 14225

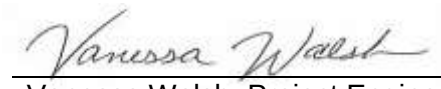
FINAL REPORT SUBMITTED:

March 4, 2015

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

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by:  Date: March 4, 2015

Vanessa Walsh, Project Engineer

Approved by:  Date: March 4, 2015

Edward J. Dutton, Test Engineer Director
Transportation Test Operations

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

_____

Date: _____

_____

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

Date: _____

TECHNICAL REPORT STANDARD TITLE PAGE

1. *Report No.* R&D-CAL-12-006	***2. Government Accession No.***	***3. Recipient's Catalog No.***
4. Title and Subtitle Report for Frontal Oblique Offset Program Testing of a 2013 Ford Taurus four door sedan NHTSA No.: R20130026		***5. Report Date*** 3/4/2015 ***6. Performing Organization Code*** CAL
7. Author(s) Vanessa Walsh, Project Engineer Edward Dutton, Senior Test Engineer		***8. Performing Organization Report No.*** CAL-DOT-2012-006
9. Performing Organization Name and Address Calspan Corporation 4455 Genesee Street Buffalo, New York 14225		***10. Work Unit No.*** ***11. Contract or Grant No.*** DTNH22-10-D-00155
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Research 1200 New Jersey Ave SE, Room W46-446 Washington, DC 20590		***13. Type of Report and Period Covered*** Final Report, 3/4/2015 ***14. Sponsoring Agency Code*** NVS-321
15. Supplementary Notes		

16. Abstract

A test was conducted in accordance with Task Order 0001 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 2013 Ford Taurus. 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 December 15, 2012. The RMDB impact velocity was 90.08 kph and the ambient temperature at the test vehicle at the time of impact was 21°C. The target vehicle post-test maximum crush was 380 mm. The test vehicle's performance was as follows:

Measurement Description	Units	Driver ATD		Pass. ATD	
		Threshold	Result	Threshold	Result
Head Injury Criteria (HIC_{15})	N/A	700	583.73	700	157.43
Maximum Chest Compression	mm	63	-45.16	63	-32.25
Neck Injury Criteria (Nij)	N/A	1	0.32	1	0.34
Neck Tension	N	4,170	2008.69	4,170	1206.94
Neck Compression	N	4,000	-721.99	4,000	-41.96
Left Femur Force	N	10,008	-2688.75	10,008	-2468.36
Right Femur Force	N	10,008	-4069.26	10,008	-3415.13

17. Key Words THOR ATD Oblique Offset	***18. Distribution Statement*** Copies of this report are available from: National Highway Traffic Safety Administration Technical Reference Division 1200 New Jersey Ave, SE Washington, DC 20590		
19. Security Classif. (of this report) UNCLASSIFIED	***20. Security Classif. (of this page)*** UNCLASSIFIED	***21. No. of Pages*** 336	***22. Price***

Form DOT F1700.7 (8-69)

TABLE OF CONTENTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

Section		Page No.
1	Purpose of Test	1-1
2	Summary of Test	2-1
	Crash Vehicle Summary	2-3
	Injury Summary: Driver THOR Male	2-4
	Injury Summary: Driver THOR Male Legs	2-6
	Injury Summary: Front Passenger THOR Male	2-7
	Injury Summary: Front Passenger THOR Male Legs	2-9
3	Data Sheets	3-1

Data Sheet No.		Page No.
1	General Test and Vehicle Parameter Data	3-2
2	Seat Adjustment, Fuel System, and Steering Wheel	3-6
3	Dummy Longitudinal Clearance Dimensions	3-8
4	Dummy Lateral Clearance Dimensions	3-10
5	Seat Belt Positioning Data	3-11
6	High-Speed Camera Locations and Data	3-12
7	Vehicle Instrumentation Data	3-15
8	Photographic Reference Target Locations	3-17
9	Test Vehicle Summary of Results	3-24
10	Post-Test Observations	3-25
11	Vehicle Profile Measurements	3-26
12	Accident Investigation Division Data	3-28
13	Vehicle Intrusion Measurements	3-29
14	RMDB Crush Measurements	3-46
15	Summary of FMVSS 212, 219 (Partial), and 301 Data	
	Windshield Periphery Measurements	3-47
	Fuel System Integrity Post Impact Data	3-48
16	FMVSS 301 Static Rollover Results	3-49
17	Dummy / Vehicle Temperature Stabilization	3-50

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

SECTION 1
PURPOSE OF TEST

Test Vehicle:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012

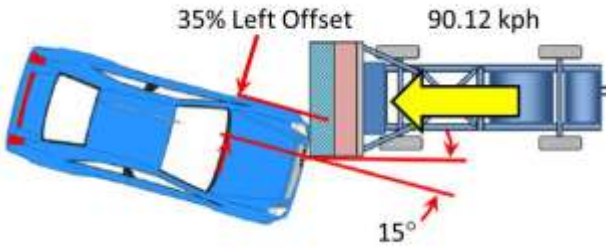
This 90.12 kph (56 mph) Research Moving Deformable Barrier (RMDB) into a vehicle test is part of the Frontal Offset Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-10-D-00155. The purpose of this test is to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

This test was conducted in accordance with the instructions set forth by NHTSA in which the vehicle was placed at a 15° angle, 35% offset relative to the RMDB as outlined in Task Order (TO-1) DTNH22-10-D00155. 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 TO-1 of DTNH22-10-D-00155.

SECTION 2
SUMMARY OF TEST

Test Vehicle:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012

A 2013 Ford Taurus 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 2,123.0 kg (4,680.4 lbs), and the RMDB's mass was 2490.7 kg (5491 lbs). The test was conducted by Calspan Corporation on December 15, 2012.



The test was documented by one (1) 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 with MOD KIT (TK) Anthropomorphic Test Device (ATD) (Serial No. 007) was seated in the left, front (P1 -Driver's) seating position and one 50% adult male THOR-NT with MOD KIT (TK) ATD (Serial No. 016) was seated in the right front passenger seating position (P2). The THOR TK 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, and a frontal airbag. The passenger was restrained with a 3 – point seat belt, and a frontal airbag. The passenger's curtain and torso airbags were disabled.

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

Two hundred and thirty (230) 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 95.1% total windshield retention, with 84% and 89.6% 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 380 mm at C1 to the left of the vehicle's centerline. The maximum crush of the structural bumper beam was 552 mm at B3, to the left of the vehicle's centerline. Additional information pertaining to static crush measurements can be found on Data Sheet No.12 of this report.

All four vehicle doors remained closed and latched during the test. The left front door was deformed as a result of the impact causing it to be non-operational. The remaining doors all remained operational after the test.

Structure observations include the following:

- Driver's side A-Pillar buckled rearward. Resulting in separation between the top of the door and roof sill. (See Photo No.061 in Appendix A)
- Windshield cracked throughout with some minor separation along the bottom right and left side
- Hood did not remain latched during the impact event and bent upwards exposing the engine compartment

The driver ATD's visible contact points were:

- Head Contact: Front airbag and driver's side door
- Torso Contact: Front airbag
- Knee Contact: Knee Bolster

The passenger ATD's visible contact points were:

- Head Contact: Front airbag, left shoulder, visor and side head liner
- Torso Contact: Front airbag
- Knee Contact: Knee Bolster

SECTION 2 (CONTINUED)
CRASH VEHICLE SUMMARY

Test Vehicle: 2013 Ford Taurus Four Door Sedan
Test Program: R&D 90.1kph, 15° angle, 35% offset

NHTSA No.: R20130026
Test Date: 12/15/2012

Primary Impact Data

Measured Parameter	Units	Value
RMDB Velocity at Impact	kph	90.08
RMDB Test Weight	kg	2490.7
RMDB Maximum Static Crush	mm	295.4
Vehicle Test Weight	kg	2123
Actual Vehicle Angle	degrees	15
Vehicle Maximum Static Crush	mm	380
Vertical Offset from Target Point (+ down / - up)*	mm	-10
Lateral Offset from Target Point (+ left / - right)*	mm	-20
Number of Data Channels		230
Number of Real-Time Cameras		1
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	50% Male, Thor 007		50% Male, Thor 016	
Head Contact	Front airbag & driver's side door	A49-A51	Front airbag, left shoulder, visor & side head liner	A70-A72
Upper Torso Contact	Front airbag	NA	Front airbag	NA
Lower Torso Contact	None	NA	None	NA
Left Knee Contact	Knee Bolster	A28	Knee Bolster	A52
Right Knee Contact	Knee Bolster	A28	Knee Bolster	A52

Data Anomalies:

- V2P1 ABDL RY was questionable between 102-131ms
- V2P1 FOTL AZ had data spikes at 40 & 57ms
- V2P1 FOTR AZ had data spikes at 48& 67ms
- V2P2 PVCG AY had a data spike at 58ms
- V2P2 ANKL RX was questionable
- V2P2 ANKL RY was questionable
- V2P2 FOTL AZ failed
- V2P2 TBRL MY was questionable between 57 & 84ms
- V2P2 ANKR RX was questionable
- V2P2 ANKR RY was questionable

SECTION 2 (CONTINUED)
PRELIMINARY INJURY SUMMARY: Driver

Test Vehicle: 2013 Ford Taurus - Four Door Sedan NHTSA No.: R20130026
Test Program: Research and Development Left Oblique Offset Test Date: 12/15/2012

Driver: Thor Serial No. 007 Injury Summary

	Nomenclature	Units	Source	Max	Min
Head	Head CG X	g	1000	6.39	-22.88
	Head CG Y	g	1000	139.99	-3.61
	Head CG Z	g	1000	50.47	-0.91
	Head Resultant	g	Compute	144.48	
	36 ms HIC		Compute	758.25	
	15 ms HIC		Compute	583.73	
	Head Resultant CG Acceleration, 3 ms Clip	g	Compute	93.75	
	Head Rotational Velocity X	deg/s	60	1355.91	-2357.75
	Head Rotational Velocity Y	deg/s	60	1159.97	-2049.88
	Head Rotational Velocity Z	deg/s	60	1648.31	-2105.39
	Head Rotational Velocity Resultant	deg/s	Compute	2735.96	
	Brain Injury Criteria		Compute	1.23	
Neck	UNLC Transferred to OC, Neck System, FX	N	1000	298.73	-1048.28
	UNLC Neck System Tension, FZ	N	1000	2008.69	
	UNLC Neck System Compression, FZ	N	1000		-721.99
	UNLC Transferred to OC, Neck System Flexion, MY	N-m	Thortest	1.75	
	UNLC Transferred to OC, Neck System Extension, MY	N-m	Thortest		-27.60
	NIJ		Compute	0.33	
	On head acting through total neck section, FX	N	Thortest	313.87	-828.28
	On head acting through total neck section, FY	N	Thortest	572.13	-113.47
	On head acting through total neck section, FZ	N	Thortest	2355.85	-49.93
	On head acting through total neck section, MX	N-m	Thortest	39.51	-11.20
	On head acting through total neck section, MY	N-m	Thortest	22.94	-30.53
	On head acting through total neck section, MZ	N-m	Thortest	15.13	-29.59
	On head acting through O.C. joint only, FX	N	Thortest	384.80	-1087.97
	On head acting through O.C. joint only, FZ	N	Thortest	2014.24	-680.05
	On head acting through O.C. joint only, MY	N-m	Thortest	1.75	-27.60
Chest	Upper Left IR-TRACC X - deflection	mm	Thortest	1.46	-13.27
	Upper Left IR-TRACC Y - deflection	mm	Thortest	11.85	-6.93
	Upper Left IR-TRACC Z - deflection	mm	Thortest	13.48	-17.34
	Upper Left IR-TRACC D - deflection	mm	Thortest	3.62	-11.05
	Upper Right IR-TRACC X - deflection	mm	Thortest	0.16	-33.56
	Upper Right IR-TRACC Y - deflection	mm	Thortest	11.26	-10.13
	Upper Right IR-TRACC Z - deflection	mm	Thortest	9.06	-16.01
	Upper Right IR-TRACC D - deflection	mm	Thortest	0.16	-31.74
	Lower Left IR-TRACC X - deflection	mm	Thortest	3.92	-11.11
	Lower Left IR-TRACC Y - deflection	mm	Thortest	5.72	-17.56

SECTION 2 (CONTINUED)
PRELIMINARY INJURY SUMMARY: Driver

Test Vehicle: 2013 Ford Taurus - Four Door Sedan NHTSA No.: R20130026
Test Program: Research and Development Left Oblique Offset Test Date: 12/15/2012

Driver: Thor Serial No. 007 Injury Summary

	Nomenclature	Units	Source	Max	Min
Chest (Con't)	Lower Left IR-TRACC Z - deflection	mm	Thortest	16.48	-5.79
	Lower Left IR-TRACC D - deflection	mm	Thortest	4.97	-13.36
	Lower Right IR-TRACC X - deflection	mm	Thortest	3.16	-46.38
	Lower Right IR-TRACC Y - deflection	mm	Thortest	2.95	-19.31
	Lower Right IR-TRACC Z - deflection	mm	Thortest	4.28	-20.29
	Lower Right IR-TRACC D - deflection	mm	Thortest	3.23	-45.16
	Chest CG Acceleration, 3 ms clip	g	Compute	47.74	
Abdomen	Lower Left IR-TRACC X - deflection	mm	Thortest	0.51(1)	-68.51(1)
	Lower Left IR-TRACC Y - deflection	mm	Thortest	0.17(1)	-22.09(1)
	Lower Left IR-TRACC Z - deflection	mm	Thortest	22.69(1)	-2.73(1)
	Lower Left IR-TRACC D - deflection	mm	Thortest	0.54(1)	-69.64(1)
	Left Viscous Criterion Based on X - deflection		Compute	7.19(1)	
	Lower Right IR-TRACC X - deflection	mm	Thortest	0.66	-58.64
	Lower Right IR-TRACC Y - deflection	mm	Thortest	5.75	-6.27
	Lower Right IR-TRACC Z - deflection	mm	Thortest	25.59	-1.22
	Lower Right IR-TRACC D - deflection	mm	Thortest	0.60	-62.54
	Right Viscous Criterion Based on X - deflection		Compute	1.40	
Spine	Upper Spine (T1) AX	g	180	5.01	-43.40
	Upper Spine (T1) AY	g	180	24.69	-8.18
	Upper Spine (T1) AZ	g	180	21.97	-15.19
	Upper Spine (T1) Resultant	g	Compute	46.47	
	Middle Spine (T6) AX	g	180	11.04	-33.64
	Middle Spine (T6) AY	g	180	37.60	-5.35
	Middle Spine (T6) AZ	g	180	5.43	-17.21
	Middle Spine (T6) Resultant	g	Compute	49.62	
Pelvis	Pelvis CG Resultant Acceleration	g	Compute	50.73	
Acetabulum	Left FX force	N	600	1840.28	-1592.11
	Left FY force	N	600	666.72	-833.64
	Left FZ force	N	600	1245.72	-385.25
	Left Acetabulum Resultant	N	Compute	2093.06	
	Right FX force	N	600	645.67	-1116.74
	Right FY force	N	600	358.72	-1584.60
	Right FZ force	N	600	648.47	-593.55
	Right Acetabulum Resultant	N	Compute	1948.01	

Anomalies

(1) Questionable data from 102 to 131 ms

SECTION 2 (CONTINUED)
PRELIMINARY INJURY SUMMARY: Driver Legs

Test Vehicle: 2013 Ford Taurus - Four Door Sedan NHTSA No.: R20130026
Test Program: Research and Development Left Oblique Offset Test Date: 12/15/2012

Driver: Thor Serial No. 007 Injury Summary

	Nomenclature	Units	Source	Max	Min
Knee	Left Knee Displacement, DX	mm	180	1.62	-7.48
	Right Knee Displacement, DX	mm	180	1.71	-16.20
Femur	Left Femur Force, FZ	N	600	316.26	-2688.75
	Left Femur Moment, MX	N-m	600	20.82	-139.57
	Left Femur Moment, MY	N-m	600	47.81	-85.69
	Left Femur Res (MX / MY only, not MZ)	N-m	Compute	162.85	
	Right Femur Force, FZ	N	600	274.60	-4069.26
	Right Femur Moment, MX	N-m	600	22.76	-71.00
	Right Femur Moment, MY	N-m	600	57.14	-47.09
	Right Femur Res (MX / MX only, not MZ)	N-m	Compute	73.96	
Tibia	Left Upper Tibia, FZ	N	600	159.23	-1423.39
	Left Upper Tibia, MY	N-m	600	39.15	-62.19
	Left Upper Tibia, Index		Compute	0.36	
	Right Upper Tibia, FZ	N	600	597.62	-1075.61
	Right Upper Tibia, MY	N-m	600	49.36	-84.86
	Right Upper Tibia, Index		Compute	0.63	
	Left Lower Tibia, FZ	N	600	135.49	-1998.46
	Left Lower Tibia, MY	N-m	600	24.24	-45.82
	Left Lower Tibia, Index		Compute	0.34	
	Right Lower Tibia, FZ	N	600	326.65	-2402.66
	Right Lower Tibia, MY	N-m	600	33.87	-94.09
	Right Lower Tibia, Index		Compute	0.82	
Ankle	Left Ankle Rotation, RX	Deg	180	22.19	-27.23
	Left Ankle Rotation, RY	Deg	180	20.29	-9.41
	Right Ankle Rotation, RX	Deg	180	23.98	-36.30
	Right Ankle Rotation, RY	Deg	180	13.27	-30.89

Anomalies
None

SECTION 2 (CONTINUED)
PRELIMINARY INJURY SUMMARY: Right Front Passenger

Test Vehicle: 2013 Ford Taurus - Four Door Sedan NHTSA No.: R20130026
Test Program: Research and Development Left Oblique Offset Test Date: 12/15/2012

Right Front Passenger: Thor Serial No. 016 Injury Summary

	Nomenclature	Units	Source	Max	Min
Head	Head CG X	g	1000	28.84	-16.26
	Head CG Y	g	1000	38.52	-4.86
	Head CG Z	g	1000	32.55	-0.88
	Head Resultant	g	Compute	50.89	
	36 ms HIC		Compute	265.02	
	15 ms HIC		Compute	157.43	
	Head Resultant CG Acceleration, 3 ms Clip	g	Compute	47.70	
	Head Rotational Velocity X	deg/s	60	766.50	-2192.33
	Head Rotational Velocity Y	deg/s	60	1232.18	-1326.80
	Head Rotational Velocity Z	deg/s	60	2566.70	-1572.86
	Head Rotational Velocity Resultant	deg/s	Compute	3205.30	
	Brain Injury Criteria		Compute	1.26	
Neck	UNLC Transferred to OC, Neck System, FX	N	1000	489.38	-133.32
	UNLC Neck System Tension, FZ	N	1000	1206.94	
	UNLC Neck System Compression, FZ	N	1000		-41.96
	UNLC Transferred to OC, Neck System Flexion, MY	N-m	Thortest	11.33	
	UNLC Transferred to OC, Neck System Extension, MY	N-m	Thortest		-7.10
	NIJ		Compute	0.36	
	On head acting through total neck section, FX	N	Thortest	559.28	-302.99
	On head acting through total neck section, FY	N	Thortest	436.01	-110.85
	On head acting through total neck section, FZ	N	Thortest	1572.01	-19.07
	On head acting through total neck section, MX	N-m	Thortest	56.04	-36.87
	On head acting through total neck section, MY	N-m	Thortest	8.24	-26.09
	On head acting through total neck section, MZ	N-m	Thortest	12.39	-33.96
	On head acting through O.C. joint only, FX	N	Thortest	525.59	-274.56
	On head acting through O.C. joint only, FZ	N	Thortest	1167.40	-40.28
	On head acting through O.C. joint only, MY	N-m	Thortest	11.33	-7.10
Chest	Upper Left IR-TRACC X - deflection	mm	Thortest	0.08	-32.72
	Upper Left IR-TRACC Y - deflection	mm	Thortest	1.41	-10.44
	Upper Left IR-TRACC Z - deflection	mm	Thortest	9.97	-24.79
	Upper Left IR-TRACC D - deflection	mm	Thortest	0.09	-32.06
	Upper Right IR-TRACC X - deflection	mm	Thortest	0.22	-27.97
	Upper Right IR-TRACC Y - deflection	mm	Thortest	2.26	-10.73
	Upper Right IR-TRACC Z - deflection	mm	Thortest	9.29	-13.14
	Upper Right IR-TRACC D - deflection	mm	Thortest	0.22	-27.47
	Lower Left IR-TRACC X - deflection	mm	Thortest	0.34	-32.54
	Lower Left IR-TRACC Y - deflection	mm	Thortest	12.99	-7.31

SECTION 2 (CONTINUED)
PRELIMINARY INJURY SUMMARY: Right Front Passenger

Test Vehicle: 2013 Ford Taurus - Four Door Sedan NHTSA No.: R20130026
Test Program: Research and Development Left Oblique Offset Test Date: 12/15/2012

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	3.75	-8.11
	Lower Left IR-TRACC D - deflection	mm	Thortest	0.31	-32.25
	Lower Right IR-TRACC X - deflection	mm	Thortest	1.89	-13.94
	Lower Right IR-TRACC Y - deflection	mm	Thortest	4.68	-18.85
	Lower Right IR-TRACC Z - deflection	mm	Thortest	3.03	-13.04
	Lower Right IR-TRACC D - deflection	mm	Thortest	1.60	-11.87
	Chest CG Acceleration, 3 ms clip	g	Compute	39.84	
Abdomen	Lower Left IR-TRACC X - deflection	mm	Thortest	0.46	-67.76
	Lower Left IR-TRACC Y - deflection	mm	Thortest	6.10	-6.50
	Lower Left IR-TRACC Z - deflection	mm	Thortest	16.58	-5.56
	Lower Left IR-TRACC D - deflection	mm	Thortest	0.47	-67.39
	Left Viscous Criterion Based on X - deflection		Compute	6.90	
	Lower Right IR-TRACC X - deflection	mm	Thortest	0.19	-52.77
	Lower Right IR-TRACC Y - deflection	mm	Thortest	11.99	-1.53
	Lower Right IR-TRACC Z - deflection	mm	Thortest	12.38	-3.67
	Lower Right IR-TRACC D - deflection	mm	Thortest	0.19	-52.86
	Right Viscous Criterion Based on X - deflection		Compute	1.31	
Spine	Upper Spine (T1) AX	g	180	8.63	-29.95
	Upper Spine (T1) AY	g	180	30.23	-7.19
	Upper Spine (T1) AZ	g	180	18.88	-6.57
	Upper Spine (T1) Resultant	g	Compute	44.36	
	Middle Spine (T6) AX	g	180	2.98	-34.06
	Middle Spine (T6) AY	g	180	30.10	-2.69
	Middle Spine (T6) AZ	g	180	9.85	-9.45
	Middle Spine (T6) Resultant	g	Compute	45.93	
Pelvis	Pelvis CG Resultant Acceleration	g	Compute	72.56(2)	
Acetabulum	Left FX force	N	600	424.72	-1792.76
	Left FY force	N	600	1946.46	-253.00
	Left FZ force	N	600	142.26	-923.94
	Left Acetabulum Resultant	N	Compute	2623.45	
	Right FX force	N	600	739.35	-3158.82
	Right FY force	N	600	1016.68	-909.99
	Right FZ force	N	600	39.80	-1284.61
	Right Acetabulum Resultant	N	Compute	3540.74	

Anomalies

(2) Questionable spike at 58 ms

SECTION 2 (CONTINUED)
PRELIMINARY INJURY SUMMARY: Right Front Passenger Legs

Test Vehicle: 2013 Ford Taurus - Four Door Sedan NHTSA No.: R20130026
Test Program: Research and Development Left Oblique Offset Test Date: 12/15/2012

Right Front Passenger: Thor Serial No. 016 Injury Summary

	Nomenclature	Units	Source	Max	Min
Knee	Left Knee Displacement, DX	mm	180	0.95	-9.48
	Right Knee Displacement, DX	mm	180	1.57	-2.35
Femur	Left Femur Force, FZ	N	600	427.51	-2468.36
	Left Femur Moment, MX	N-m	600	135.28	-110.60
	Left Femur Moment, MY	N-m	600	82.54	-6.83
	Left Femur Res (MX / MY only, not MZ)	N-m	Compute	157.62	
	Right Femur Force, FZ	N	600	450.10	-3415.13
	Right Femur Moment, MX	N-m	600	52.78	-247.52
	Right Femur Moment, MY	N-m	600	89.14	-30.06
	Right Femur Res (MX / MX only, not MZ)	N-m	Compute	260.81	
Tibia	Left Upper Tibia, FZ	N	600	92.43	-2844.10
	Left Upper Tibia, MY	N-m	600	95.03	-44.67
	Left Upper Tibia, Index		Compute	0.70	
	Right Upper Tibia, FZ	N	600	175.30	-2093.01
	Right Upper Tibia, MY	N-m	600	88.52	-22.77
	Right Upper Tibia, Index		Compute	0.58	
	Left Lower Tibia, FZ	N	600	156.99	-2752.67
	Left Lower Tibia, MY	N-m	600	74.75	-63.12
	Left Lower Tibia, Index		Compute	0.67	
	Right Lower Tibia, FZ	N	600	167.89	-1994.52
	Right Lower Tibia, MY	N-m	600	64.21(3)	-34.77(3)
	Right Lower Tibia, Index		Compute	0.42(3)	
Ankle	Left Ankle Rotation, RX	Deg	180	38.24(4)	-90.89(4)
	Left Ankle Rotation, RY	Deg	180	13.55(5)	-105.72(5)
	Right Ankle Rotation, RX	Deg	180	27.08	-25.36
	Right Ankle Rotation, RY	Deg	180	-4.06(6)	-35.67(6)

Anomalies

(3) Questionable data from 57 to 84 ms
(4) Channel failed
(5) Channel failed
(6) Questionable data throughout

SECTION 3
DATA SHEETS

Test Vehicle:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012

Data Sheet No.		Page No.
1	General Test and Vehicle Parameter Data	3-2
2	Seat Adjustment, Fuel System, and Steering Wheel	3-6
3	Dummy Longitudinal Clearance Dimensions	3-8
4	Dummy Lateral Clearance Dimensions	3-10
5	Seat Belt Positioning Data	3-11
6	High-Speed Camera Locations and Data	3-12
7	Vehicle Instrumentation Data	3-15
8	Photographic Reference Target Locations	3-17
9	Test Vehicle Summary of Results	3-24
10	Post-Test Observations	3-25
11	Vehicle Profile Measurements	3-26
12	Accident Investigation Division Data	3-28
13	Vehicle Intrusion Measurements	3-29
14	RMDB Crush Measurements	3-46
15	Summary of FMVSS 212, 219 (Partial), and 301 Data	
	Windshield Periphery Measurements	3-47
	Fuel System Integrity Post Impact Data	3-48
16	FMVSS 301 Static Rollover Results	3-49
17	Dummy / Vehicle Temperature Stabilization	3-50

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Ford Taurus Four Door Sedan
Test Program: R&D 90.1kph, 15° angle, 35% offset

NHTSA No.: R20130026
Test Date: 12/15/2012

VEHICLE INFORMATION

NHTSA No.	R20130026
Model Year	2013
Make	Ford
Model	Taurus
Body Style	Four Door Sedan
VIN	1FAHP2D80DG147416
Body Color	Light gray/silver
Odometer Reading (km/mi)	55 / 34
Engine Displacement. (L)	3.5
Type/No. Cylinders	V6
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	Front Wheel Drive
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
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	Ford Motor Co
Date of Manufacture	08/12

GVWR (kg)	2386
GAWR Front (kg)	1279
GAWR Rear (kg)	1143

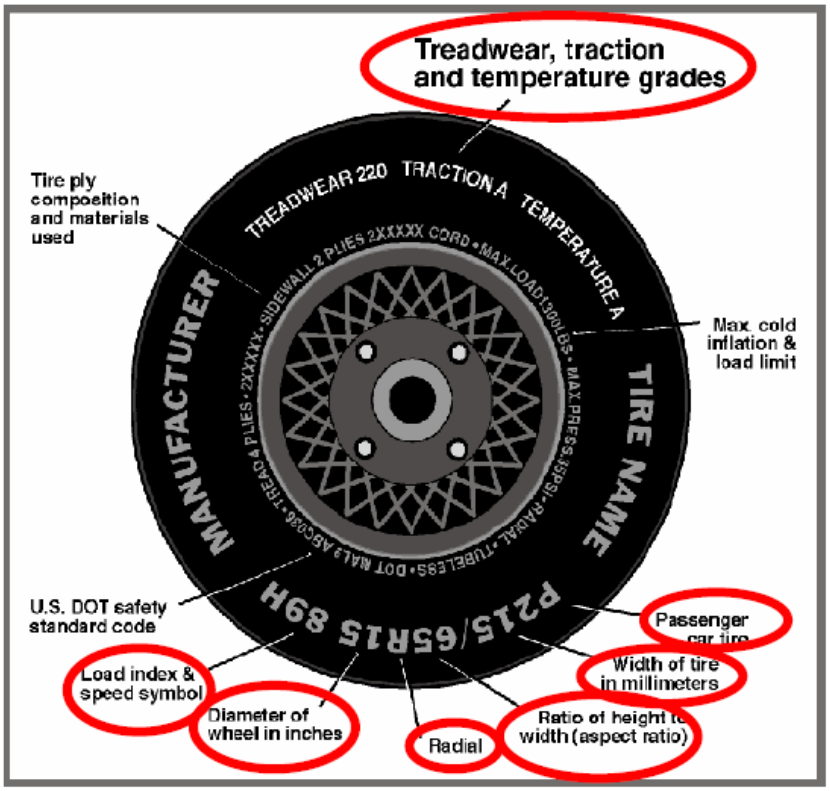
VEHICLE SEATING AND WEIGHT CAPACITY

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	--	
Number of Occupants	2	3	--	5
Capacity Wt. (VCW) (kg)				430.00
Cargo Wt. (RCLW) (kg)				89.80

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

Test Vehicle:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012

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



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	260	260
Recommended Tire Size	P235/60R17	P235/60R17
Tire Size on Vehicle	P235/60R17	P235/60R17
Tire Manufacturer	Hankook	Hankook
Tire Model	Optimo H725	Optimo H725
Treadwear	740	740
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 2 Polyester, 1 Nylon	2 Steel, 2 Polyester, 1 Nylon
Load Index/Speed Symbol	100T	100T
Tire Material	Rubber	Rubber
DOT Safety Code Right	5MJCDFHP1612	5MJCDFHP1612
DOT Safety Code Left	5MJCDFHP1612	5MJCDFHP1612

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

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	536	356		572	503	
Right	kg	538	347		567	481	
Ratio	%	60.4%	39.6%		53.7%	46.3%	
Totals	kg	1,074.0	703.0	1,777.0	1,139.0	984.0	2123

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1,777.00
Weight of 2 P572E ATDs	kg	190.51
Rated Cargo/Luggage Weight (RCLW)	kg	89.80
Calculated Vehicle Target Weight (TVTW)	kg	2,048.31

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	769	770	784	786	1132
As Tested	mm	757	762	743	742	1327
Post Test	mm	794	738	690	800	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2862
Total Vehicle Length at Left Side	mm	4995
Total Vehicle Length at Centerline	mm	5150
Total Vehicle Length at Right Side	mm	4995
Weight of Ballast in Cargo Area	kg	0
Weight of Vehicle Components Removed	kg	0
Amount of Stoddard Solvent in Fuel Tank	L	66.9

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

No components were removed in order to meet the required test weight.

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

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements		Pre-Test
1	Total Length	mm	5150
2	Total Width	mm	1939
3	Bumper Top Height	mm	864
4	Bumper Bottom Height	mm	1004
5	Longitudinal Member Top Height	mm	878
6	Distance Between Longitudinal Members	mm	1271
7	Longitudinal Member Width	mm	126
8	Engine Top Height	mm	502
9	Engine Bottom Height	mm	1203
10	Engine and Gearbox Width	mm	602
11	Front Bumper-Engine Distance	mm	555
12	Front Shock Absorber Fixing Height	mm	488
13	Bonnet Leading Edge Height	mm	596
14	Front Shock Absorber Fixing Width	mm	1269
15	Front Bumper – Front Axle Distance	mm	1030
16	Front Axle – A Pillar Distance	mm	542
17	A-Pillar – B-Pillar Distance	mm	1107
18	B-Pillar – Rear Axle Distance	mm	1216
19	B-Pillar – C-Pillar Distance	mm	1119
20	Roof Sill Bottom Height	mm	1404
21	Roof Sill Top Height	mm	1530
22	Floor Sill Bottom Height	mm	344
23	Floor Sill Top Height	mm	457

Note: Height measurements are in reference to the ground.

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

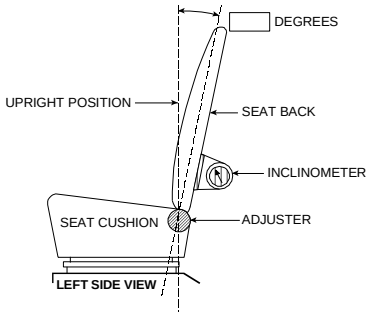
Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

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 to allow for a zero head angle of the passenger dummy



FRONT SEAT ASSEMBLY

	Deg.
Driver Seat Back Angle	19.2
Passenger Seat Back Angle	19.3

SEAT FORE/AFT POSITIONS

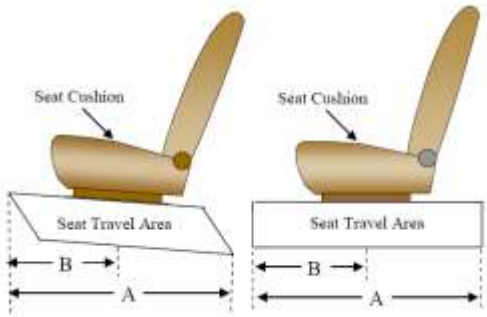
Describe the method used of determining seat fore/aft positions. The driver's seat was positioned at the mid-point of fore/aft travel. The passenger's seat was positioned at the most forward position of fore/aft travel.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	327	163.5
Passenger Seat	327	163.5

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	80 mm	0-uppermost
Passenger Seat	80 mm	0-uppermost



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

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

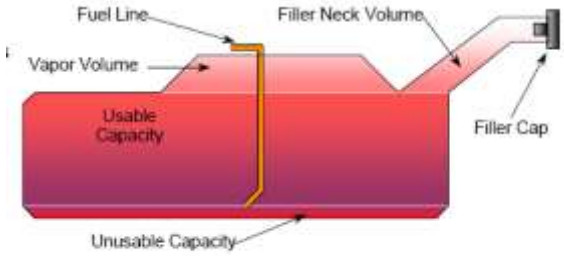
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	71.9
Usable Capacity of "Optional Tank"	
93% of Usable Capacity	66.9
Actual Amount of Solvent Used	66.9
1/3 of Usable Capacity	23.7

FUEL PUMP

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

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

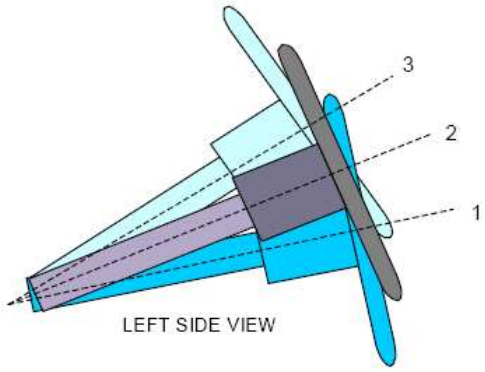


VEHICLE FUEL TANK ASSEMBLY

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

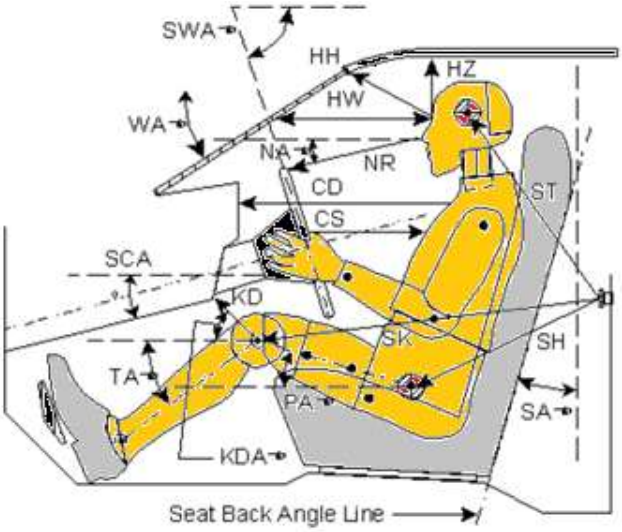
STEERING COLUMN POSITIONS

	Tilt (degrees)	Fore/Aft Position (mm)
Lowermost position No. 1	19.8	
Geometric center position No. 2	22.8	
Uppermost position No. 3	25.8	
Telescoping Steering Wheel Travel		28
Test Position	22.8	14

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 Ford Taurus Four Door Sedan
Test Program: R&D 90.1kph, 15° angle, 35% offset

NHTSA No.: R20130026
Test Date: 12/15/2012



Code	Measurement Description	Driver (Serial # Thor 007)		Passenger (Serial # Thor 016)	
		Length (mm)	Angle(°)	Length (mm)	Angle (°)
WAº	Windshield Angle		25.8		
SWAº	Steering Wheel Angle		23.0		
SCAº	Steering Column Angle		67.0		
SAº	Seat Back Angle (on headrest post)		19.2		19.3
HZ	Head to Roof (Z)	196	90.0	196	90.0
HH	Head to Header	463	16.9	472	14.2
HW	Head to Windshield	778	0.0	739	0.0
NR	Nose to Rim	488	-12.2	670	-31.2
CD	Chest to Dash	612		530	
CS	Chest to Steering Hub	360	-3.4		
RA	Rim to Abdomen	183	5.4		
KDL	Left Knee to Dash	144	35.0	141	33.1
KDR	Right Knee to Dash	115	46.0	142	32.0
PAº	Pelvic Angle		-22.5		22.2
TAº	Tibia Angle		-46.5		-42.3
SK	Striker to Knee	569	-1.3	583	-3.4
ST	Striker to Head	16	88.7	38	85.9
SH	Striker to H-Point	178	-42.7	174	-41.7
HAX˚	Head Angle (X)		-0.3		0.2
HAY˚	Head Angle (Y)		0.2		-0.3
NAX˚	Neck Angle (X)		4.1		
NAY˚	Neck Angle (Y)		-0.3		
TAX˚	T6 Angle (X)		20.0		5.6
TAY˚	T6 Angle (Y)		-0.4		-1.0
LAX˚	Lumbar Angle (X)		0.4		-0.6
LAY˚	Lumbar Angle (Y)		24.7		21.1

DATA SHEET NO.3 (CONTINUED)
DUMMY CMM MEASUREMENTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

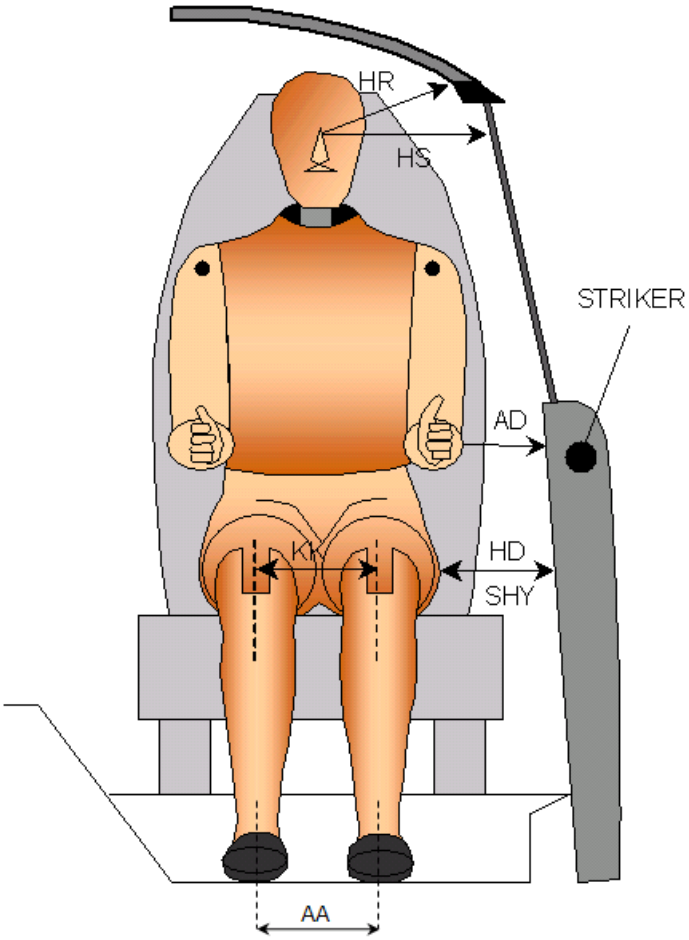
Description	Units	Driver			Passenger		
		X	Y	Z	X	Y	Z
Striker	mm	1211	-819	691	1209	820	697
Head CG	mm	1227	-447	170	1205	446	176
Bridge of Nose	mm	1320	-366	178	1303	374	175
Tip of Nose	mm	1321	-367	215	1304	375	215
Shoulder Bolt	mm	1295	-561	413	1248	567	447
Tip of Chin	mm	1318	-368	298	1305	376	300
H-Point	mm	1421	-576	866	1417	572	860
Left Knee	mm	1812	-566	715	1829	322	763
Right Knee	mm	1814	-303	725	1826	531	740
Left Ankle	mm	2095	-558	1026	2169	282	1002
Right Ankle	mm	2107	-275	1028	2138	515	1016
Left Heel	mm	2100	-532	1160	2146	212	1131
Right Heel	mm	2103	-238	1160	2112	473	1151
Outboard Seat Anchor Bolt	mm	1739	-583	1083	1738	577	1085
Outboard Head Restraint Post	mm	1034	-458	371	1028	460	378
Top of Head Restraint	mm	1071	-366	104	1036	375	131
Center of Steering Wheel	mm	1722	-376	470			

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. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

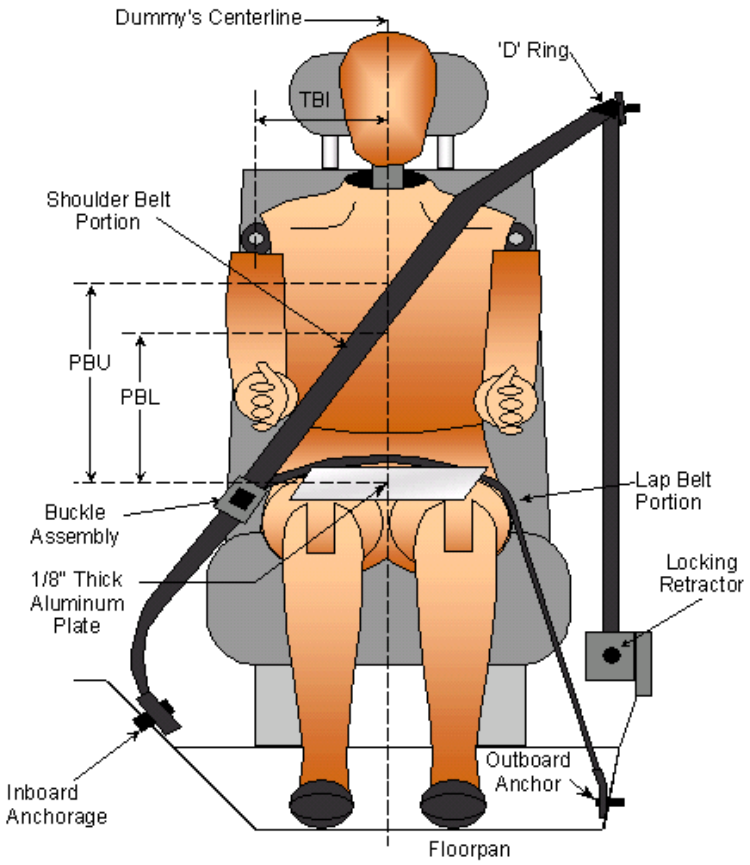
Test Vehicle: 2013 Ford Taurus Four Door Sedan
Test Program: R&D 90.1kph, 15° angle, 35% offset
NHTSA No.: R20130026
Test Date: 12/15/2012



Code	Description	Units	Driver	Passenger
AD	Arm to Door	mm	125	52
HD	H-Point to Door	mm	138	141
HR	Head to Side Header	mm	206	204
HS	Head to Side Window	mm	372	365
KK	Knee to Knee	mm	312	270
SHY	Striker to H-Point (Y Direction)	mm	245	250
AA	Ankle to Ankle	mm	276	245

DATA SHEET NO. 5
SEAT BELT POSITIONING DATA

Test Vehicle:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012



SEAT BELT POSITIONING MEASUREMENTS

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

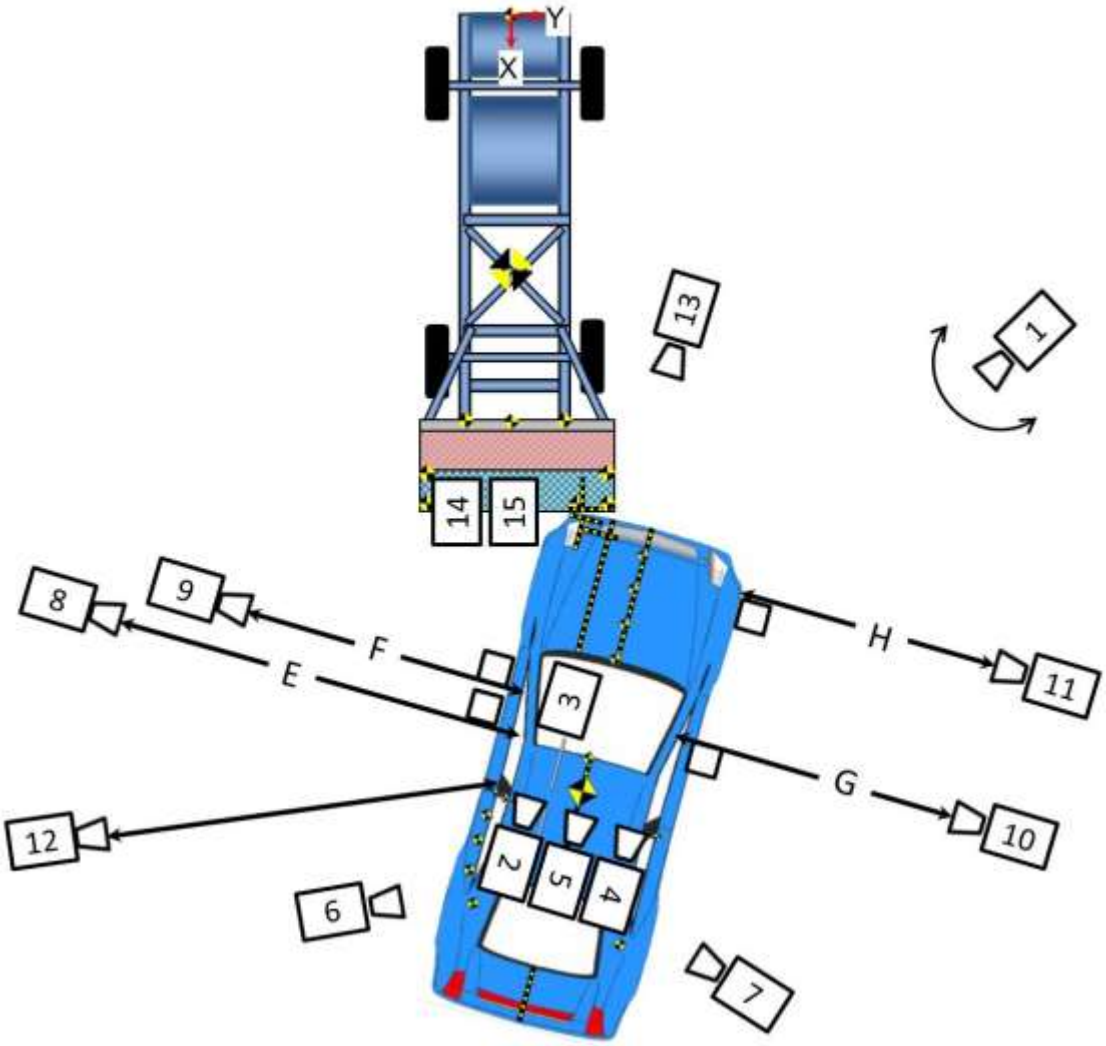
BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	805	800
Lap Belt Length as measured on ATD	mm	500	495
Remainder of belt on reel	mm	845	855
Total belt length for continuous webbing systems	mm	2,150	2,150

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

Test Vehicle:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012

HORIZONTAL LOCATION

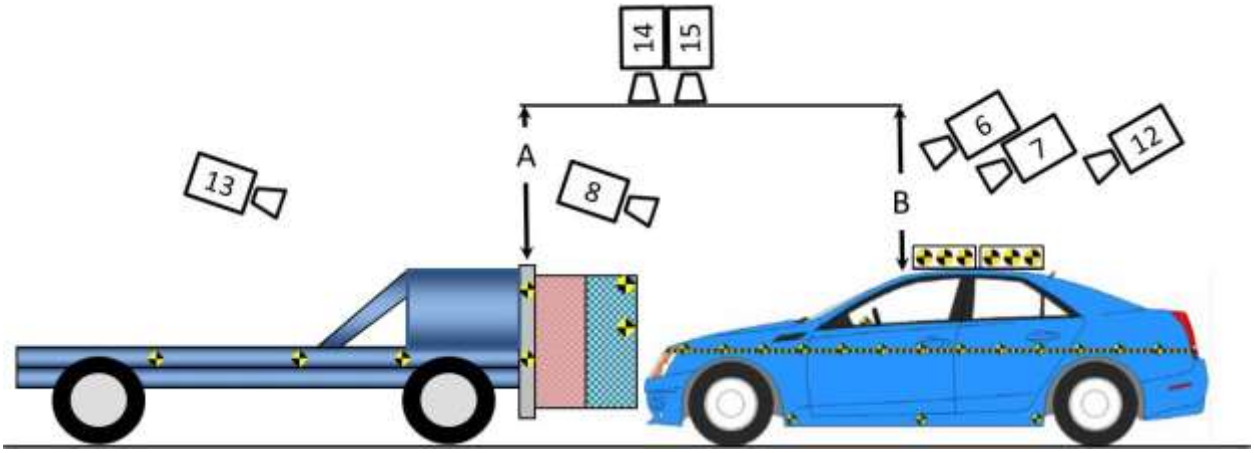


E	mm	9725
F	mm	6577
G	mm	8427
H	mm	8624

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

Test Vehicle:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012

VERTICAL LOCATION



A	mm	4117
B	mm	4260

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

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

CAMERA LOCATIONS

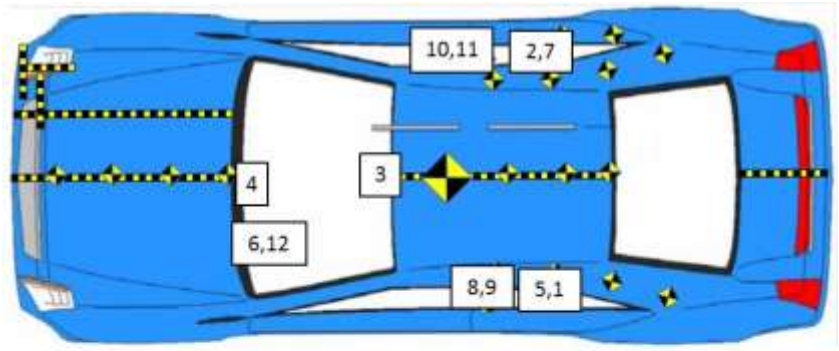
No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side	--	--	--	Zoom	30
2	Onboard Passenger Movement	8408	-784	1376	12.5	500
3	Onboard Driver Lower Leg	6507	-565	251	6.5	500
4	Onboard Driver Movement	8302	-436	1376	12.5	500
5	Onboard Centerline	8197	-75	1376	12.5	500
6	Driver Interaction	7969	-4120	3355	24	1000
7	Passenger Interaction	11891	8324	2551	50	1000
8	Target Vehicle Left Side Perpendicular (High)	5135	9582	3252	24-70	1000
9	Target Vehicle Driver Motion	6109	6046	1349	24	1000
10	Target Vehicle Passenger Motion	9102	9643	1936	50	1000
11	Target Vehicle Right Side	8873	10225	1958	24	1000
12	Target Vehicle Left Side (High)	10486	8397	3177	28-70	1000
13	RMDB/Target Vehicle Interaction	3957	1563	2017	13	1000
14	Close-up Impact Point	4935	878	4704	28	1000
15	Overall Impact	6427	616	5294	14	1000

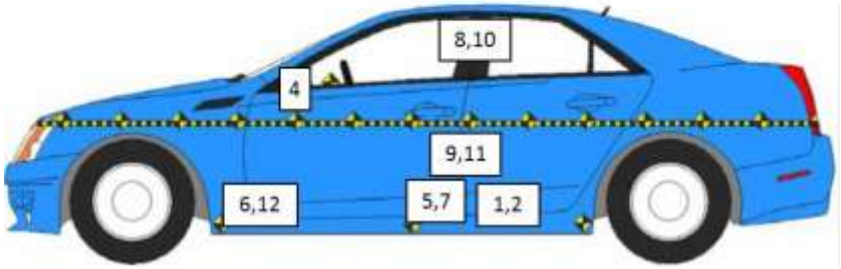
Reference Point: Center most rearward point of the RMDB when in contact with the target vehicle:

+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: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012





VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Axes	Units	Measurements (mm)		
				X	Y	Z
1	Left Rear Sill	X,Y	mm	1006	-652	1100
2	Right Rear Sill	X,Y	mm	963	642	1102
3	Vehicle CG	X,Y,Z	mm	1535	21	840
4	Instrument Panel	X	mm	2002	-4	439
5	Driver Seat Track	X,Y,Z	mm	1296	-517	1105
6	Behind Brake Pedal	X,Y,Z	mm	2441	-403	995
7	Passenger Seat Track	X,Y,Z	mm	1292	513	1108

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. 7 (CONTINUED)
VEHICLE INSTRUMENTATION DATA

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

VEHICLE INSTRUMENTATION DATA

Loc.	Description	Axes	Units	Positive Direction		Negative Direction	
				Max	Time (ms)	Max	Time (ms)
1	Left Rear Sill	X	g	2.02	9.05	-35.57	38.80
		Y	g	25.42	42.30	-3.13	99.15
2	Right Rear Sill	X	g	1.83	126.65	-44.66	44.95
		Y	g	21.40	41.55	-4.76	69.15
3	Vehicle CG	X	g	2.51	131.15	-43.56	39.90
		Y	g	41.69	39.70	-5.57	15.95
		Z	g	35.84	35.90	-13.37	61.85
4	Instrument Panel	X	g	32.23	74.60	-82.09	42.25
5	Driver Seat Track	X	g	2.76	115.35	-33.16	39.30
		Y	g	43.59	42.25	-7.30	4.00
		Z	g	27.84	40.05	-14.67	85.25
6	Behind Brake Pedal	X	g	48.03	7.95	-117.64	36.05
		Y	g	55.09	39.00	-10.32	7.60
		Z	g	37.45	48.80	-32.06	35.70
7	Passenger Seat Track	X	g	1.82	119.45	-45.89	45.00
		Y	g	26.16	47.55	-6.56	69.40
		Z	g	15.18	39.50	-13.02	35.40
8	Driver Shoulder Belt		N	3,733.47	48.90	-59.58	139.90
9	Driver Lap Belt		N	4,578.49	66.15	-33.70	10.75
10	Passenger Shoulder Belt		N	5,530.59	56.85	-20.12	8.20
11	Passenger Lap Belt		N	8,271.20	62.00	-35.76	10.65
12	Driver Floor Pan String Pot		mm	52.07	73.70	-51.78	267.00

TIME TO FIRE RESTRAINT TIMING

Loc.	Description	Axes	Units	Time to Fire (ms)
1	Driver Air Bag Squib 1	*	V	Not Monitored
2	Driver Air Bag Squib 2	*	V	Not Monitored
3	Driver Curtain Airbag	*	V	Not Monitored
4	Driver Torso Airbag	*	V	Not Monitored
5	Driver Knee Airbag	*	V	Not Monitored
6	Driver Pretensioner	*	V	Not Monitored
7	Passenger Air Bag Squib 1	*	V	Not Monitored
8	Passenger Air Bag Squib 2	*	V	Not Monitored
9	Passenger Curtain Airbag	*	V	Not Monitored
10	Passenger Torso Airbag	*	V	Not Monitored
11	Passenger Knee Airbag	*	V	Not Monitored
12	Passenger Pretensioner	*	V	Not Monitored

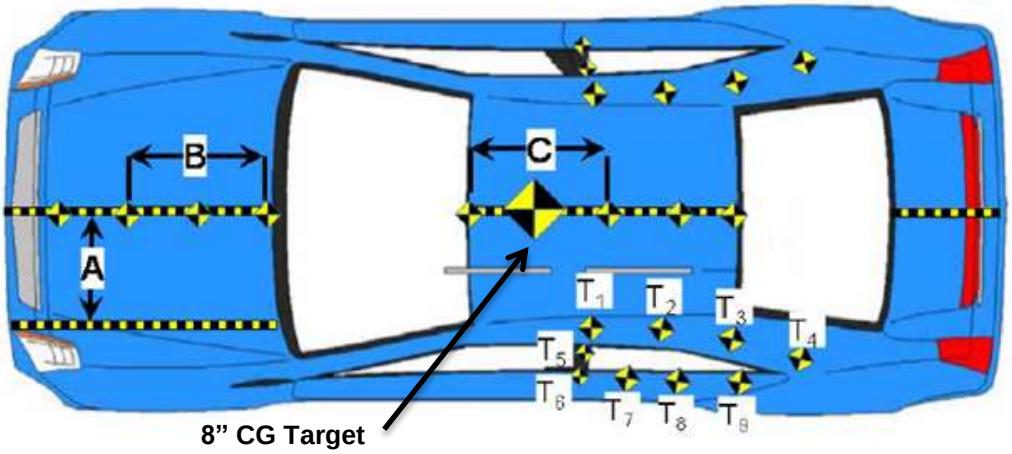
* The measurement indicates the time the voltage changed
Note: Airbags were not monitored as the wiring diagram was not available

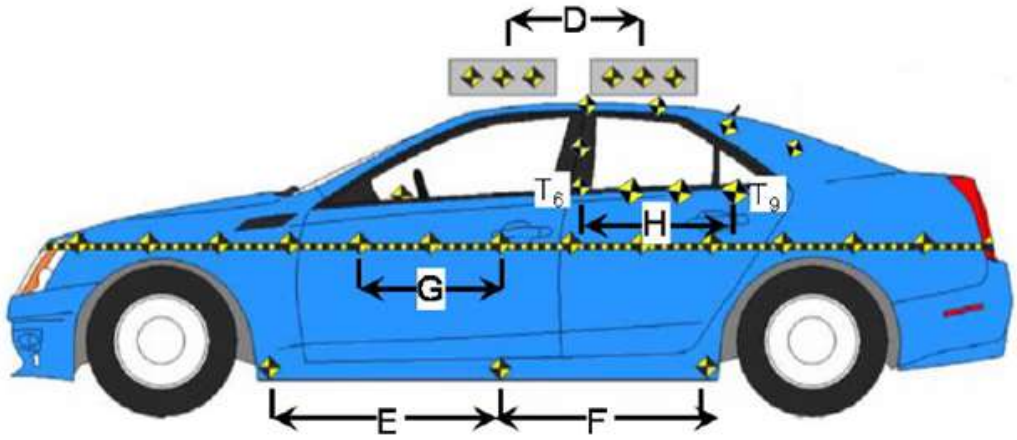
DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

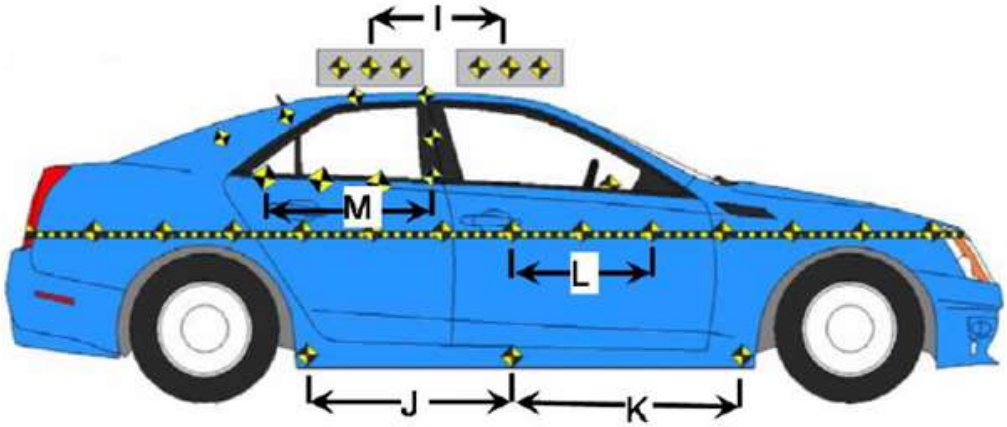
Test Vehicle:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012

Item	Units	Value
A	mm	291
B	mm	1220
C	mm	1220
D	mm	612
E	mm	933
F	mm	935
G	mm	1220
H	mm	1160
I	mm	612
J	mm	928
K	mm	937
L	mm	1220
M	mm	1160

Note: All 6" targets on the centerline of the hood and roof are 610mm apart

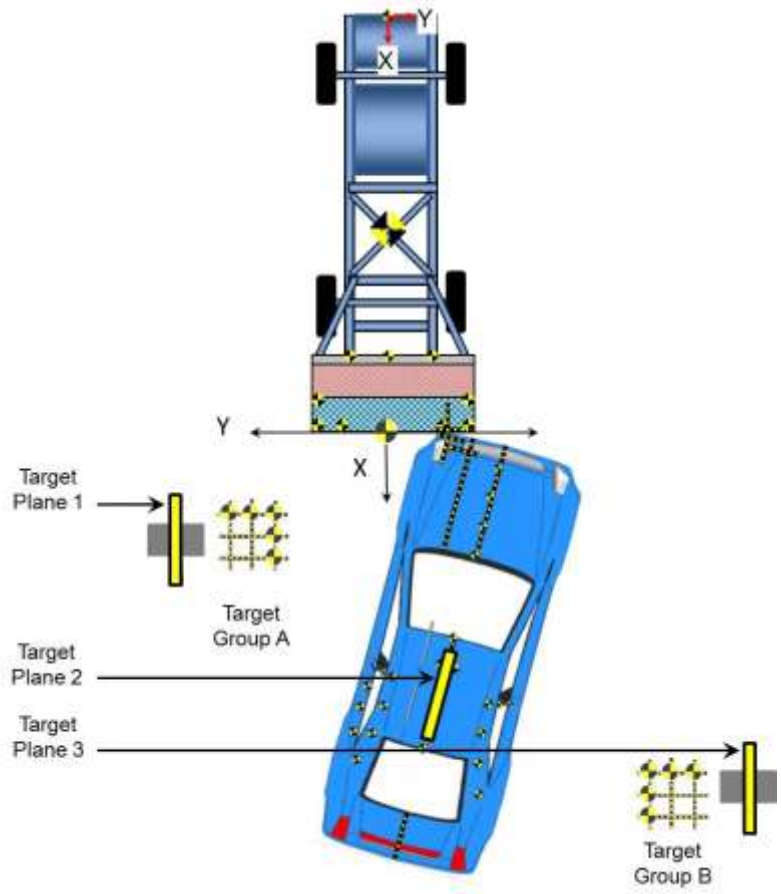


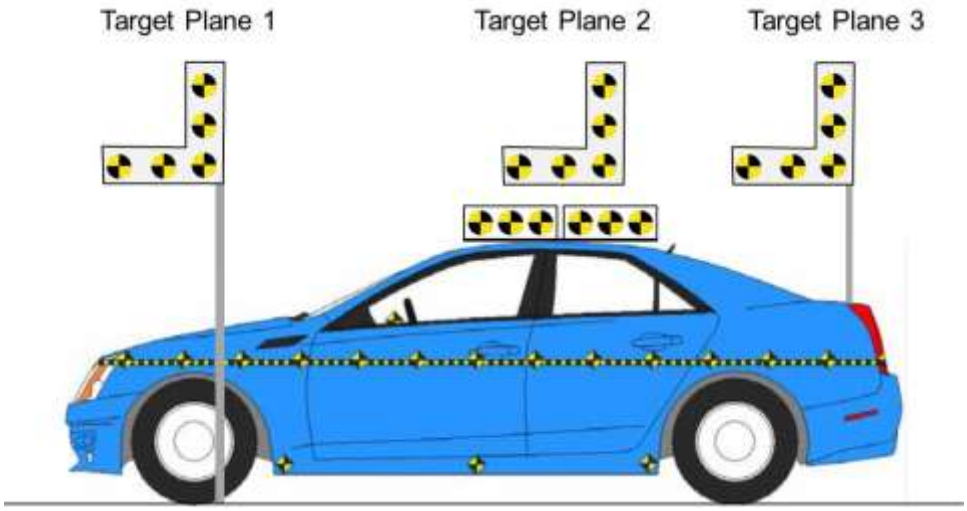




DATA SHEET NO. 8 (CONTINUED)
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

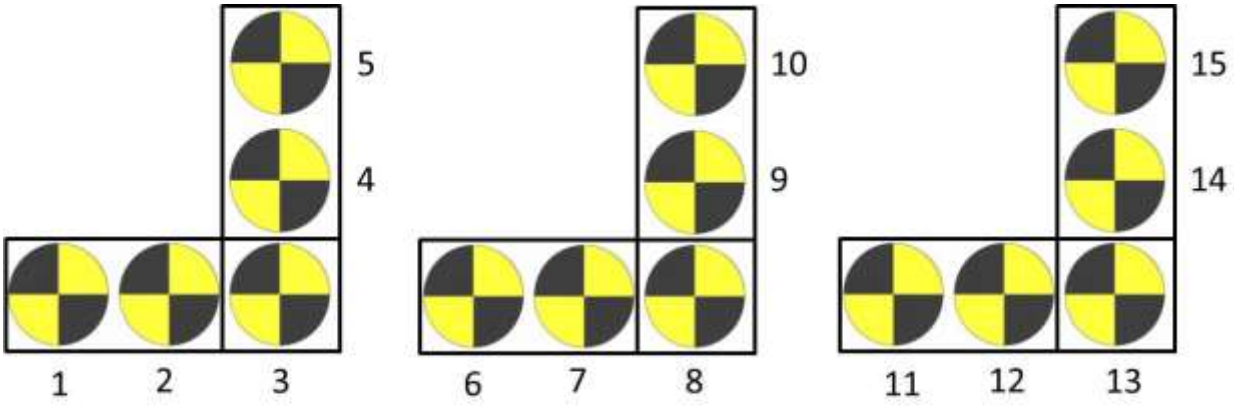
Test Vehicle:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012





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

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012



Vertical Target Plane 1 (Rear of Vehicle)

Vertical Target Plane 2 (Over Roof)

Vertical Target Plane 3 (Front of Vehicle)

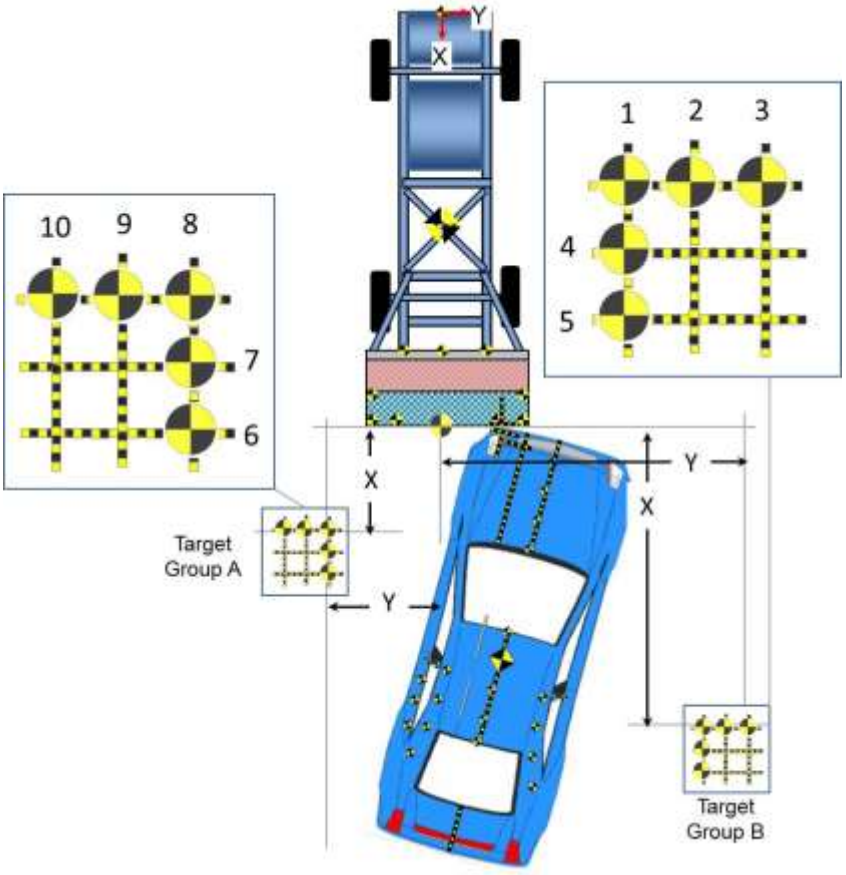
Target	Units	X	Y	Z
1	mm	5035	3020	1650
2	mm	5340	3020	1650
3	mm	5645	3020	1650
4	mm	5645	3020	1955
5	mm	5645	3020	2260
6*	mm	1367	-387	-314
7*	mm	1063	-393	-324
8*	mm	759	-395	-336
9*	mm	767	-392	-641
10*	mm	781	-393	-945
11	mm	7760	3110	1665
12	mm	8065	3110	1665
13	mm	8370	3110	1665
14	mm	8370	3110	1970
15	mm	8370	3110	2275

*NOTE:

- Targets 6-10 are in reference to the vehicle coordinate system
- Targets 1-5 and Targets 11-15 are in reference to the global coordinate system, which references the back of the RMBD.

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

Test Vehicle:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012

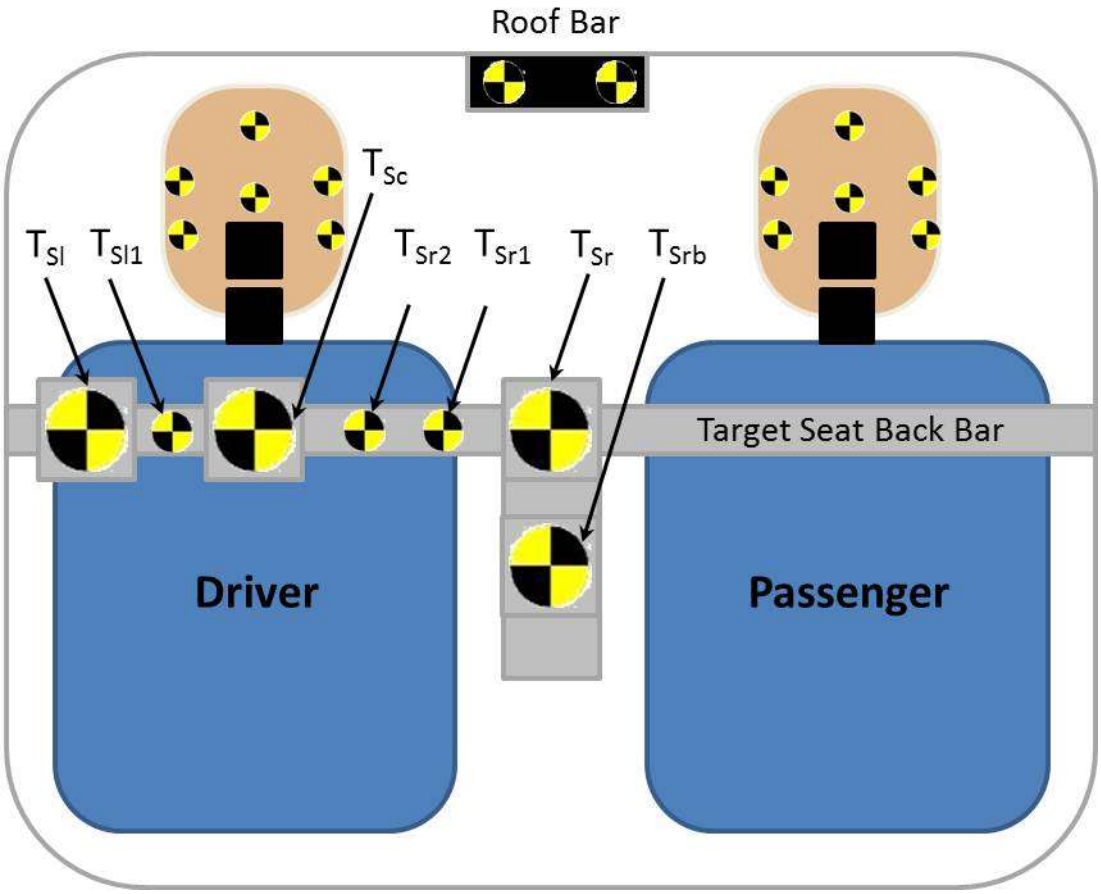


Target	Units	X	Y
1	mm	3198	1820
2	mm	3198	2122
3	mm	3198	2425
4	mm	3500	1820
5	mm	3803	1820
6	mm	1678	615
7	mm	1382	615
8	mm	1068	615
9	mm	1068	923
10	mm	1068	1916

Note: Target Locations are in reference to the front center of RMDB

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

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012



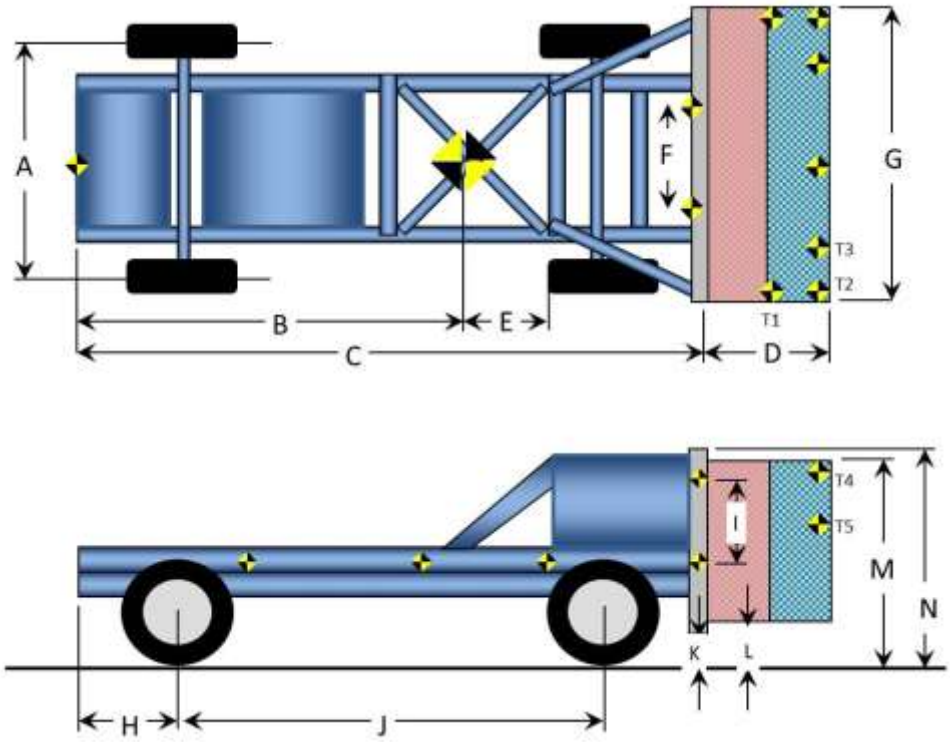
Point	Pre-Test		
	X	Y	Z
TSrb	920	-2	582
TSr	912	5	433
TSr1	924	-128	464
TSr2	923	-246	460
TSc	913	-380	431
TSl1	922	-489	460
TSl	913	-620	432
Roof Bar Driver	1736	-53	87
Roof Bar Passenger	1737	70	87

Note: Target locations are in reference to the vehicle 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)
RMDB PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2013 Ford Taurus Four Door Sedan
Test Program: R&D 90.1kph, 15° angle, 35% offset

NHTSA No.: R20130026
Test Date: 12/15/2012

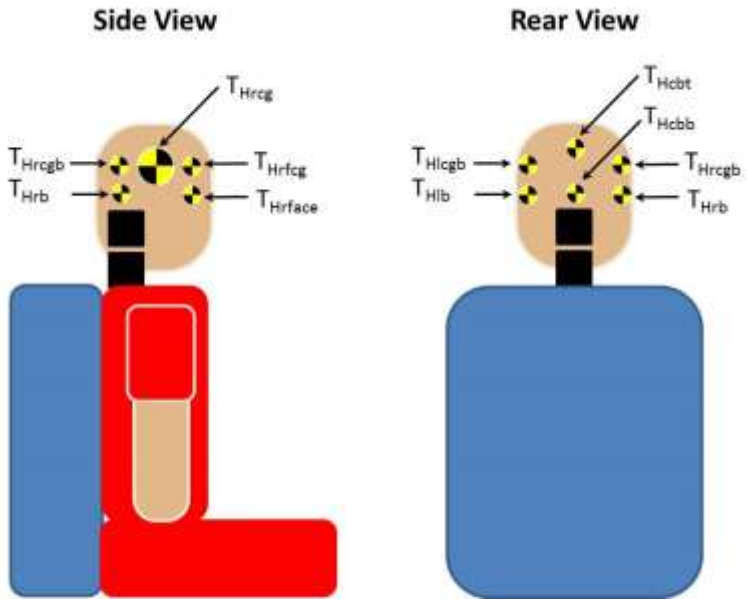


Item	Units	Value	Item	Units	Value
A	mm	1930	H	mm	800
B	mm	2451	I	mm	500
C	mm	3995	J	mm	2555
D	mm	605	K	mm	77
E	mm	904	L	mm	71
F	mm	1123	M	mm	1024
G	mm	2205	N	mm	1177

	Units	Front Axle	Rear Axle	Total
Left	kg	802.0	453.6	1255.6
Right	kg	807.4	427.7	1235.1
Ratio	%	65	35	100
Total	kg	1609.4	881.3	2490.7
CG Aft of Front Axle	mm			904

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

Test Vehicle:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012



Driver Dummy Head Targets (THOR007)

Measurement	Units	Value
Distance between T_{Hrcg} & T_{Hrfcg}	mm	50
Distance between T_{Hrcg} & T_{Hrcgb}	mm	40
Distance between T_{Hrcgb} & T_{Hrb}	mm	70
Distance between T_{Hrfcg} & T_{Hrface}	mm	70
Distance between T_{Hlcg} & T_{Hlfcg}	mm	50
Distance between T_{Hlcg} & T_{Hlcgb}	mm	40
Distance between T_{Hlcgb} & T_{Hlb}	mm	70
Distance between T_{Hlfcg} & T_{Hlface}	mm	70
Distance between T_{Hcbt} & T_{Hcbb}	mm	67

Passenger Dummy Head Targets (THOR016)

Measurement	Units	Value
Distance between T_{Hrcg} & T_{Hrfcg}	mm	50
Distance between T_{Hrcg} & T_{Hrcgb}	mm	40
Distance between T_{Hrcgb} & T_{Hrb}	mm	70
Distance between T_{Hrfcg} & T_{Hrface}	mm	70
Distance between T_{Hlcg} & T_{Hlfcg}	mm	50
Distance between T_{Hlcg} & T_{Hlcgb}	mm	40
Distance between T_{Hlcgb} & T_{Hlb}	mm	70
Distance between T_{Hlfcg} & T_{Hlface}	mm	70
Distance between T_{Hcbt} & T_{Hcbb}	mm	67

DATA SHEET NO. 9
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	93
Passenger Dummy Accelerometers	93
Vehicle Structure Accelerometers	38
RMDB Cart Accelerometers	6
Total	230

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	4
High-Speed Off-board	10
Real-Time Panning	1
Total	15

DATA SHEET NO. 10 - POST TEST OBSERVATIONS

Test Vehicle: 2013 Ford Taurus Four Door Sedan
Test Program: R&D 90.1kph, 15° angle, 35% offset
NHTSA No.: R20130026
Test Date: 12/15/2012

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Right Front Passenger
Dummy Type/Serial No.	THOR 007	THOR 016
Lower Leg Type	THOR LOWER LEG LX	THOR LOWER LEG LX
Lower Leg Serial No.	LX036 / LX037	LX018 / LX019
Head Contact	Front airbag & driver's side door	Front airbag, left shoulder, visor & target bar
Upper Torso Contact	Front airbag	Front airbag
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	Latched & Jammed	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

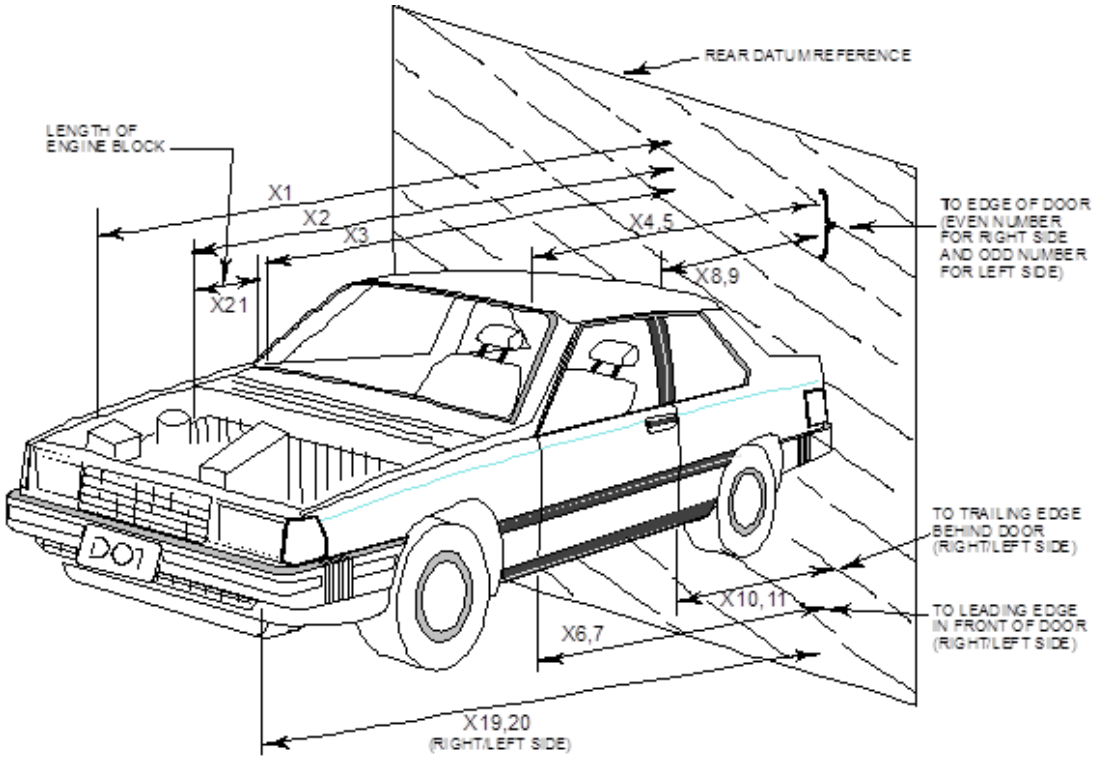
Critical Areas of Performance	Observations and Conclusions	Photo Taken (Y/N)
Pillar Performance	Driver's A-Pillar had minor buckling causing separation between the door and vehicle	Y
Windshield Damage	Cracks throughout with some minor separation	Y
Window Damage	None	Y
Other Notable Effects	None	--

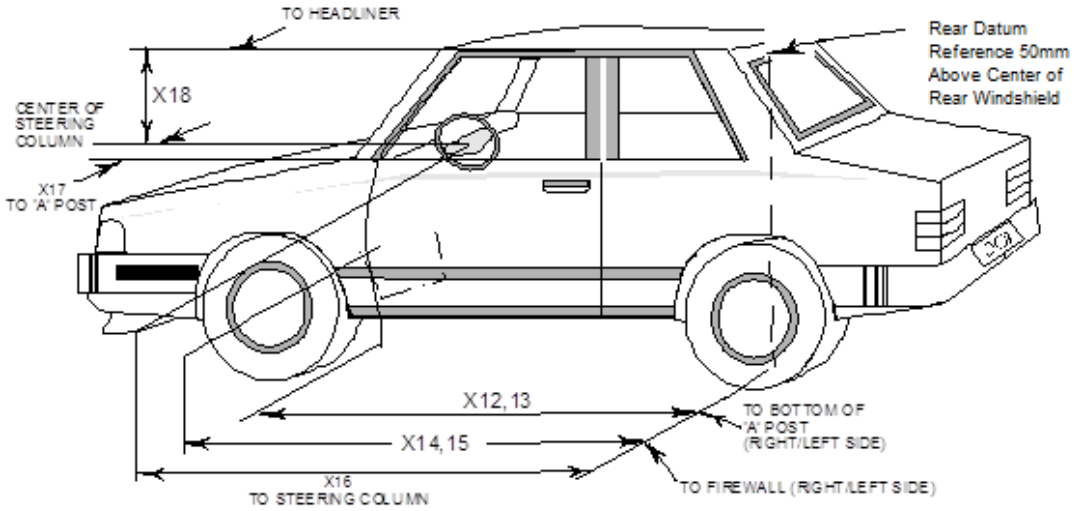
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver (Occupant 1)		Right Front Passenger (Occupant 2)	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	Yes	Yes	Yes
Curtain Airbag	Yes	No	Yes	No
Torso Airbag	Yes	No	Yes	No
Knee Airbag	No	NA	No	NA
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:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012





DATA SHEET NO. 11 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	3791	3561	230
2	Rear Surface of Vehicle (RSOV) to Front of Engine	mm	3236	3115	121
3	RSOV to Firewall	mm	2696	2491	205
4	RSOV to Upper Leading Edge of Right Door	mm	2224	2223	1
5	RSOV to Upper Leading Edge of Left Door	mm	2224	2210	14
6	RSOV to Lower Leading Edge of Right Door	mm	2219	2222	-3
7	RSOV to Lower Leading Edge of Left Door	mm	2218	2199	19
8	RSOV to Upper Trailing Edge of Right Door	mm	1129	1129	0
9	RSOV to Upper Trailing Edge of Left Door	mm	1130	1116	15
10	RSOV to Lower Trailing Edge of Right Door	mm	1194	1197	-3
11	RSOV to Lower Trailing Edge of Left Door	mm	1193	1178	15
12	RSOV to Bottom of “A” Post of Right Side	mm	2271	2269	2
13	RSOV to Bottom of “A” Post of Left Side	mm	2272	2242	30
14	RSOV to Firewall, Right Side	mm	2838	2837	1
15	RSOV to Firewall, Left Side	mm	2839	2586	253
16	RSOV to Steering Column	mm	1722	1702	20
17	Center of Steering Column to “A” Post	mm	294	307	-13
18	Center of Steering Column to Headliner	mm	410	418	-8
19	RSOV to Right Side of Front Bumper	mm	3706	3664	42
20	RSOV to Left Side of Front Bumper	mm	3706	3347	359
21	Length of Engine Block	mm	562	558	4
RD	RSOV to Right Side of Dash Panel	mm	1922	1916	6
CD	RSOV to Center of Dash Panel	mm	2012	1983	29
LD	RSOV to Left Side of Dash Panel	mm	1923	1875	47

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. 12
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012

VEHICLE INFORMATION

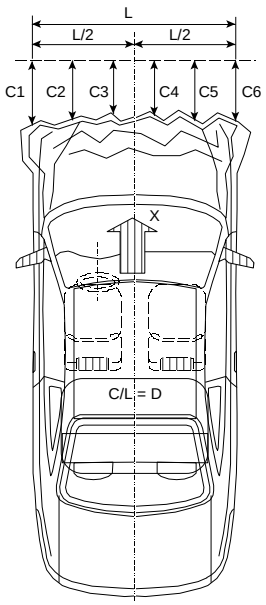
VIN:	1FAHP2D80DG147416	Wheelbase (mm):	2862
Vehicle Size Category:	Passenger	Test Weight (kg):	2123.0

ACCELEROMETER DATA

Accelerometer Locations:	As Described in Data Sheet No. 7
Cal. Procedure/Interval:	Calspan Procedure / 6 month
Integration Algorithm:	Trapezoidal
Linearity:	> 99%
Impact Velocity (kph):	90.08
Velocity Change (kph):	90.08

CRUSH PROFILE

Collision Deformation Classification:	11FYEW4
Midpoint of Damage:	C2
Damage Region Length (mm):	1213
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	3652	3272	380
C2	Crush zone 2 at left side	mm	3745	3374	371
C3	Crush zone 3 at left side	mm	3787	3503	284
C4	Crush zone 4 at right side	mm	3787	3599	188
C5	Crush zone 5 at right side	mm	3744	3658	86
C6	Crush zone 6 at right side	mm	3650	3636	14
L	C1 to C6	mm	1213	1252	-39

Crush Measurements: Bumper Cover Removed

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
B1	Bumper Beam 1 at left side	mm	3611	3332	-279
B2	Bumper Beam 2 at left side	mm	3652	3227	-425
B3	Bumper Beam 3 at left side	mm	3679	3126	-552
B4	Bumper Beam 4 at left side	mm	3694	3224	-470
B5	Bumper Beam 5 at right side	mm	3700	3333	-368
B6	Bumper Beam 6 at right side	mm	3695	3433	-262
B7	Bumper Beam 7 at right side	mm	3679	3510	-169
B8	Bumper Beam 8 at right side	mm	3651	3572	-79
B9	Bumper Beam 9 at right side	mm	3611	3617	7
L	B1 to B9	mm	1250	958	292

DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

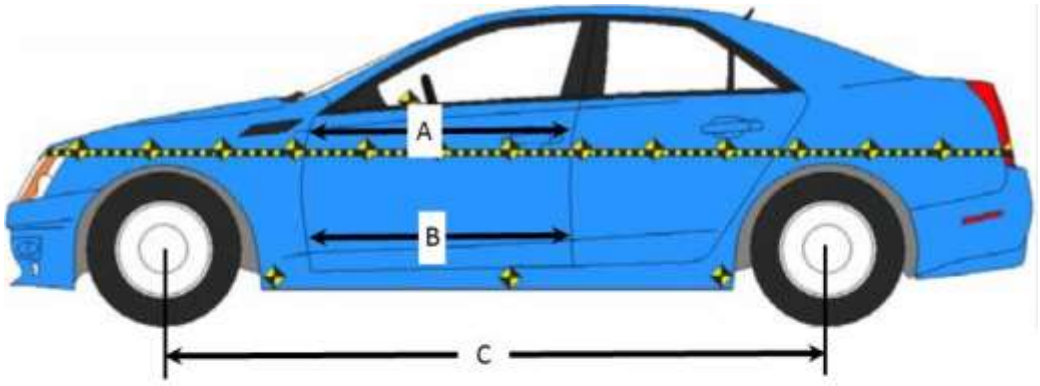
Test Vehicle: 2013 Ford Taurus Four Door Sedan
Test Program: R&D 90.1kph, 15° angle, 35% offset
NHTSA No.: R20130026
Test Date: 12/15/2012

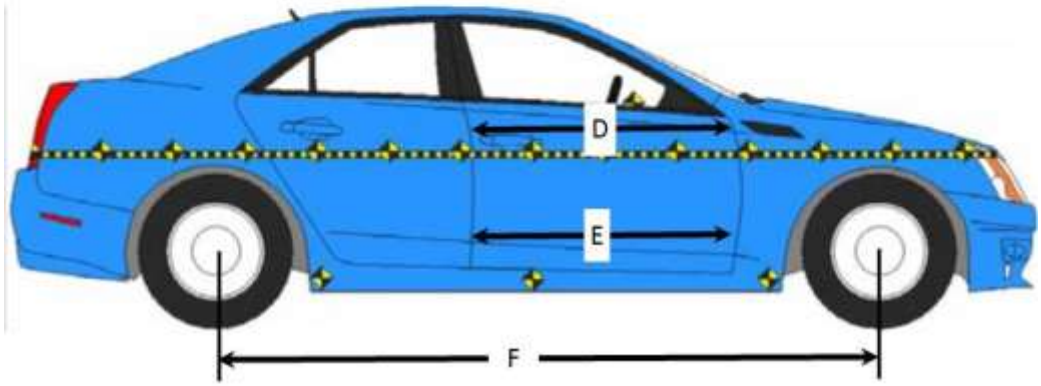
DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	965	940	-25
B	Left Side Lower	mm	898	880	-18
D	Right Side Upper	mm	964	963	-1
E	Right Side Lower	mm	887	889	2

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2862	2663	-199
F	Right Side Wheelbase	mm	2862	2887	25





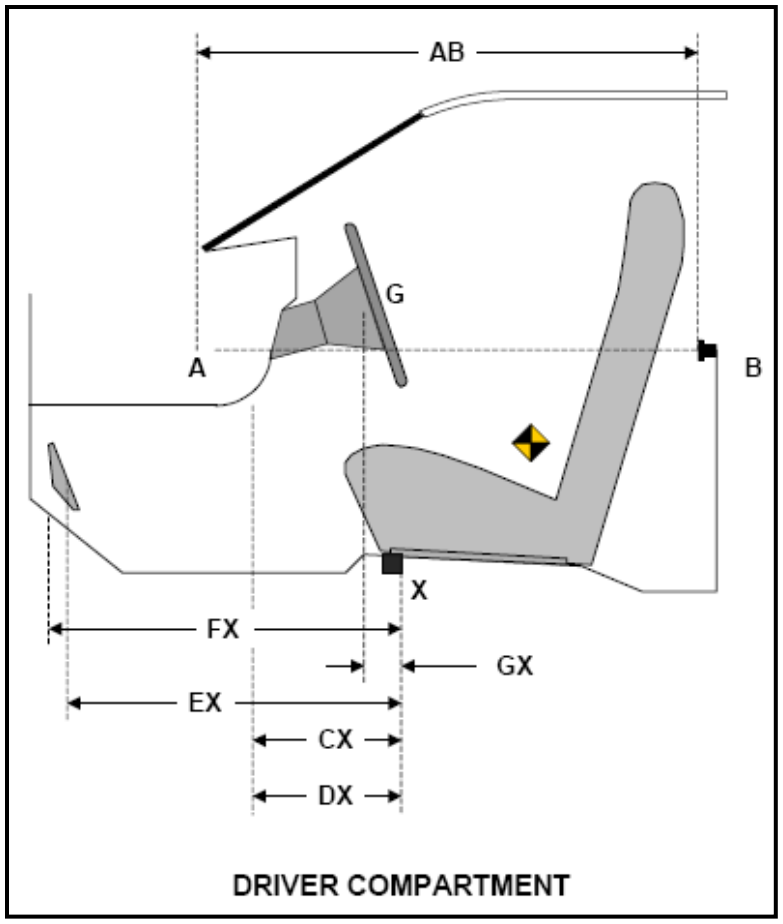
DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	748	743	-5
CX	Left Knee Bolster to X	mm	208	150	-58
DX	Right Knee Bolster to X	mm	184	106	-78
EX	Brake Pedal to X	mm	471	432	-39
FX	Foot Rest to X	mm	444	410	-34
GX	Center of Steering Column Wheel Hub to X	mm	-17	-40	-23

X = Front of Seat Track (Stationary)



DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

DRIVER SIDE DOOR SILL INTRUSIONS

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

Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
1	2133	-789	975	2122	-806	978	-11	-17	3
2	2139	-788	902	2122	-805	905	-17	-17	3
3	2141	-787	829	2121	-806	832	-20	-19	3
4	2152	-785	527	2126	-806	530	-26	-21	3
5	2155	-784	452	2129	-807	454	-26	-23	2
6	2136	-767	375	2121	-784	379	-15	-17	4
7	2012	-792	1077	2012	-794	1090	0	-2	13
8	1861	-790	1078	1862	-790	1085	1	0	7
9	1711	-790	1078	1713	-791	1082	2	-1	4
10	2065	-790	1058	2063	-797	1068	-2	-7	10
11	2106	-791	1025	2100	-803	1031	-6	-12	6
12	2145	-787	729	2121	-807	733	-24	-20	4
13	2148	-786	629	2123	-806	632	-25	-20	3
14	2080	-776	307	2072	-788	305	-8	-12	-2
15	2007	-757	260	2004	-764	255	-3	-7	-5
16	1930	-738	215	1928	-744	210	-2	-6	-5

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

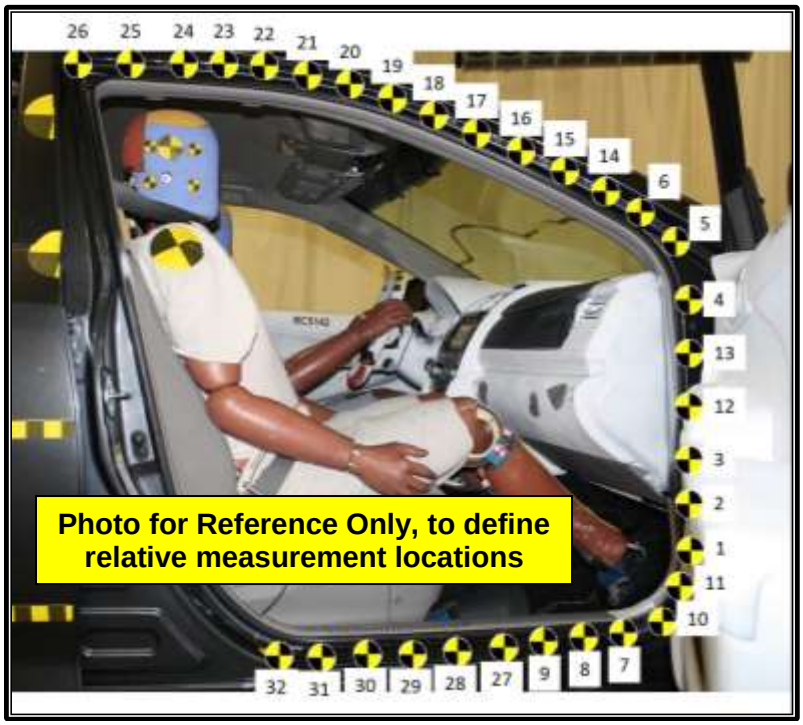
Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
17	1853	-720	175	1853	-723	169	0	-3	-6
18	1776	-701	138	1778	-700	129	2	1	-9
19	1698	-683	103	1701	-678	92	3	5	-11
20	1616	-666	75	1618	-663	66	2	3	-9
21	1530	-655	52	1531	-651	47	1	4	-5
22	1445	-646	38	1445	-642	34	0	4	-4
23	1356	-640	27	1358	-636	25	2	4	-2
24	1268	-635	20	1269	-632	19	1	3	-1
25	1182	-633	14	1183	-630	14	1	3	0
26	1093	-630	13	1094	-628	15	1	2	2
27	1650	-789	1077	1652	-791	1081	2	-2	4
28	1590	-790	1075	1591	-792	1078	1	-2	3
29	1531	-790	1065	1533	-792	1068	2	-2	3
30	1474	-791	1048	1476	-792	1050	2	-1	2
31	1420	-789	1022	1421	-790	1024	1	-1	2
32	1370	-789	990	1371	-789	992	1	0	2

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: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

PASSENGER SIDE DOOR SILL INTRUSIONS



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

Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
1	2134	781	976	2133	803	969	-1	22	-7
2	2139	782	903	2138	803	896	-1	21	-7
3	2141	782	827	2139	803	821	-2	21	-6
4	2151	783	527	2147	803	519	-4	20	-8
5	2155	783	452	2151	804	446	-4	21	-6
6	2126	764	376	2123	783	369	-3	19	-7
7	2011	783	1084	2011	804	1078	0	21	-6
8	1861	782	1084	1860	801	1079	-1	19	-5
9	1711	783	1084	1711	799	1080	0	16	-4
10	2067	782	1065	2066	804	1058	-1	22	-7
11	2109	782	1029	2108	803	1022	-1	21	-7
12	2144	783	730	2142	803	724	-2	20	-6
13	2148	783	629	2145	803	621	-3	20	-8
14	2075	775	312	2071	790	305	-4	15	-7
15	2000	756	265	1998	769	259	-2	13	-6
16	1925	739	221	1922	749	215	-3	10	-6

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

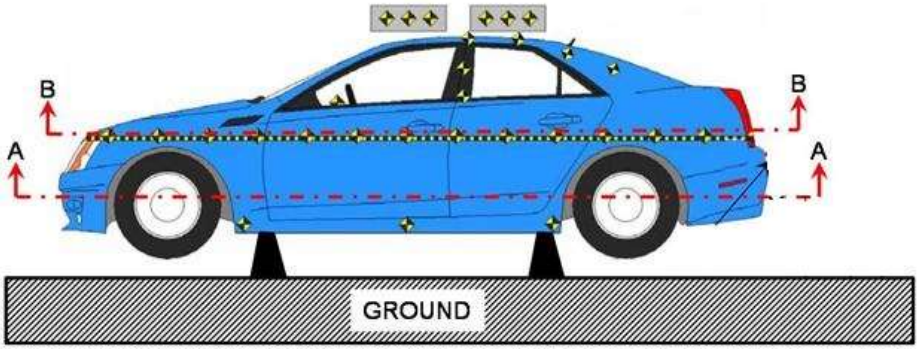
Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
17	1849	721	180	1846	729	174	-3	8	-6
18	1770	703	142	1768	708	137	-2	5	-5
19	1692	685	106	1690	688	101	-2	3	-5
20	1609	670	79	1608	671	74	-1	1	-5
21	1525	658	58	1525	659	54	0	1	-4
22	1440	651	43	1439	651	38	-1	0	-5
23	1353	644	32	1352	645	28	-1	1	-4
24	1266	641	25	1265	641	21	-1	0	-4
25	1179	639	19	1179	639	16	0	0	-3
26	1092	636	19	1091	637	17	-1	1	-2
27	1651	781	1083	1651	795	1078	0	14	-5
28	1591	782	1082	1590	795	1077	-1	13	-5
29	1531	783	1072	1530	794	1068	-1	11	-4
30	1472	783	1054	1471	793	1050	-1	10	-4
31	1418	784	1029	1417	793	1025	-1	9	-4
32	1371	784	998	1370	792	994	-1	8	-4

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: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012



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

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
1	3168	-937	933	1	2470	-892	933
2	3268	-905	934	2	2762	-832	933
3	3347	-872	934	3	2953	-542	933
4	3436	-826	933	4	3050	-424	933
5	3511	-773	935	5	3111	-279	933
6	3571	-715	933	6	3099	-201	933
7	3633	-634	933	7	3178	-104	932
8	3683	-543	935	8	3279	38	933
9	3706	-487	934	9	3362	166	932
10	3733	-408	934	10	3444	293	933
11	3764	-282	934	11	3512	354	932
12	3783	-158	936	12	3154	878	934
13	3790	-60	935	13	3118	960	933
14	3792	35	935	14	2353	981	933
15	3785	155	933	15	2207	974	934
16	3766	276	934	16	2006	965	934
17	3740	387	934	17	1752	962	934
18	3707	487	932	18	1562	962	933
19	3667	578	933	19	1375	960	933
20	3624	648	934	20	1183	958	934
21	3564	725	936	21	929	953	934
22	3491	790	933	22	539	948	934
23	3398	849	934	23	351	955	933
24	3306	891	933	24	280	954	933
25	3229	922	934	25	-508	944	934

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A (Continued)

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
26	3152	942	934	26	-579	934	933
27	2355	956	933	27	-804	864	933
28	2281	953	934	28	-941	822	934
29	2171	947	933	29	-1082	772	934
30	2034	944	935	30	-1171	720	934
31	1845	945	935	31	-1227	651	933
32	1675	947	933	32	-1282	504	933
33	1518	948	935	33	-1312	383	934
34	1371	949	935	34	-1338	220	933
35	1210	951	934	35	-1296	172	934
36	1091	949	935	36	-1299	18	933
37	935	947	936	37	-1297	-179	934
38	834	946	936	38	-1340	-193	934
39	720	945	934	39	-1321	-333	934
40	605	944	934	40	-1296	-484	934
41	470	946	933	41	-1251	-623	933
42	362	952	934	42	-1178	-732	933
43	277	952	933	43	-1111	-772	934
44	-509	945	934	44	-908	-851	933
45	-574	935	933	45	-704	-903	934
46	-652	907	934	46	-522	-947	933
47	-744	880	934	47	292	-959	933
48	-838	854	933	48	445	-951	933
49	-1010	798	933	49	679	-948	933
50	-1103	763	930	50	921	-950	934
51	-1176	717	932	51	1050	-951	934
52	-1226	654	932	52	1158	-954	933
53	-1260	564	934	53	1334	-957	933
54	-1293	460	934	54	1531	-962	934
55	-1310	375	934	55	1760	-967	933
56	-1324	295	934	56	1993	-973	933
57	-1335	210	934	57	2190	-983	933
58	-1294	177	931	58	2247	-1000	934
59	-1295	102	933	59	2326	-965	934
60	-1296	32	934				
61	-1296	-41	933				
62	-1297	-92	932				
63	-1295	-135	933				
64	-1294	-171	932				
65	-1335	-210	936				
66	-1328	-270	934				

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

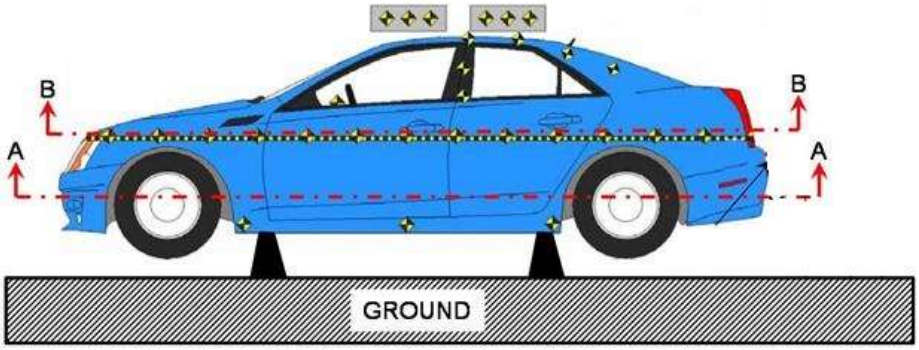
Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A (Continued)

Point	Post-Test		
	X	Y	Z
67	-1317	-337	933
68	-1304	-406	933
69	-1273	-529	934
70	-1239	-622	935
71	-1183	-715	934
72	-1110	-765	935
73	-1014	-804	936
74	-934	-831	934
75	-824	-864	934
76	-722	-892	934
77	-617	-928	934
78	-506	-953	935
79	292	-957	934
80	432	-950	934
81	615	-947	935
82	770	-948	934
83	918	-950	933
84	1073	-951	935
85	1168	-951	934
86	1347	-952	935
87	1508	-952	934
88	1665	-951	934
89	1820	-949	933
90	1976	-948	933
91	2153	-951	933
92	2269	-958	933
93	2354	-960	935
94	3168	-937	933

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012



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

VEHICLE EXTERIOR CRUSH PROFILE
SECTION B-B

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
1	2800	-929	588	1	2673	-719	586
2	2902	-912	587	2	2731	-603	587
3	2991	-892	588	3	2769	-541	586
4	3077	-872	588	4	2832	-473	586
5	3163	-844	588	5	2952	-315	589
6	3238	-821	586	6	3080	-150	585
7	3332	-763	587	7	3192	-42	588
8	3398	-689	587	8	3293	108	585
9	3464	-591	587	9	3390	280	586
10	3526	-497	585	10	3499	365	586
11	3576	-401	587	11	3436	499	587
12	3609	-280	586	12	3438	694	586
13	3629	-169	585	13	3244	807	586
14	3640	-52	586	14	3160	866	587
15	3638	86	587	15	3051	902	586
16	3631	159	587	16	2655	957	586
17	3617	244	588	17	2451	955	586
18	3588	351	588	18	2269	958	587
19	3556	451	588	19	2033	959	586
20	3501	525	586	20	1866	958	587
21	3427	636	586	21	1688	955	587
22	3381	702	587	22	1421	951	586
23	3322	766	589	23	1238	947	588
24	3248	811	587	24	1076	943	587
25	3163	847	588	25	820	940	587

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

VEHICLE EXTERIOR CRUSH PROFILE
SECTION B-B (Continued)

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
26	3075	871	588	26	578	936	587
27	2967	894	587	27	268	935	587
28	2836	919	586	28	28	945	587
29	2762	928	587	29	-131	946	587
30	2690	932	587	30	-376	918	587
31	2658	930	587	31	-376	918	587
32	2541	930	586	32	-471	902	586
33	2383	930	588	33	-636	872	587
34	2264	931	587	34	-782	846	587
35	2141	934	587	35	-1002	780	586
36	1988	939	587	36	-1168	604	587
37	1824	943	586	37	-1229	385	587
38	1651	943	586	38	-1262	137	587
39	1472	942	586	39	-1267	-3	586
40	1340	941	586	40	-1263	-120	587
41	1194	940	587	41	-1243	-311	586
42	1045	937	587	42	-1211	-474	587
43	900	936	587	43	-1168	-609	586
44	727	934	585	44	-1078	-740	587
45	589	932	587	45	-917	-812	586
46	430	930	587	46	-695	-863	587
47	296	932	587	47	-506	-898	587
48	187	937	587	48	-381	-921	586
49	108	941	586	49	-311	-932	587
50	0	945	588	50	-251	-940	586
51	-87	945	587	51	-70	-951	587
52	-198	940	587	52	91	-945	587
53	-285	930	587	53	315	-936	586
54	-337	924	587	54	532	-935	587
55	-378	918	587	55	785	-937	586
56	-442	907	586	56	1006	-938	586
57	-515	892	588	57	1168	-944	586
58	-610	876	588	58	1392	-951	586
59	-701	860	587	59	1606	-958	587
60	-804	838	587	60	1784	-964	587
61	-912	812	585	61	2016	-969	586
62	-1005	777	586	62	2214	-968	586
63	-1107	707	585	63	2254	-960	587
64	-1156	638	586	64	2360	-985	586
65	-1198	525	586	65	2427	-906	586
66	-1230	388	587	66	2604	-837	586
67	-1254	239	587	67	2653	-753	586

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

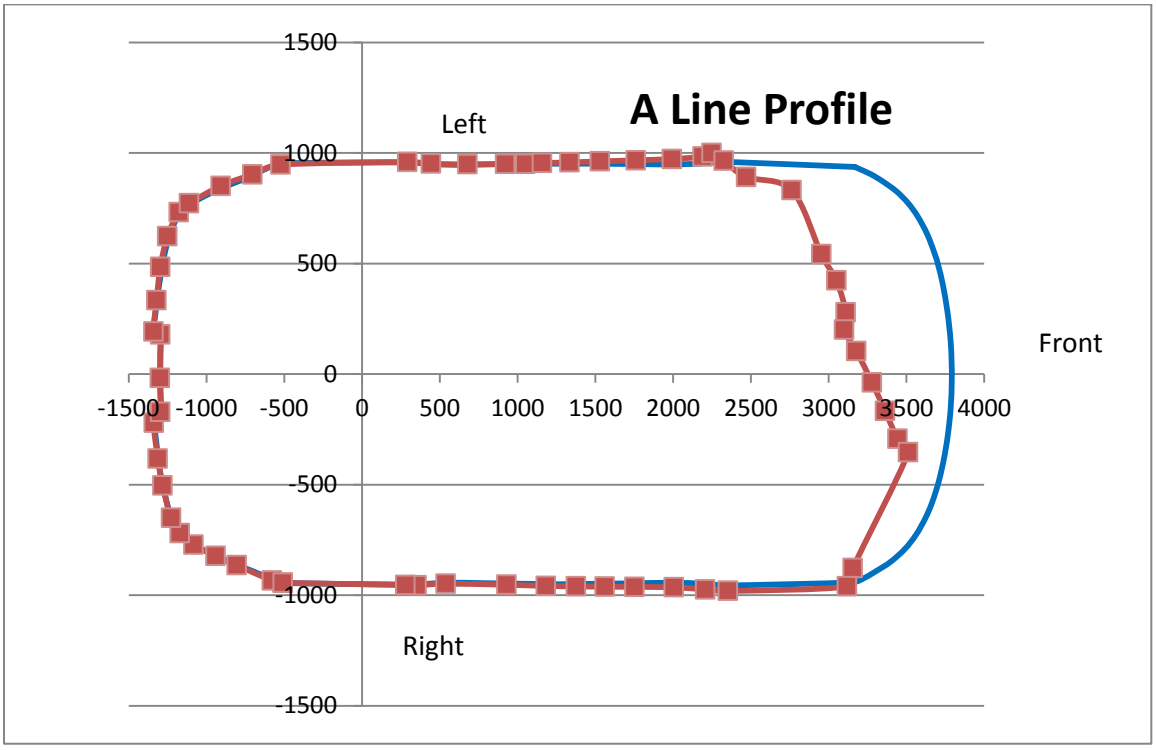
VEHICLE EXTERIOR CRUSH PROFILE
SECTION B-B (Continued)

Point	Post-Test		
	X	Y	Z
68	-1266	104	587
69	-1269	-3	586
70	-1266	-117	587
71	-1256	-229	587
72	-1243	-322	585
73	-1227	-415	585
74	-1205	-514	587
75	-1181	-593	587
76	-1143	-668	586
77	-1072	-746	585
78	-985	-789	586
79	-858	-830	589
80	-737	-858	588
81	-598	-882	588
82	-479	-904	586
83	-385	-921	587
84	-311	-933	587
85	-252	-941	587
86	-122	-950	586
87	10	-949	587
88	123	-943	586
89	274	-935	586
90	444	-932	586
91	598	-934	588
92	776	-936	587
93	932	-937	588
94	1115	-937	588
95	1293	-939	587
96	1426	-939	586
97	1555	-939	587
98	1679	-939	588
99	1800	-939	588
100	1911	-939	587
101	2029	-939	587
102	2152	-935	585
103	2273	-932	586
104	2454	-931	587
105	2584	-932	586
106	2697	-934	586
107	2746	-933	587
108	2800	-929	588

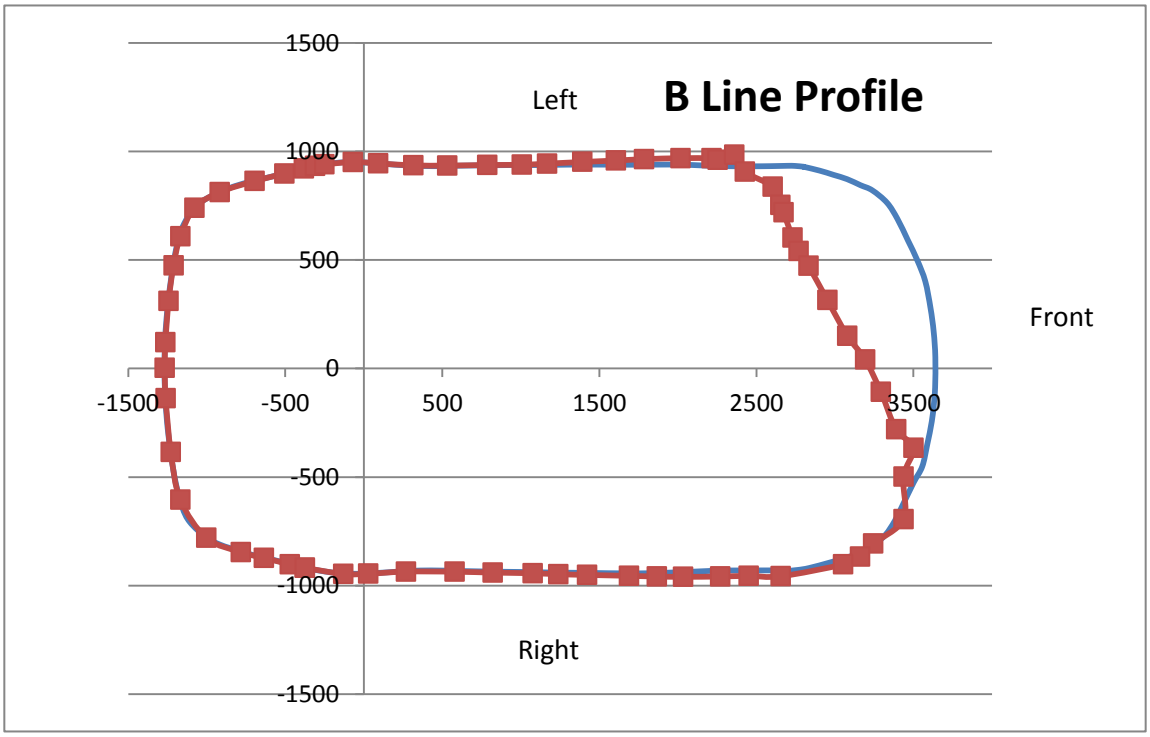
DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A



SECTION B-B



DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

STRUCTURAL BUMPER BEAM POINTS

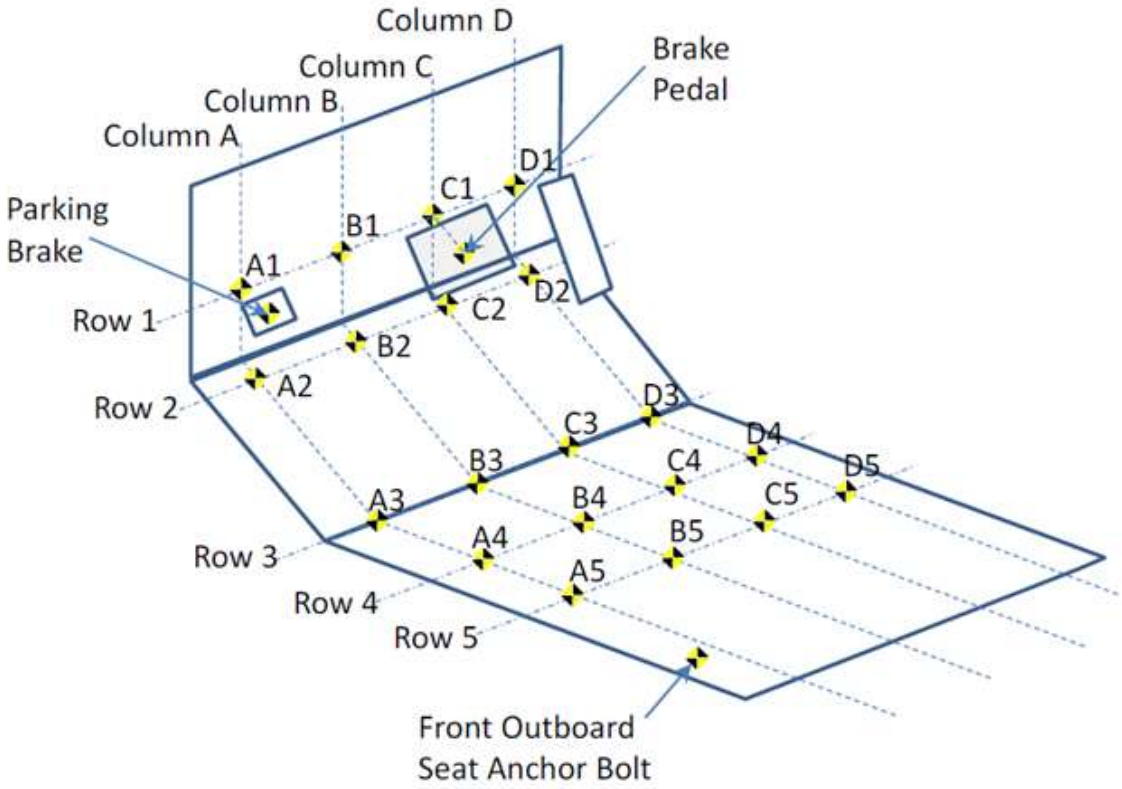
	Point	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
		X	Y	Z	X	Y	Z	X	Y	Z
Redundant Structural Bumper Beam	B10	3615	-627	907	3342	-419	780	-273	208	-127
	B11	3652	-473	908	3232	-316	779	-420	157	-129
	B12	3678	-316	909	3122	-253	772	-556	63	-137
	B13	3694	-159	910	3222	-134	781	-472	25	-129
	B14	3700	1	911	3332	-20	787	-368	-21	-124
	B15	3695	154	912	3429	99	795	-266	-55	-117
	B16	3678	319	912	3508	243	805	-170	-76	-107
	B17	3650	474	911	3571	387	814	-79	-87	-97
	B18	3614	627	912	3626	533	826	12	-94	-86
Center Structural Bumper Beam	B1	3611	-626	933	3332	-423	806	-279	203	-127
	B2	3652	-473	933	3227	-320	805	-425	153	-128
	B3	3679	-316	934	3126	-257	796	-553	59	-138
	B4	3694	-157	934	3224	-136	805	-470	21	-129
	B5	3700	0	934	3333	-23	812	-367	-23	-122
	B6	3695	156	937	3433	98	819	-262	-58	-118
	B7	3679	318	937	3510	240	829	-169	-78	-108
	B8	3651	474	936	3572	384	838	-79	-90	-98
	B9	3611	624	937	3617	535	851	6	-89	-86
Upper Radiator Support	1	3420	-577	597	2852	-315	419	-568	262	-178
	2	3518	-438	613	3149	-382	471	-369	56	-142
	3	3531	-294	588	3216	-253	466	-315	41	-122
	4	3487	-147	592	3233	-104	470	-254	43	-122
	5	3460	-3	588	3267	40	475	-193	43	-113
	6	3481	143	592	3343	164	484	-138	21	-108
	7	3521	281	597	3433	277	495	-88	-4	-102
	8	3499	425	607	3466	419	522	-33	-6	-85
	9	3421	579	603	3424	586	545	3	7	-58

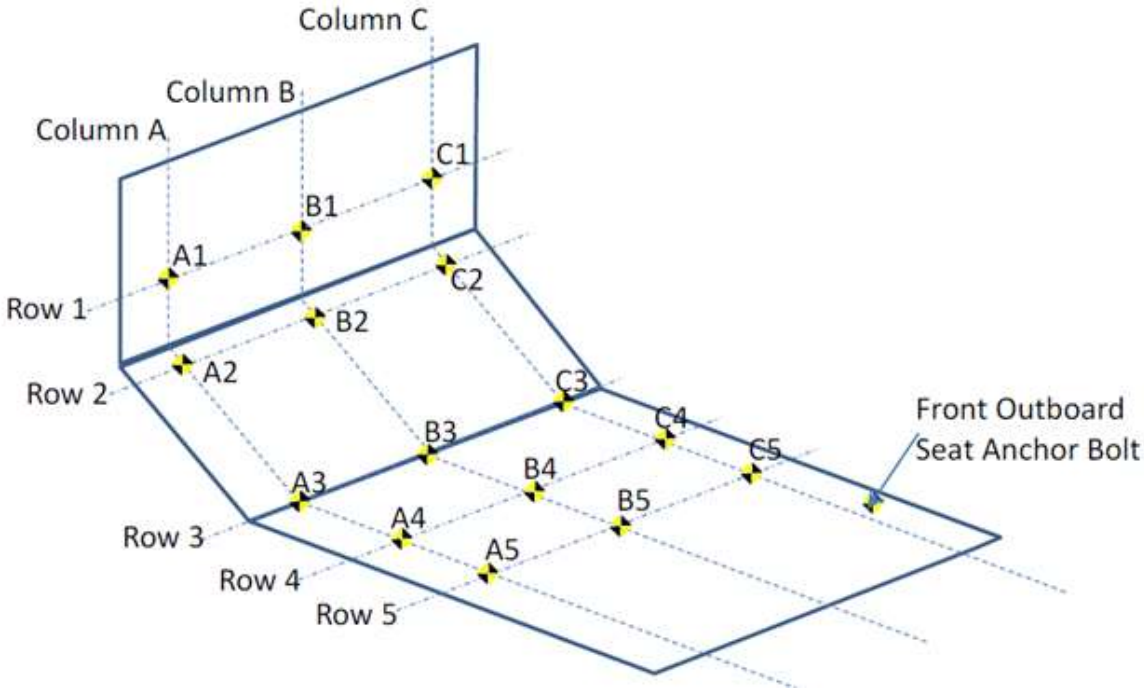
Reference point: 50mm above the center of the rear windshield (See appendix D for procedure to create coordinate system).

+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.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012





Note: See Appendix D for toe pan measuring procedure

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

DRIVER FLOOR PAN MEASUREMENTS

Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	2314	-624	976	2261	-631	961	-53	-7	-15
B1	2362	-524	977	2278	-522	955	-84	2	-23
C1	2437	-371	975	2330	-339	937	-107	32	-38
D1	2440	-222	973	2391	-205	959	-49	17	-15
A2	2253	-623	1044	2246	-650	1049	-7	-27	6
B2	2335	-523	1045	2268	-524	1026	-67	-1	-18
C2	2436	-375	1043	2350	-357	1000	-85	17	-42
D2	2414	-221	1045	2378	-220	1021	-35	1	-24
A3	2220	-624	1169	2220	-620	1168	-1	4	-1
B3	2221	-523	1170	2222	-522	1178	1	2	7
C3	2221	-374	1162	2222	-370	1167	0	4	5
D3	2222	-222	1163	2223	-218	1155	1	4	-8
A4	2169	-625	1165	2168	-620	1174	-1	5	9
B4	2170	-523	1163	2172	-521	1169	2	3	7
C4	2173	-374	1162	2175	-371	1162	2	3	0
D4	2172	-223	1162	2175	-218	1151	3	4	-11
A5	2121	-623	1170	2121	-621	1179	0	2	10
B5	2120	-523	1167	2122	-521	1164	1	2	-3
C5	2123	-373	1167	2124	-369	1158	2	4	-9
D5	2122	-223	1170	2124	-219	1151	2	4	-19
Brake Pedal	2210	-373	977	2175	-390	1003	-36	-18	26
Driver IP Left	1947	-525	666	1892	-539	658	-55	-14	-8
Driver IP Right	1923	-224	664	1848	-238	682	-75	-14	17
DOLP	1970	-624	677	1909	-637	673	-60	-13	-4
Steering Column	1722	-376	470	1702	-365	477	-20	11	7
Front Outboard Bolt	1739	-583	1083	1742	-587	1087	3	-5	4

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.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

PASSENGER FLOOR PAN MEASUREMENTS

Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	2435	225	977	2424	245	968	-10	19	-9
B1	2436	376	977	2432	396	969	-4	20	-8
C1	2361	524	977	2359	547	969	-2	23	-8
A2	2414	224	1045	2414	246	1041	-1	22	-4
B2	2394	375	1044	2388	396	1036	-6	21	-8
C2	2327	526	1043	2325	549	1037	-2	23	-6
A3	2220	224	1161	2219	247	1162	0	23	1
B3	2221	374	1165	2219	395	1162	-3	21	-3
C3	2222	526	1168	2223	548	1165	1	22	-3
A4	2170	224	1165	2169	247	1164	-1	23	-1
B4	2170	375	1166	2169	397	1164	-2	21	-2
C4	2172	526	1168	2171	548	1163	0	22	-5
A5	2121	224	1169	2120	246	1168	-1	22	-1
B5	2122	374	1169	2120	396	1166	-2	22	-3
C5	2120	524	1171	2119	547	1168	-1	23	-3
Pass IP Left	1957	224	702	1981	233	689	24	9	-13
Pass IP Right	1965	526	696	1970	534	689	5	7	-6
PORP	1958	621	675	1957	629	673	-1	8	-2
Front Outboard Bolt	1738	578	1085	1740	592	1083	2	14	-2

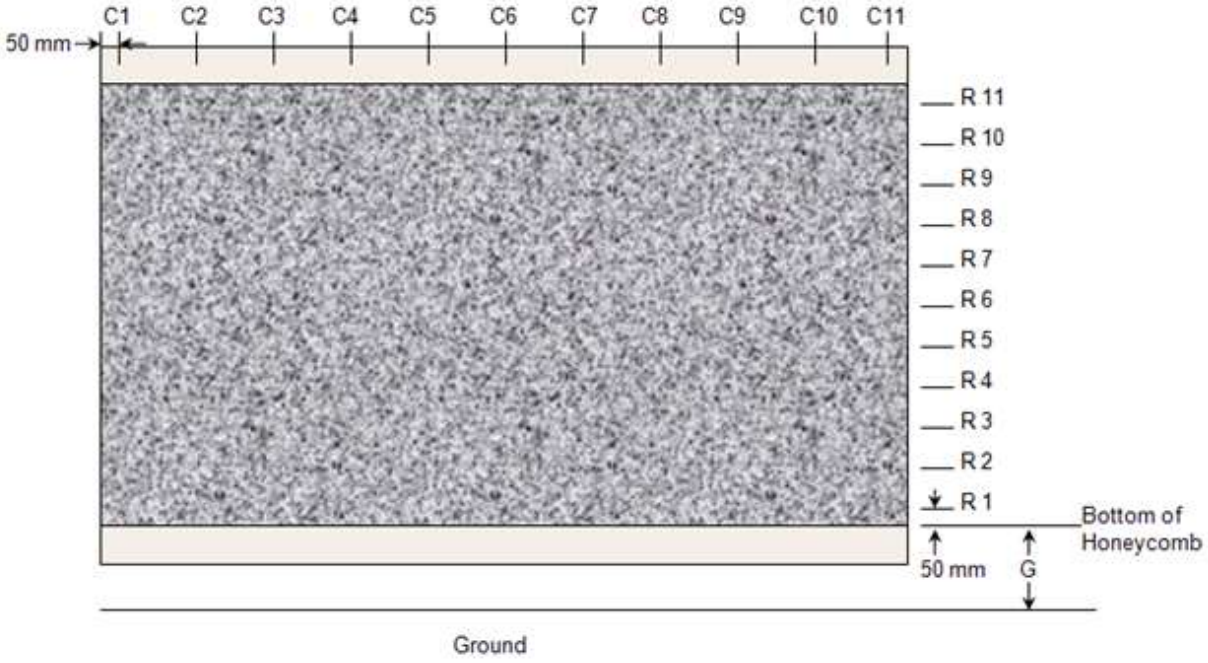
Reference point: 50mm above the center of the rear windshield (See appendix D for procedure to create coordinate system).

+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.14
RMDB CRUSH MEASUREMENTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan
Test Program: R&D 90.1kph, 15° angle, 35% offset

NHTSA No.: R20130026
Test Date: 12/15/2012



		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
		50 mm	260 mm	470 mm	680 mm	890 mm	1100 mm	1310 mm	1520 mm	1730 mm	1940 mm	2150 mm
R11	**910mm**	2.7	4.3	4.5	4.0	4.7	4.6	4.5	9.4	7.1	10.8	53.0
R10	**824mm**	2.2	2.1	1.8	1.5	1.9	2.2	2.4	9.3	30.6	19.7	82.0
R9	**738mm**	1.8	1.7	1.6	1.4	1.4	1.9	2.4	19.6	45.7	39.3	116.6
R8	**652mm**	1.9	1.4	1.1	1.4	1.5	1.6	1.8	17.7	58.1	75.2	153.9
R7	**566mm**	1.5	1.1	1.0	0.9	1.6	1.5	1.8	11.8	84.6	125.9	184.1
R6	**480mm**	1.0	0.6	0.8	1.0	1.3	1.8	12.2	9.4	157.2	295.4	206.3
R5	**384mm**	0.8	0.2	0.4	1.1	1.3	1.8	44.1	24.0	133.5	248.5	200.3
R4	**308mm**	0.3	0.2	0.3	0.9	1.4	2.1	58.2	30.4	120.9	206.6	202.9
R3	**222mm**	-0.2	-0.1	0.2	1.0	0.9	1.8	68.0	39.4	97.4	165.2	199.0
R2	**136mm**	-1.3	-0.2	0.1	1.0	1.2	2.3	72.8	46.3	74.4	84.3	188.7
R1	**50mm**	-1.1	-0.4	0.3	1.2	*	*	96.6	28.3	10.9	35.1	136.7

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

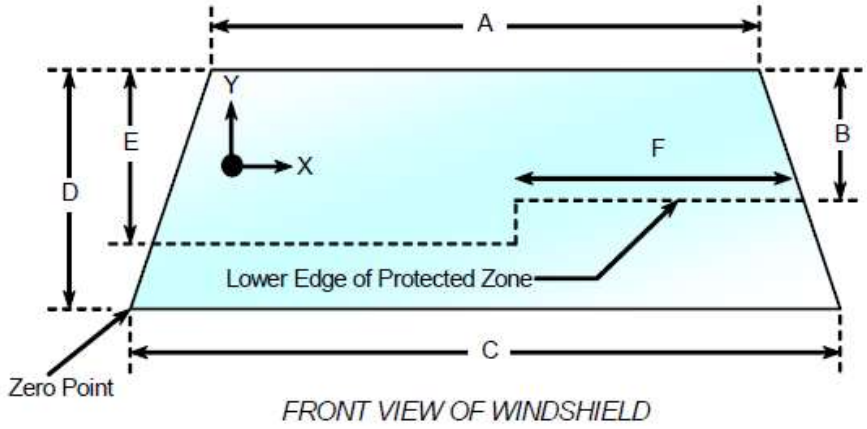
DATA SHEET NO. 15
SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012

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	2158	2053	95.1%
Right Side	2158	1813	84.0%
Total	4316	3866	89.6%



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1272
B	mm	422
C	mm	1620
D	mm	712
E	mm	423
F	mm	327

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: 2013 Ford Taurus Four Door Sedan NHTSA No.: R20130026
Test Program: R&D 90.1kph, 15° angle, 35% offset Test Date: 12/15/2012

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

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

Test Time: 12:02 PM

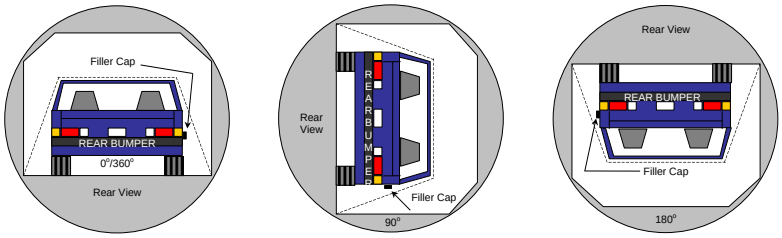
Stoddard Solvent Spillage Measurements

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

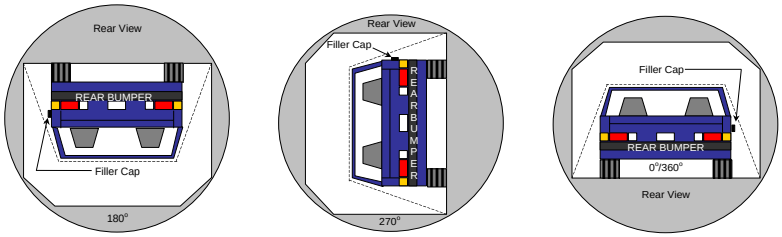
DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2013 Ford Taurus Four Door Sedan
Test Program: R&D 90.1kph, 15° angle, 35% offset

NHTSA No.: R20130026
Test Date: 12/15/2012



0° TO 90° 90° TO 180°



180° TO 270° 270° TO 360°

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°	65	300	365
180° to 270°	62	300	362
270° to 360°	71	300	371

FMVSS 301 SPILLAGE TABLE

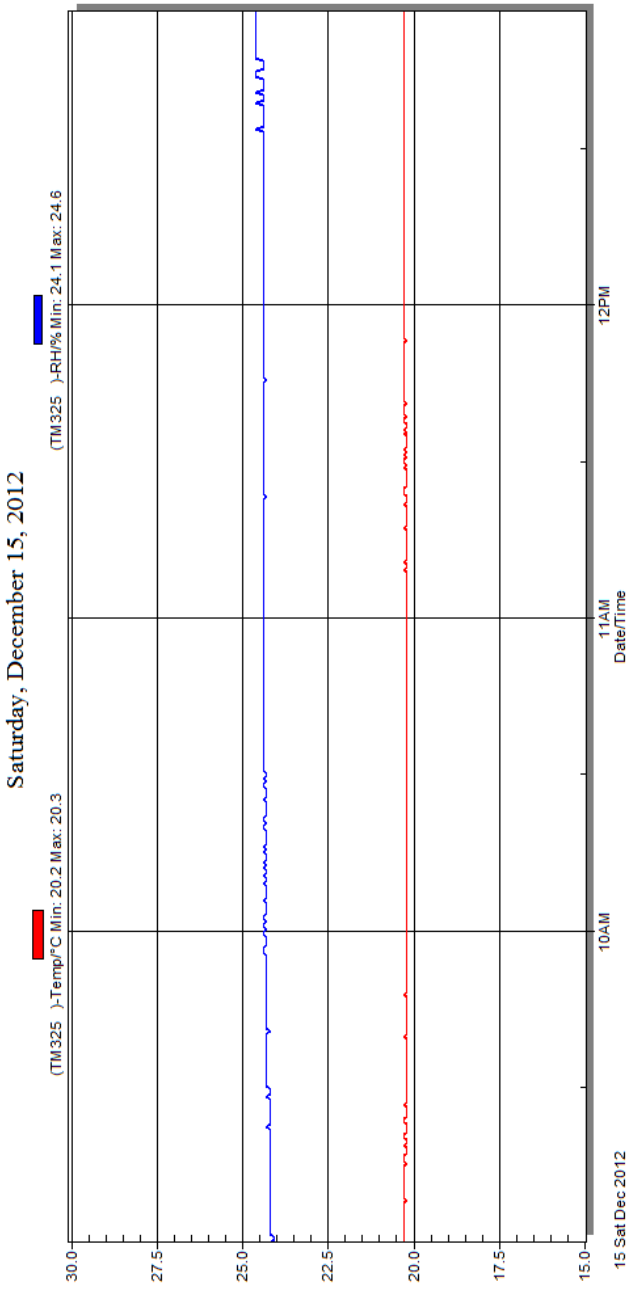
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

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:	2013 Ford Taurus Four Door Sedan	NHTSA No.:	R20130026
Test Program:	R&D 90.1kph, 15° angle, 35% offset	Test Date:	12/15/2012



Temperature Stabilization Chart/Data

APPENDIX A

PHOTOGRAPHS

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

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

TABLE OF PHOTOGRAPHS (Continued)		
No.	Description	Page
61	Post-Test View of Driver Door Clearance	A-39
62	Pre-Test View of Parking Brake	A-40
63	Pre-Test Driver Seat Fore Aft Markings	A-41
64	Post-Test Driver Seat Fore Aft Markings	A-41
65	Pre-Test Driver Seat Back Markings	A-42
66	Pre-Test Overhead View of Driver Thighs on Seat	A-42
67	Pre-Test Driver Adjustable D-ring	A-43
68	Post-Test Driver Adjustable D-ring	A-43
69	Pre-Test Driver Feet	A-44
70	Post-Test Driver Feet	A-44
71	Pre-Test View of Driver Right Knee and Bolster	A-45
72	Post-Test View of Driver Right Knee and Bolster	A-45
73	Pre-Test View of Driver Left Knee and Bolster	A-46
74	Post-Test View of Driver Left Knee and Bolster	A-46
75	Pre-Test View of Driver Abdomen	A-47
76	Post-Test View of Driver Abdomen	A-47
77	Pre-Test Left Side View of Steering Wheel set position	A-48
78	Post-Test Left Side View of Steering Wheel set position	A-48
79	Post-Test View of Driver Head Contact with Airbag – Front	A-49
80	Post-Test View of Driver Head Contact with Airbag – Curtain	A-49
81	Post-Test View of Driver Head Contact with Vehicle Interior – A	A-50
81a	Post-Test View of Driver Head Contact with Vehicle Interior – B	A-50
81b	Post-Test View of Driver Head Contact with Vehicle Interior – C	A-51
82	Pre-Test Overall View of Passenger Knee Bolsters	A-52
83	Post-Test Overall View of Passenger Knee Bolsters	A-52
84	Pre-Test Left Side View of Passenger Knee Bolsters	A-53
85	Post-Test Left Side View of Passenger Knee Bolsters	A-53
86	Pre-Test Right Side View of Passenger Knee Bolsters	A-54
87	Post-Test Right Side View of Passenger Knee Bolsters	A-54
88	Pre-Test View of Passenger Floor pan at Left sill level, w/carpet	A-55

TABLE OF PHOTOGRAPHS (Continued)		
No.	Description	Page
89	Post-Test View of Passenger Floor pan at Left sill level, w/carpet	A-55
90	Pre-Test View of Passenger Floor pan at Mid seat level, w/carpet	A-56
91	Post-Test view of Passenger Floor pan at Mid seat level, w/carpet	A-56
92	Pre-Test View of Passenger Floor pan at Left sill level, w/o carpet	A-57
93	Post-Test View of Passenger Floor pan at Left sill level, w/o carpet	A-57
94	Pre-Test View of Passenger Floor pan at Mid seat level, w/o carpet	A-58
95	Post-Test view of Passenger Floor pan at Mid seat level, w/o carpet	A-58
96	Pre-Test Passenger Front Close-up View, Windshield	A-59
97	Post-Test Passenger Front Close-up View, Windshield	A-59
98	Pre-Test Left Side Passenger and Interior View	A-60
99	Post-Test Left Side Passenger and Interior View	A-60
100	Pre-Test Right Side Passenger Window View	A-61
101	Post-Test Right Side Passenger Window View	A-61
102	Pre-Test Right Side Passenger and Interior View	A-62
103	Post-Test Right Side Passenger and Interior View	A-62
104	Pre-Test View of Passenger Door Clearance	A-63
105	Post-Test View of Passenger Door Clearance	A-63
106	Pre-Test Passenger Seat Fore-Aft Markings	A-64
107	Post-Test Passenger Seat Fore-Aft Markings	A-64
108	Pre-Test Passenger Seat Back Markings	A-65
109	Pre-Test Overhead View of Passenger Thighs on seat	A-65
110	Pre-Test Passenger Adjustable D-ring	A-66
111	Post-Test Passenger Adjustable D-ring	A-66
112	Pre-Test View of Passenger Feet	A-67
113	Post-Test View of Passenger Feet	A-67
114	Pre-Test View of Passenger Right Knee and Bolster	A-68
115	Post-Test View of Passenger Right Knee and Bolster	A-68
116	Pre-Test View of Passenger Left Knee and Bolster	A-69
117	Post-Test View of Passenger Left Knee and Bolster	A-69
118	Pre-Test View of Passenger Abdomen	A-70

TABLE OF PHOTOGRAPHS (Continued)		
No.	Description	Page
119	Post-Test View of Passenger Abdomen	A-70
120	Post-Test View of Passenger Head contact with Airbag – Front	A-71
120a	Post-Test View of Passenger Head contact with Airbag – Curtain	A-71
121	Post-Test View of Passenger Head contact with Interior – A	A-72
121a	Post-Test View of Passenger Head contact with Interior – B	A-72
121b	Post-Test View of Passenger Head contact with Interior – C	A-73
122	Post-Test Passenger Contact With Glovebox	A-73
123	Pre-Test Ballast Locations	A-74
124	Post-Test Speed Trap Readout	A-74
125	Pre-Test View of Fuel Filler Cap	A-75
126	Post-Test View of Fuel Filler Cap	A-75
127	Pre-Test Engine Compartment View	A-76
128	Post-Test Engine Compartment View	A-76
129	Pre-Test View of Front Underbody (perpendicular to vehicle)	A-77
130	Post-Test View of Front Underbody (perpendicular to vehicle)	A-77
131	Pre-Test View of Mid Underbody (perpendicular to vehicle)	A-78
132	Post-Test View of Mid Underbody (perpendicular to vehicle)	A-78
133	Pre-Test View of Rear Underbody (perpendicular to vehicle)	A-79
134	Post-Test View of Rear Underbody (perpendicular to vehicle)	A-79
135	Pre-Test View of Steering rack and or sway bar	A-80
136	Post-Test View of Steering rack and or sway bar	A-80
137	Pre-Test Bumper to Rail Attachments and Crush Initiators	A-81
138	Post-Test Bumper to Rail Attachments and Crush Initiators	A-82
139	Post-Test View of Front Sub-Frame Deformation	A-82
140	Pre-Test Frame Rail with tire removed	A-83
141	Post-Test Frame Rail with tire removed	A-83
142	Pre-Test View of Front Driver Wheel Well with tire removed	A-84
143	Post-Test ¾ View of Front Driver Wheel Well w/ tire removed	A-84
144	Post-Test Side View of Front Driver Wheel Well w/ tire removed	A-85
145	Post-Test Right Side 3/4 Rear View of the Front Driver Wheel Well w/ tire removed	A-85

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

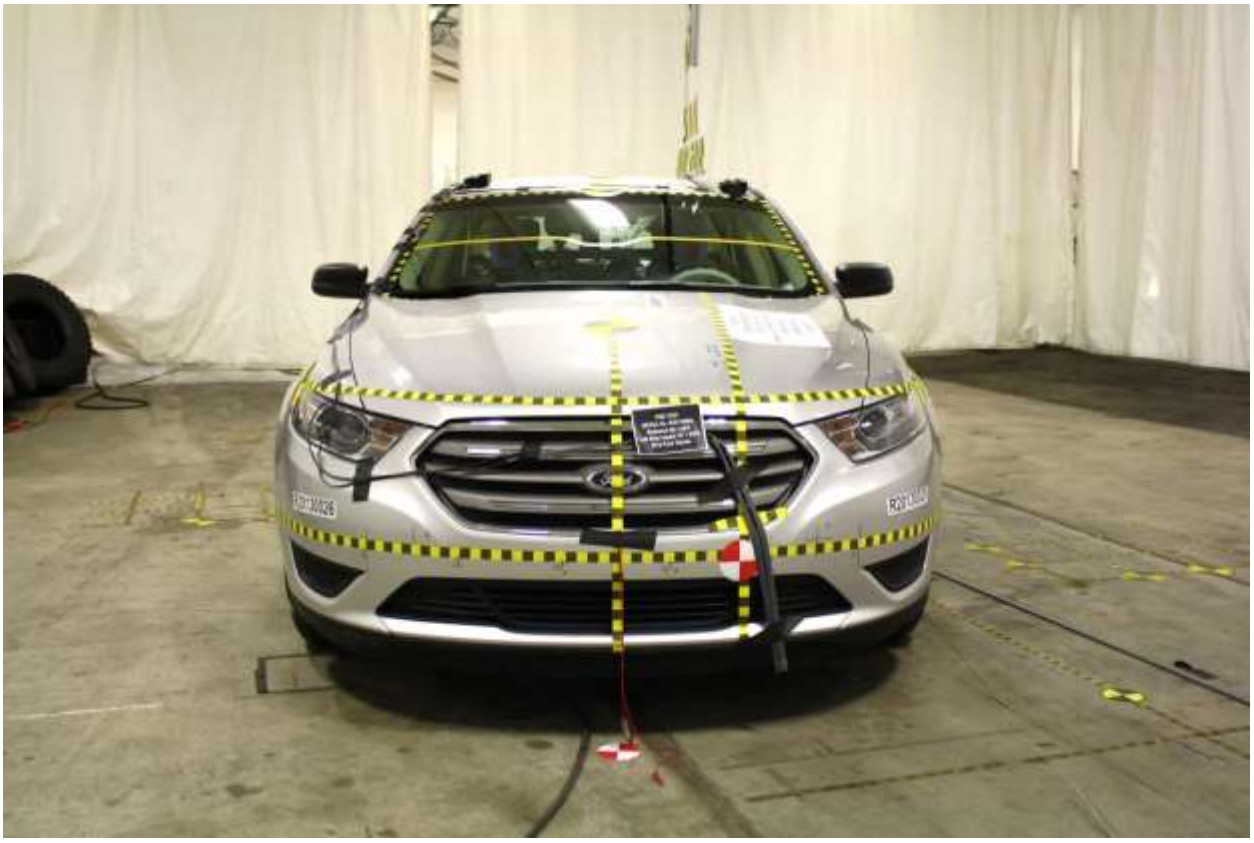
TABLE OF PHOTOGRAPHS (Continued)		
No.	Description	Page
176	Pre-Test RMDB & Vehicle, Rear View	A-101
177	Post-Test RMDB & Vehicle, Rear View	A-101
178	Pre-Test RMDB & Vehicle, Front View	A-102
179	Post-Test RMDB & Vehicle, Front View	A-102
180	Vehicle at 0 Degrees on Static Rollover Device	A-103
181	Vehicle at 90 Degrees on Static Rollover Device	A-103
182	Vehicle at 180 Degrees on Static Rollover Device	A-104
183	Vehicle at 270 Degrees on Static Rollover Device	A-104
184	Vehicle at 360 Degrees on Static Rollover Device	A-105
185	Impact Photo	A-105

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

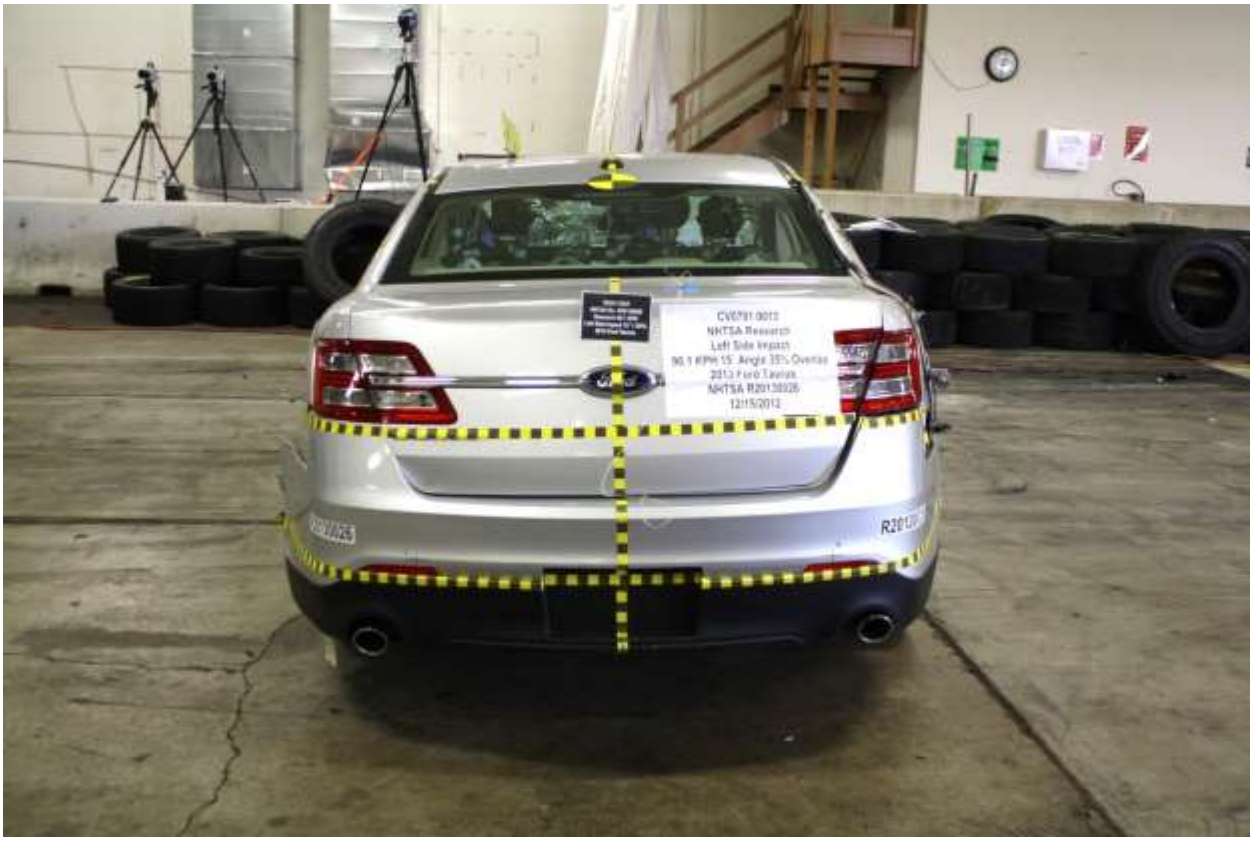
No. 009 Pre-Test Left Side View of Test Vehicle

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

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

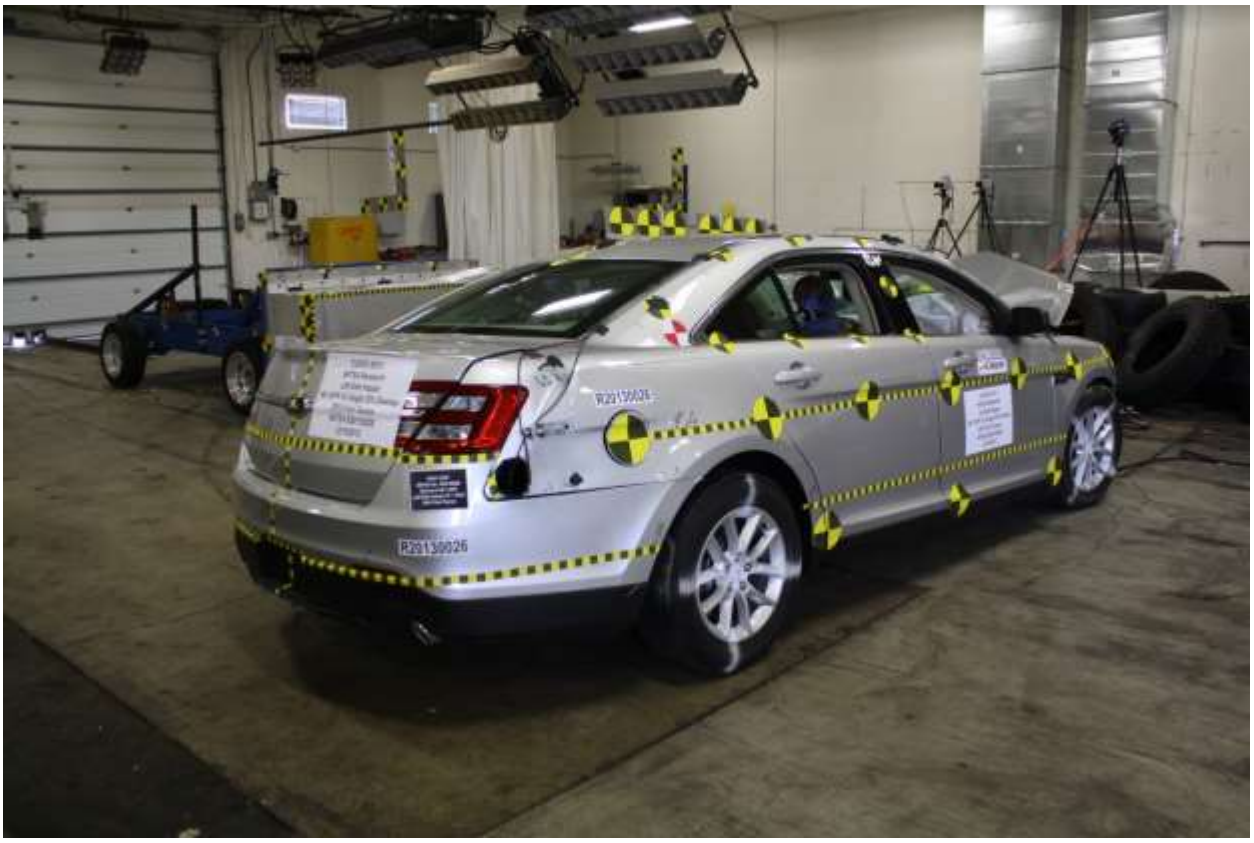
No. 012 Post-Test Left Rear 3-4 View of Test Vehicle

No. 013 Pre-Test Rear View of Test Vehicle

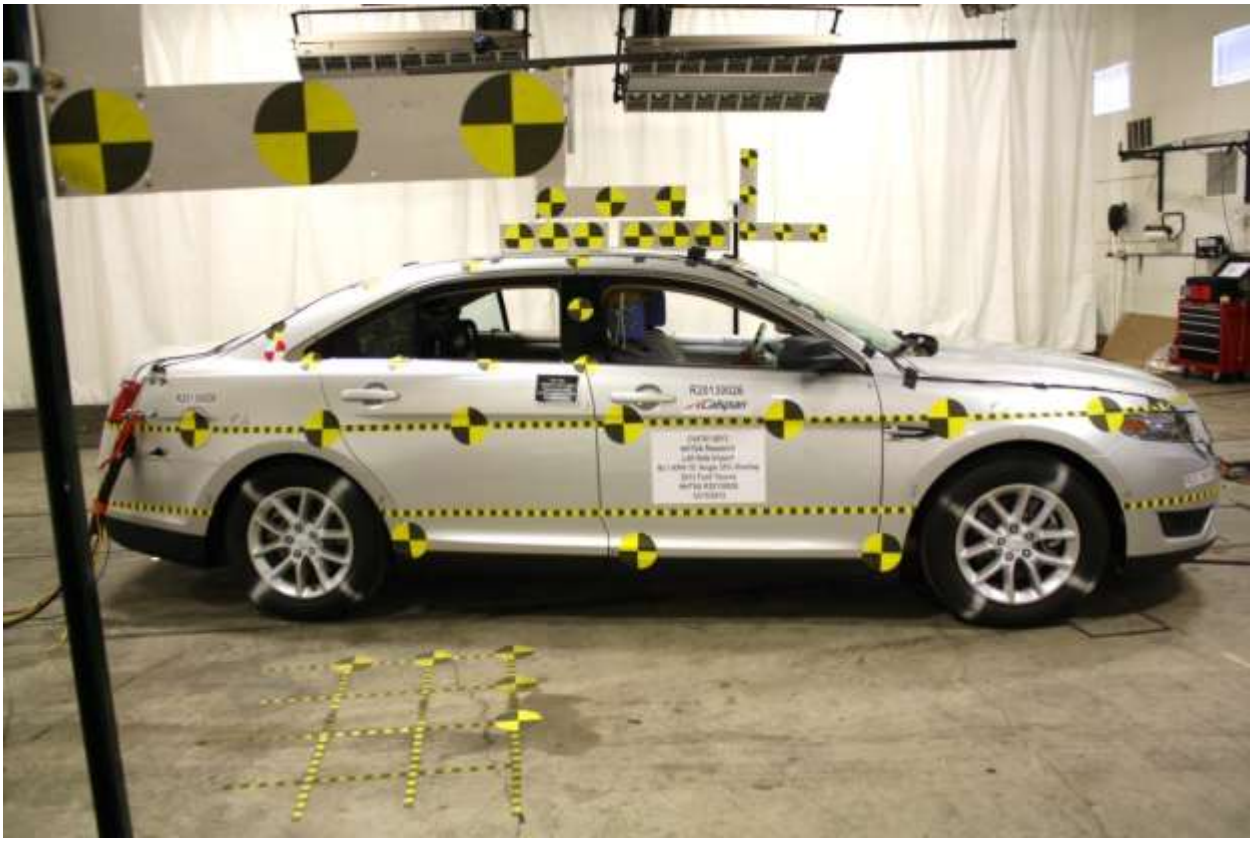


No. 014 Post-Test Rear View of Test Vehicle

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



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

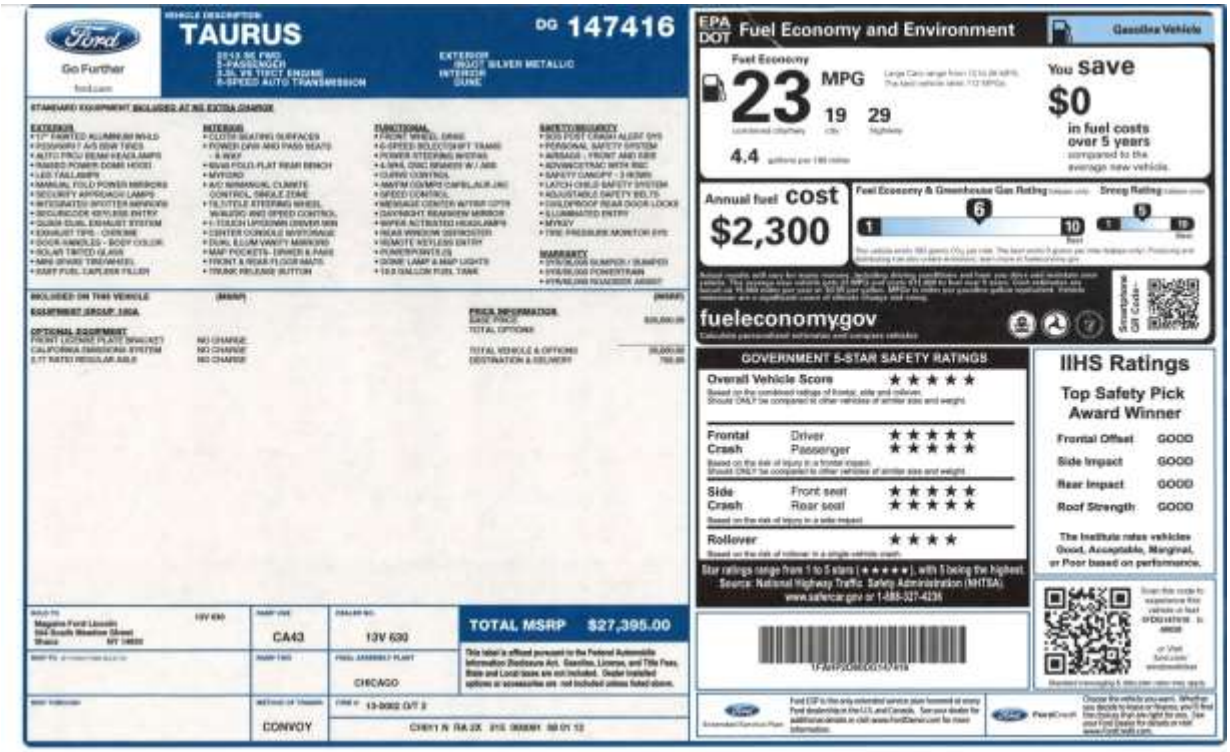


No. 017 Pre-Test Right Side View of Test Vehicle

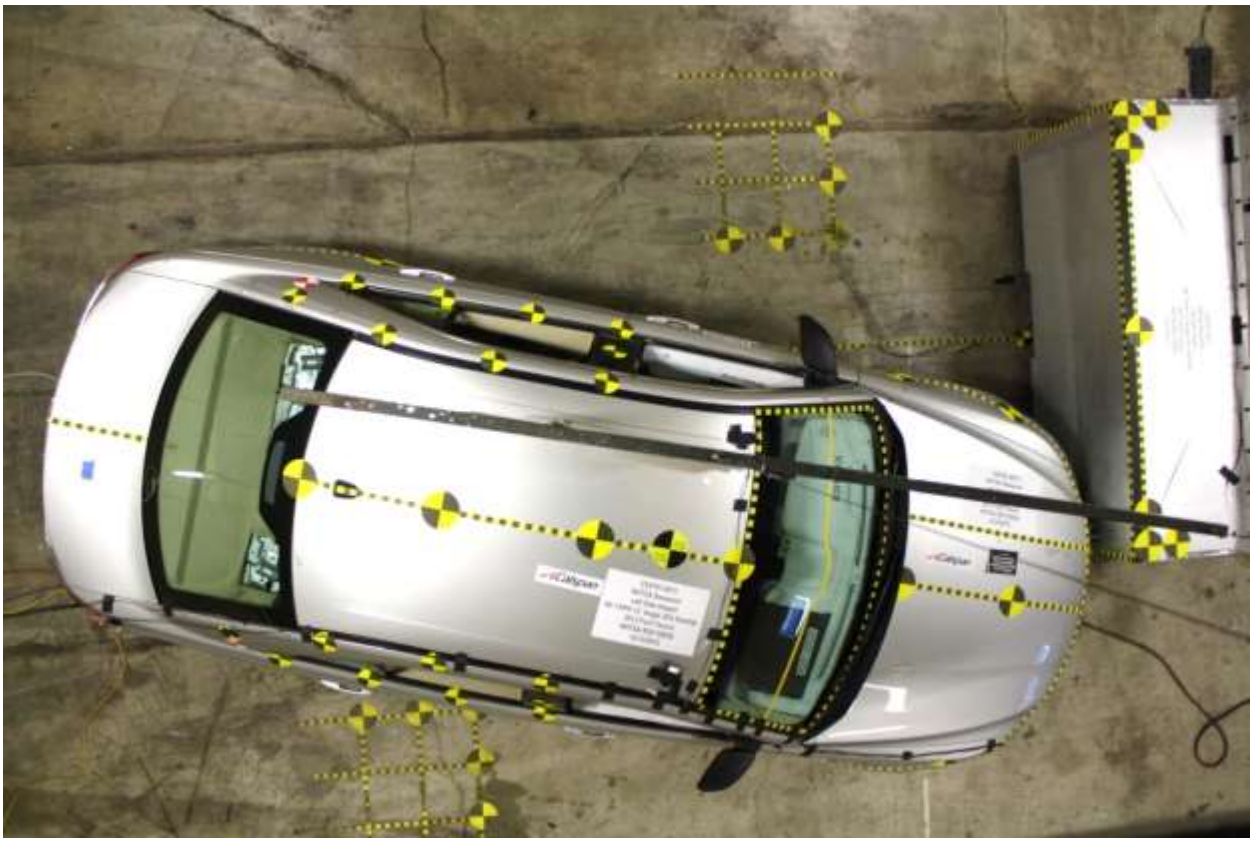
No. 018 Post-Test Right Side View of Test Vehicle

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

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

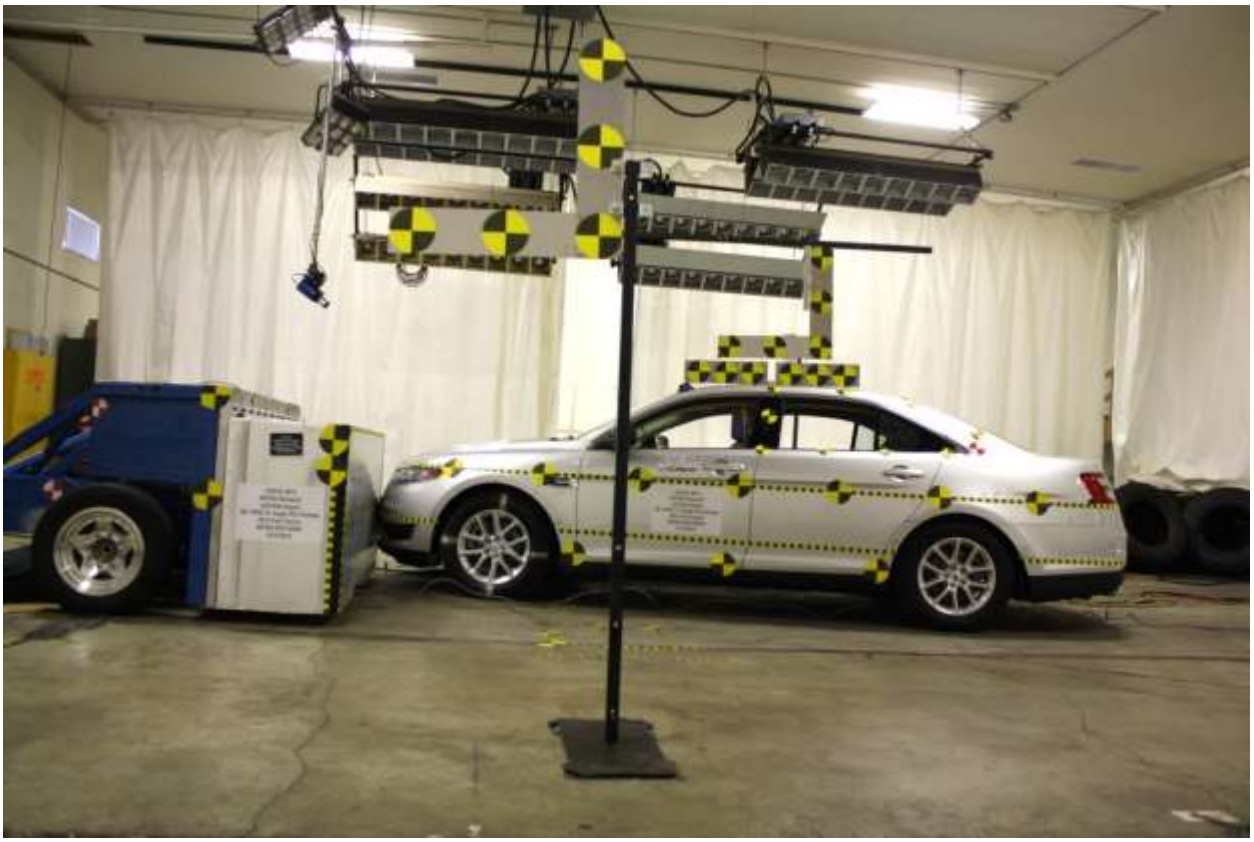


No. 021 Monroney Label Photograph



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

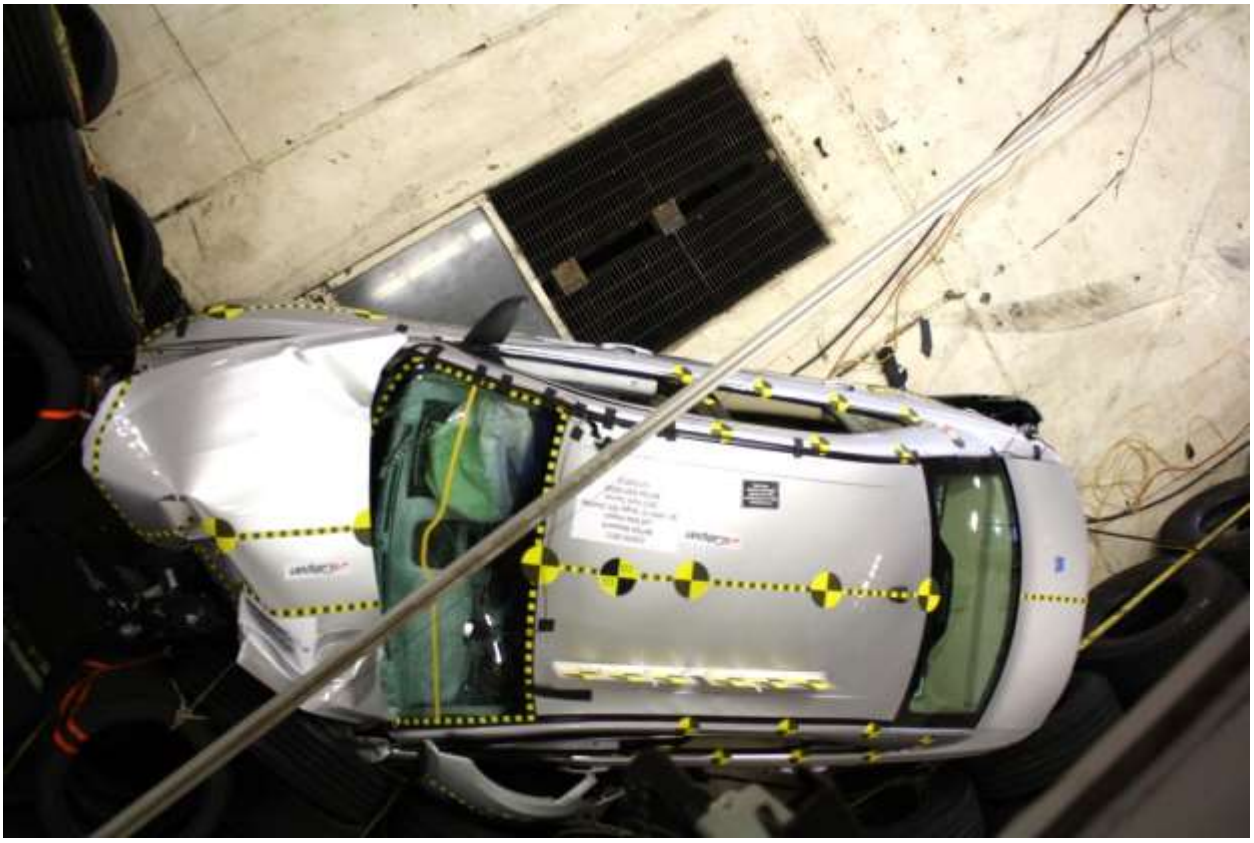
No. 023 Pre-Test Left Side View of RMDB against target vehicle at ideal Impact Point



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

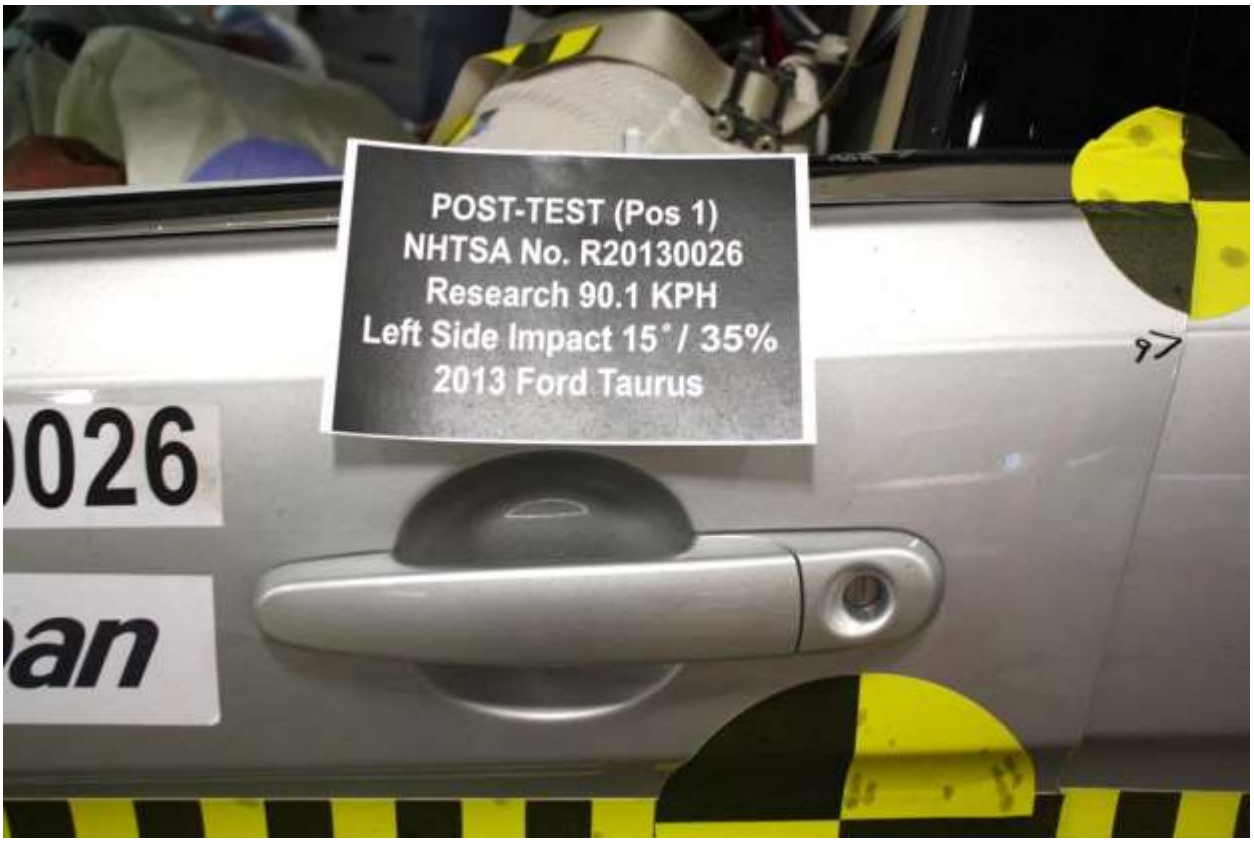
No. 025 Pre-Test Close-up View of Impact Point

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

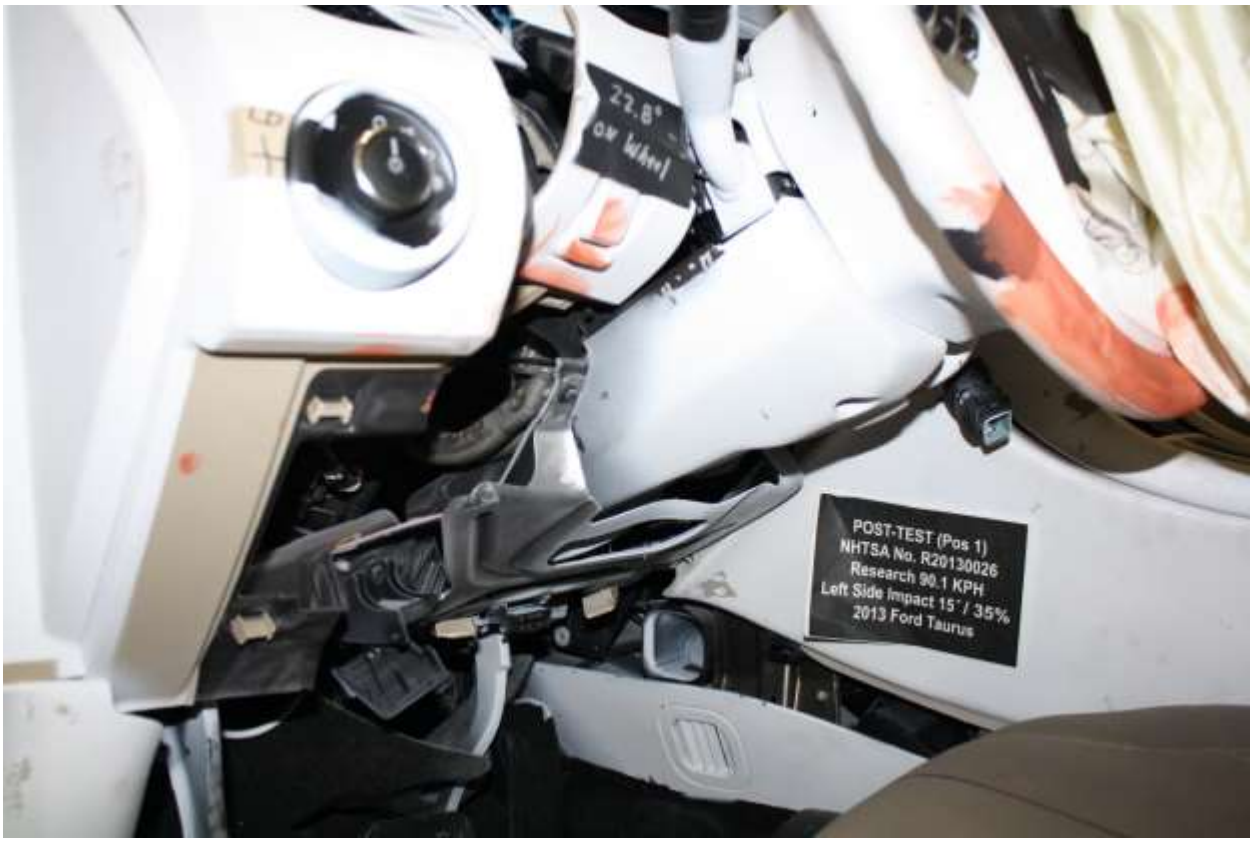
No. 036 Pre-Test View of Passenger Inner Door Panel

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

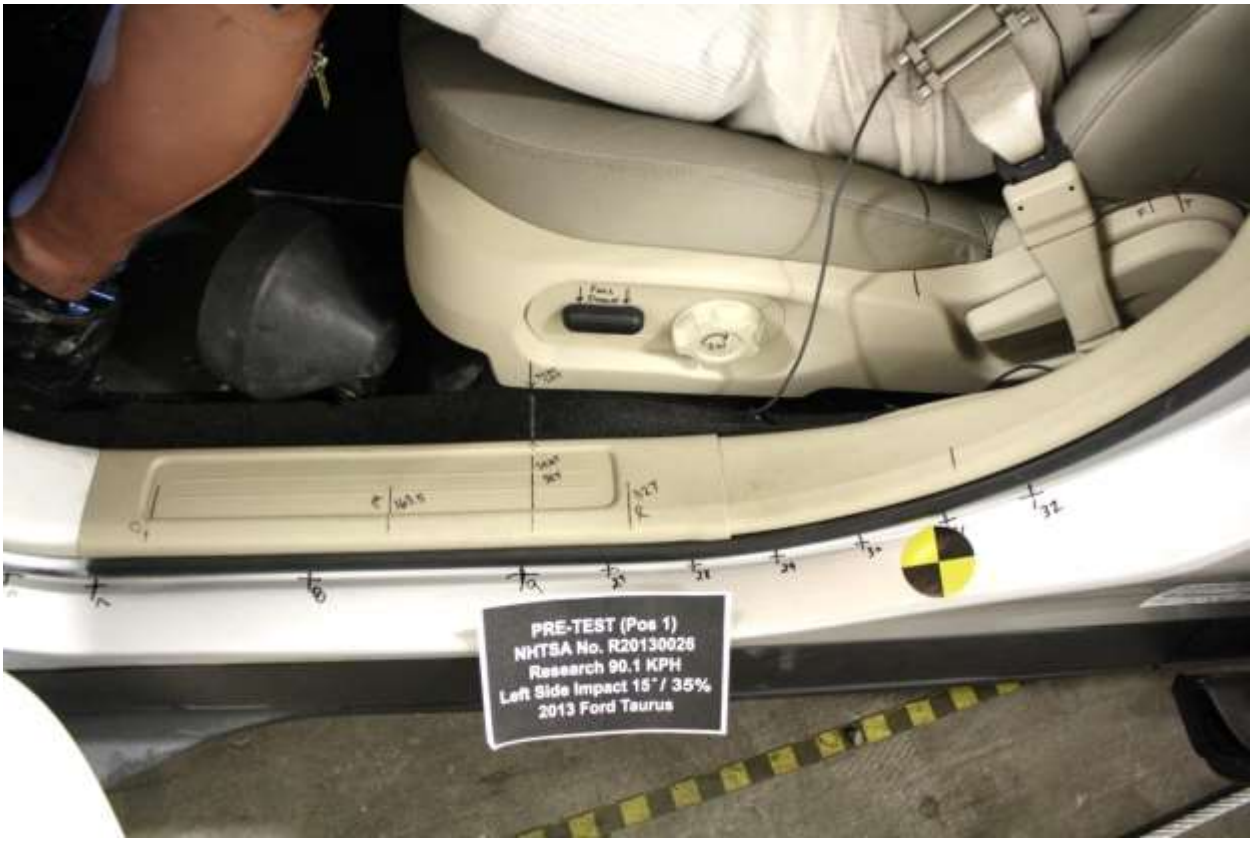
No. 058 Pre-Test Right Side View of Driver and Interior

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

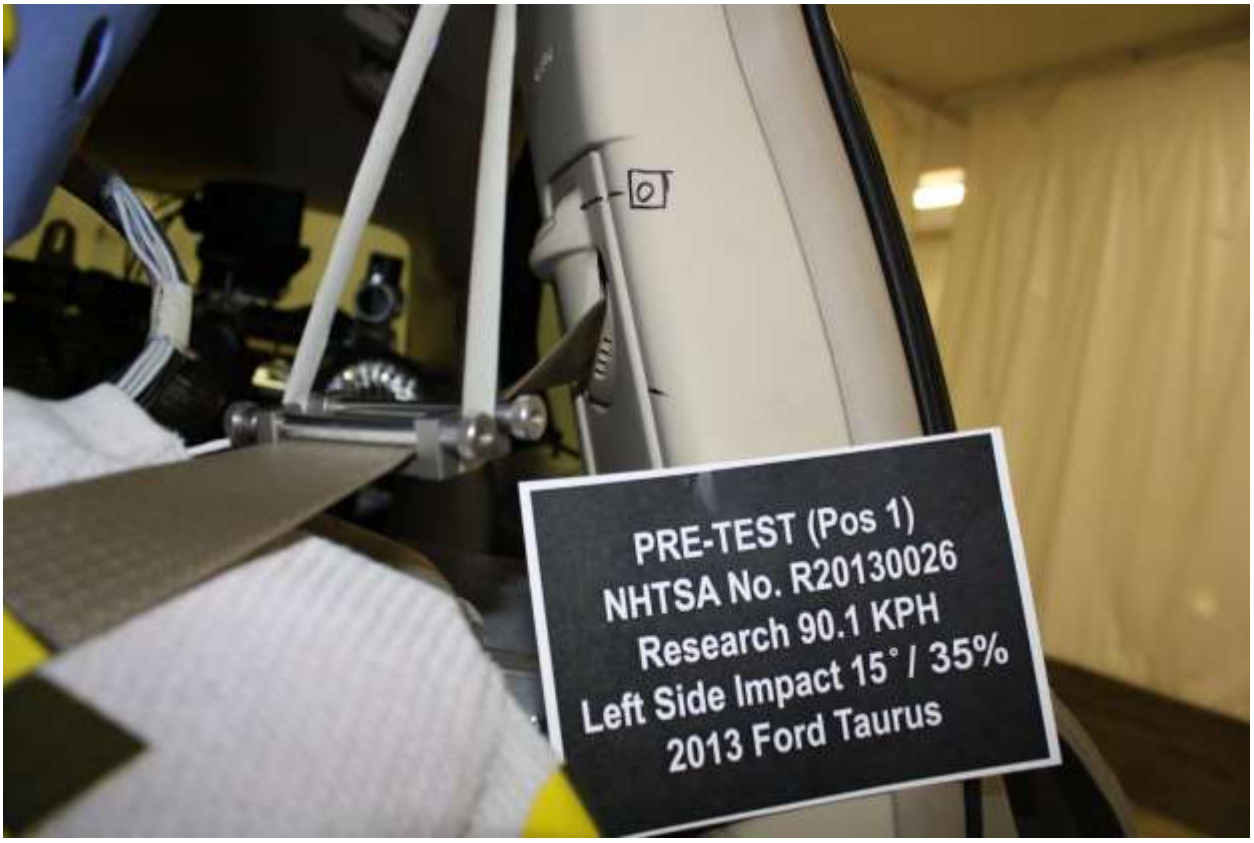


No. 063 Pre-Test Driver Seat Fore Aft Markings

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

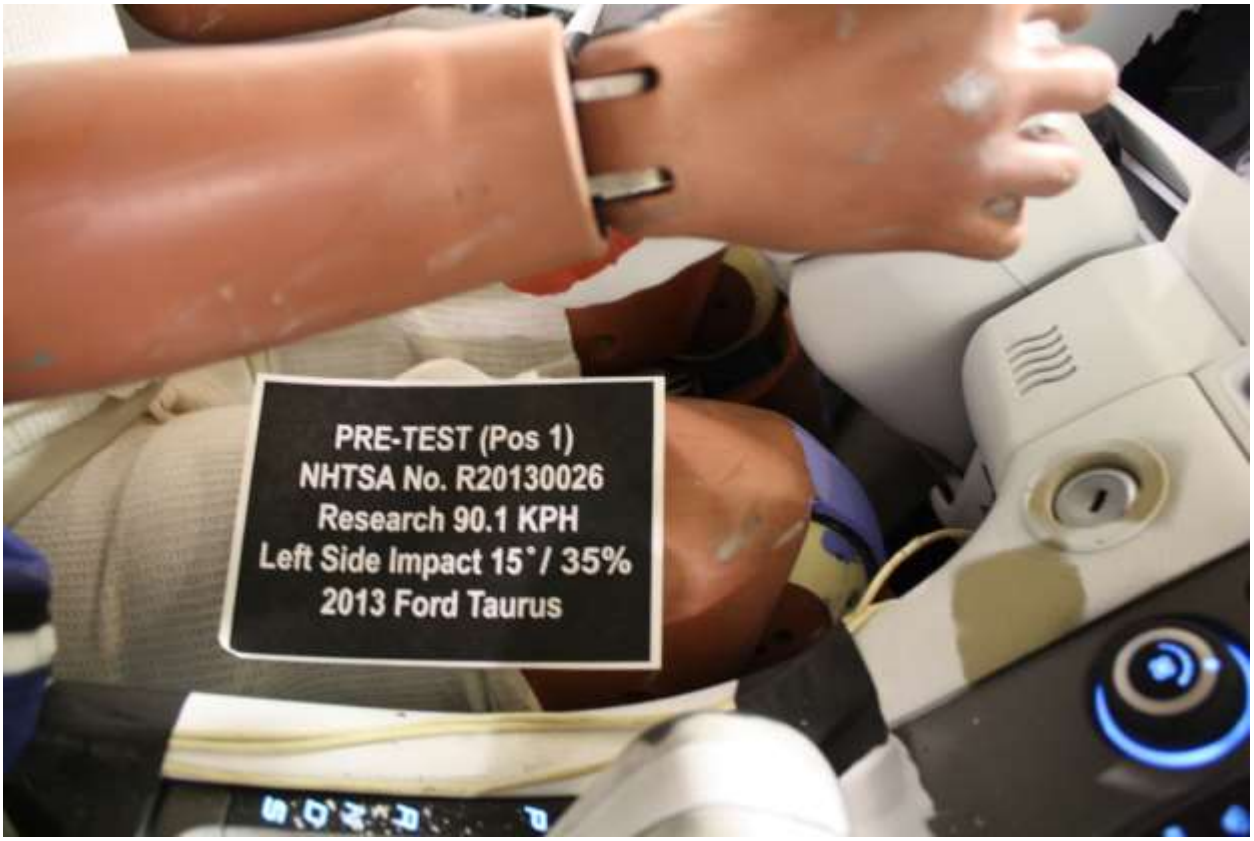


No. 067 Pre-Test Driver Adjustable D-Ring

No. 068 Post-Test Driver Adjustable D-Ring

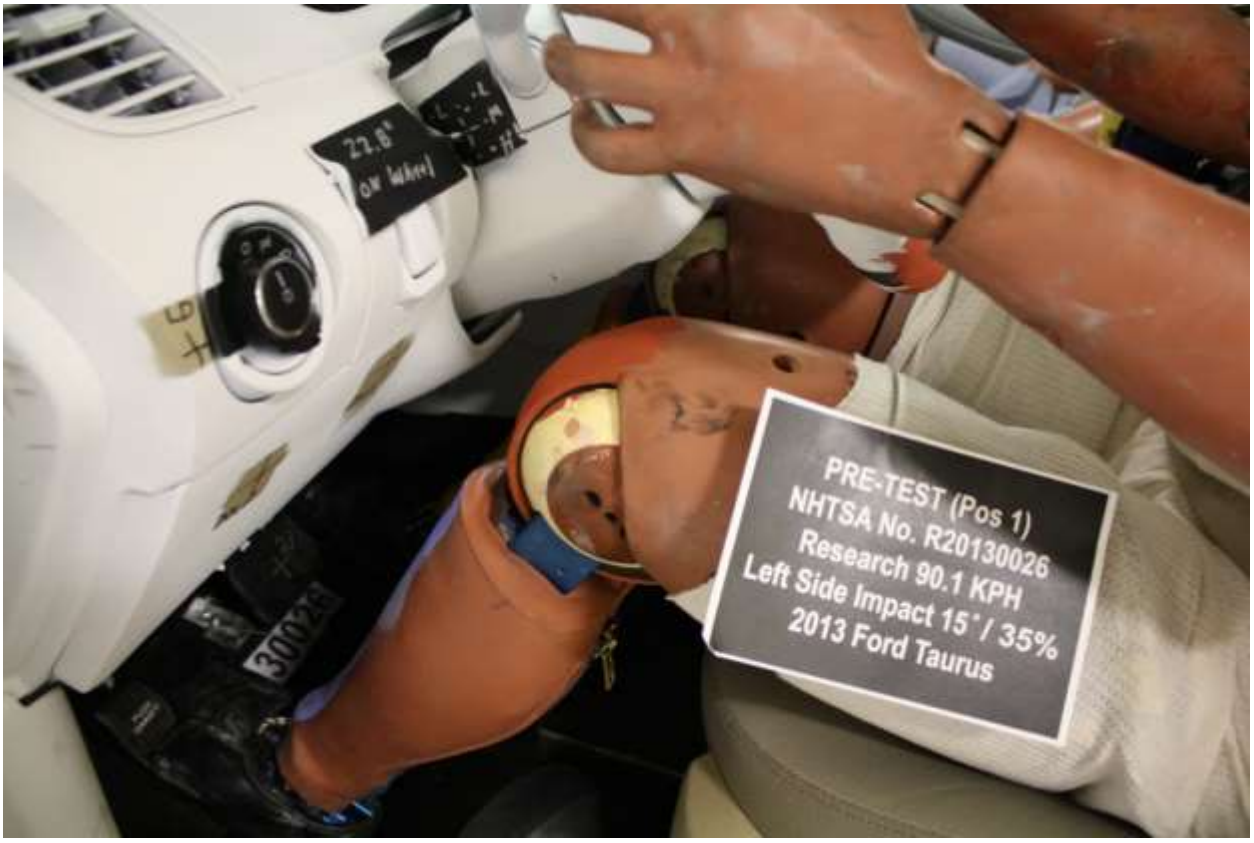
No. 069 Pre-Test Driver Feet

No. 070 Post-Test Driver Feet



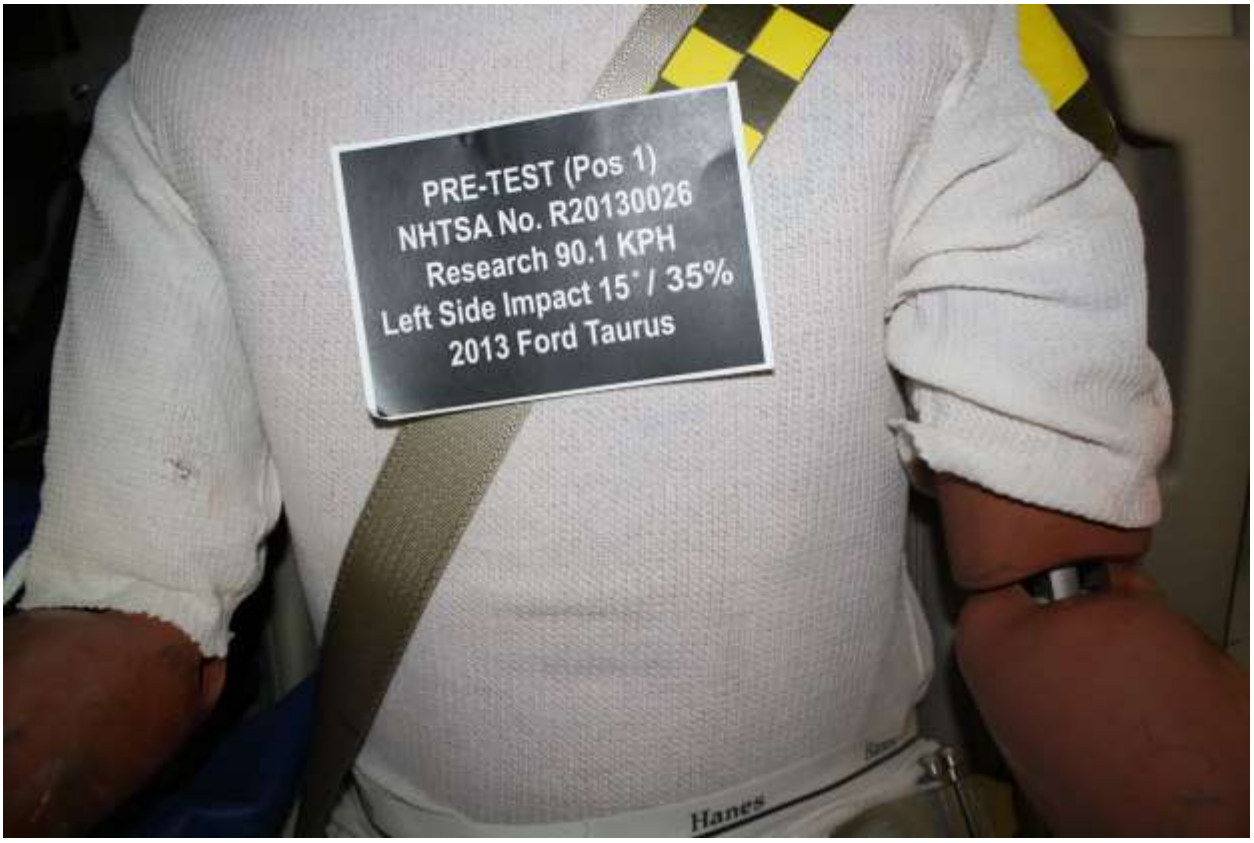
No. 071 Pre-Test View of Driver Right Knee and Bolster

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

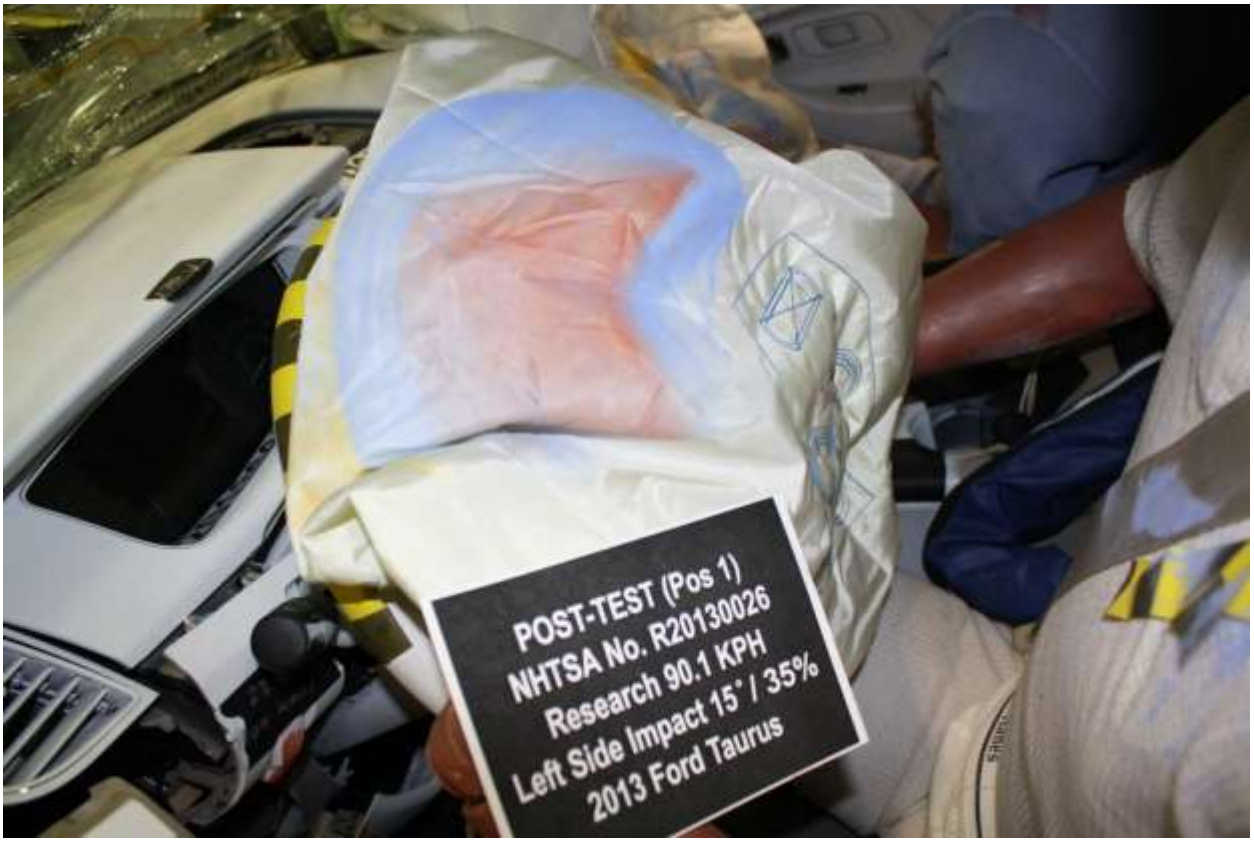


No. 075 Pre-Test View of Driver Abdomen

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

Photo Not Applicable

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

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

Photo Not Applicable

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

Photo Not Applicable

No. 081b Post-Test View of Driver Head 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 – Placard should say Pre-Test not Post-Test

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– Placard should say Pre-Test not Post-Test

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

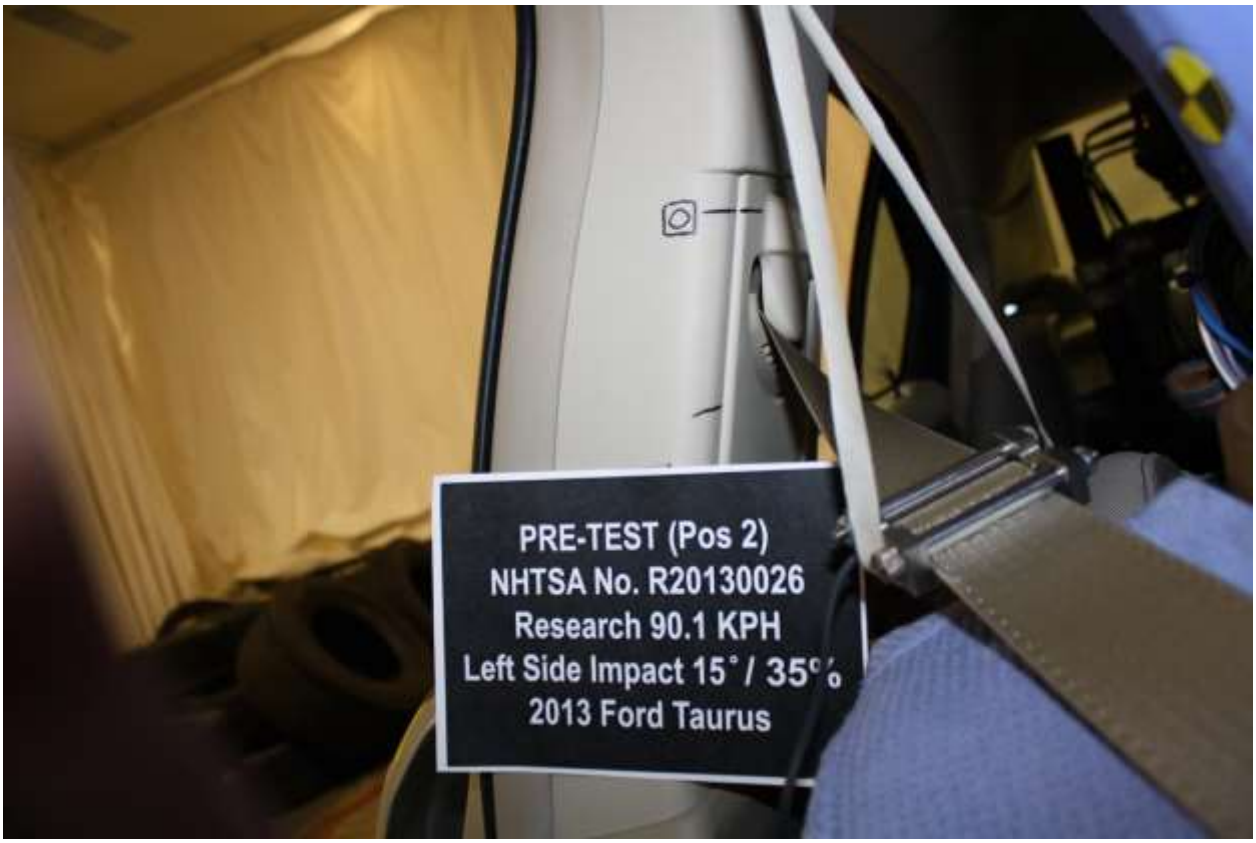
No. 105 Post-Test View of Passenger Door Clearance

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

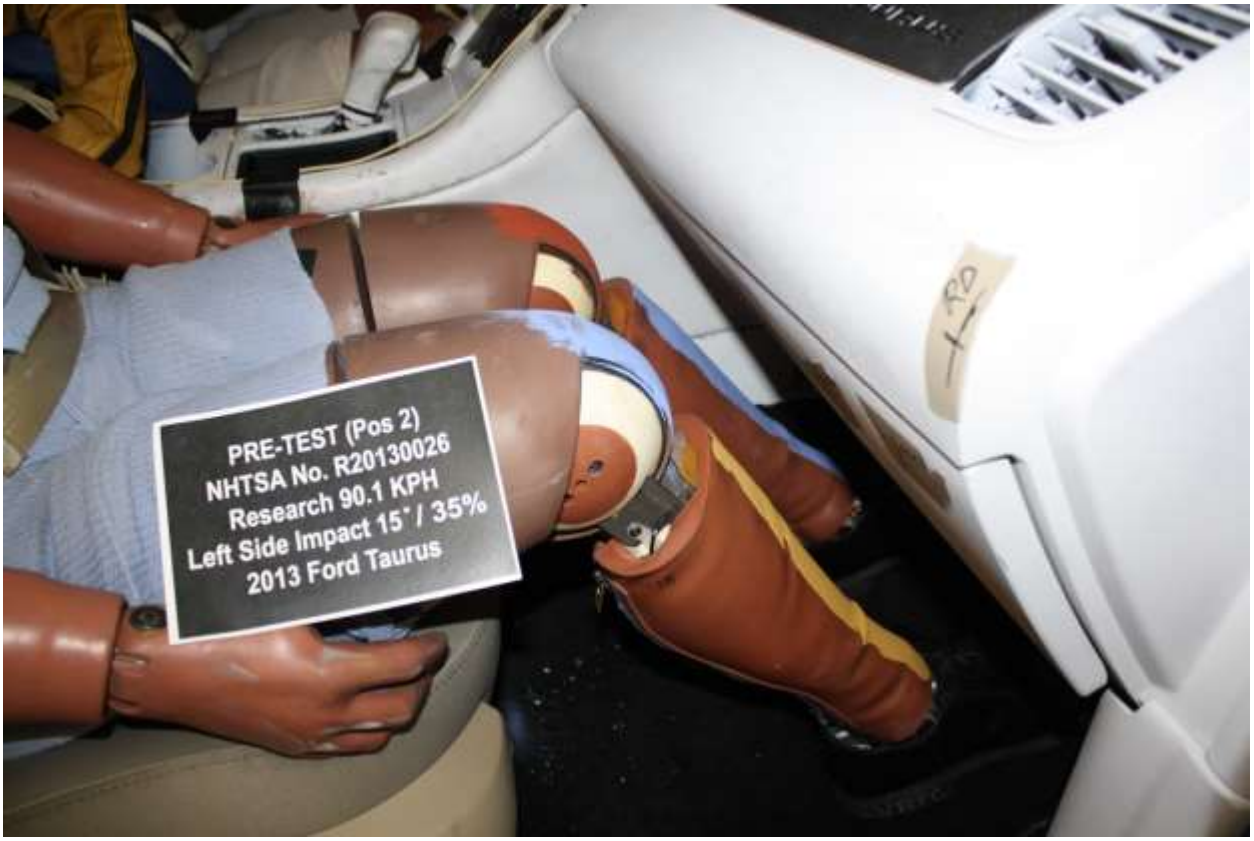


No. 110 Pre-Test Passenger Adjustable D-ring

No. 111 Post-Test Passenger Adjustable D-ring

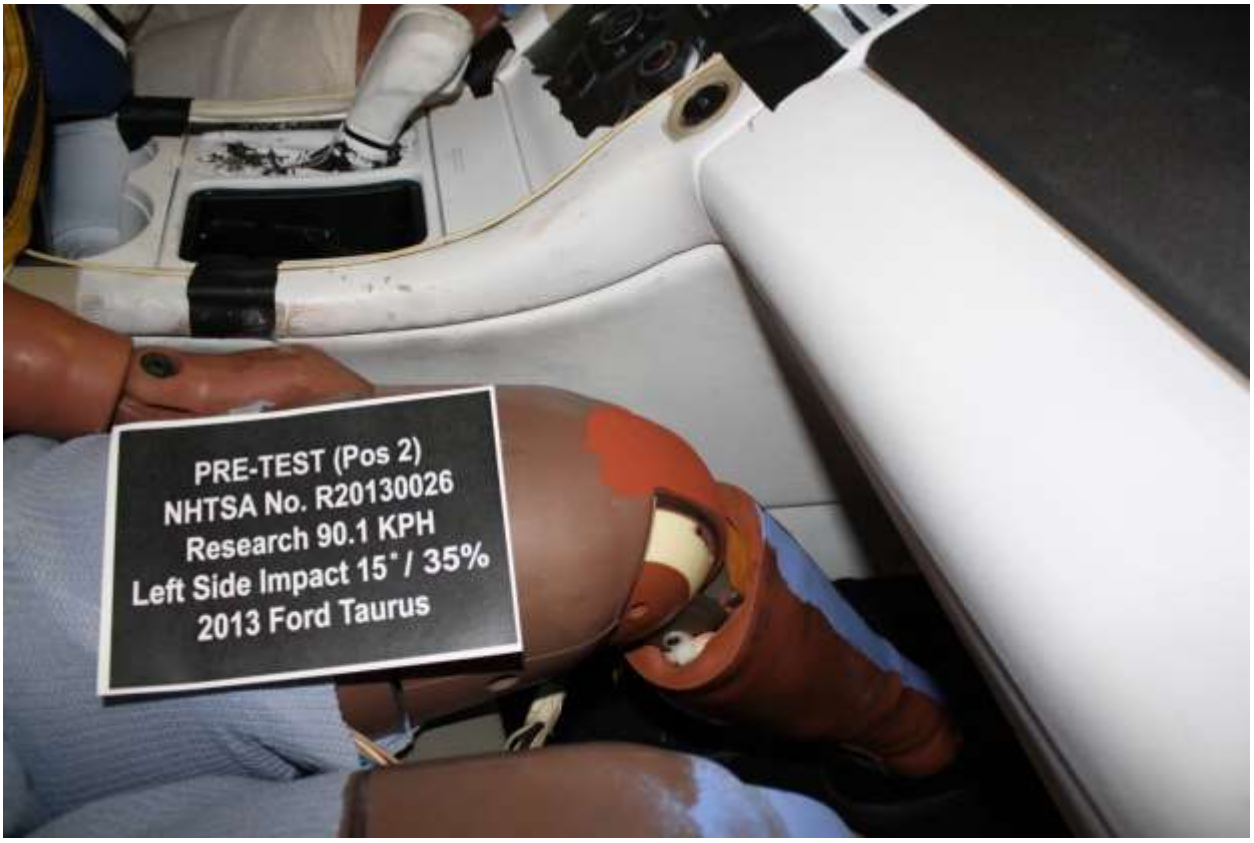
No. 112 Pre-Test View of Passenger Feet

No. 113 Post-Test View of Passenger Feet

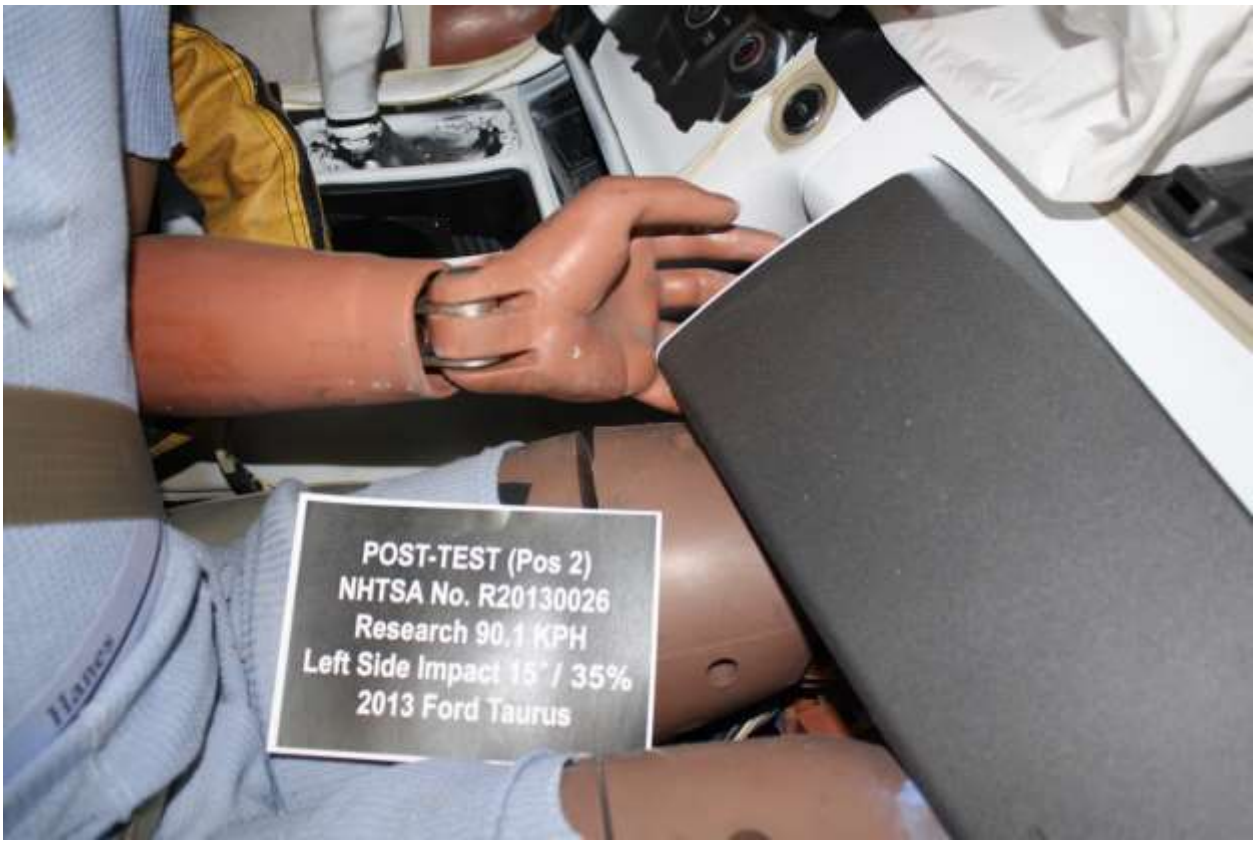


No. 114 Pre-Test View of Passenger Right Knee and Bolster

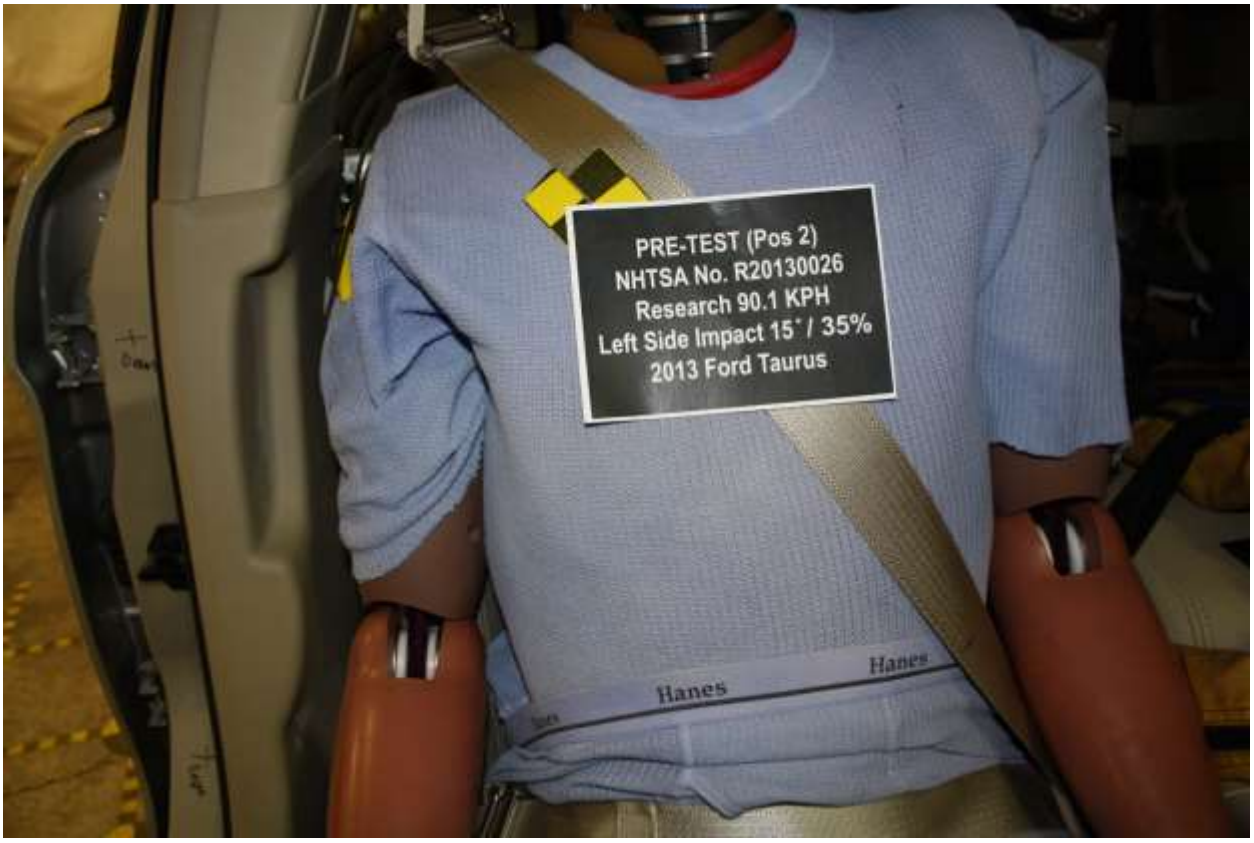
No. 115 Post-Test View of Passenger Right Knee and Bolster



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

Photo Not Applicable

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

No. 122 Post-Test Passenger Contact With Glovebox

No. 123 Pre-Test Ballast Locations

No. 124 Post-Test Speed Trap Readout

No. 125 Pre-Test View of Fuel Filler Cap

No. 126 Post-Test View of Fuel Filler Cap

No. 127 Pre-Test Engine Compartment View

No. 128 Post-Test Engine Compartment View

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

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

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

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

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

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

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

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

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

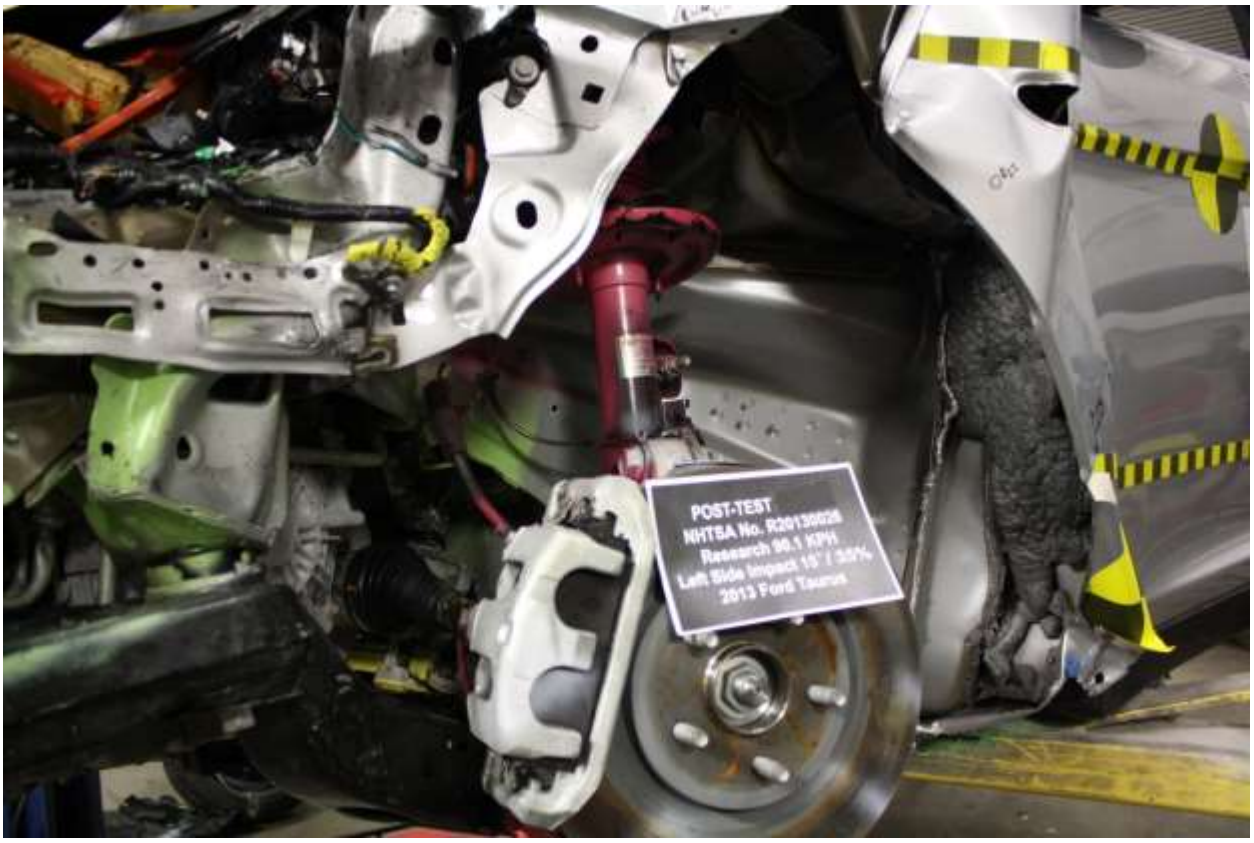
No. 138 Post-Test Bumper to Rail Attachments and Crush Initiators

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

No. 140 Pre-Test Frame Rail with tire removed

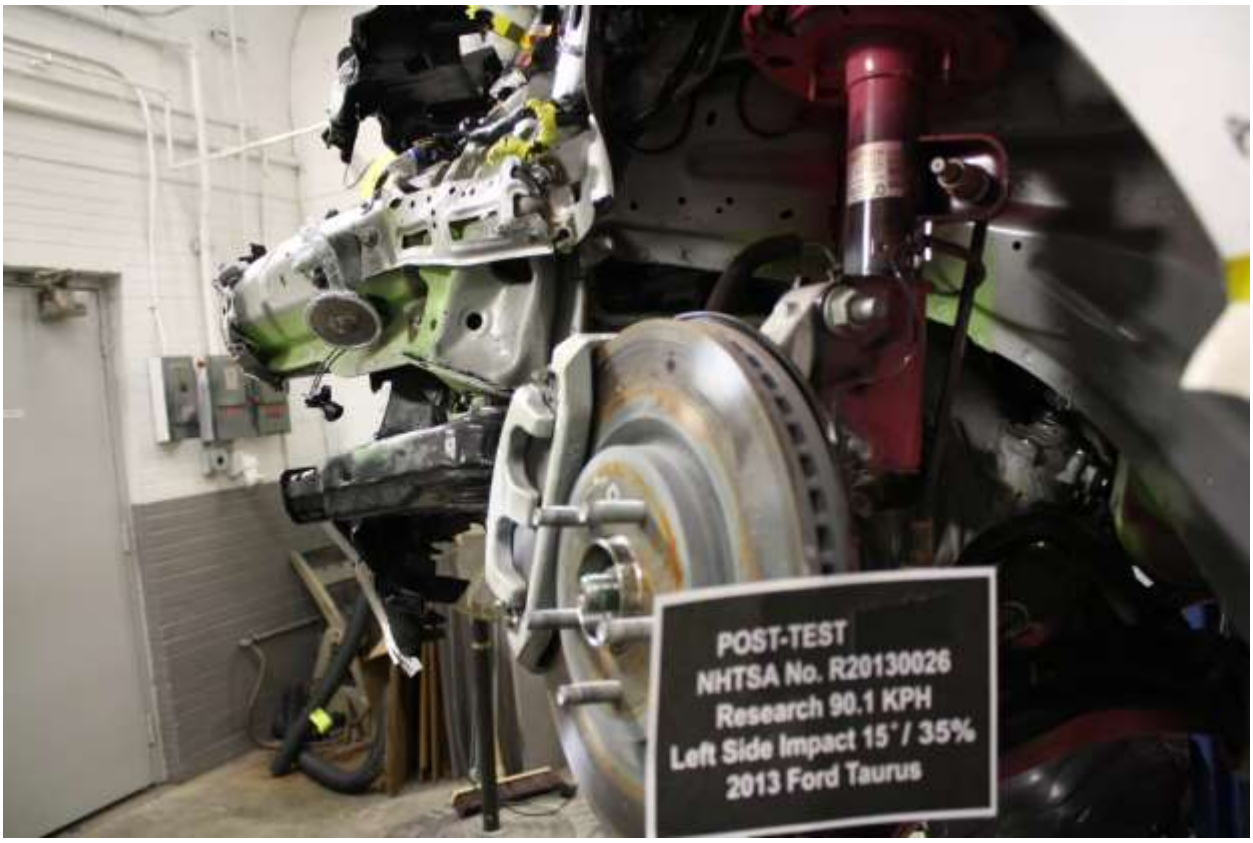
No. 141 Post-Test Frame Rail with tire removed

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



No. 143 Post-Test ¾ View of Front Driver Wheel Well w/ Tire Removed

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



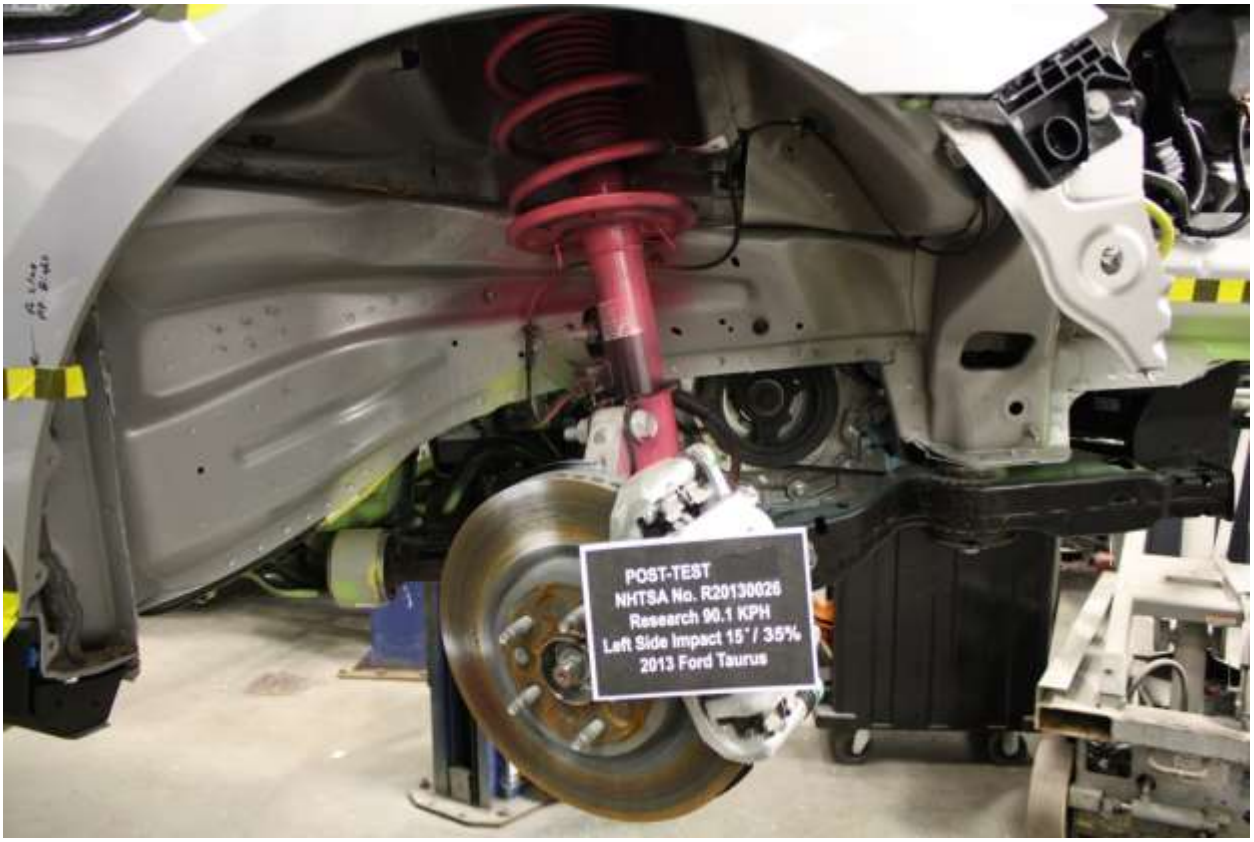
No. 145 Post-Test Right Side 3/4 Rear View of the Front Driver Wheel Well w/ Tire Removed

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

No. 147 Post-Test Right Side ¾ View of Front Driver Shotgun

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

No. 149 Post-Test ¾ View of Front Passenger Wheel Well w/ Tire Removed

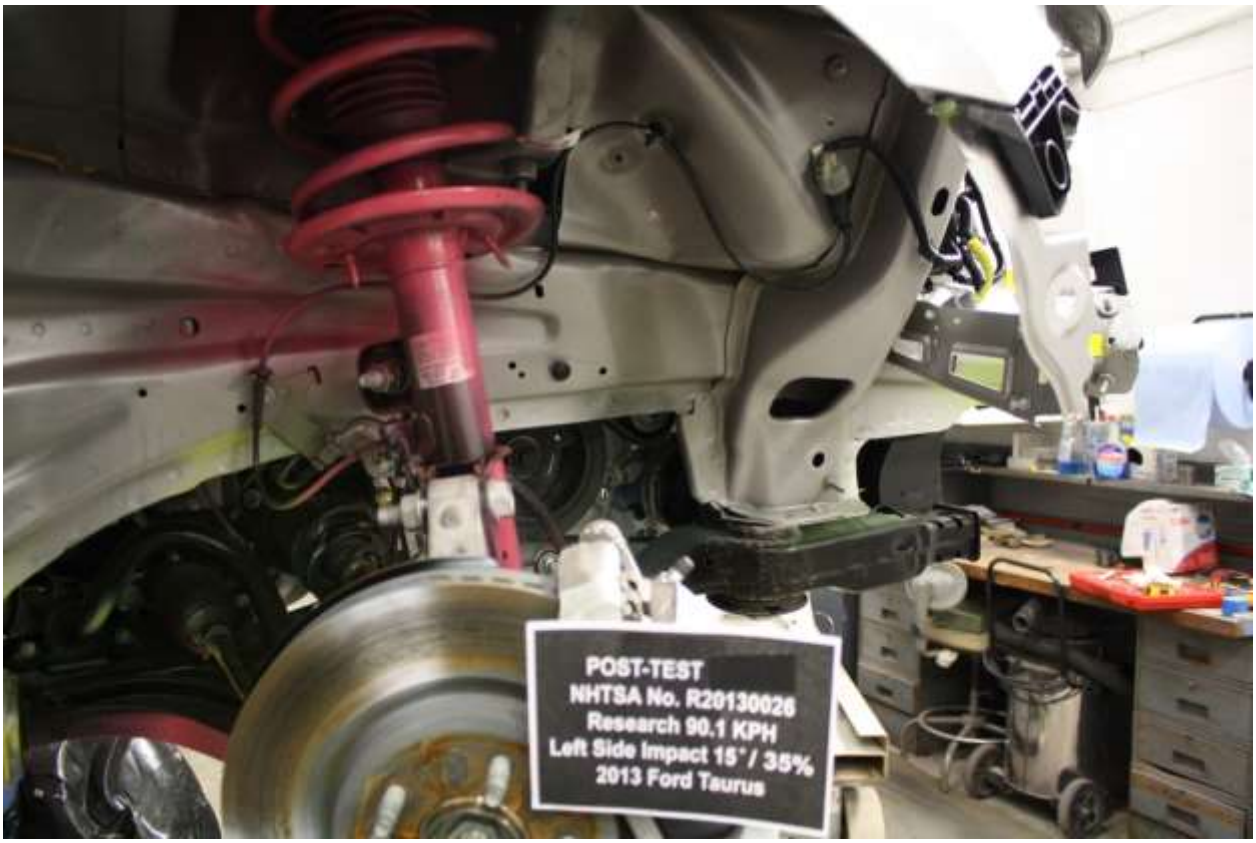


No. 150 Post-Test Side View of Front Passenger Wheel Well w/ Tire Removed

No. 151 Post-Test Right Side 3/4 Rear View of the Front Passenger Wheel Well w/ Tire Removed

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

No. 153 Post-Test Right Side ¾ View of Front Passenger Shotgun

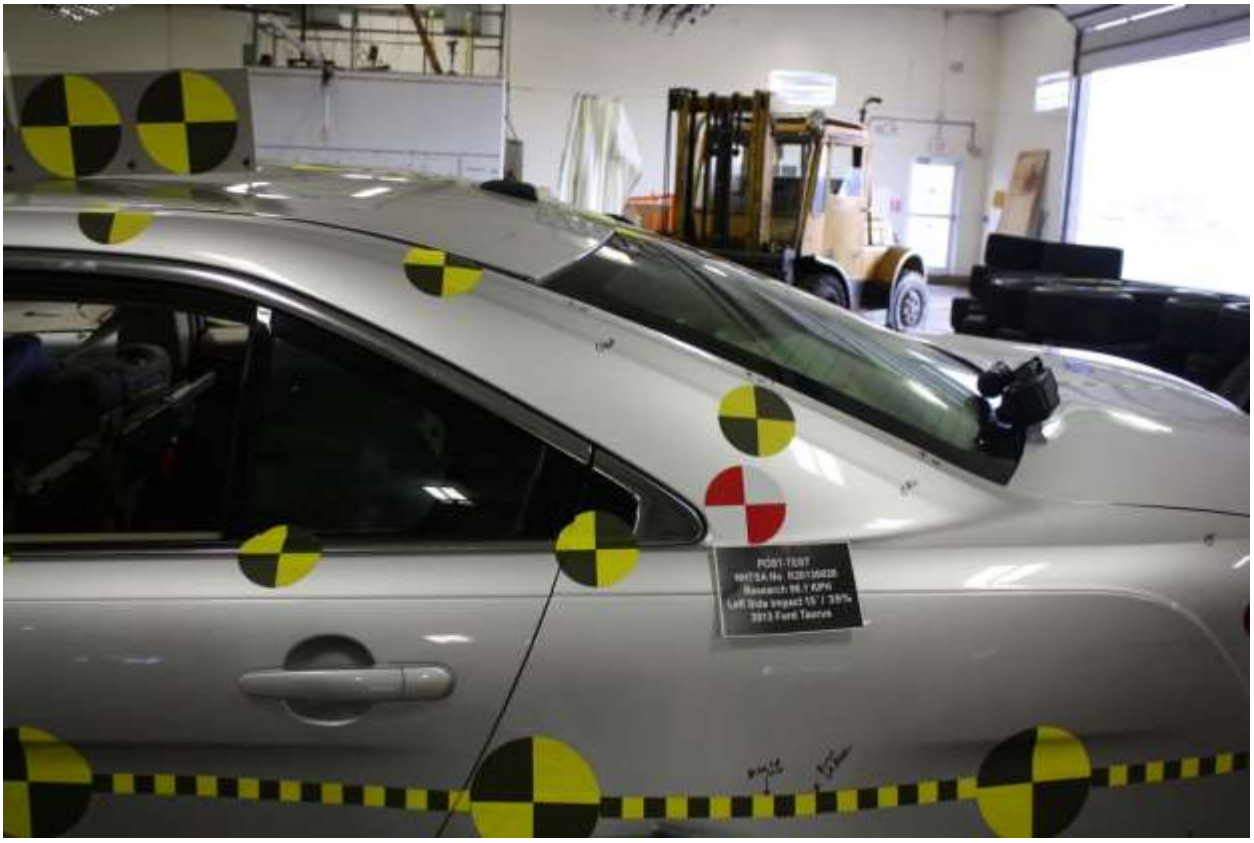


No. 154 Post-Test Front Passenger Close up View of Suspension w/ Tire Removed

No. 155 Post-Test View of Door Sill with Door Open- Struck Side

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

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

No. 161 Post-Test View of Windshield Separation

No. 162 Pre-Test Left Side View of RMDB

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

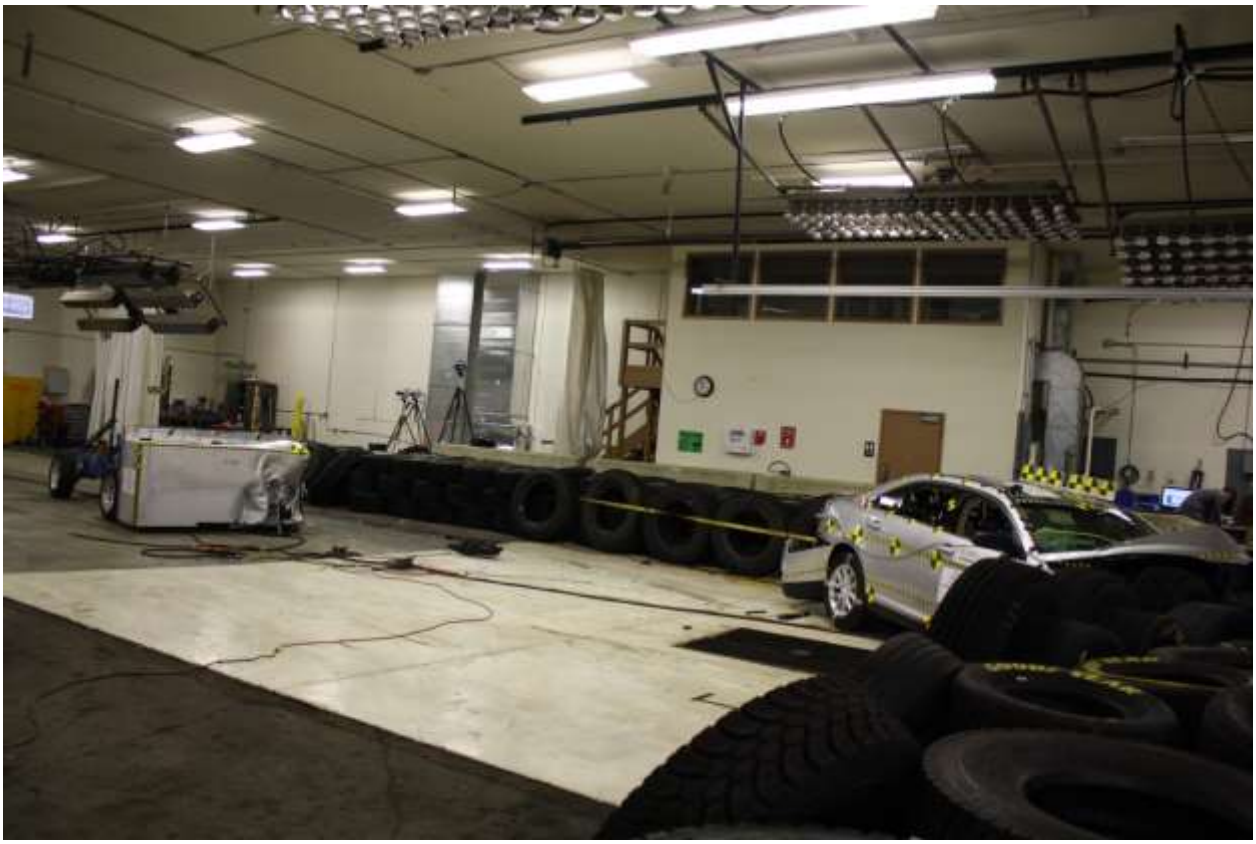
No. 166 Pre-Test Top View of RMDB

No. 167 Post-Test Top View of RMDB

No. 168 Pre-Test Front View of RMDB

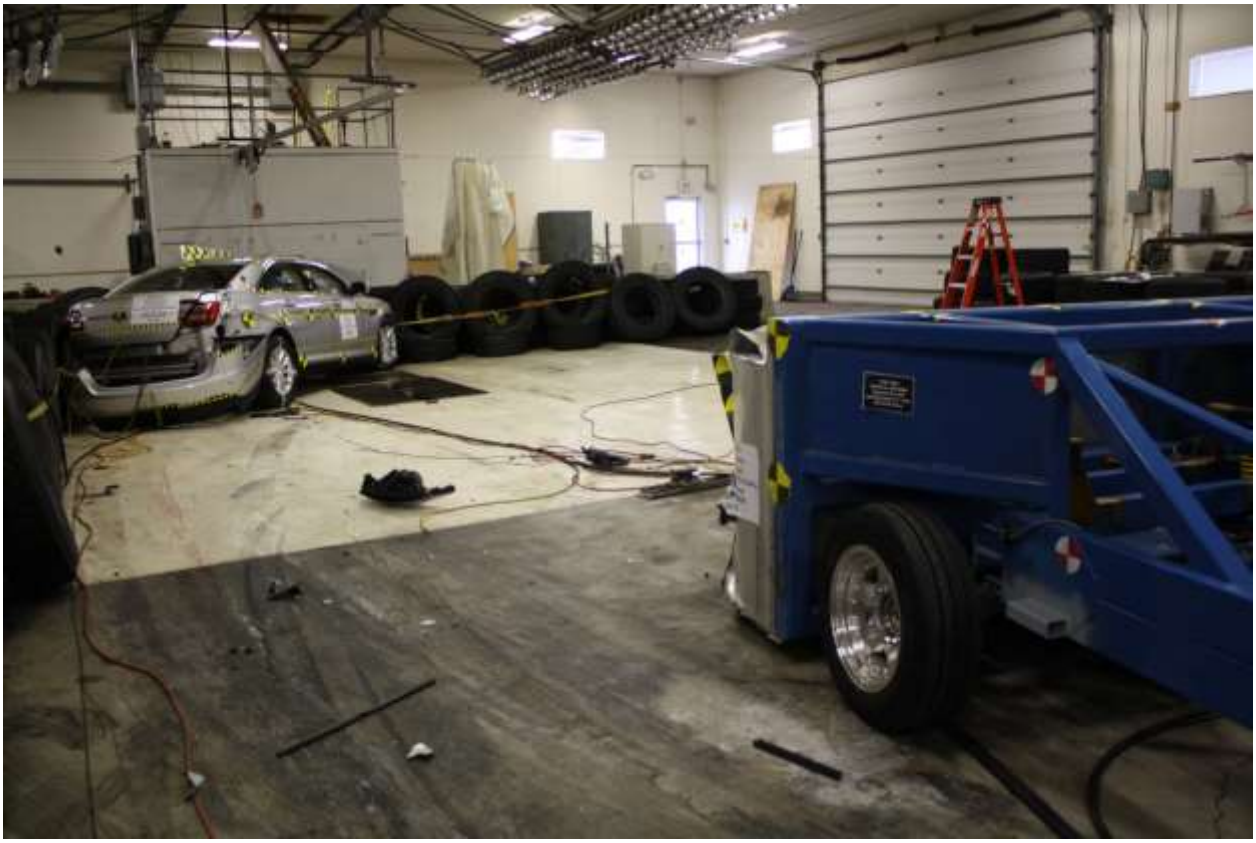
No. 169 Post-Test Front View of RMDB

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

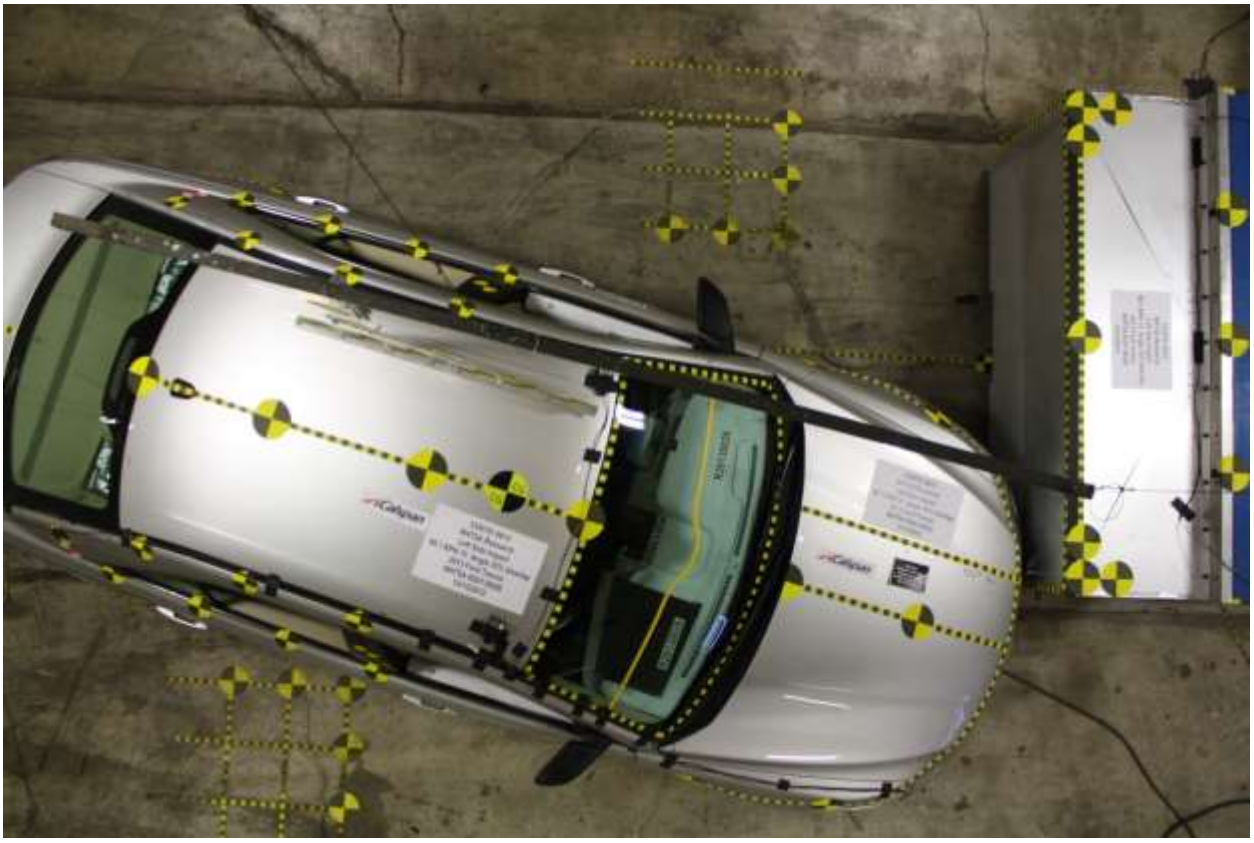


No. 171 Post-Test RMDB & Vehicle, Right Side

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



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



No. 174 Pre-Test RMDB & Vehicle, Top View

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

No. 176 Pre-Test RMDB & Vehicle, Rear View

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

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

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

No. 180 Vehicle at 0 Degrees on Static Rollover Device

No. 181 Vehicle at 90 Degrees on Static Rollover Device

No. 182 Vehicle at 180 Degrees on Static Rollover Device

No. 183 Vehicle at 270 Degrees on Static Rollover Device

No. 184 Vehicle at 360 Degrees on Static Rollover Device

No. 185 Impact Photo

APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

Table of Data Plots

No.	Description	Page
Plot 1	V2P1 HEAD CG X	B-8
Plot 2	V2P1 HEAD CG Y	B-8
Plot 3	V2P1 HEAD CG Z	B-8
Plot 4	V2P1 HEAD CG WX	B-8
Plot 5	V2P1 HEAD CG WY	B-9
Plot 6	V2P1 HEAD CG WZ	B-9
Plot 7	V2P1 NECK UPPER FX	B-9
Plot 8	V2P1 NECK UPPER FY	B-9
Plot 9	V2P1 NECK UPPER FZ	B-10
Plot 10	V2P1 NECK UPPER MX	B-10
Plot 11	V2P1 NECK UPPER MY	B-10
Plot 12	V2P1 NECK UPPER MZ	B-10
Plot 13	V2P1 NECK LOWER FX	B-11
Plot 14	V2P1 NECK LOWER FY	B-11
Plot 15	V2P1 NECK LOWER FZ	B-11
Plot 16	V2P1 NECK LOWER MX	B-11
Plot 17	V2P1 NECK LOWER MY	B-12
Plot 18	V2P1 NECK LOWER MZ	B-12
Plot 19	V2P1 NECK SPRING LOAD CELL - FRONT	B-12
Plot 20	V2P1 NECK SPRING LOAD CELL - REAR	B-12
Plot 21	V2P1 OC ANGLE RY	B-13
Plot 22	V2P1 T1 ACCEL AX	B-13
Plot 23	V2P1 T1 ACCEL AY	B-13
Plot 24	V2P1 T1 ACCEL AZ	B-13
Plot 25	V2P1 T6 ACCEL AX	B-14
Plot 26	V2P1 T6 ACCEL AY	B-14
Plot 27	V2P1 T6 ACCEL AZ	B-14
Plot 28	V2P1 UL CHEST IRTRACC D	B-14
Plot 29	V2P1 UL CHEST RY	B-15
Plot 30	V2P1 UL CHEST RZ	B-15
Plot 31	V2P1 UR CHEST IRTRACC D	B-15
Plot 32	V2P1 UR CHEST RY	B-15
Plot 33	V2P1 UR CHEST RZ	B-16
Plot 34	V2P1 LL CHEST IRTRACC D	B-16
Plot 35	V2P1 LL CHEST RY	B-16
Plot 36	V2P1 LL CHEST RZ	B-16
Plot 37	V2P1 LR CHEST IRTRACC D	B-17
Plot 38	V2P1 LR CHEST RY	B-17
Plot 39	V2P1 LR CHEST RZ	B-17
Plot 40	V2P1 ABDOMEN LEFT IRTRACC D	B-17
Plot 41	V2P1 ABDOMEN LEFT RY	B-18
Plot 42	V2P1 ABDOMEN LEFT RZ	B-18
Plot 43	V2P1 ABDOMEN RIGHT IRTRACC D	B-18
Plot 44	V2P1 ABDOMEN RIGHT RY	B-18
Plot 45	V2P1 ABDOMEN RIGHT RZ	B-19
Plot 46	V2P1 SPINE LOWER FX	B-19
Plot 47	V2P1 SPINE LOWER FY	B-19
Plot 48	V2P1 SPINE LOWER FZ	B-19
Plot 49	V2P1 SPINE LOWER MX	B-20
Plot 50	V2P1 SPINE LOWER MY	B-20
Plot 51	V2P1 PELVIS CG AX	B-20
Plot 52	V2P1 PELVIS CG AY	B-20
Plot 53	V2P1 PELVIS CG AZ	B-21
Plot 54	V2P1 PELVIS ACETABULUM LEFT FX	B-21
Plot 55	V2P1 PELVIS ACETABULUM LEFT FY	B-21
Plot 56	V2P1 PELVIS ACETABULUM LEFT FZ	B-21

Plot 57	V2P1 PELVIS ACETABULUM RIGHT FX	B-22
Plot 58	V2P1 PELVIS ACETABULUM RIGHT FY	B-22
Plot 59	V2P1 PELVIS ACETABULUM RIGHT FZ	B-22
Plot 60	V2P1 LEFT ASIS FX	B-22
Plot 61	V2P1 RIGHT ASIS FX	B-23
Plot 62	V2P1 LEFT FEMUR FX	B-23
Plot 63	V2P1 LEFT FEMUR FY	B-23
Plot 64	V2P1 LEFT FEMUR FZ	B-23
Plot 65	V2P1 LEFT FEMUR MX	B-24
Plot 66	V2P1 LEFT FEMUR MY	B-24
Plot 67	V2P1 LEFT FEMUR MZ	B-24
Plot 68	V2P1 RIGHT FEMUR FX	B-24
Plot 69	V2P1 RIGHT FEMUR FY	B-25
Plot 70	V2P1 RIGHT FEMUR FZ	B-25
Plot 71	V2P1 RIGHT FEMUR MX	B-25
Plot 72	V2P1 RIGHT FEMUR MY	B-25
Plot 73	V2P1 RIGHT FEMUR MZ	B-26
Plot 74	V2P1 KNEE LEFT DX	B-26
Plot 75	V2P1 TIBIA LEFT UPPER FZ	B-26
Plot 76	V2P1 TIBIA LEFT UPPER MX	B-26
Plot 77	V2P1 TIBIA LEFT UPPER MY	B-27
Plot 78	V2P1 TIBIA LEFT LOWER FZ	B-27
Plot 79	V2P1 TIBIA LEFT LOWER MX	B-27
Plot 80	V2P1 TIBIA LEFT LOWER MY	B-27
Plot 81	V2P1 ANKLE LEFT POT RX	B-28
Plot 82	V2P1 ANKLE LEFT POT RY	B-28
Plot 83	V2P1 FOOT LEFT AZ	B-28
Plot 84	V2P1 KNEE RIGHT DX	B-28
Plot 85	V2P1 TIBIA RIGHT UPPER FZ	B-29
Plot 86	V2P1 TIBIA RIGHT UPPER MX	B-29
Plot 87	V2P1 TIBIA RIGHT UPPER MY	B-29
Plot 88	V2P1 TIBIA RIGHT LOWER FZ	B-29
Plot 89	V2P1 TIBIA RIGHT LOWER MX	B-30
Plot 90	V2P1 TIBIA RIGHT LOWER MY	B-30
Plot 91	V2P1 ANKLE RIGHT POT RX	B-30
Plot 92	V2P1 ANKLE RIGHT POT RY	B-30
Plot 93	V2P1 FOOT RIGHT AZ	B-31
Plot 94	V2 P1 DRIVER LAP BELT	B-31
Plot 95	V2 P1 DRIVER SHOULDER BELT	B-31
Plot 96	V2P2 HEAD CG X	B-31
Plot 97	V2P2 HEAD CG Y	B-32
Plot 98	V2P2 HEAD CG Z	B-32
Plot 99	V2P2 HEAD CG WX	B-32
Plot 100	V2P2 HEAD CG WY	B-32
Plot 101	V2P2 HEAD CG WZ	B-33
Plot 102	V2P2 NECK UPPER FX	B-33
Plot 103	V2P2 NECK UPPER FY	B-33
Plot 104	V2P2 NECK UPPER FZ	B-33
Plot 105	V2P2 NECK UPPER MX	B-34
Plot 106	V2P2 NECK UPPER MY	B-34
Plot 107	V2P2 NECK UPPER MZ	B-34
Plot 108	V2P2 NECK LOWER FX	B-34
Plot 109	V2P2 NECK LOWER FY	B-35
Plot 110	V2P2 NECK LOWER FZ	B-35
Plot 111	V2P2 NECK LOWER MX	B-35
Plot 112	V2P2 NECK LOWER MY	B-35
Plot 113	V2P2 NECK LOWER MZ	B-36
Plot 114	V2P2 NECK SPRING LOAD CELL - FRONT	B-36

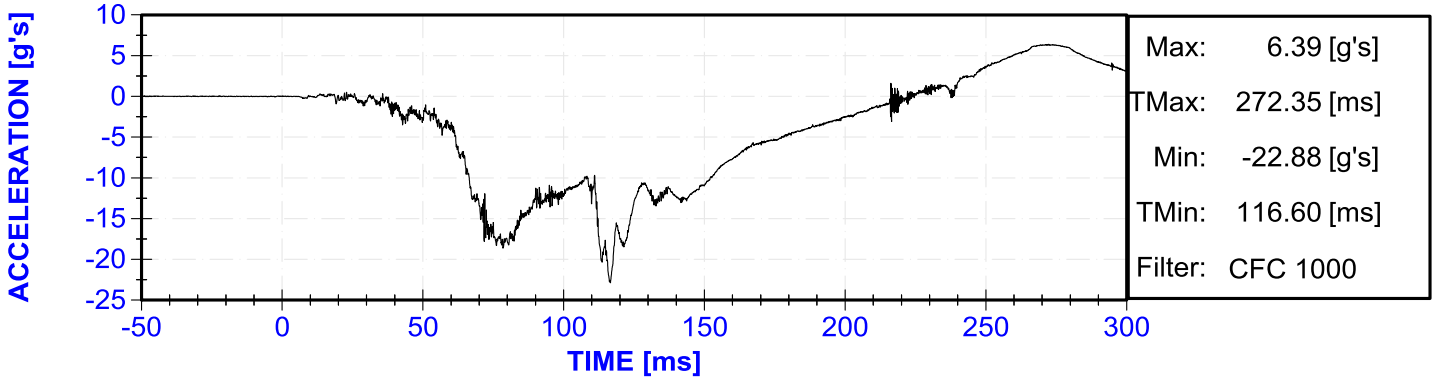
Plot 115	V2P2 NECK SPRING LOAD CELL - REAR	B-36
Plot 116	V2P2 OC ANGLE RY	B-36
Plot 117	V2P2 T1 ACCEL AX	B-37
Plot 118	V2P2 T1 ACCEL AY	B-37
Plot 119	V2P2 T1 ACCEL AZ	B-37
Plot 120	V2P2 T6 ACCEL AX	B-37
Plot 121	V2P2 T6 ACCEL AY	B-38
Plot 122	V2P2 T6 ACCEL AZ	B-38
Plot 123	V2P2 UL CHEST IRTRACC D	B-38
Plot 124	V2P2 UL CHEST RY	B-38
Plot 125	V2P2 UL CHEST RZ	B-39
Plot 126	V2P2 UR CHEST IRTRACC D	B-39
Plot 127	V2P2 UR CHEST RY	B-39
Plot 128	V2P2 UR CHEST RZ	B-39
Plot 129	V2P2 LL CHEST IRTRACC D	B-40
Plot 130	V2P2 LL CHEST RY	B-40
Plot 131	V2P2 LL CHEST RZ	B-40
Plot 132	V2P2 LR CHEST IRTRACC D	B-40
Plot 133	V2P2 LR CHEST RY	B-41
Plot 134	V2P2 LR CHEST RZ	B-41
Plot 135	V2P2 ABDOMEN LEFT IRTRACC D	B-41
Plot 136	V2P2 ABDOMEN LEFT RY	B-41
Plot 137	V2P2 ABDOMEN LEFT RZ	B-42
Plot 138	V2P2 ABDOMEN RIGHT IRTRACC D	B-42
Plot 139	V2P2 ABDOMEN RIGHT RY	B-42
Plot 140	V2P2 ABDOMEN RIGHT RZ	B-42
Plot 141	V2P2 SPINE LOWER FX	B-43
Plot 142	V2P2 SPINE LOWER FY	B-43
Plot 143	V2P2 SPINE LOWER FZ	B-43
Plot 144	V2P2 SPINE LOWER MX	B-43
Plot 145	V2P2 SPINE LOWER MY	B-44
Plot 146	V2P2 PELVIS CG AX	B-44
Plot 147	V2P2 PELVIS CG AY	B-44
Plot 148	V2P2 PELVIS CG AZ	B-44
Plot 149	V2P2 PELVIS ACETABULUM LEFT FX	B-45
Plot 150	V2P2 PELVIS ACETABULUM LEFT FY	B-45
Plot 151	V2P2 PELVIS ACETABULUM LEFT FZ	B-45
Plot 152	V2P2 PELVIS ACETABULUM RIGHT FX	B-45
Plot 153	V2P2 PELVIS ACETABULUM RIGHT FY	B-46
Plot 154	V2P2 PELVIS ACETABULUM RIGHT FZ	B-46
Plot 155	V2P2 LEFT ASIS FX	B-46
Plot 156	V2P2 RIGHT ASIS FX	B-46
Plot 157	V2P2 LEFT FEMUR FX	B-47
Plot 158	V2P2 LEFT FEMUR FY	B-47
Plot 159	V2P2 LEFT FEMUR FZ	B-47
Plot 160	V2P2 LEFT FEMUR MX	B-47
Plot 161	V2P2 LEFT FEMUR MY	B-48
Plot 162	V2P2 LEFT FEMUR MZ	B-48
Plot 163	V2P2 RIGHT FEMUR FX	B-48
Plot 164	V2P2 RIGHT FEMUR FY	B-48
Plot 165	V2P2 RIGHT FEMUR FZ	B-49
Plot 166	V2P2 RIGHT FEMUR MX	B-49
Plot 167	V2P2 RIGHT FEMUR MY	B-49
Plot 168	V2P2 RIGHT FEMUR MZ	B-49
Plot 169	V2P2 KNEE LEFT DX	B-50
Plot 170	V2P2 TIBIA LEFT UPPER FZ	B-50
Plot 171	V2P2 TIBIA LEFT UPPER MX	B-50
Plot 172	V2P2 TIBIA LEFT UPPER MY	B-50

Plot 173	V2P2 TIBIA LEFT LOWER FZ	B-51
Plot 174	V2P2 TIBIA LEFT LOWER MX	B-51
Plot 175	V2P2 TIBIA LEFT LOWER MY	B-51
Plot 176	V2P2 ANKLE LEFT POT RX	B-51
Plot 177	V2P2 ANKLE LEFT POT RY	B-52
Plot 178	V2P2 FOOT LEFT AZ	B-52
Plot 179	V2P2 KNEE RIGHT DX	B-52
Plot 180	V2P2 TIBIA RIGHT UPPER FZ	B-52
Plot 181	V2P2 TIBIA RIGHT UPPER MX	B-53
Plot 182	V2P2 TIBIA RIGHT UPPER MY	B-53
Plot 183	V2P2 TIBIA RIGHT LOWER FZ	B-53
Plot 184	V2P2 TIBIA RIGHT LOWER MX	B-53
Plot 185	V2P2 TIBIA RIGHT LOWER MY	B-54
Plot 186	V2P2 ANKLE RIGHT POT RX	B-54
Plot 187	V2P2 ANKLE RIGHT POT RY	B-54
Plot 188	V2P2 FOOT RIGHT AZ	B-54
Plot 189	V2 P2 PASSENGER LAP BELT	B-55
Plot 190	V2 P2 PASSENGER SHOULDER BELT	B-55
Plot 191	V2 LEFT REAR SILL X	B-55
Plot 192	V2 LEFT REAR SILL Y	B-55
Plot 193	V2 LEFT REAR SILL RX	B-56
Plot 194	V2 LEFT REAR SILL RY	B-56
Plot 195	V2 RIGHT REAR SILL X	B-56
Plot 196	V2 RIGHT REAR SILL Y	B-56
Plot 197	V2 VEHICLE CG X	B-57
Plot 198	V2 VEHICLE CG Y	B-57
Plot 199	V2 VEHICLE CG Z	B-57
Plot 200	V2 VEHICLE CG RX	B-57
Plot 201	V2 VEHICLE CG RY	B-58
Plot 202	V2 VEHICLE CG RZ	B-58
Plot 203	V2 INSTRUMENT PANEL X	B-58
Plot 204	V2 DRIVER SEAT TRACK X	B-58
Plot 205	V2 DRIVER SEAT TRACK Y	B-59
Plot 206	V2 DRIVER SEAT TRACK Z	B-59
Plot 207	V2 PASSENGER SEAT TRACK X	B-59
Plot 208	V2 PASSENGER SEAT TRACK Y	B-59
Plot 209	V2 PASSENGER SEAT TRACK Z	B-60
Plot 210	V2 DRIVER FLOOR PAN X	B-60
Plot 211	V2 DRIVER FLOOR PAN Y	B-60
Plot 212	V2 DRIVER FLOOR PAN Z	B-60
Plot 213	V2 DRIVER FLOOR PAN STRING POT	B-61
Plot 214	V2 DRIVER SW AIRBAG STAGE 1	B-61
Plot 215	V2 DRIVER SW AIRBAG STAGE 2	B-61
Plot 216	V2 DRIVER HEAD CURTAIN	B-61
Plot 217	V2 DRIVER SEAT HEAD/TORSO/PELVIS	B-62
Plot 218	V2 DRIVER KNEE	B-62
Plot 219	V2 DRIVER TORSO BELT PRETENSIONER	B-62
Plot 220	V2 PASSENGER FRT AIRBAG STAGE 1	B-62
Plot 221	V2 PASSENGER FRT AIRBAG STAGE 2	B-63
Plot 222	V2 PASSENGER HEAD CURTAIN	B-63
Plot 223	V2 PASSENGER HEAD/TORSO/PELVIS	B-63
Plot 224	V2 PASSENGER KNEE	B-63
Plot 225	V2 PASSENGER TORSO BELT PRETENSIONER	B-64
Plot 226	V1 CG AX	B-64
Plot 227	V1 CG AY	B-64
Plot 228	V1 CG AZ	B-64
Plot 229	V1 REAR C/L AX	B-65
Plot 230	V1 REAR C/L AY	B-65

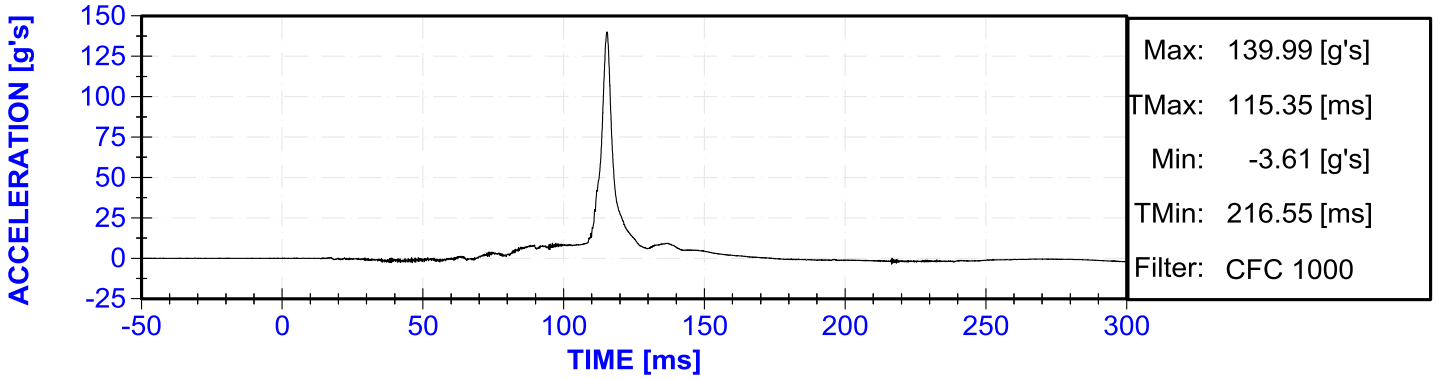
Plot 231	V1 REAR C/L AZ	B-65
Plot 232	V2P1 NECK OCCIPITAL CONDYLE FORCE X [THORTEST]	B-65
Plot 233	V2P1 NECK OCCIPITAL CONDYLE FORCE Z [THORTEST]	B-66
Plot 234	V2P1 NECK OCCIPITAL CONDYLE MY [THORTEST]	B-66
Plot 235	V2P1 NECK UPPER FORCE X [THORTEST]	B-66
Plot 236	V2P1 NECK UPPER FORCE Y [THORTEST]	B-66
Plot 237	V2P1 NECK UPPER FORCE Z [THORTEST]	B-67
Plot 238	V2P1 NECK UPPER MOMENT X [THORTEST]	B-67
Plot 239	V2P1 NECK UPPER MOMENT Y [THORTEST]	B-67
Plot 240	V2P1 NECK UPPER MOMENT Z [THORTEST]	B-67
Plot 241	V2P1 CHEST UPPER LEFT X [CFC_180]	B-68
Plot 242	V2P1 CHEST UPPER LEFT Y [CFC_180]	B-68
Plot 243	V2P1 CHEST UPPER LEFT Z [CFC_180]	B-68
Plot 244	V2P1 CHEST UPPER LEFT D [CFC_180]	B-68
Plot 245	V2P1 CHEST UPPER RIGHT X [CFC_180]	B-69
Plot 246	V2P1 CHEST UPPER RIGHT Y [CFC_180]	B-69
Plot 247	V2P1 CHEST UPPER RIGHT Z [CFC_180]	B-69
Plot 248	V2P1 CHEST UPPER RIGHT D [CFC_180]	B-69
Plot 249	V2P1 CHEST LOWER LEFT X [CFC_180]	B-70
Plot 250	V2P1 CHEST LOWER LEFT Y [CFC_180]	B-70
Plot 251	V2P1 CHEST LOWER LEFT Z [CFC_180]	B-70
Plot 252	V2P1 CHEST LOWER LEFT D [CFC_180]	B-70
Plot 253	V2P1 CHEST LOWER RIGHT X [CFC_180]	B-71
Plot 254	V2P1 CHEST LOWER RIGHT Y [CFC_180]	B-71
Plot 255	V2P1 CHEST LOWER RIGHT Z [CFC_180]	B-71
Plot 256	V2P1 CHEST LOWER RIGHT D [CFC_180]	B-71
Plot 257	V2P1 ABDOMEN LEFT LOWER X [CFC_180]	B-72
Plot 258	V2P1 ABDOMEN LEFT LOWER Y [CFC_180]	B-72
Plot 259	V2P1 ABDOMEN LEFT LOWER Z [CFC_180]	B-72
Plot 260	V2P1 ABDOMEN LEFT LOWER D [CFC_180]	B-72
Plot 261	V2P1 ABDOMEN RIGHT LOWER X [CFC_180]	B-73
Plot 262	V2P1 ABDOMEN RIGHT LOWER Y [CFC_180]	B-73
Plot 263	V2P1 ABDOMEN RIGHT LOWER Z [CFC_180]	B-73
Plot 264	V2P1 ABDOMEN RIGHT LOWER D [CFC_180]	B-73
Plot 265	V2P2 NECK OCCIPITAL CONDYLE FORCE X [THORTEST]	B-74
Plot 266	V2P2 NECK OCCIPITAL CONDYLE FORCE Z [THORTEST]	B-74
Plot 267	V2P2 NECK OCCIPITAL CONDYLE MY [THORTEST]	B-74
Plot 268	V2P2 NECK UPPER FORCE X [THORTEST]	B-74
Plot 269	V2P2 NECK UPPER FORCE Y [THORTEST]	B-75
Plot 270	V2P2 NECK UPPER FORCE Z [THORTEST]	B-75
Plot 271	V2P2 NECK UPPER MOMENT X [THORTEST]	B-75
Plot 272	V2P2 NECK UPPER MOMENT Y [THORTEST]	B-75
Plot 273	V2P2 NECK UPPER MOMENT Z [THORTEST]	B-76
Plot 274	V2P2 CHEST UPPER LEFT X [CFC_180]	B-76
Plot 275	V2P2 CHEST UPPER LEFT Y [CFC_180]	B-76
Plot 276	V2P2 CHEST UPPER LEFT Z [CFC_180]	B-76
Plot 277	V2P2 CHEST UPPER LEFT D [CFC_180]	B-77
Plot 278	V2P2 CHEST UPPER RIGHT X [CFC_180]	B-77
Plot 279	V2P2 CHEST UPPER RIGHT Y [CFC_180]	B-77
Plot 280	V2P2 CHEST UPPER RIGHT Z [CFC_180]	B-77
Plot 281	V2P2 CHEST UPPER RIGHT D [CFC_180]	B-78
Plot 282	V2P2 CHEST LOWER LEFT X [CFC_180]	B-78
Plot 283	V2P2 CHEST LOWER LEFT Y [CFC_180]	B-78
Plot 284	V2P2 CHEST LOWER LEFT Z [CFC_180]	B-78
Plot 285	V2P2 CHEST LOWER LEFT D [CFC_180]	B-79
Plot 286	V2P2 CHEST LOWER RIGHT X [CFC_180]	B-79
Plot 287	V2P2 CHEST LOWER RIGHT Y [CFC_180]	B-79
Plot 288	V2P2 CHEST LOWER RIGHT Z [CFC_180]	B-79

Plot 289	V2P2 CHEST LOWER RIGHT D [CFC_180]	B-80
Plot 290	V2P2 ABDOMEN LEFT LOWER X [CFC_180]	B-80
Plot 291	V2P2 ABDOMEN LEFT LOWER Y [CFC_180]	B-80
Plot 292	V2P2 ABDOMEN LEFT LOWER Z [CFC_180]	B-80
Plot 293	V2P2 ABDOMEN LEFT LOWER D [CFC_180]	B-81
Plot 294	V2P2 ABDOMEN RIGHT LOWER X [CFC_180]	B-81
Plot 295	V2P2 ABDOMEN RIGHT LOWER Y [CFC_180]	B-81
Plot 296	V2P2 ABDOMEN RIGHT LOWER Z [CFC_180]	B-81
Plot 297	V2P2 ABDOMEN RIGHT LOWER D [CFC_180]	B-82

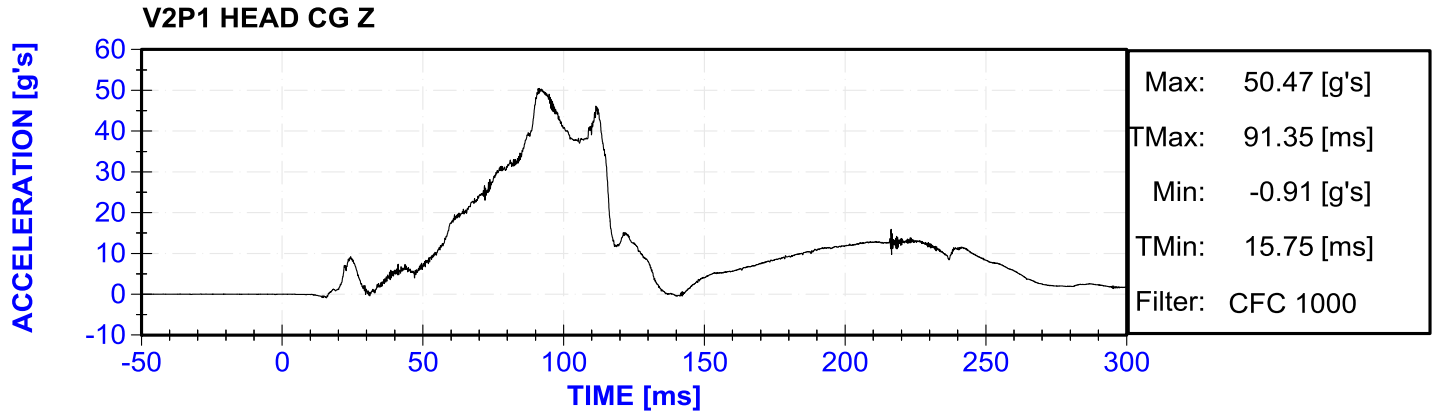
V2P1 HEAD CG X



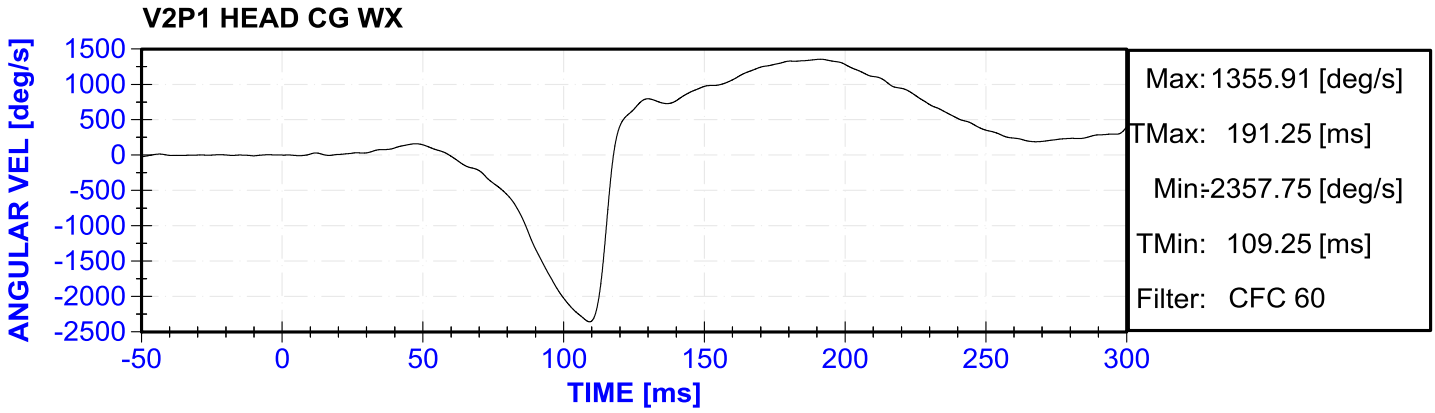
V2P1 HEAD CG Y



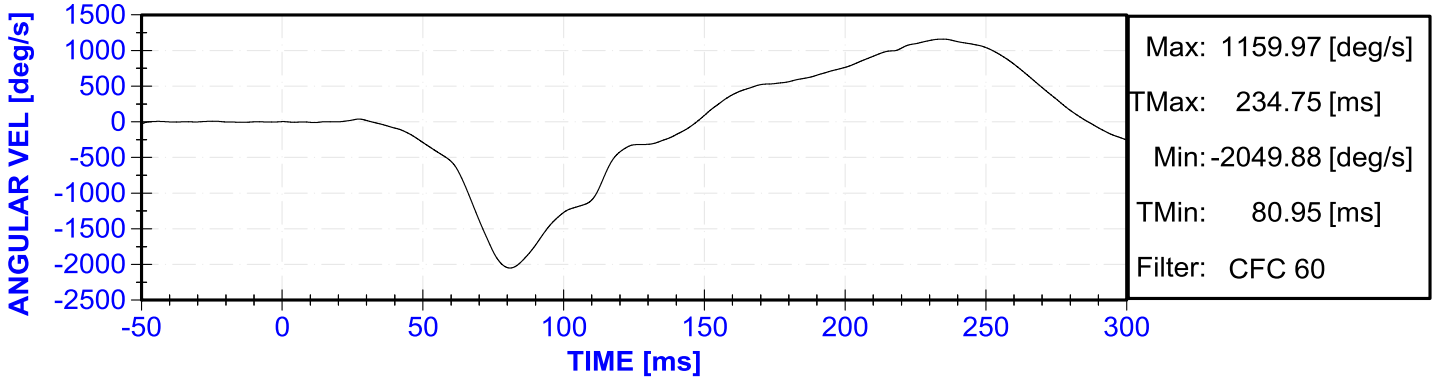
V2P1 HEAD CG Z



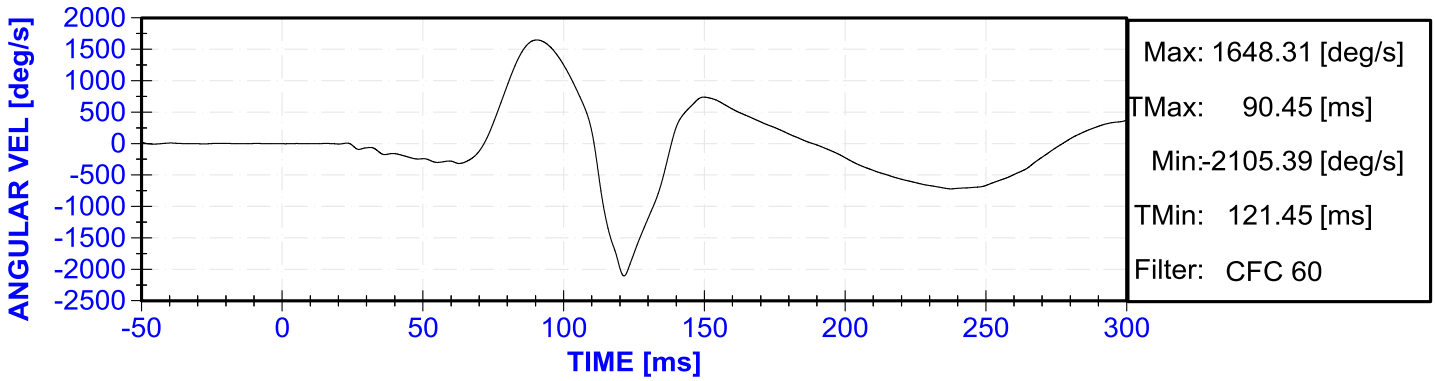
V2P1 HEAD CG WX



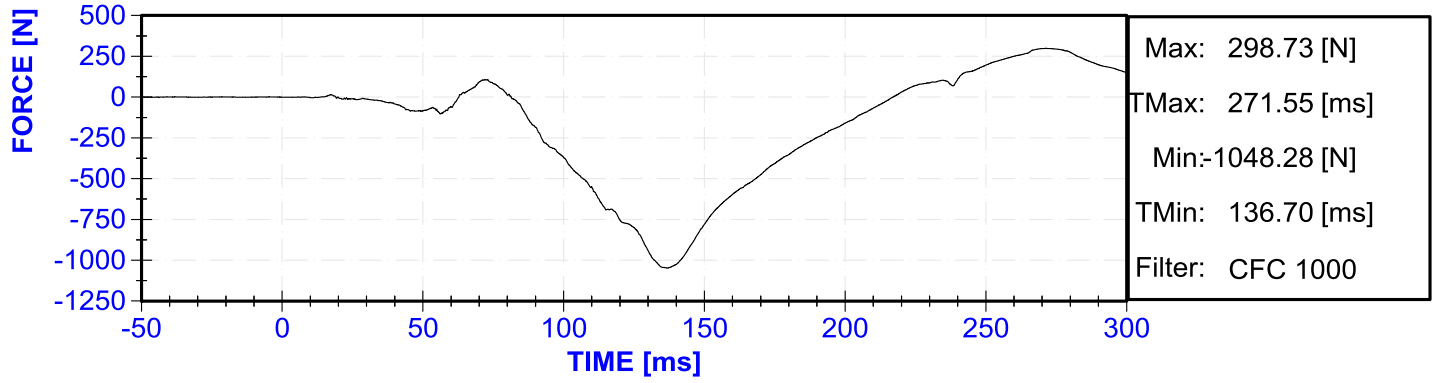
V2P1 HEAD CG WY



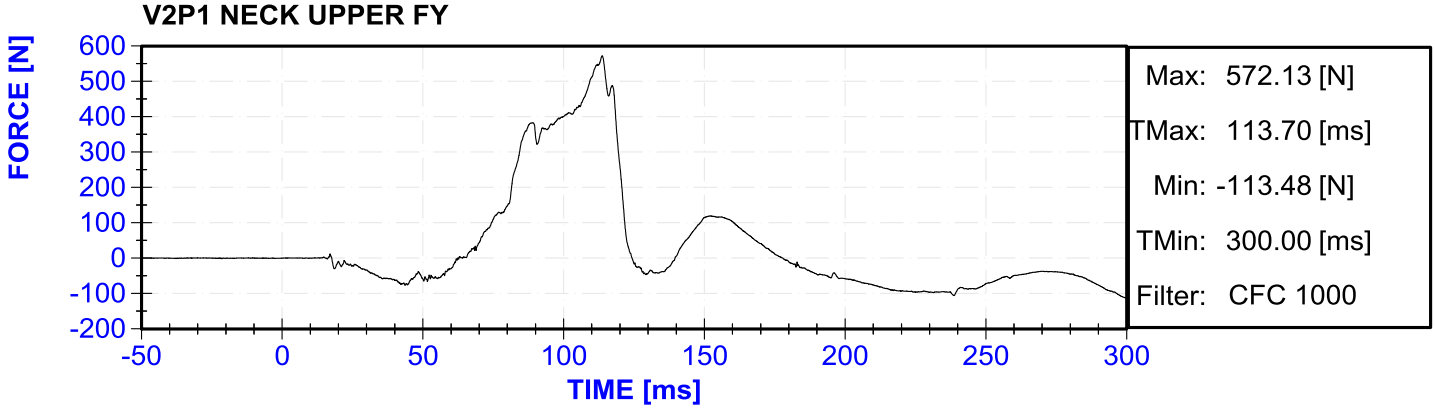
V2P1 HEAD CG WZ



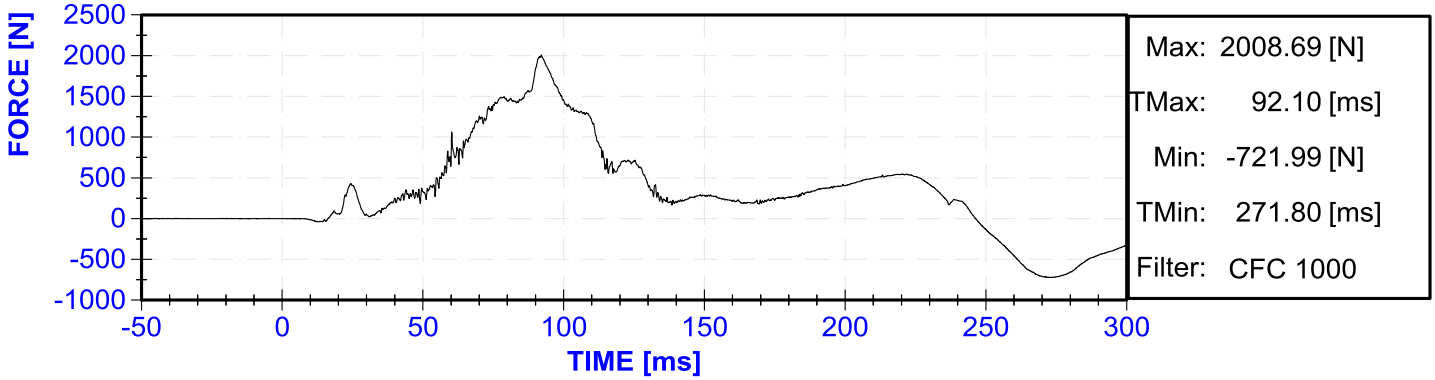
V2P1 NECK UPPER FX



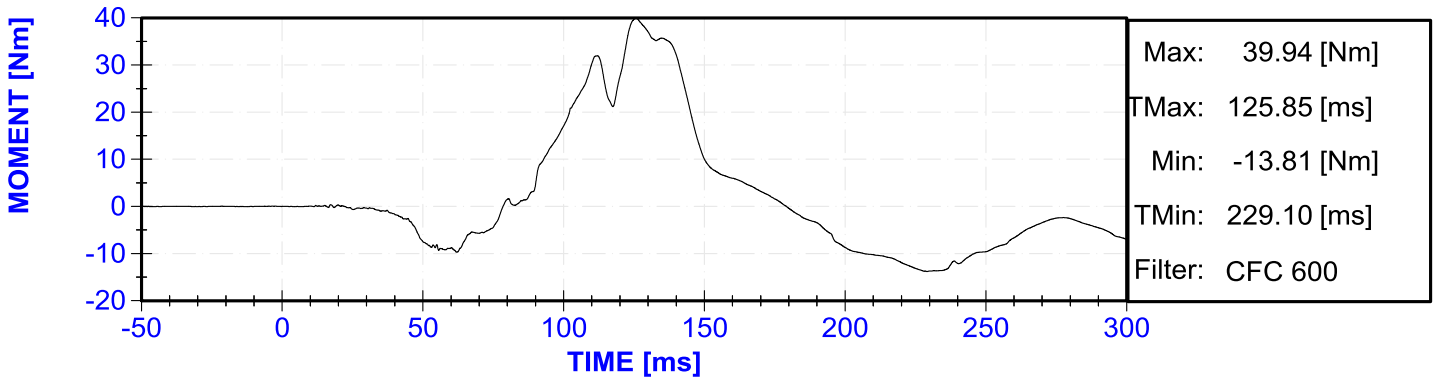
V2P1 NECK UPPER FY



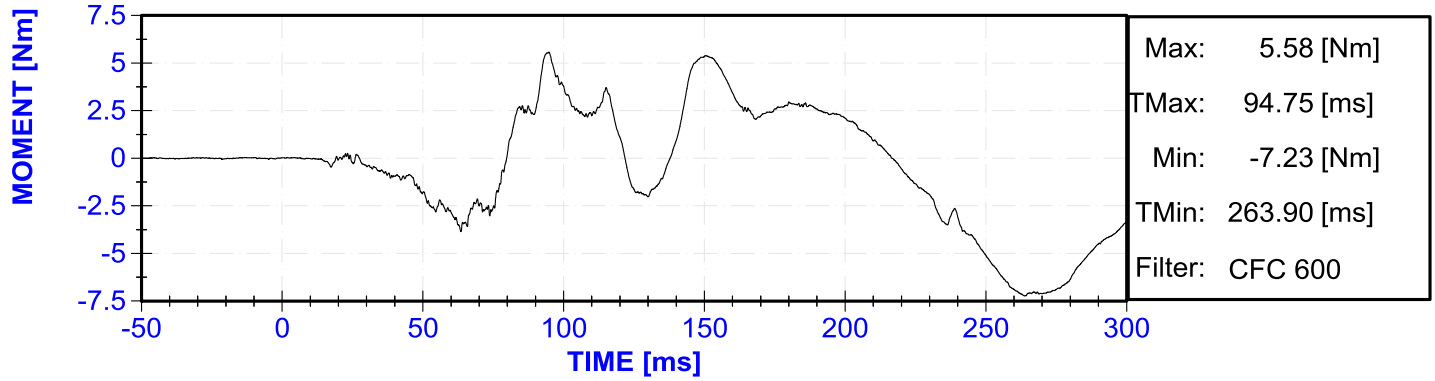
V2P1 NECK UPPER FZ



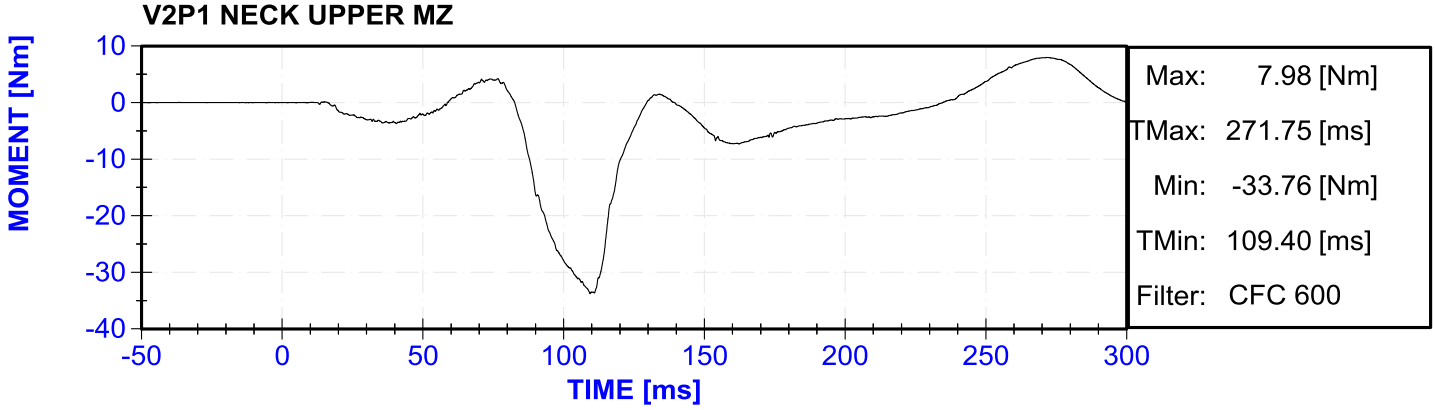
V2P1 NECK UPPER MX



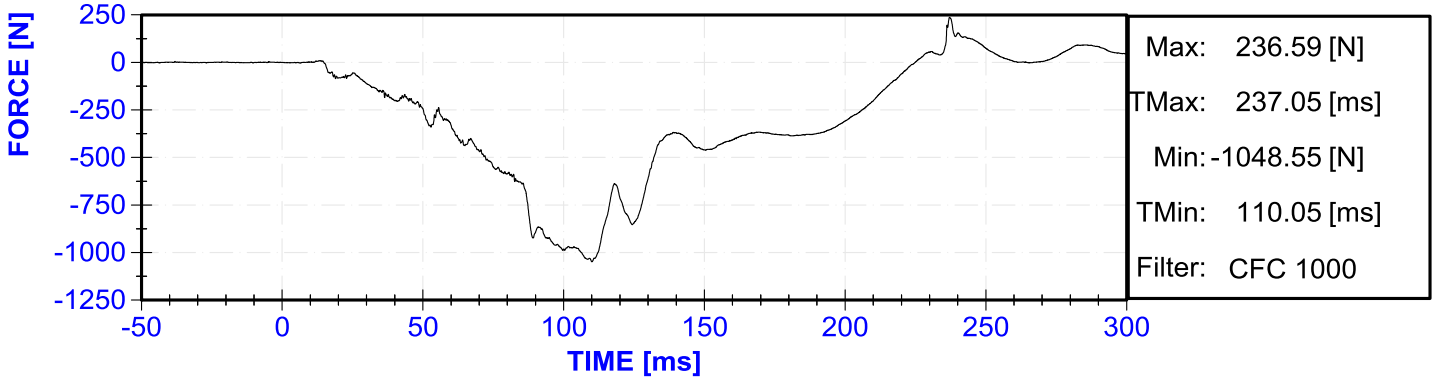
V2P1 NECK UPPER MY



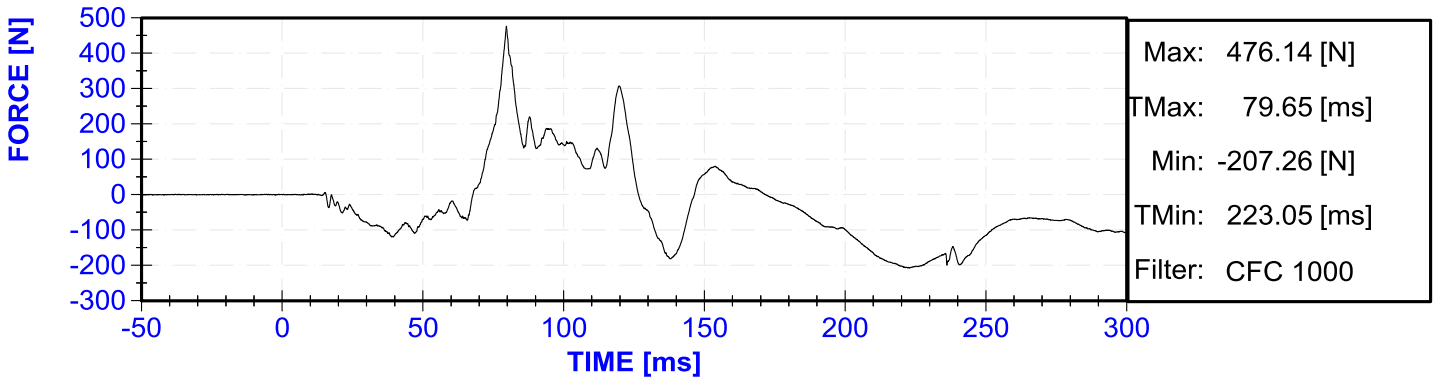
V2P1 NECK UPPER MZ



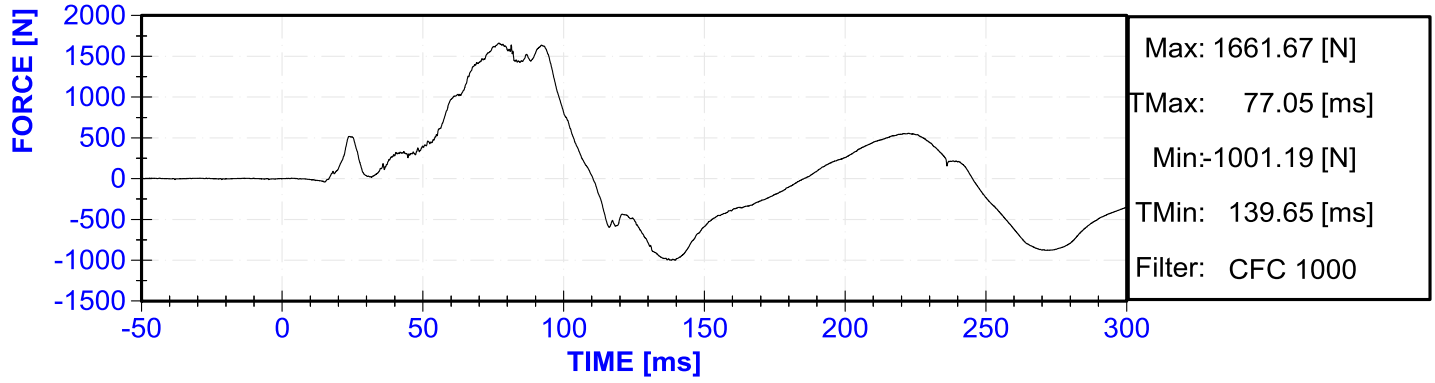
V2P1 NECK LOWER FX



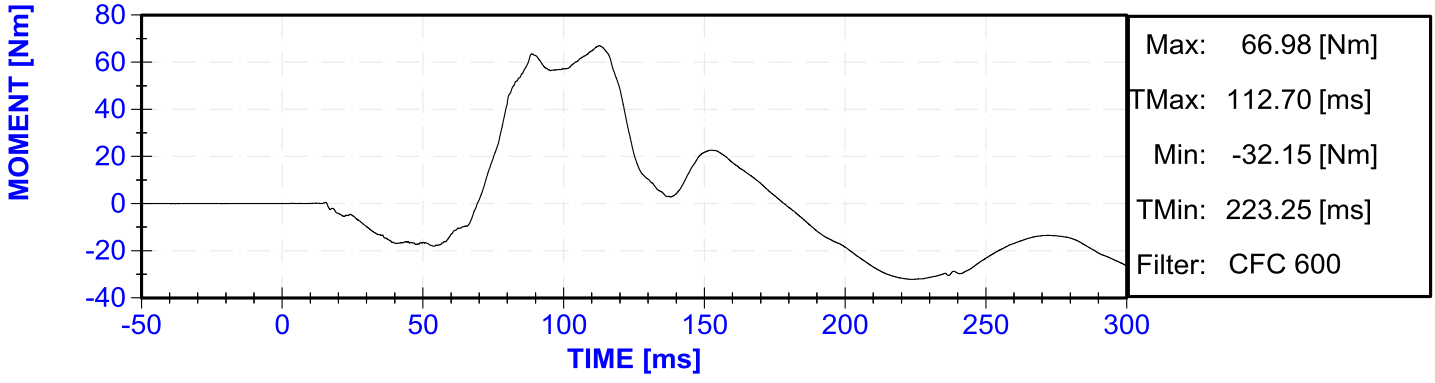
V2P1 NECK LOWER FY



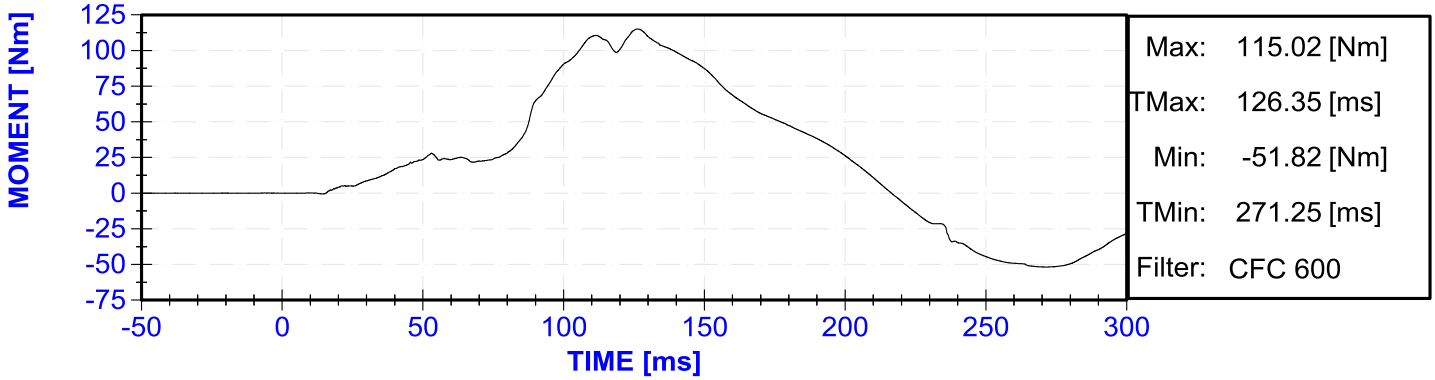
V2P1 NECK LOWER FZ



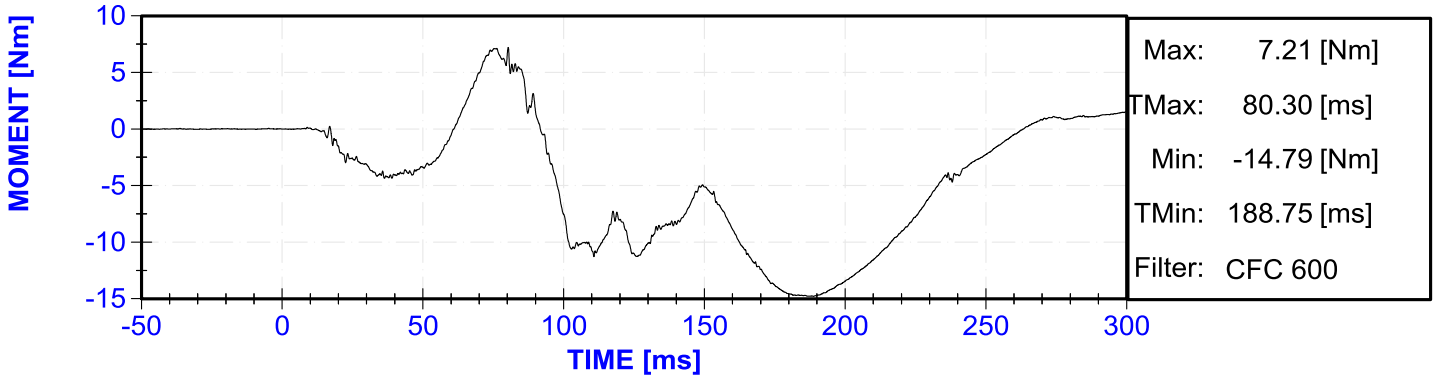
V2P1 NECK LOWER MX



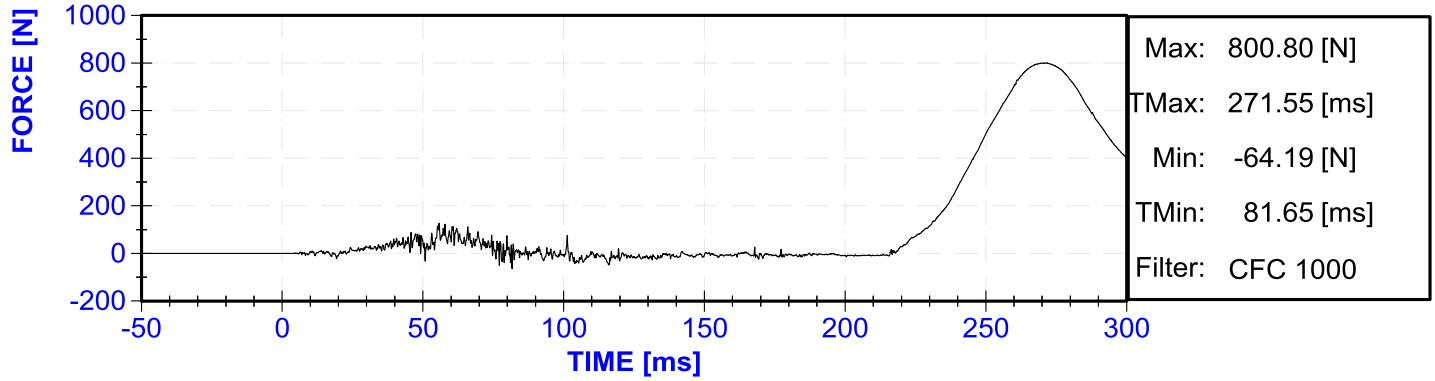
V2P1 NECK LOWER MY



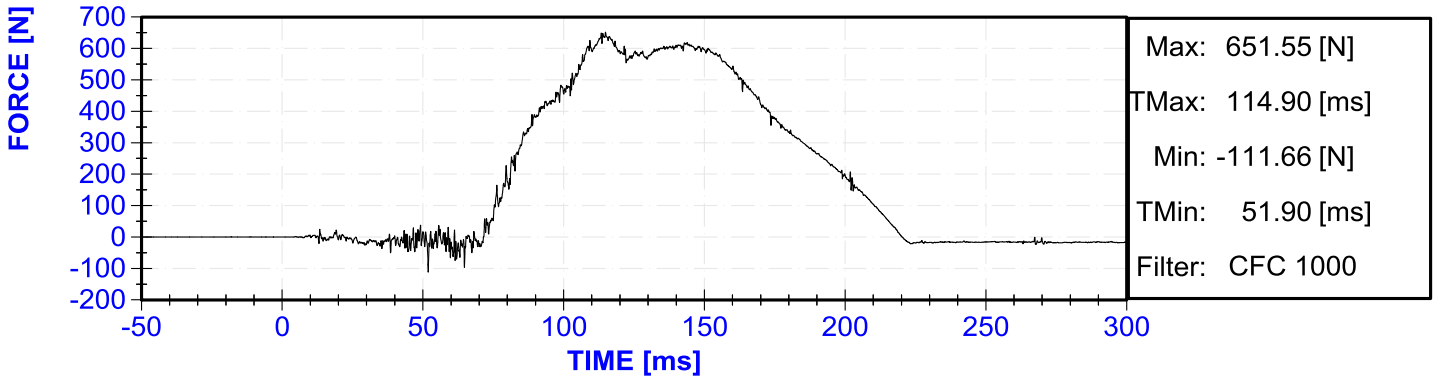
V2P1 NECK LOWER MZ



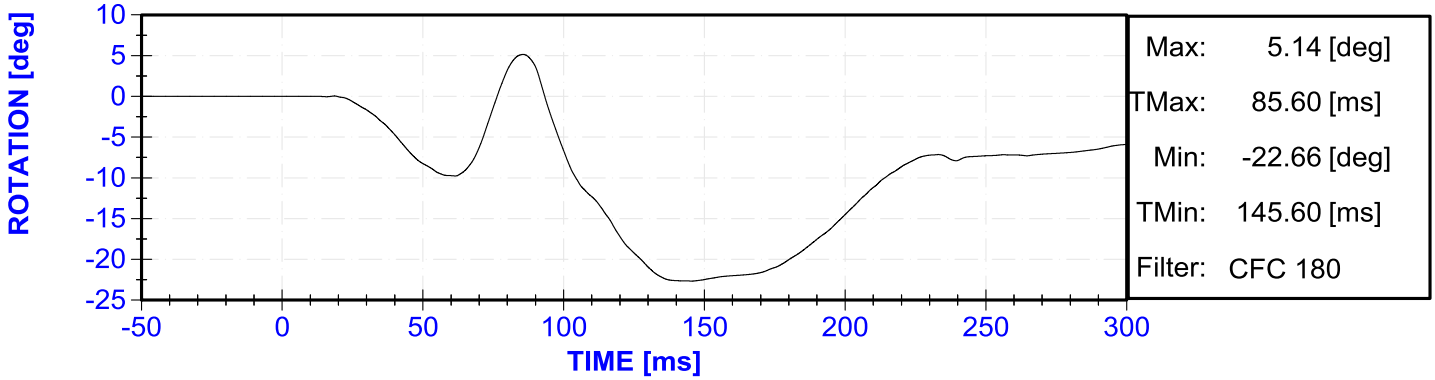
V2P1 NECK SPRING LOAD CELL - FRONT



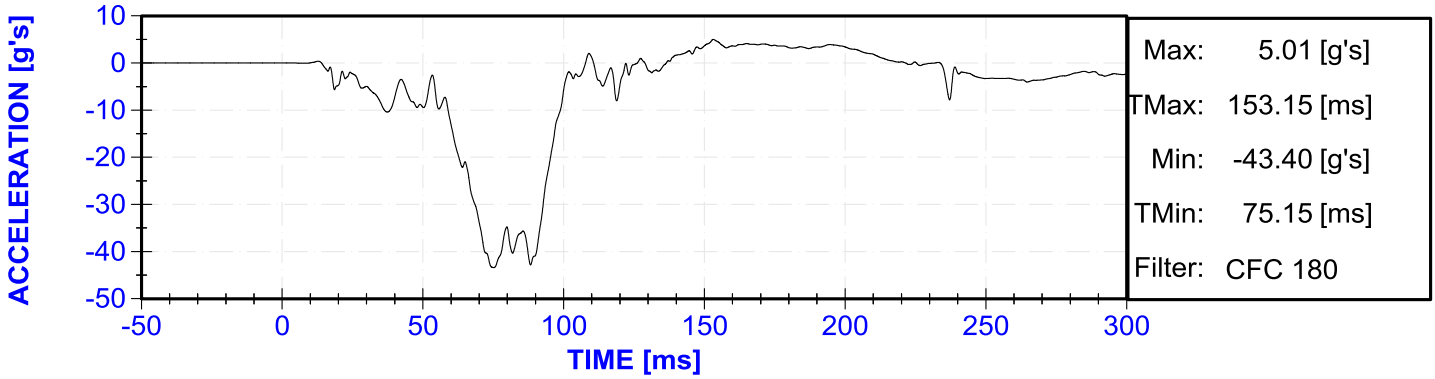
V2P1 NECK SPRING LOAD CELL - REAR



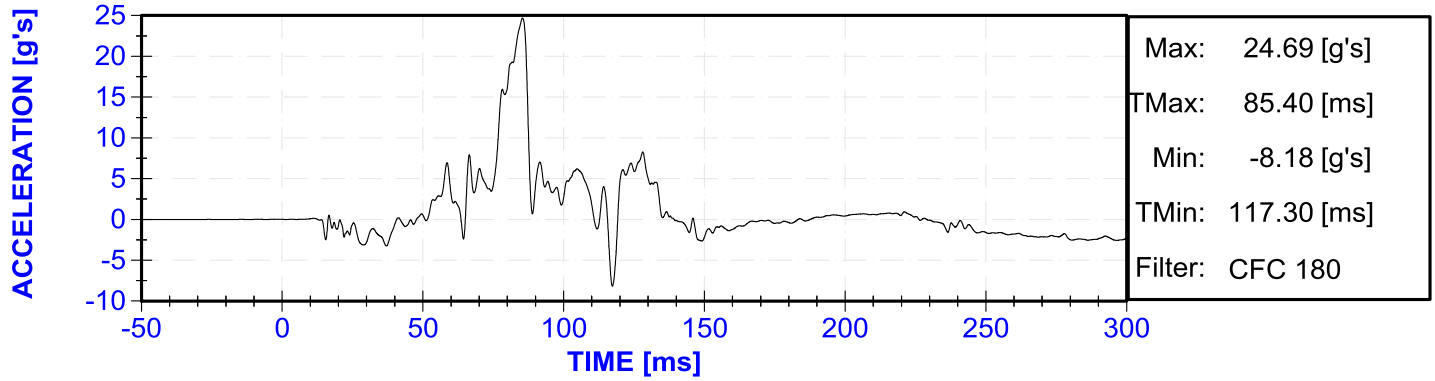
V2P1 OC ANGLE RY



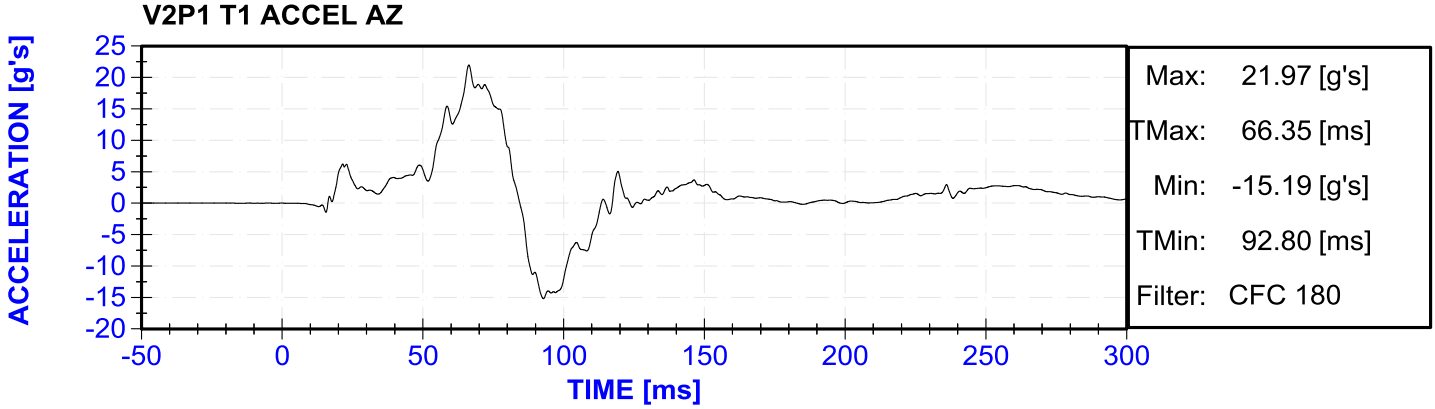
V2P1 T1 ACCEL AX



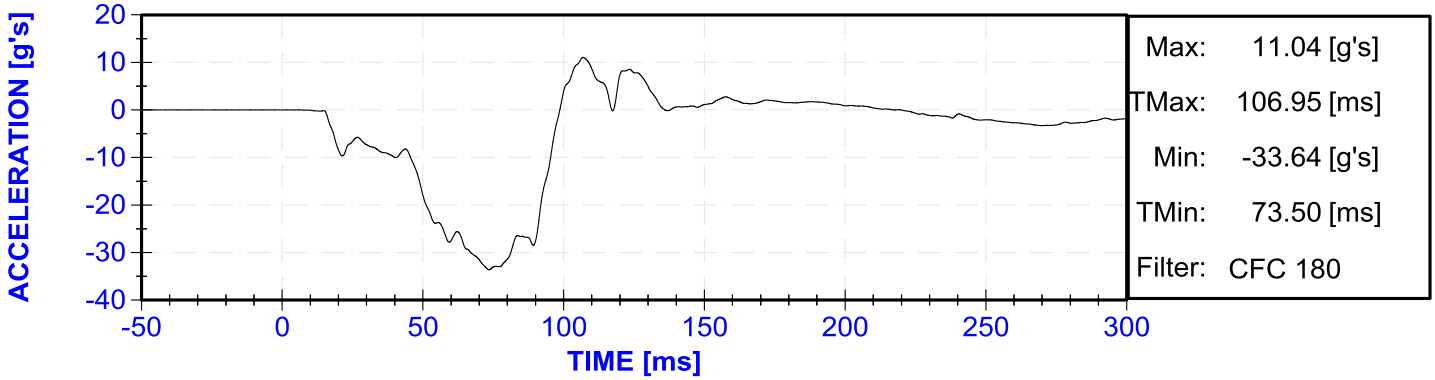
V2P1 T1 ACCEL AY



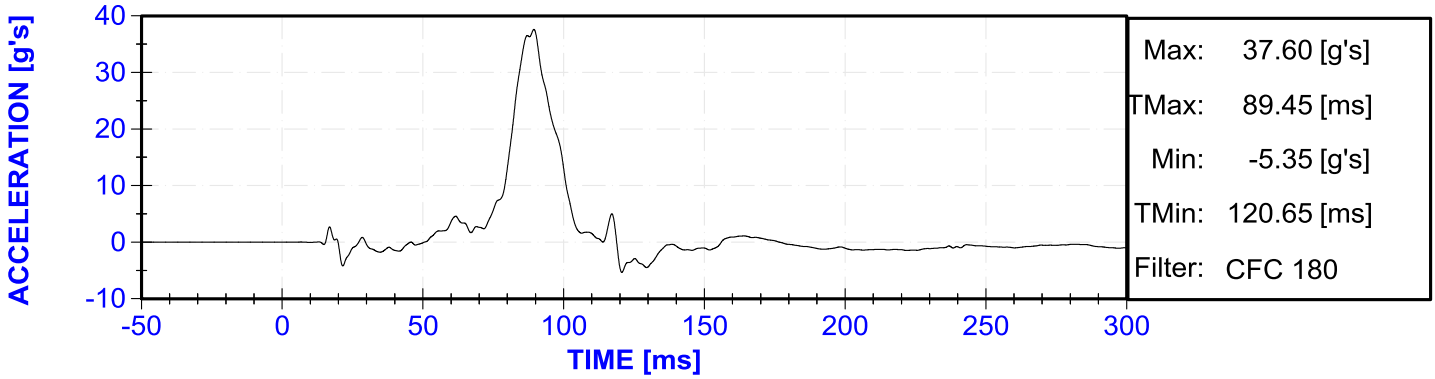
V2P1 T1 ACCEL AZ



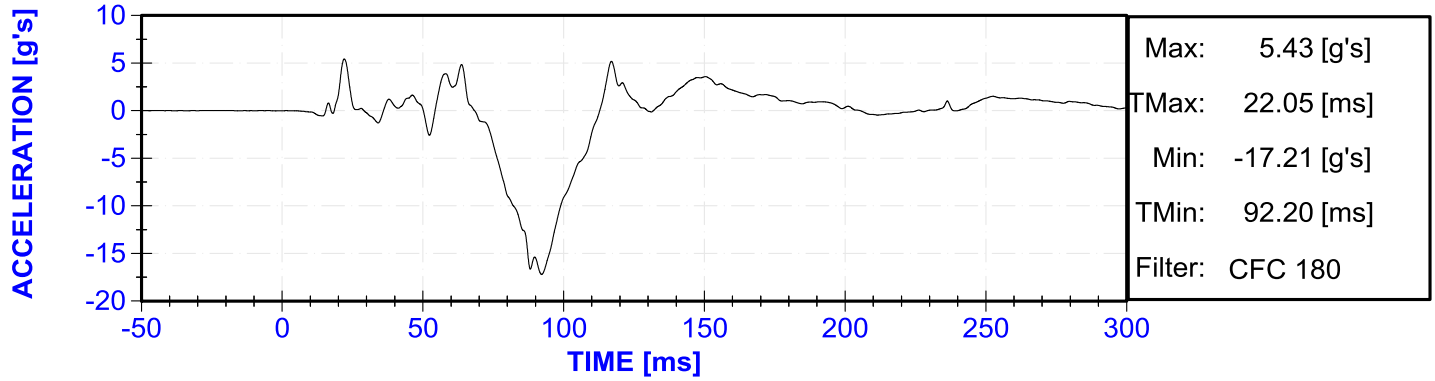
V2P1 T6 ACCEL AX



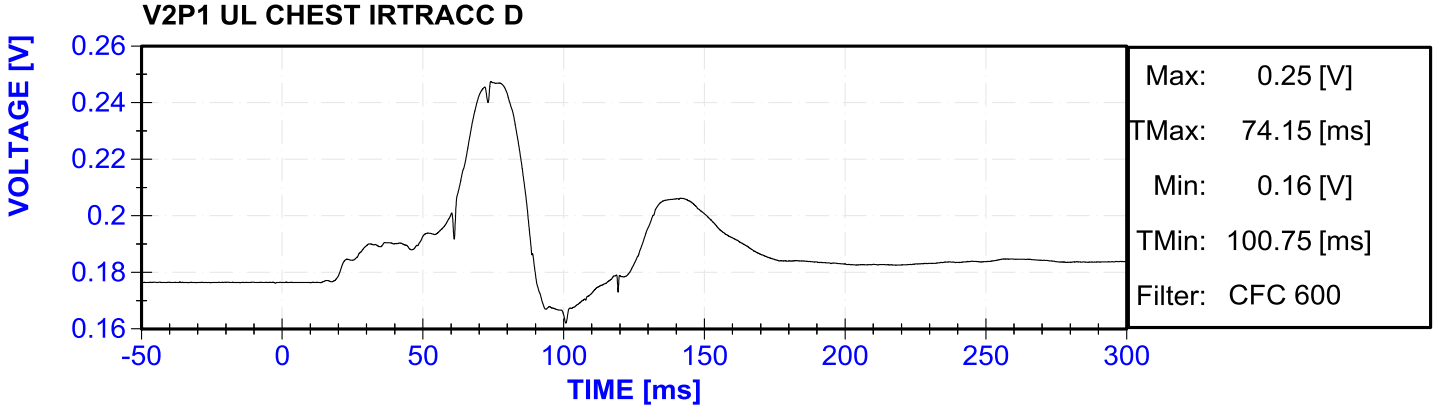
V2P1 T6 ACCEL AY



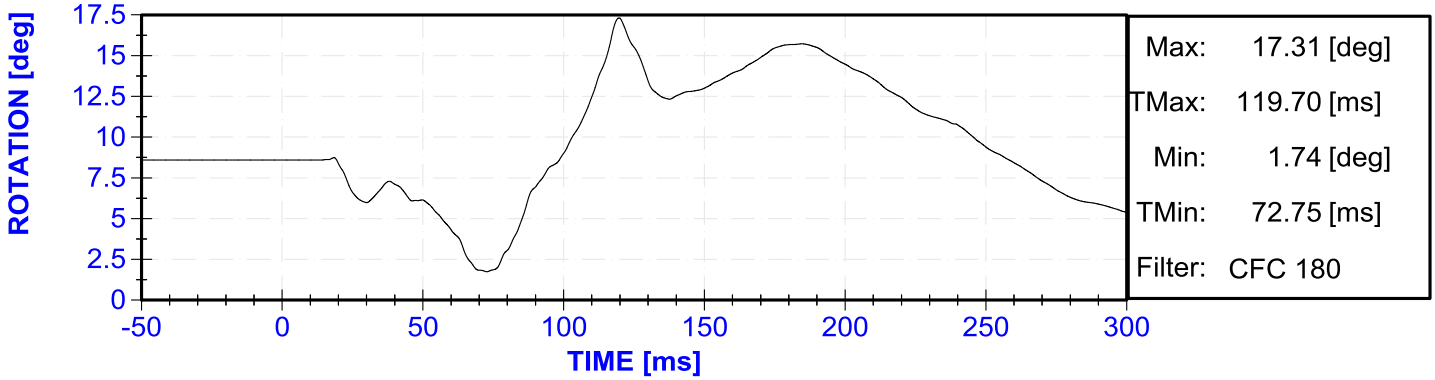
V2P1 T6 ACCEL AZ



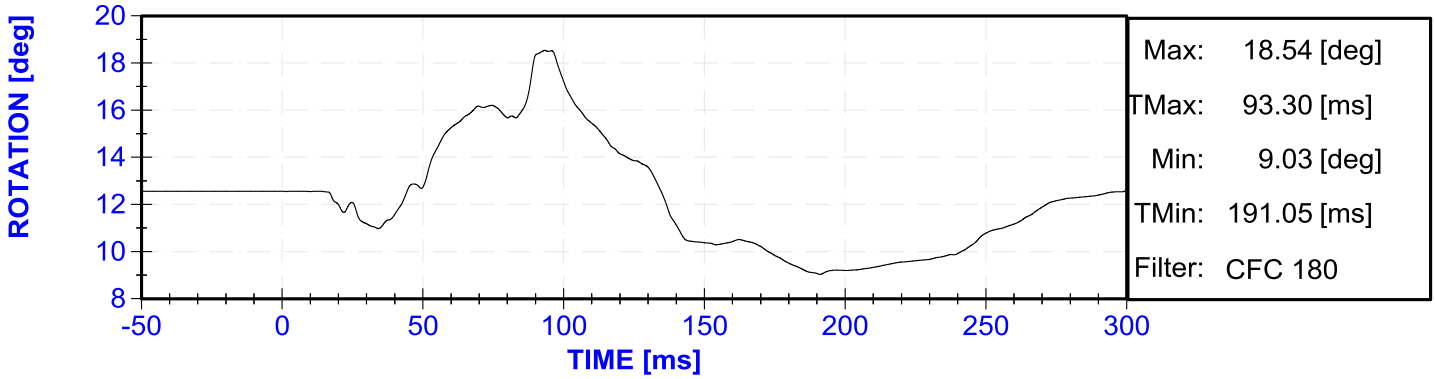
V2P1 UL CHEST IRTRACC D



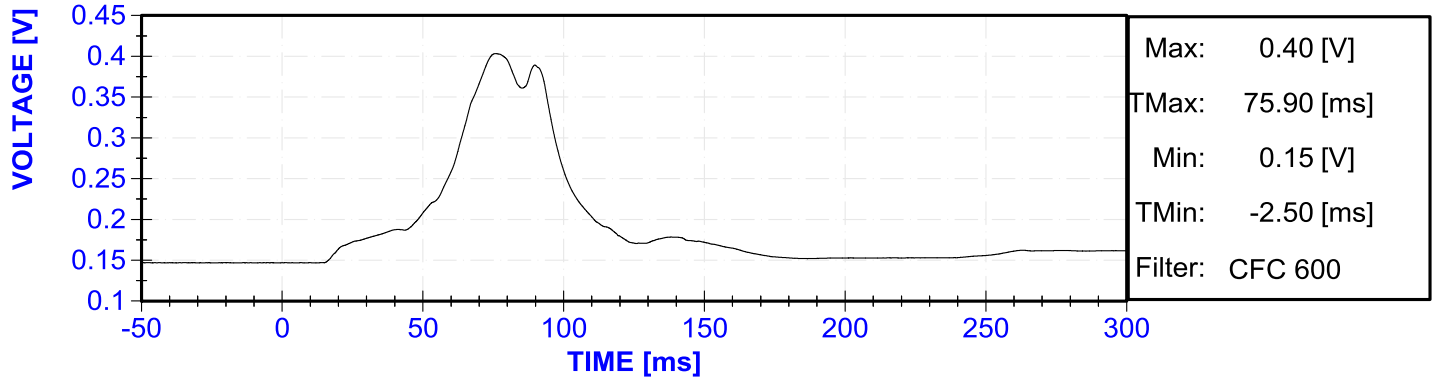
V2P1 UL CHEST RY



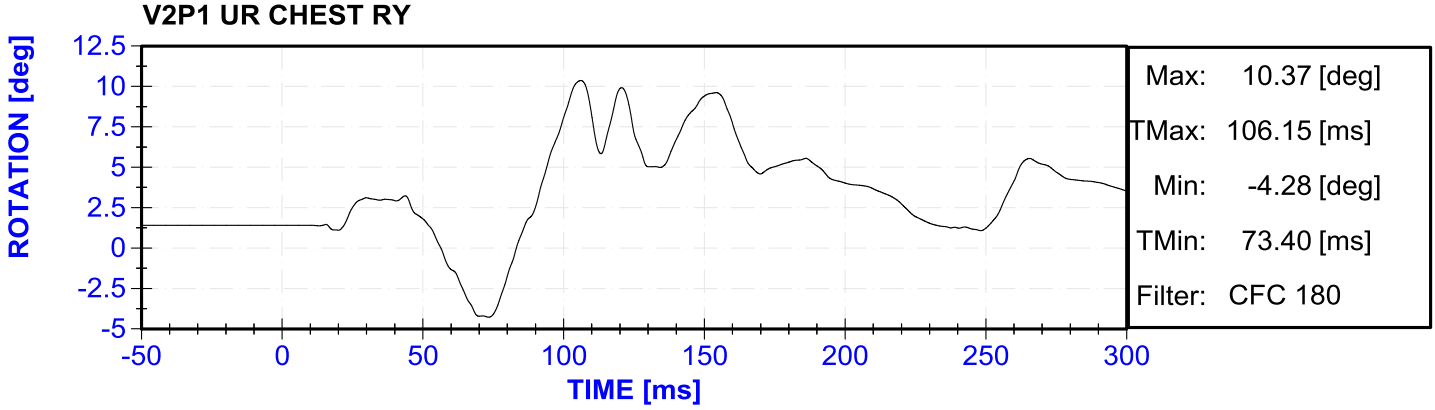
V2P1 UL CHEST RZ



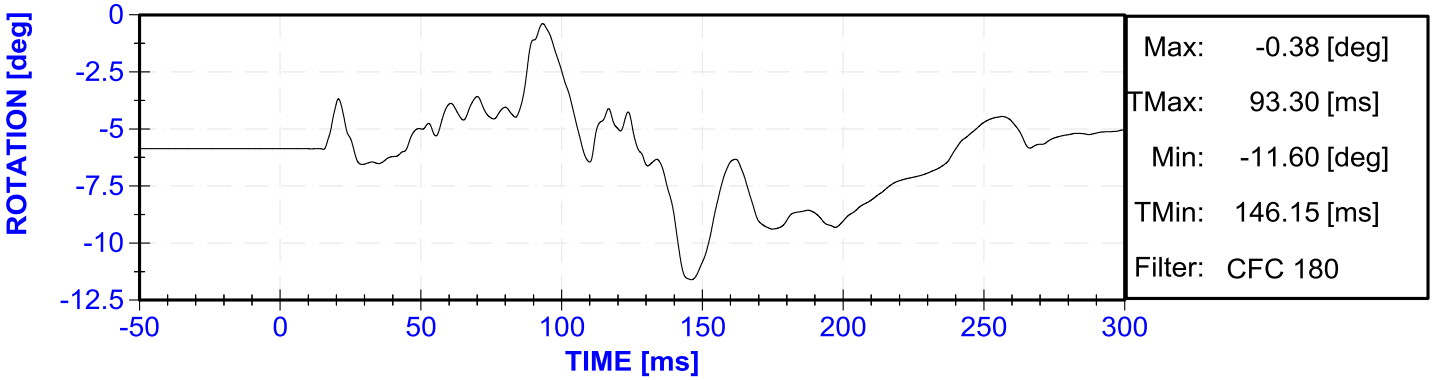
V2P1 UR CHEST IRTRACC D



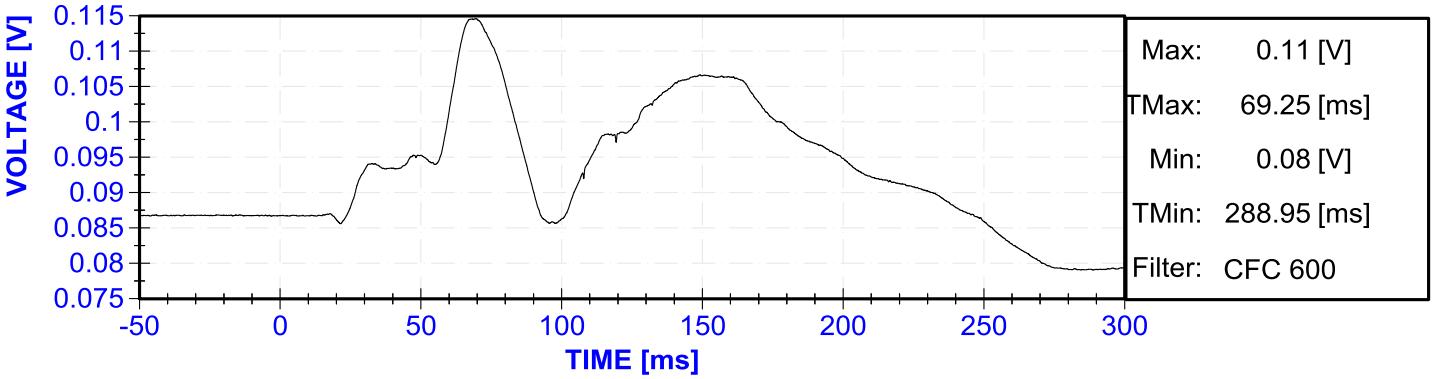
V2P1 UR CHEST RY



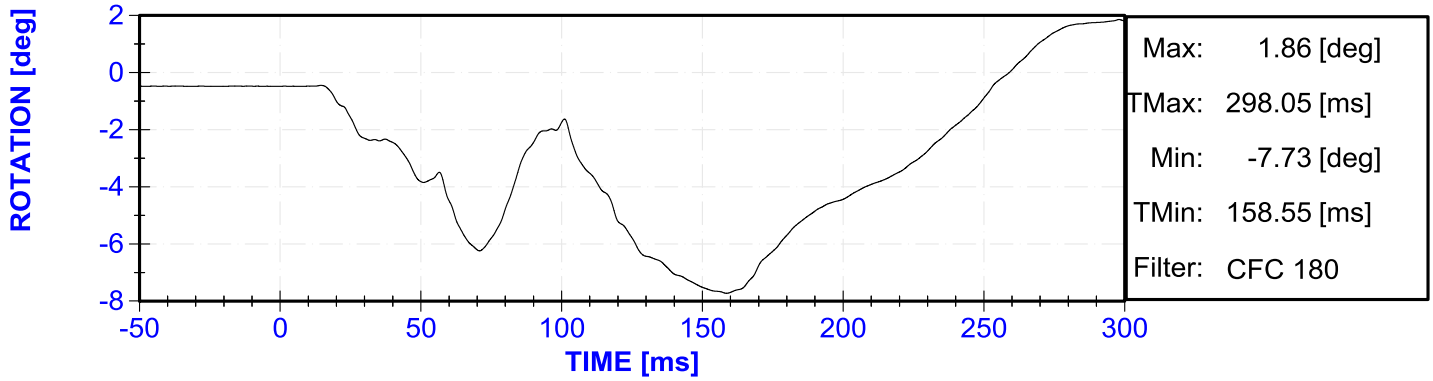
V2P1 UR CHEST RZ



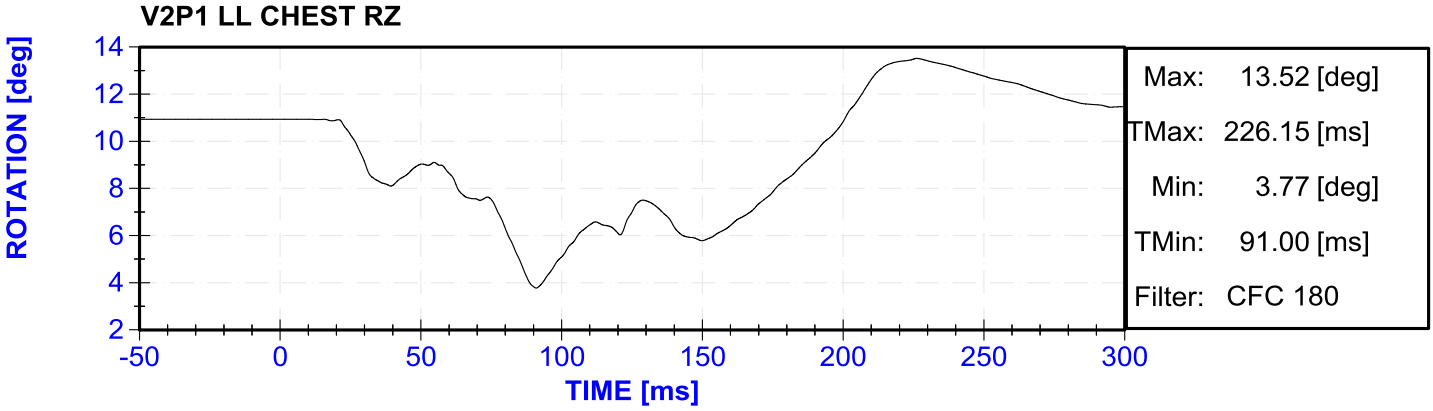
V2P1 LL CHEST IRTRACC D



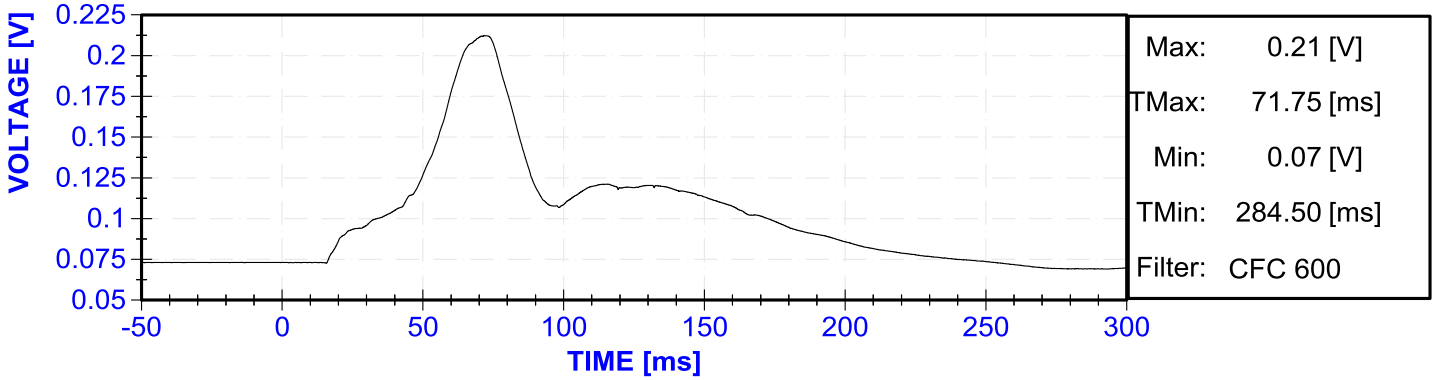
V2P1 LL CHEST RY



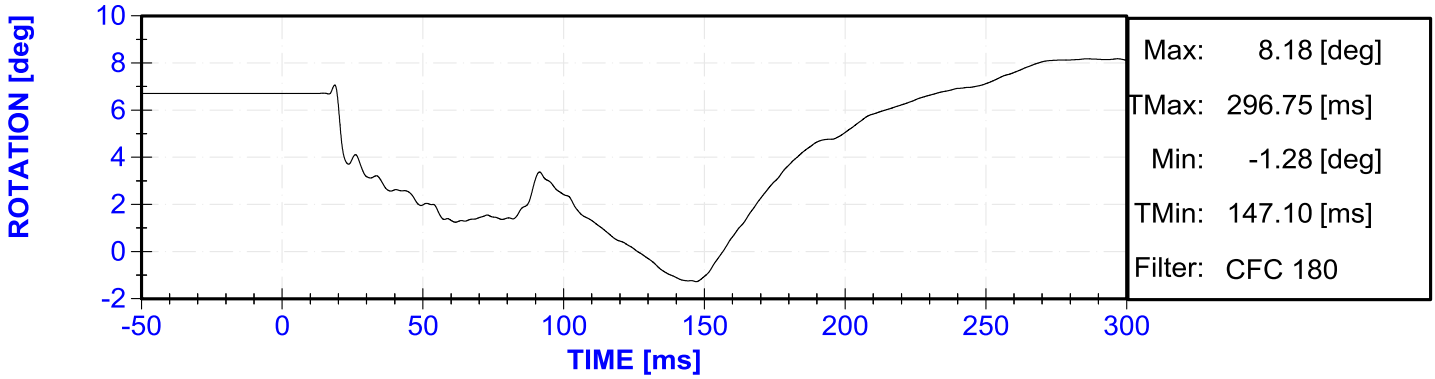
V2P1 LL CHEST RZ



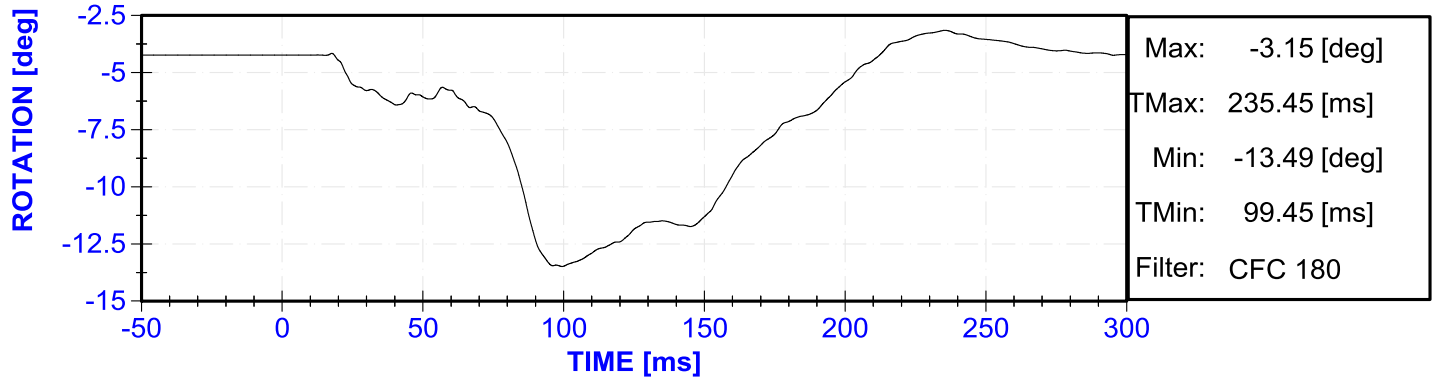
V2P1 LR CHEST IRTRACC D



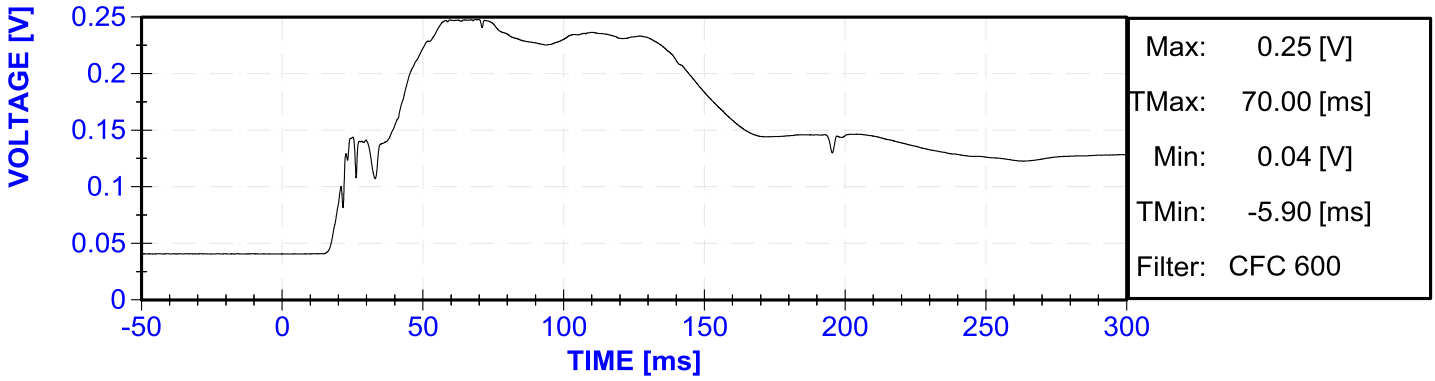
V2P1 LR CHEST RY



V2P1 LR CHEST RZ

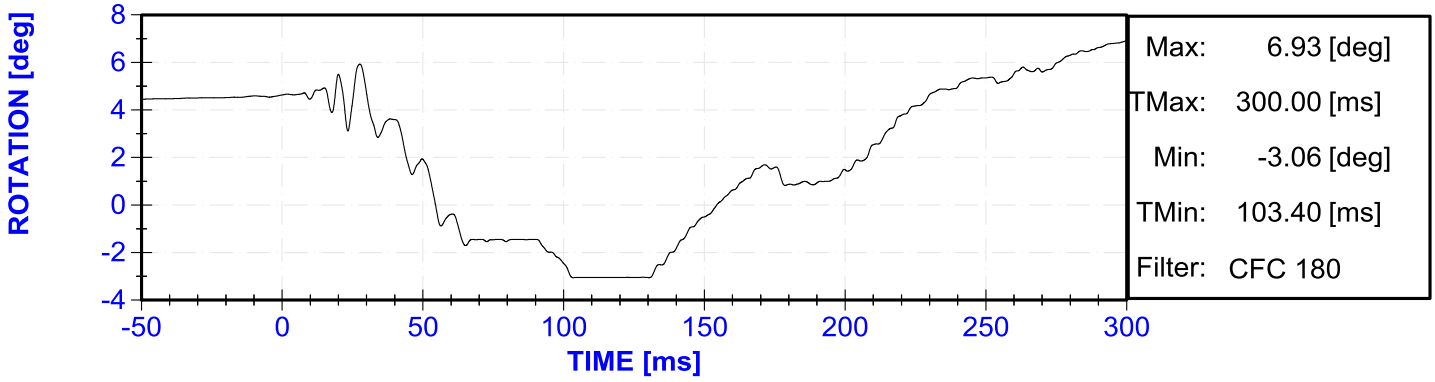


V2P1 ABDOMEN LEFT IRTRACC D

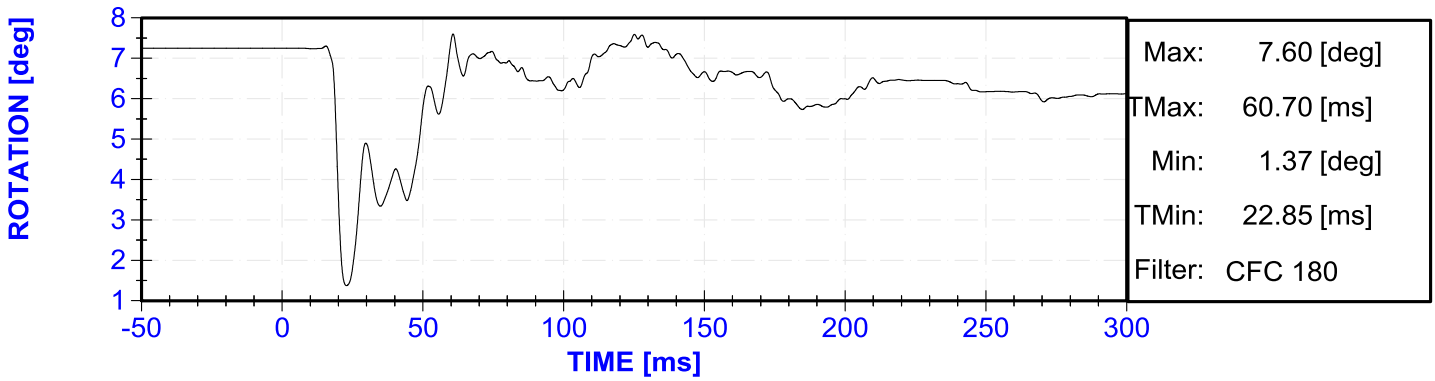


V2P1 ABDOMEN LEFT RY

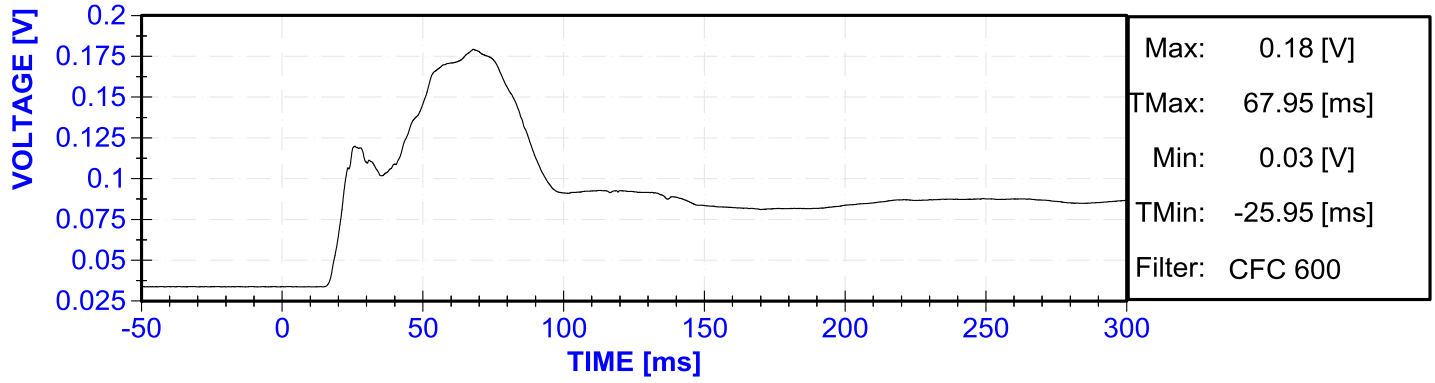
Questionable data from 102 to 131 ms



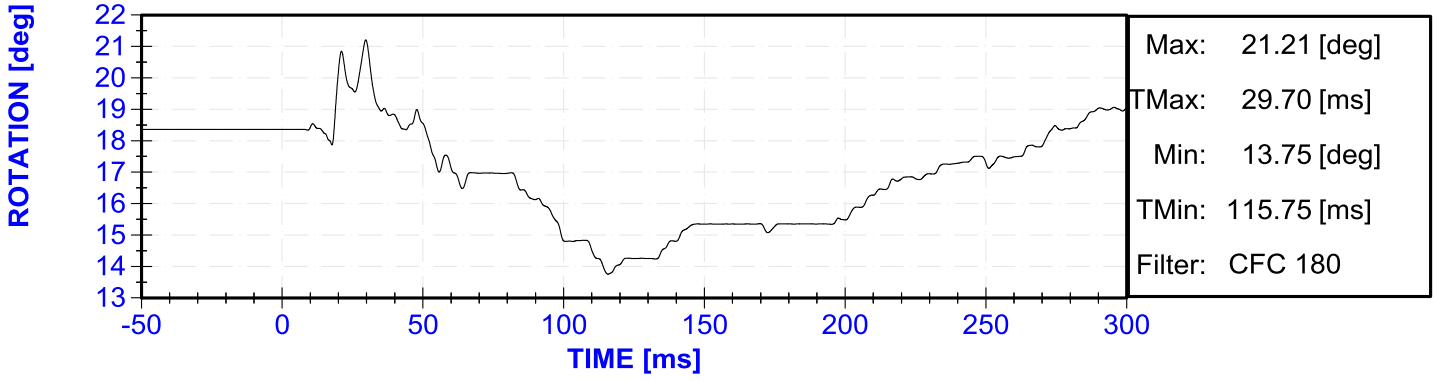
V2P1 ABDOMEN LEFT RZ



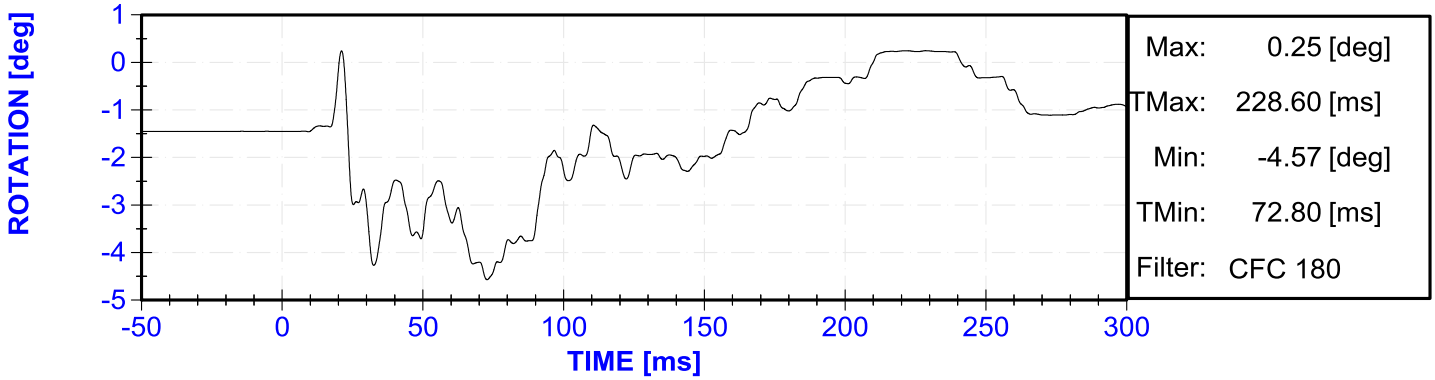
V2P1 ABDOMEN RIGHT IRTRACC D



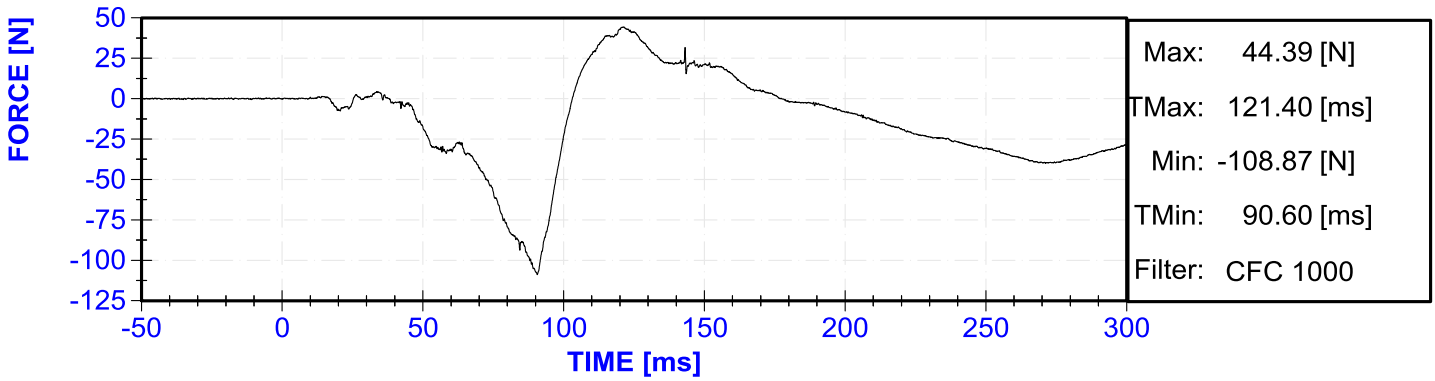
V2P1 ABDOMEN RIGHT RY



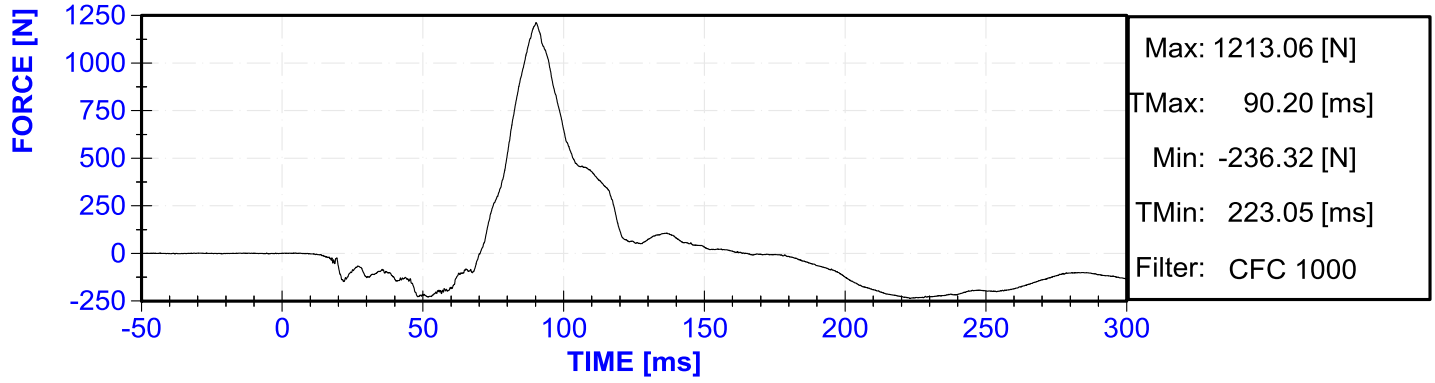
V2P1 ABDOMEN RIGHT RZ



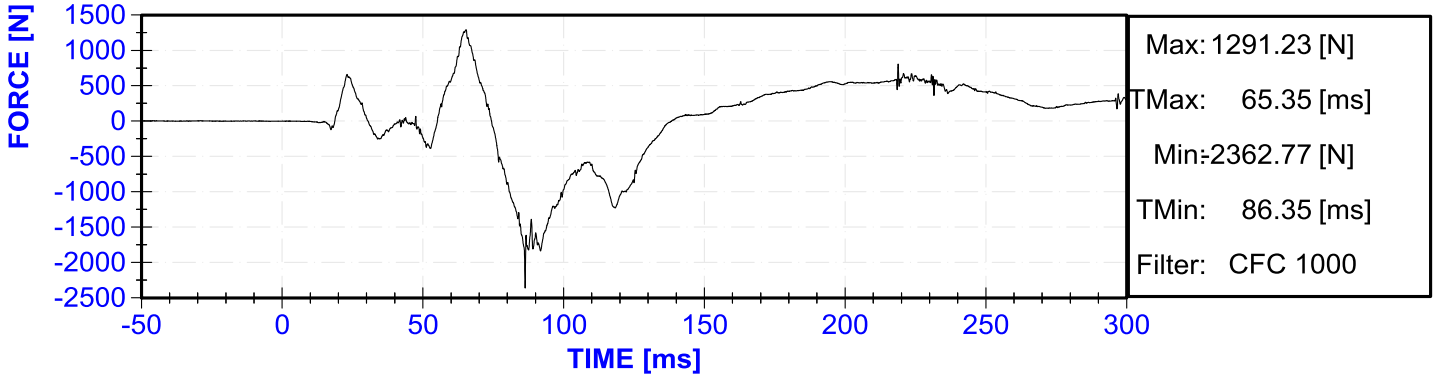
V2P1 SPINE LOWER FX



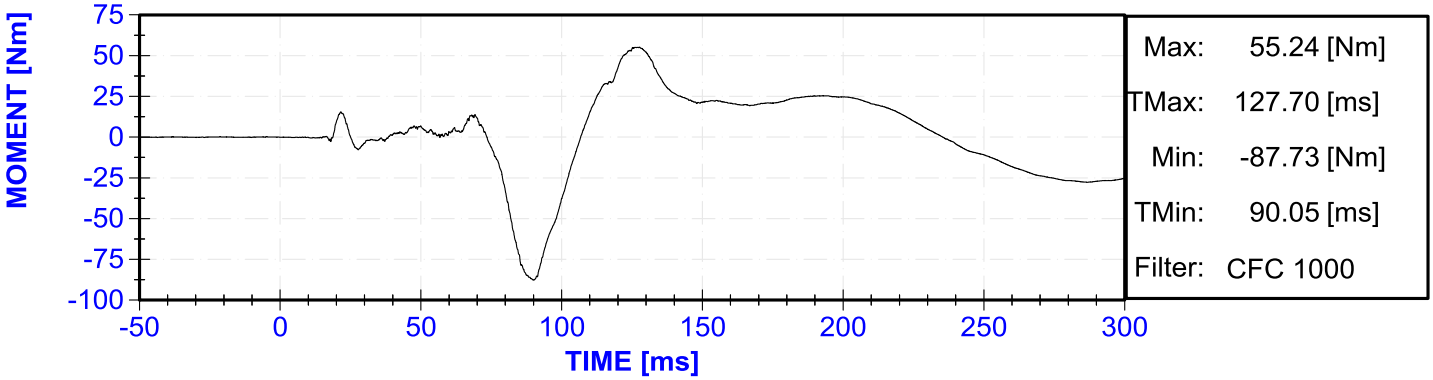
V2P1 SPINE LOWER FY



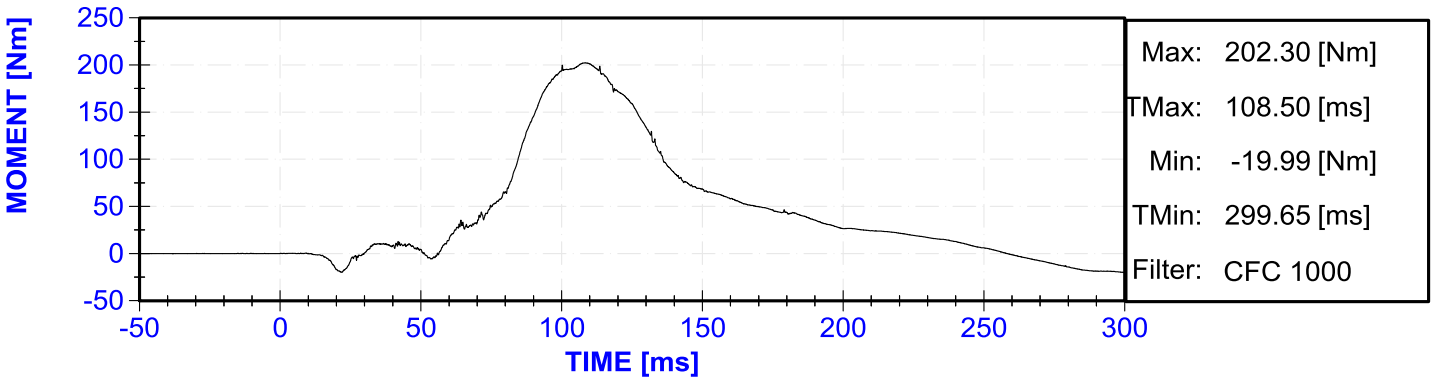
V2P1 SPINE LOWER FZ



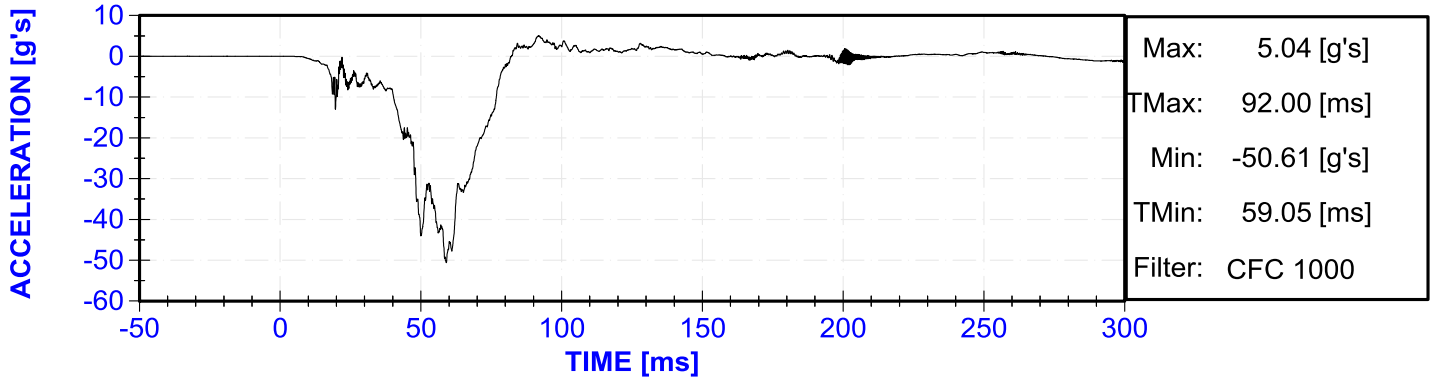
V2P1 SPINE LOWER MX



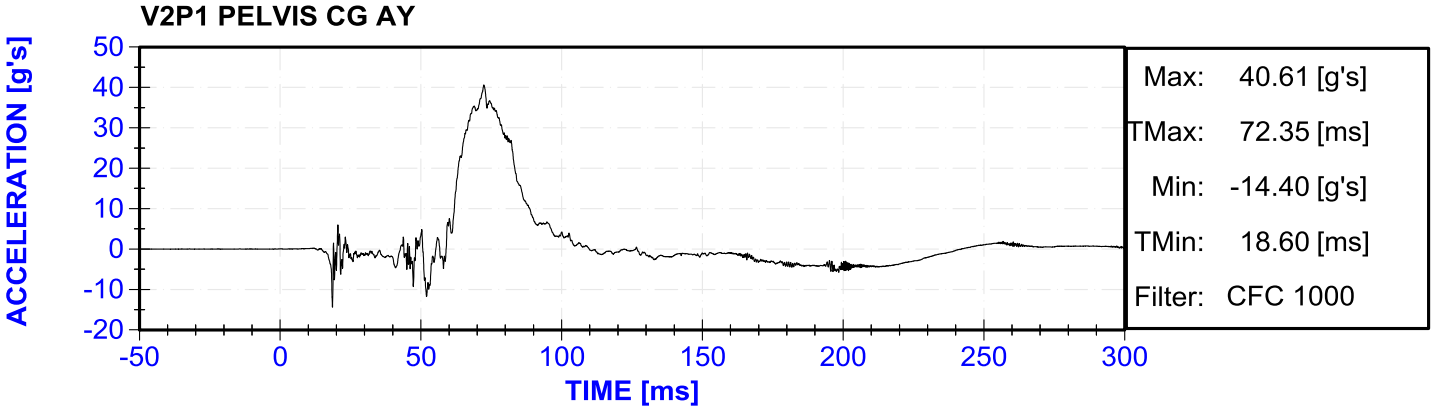
V2P1 SPINE LOWER MY



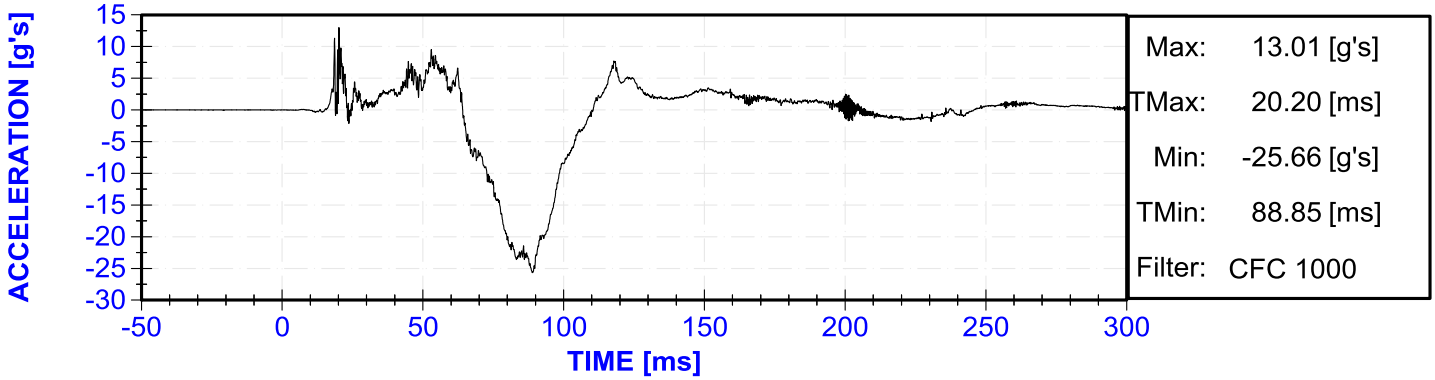
V2P1 PELVIS CG AX



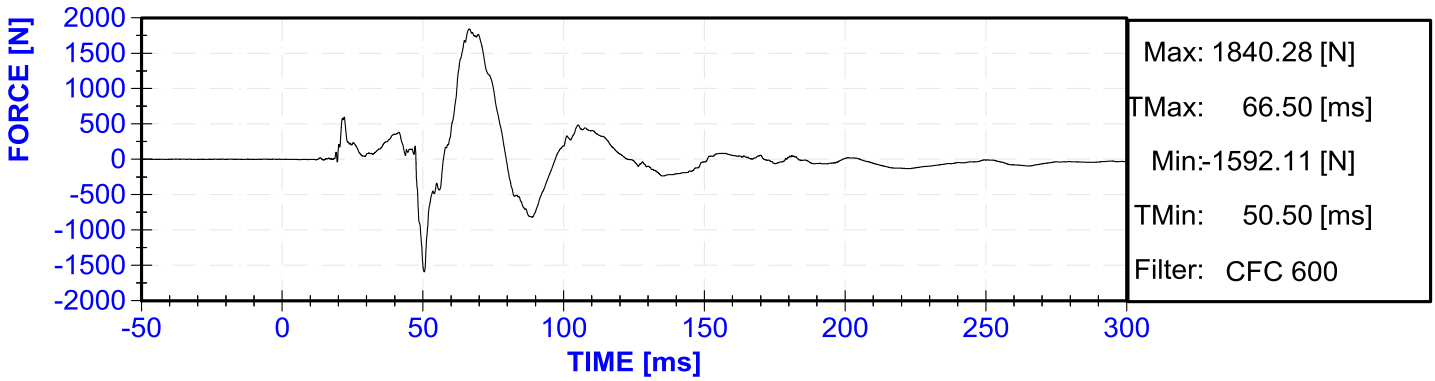
V2P1 PELVIS CG AY



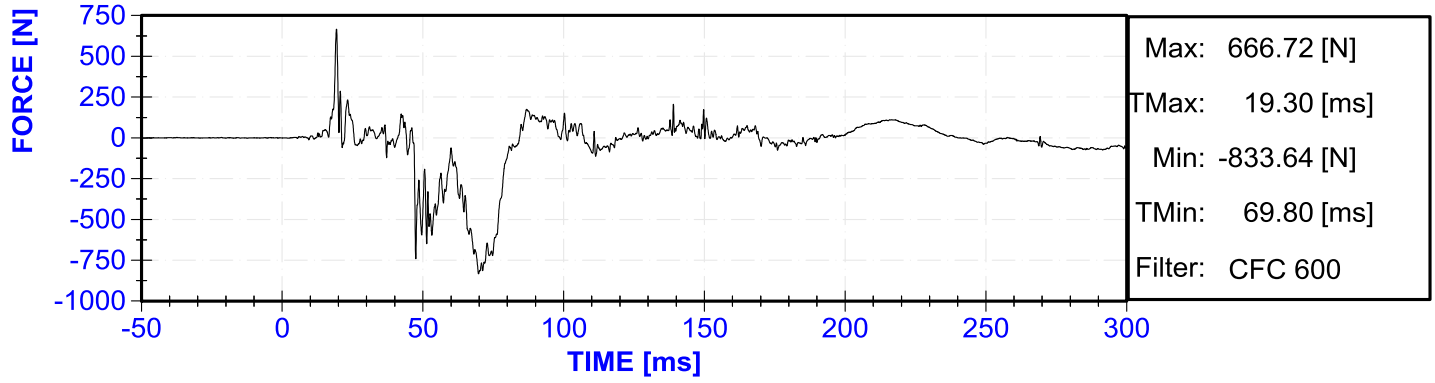
V2P1 PELVIS CG AZ



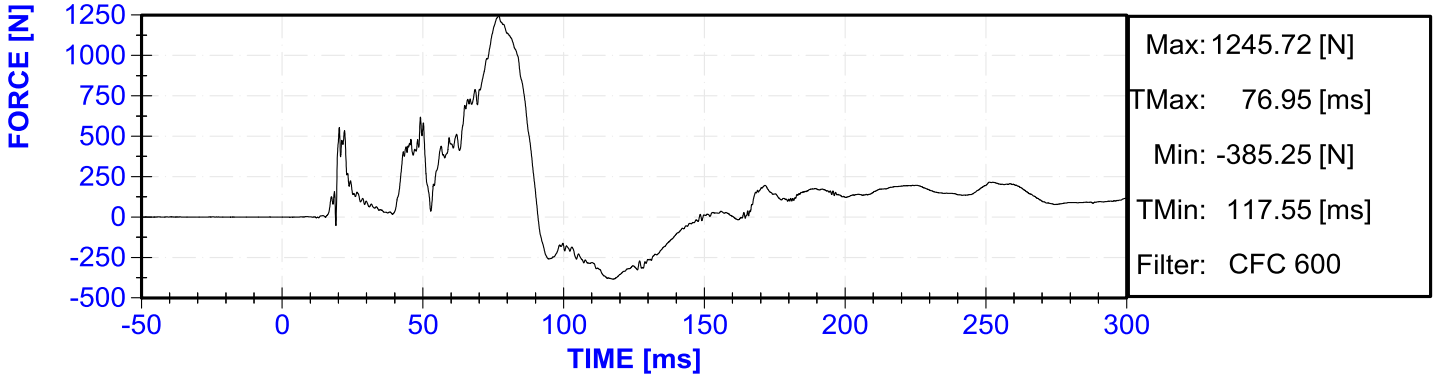
V2P1 PELVIS ACETABULUM LEFT FX



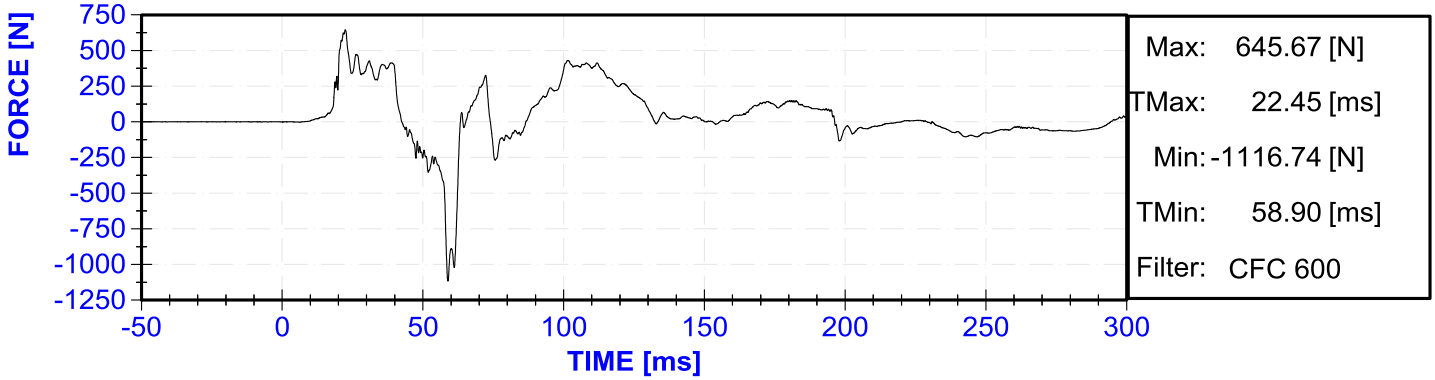
V2P1 PELVIS ACETABULUM LEFT FY



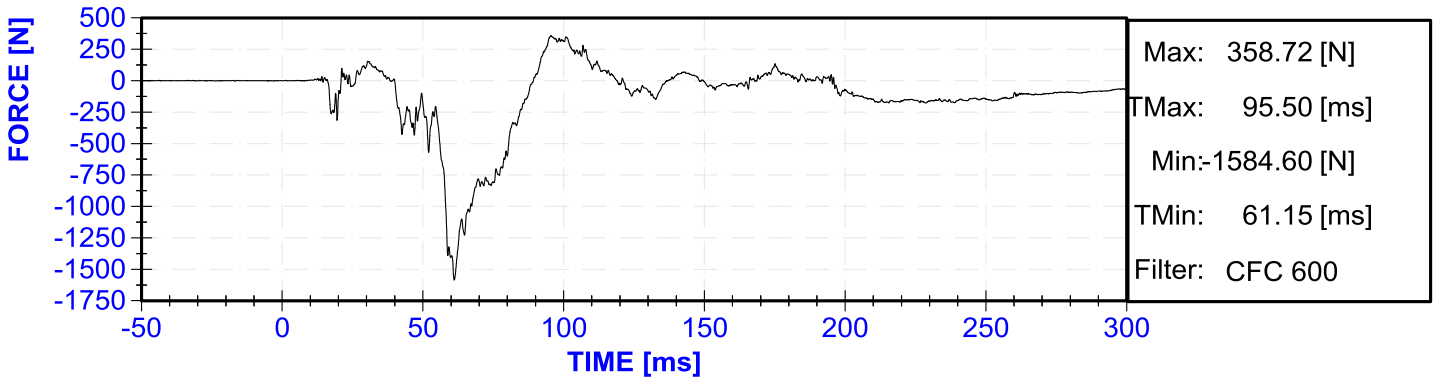
V2P1 PELVIS ACETABULUM LEFT FZ



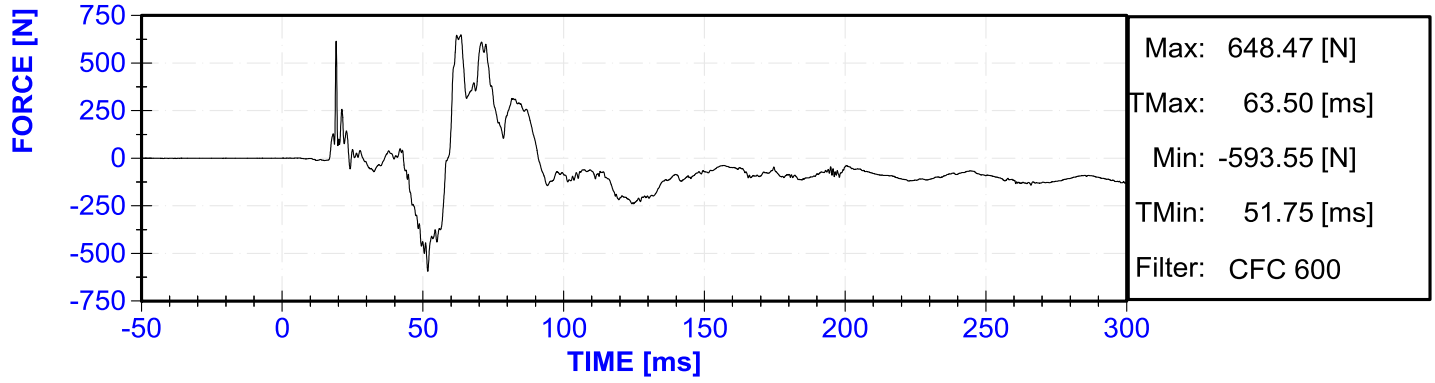
V2P1 PELVIS ACETABULUM RIGHT FX



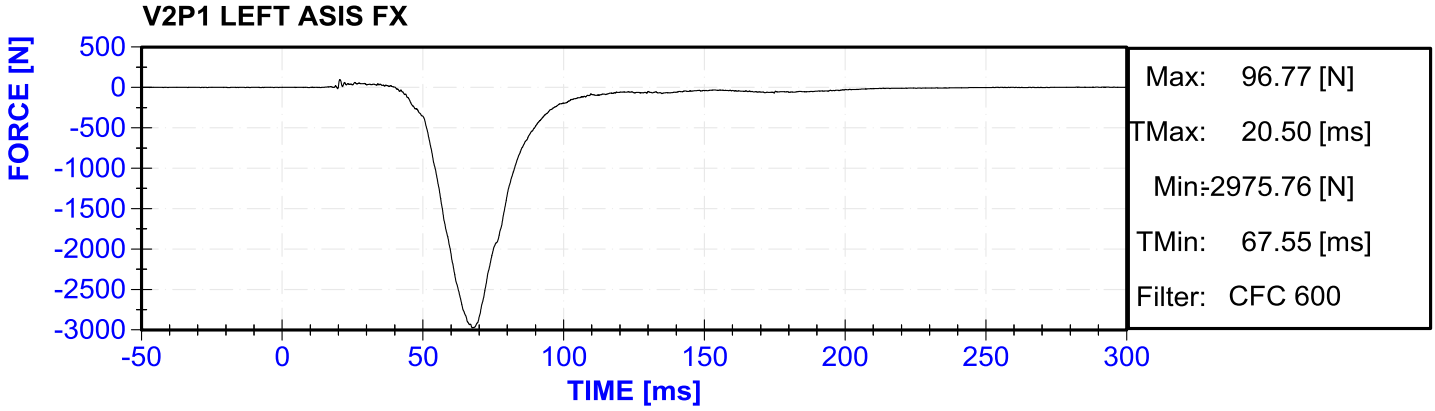
V2P1 PELVIS ACETABULUM RIGHT FY



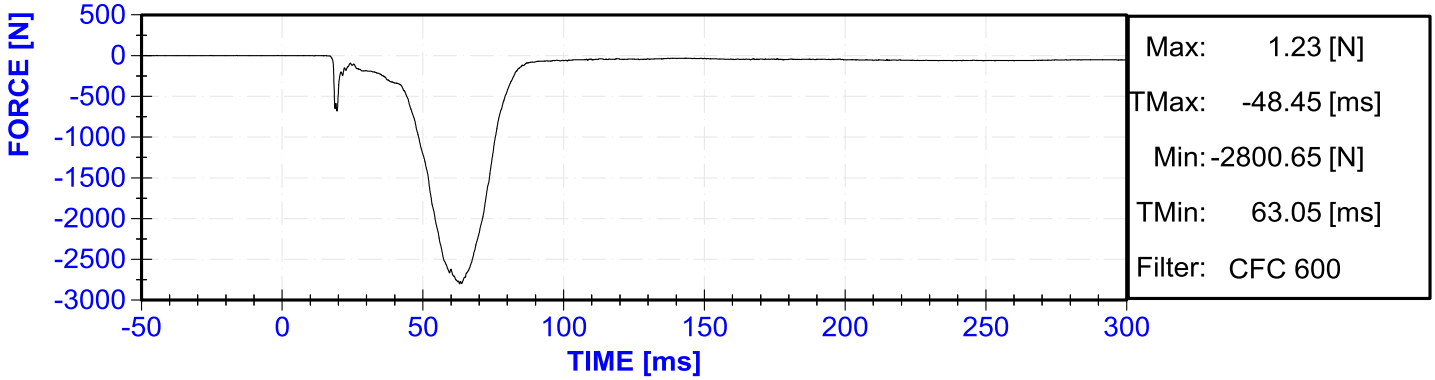
V2P1 PELVIS ACETABULUM RIGHT FZ



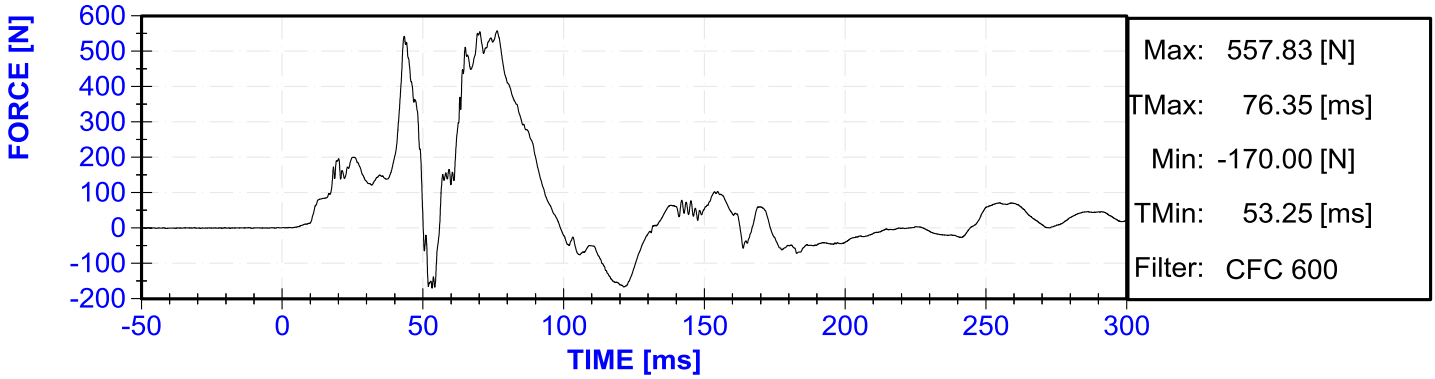
V2P1 LEFT ASIS FX



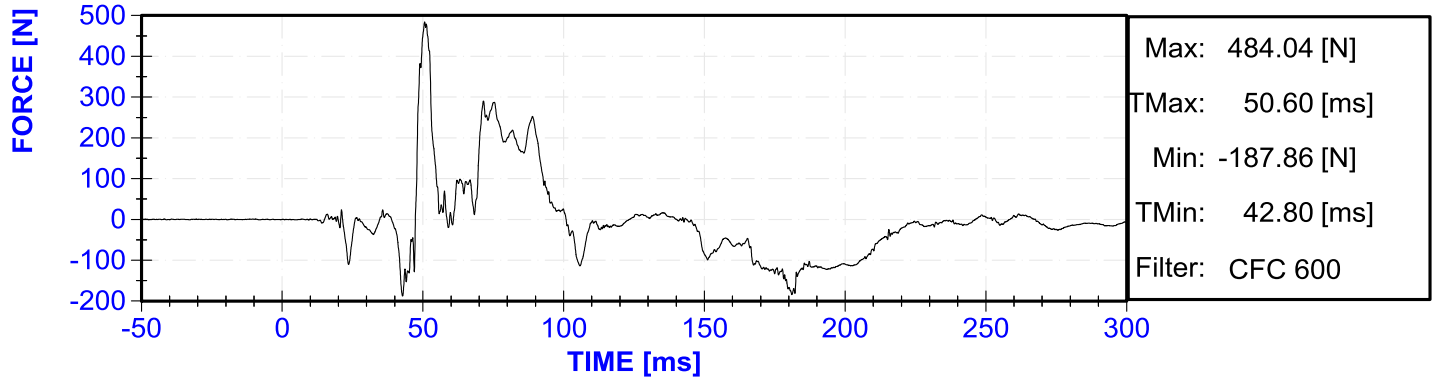
V2P1 RIGHT ASIS FX



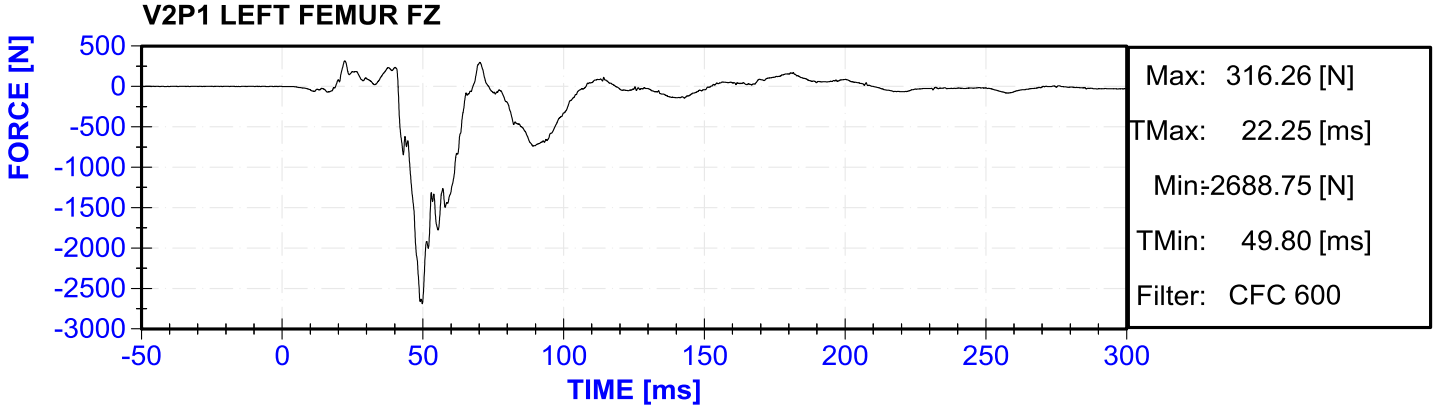
V2P1 LEFT FEMUR FX



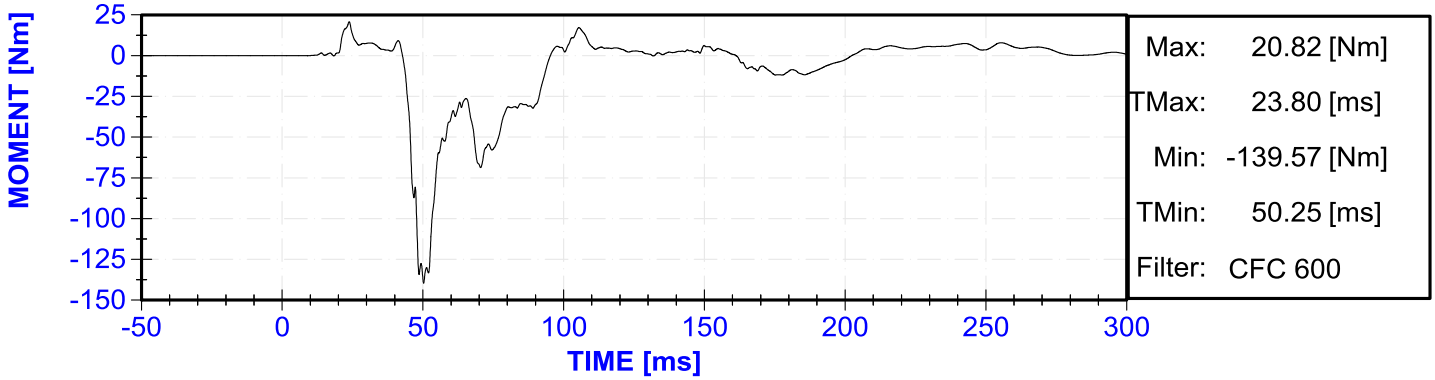
V2P1 LEFT FEMUR FY



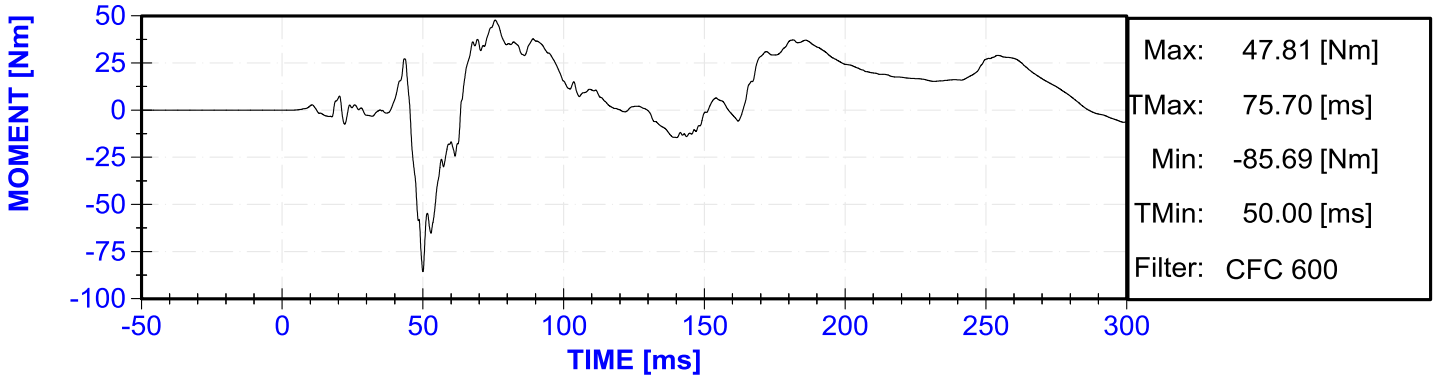
V2P1 LEFT FEMUR FZ



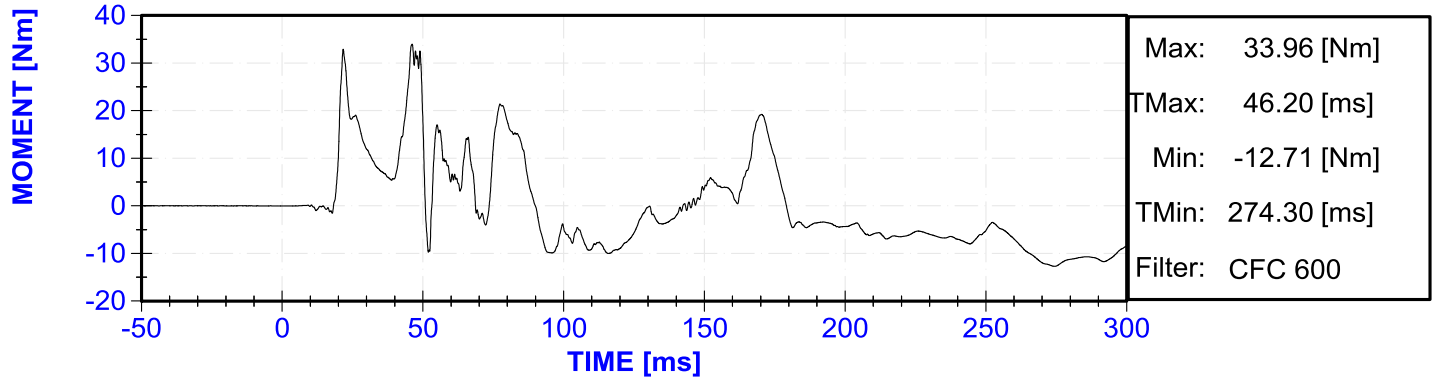
V2P1 LEFT FEMUR MX



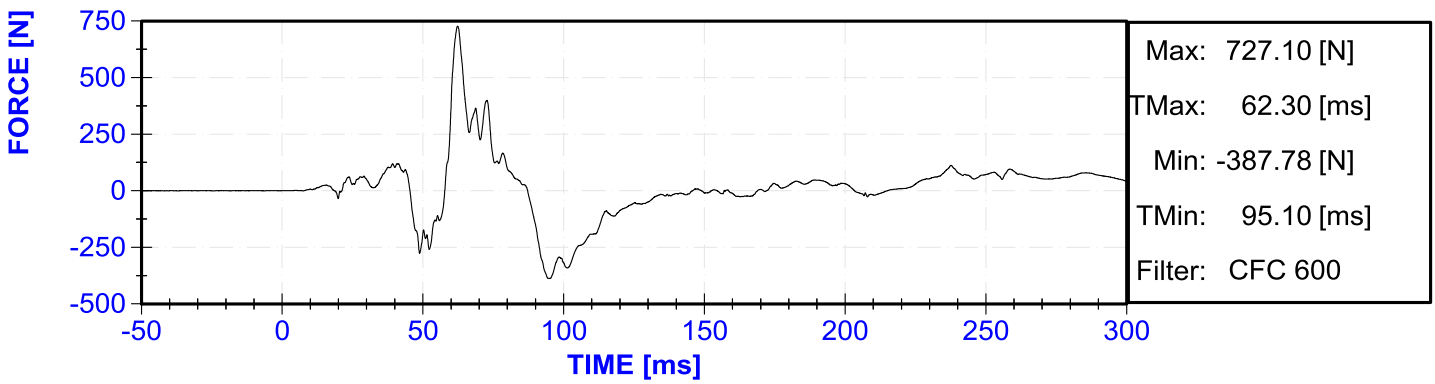
V2P1 LEFT FEMUR MY



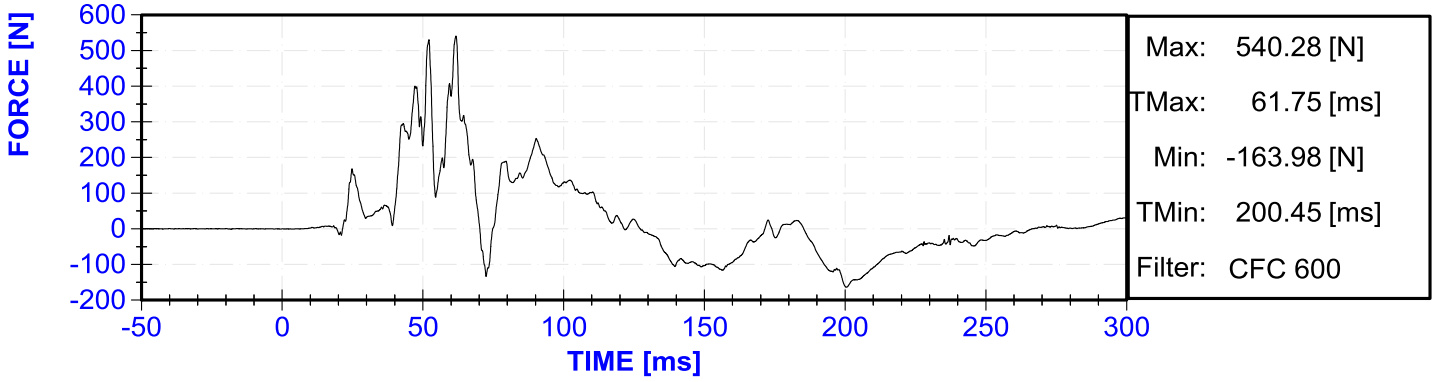
V2P1 LEFT FEMUR MZ



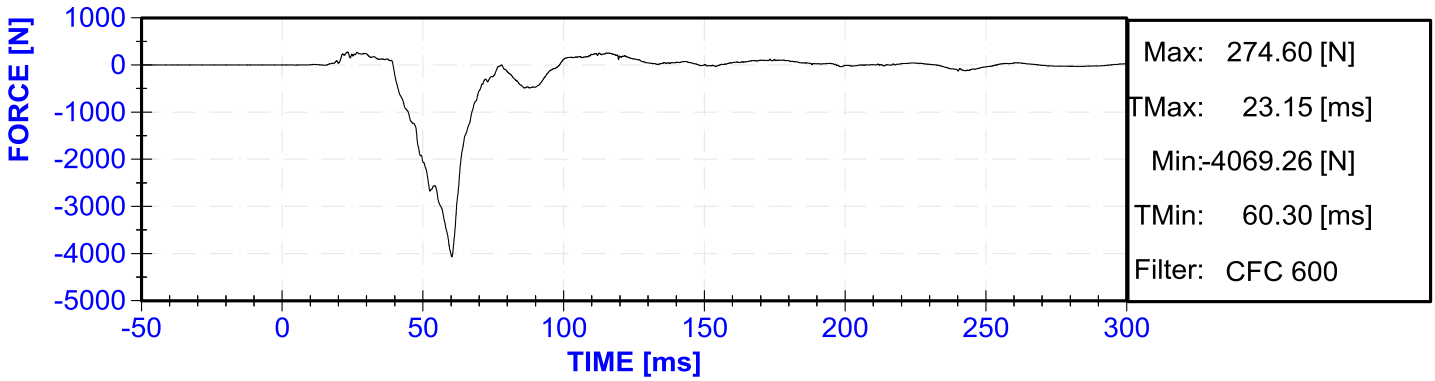
V2P1 RIGHT FEMUR FX



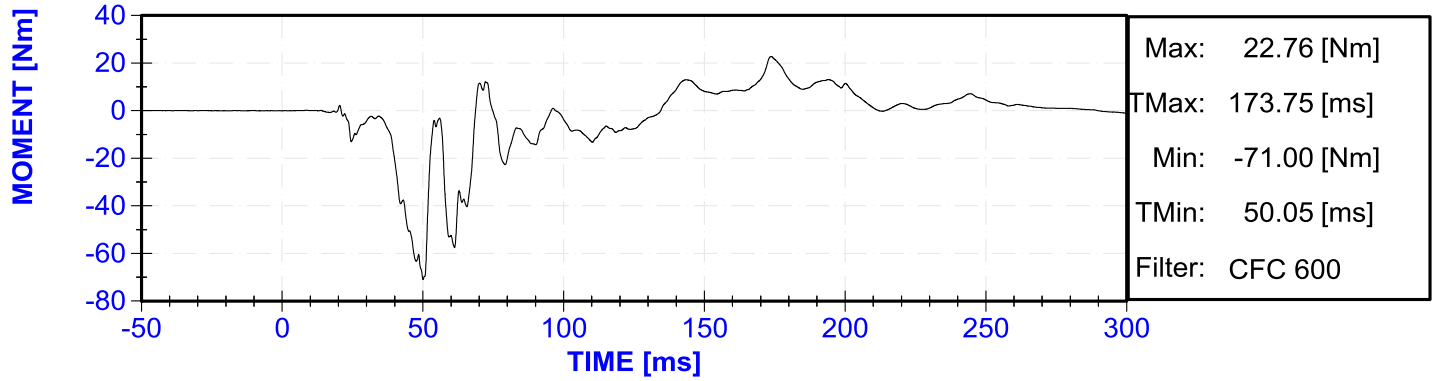
V2P1 RIGHT FEMUR FY



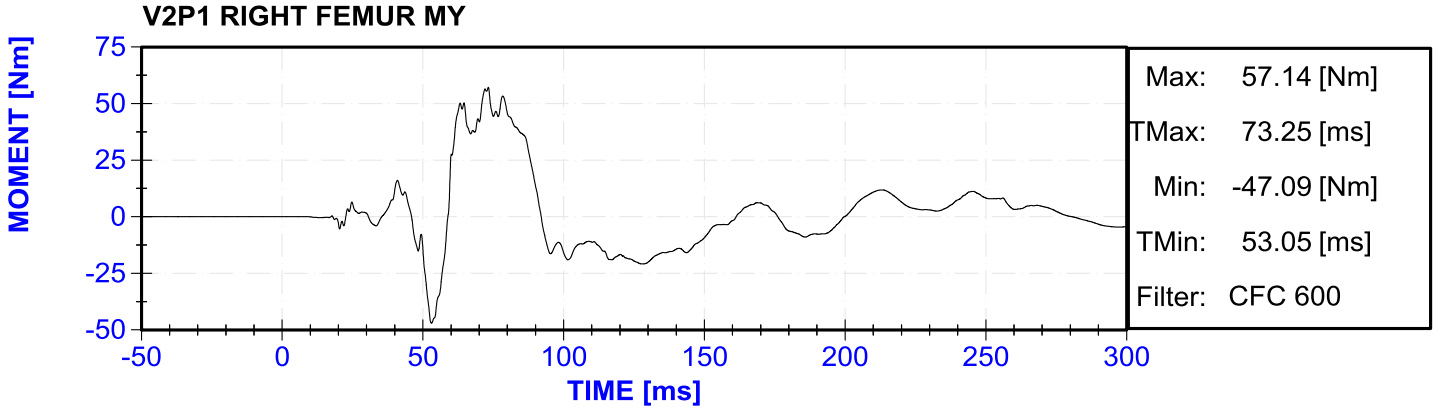
V2P1 RIGHT FEMUR FZ



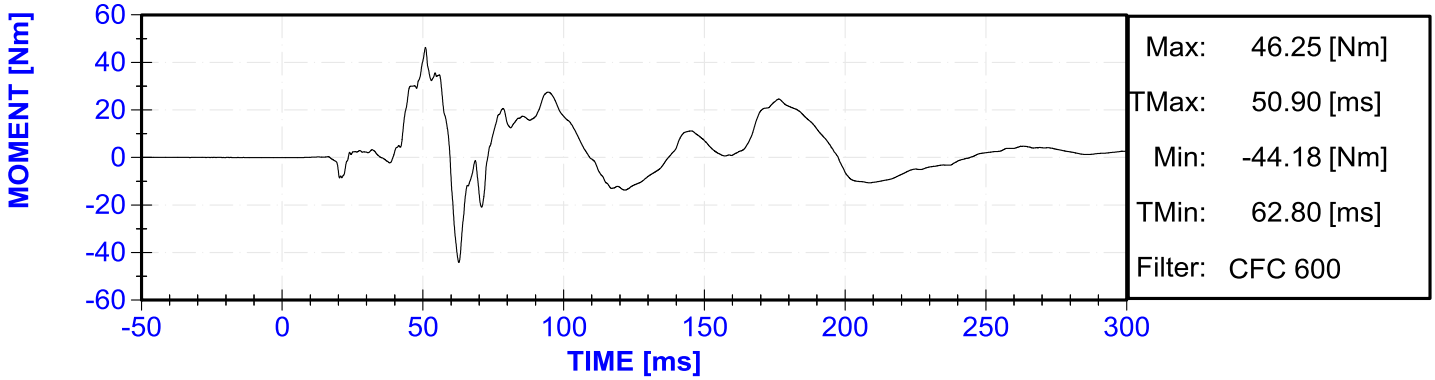
V2P1 RIGHT FEMUR MX



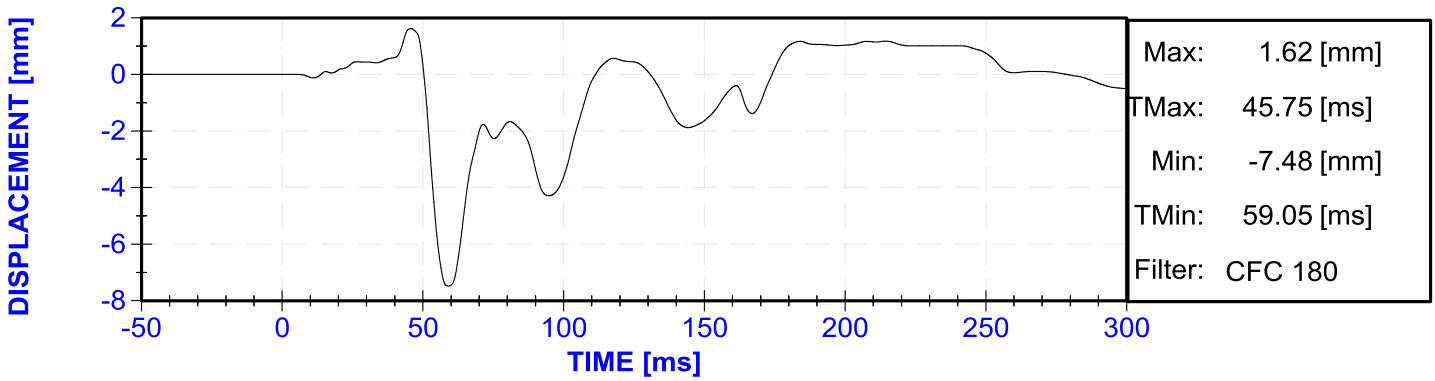
V2P1 RIGHT FEMUR MY



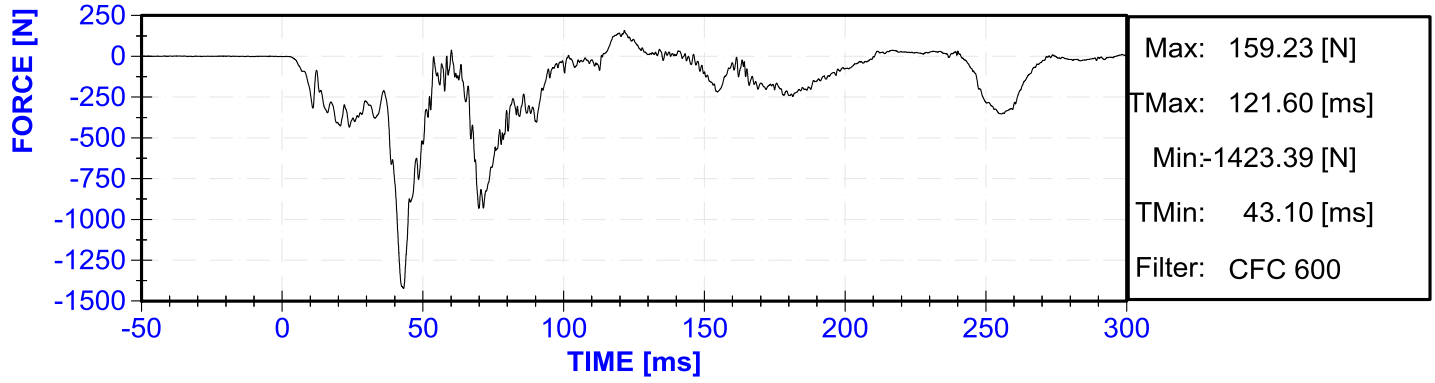
V2P1 RIGHT FEMUR MZ



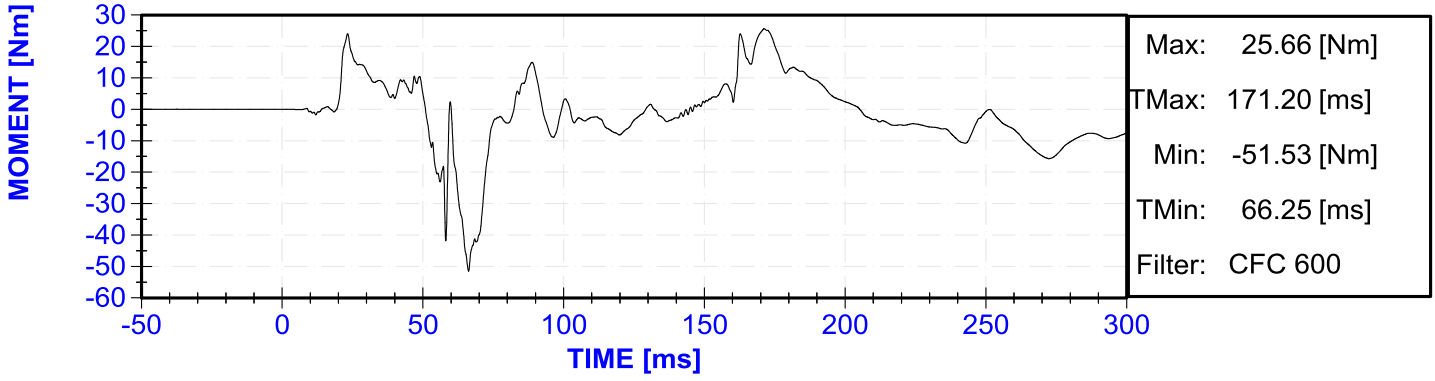
V2P1 KNEE LEFT DX



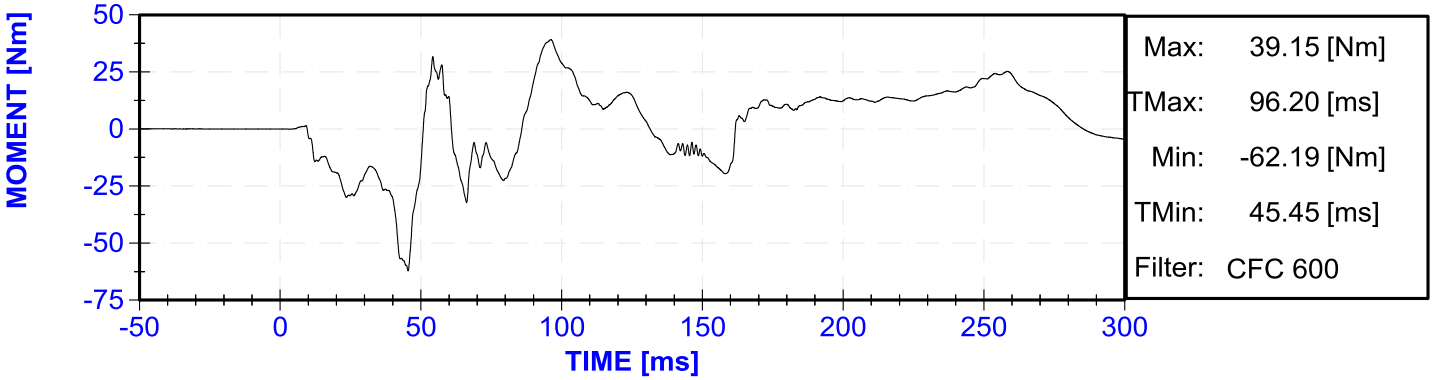
V2P1 TIBIA LEFT UPPER FZ



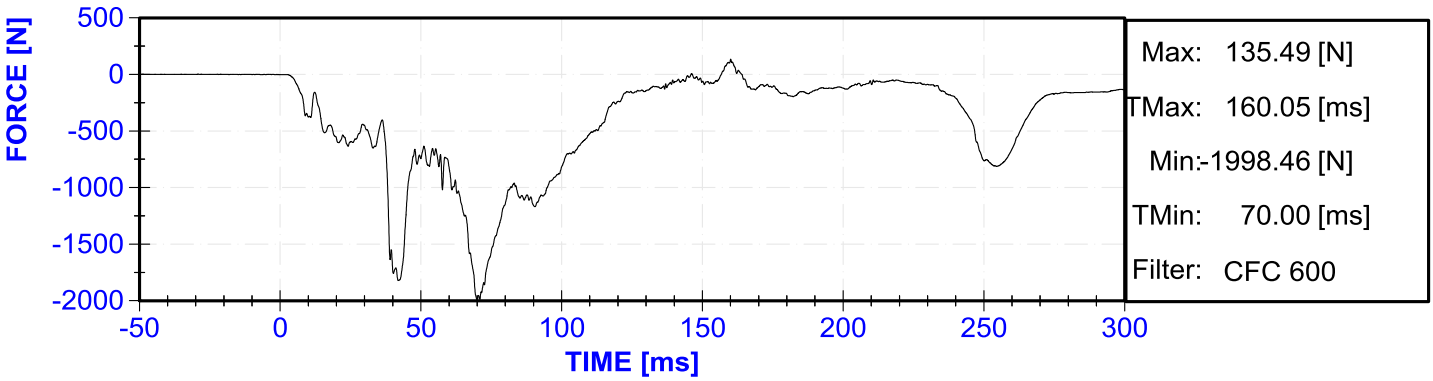
V2P1 TIBIA LEFT UPPER MX



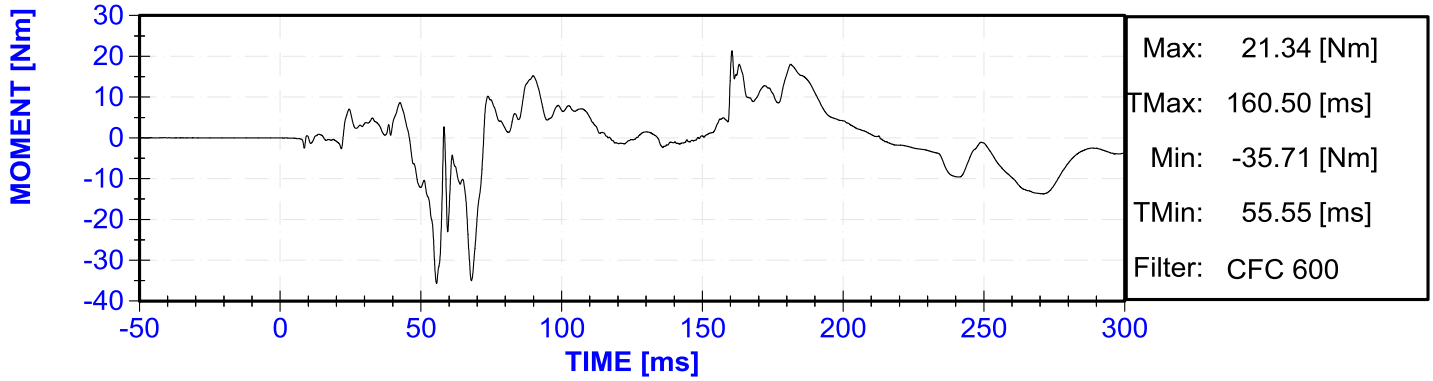
V2P1 TIBIA LEFT UPPER MY



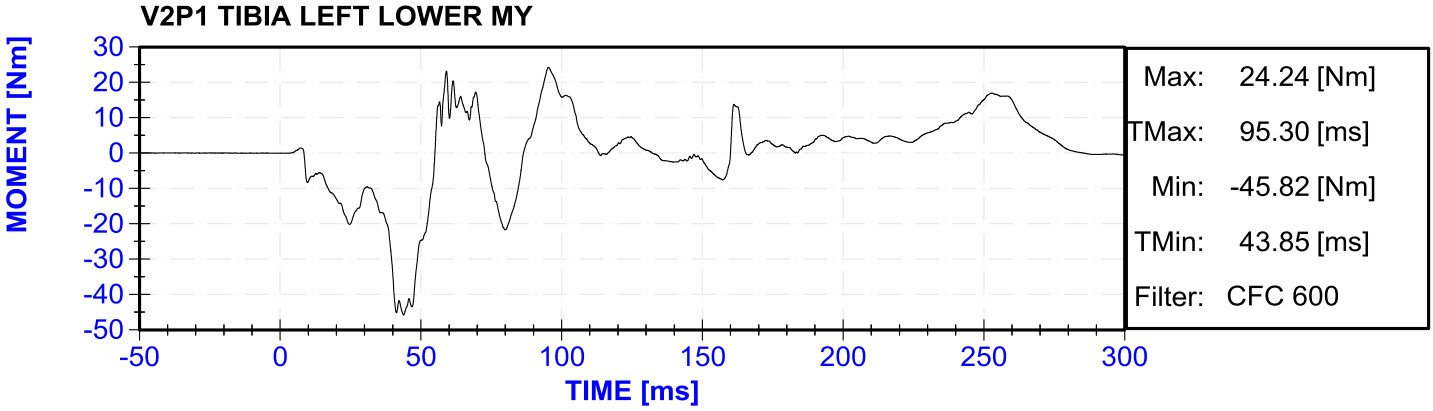
V2P1 TIBIA LEFT LOWER FZ

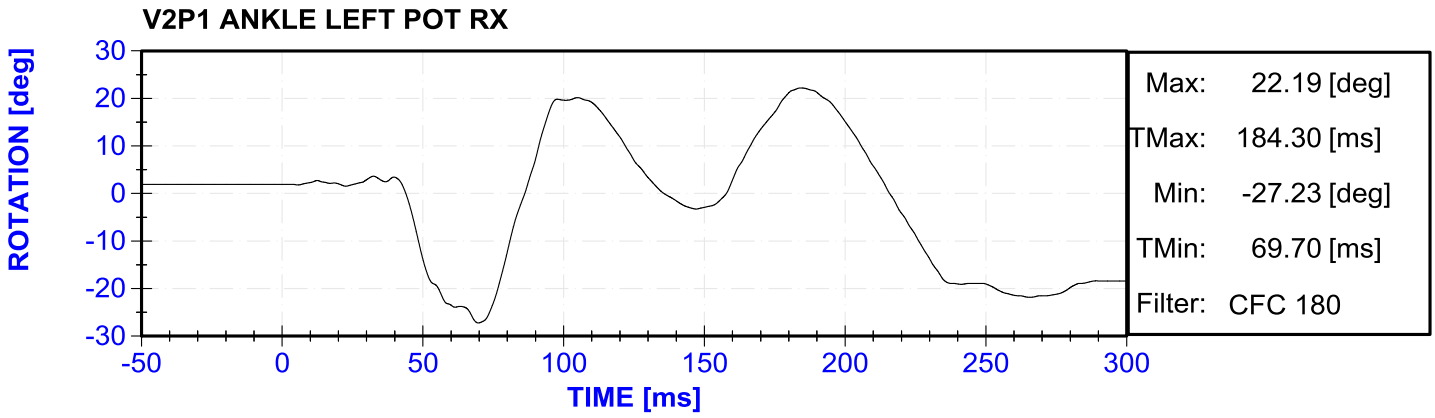


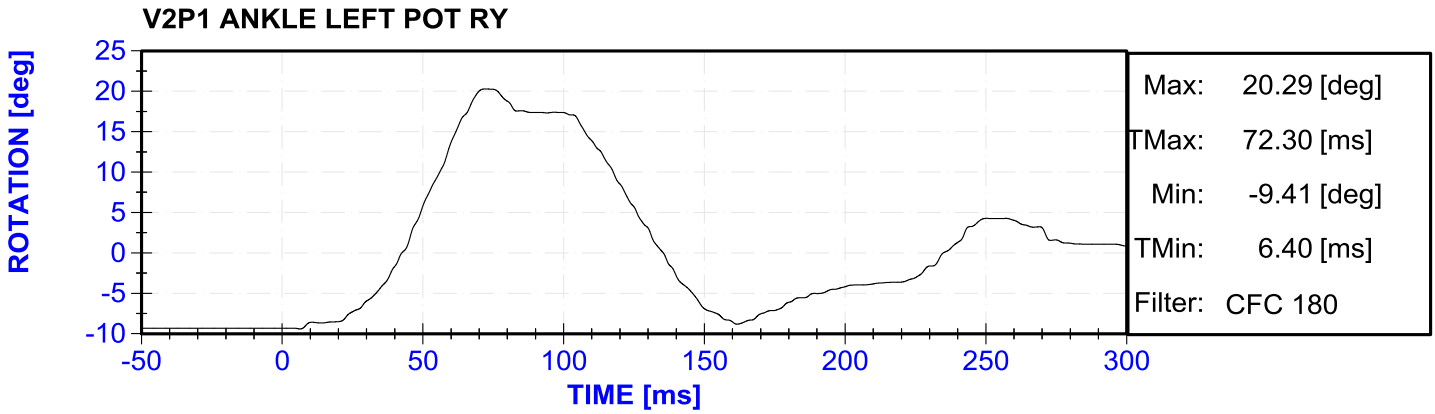
V2P1 TIBIA LEFT LOWER MX

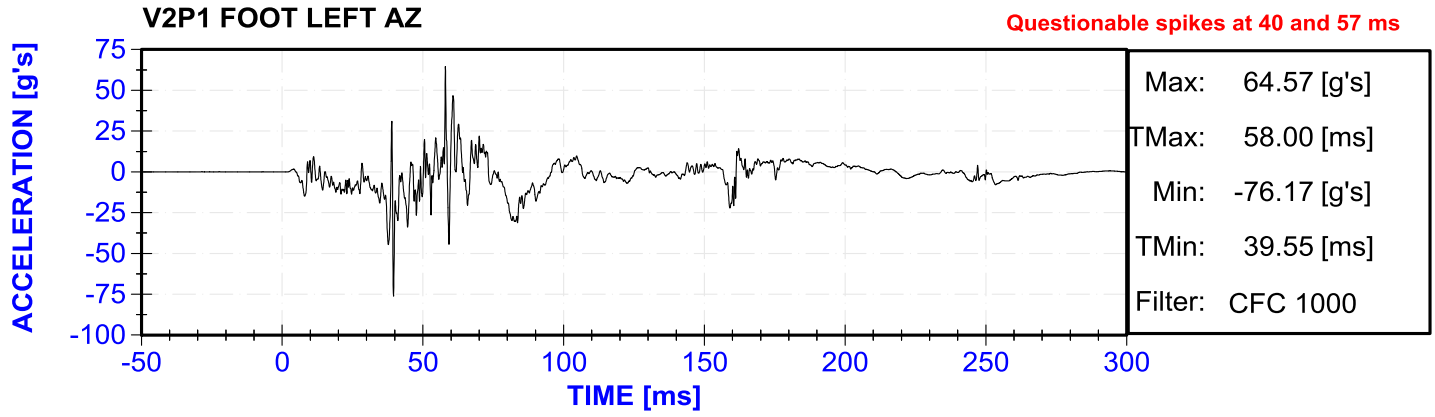


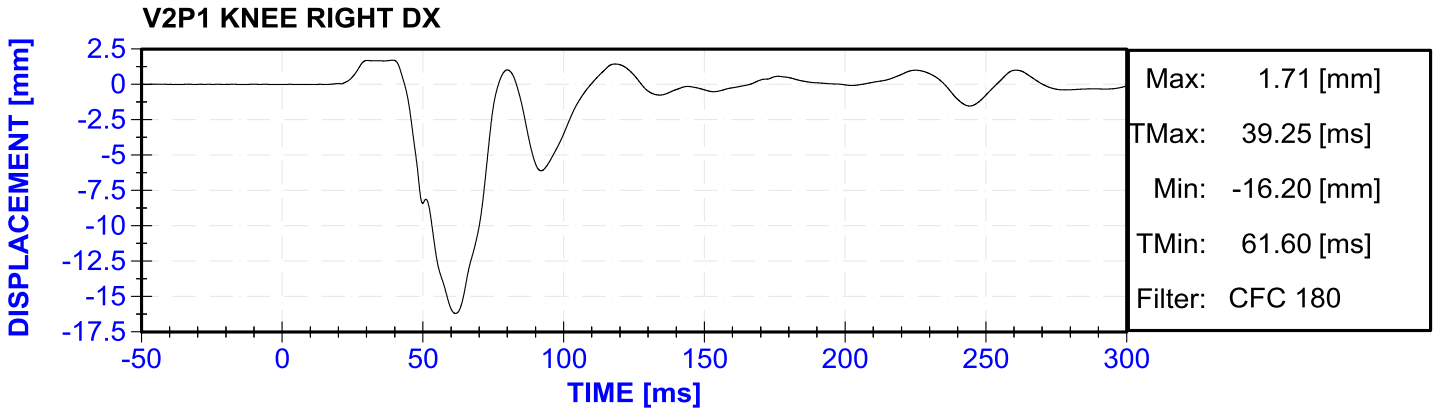
V2P1 TIBIA LEFT LOWER MY



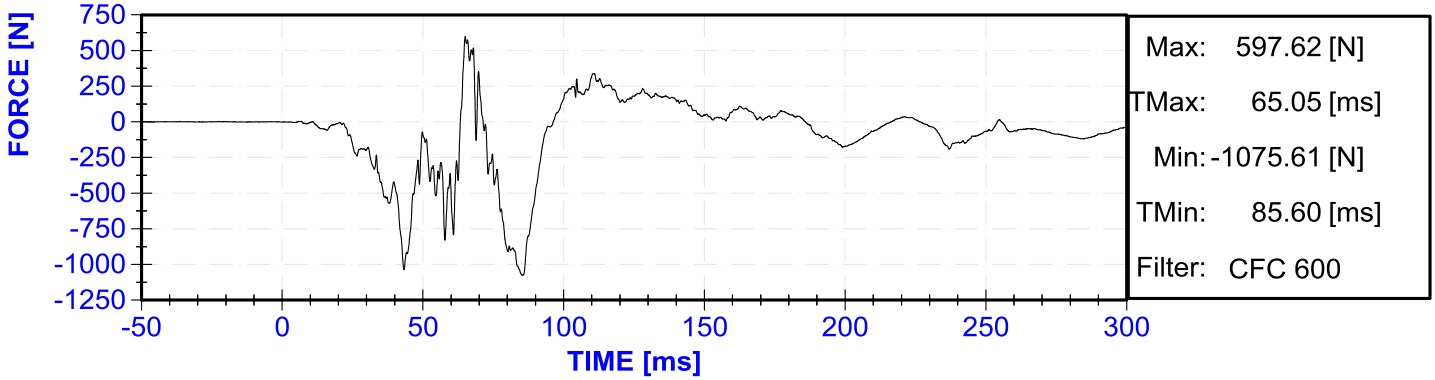

V2P1 ANKLE LEFT POT RX
ROTATION [deg]
30
20
10
0
-10
-20
-30
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 22.19 [deg]
TMax: 184.30 [ms]
Min: -27.23 [deg]
TMin: 69.70 [ms]
Filter: CFC 180


V2P1 ANKLE LEFT POT RY
ROTATION [deg]
25
20
15
10
5
0
-5
-10
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 20.29 [deg]
TMax: 72.30 [ms]
Min: -9.41 [deg]
TMin: 6.40 [ms]
Filter: CFC 180

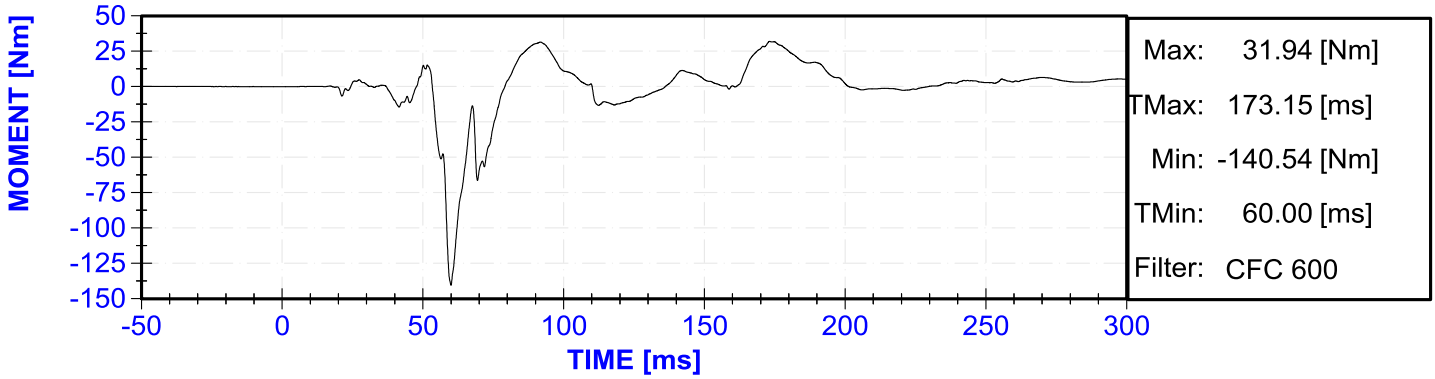

V2P1 FOOT LEFT AZ
Questionable spikes at 40 and 57 ms
ACCELERATION [g's]
75
50
25
0
-25
-50
-75
-100
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 64.57 [g's]
TMax: 58.00 [ms]
Min: -76.17 [g's]
TMin: 39.55 [ms]
Filter: CFC 1000


V2P1 KNEE RIGHT DX
DISPLACEMENT [mm]
2.5
0
-2.5
-5
-7.5
-10
-12.5
-15
-17.5
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 1.71 [mm]
TMax: 39.25 [ms]
Min: -16.20 [mm]
TMin: 61.60 [ms]
Filter: CFC 180

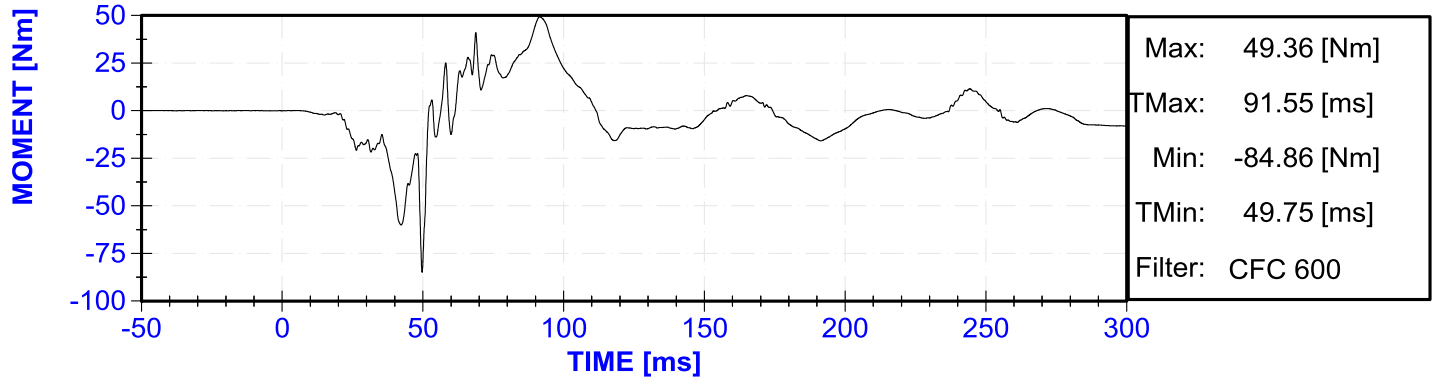
V2P1 TIBIA RIGHT UPPER FZ



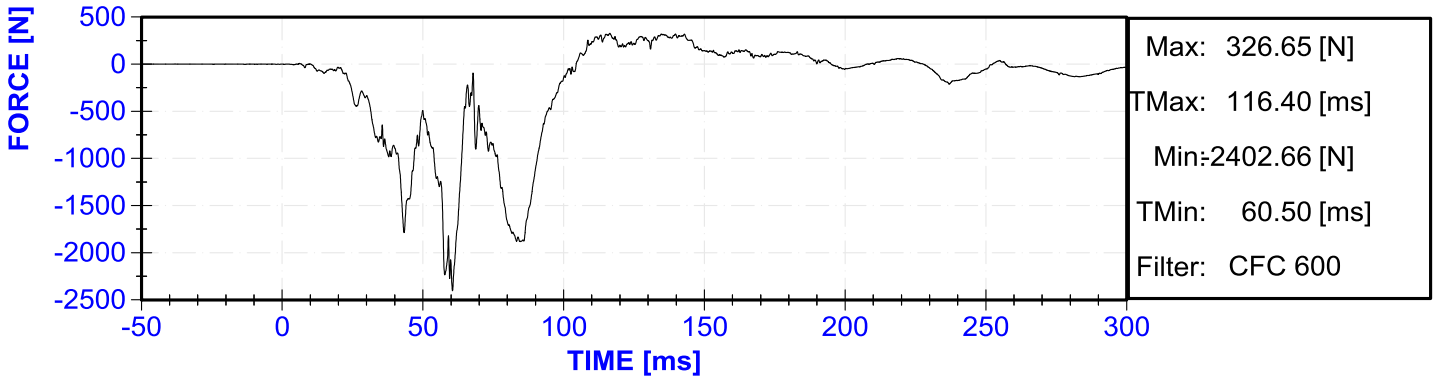
V2P1 TIBIA RIGHT UPPER MX



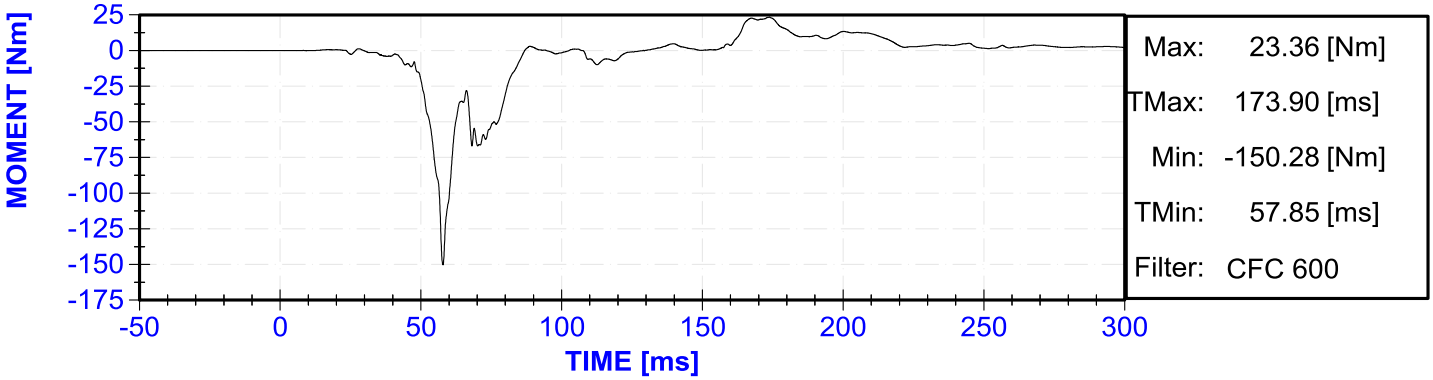
V2P1 TIBIA RIGHT UPPER MY



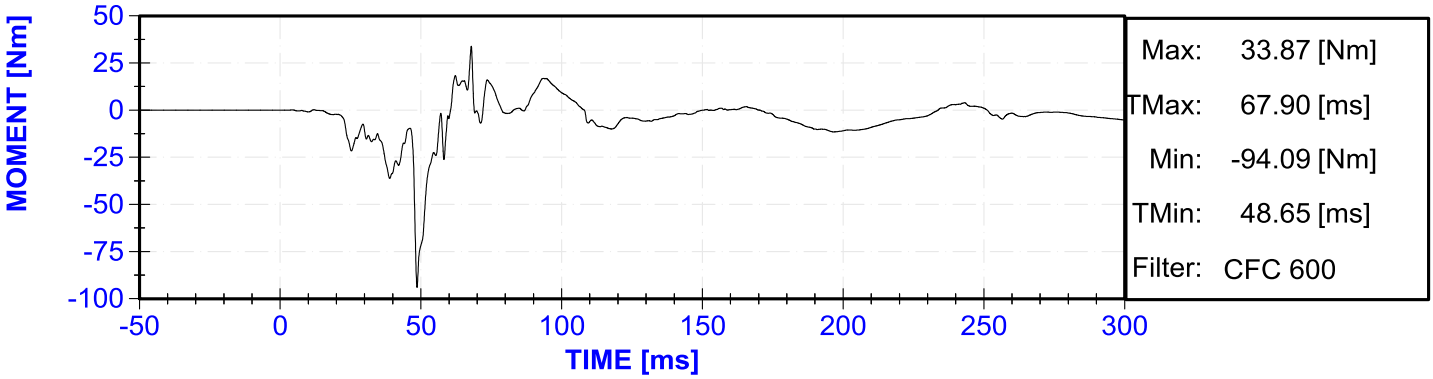
V2P1 TIBIA RIGHT LOWER FZ



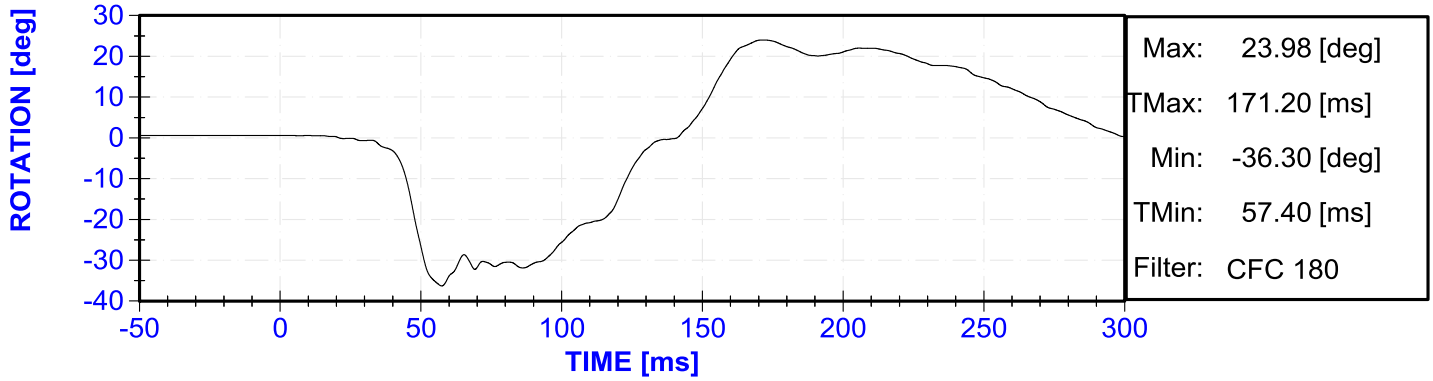
V2P1 TIBIA RIGHT LOWER MX



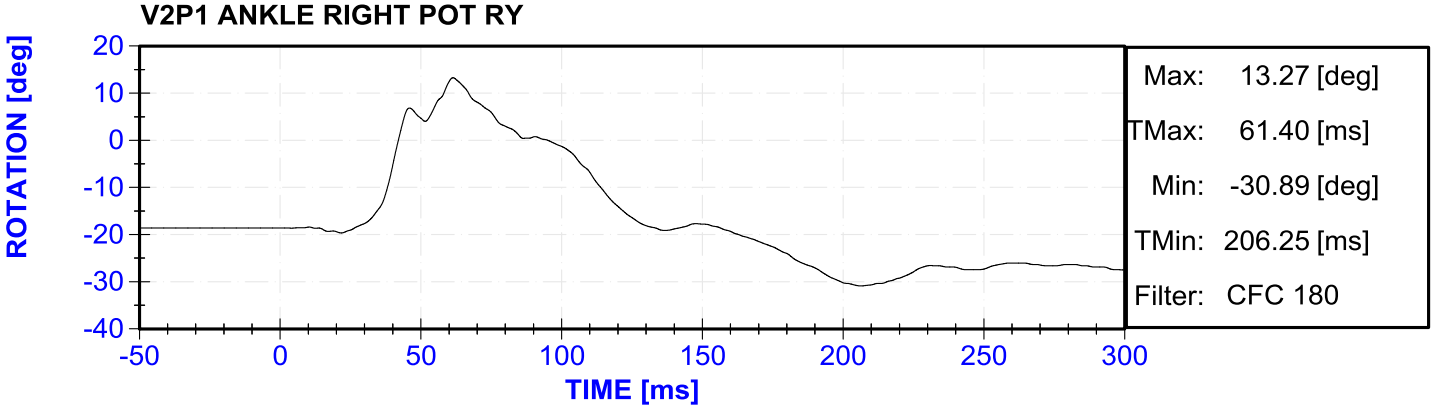
V2P1 TIBIA RIGHT LOWER MY



V2P1 ANKLE RIGHT POT RX

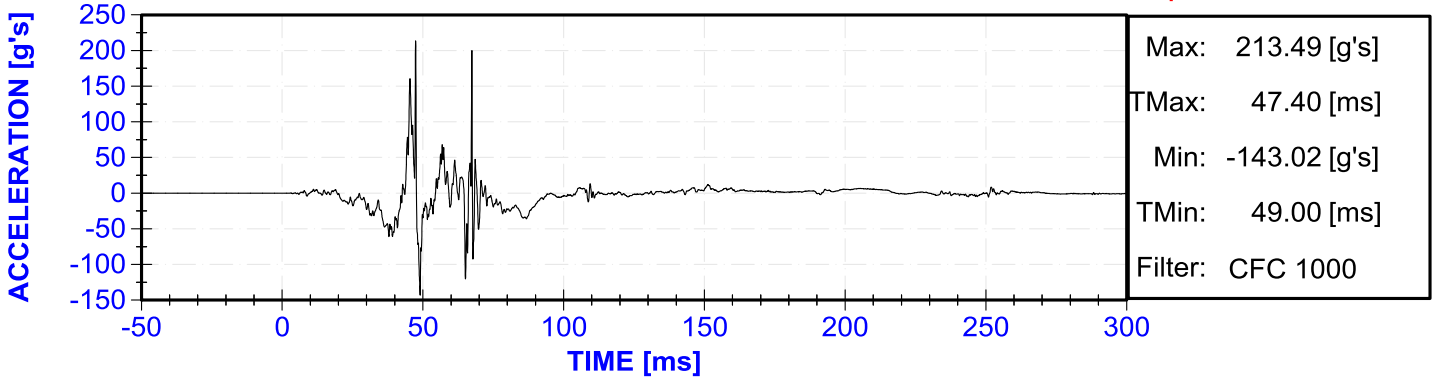


V2P1 ANKLE RIGHT POT RY

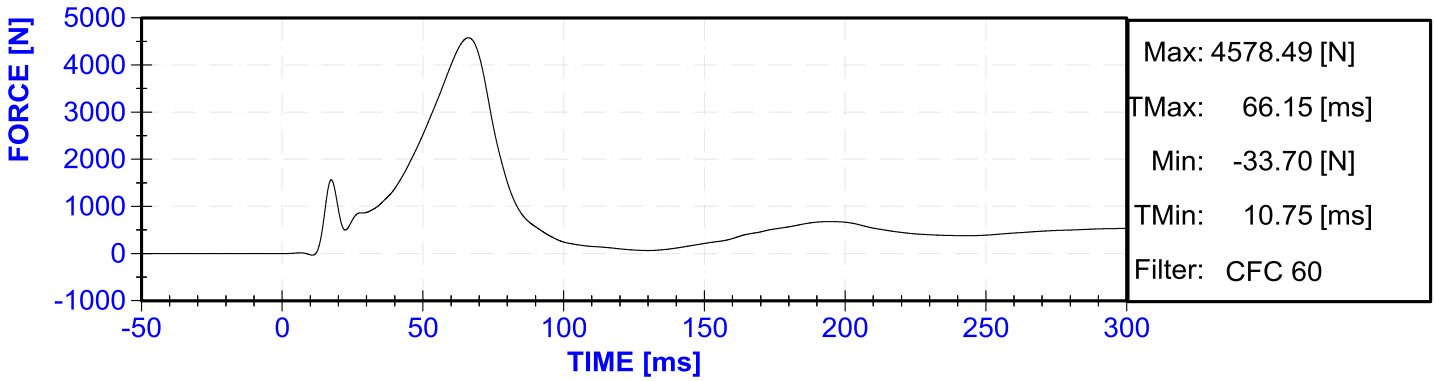


V2P1 FOOT RIGHT AZ

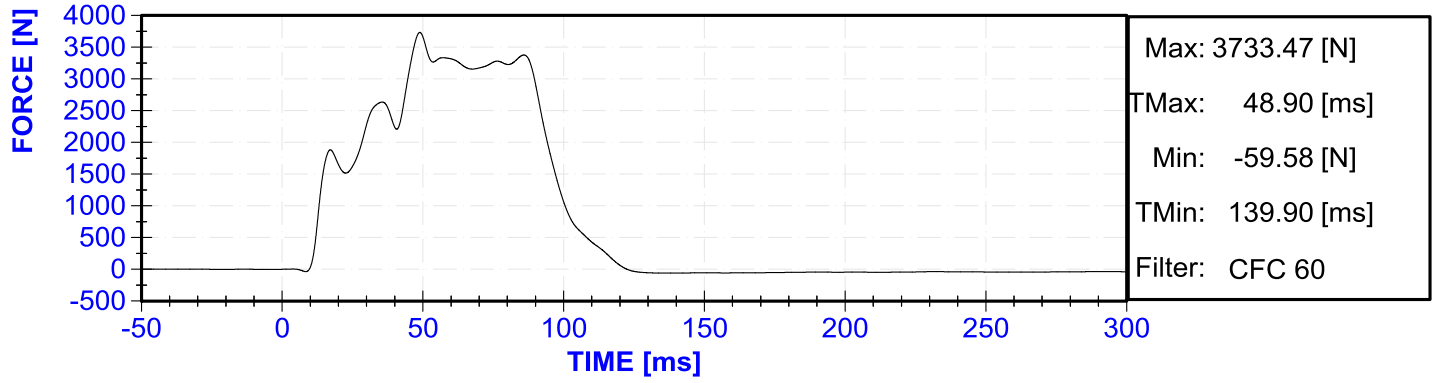
Questionable spikes at 48 and 67 ms



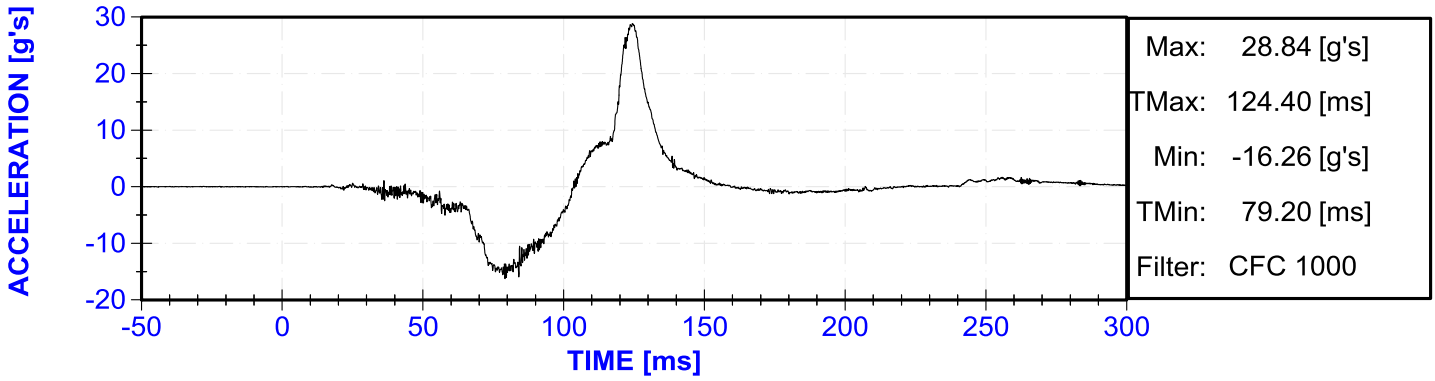
V2 P1 DRIVER LAP BELT



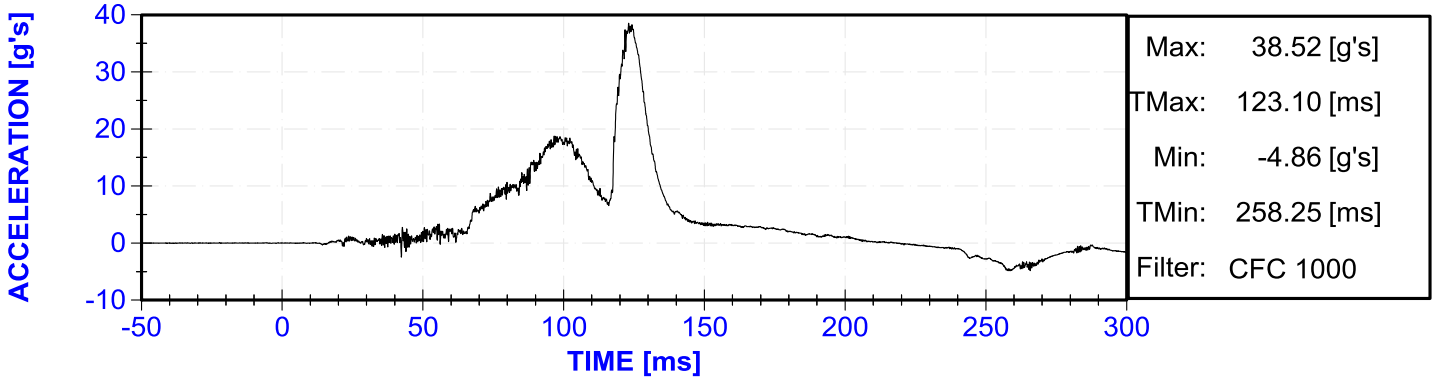
V2 P1 DRIVER SHOULDER BELT



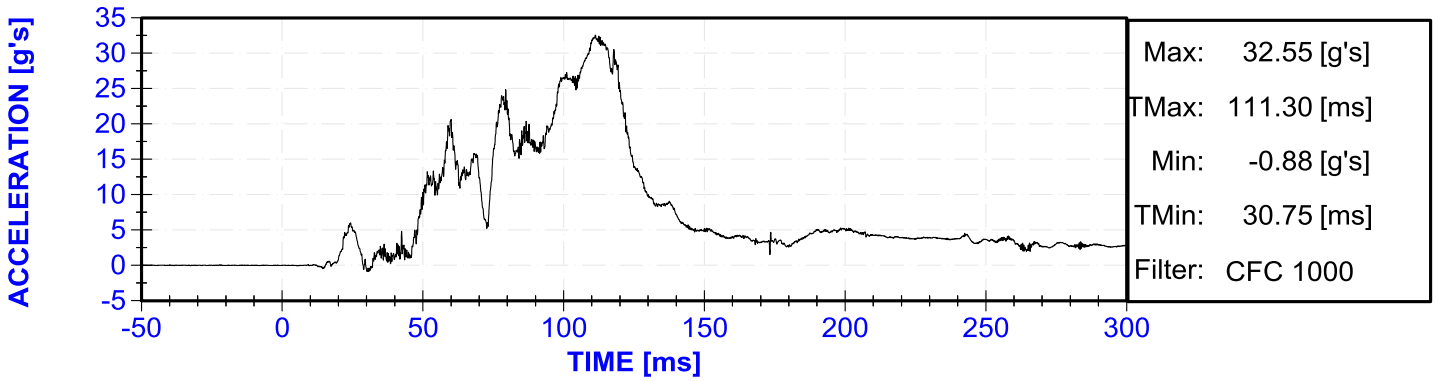
V2P2 HEAD CG X



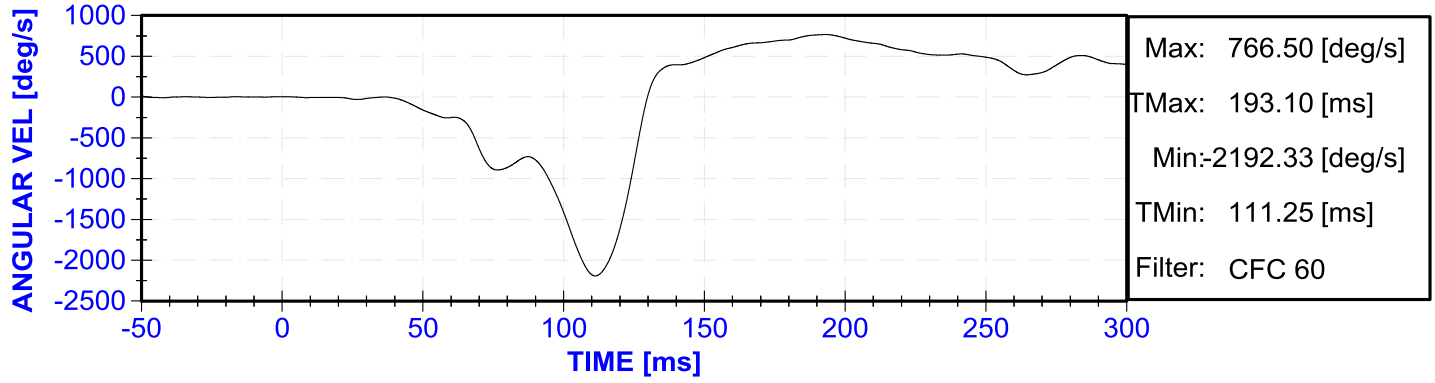
V2P2 HEAD CG Y



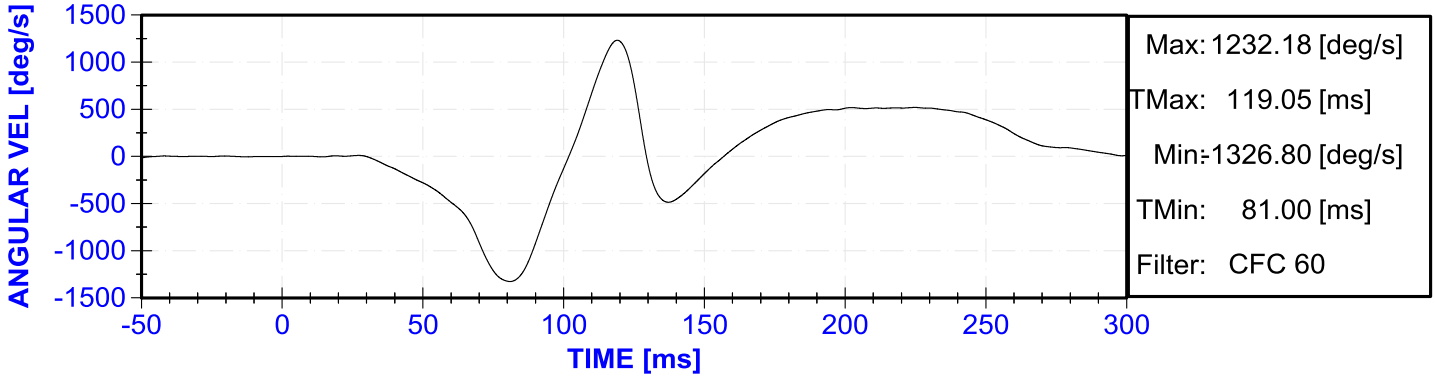
V2P2 HEAD CG Z



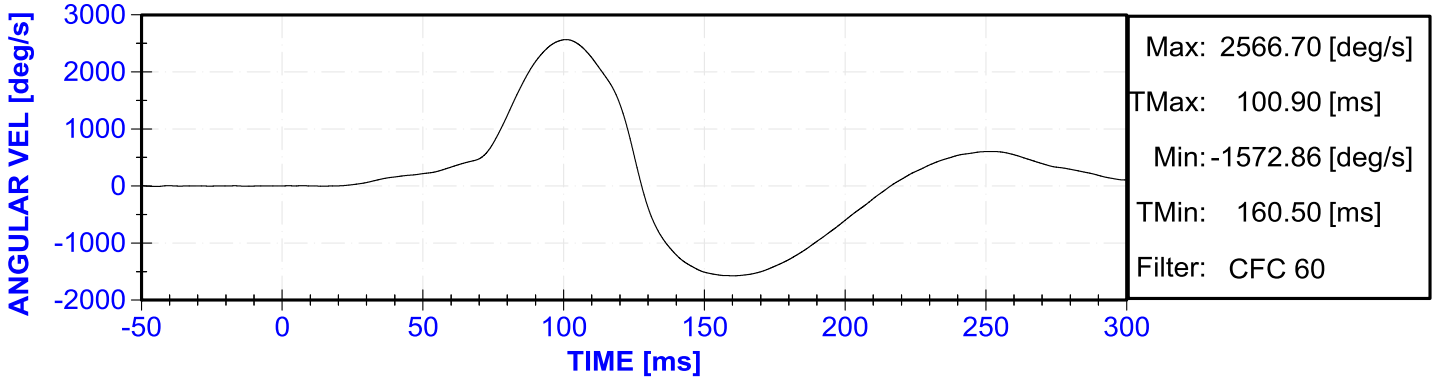
V2P2 HEAD CG WX



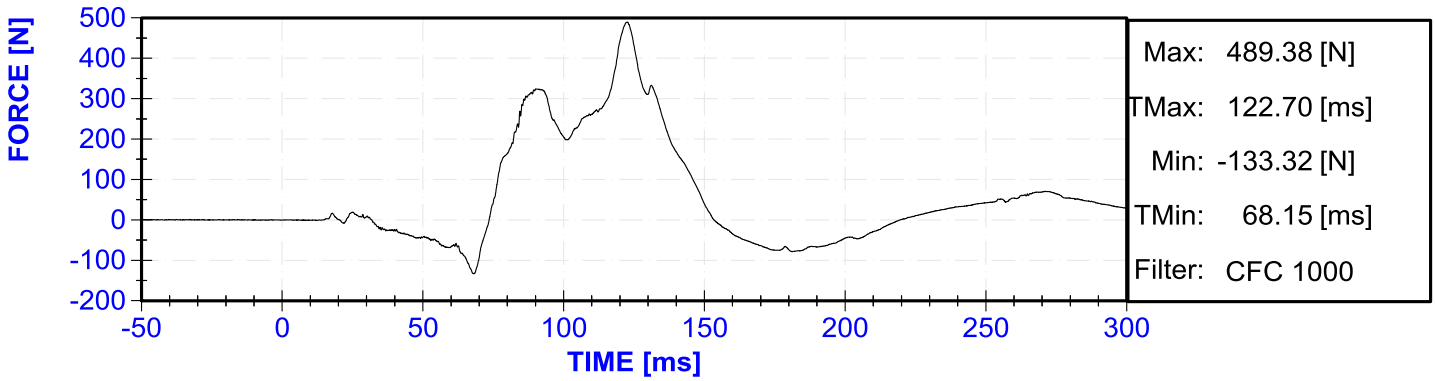
V2P2 HEAD CG WY



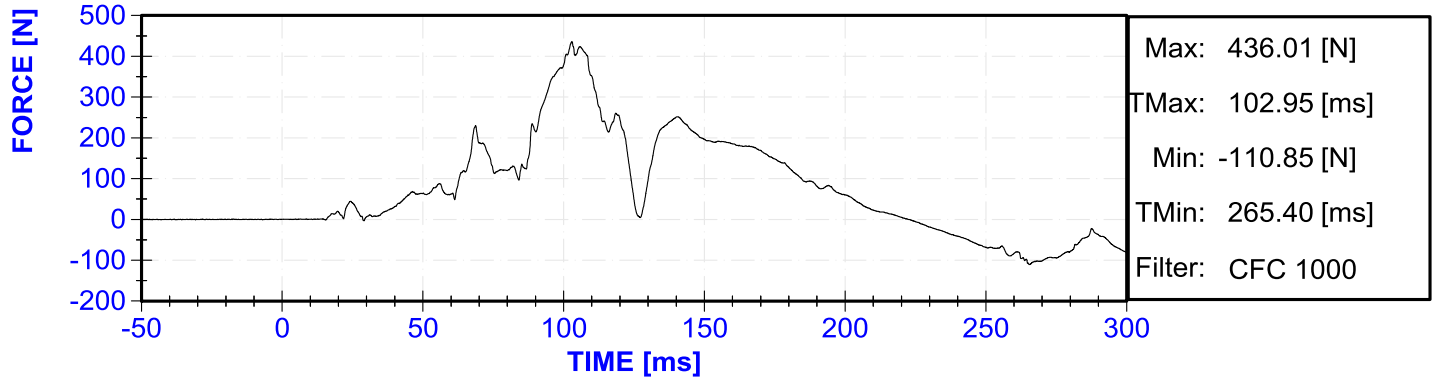
V2P2 HEAD CG WZ



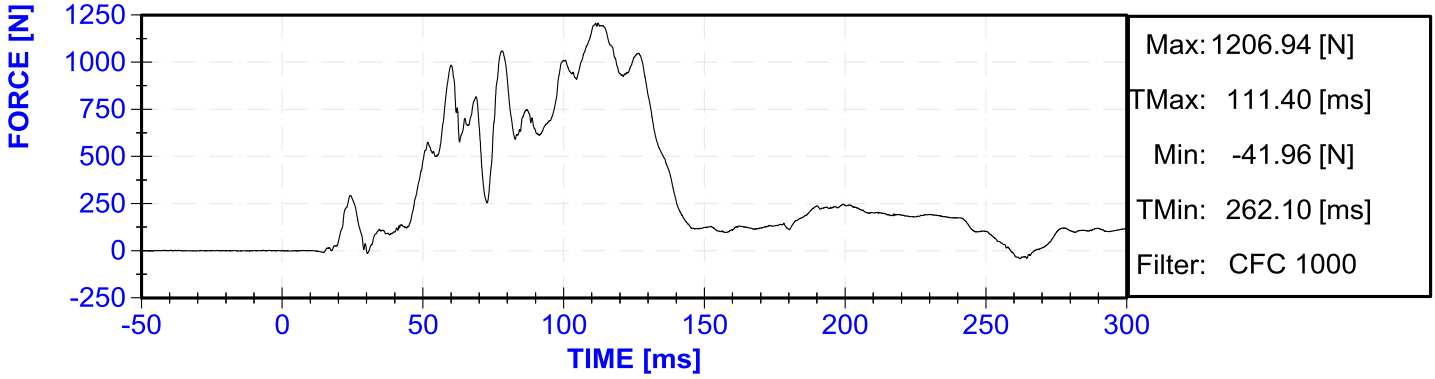
V2P2 NECK UPPER FX



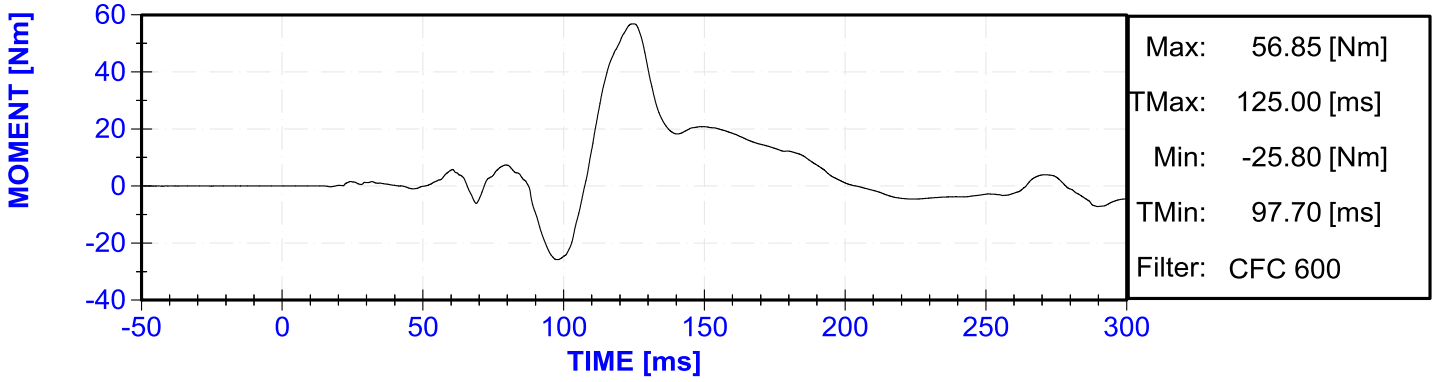
V2P2 NECK UPPER FY



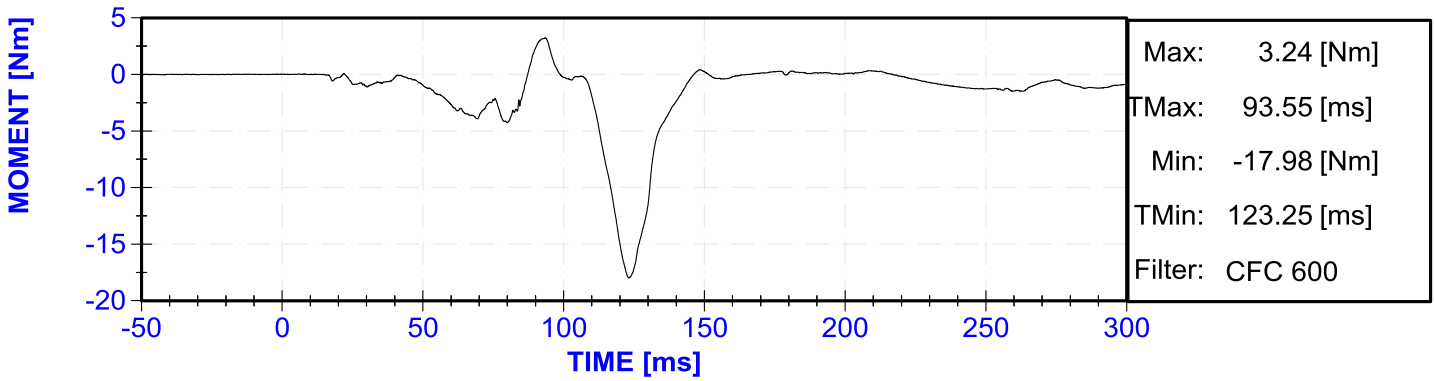
V2P2 NECK UPPER FZ



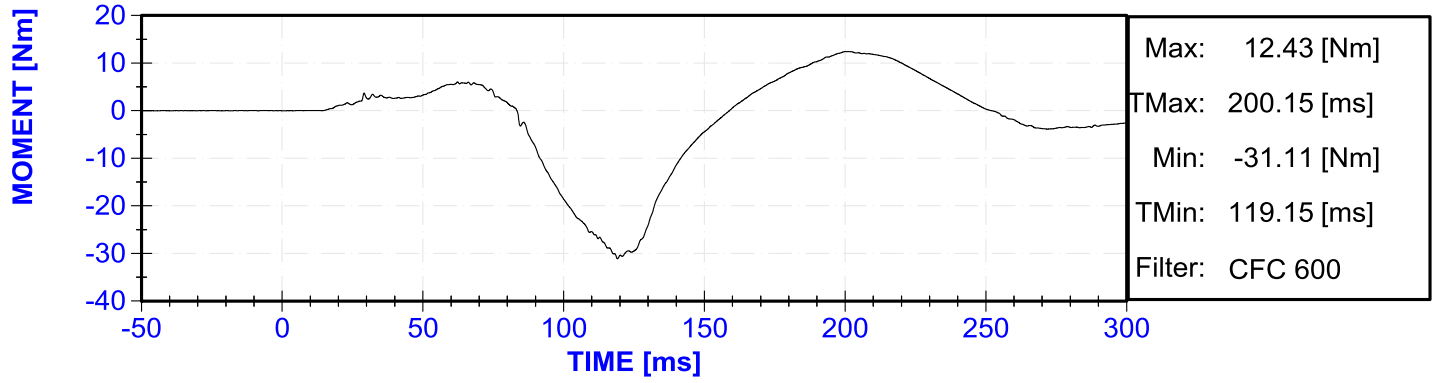
V2P2 NECK UPPER MX



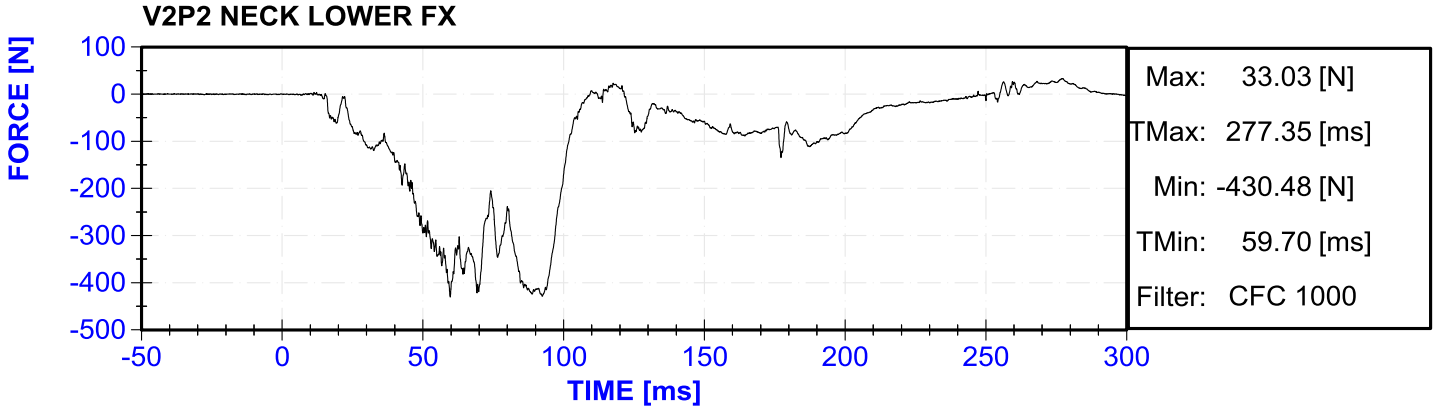
V2P2 NECK UPPER MY



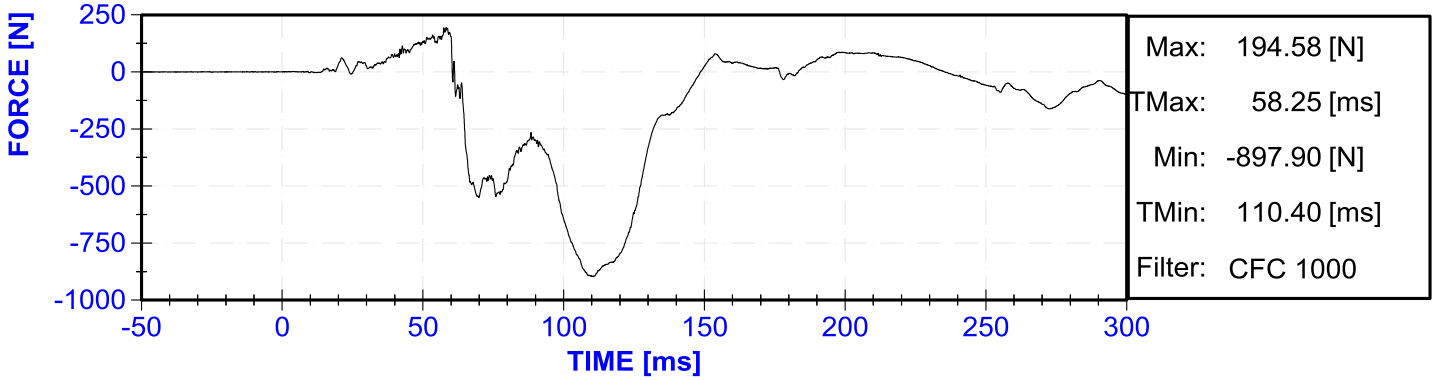
V2P2 NECK UPPER MZ



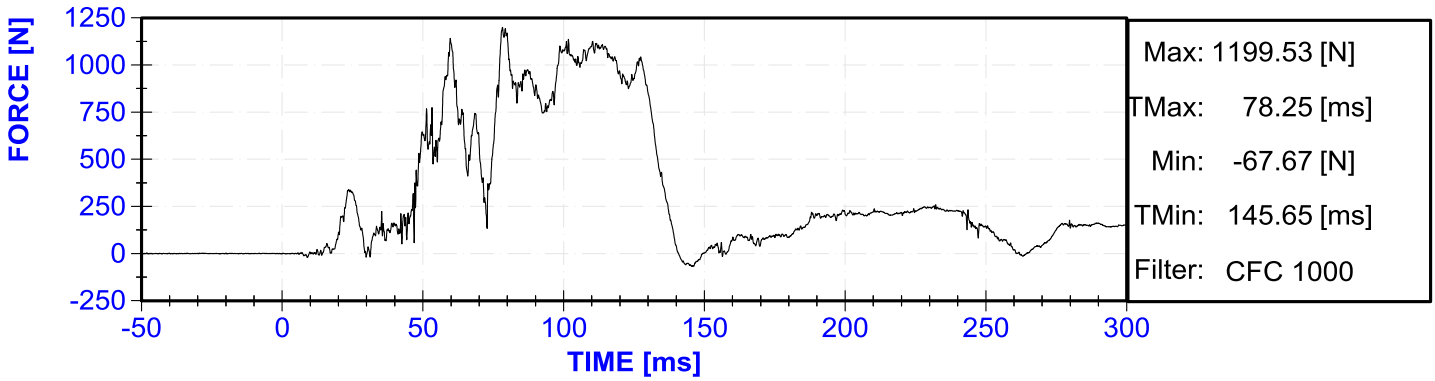
V2P2 NECK LOWER FX



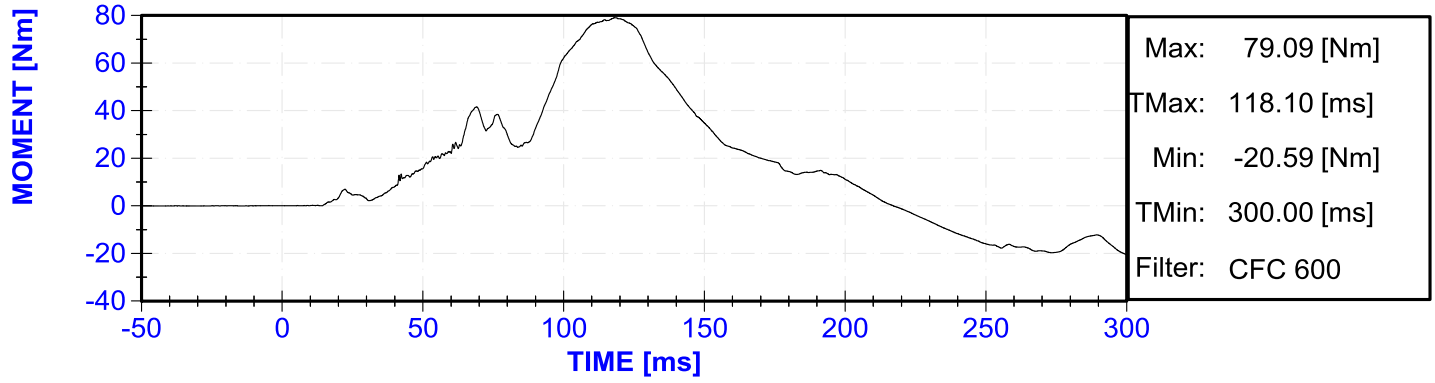
V2P2 NECK LOWER FY



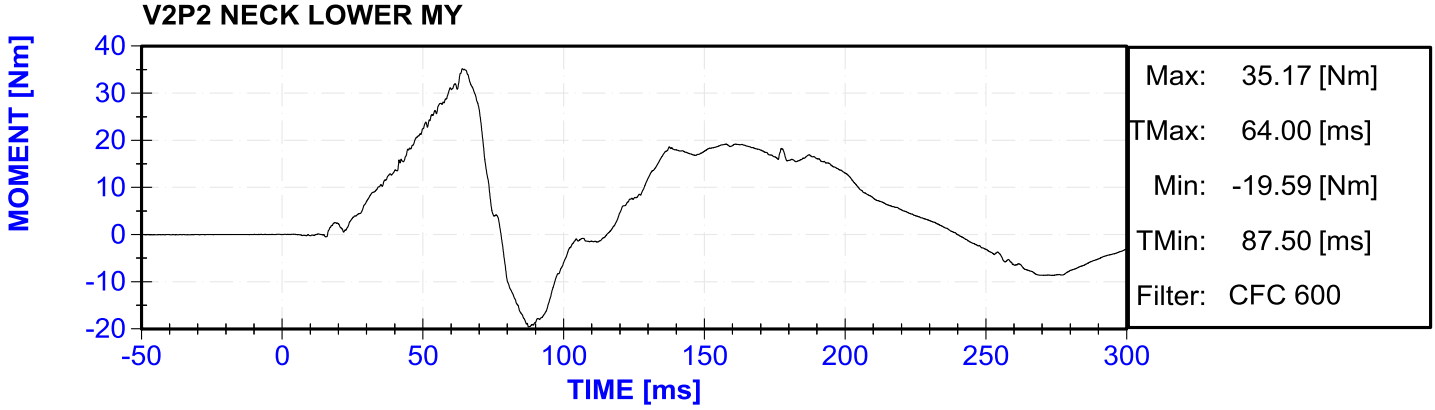
V2P2 NECK LOWER FZ



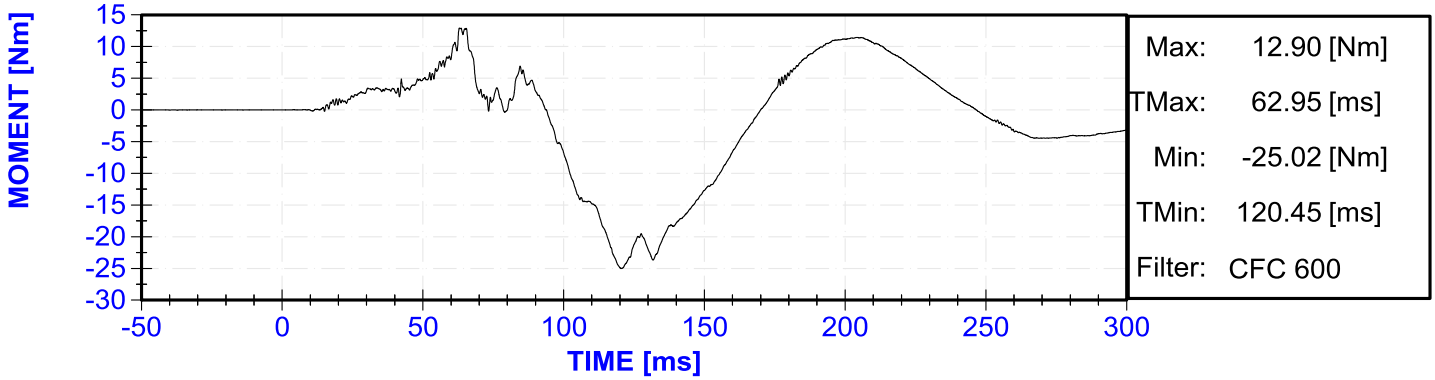
V2P2 NECK LOWER MX



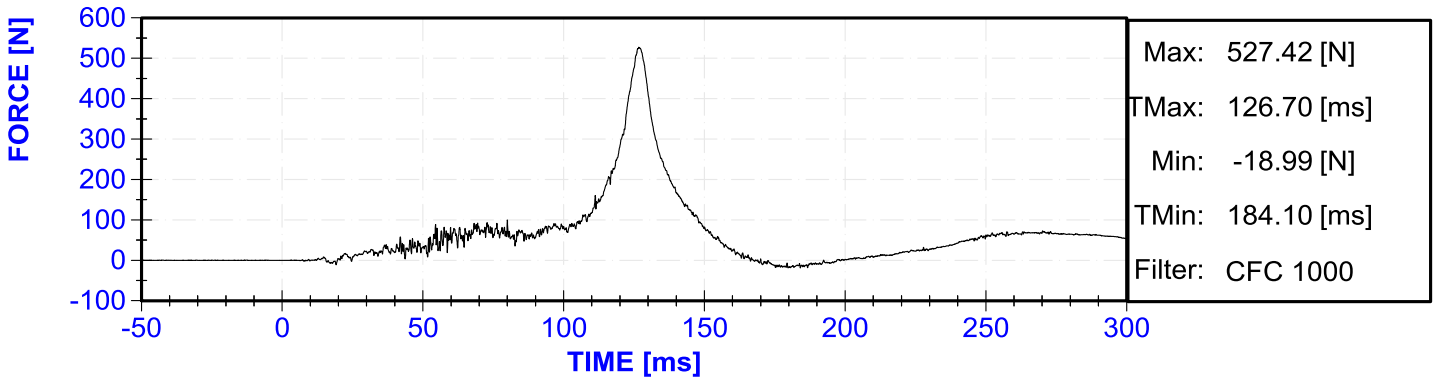
V2P2 NECK LOWER MY



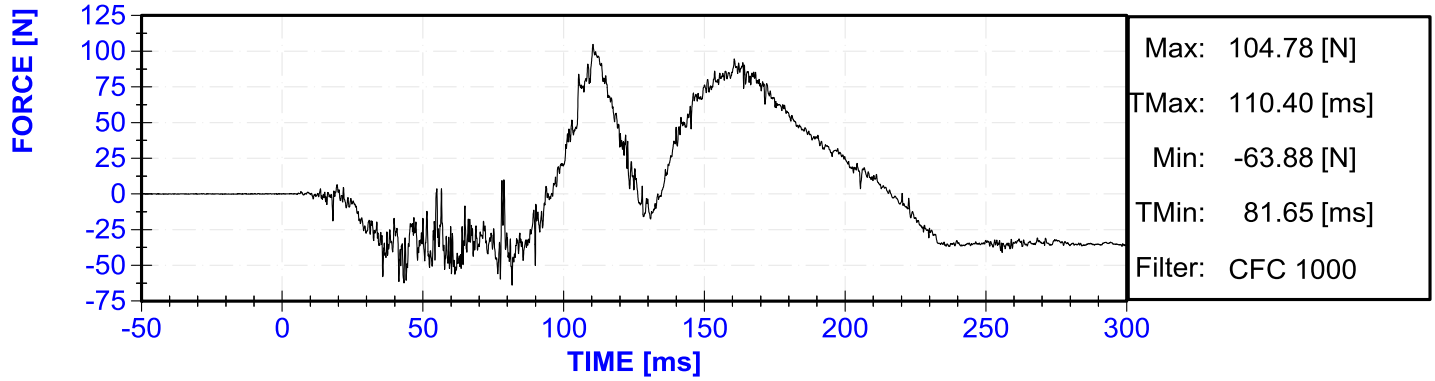
V2P2 NECK LOWER MZ



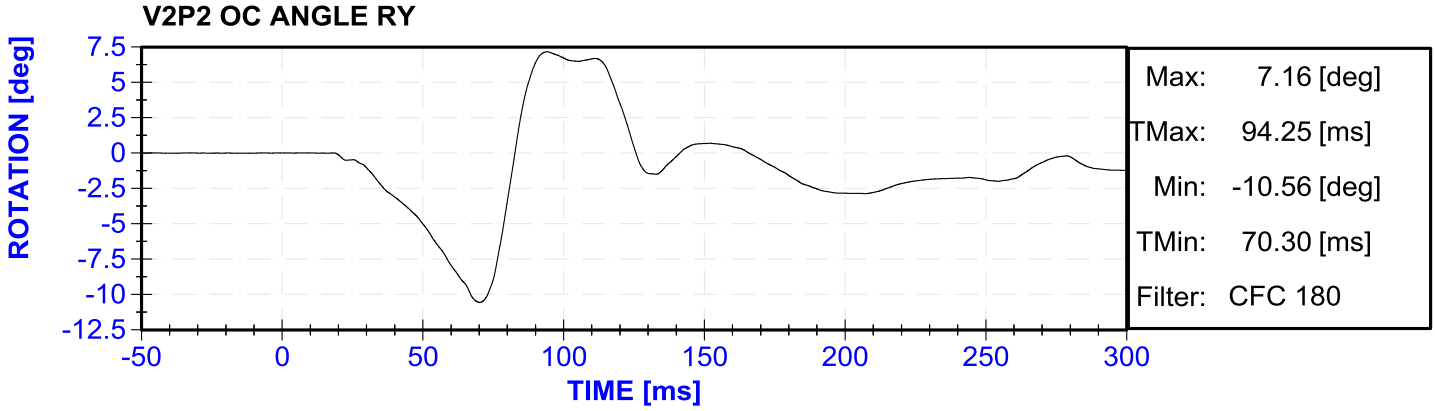
V2P2 NECK SPRING LOAD CELL - FRONT

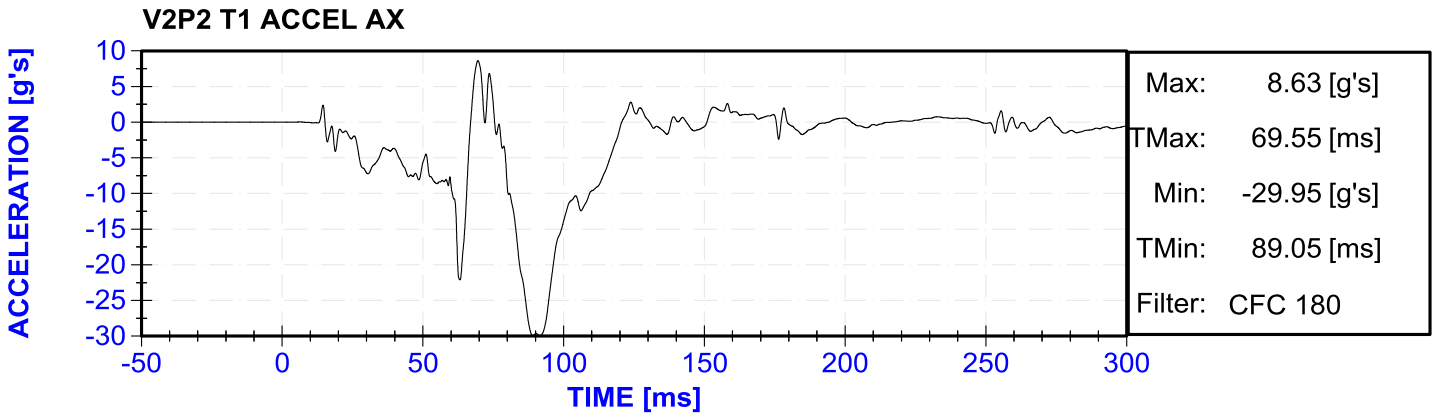


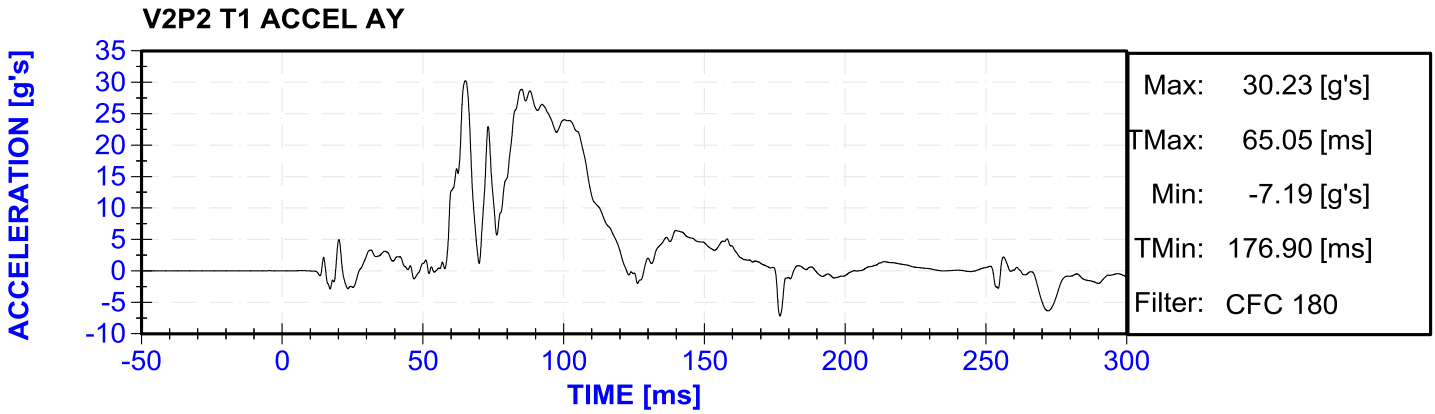
V2P2 NECK SPRING LOAD CELL - REAR

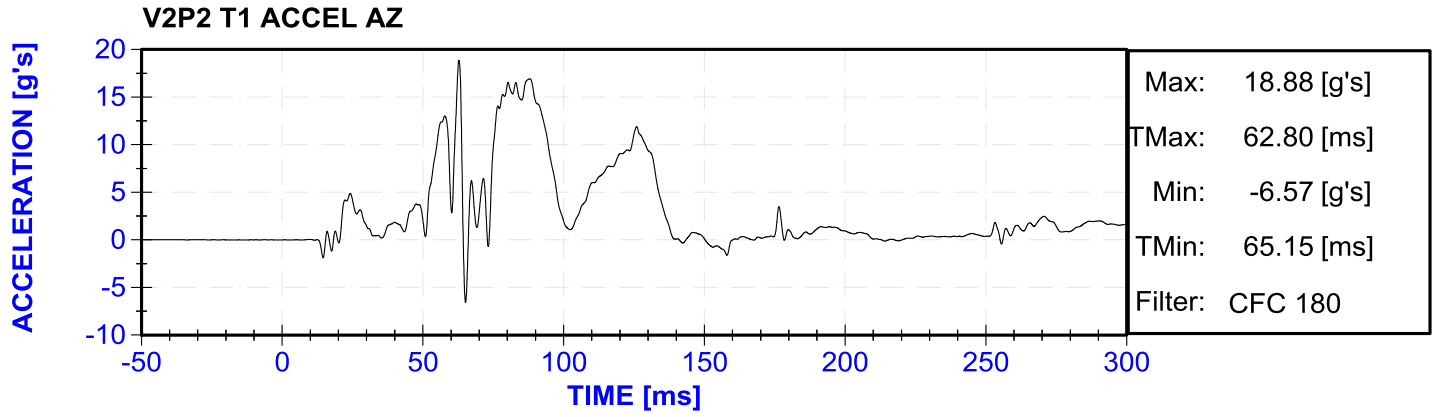


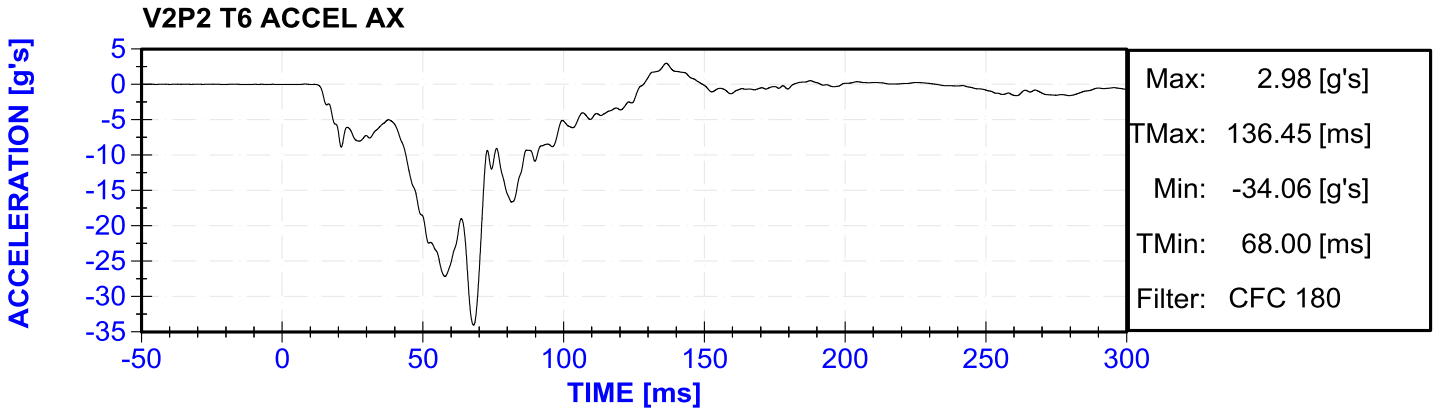
V2P2 OC ANGLE RY



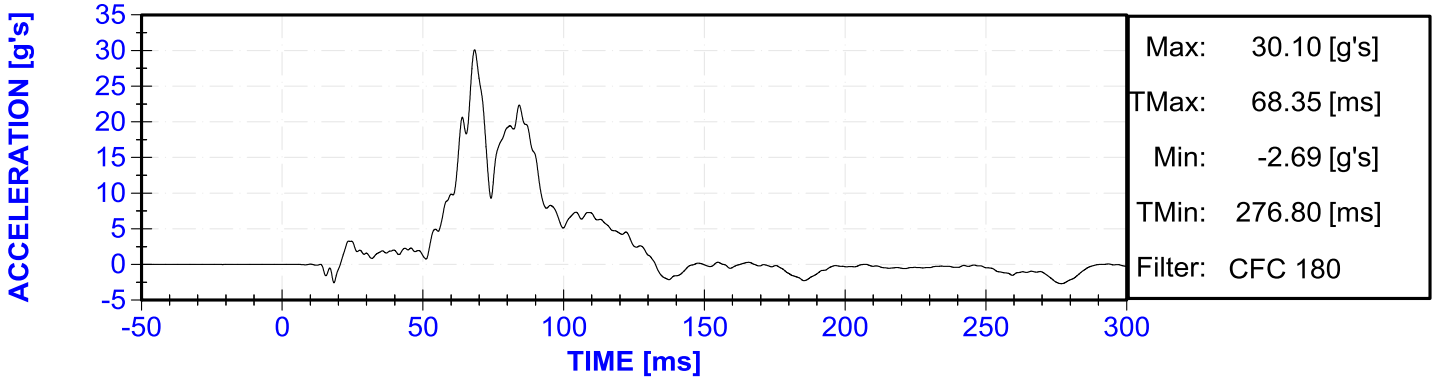

V2P2 T1 ACCEL AX
ACCELERATION [g's]
TIME [ms]
Max: 8.63 [g's]
TMax: 69.55 [ms]
Min: -29.95 [g's]
TMin: 89.05 [ms]
Filter: CFC 180


V2P2 T1 ACCEL AY
ACCELERATION [g's]
TIME [ms]
Max: 30.23 [g's]
TMax: 65.05 [ms]
Min: -7.19 [g's]
TMin: 176.90 [ms]
Filter: CFC 180

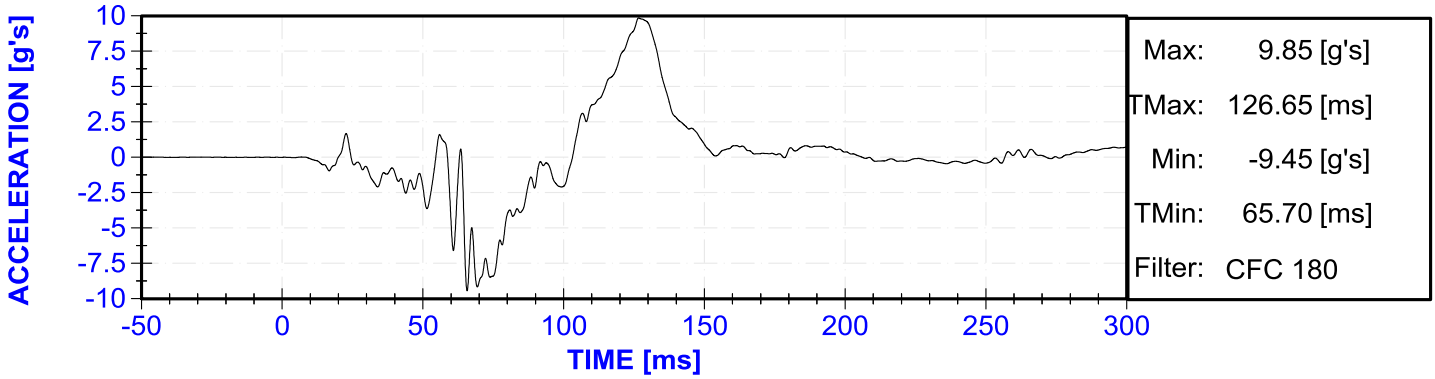

V2P2 T1 ACCEL AZ
ACCELERATION [g's]
TIME [ms]
Max: 18.88 [g's]
TMax: 62.80 [ms]
Min: -6.57 [g's]
TMin: 65.15 [ms]
Filter: CFC 180


V2P2 T6 ACCEL AX
ACCELERATION [g's]
TIME [ms]
Max: 2.98 [g's]
TMax: 136.45 [ms]
Min: -34.06 [g's]
TMin: 68.00 [ms]
Filter: CFC 180

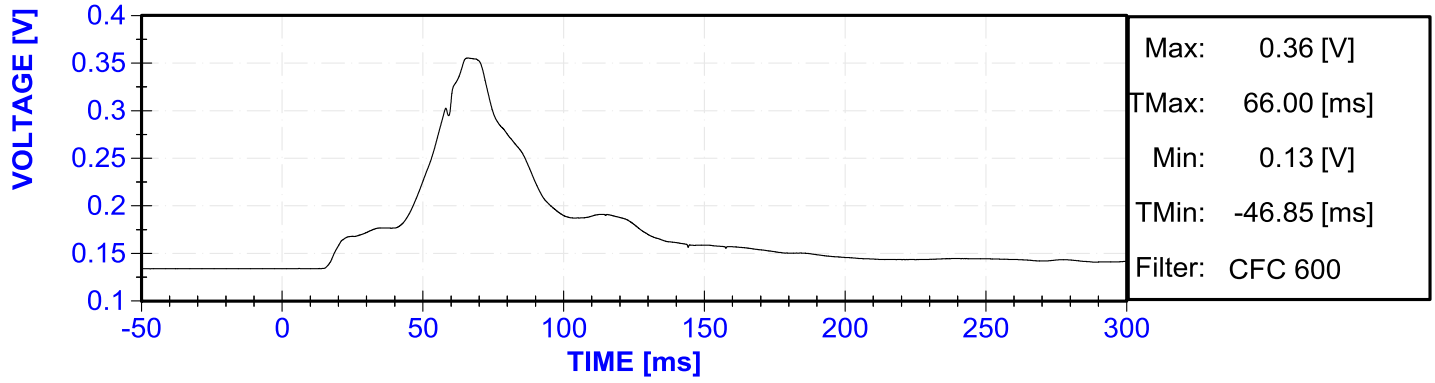
V2P2 T6 ACCEL AY



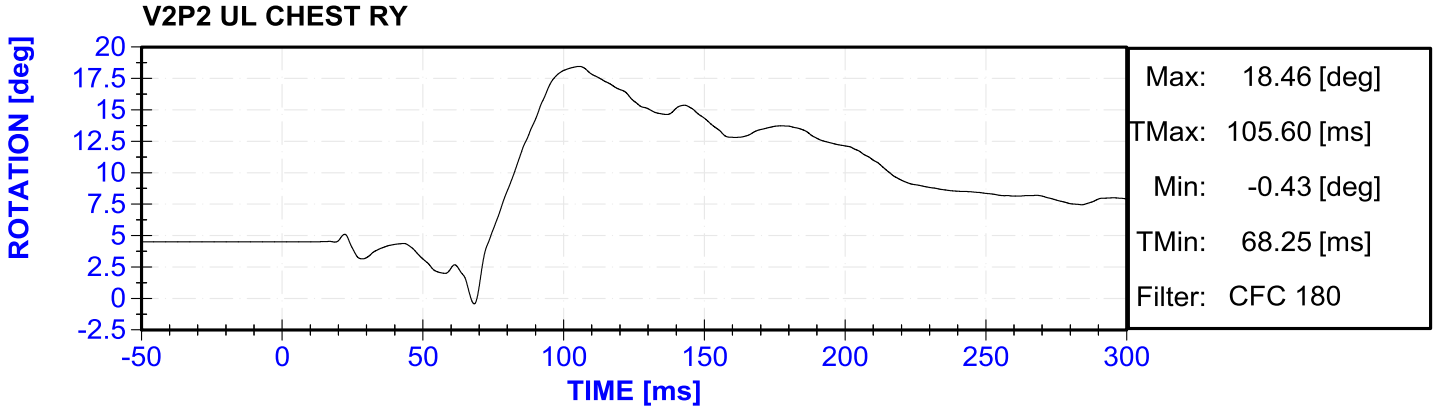
V2P2 T6 ACCEL AZ

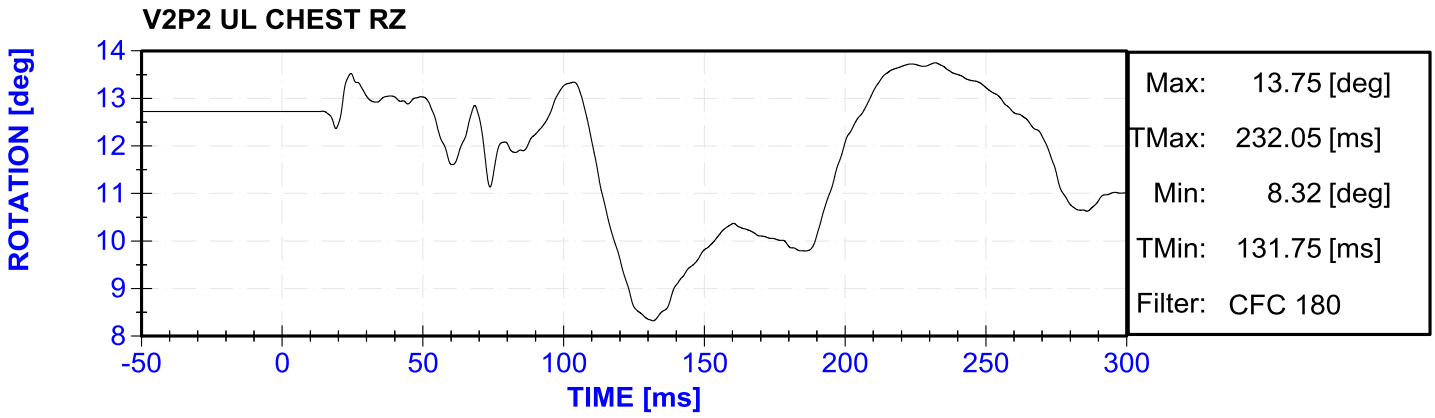


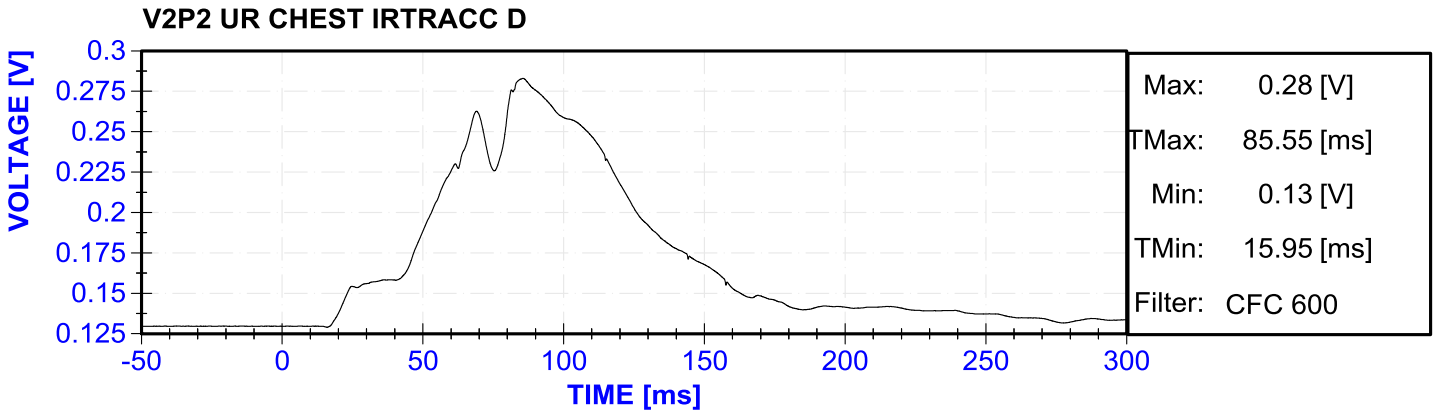
V2P2 UL CHEST IRTRACC D

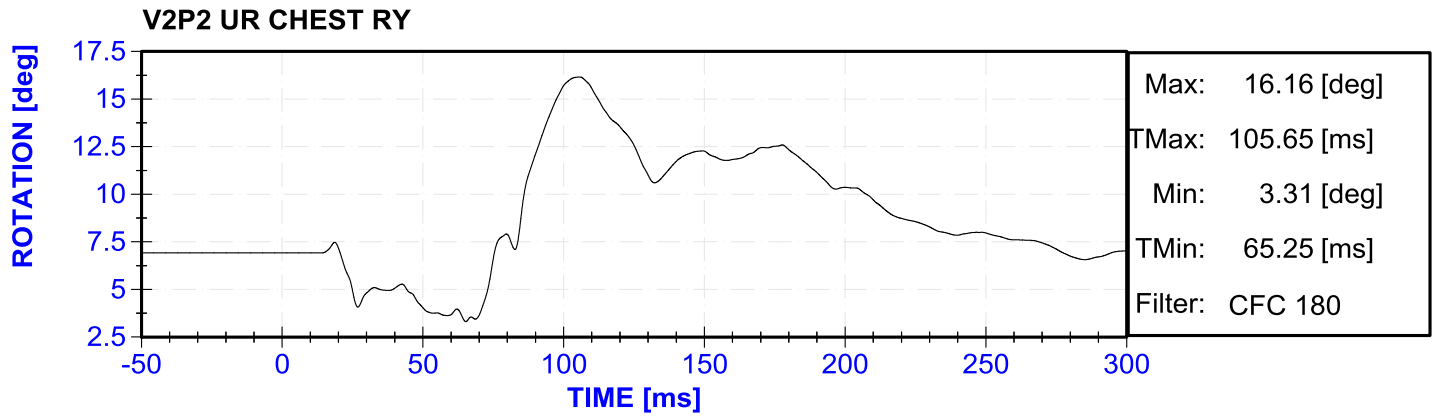


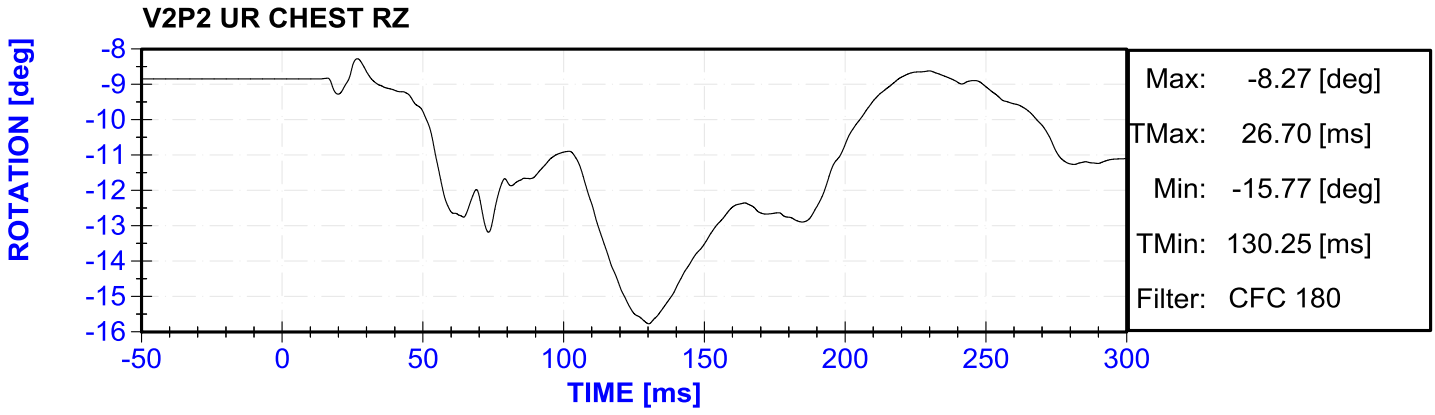
V2P2 UL CHEST RY



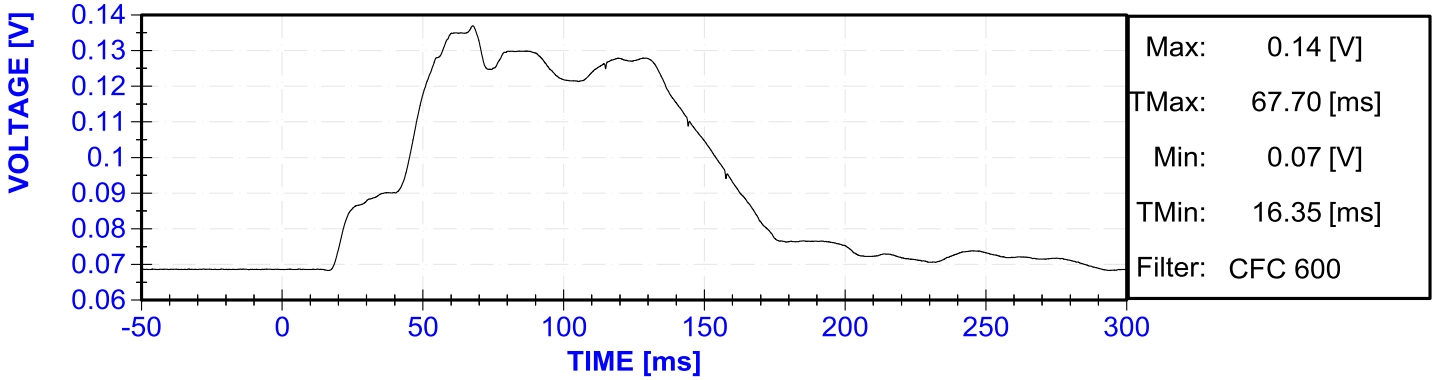

V2P2 UL CHEST RZ
ROTATION [deg]
14
13
12
11
10
9
8
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 13.75 [deg]
TMax: 232.05 [ms]
Min: 8.32 [deg]
TMin: 131.75 [ms]
Filter: CFC 180


V2P2 UR CHEST IRTRACC D
VOLTAGE [V]
0.3
0.275
0.25
0.225
0.2
0.175
0.15
0.125
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 0.28 [V]
TMax: 85.55 [ms]
Min: 0.13 [V]
TMin: 15.95 [ms]
Filter: CFC 600

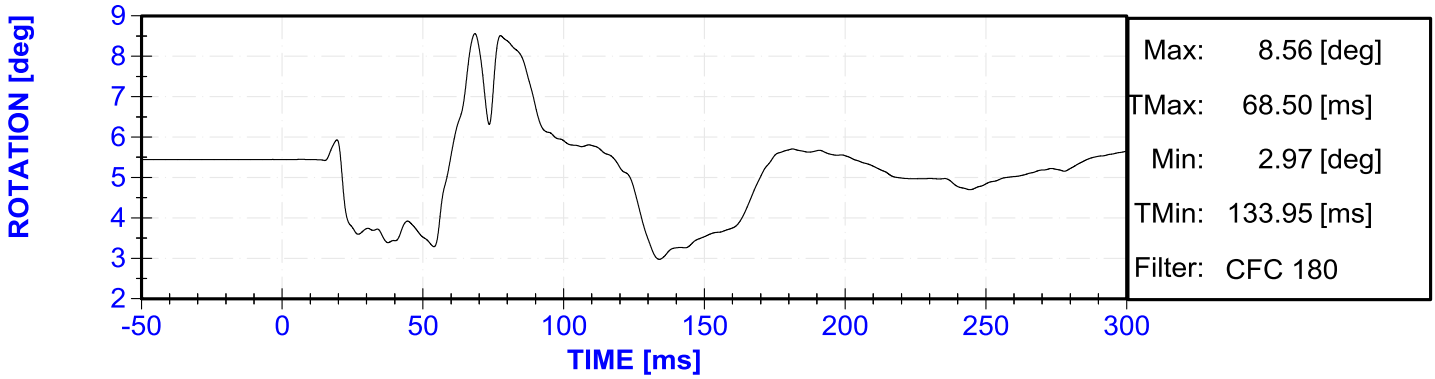

V2P2 UR CHEST RY
ROTATION [deg]
17.5
15
12.5
10
7.5
5
2.5
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 16.16 [deg]
TMax: 105.65 [ms]
Min: 3.31 [deg]
TMin: 65.25 [ms]
Filter: CFC 180


V2P2 UR CHEST RZ
ROTATION [deg]
-8
-9
-10
-11
-12
-13
-14
-15
-16
-50
0
50
100
150
200
250
300
TIME [ms]
Max: -8.27 [deg]
TMax: 26.70 [ms]
Min: -15.77 [deg]
TMin: 130.25 [ms]
Filter: CFC 180

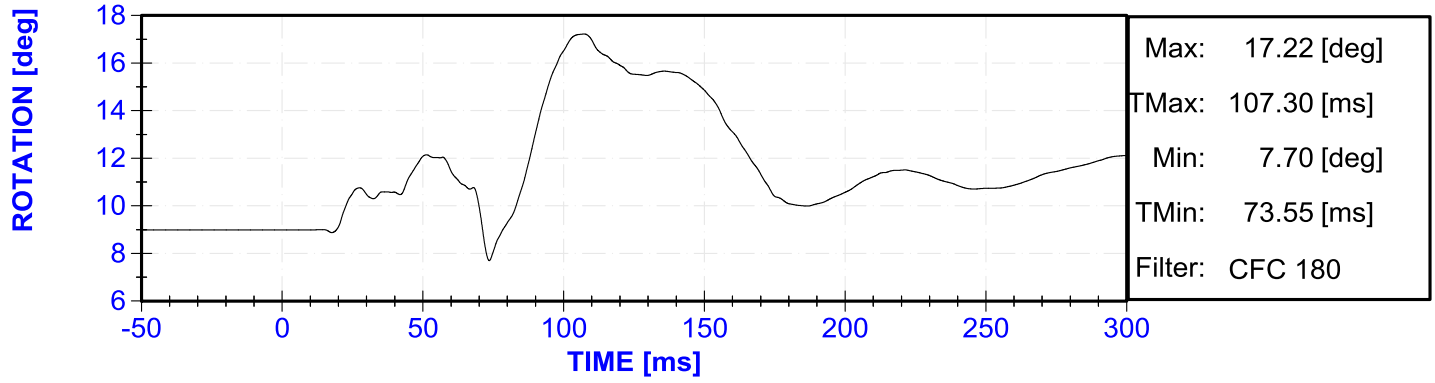
V2P2 LL CHEST IRTRACC D



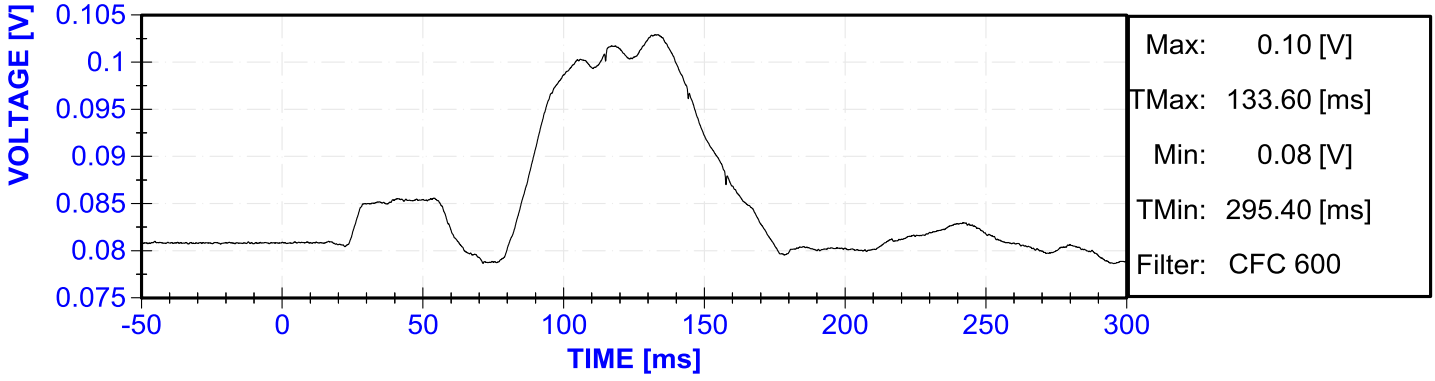
V2P2 LL CHEST RY



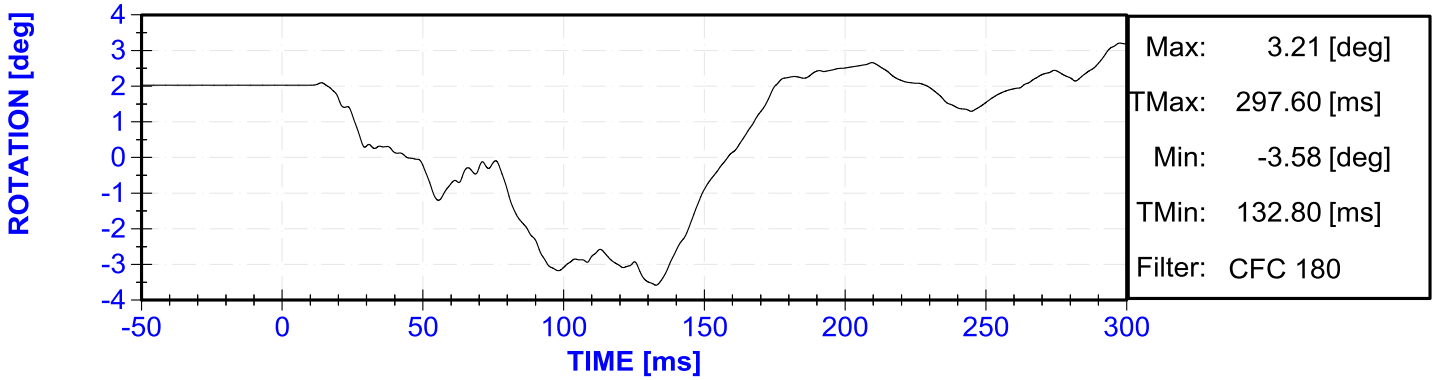
V2P2 LL CHEST RZ



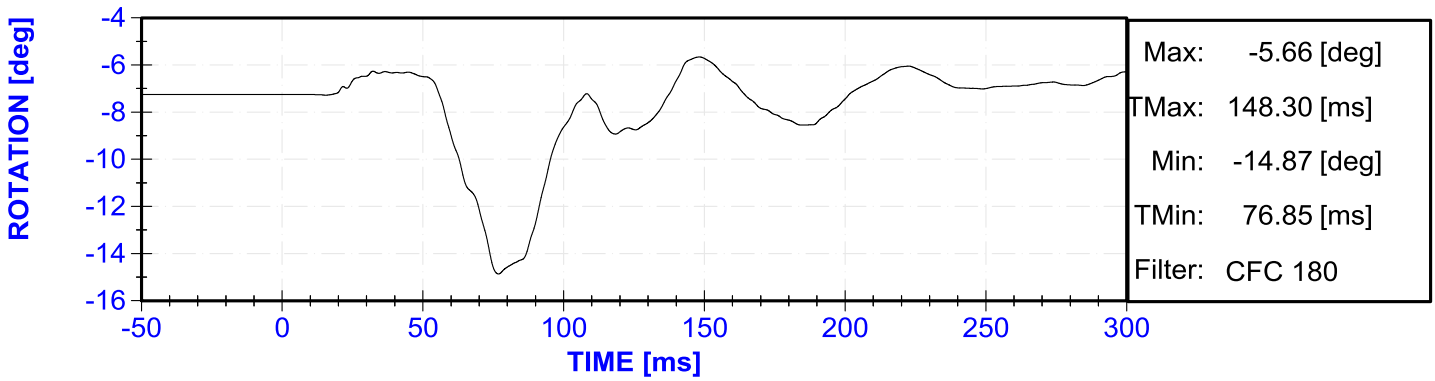
V2P2 LR CHEST IRTRACC D



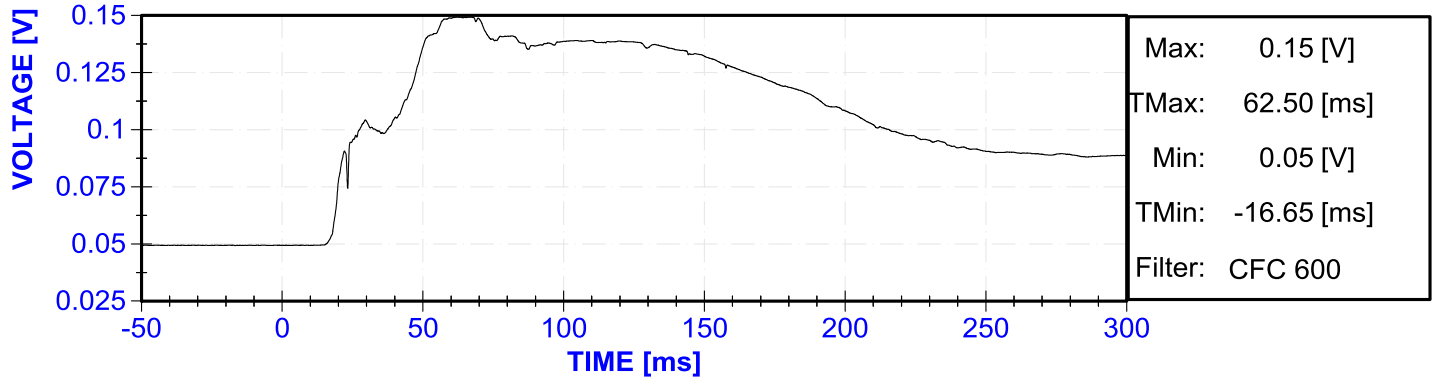
V2P2 LR CHEST RY



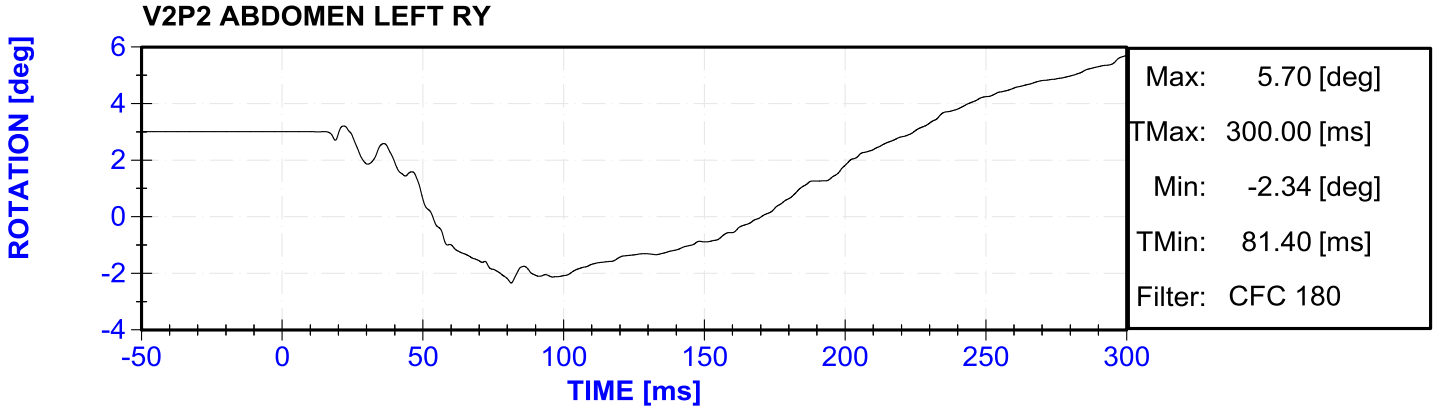
V2P2 LR CHEST RZ



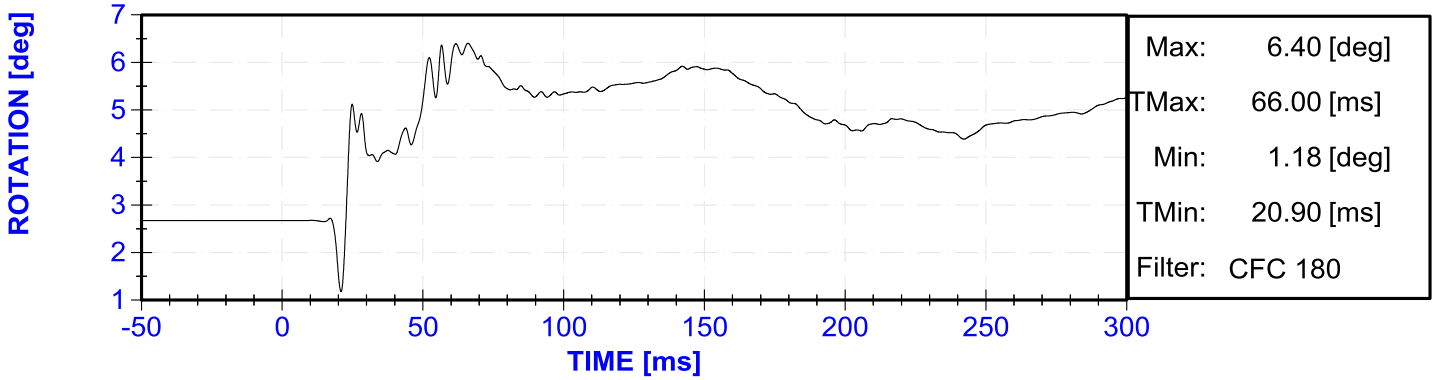
V2P2 ABDOMEN LEFT IRTRACC D



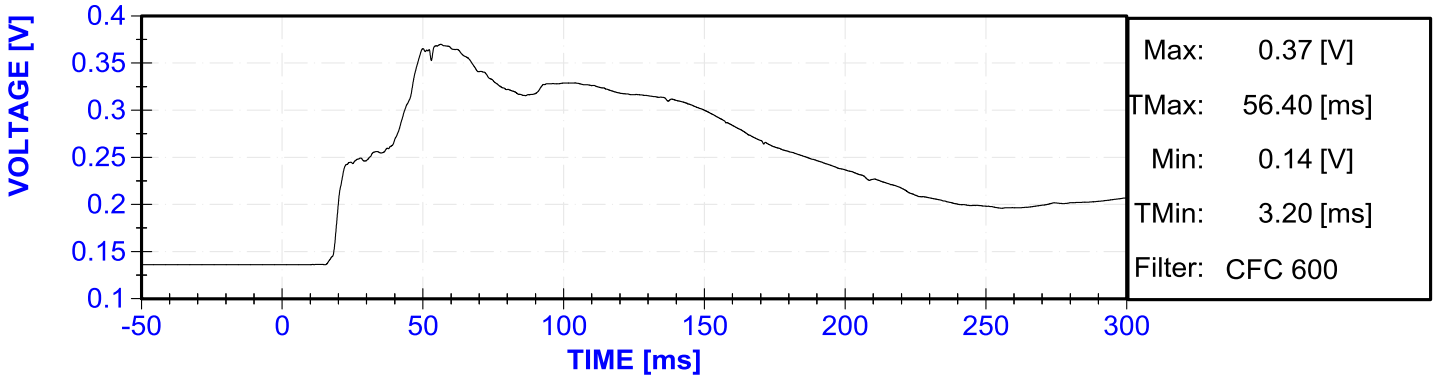
V2P2 ABDOMEN LEFT RY



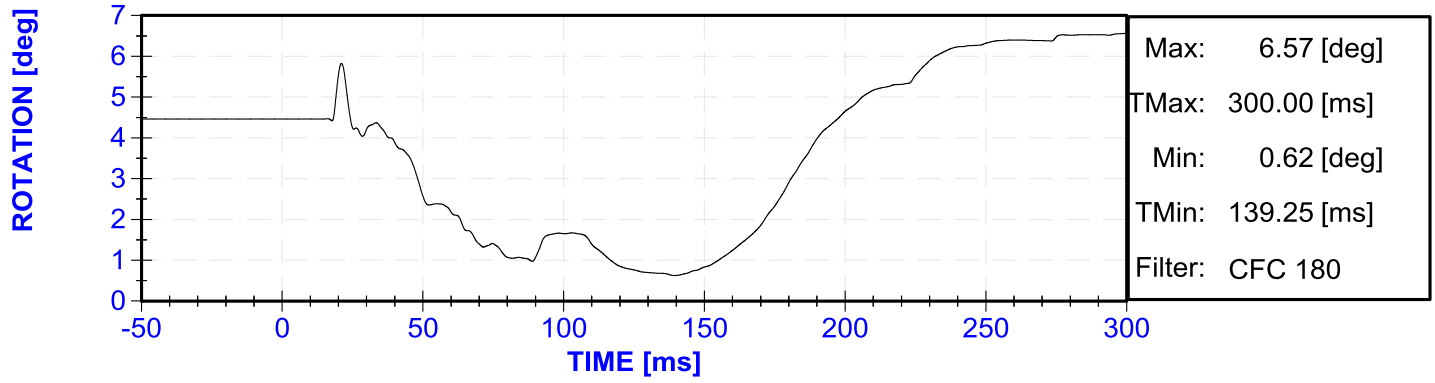
V2P2 ABDOMEN LEFT RZ



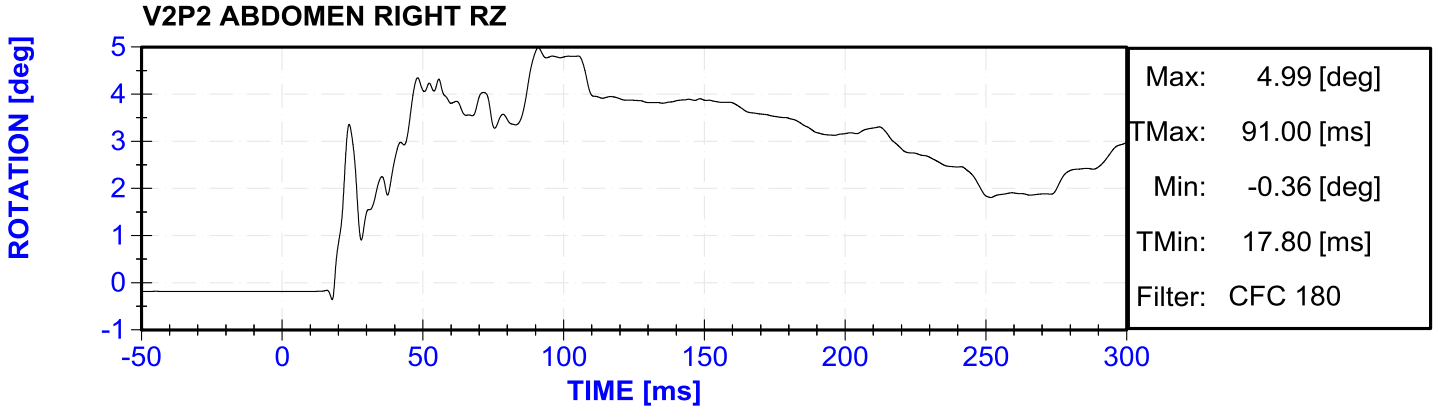
V2P2 ABDOMEN RIGHT IRTRACC D



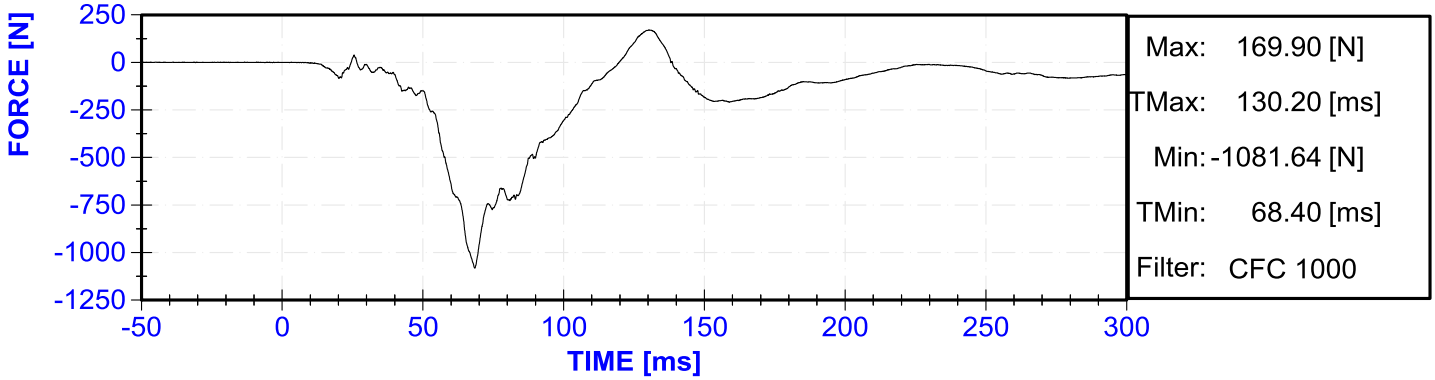
V2P2 ABDOMEN RIGHT RY



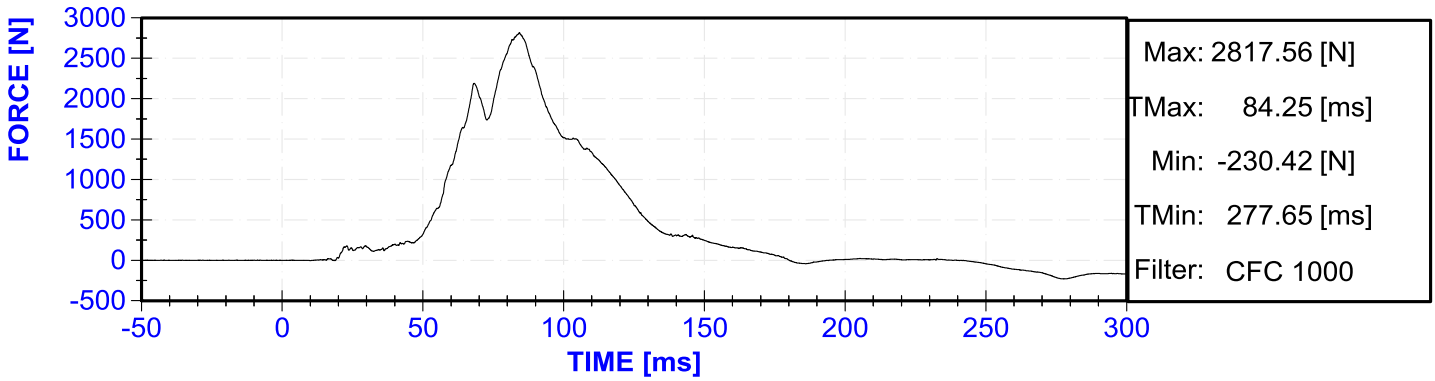
V2P2 ABDOMEN RIGHT RZ



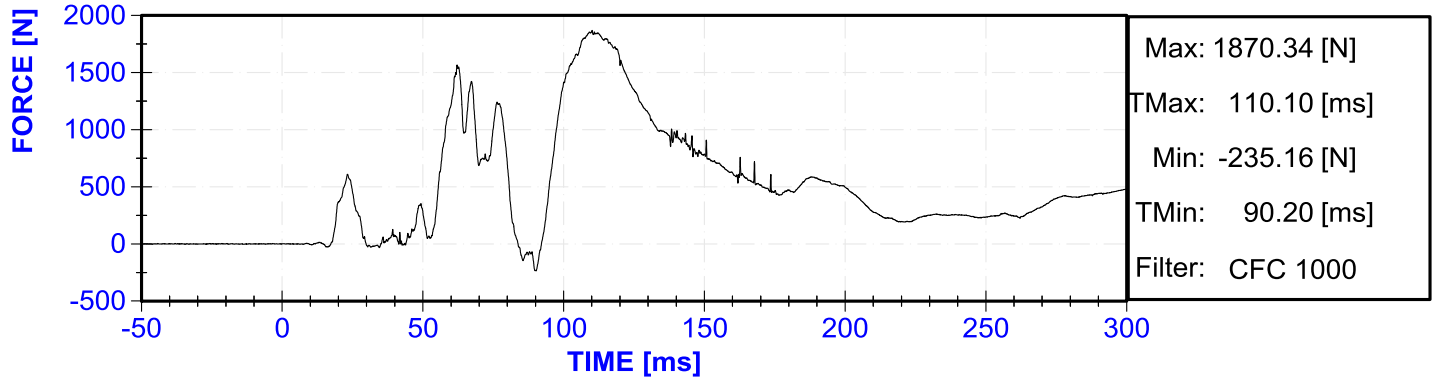
V2P2 SPINE LOWER FX



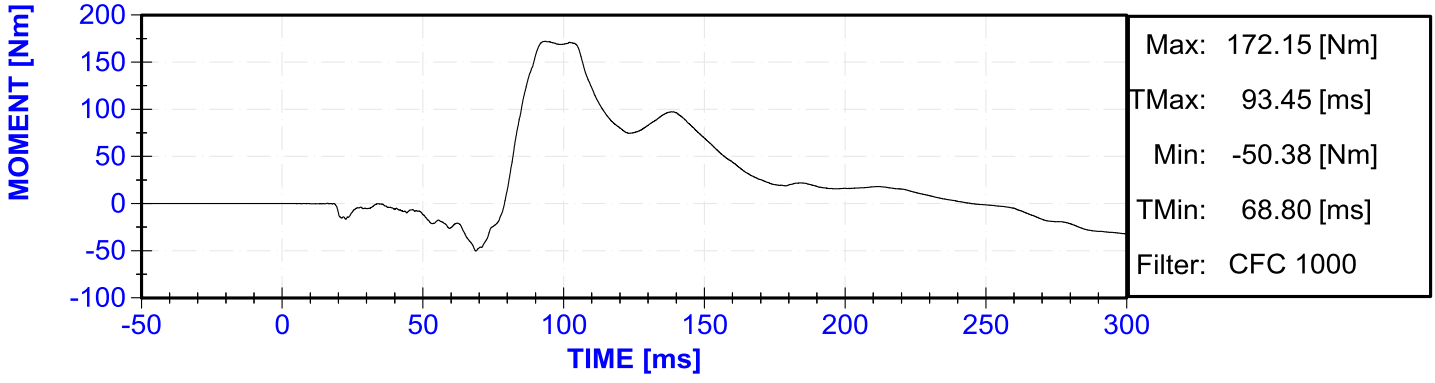
V2P2 SPINE LOWER FY



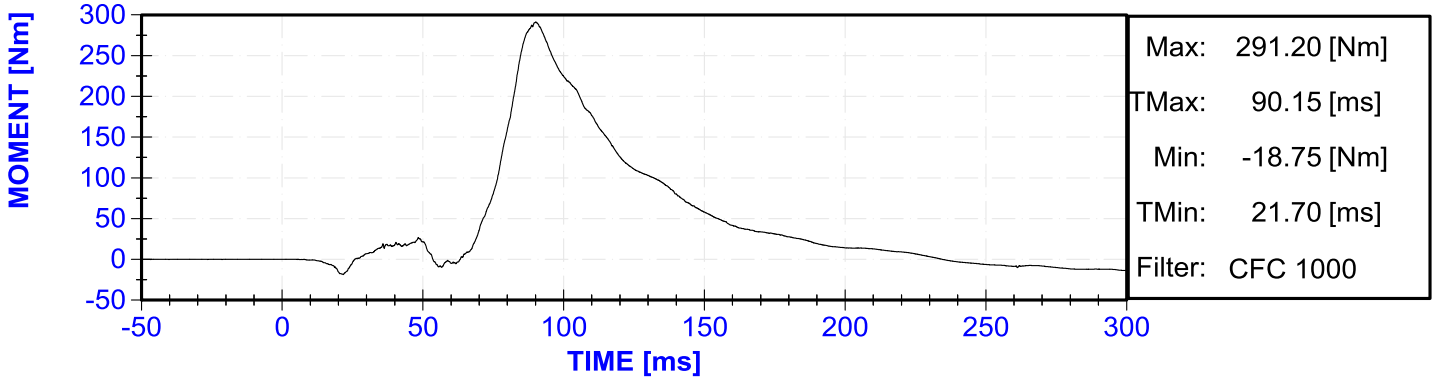
V2P2 SPINE LOWER FZ



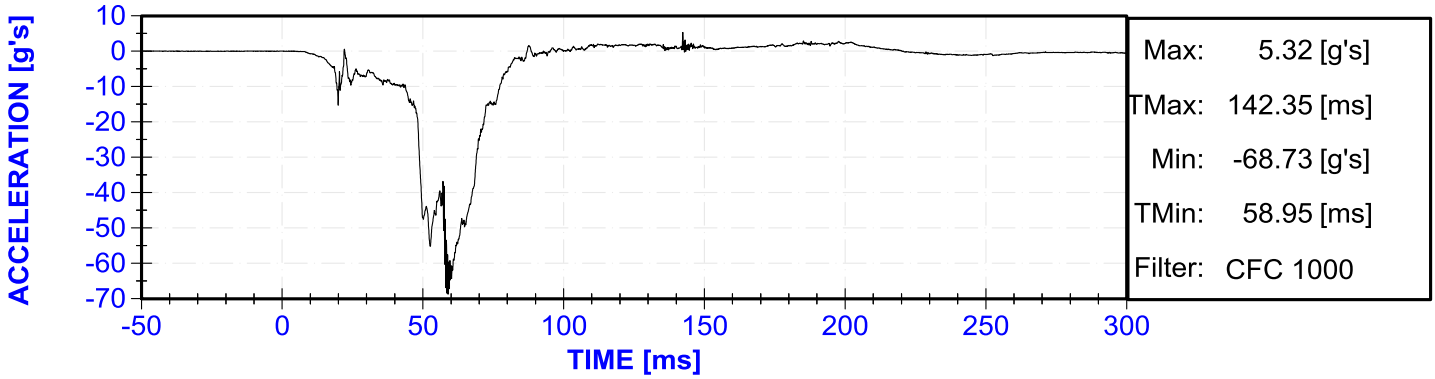
V2P2 SPINE LOWER MX



V2P2 SPINE LOWER MY

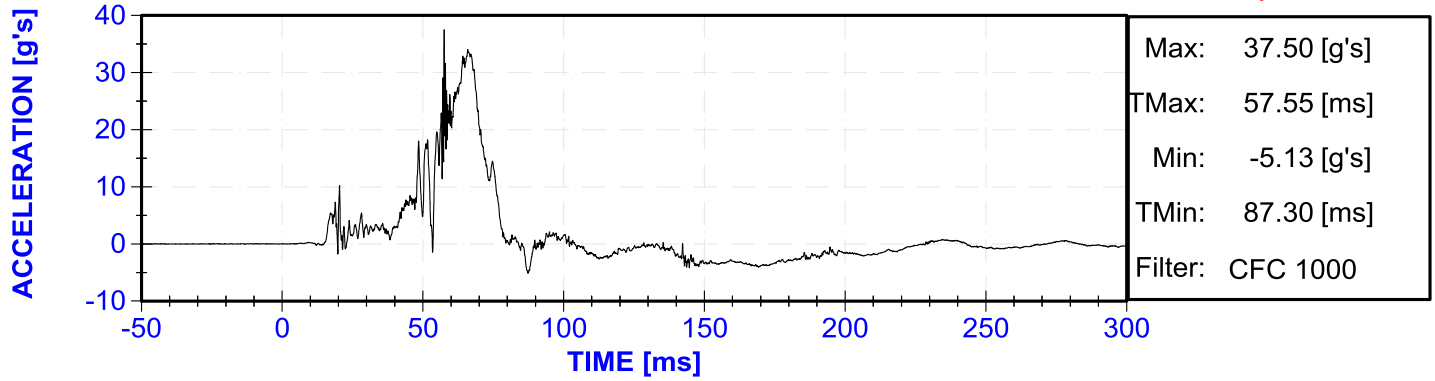


V2P2 PELVIS CG AX

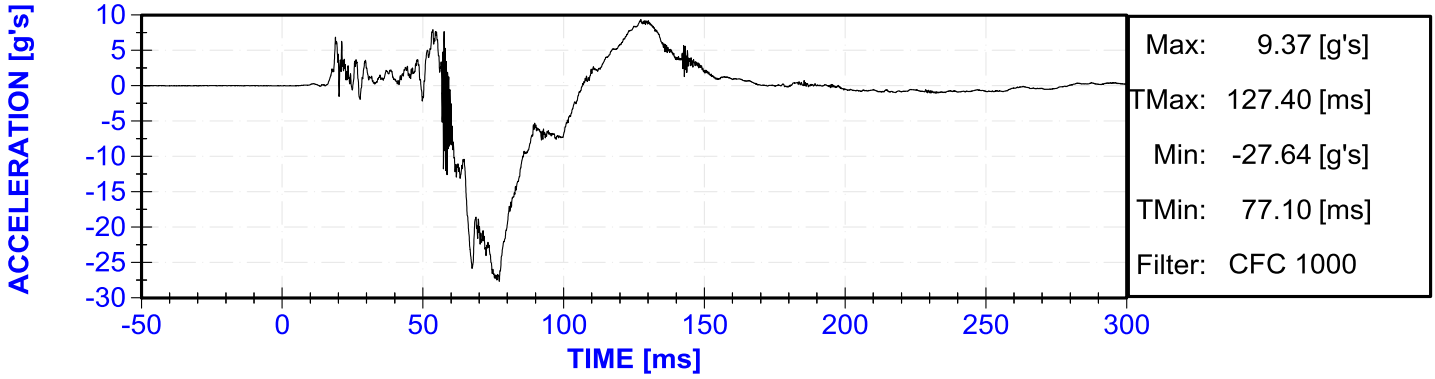


V2P2 PELVIS CG AY

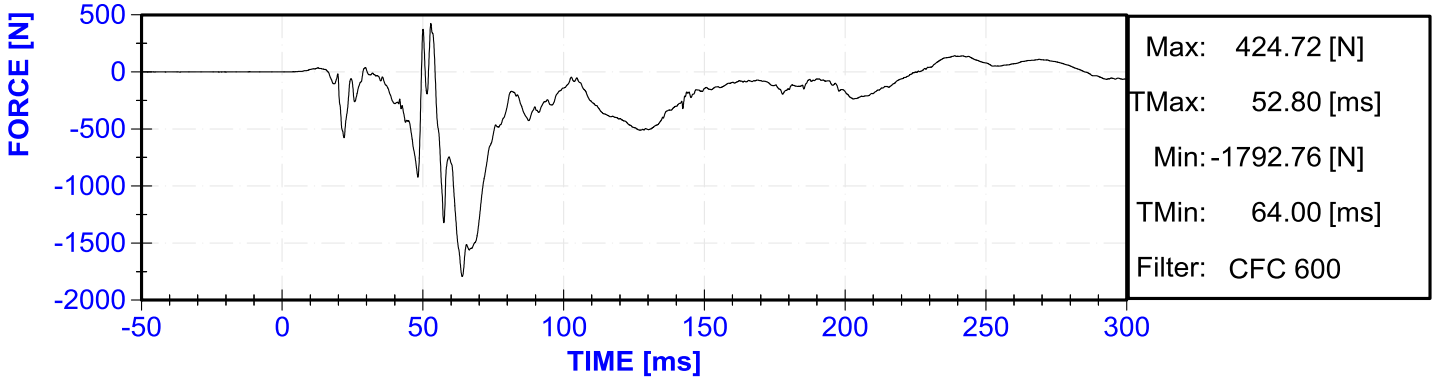
Questionable spike at 58 ms



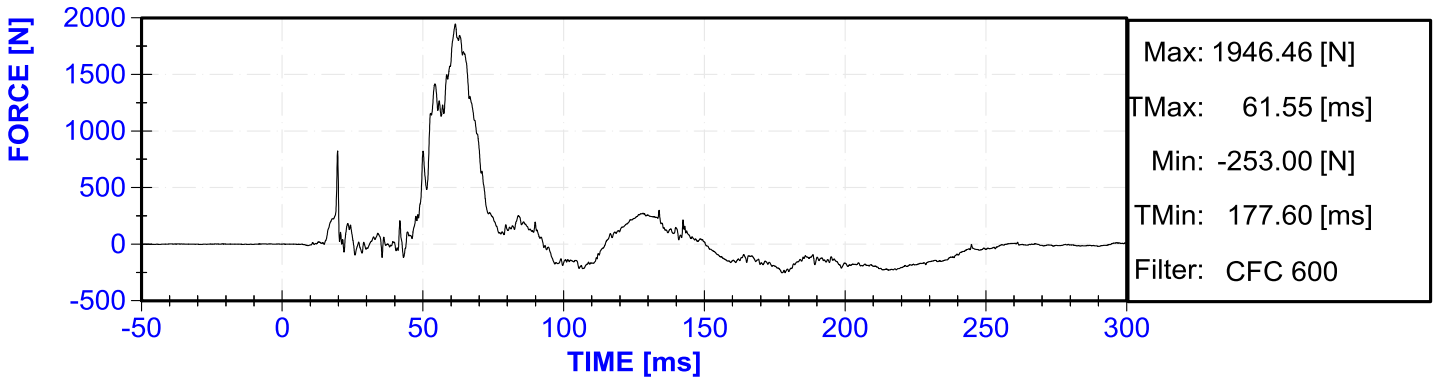
V2P2 PELVIS CG AZ



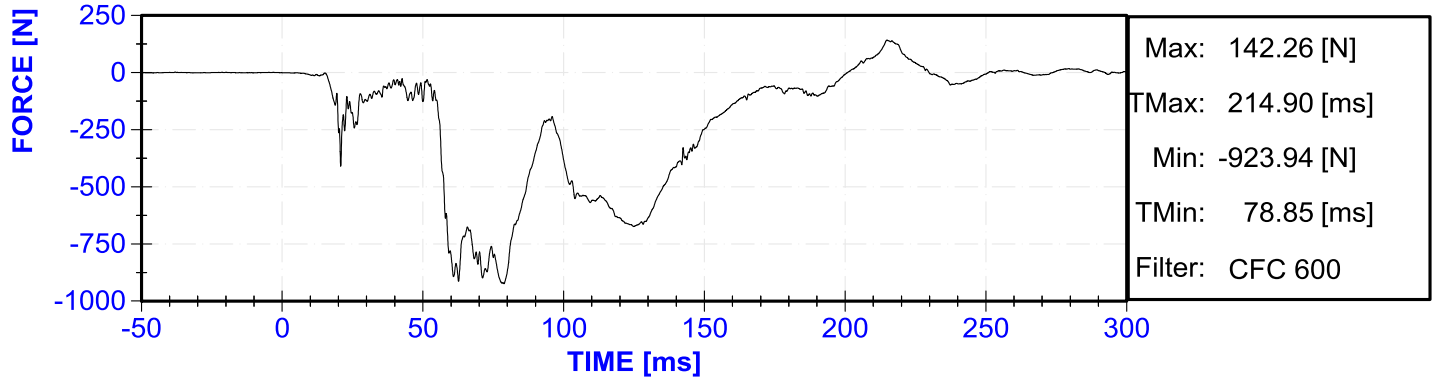
V2P2 PELVIS ACETABULUM LEFT FX



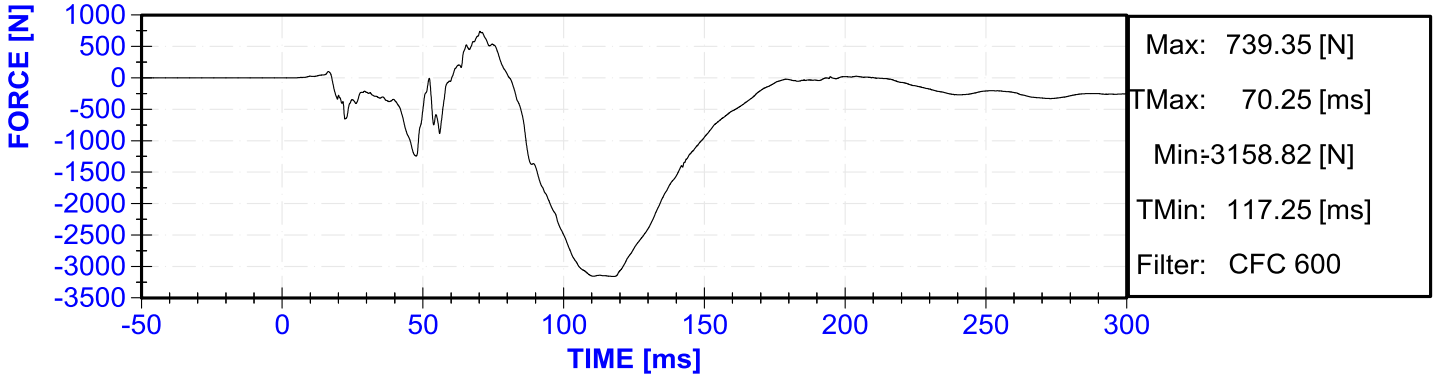
V2P2 PELVIS ACETABULUM LEFT FY



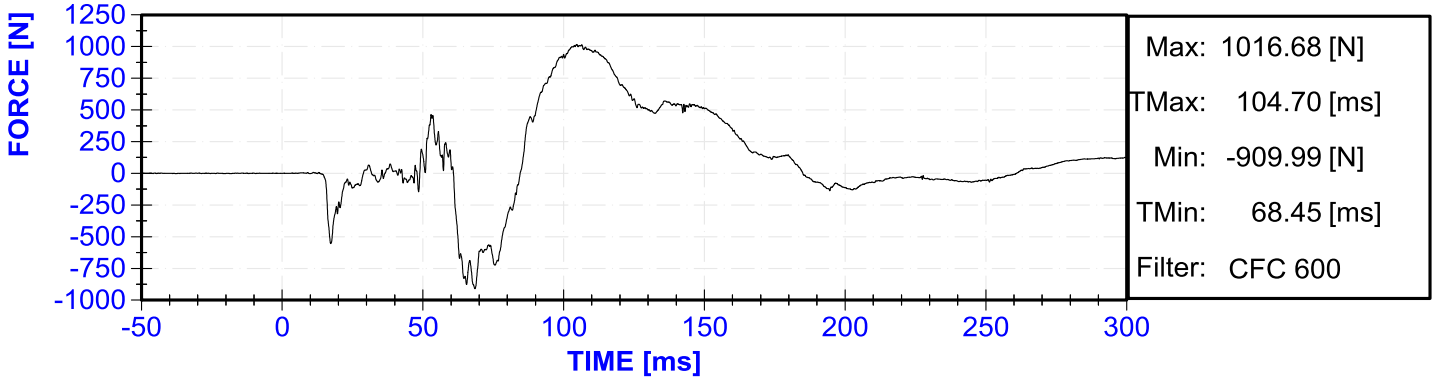
V2P2 PELVIS ACETABULUM LEFT FZ



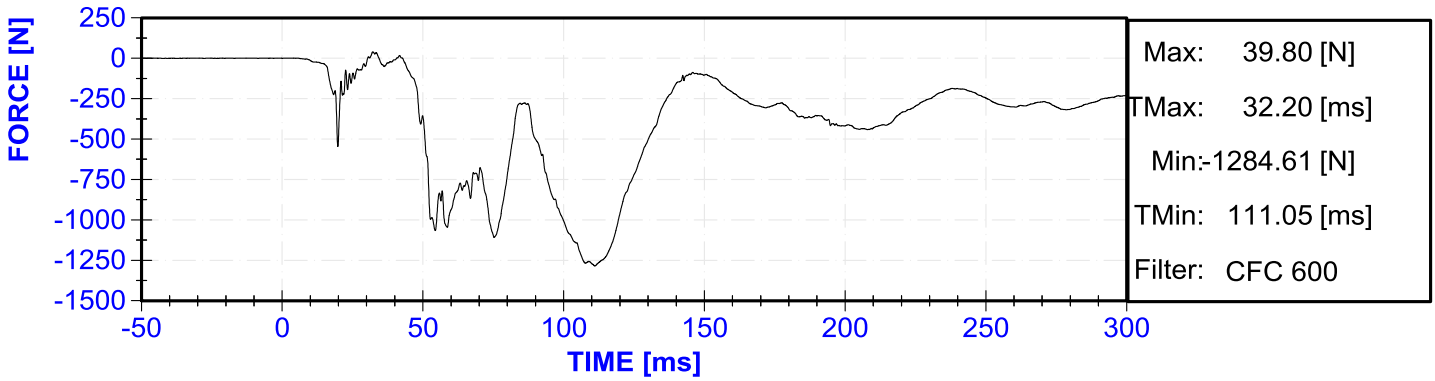
V2P2 PELVIS ACETABULUM RIGHT FX



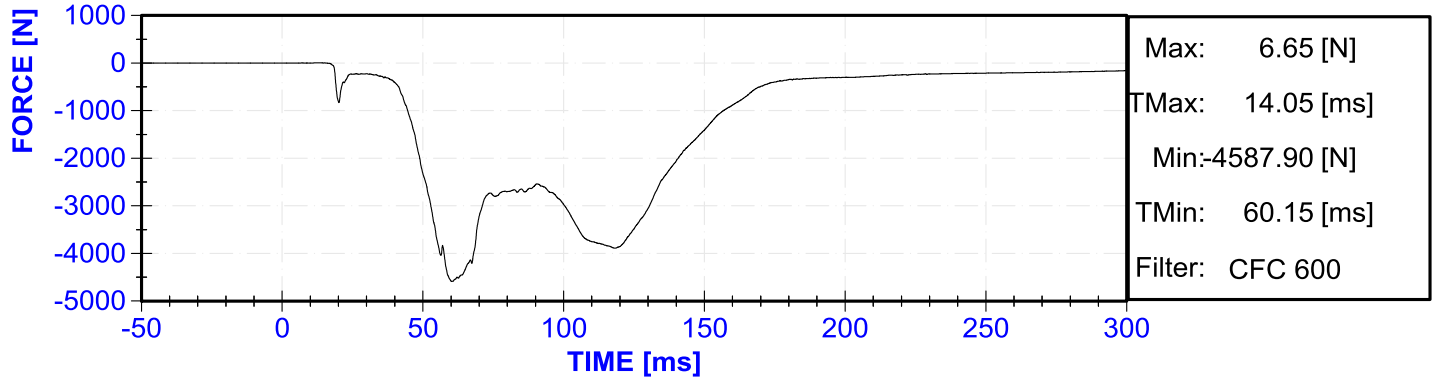
V2P2 PELVIS ACETABULUM RIGHT FY



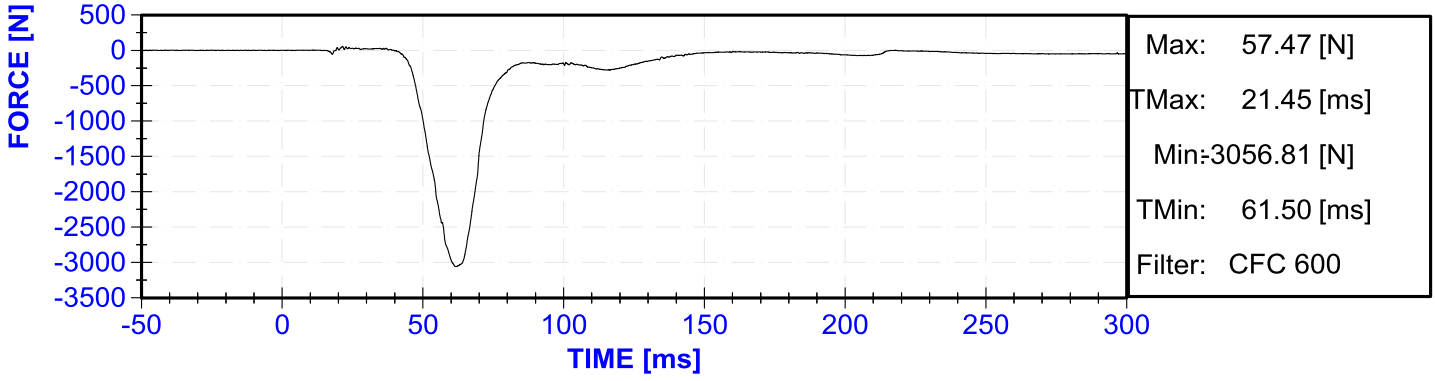
V2P2 PELVIS ACETABULUM RIGHT FZ



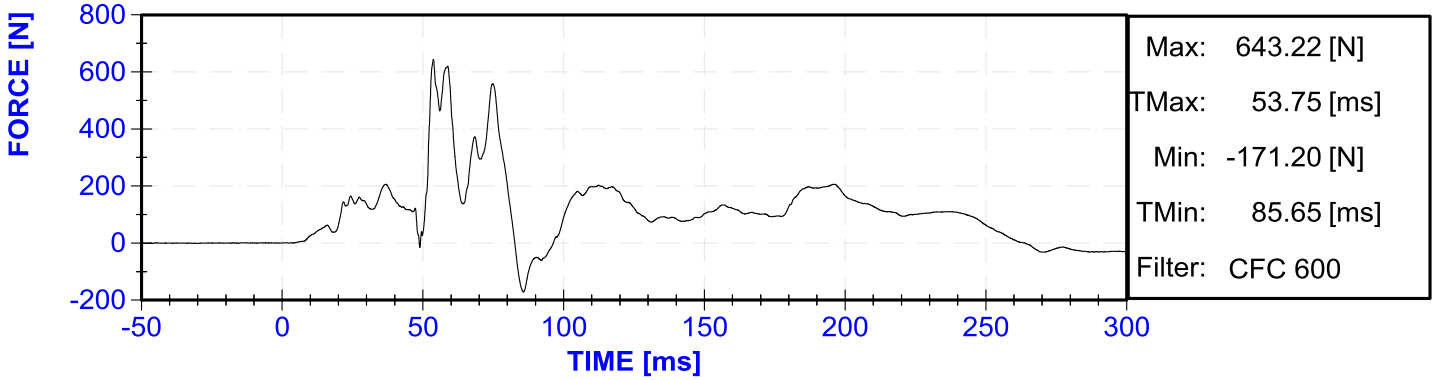
V2P2 LEFT ASIS FX



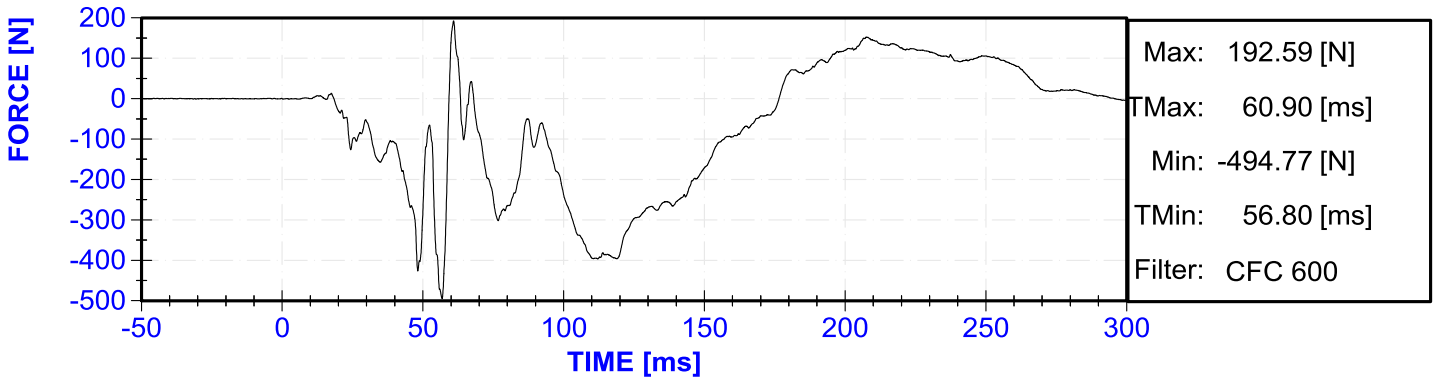
V2P2 RIGHT ASIS FX



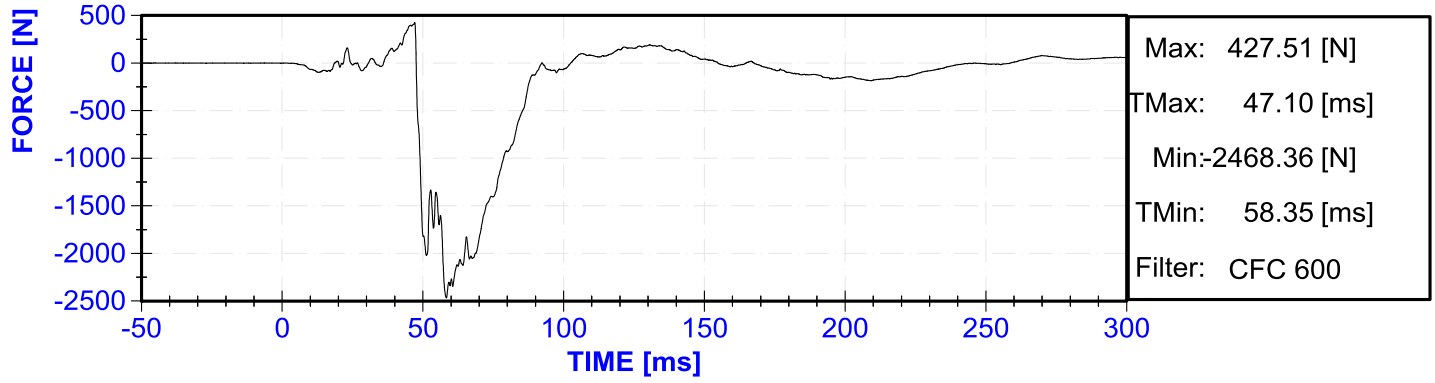
V2P2 LEFT FEMUR FX



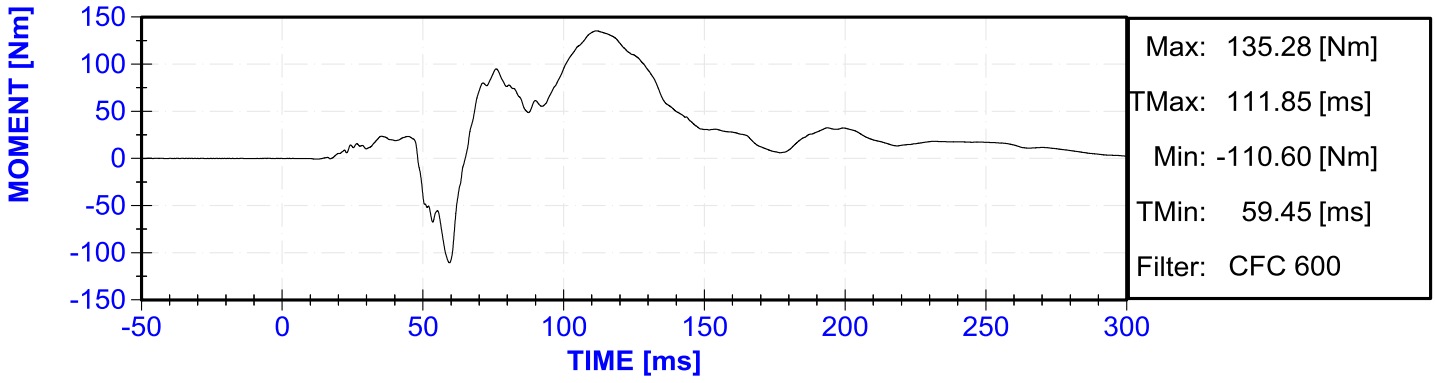
V2P2 LEFT FEMUR FY



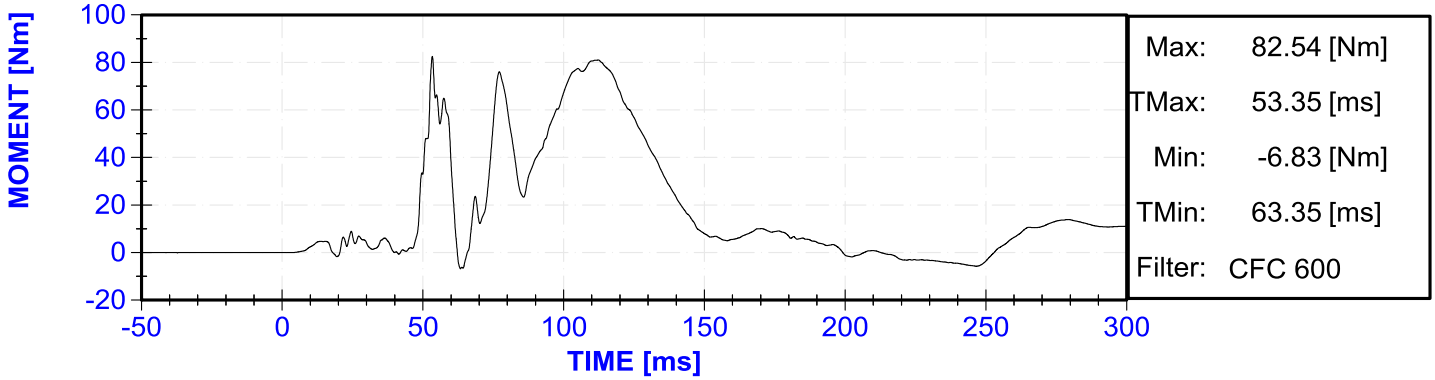
V2P2 LEFT FEMUR FZ



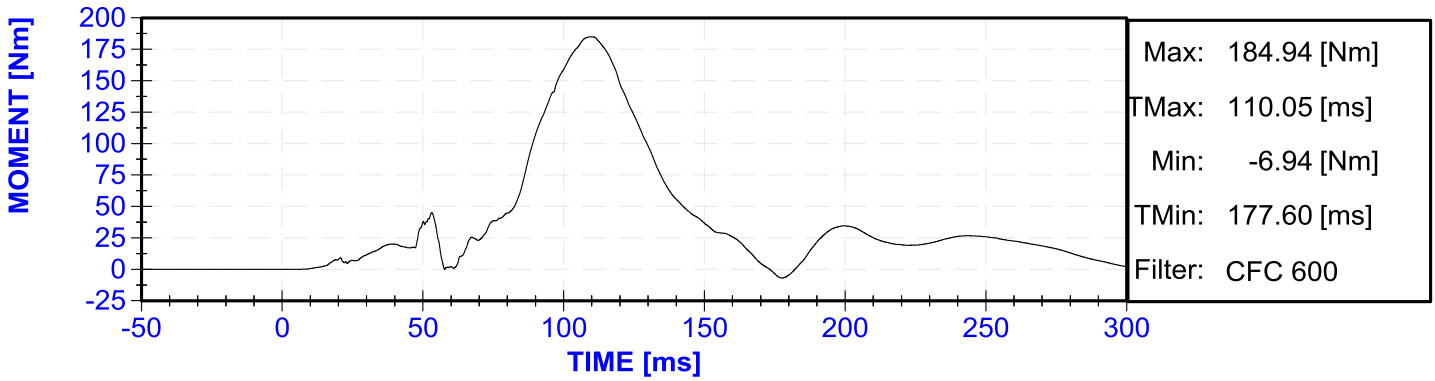
V2P2 LEFT FEMUR MX



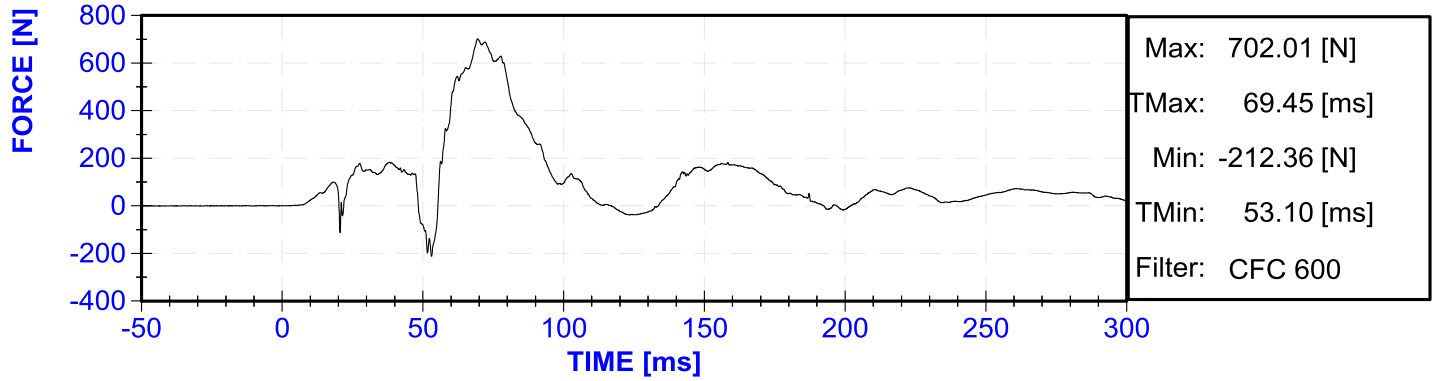
V2P2 LEFT FEMUR MY



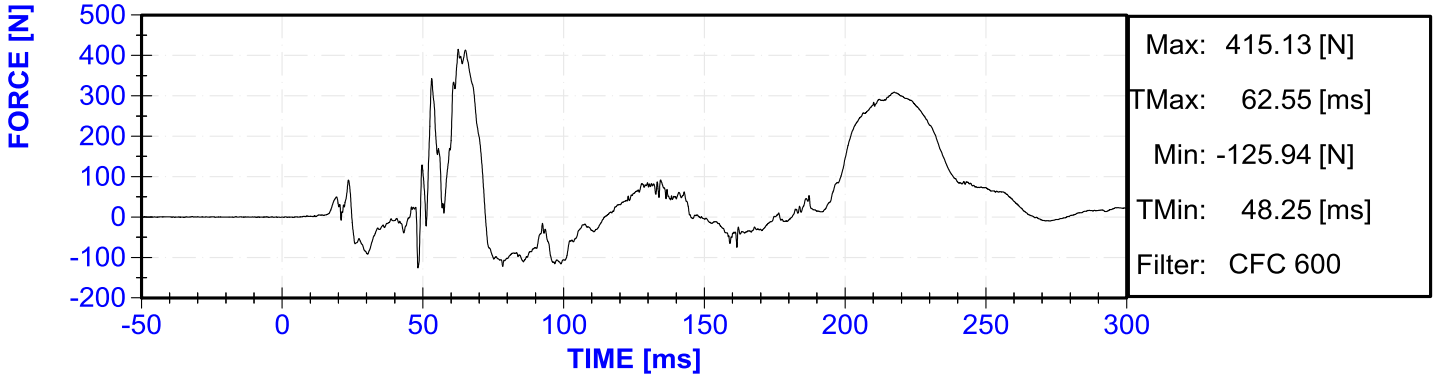
V2P2 LEFT FEMUR MZ



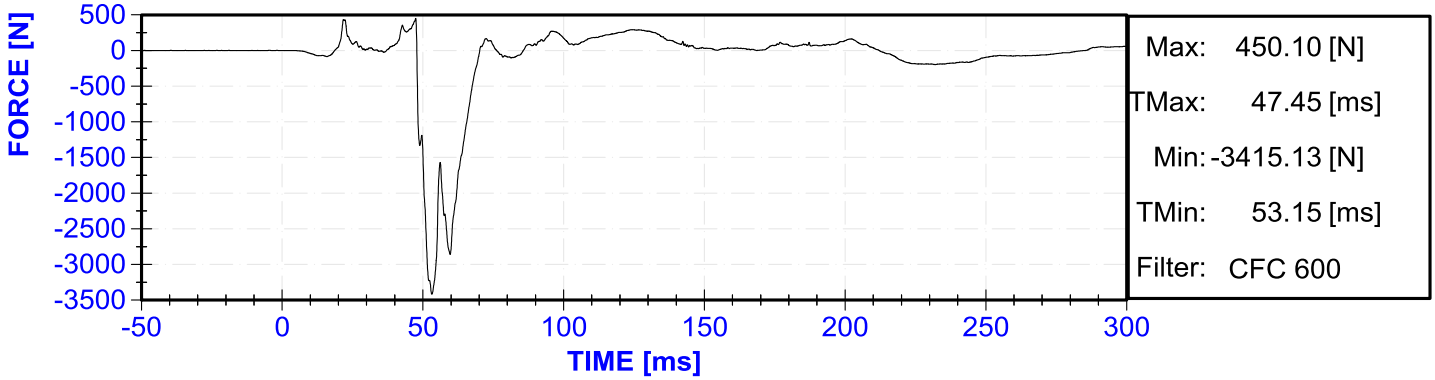
V2P2 RIGHT FEMUR FX



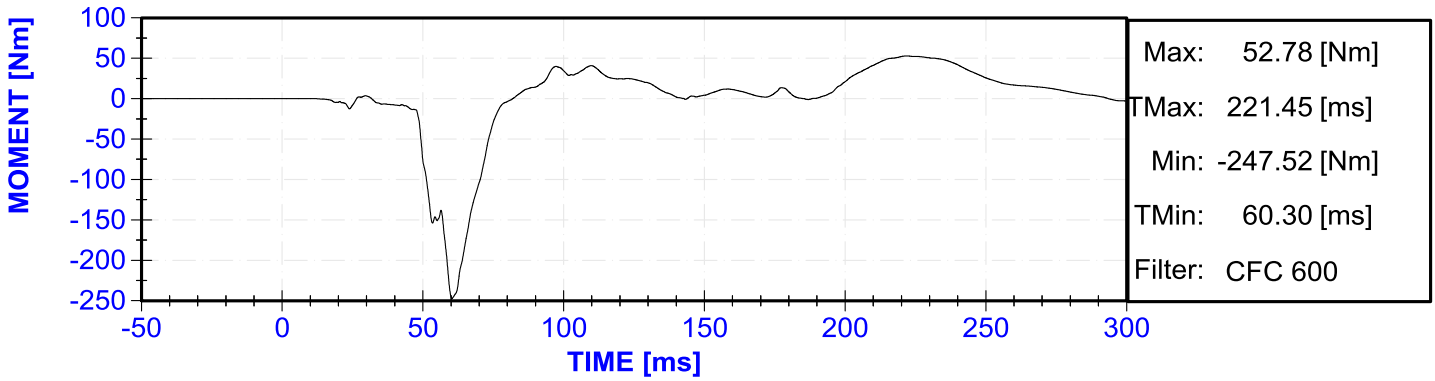
V2P2 RIGHT FEMUR FY



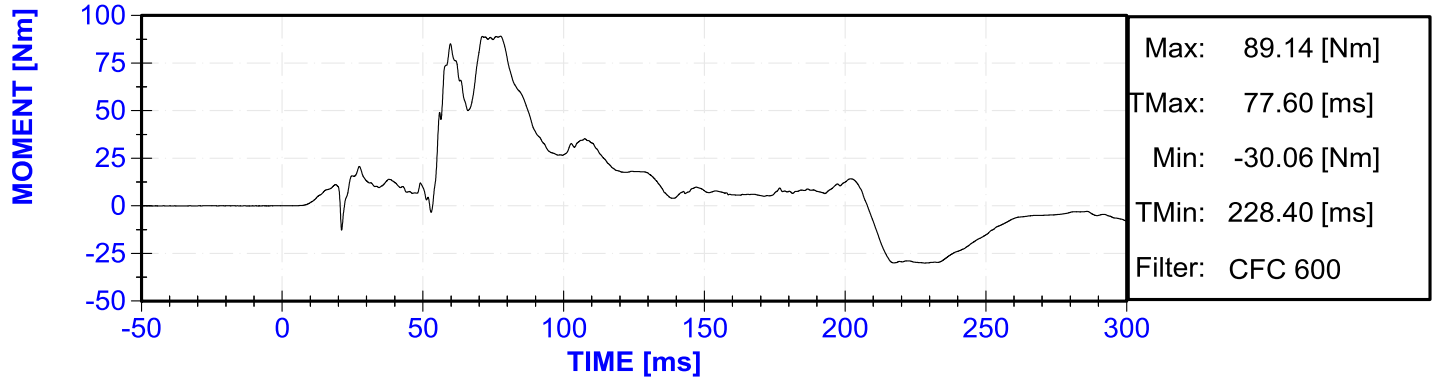
V2P2 RIGHT FEMUR FZ



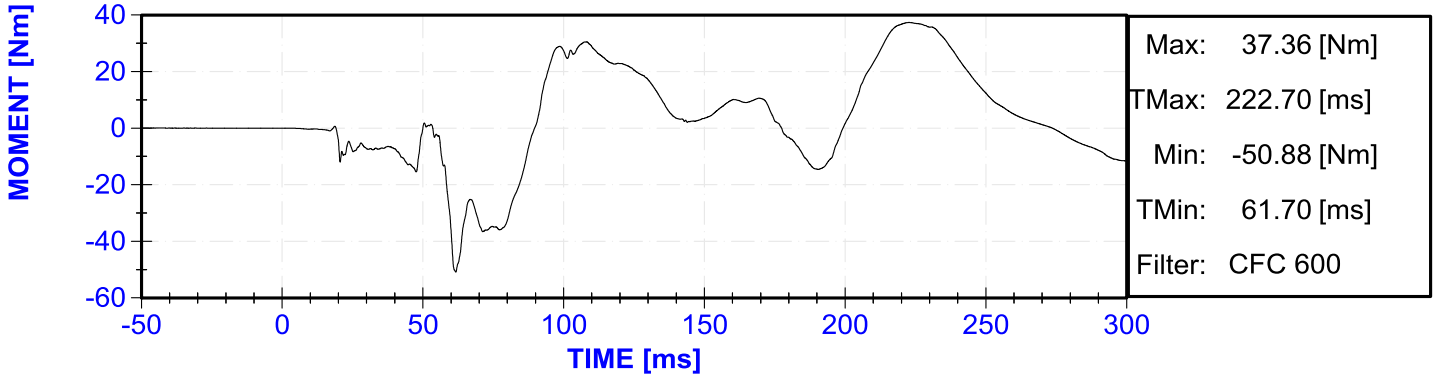
V2P2 RIGHT FEMUR MX



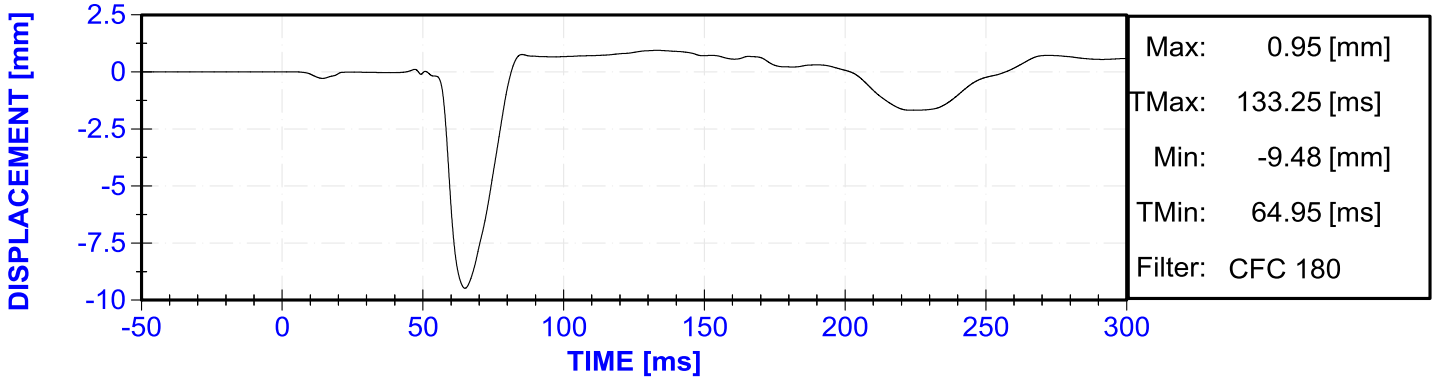
V2P2 RIGHT FEMUR MY



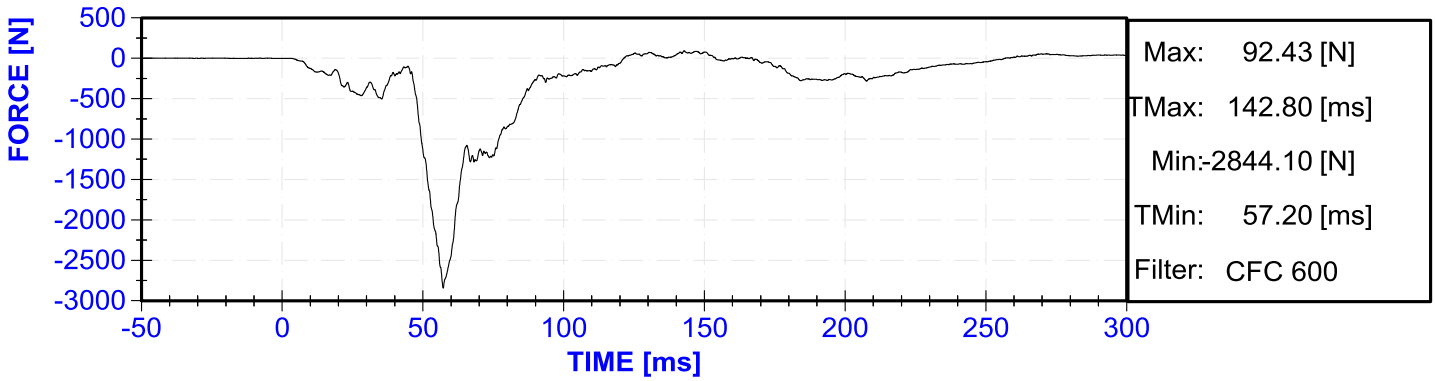
V2P2 RIGHT FEMUR MZ



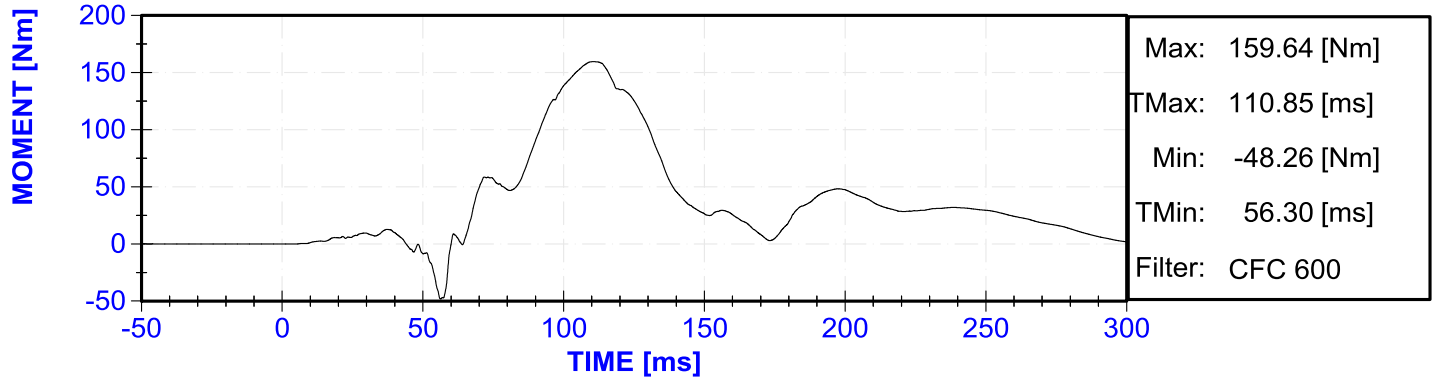
V2P2 KNEE LEFT DX



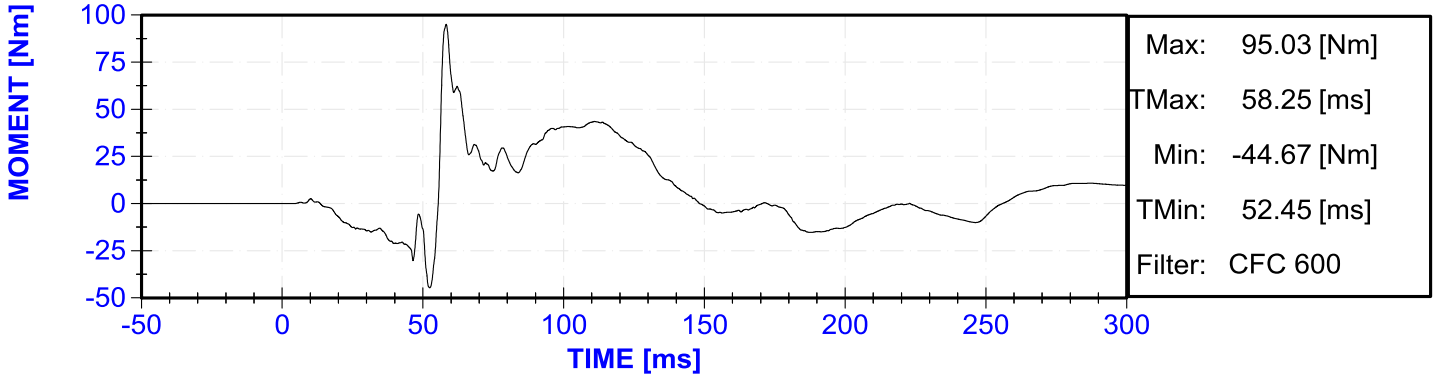
V2P2 TIBIA LEFT UPPER FZ



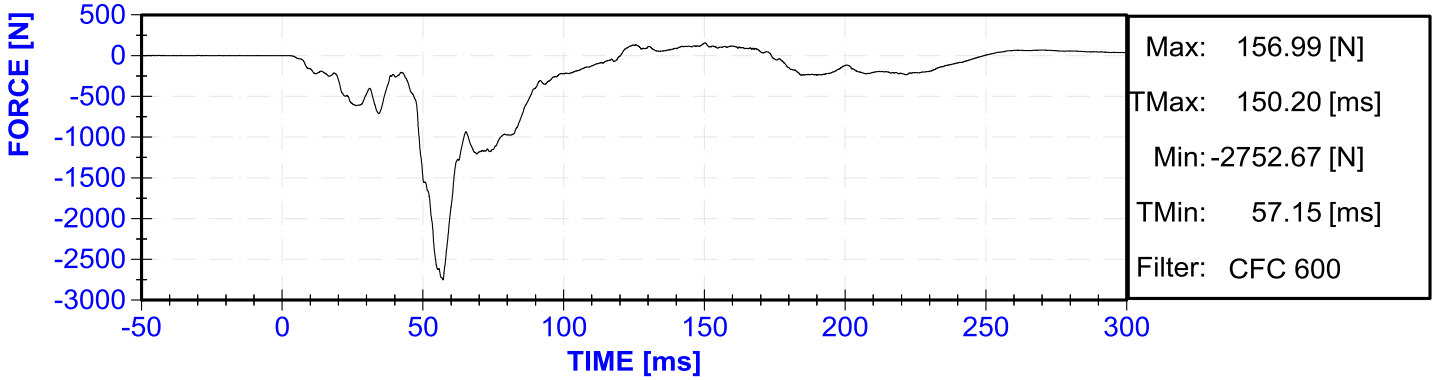
V2P2 TIBIA LEFT UPPER MX



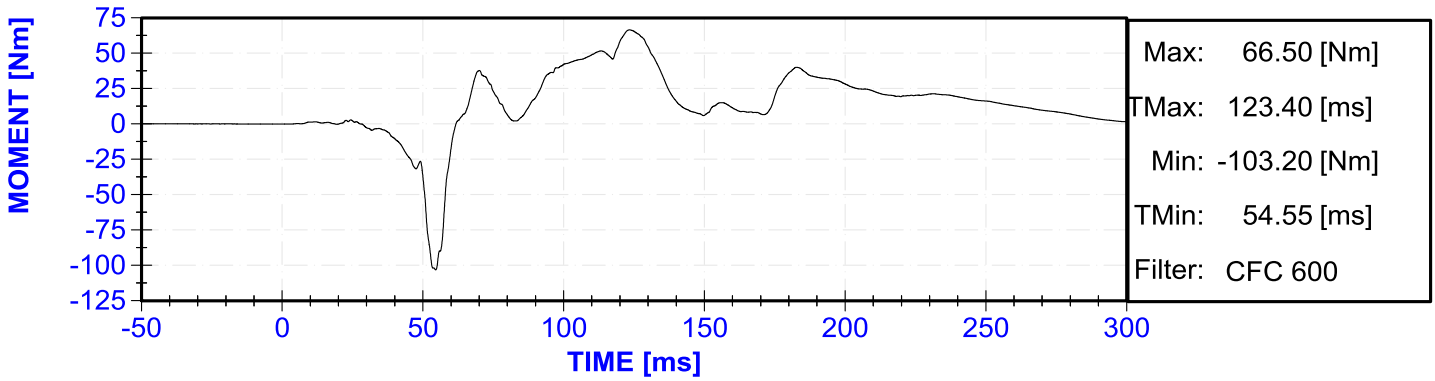
V2P2 TIBIA LEFT UPPER MY



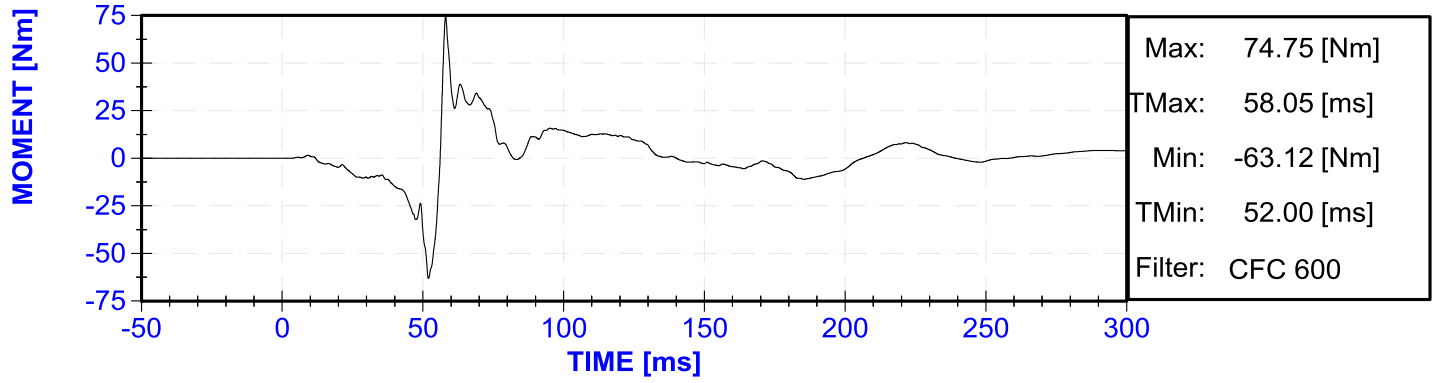
V2P2 TIBIA LEFT LOWER FZ



V2P2 TIBIA LEFT LOWER MX

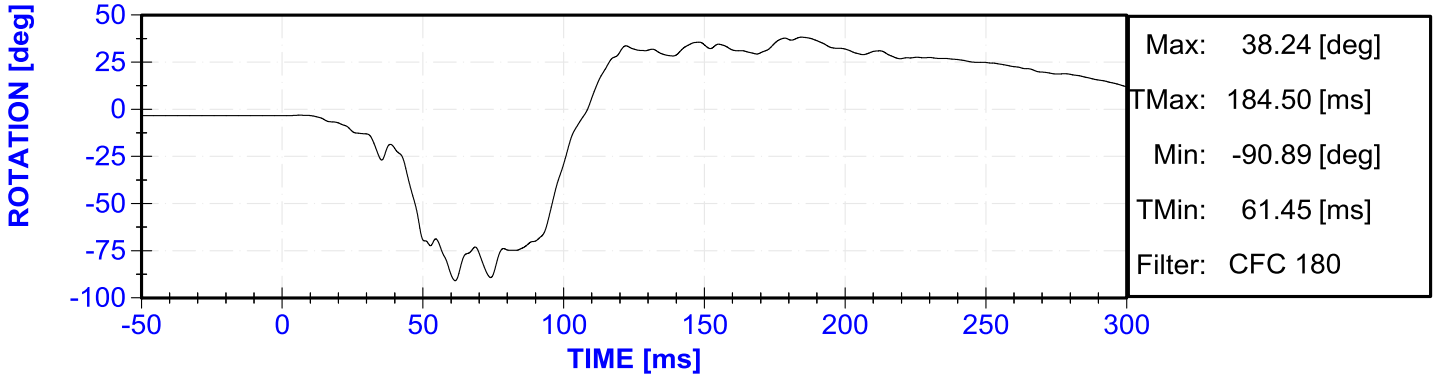


V2P2 TIBIA LEFT LOWER MY



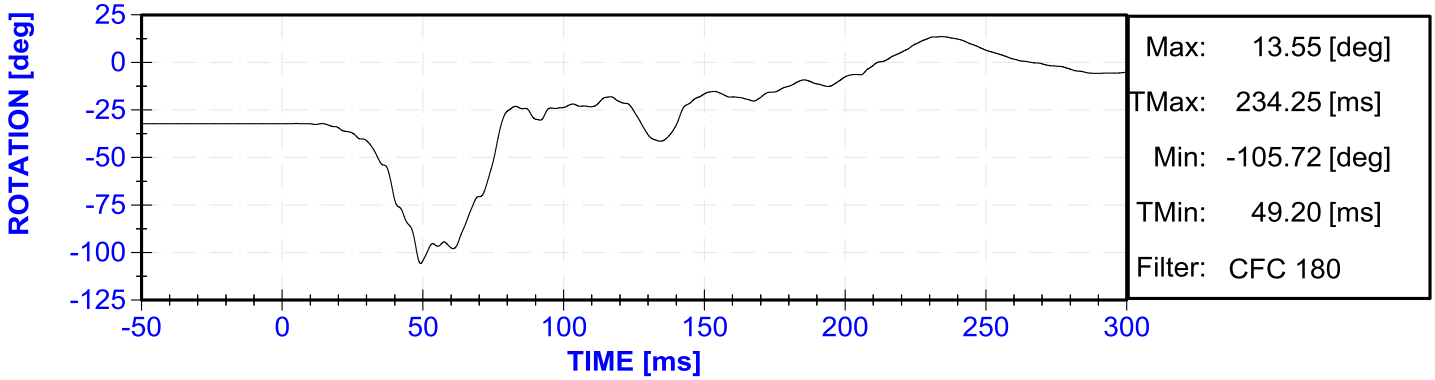
V2P2 ANKLE LEFT POT RX

Channel failed



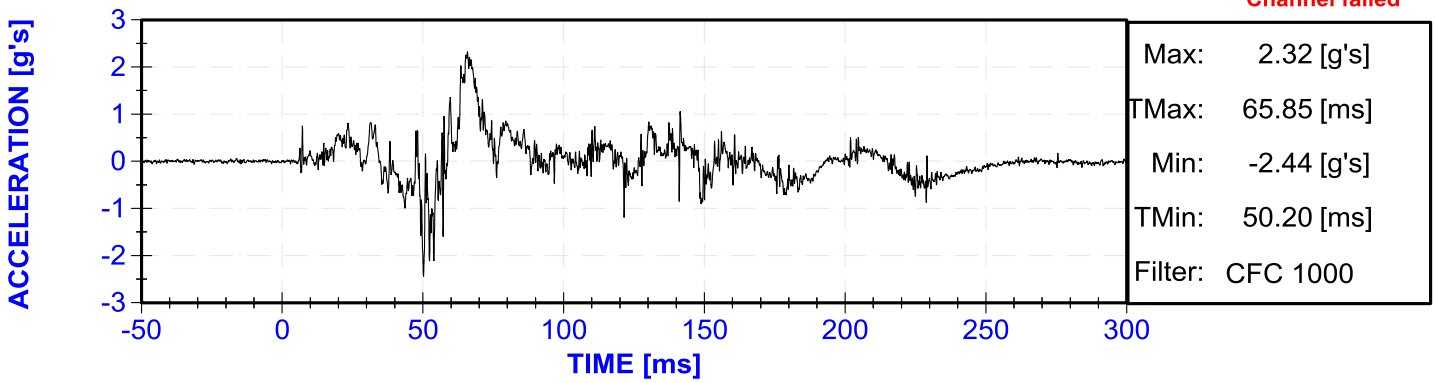
V2P2 ANKLE LEFT POT RY

Channel failed

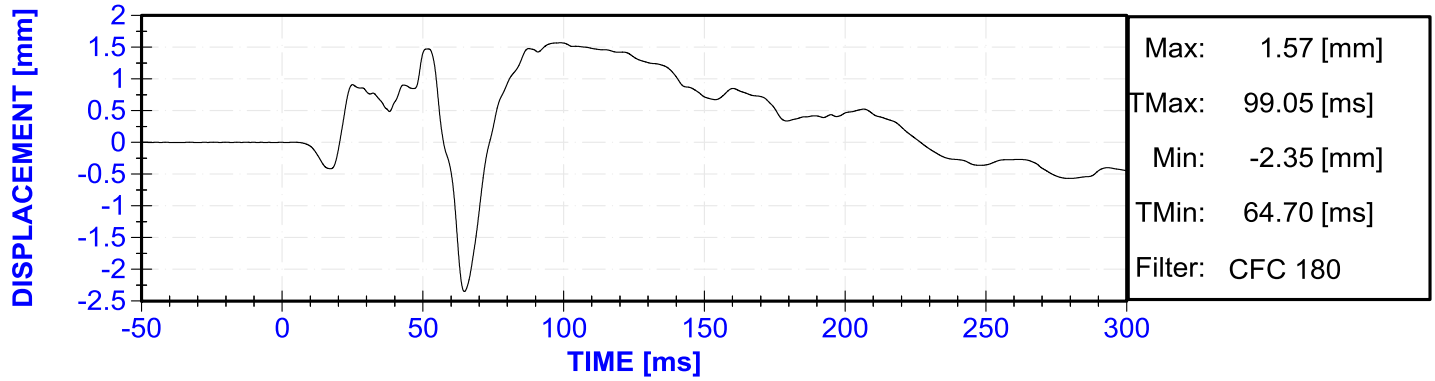


V2P2 FOOT LEFT AZ

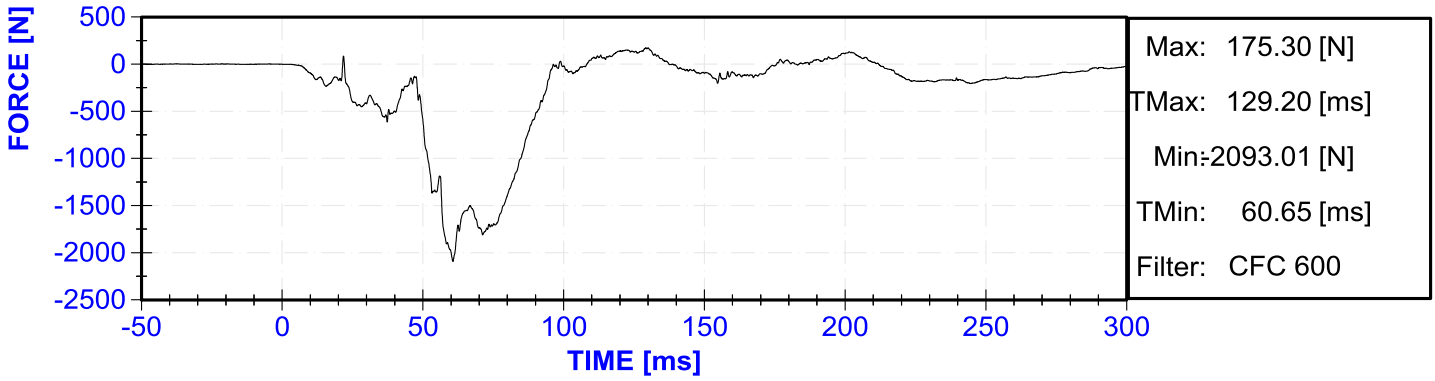
Channel failed



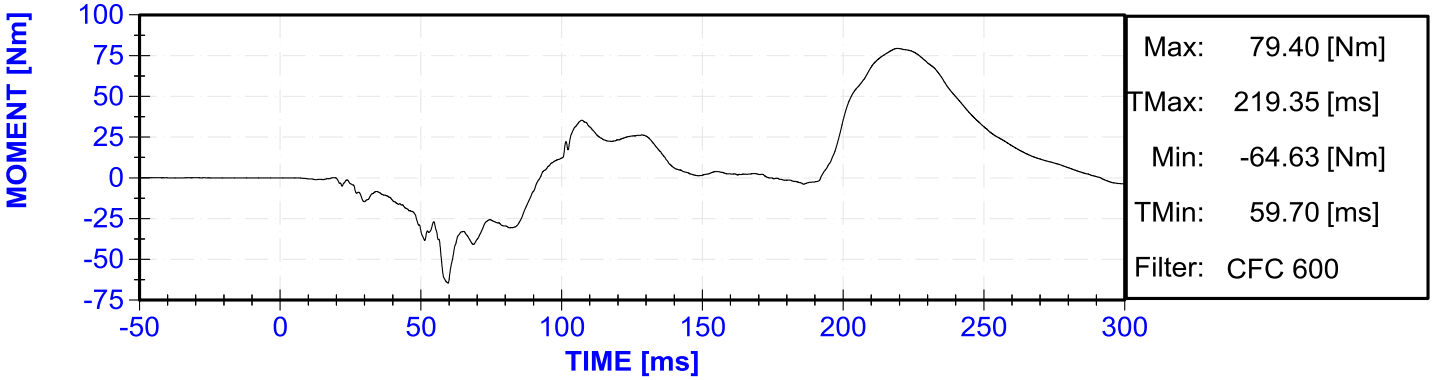
V2P2 KNEE RIGHT DX



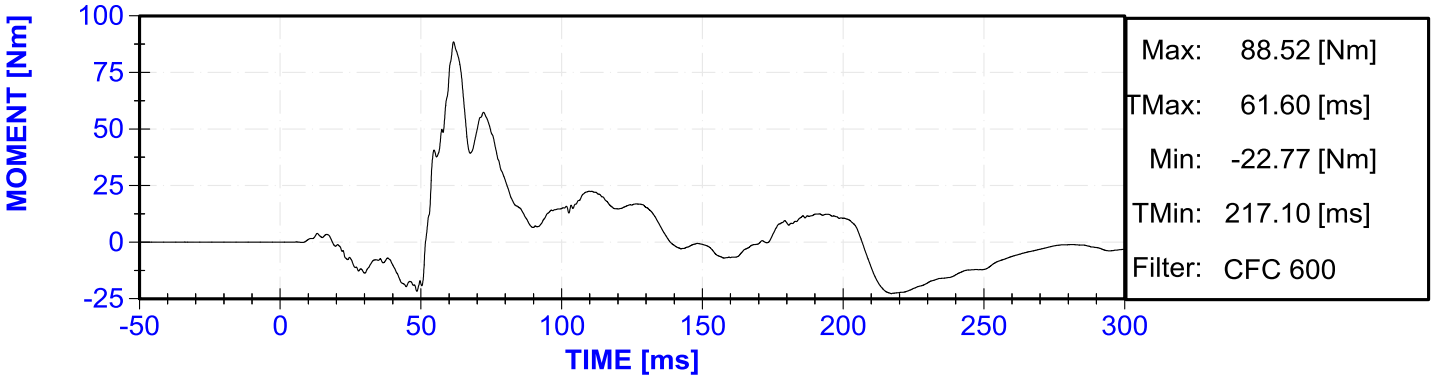
V2P2 TIBIA RIGHT UPPER FZ



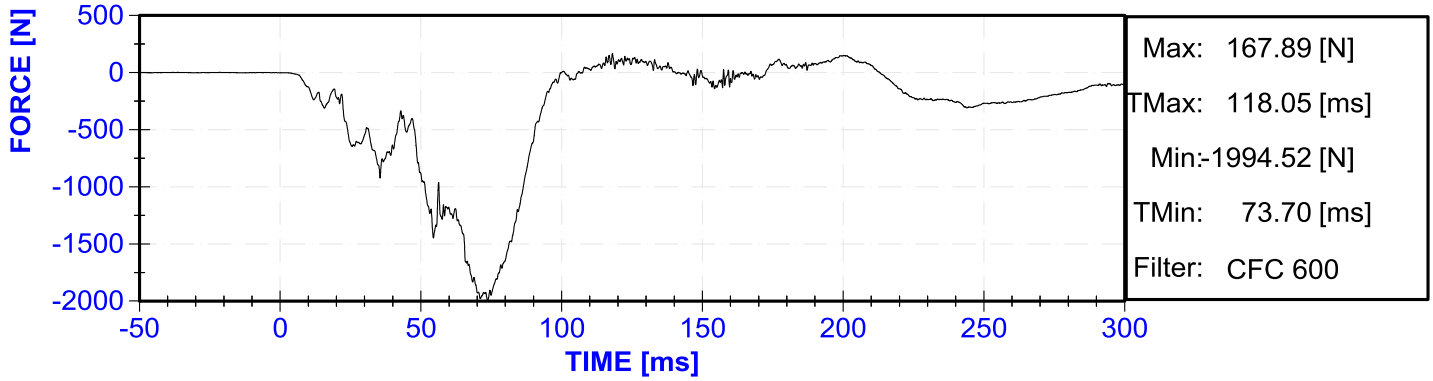
V2P2 TIBIA RIGHT UPPER MX



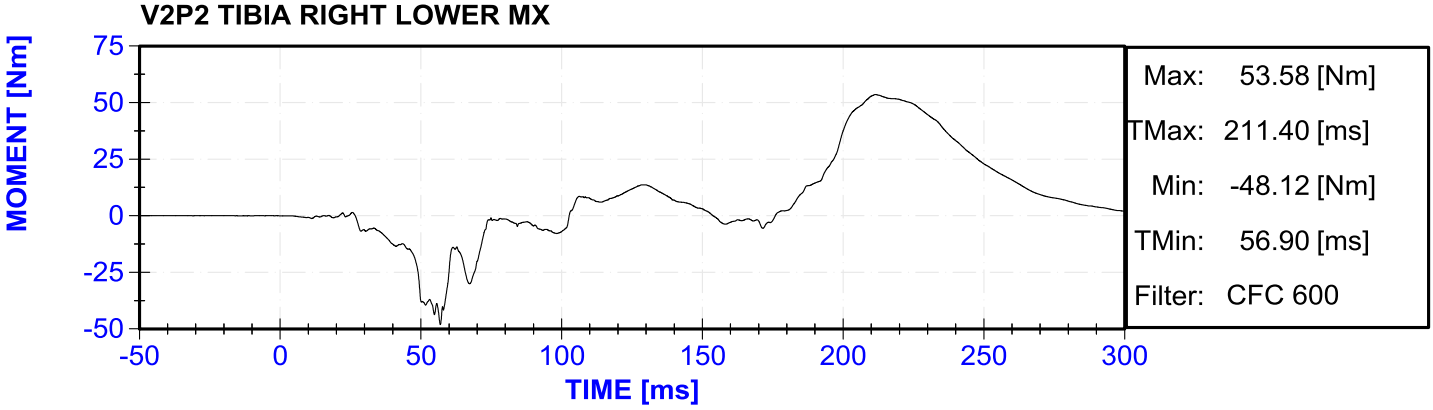
V2P2 TIBIA RIGHT UPPER MY



V2P2 TIBIA RIGHT LOWER FZ

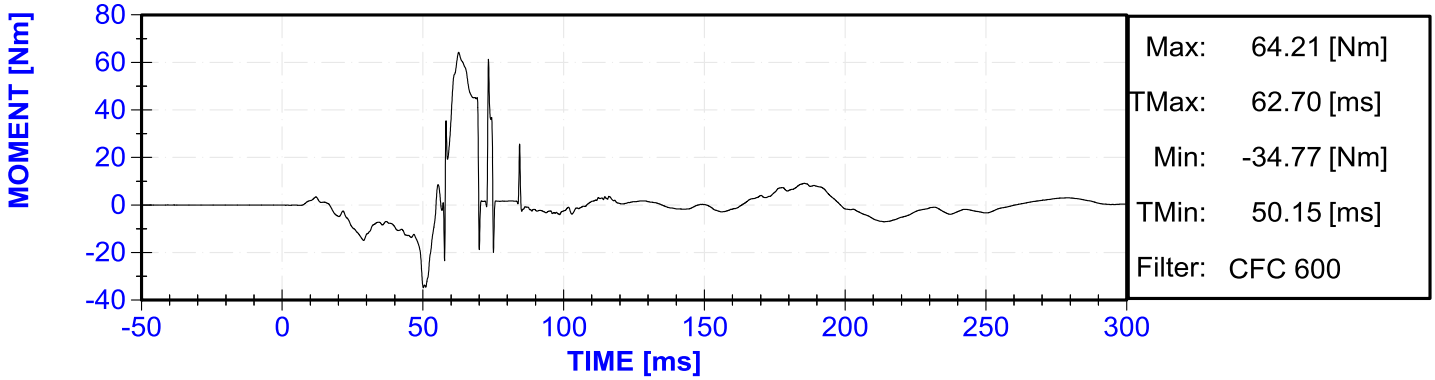


V2P2 TIBIA RIGHT LOWER MX

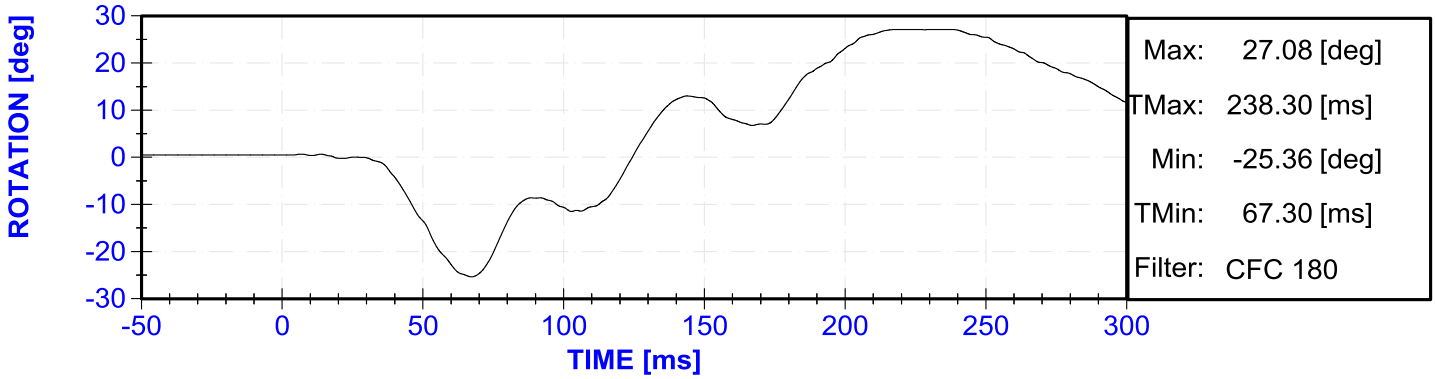


V2P2 TIBIA RIGHT LOWER MY

Questionable data from 57 to 84 ms

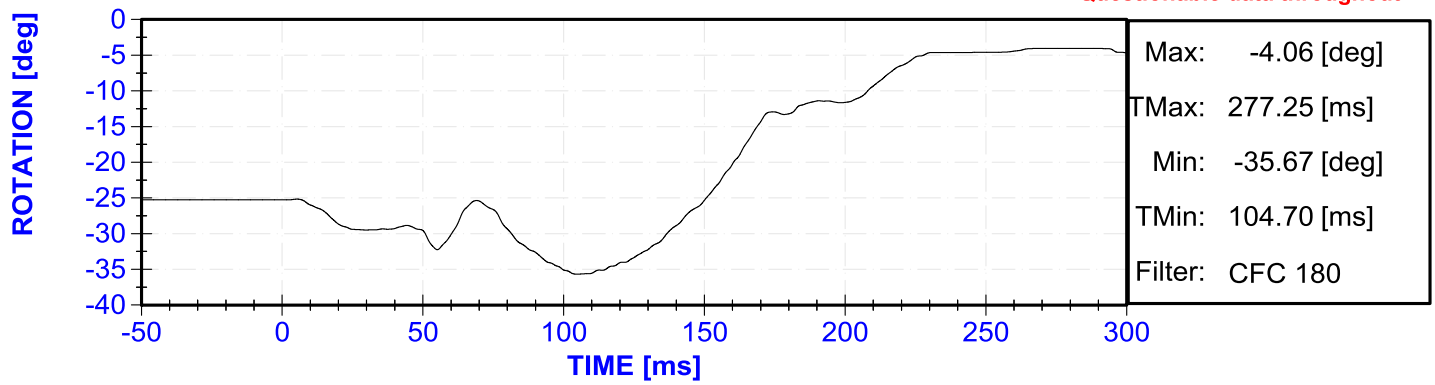


V2P2 ANKLE RIGHT POT RX

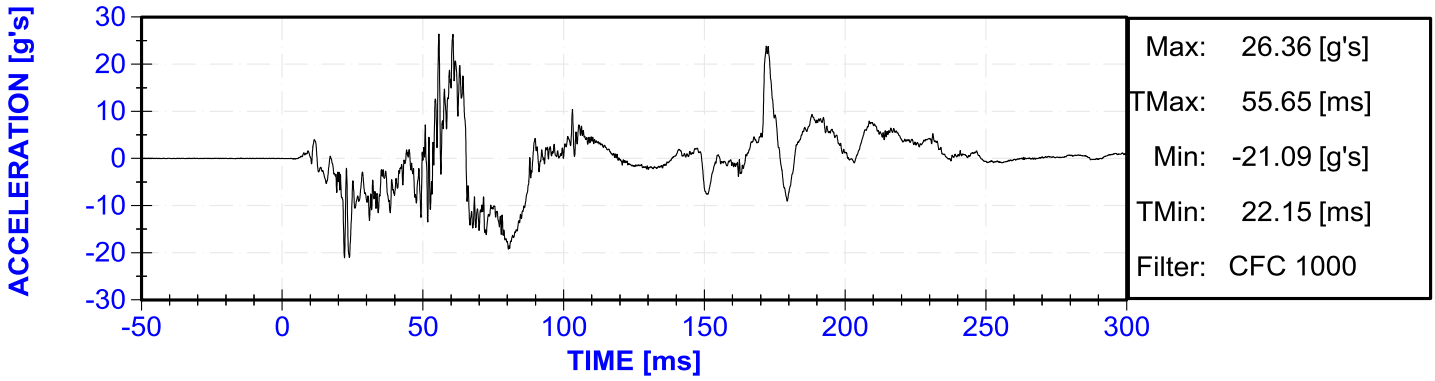


V2P2 ANKLE RIGHT POT RY

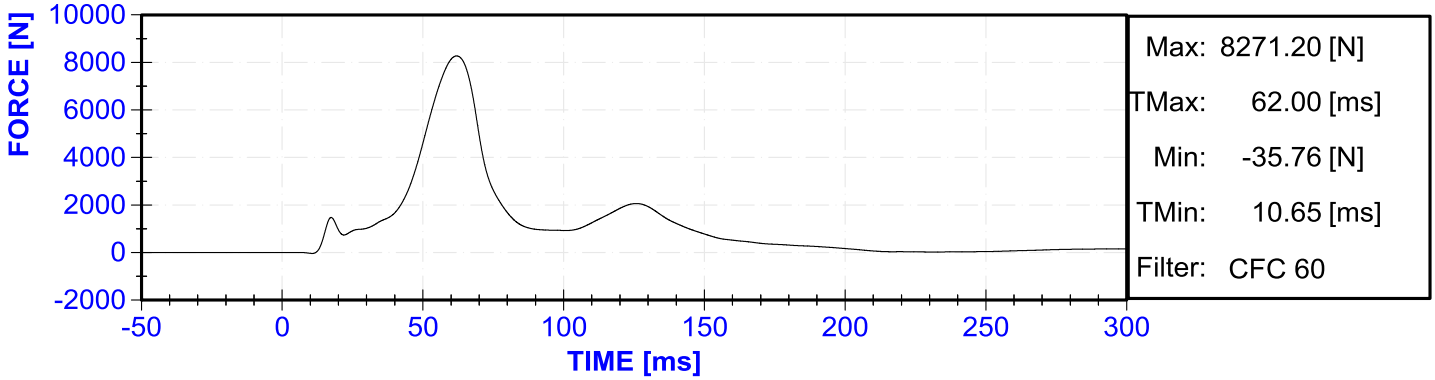
Questionable data throughout



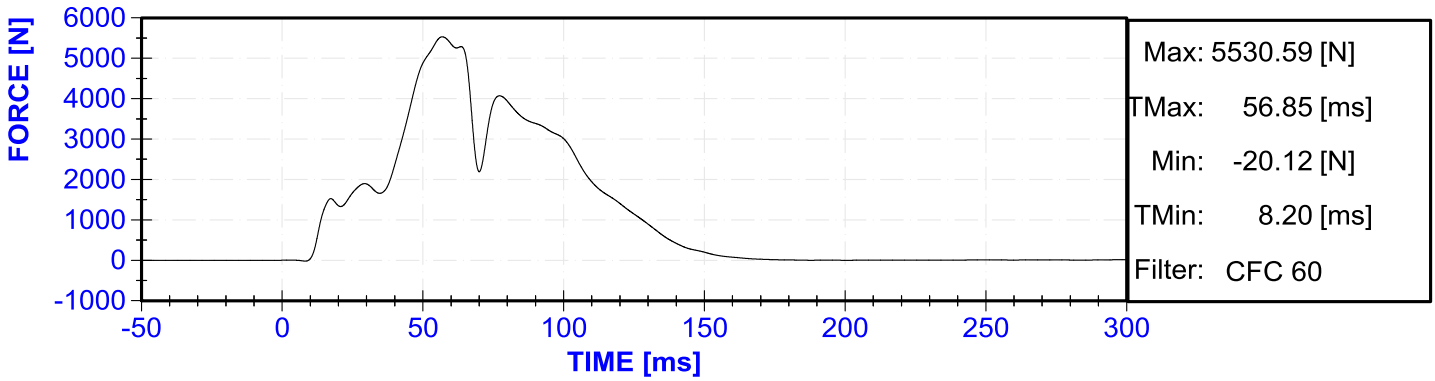
V2P2 FOOT RIGHT AZ



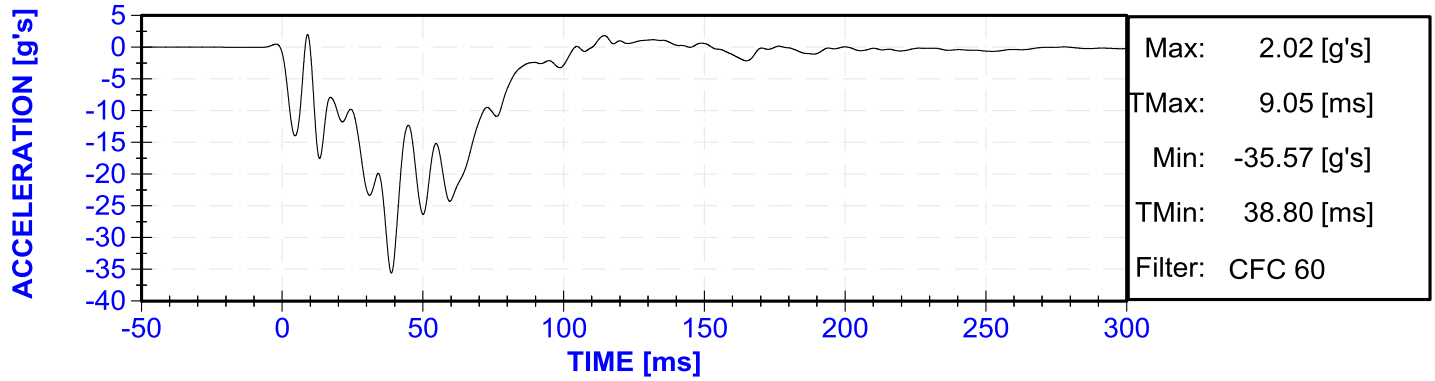
V2 P2 PASSENGER LAP BELT



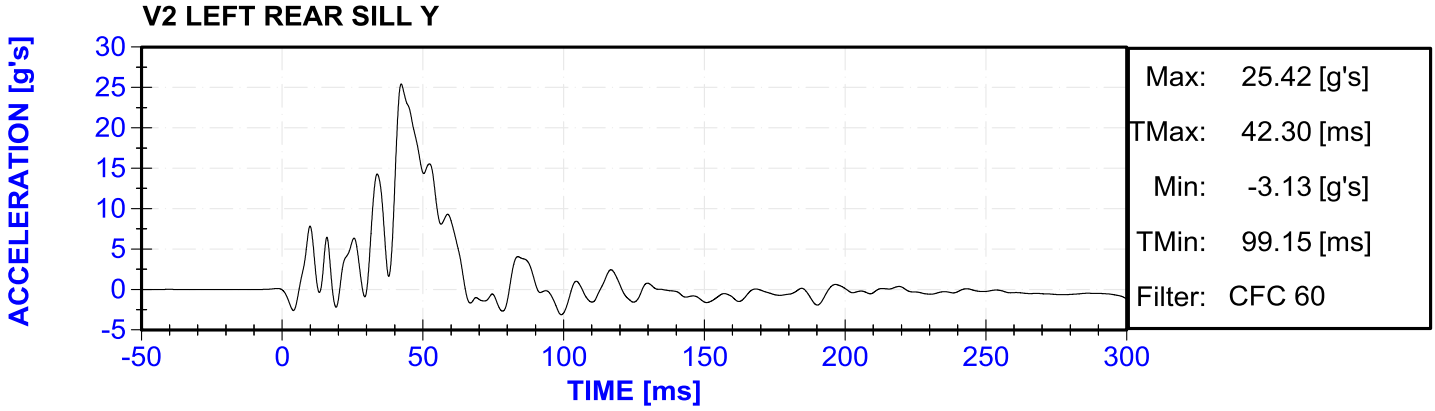
V2 P2 PASSENGER SHOULDER BELT



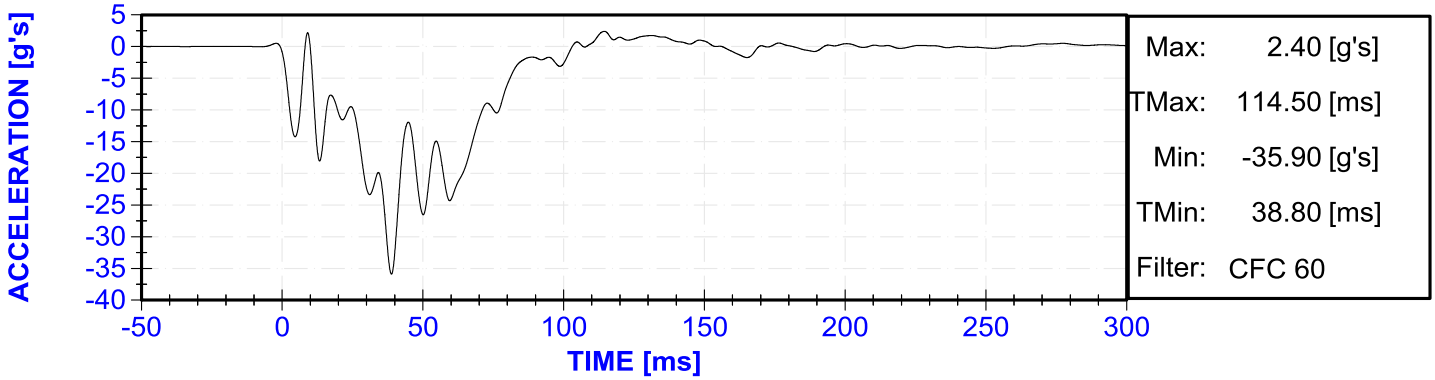
V2 LEFT REAR SILL X



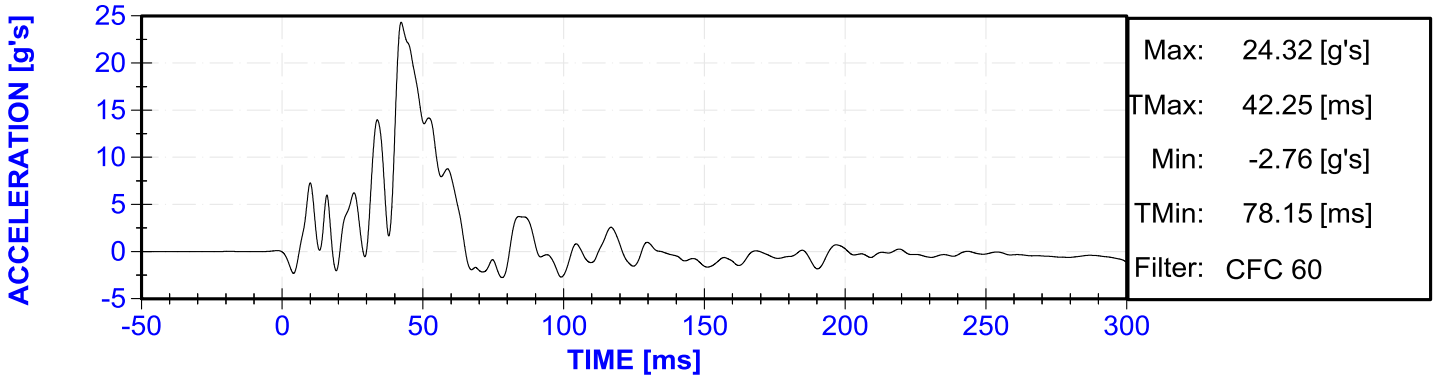
V2 LEFT REAR SILL Y



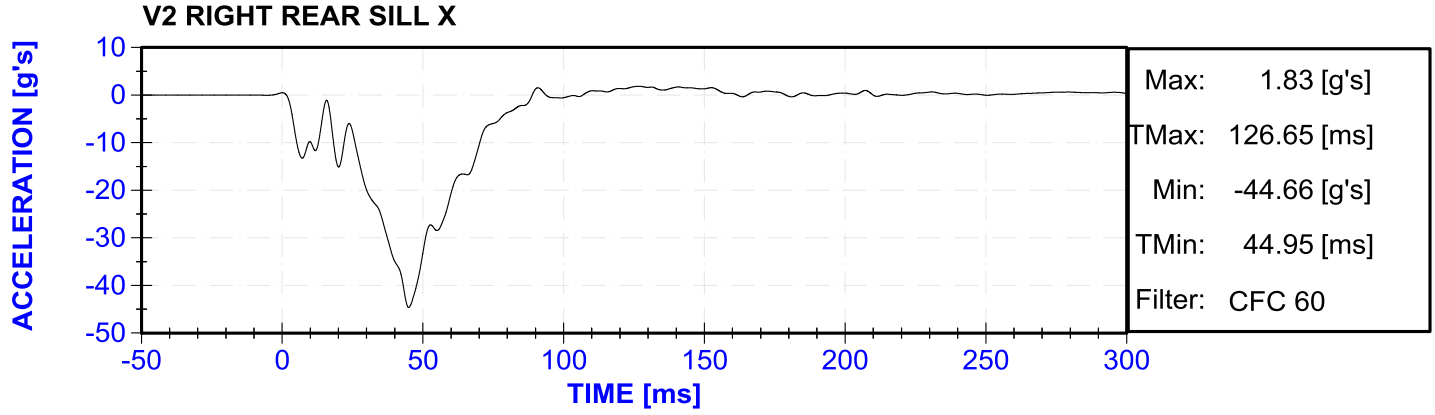
V2 LEFT REAR SILL RX



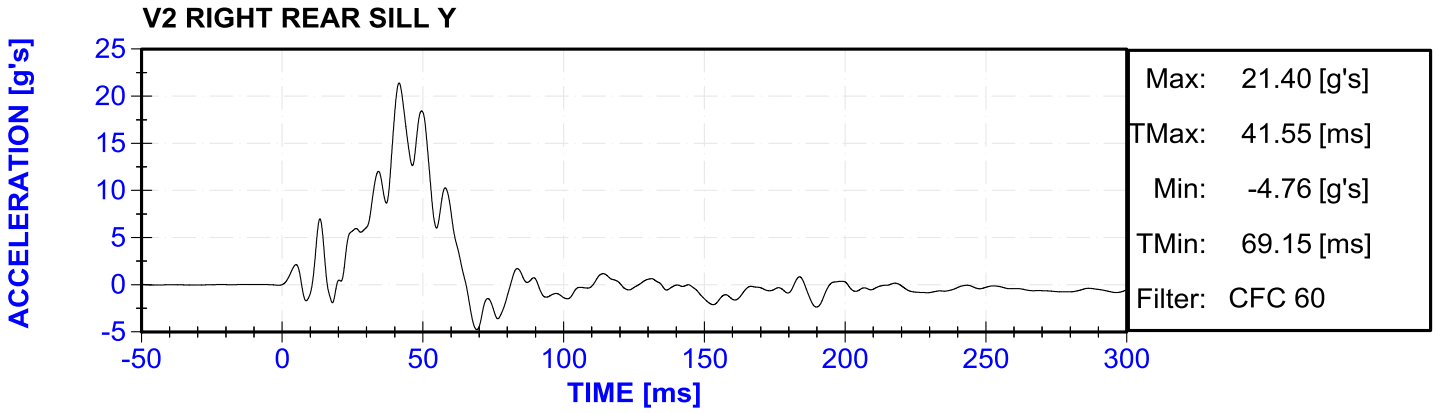
V2 LEFT REAR SILL RY

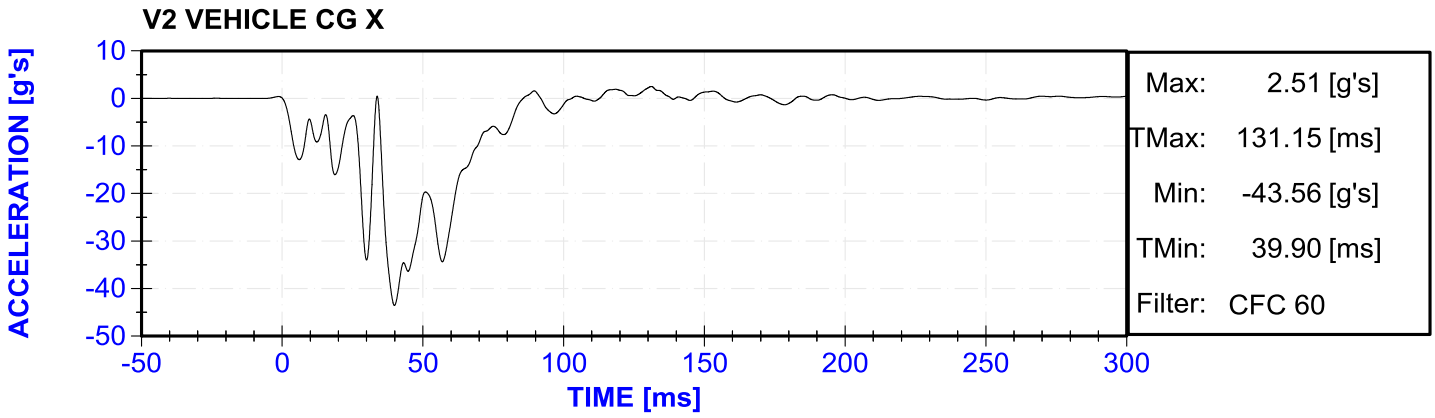


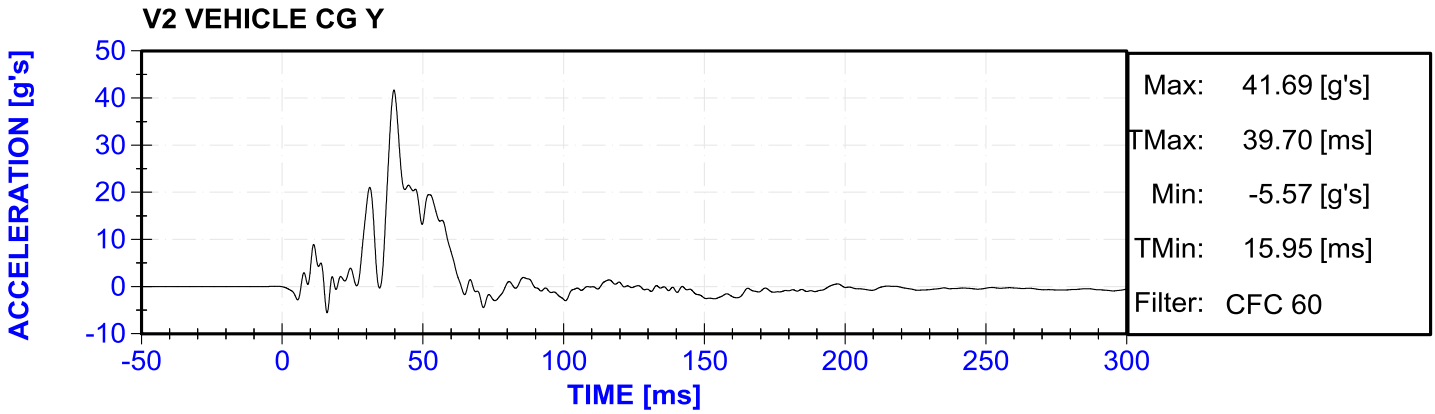
V2 RIGHT REAR SILL X

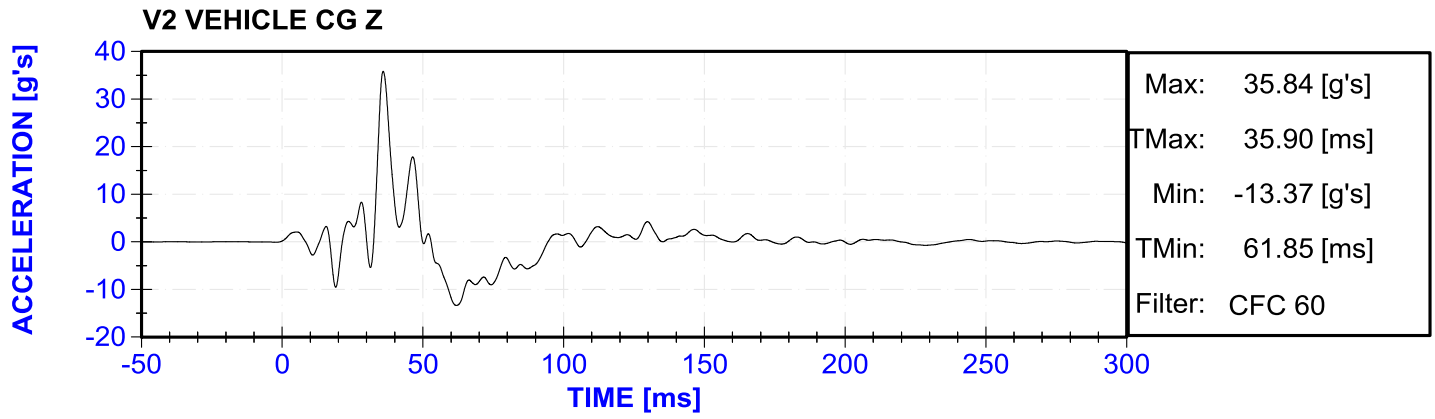


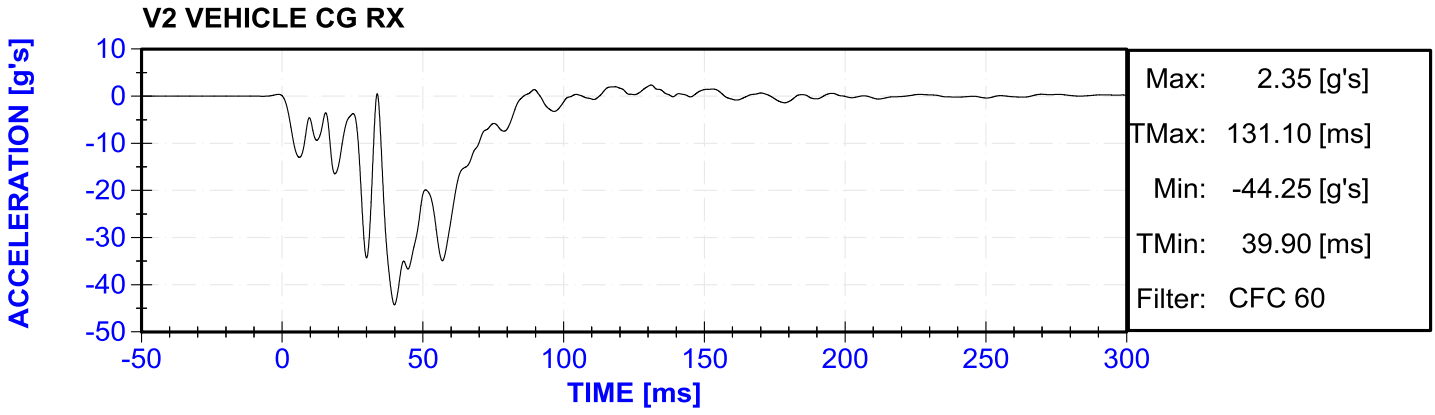
V2 RIGHT REAR SILL Y



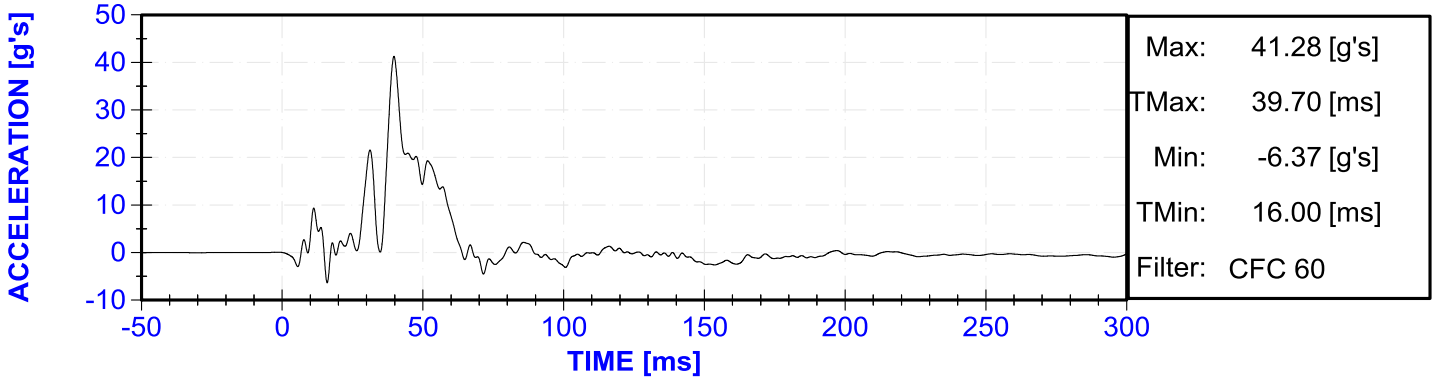

V2 VEHICLE CG X
ACCELERATION [g's]
TIME [ms]
Max: 2.51 [g's]
TMax: 131.15 [ms]
Min: -43.56 [g's]
TMin: 39.90 [ms]
Filter: CFC 60


V2 VEHICLE CG Y
ACCELERATION [g's]
TIME [ms]
Max: 41.69 [g's]
TMax: 39.70 [ms]
Min: -5.57 [g's]
TMin: 15.95 [ms]
Filter: CFC 60

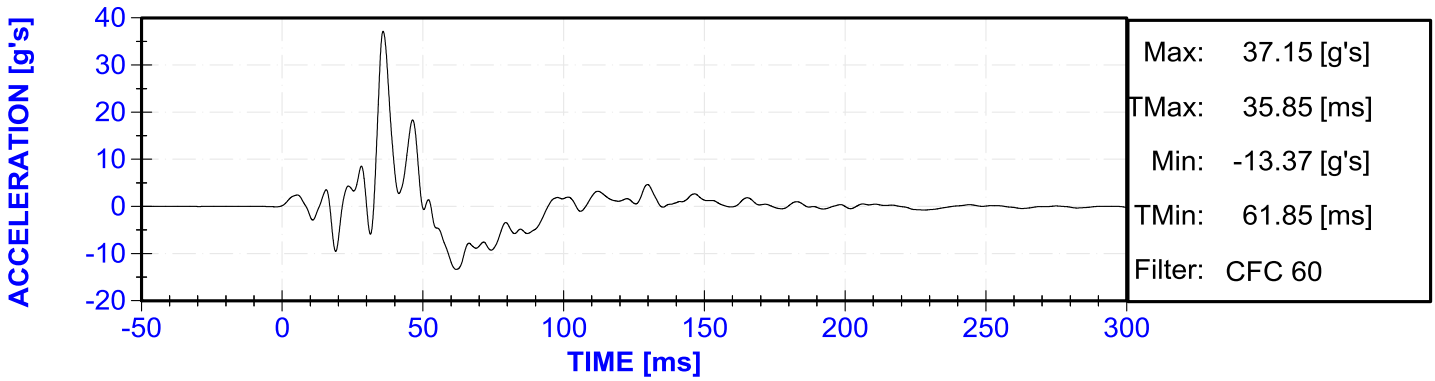

V2 VEHICLE CG Z
ACCELERATION [g's]
TIME [ms]
Max: 35.84 [g's]
TMax: 35.90 [ms]
Min: -13.37 [g's]
TMin: 61.85 [ms]
Filter: CFC 60


V2 VEHICLE CG RX
ACCELERATION [g's]
TIME [ms]
Max: 2.35 [g's]
TMax: 131.10 [ms]
Min: -44.25 [g's]
TMin: 39.90 [ms]
Filter: CFC 60

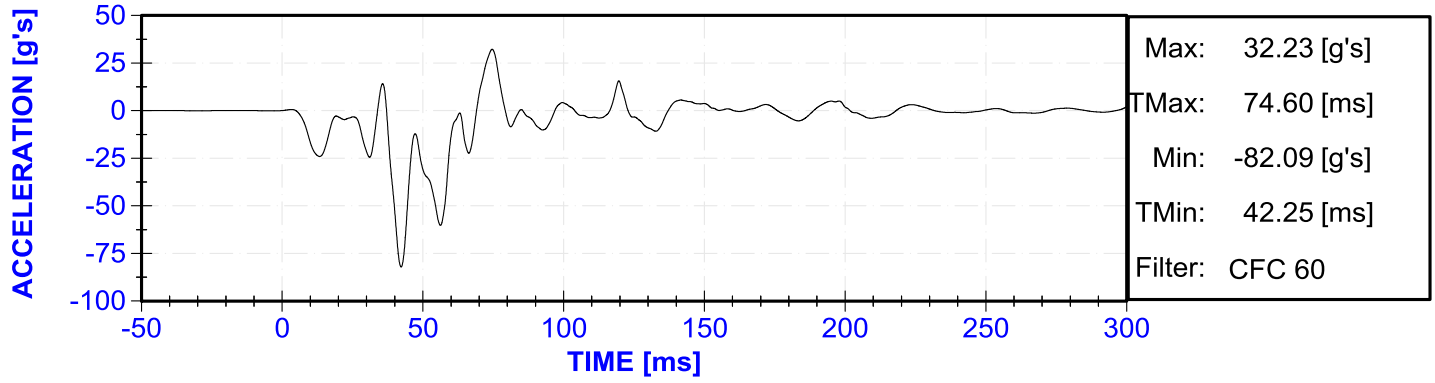
V2 VEHICLE CG RY



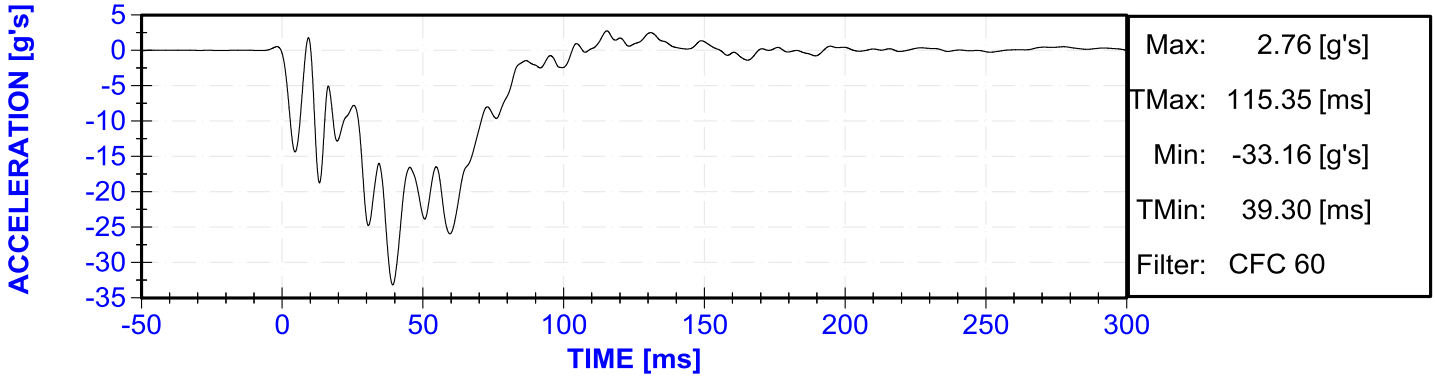
V2 VEHICLE CG RZ



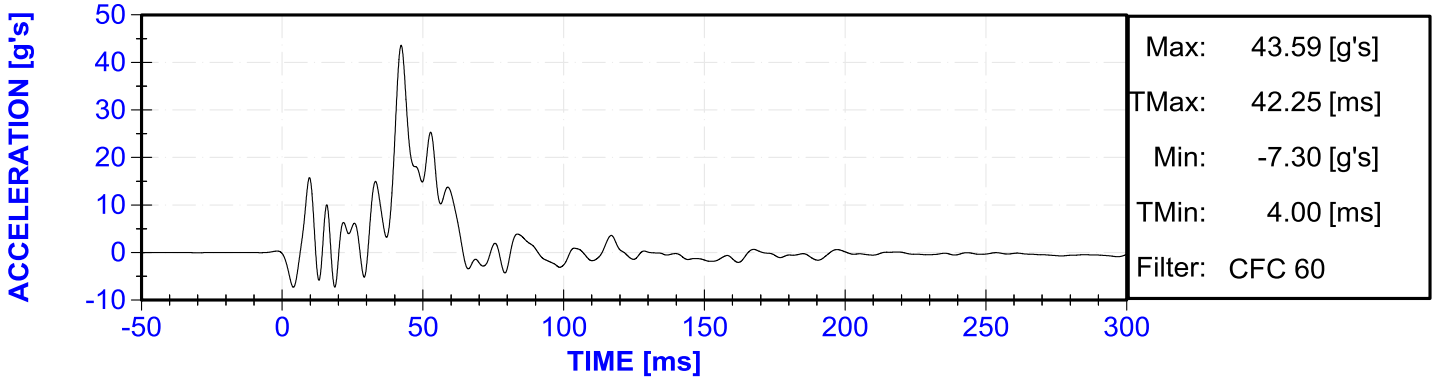
V2 INSTRUMENT PANEL X



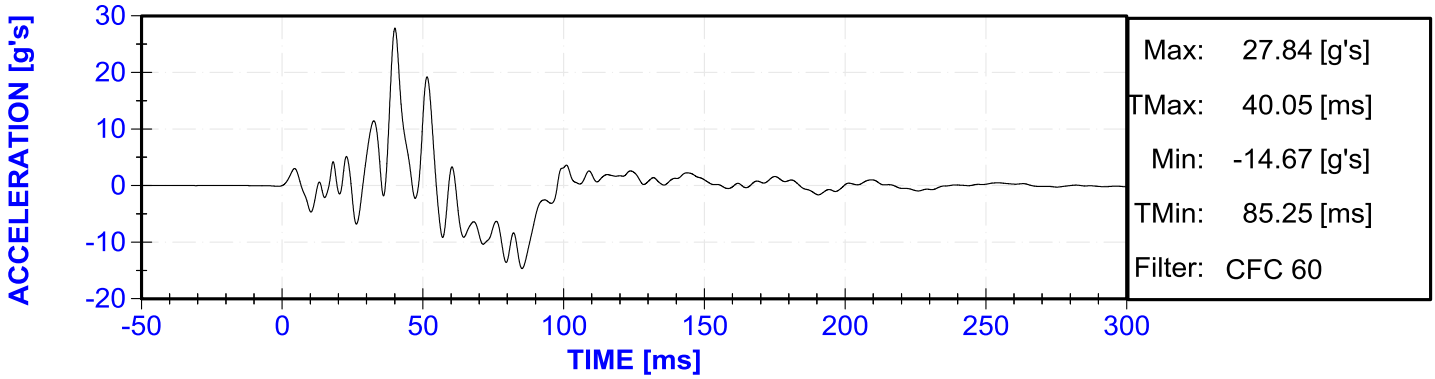
V2 DRIVER SEAT TRACK X



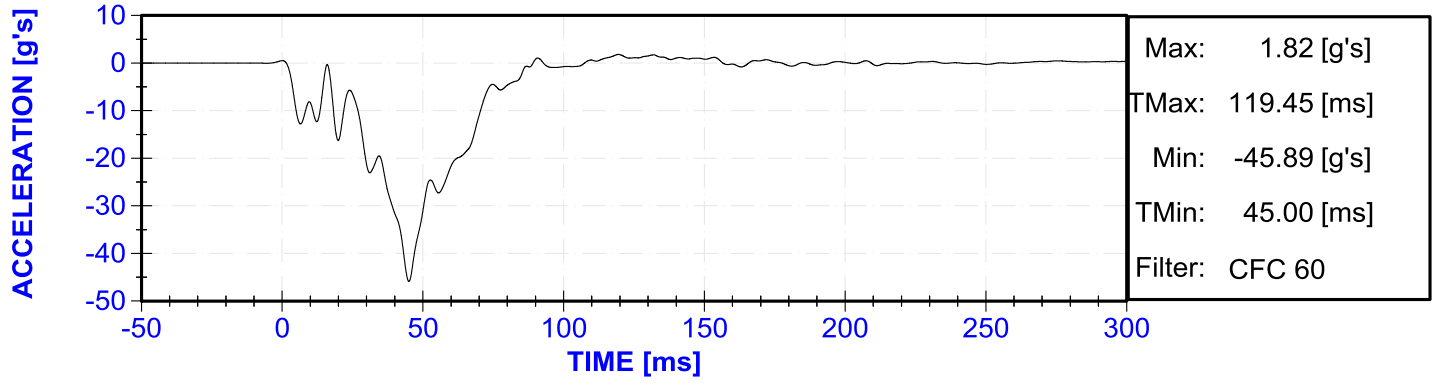
V2 DRIVER SEAT TRACK Y



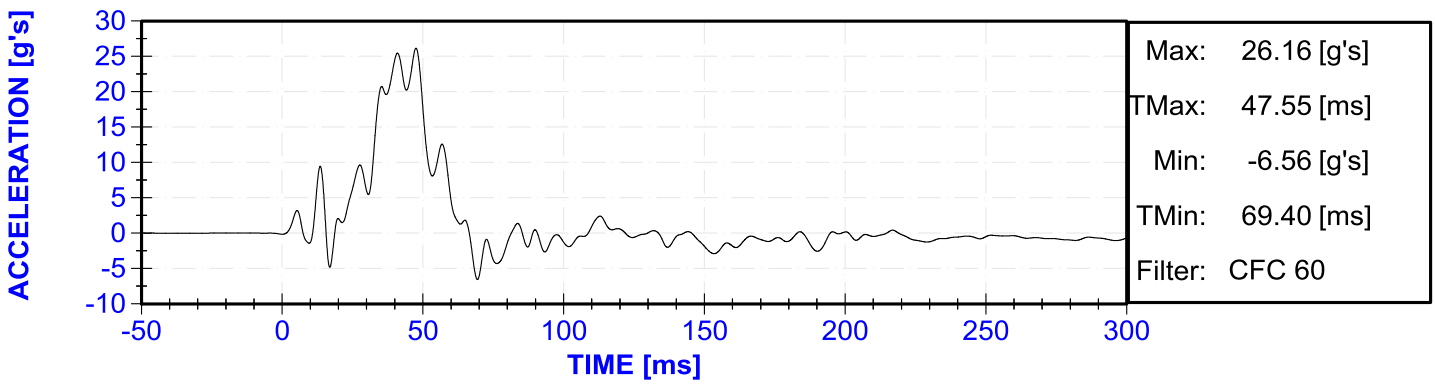
V2 DRIVER SEAT TRACK Z



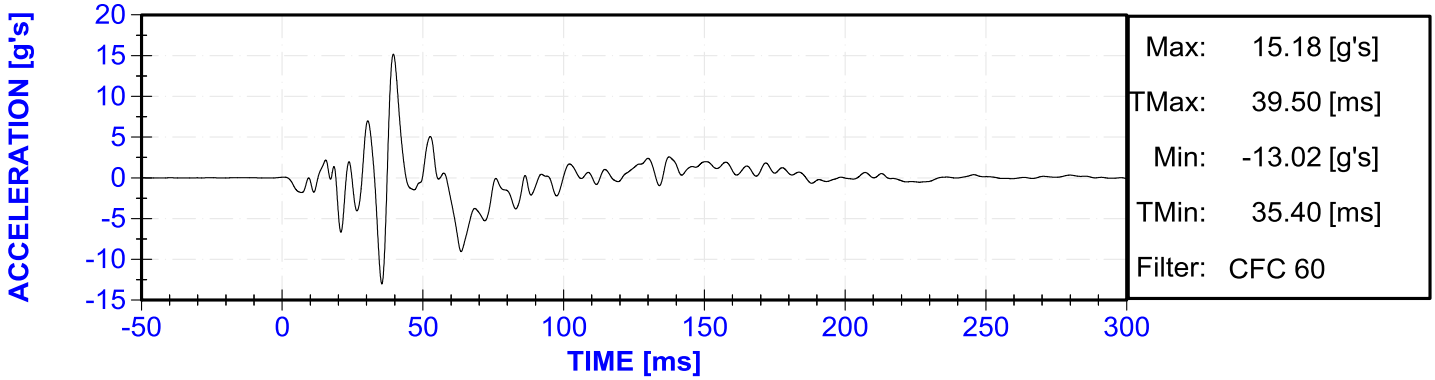
V2 PASSENGER SEAT TRACK X



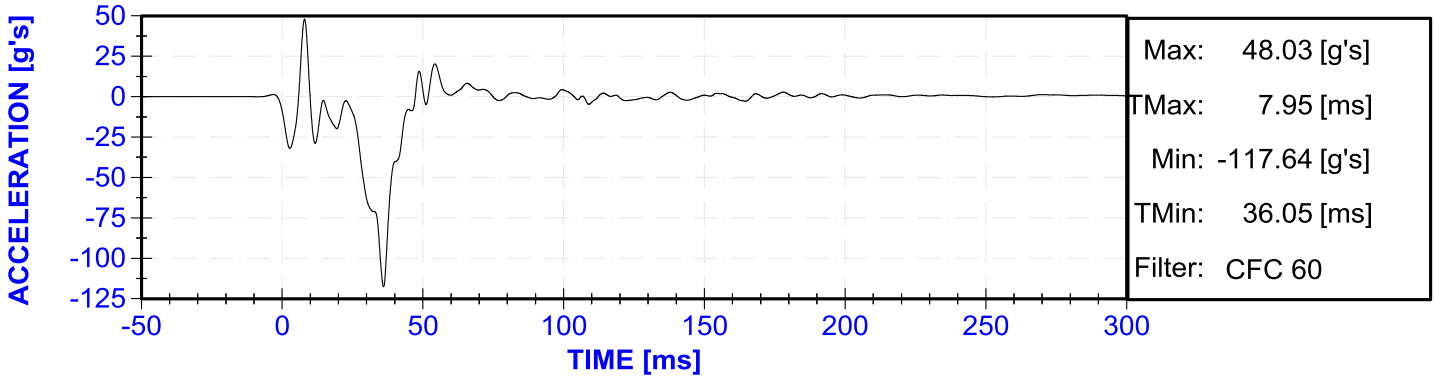
V2 PASSENGER SEAT TRACK Y



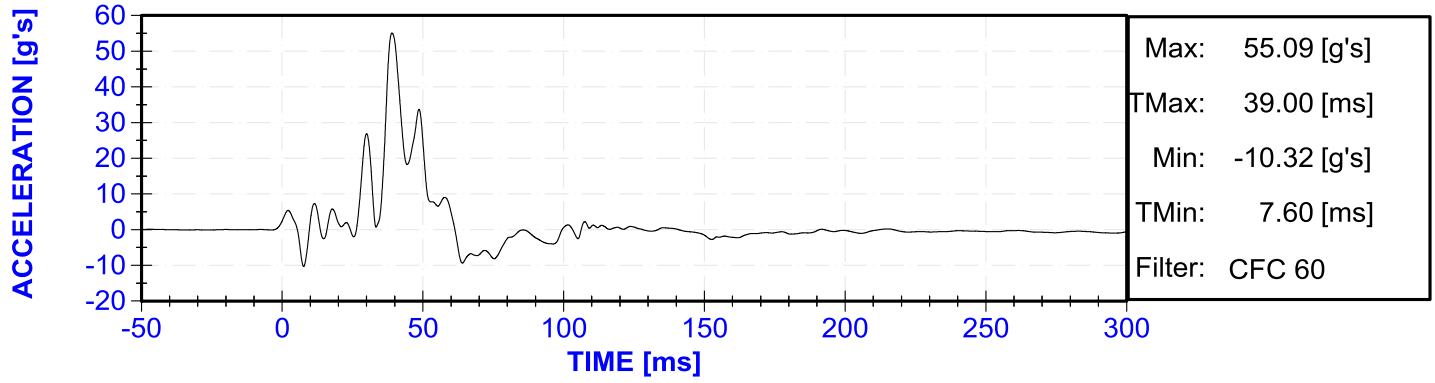
V2 PASSENGER SEAT TRACK Z



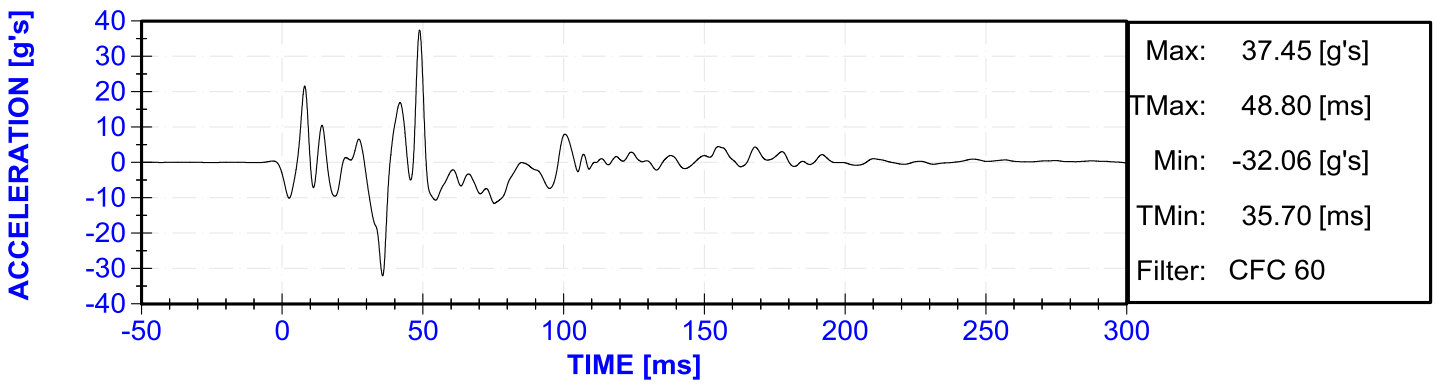
V2 DRIVER FLOOR PAN X



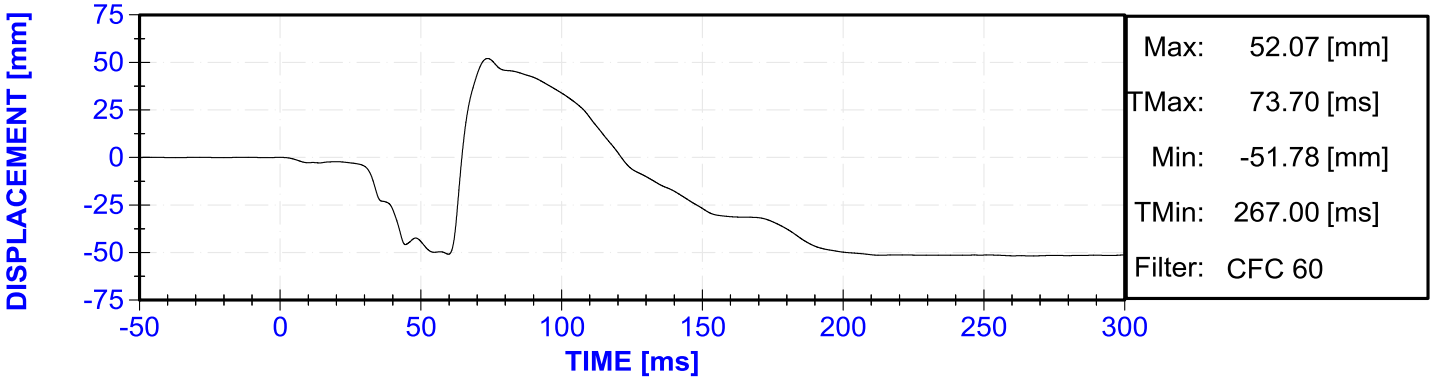
V2 DRIVER FLOOR PAN Y



V2 DRIVER FLOOR PAN Z

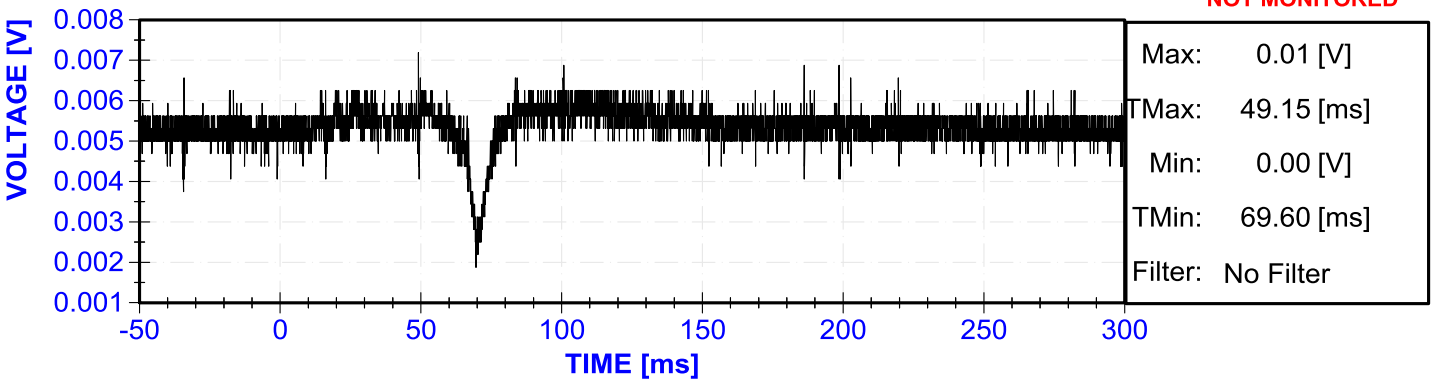


V2 DRIVER FLOOR PAN STRING POT



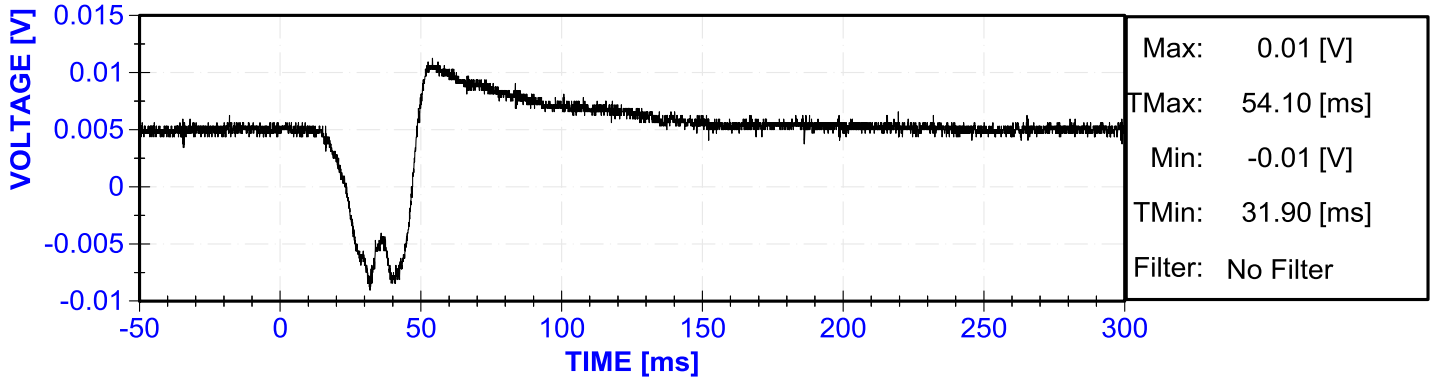
V2 DRIVER SW AIRBAG STAGE 1

NOT MONITORED



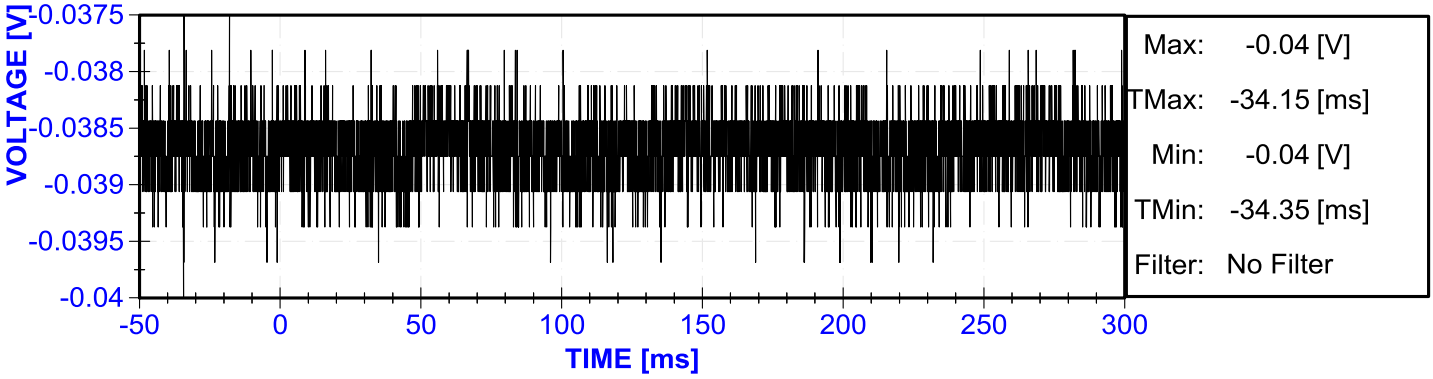
V2 DRIVER SW AIRBAG STAGE 2

NOT MONITORED



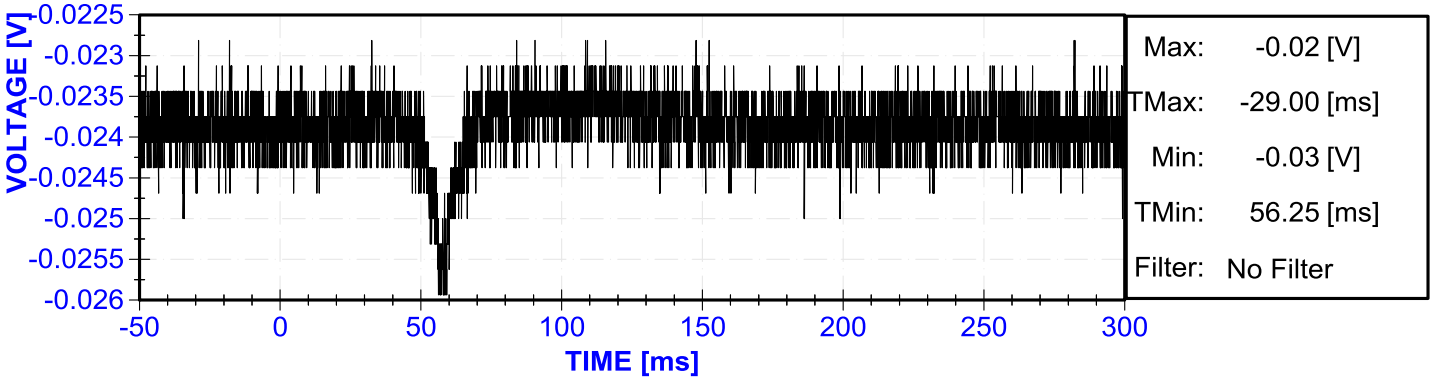
V2 DRIVER HEAD CURTAIN

NOT MONITORED



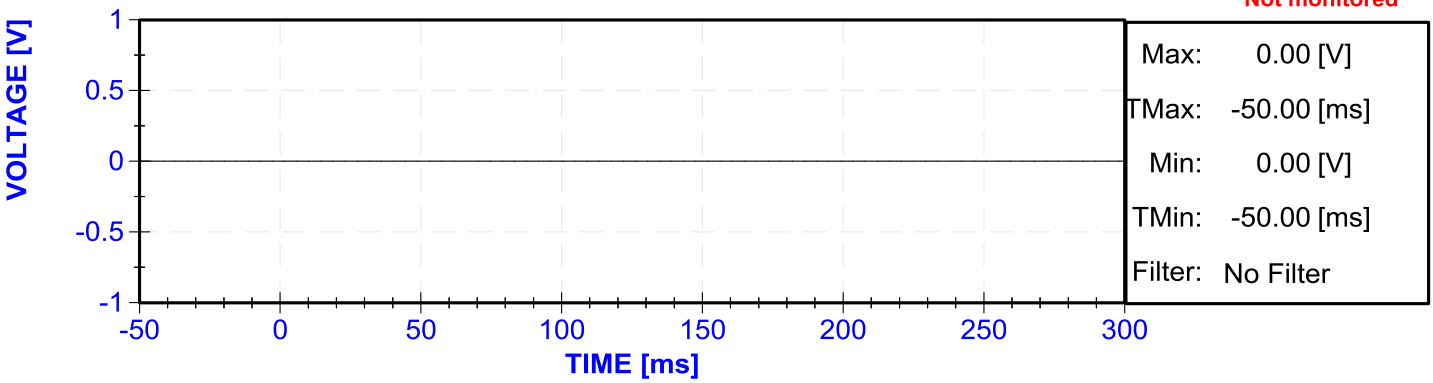
V2 DRIVER SEAT HEAD/TORSO/PELVIS

NOT MONITORED



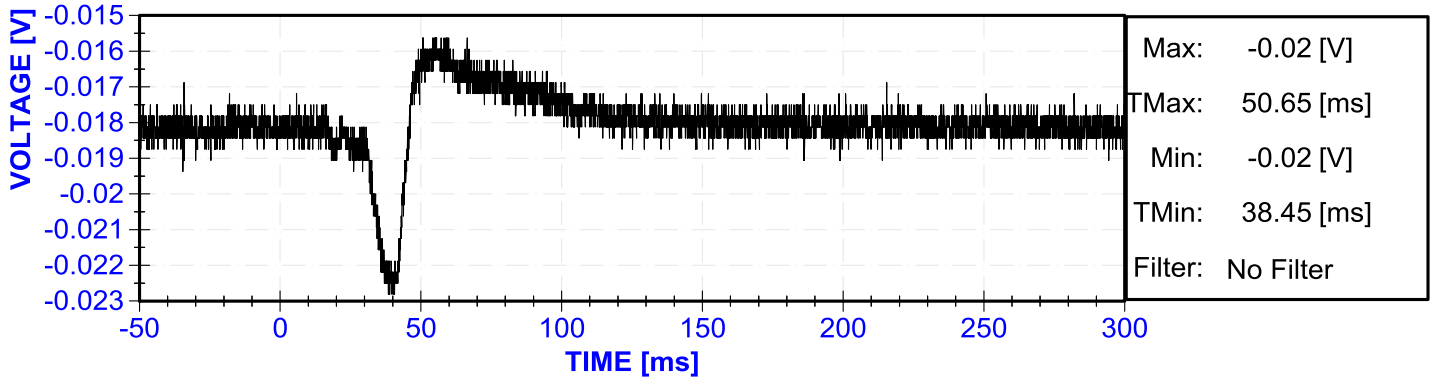
V2 DRIVER KNEE

Not monitored



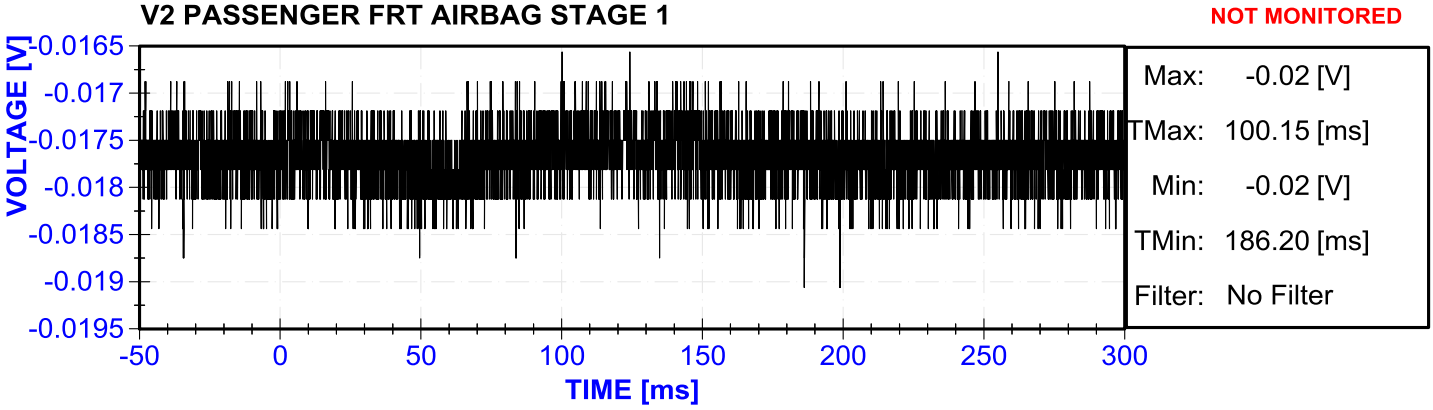
V2 DRIVER TORSO BELT PRETENSIONER

NOT MONITORED



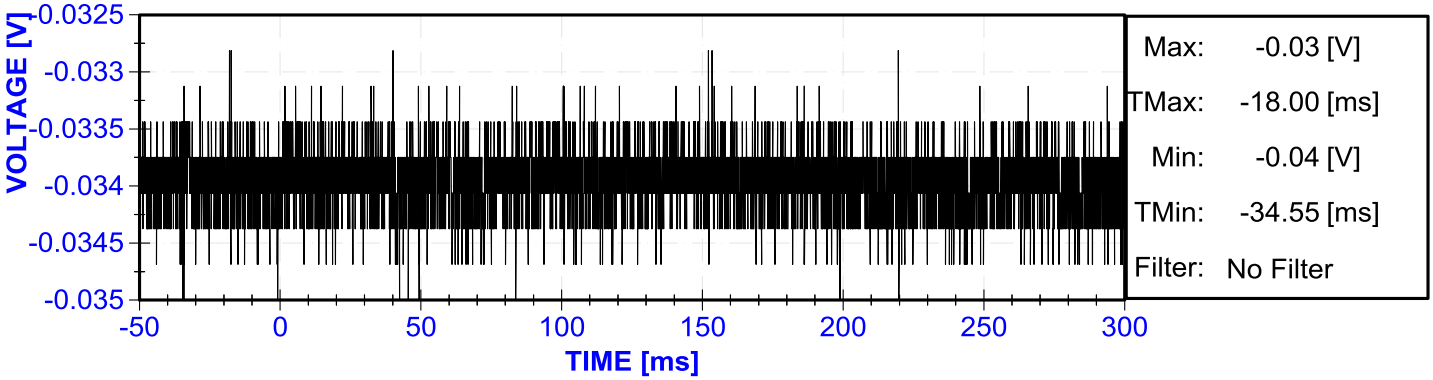
V2 PASSENGER FRT AIRBAG STAGE 1

NOT MONITORED



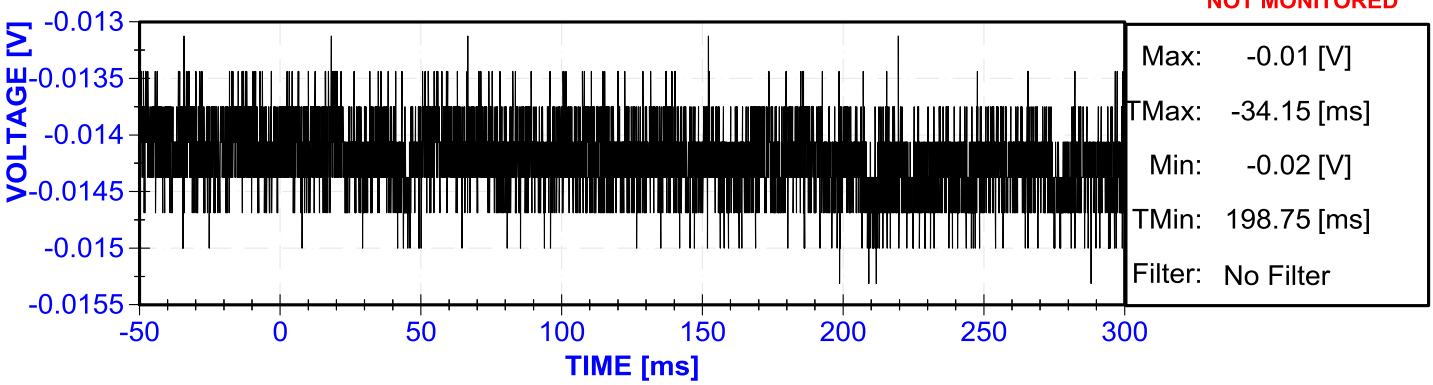
V2 PASSENGER FRT AIRBAG STAGE 2

NOT MONITORED



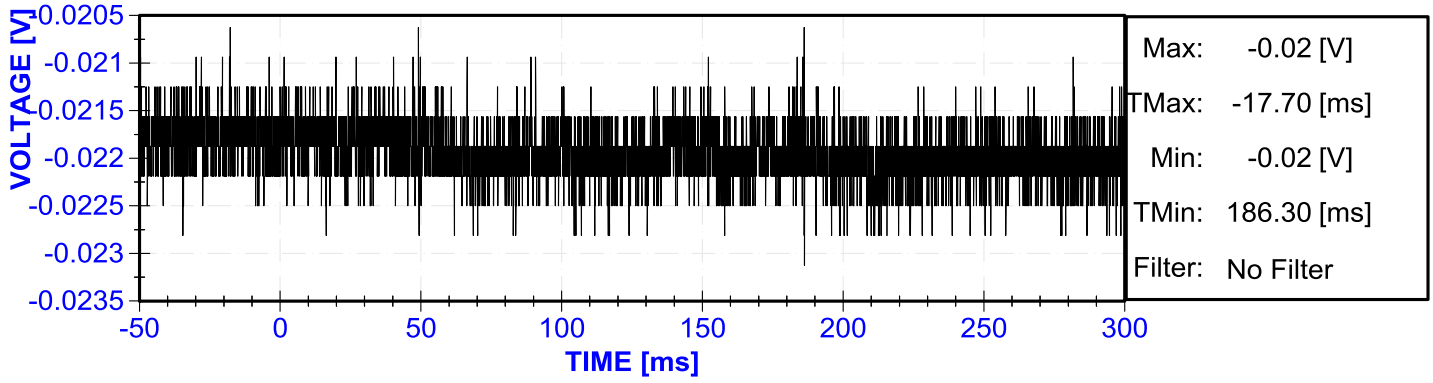
V2 PASSENGER HEAD CURTAIN

NOT MONITORED



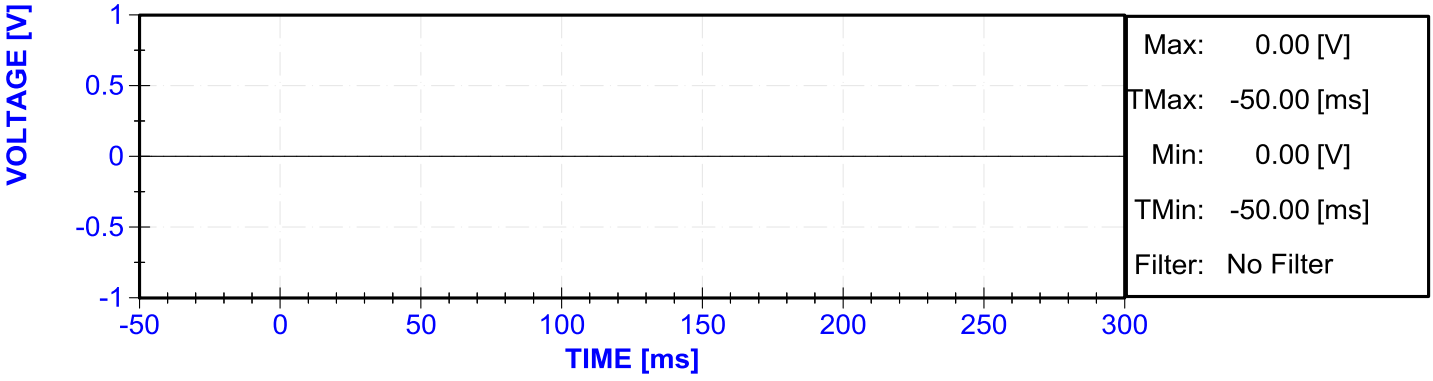
V2 PASSENGER HEAD/TORSO/PELVIS

NOT MONITORED



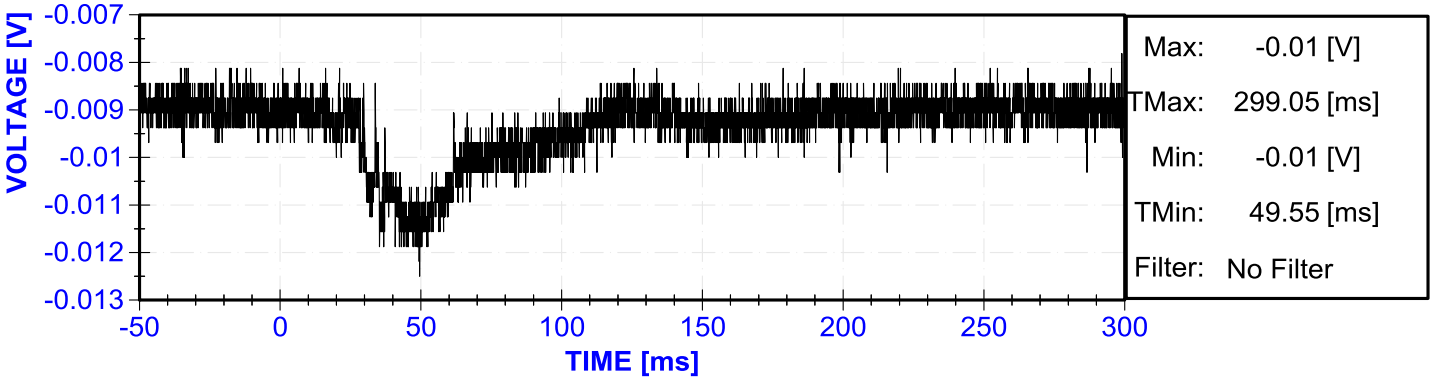
V2 PASSENGER KNEE

NOT MONITORED

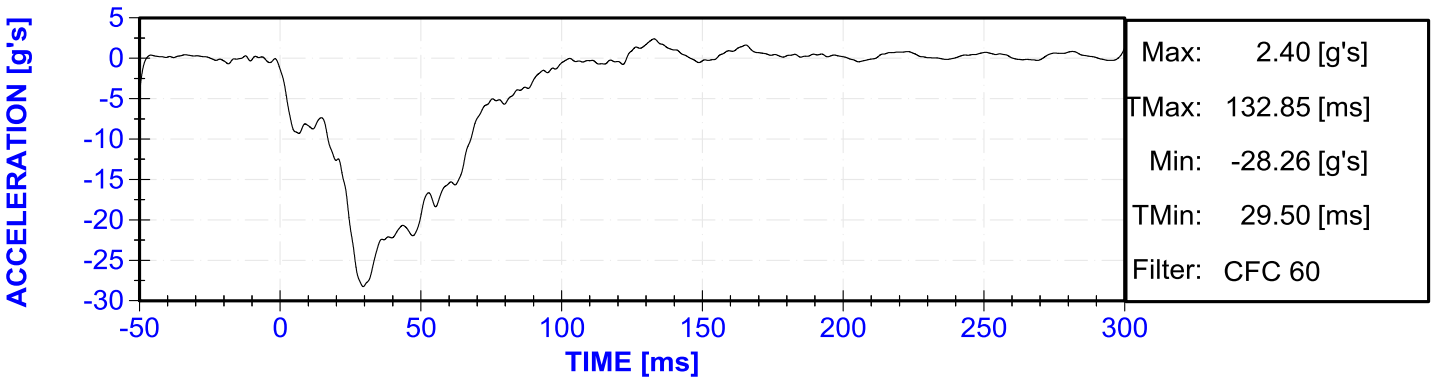


V2 PASSENGER TORSO BELT PRETENSIONER

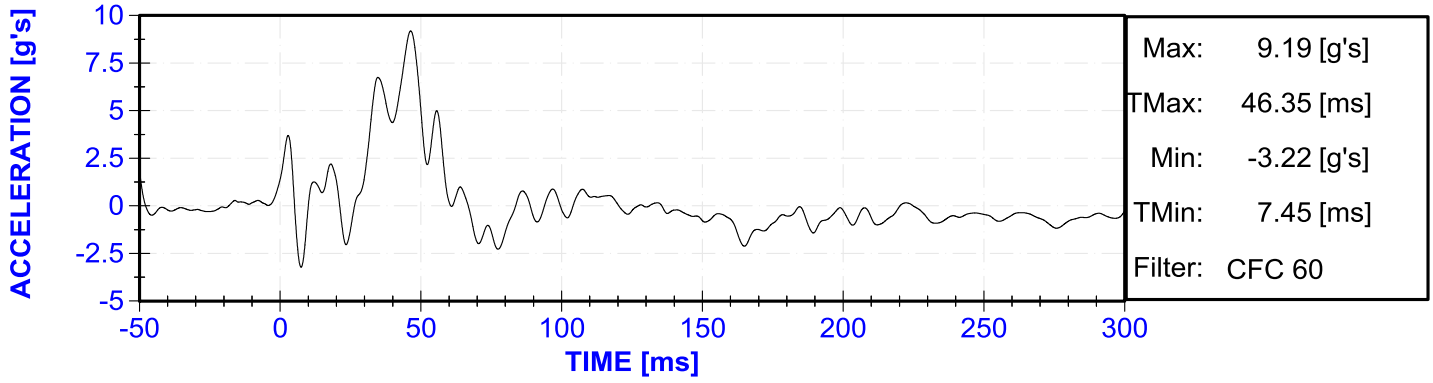
NOT MONITORED



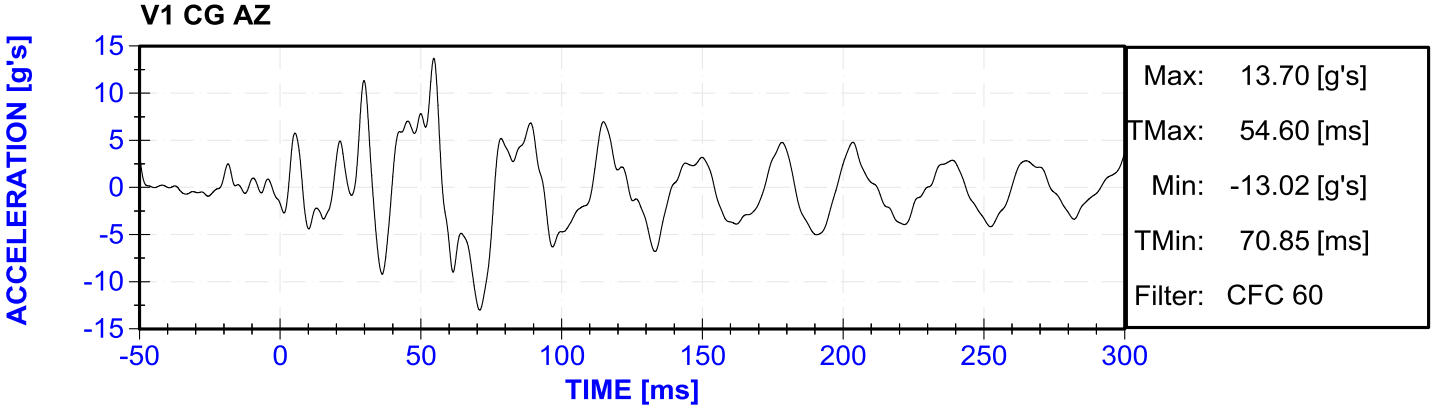
V1 CG AX

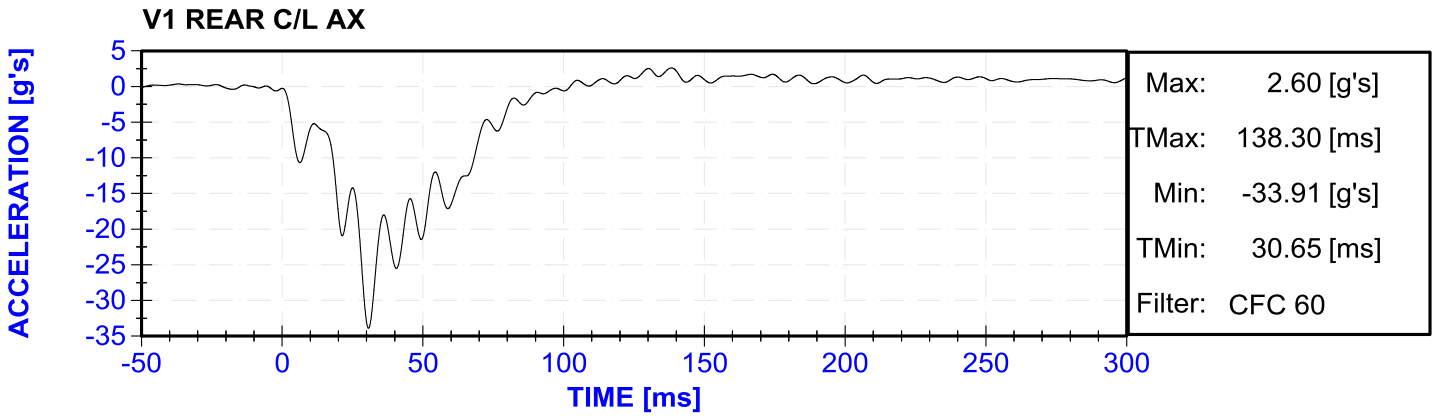


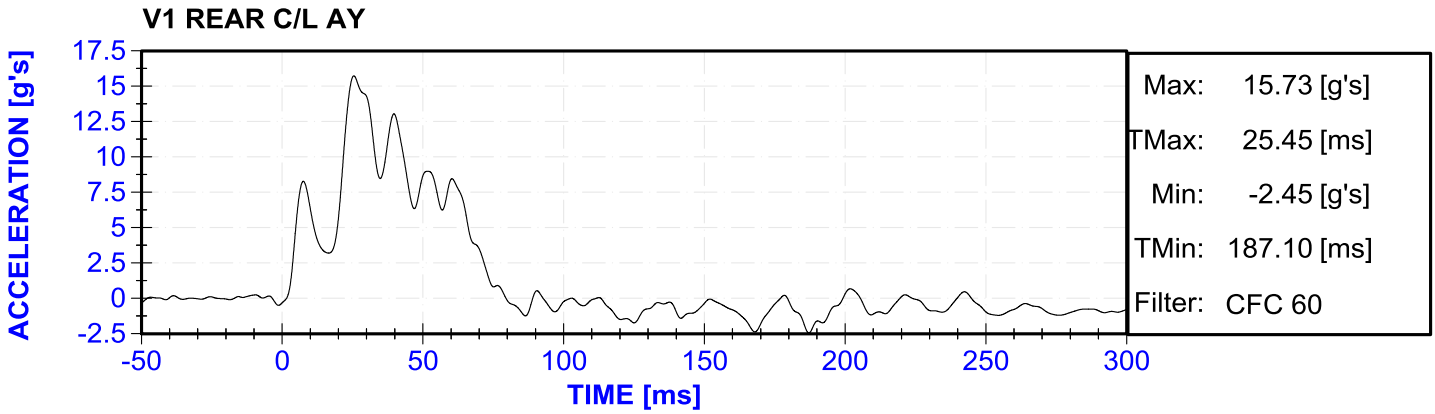
V1 CG AY

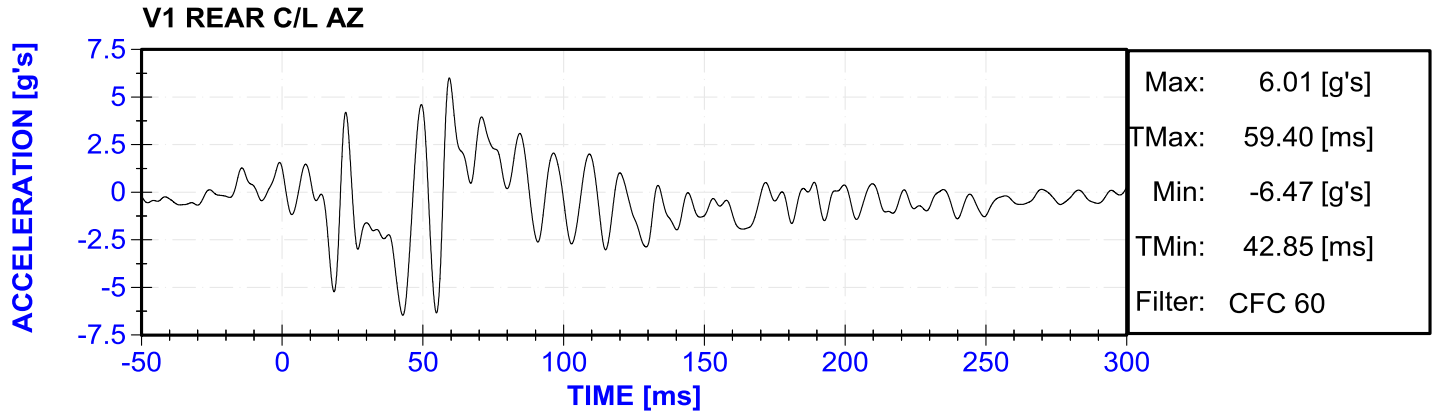


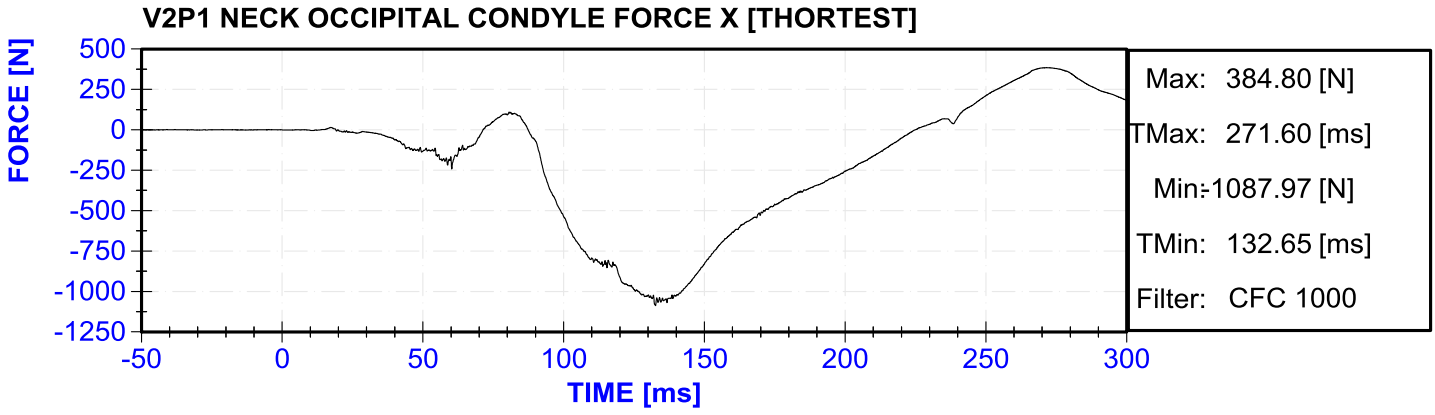
V1 CG AZ



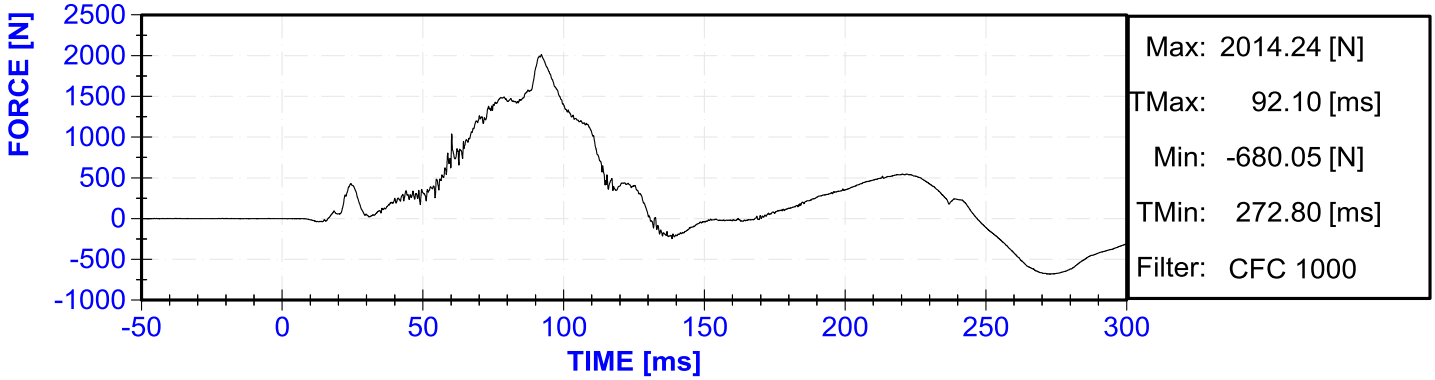

V1 REAR C/L AX
ACCELERATION [g's]
5
0
-5
-10
-15
-20
-25
-30
-35
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 2.60 [g's]
TMax: 138.30 [ms]
Min: -33.91 [g's]
TMin: 30.65 [ms]
Filter: CFC 60


V1 REAR C/L AY
ACCELERATION [g's]
17.5
15
12.5
10
7.5
5
2.5
0
-2.5
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 15.73 [g's]
TMax: 25.45 [ms]
Min: -2.45 [g's]
TMin: 187.10 [ms]
Filter: CFC 60

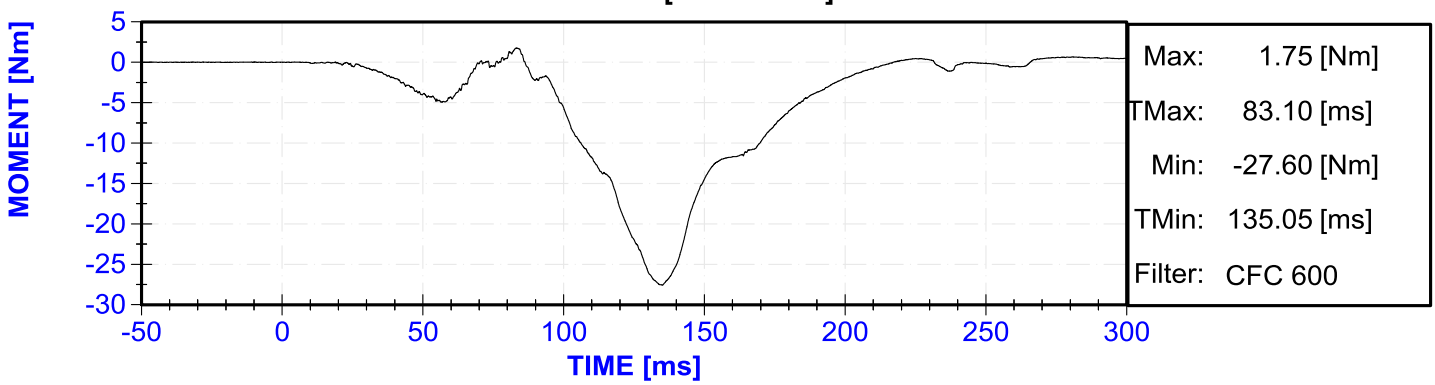

V1 REAR C/L AZ
ACCELERATION [g's]
7.5
5
2.5
0
-2.5
-5
-7.5
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 6.01 [g's]
TMax: 59.40 [ms]
Min: -6.47 [g's]
TMin: 42.85 [ms]
Filter: CFC 60


V2P1 NECK OCCIPITAL CONDYLE FORCE X [THORTEST]
FORCE [N]
500
250
0
-250
-500
-750
-1000
-1250
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 384.80 [N]
TMax: 271.60 [ms]
Min: -1087.97 [N]
TMin: 132.65 [ms]
Filter: CFC 1000

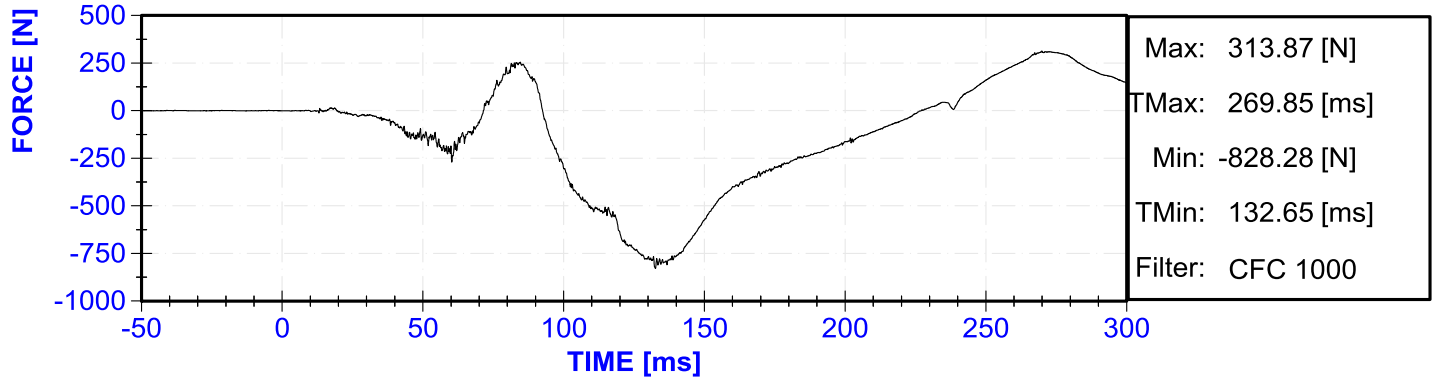
V2P1 NECK OCCIPITAL CONDYLE FORCE Z [THORTEST]



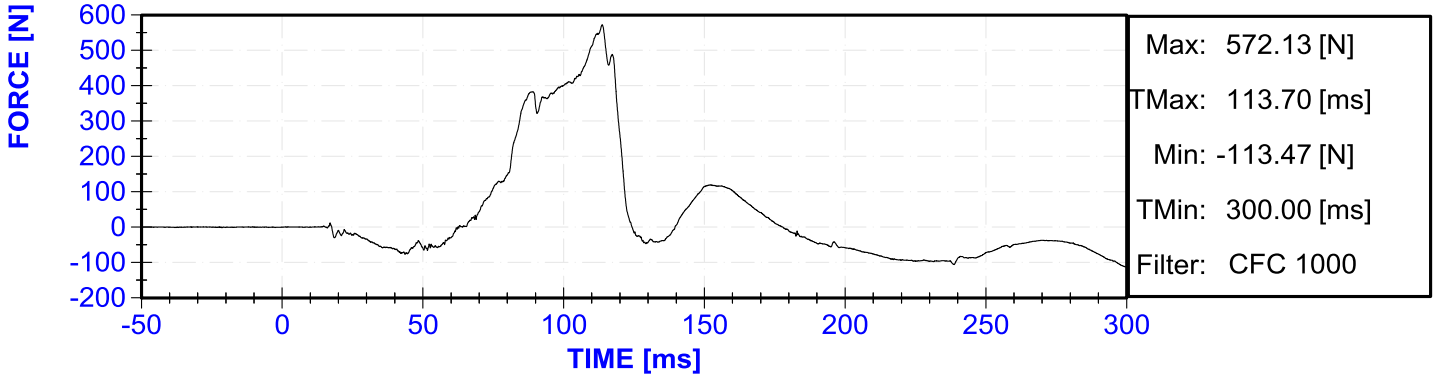
V2P1 NECK OCCIPITAL CONDYLE MY [THORTEST]



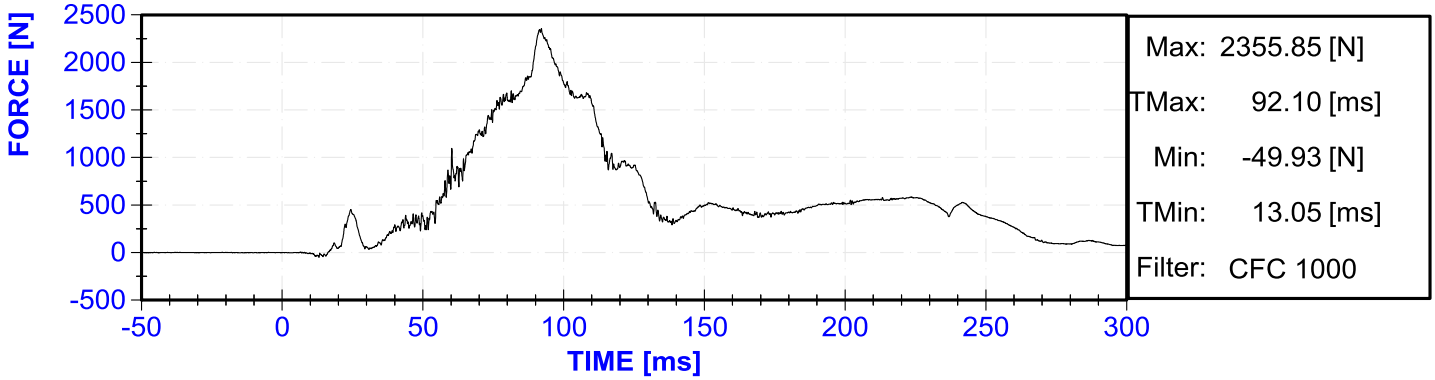
V2P1 NECK UPPER FORCE X [THORTEST]



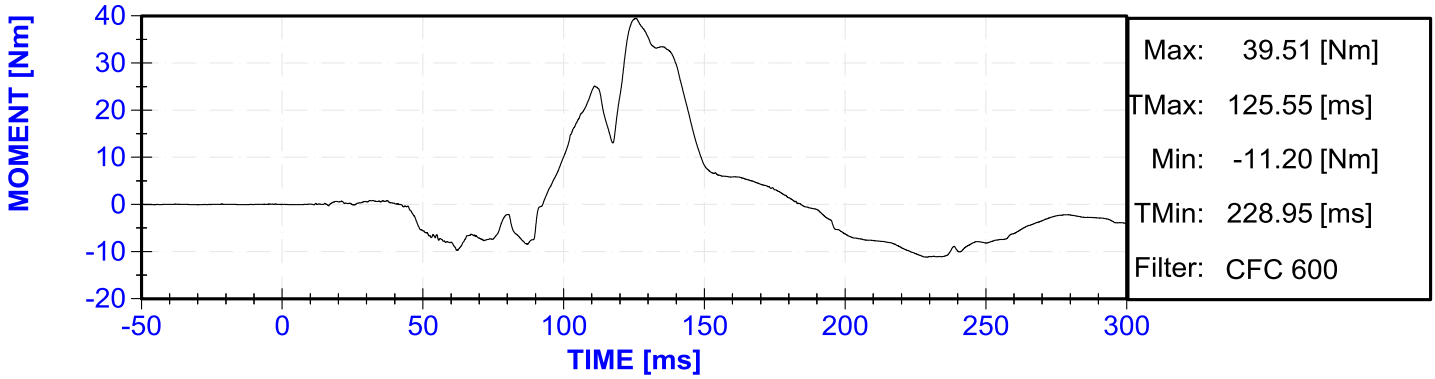
V2P1 NECK UPPER FORCE Y [THORTEST]



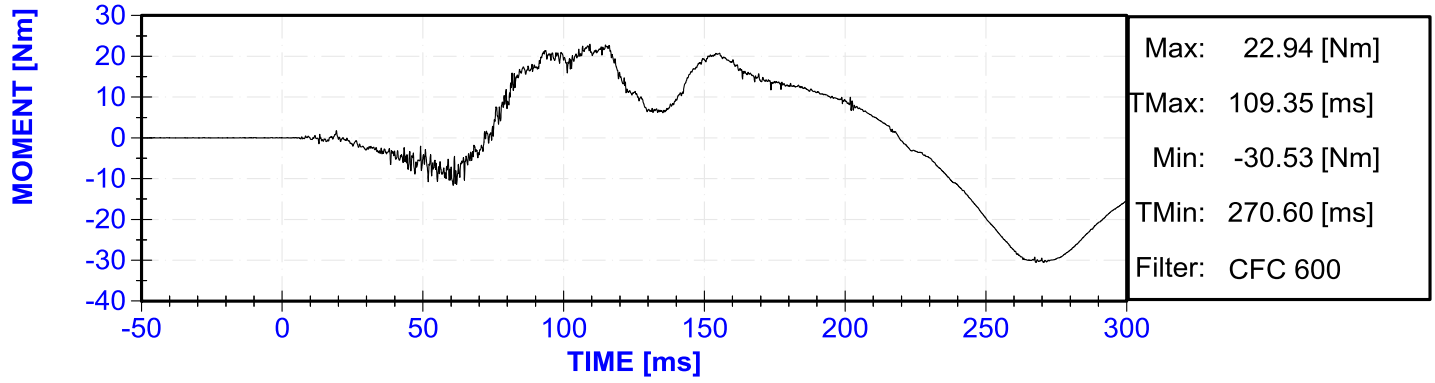
V2P1 NECK UPPER FORCE Z [THORTEST]



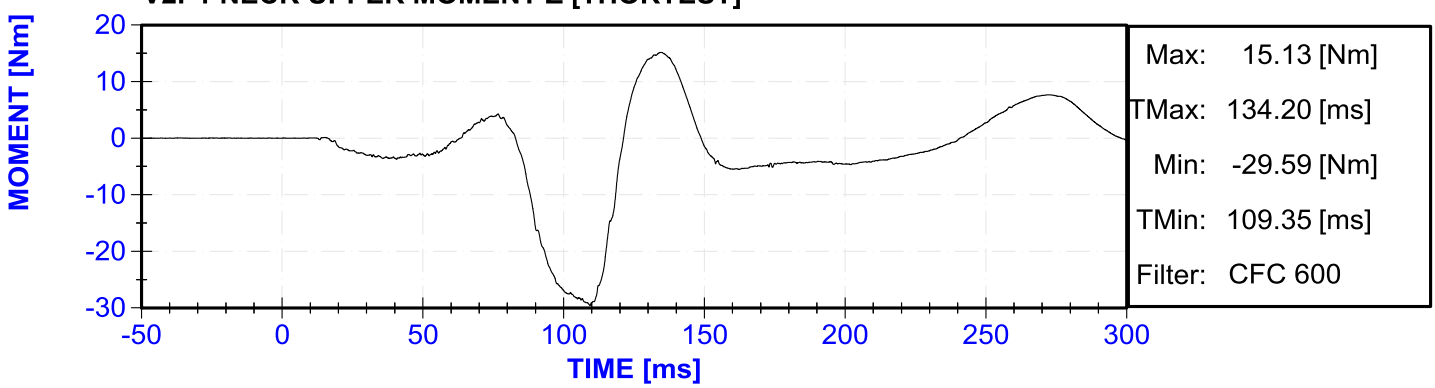
V2P1 NECK UPPER MOMENT X [THORTEST]



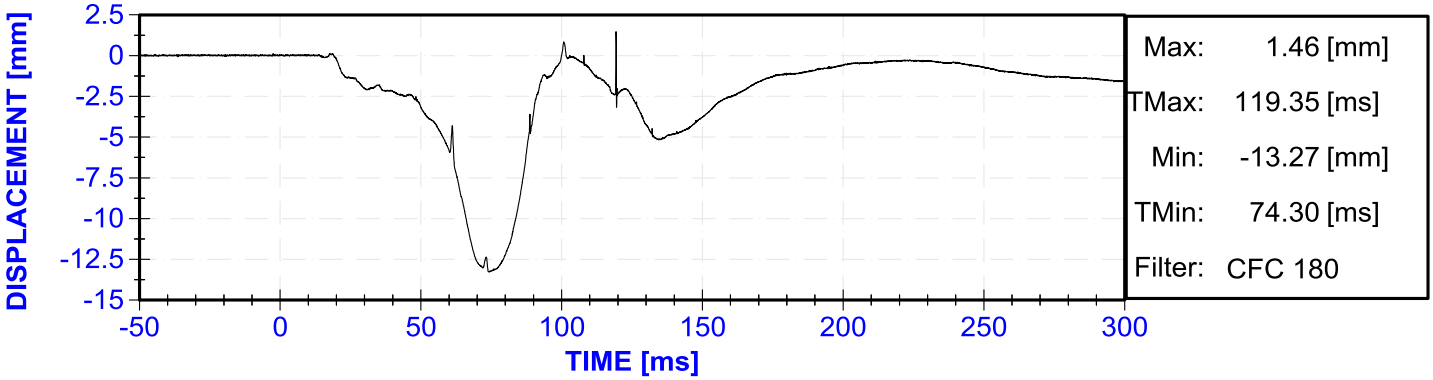
V2P1 NECK UPPER MOMENT Y [THORTEST]



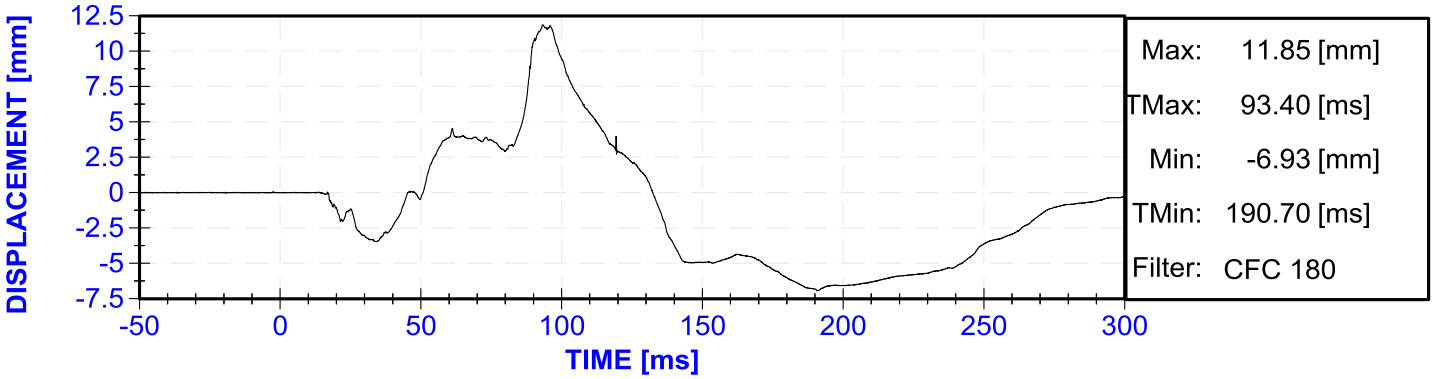
V2P1 NECK UPPER MOMENT Z [THORTEST]



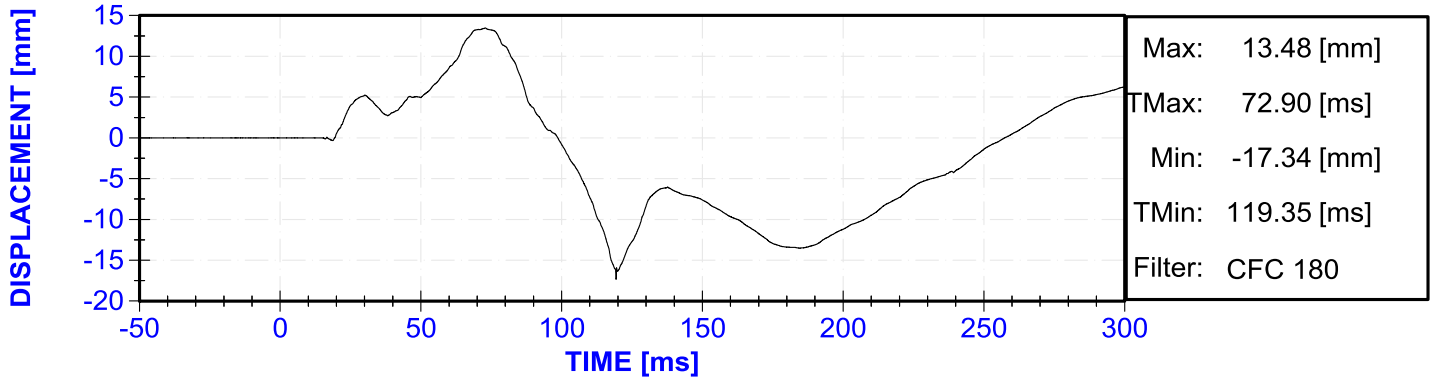
V2P1 CHEST UPPER LEFT X [CFC_180]



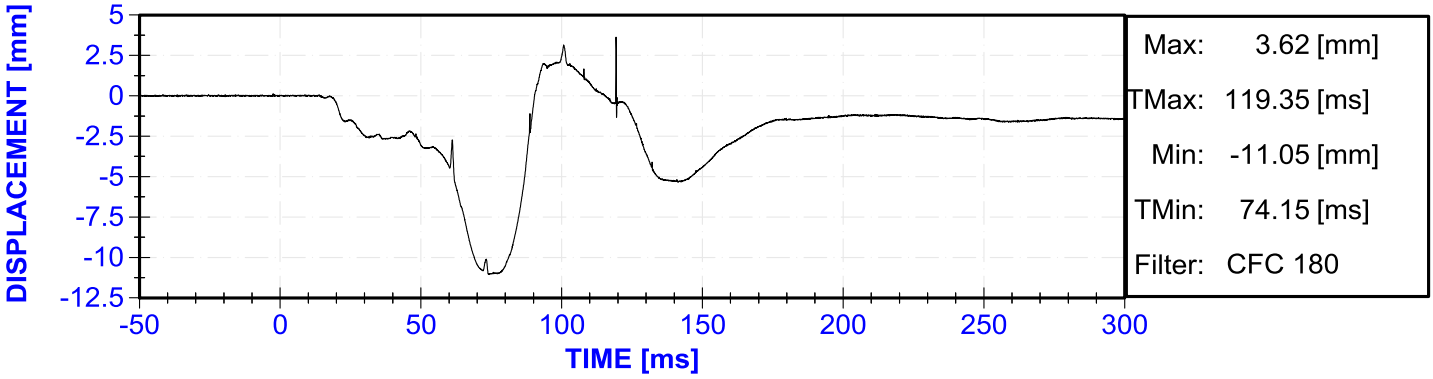
V2P1 CHEST UPPER LEFT Y [CFC_180]



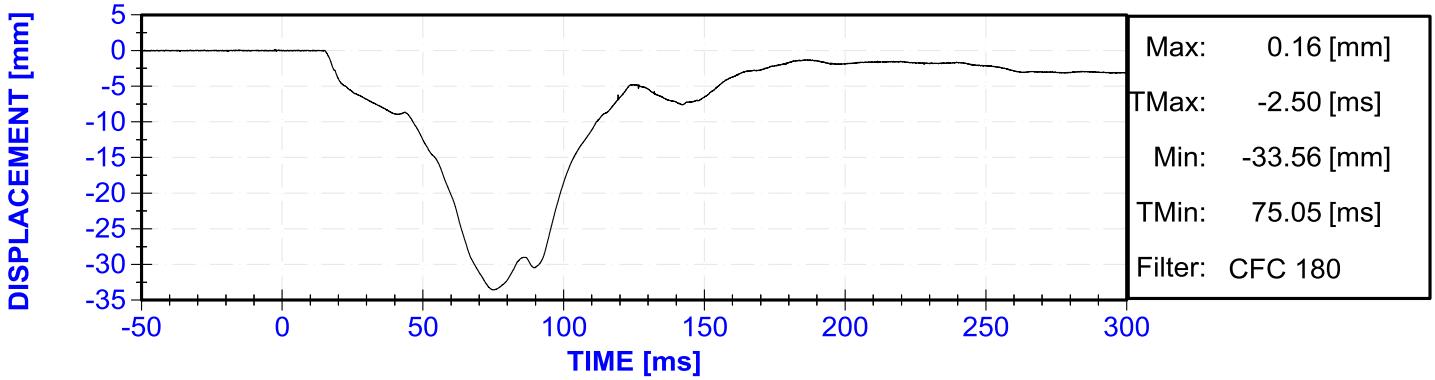
V2P1 CHEST UPPER LEFT Z [CFC_180]



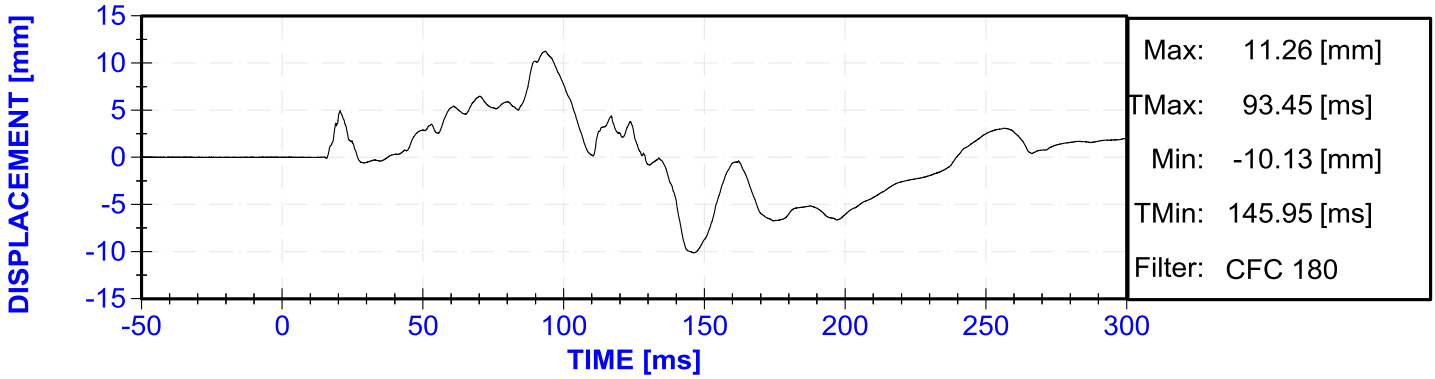
V2P1 CHEST UPPER LEFT D [CFC_180]



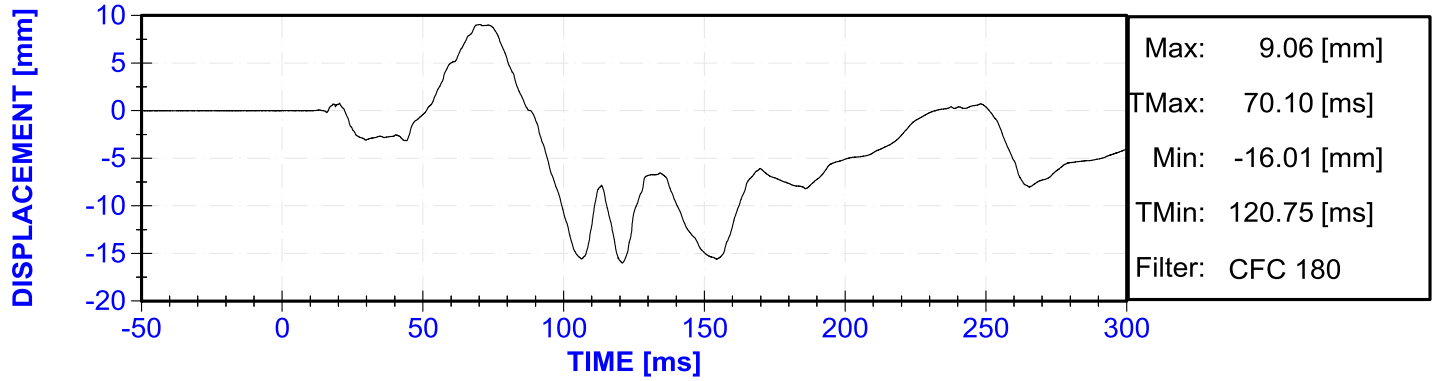
V2P1 CHEST UPPER RIGHT X [CFC_180]



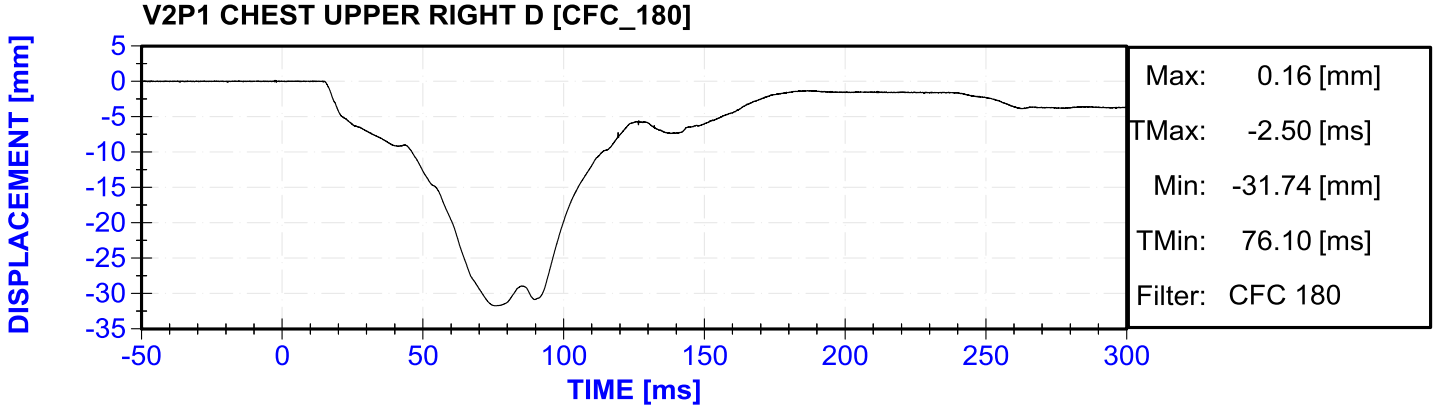
V2P1 CHEST UPPER RIGHT Y [CFC_180]



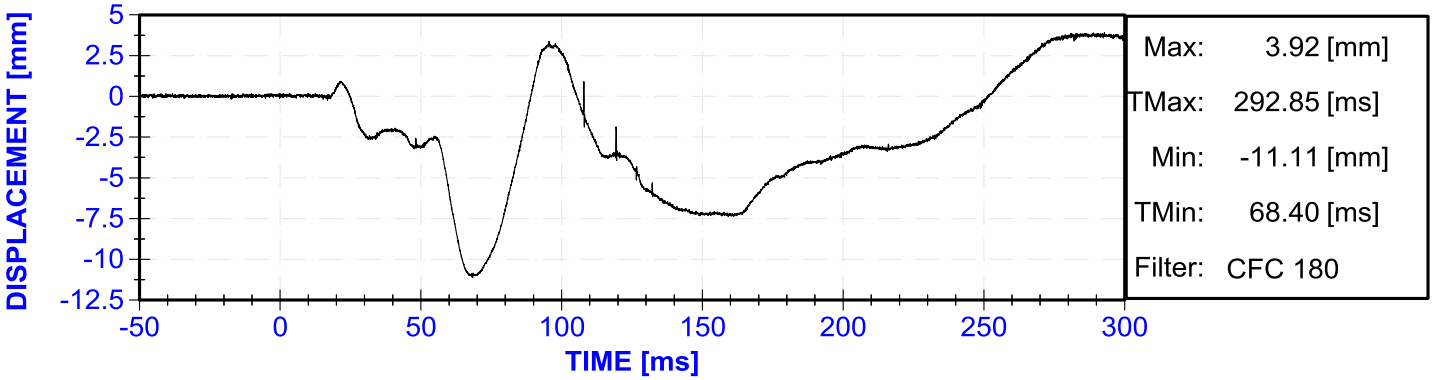
V2P1 CHEST UPPER RIGHT Z [CFC_180]



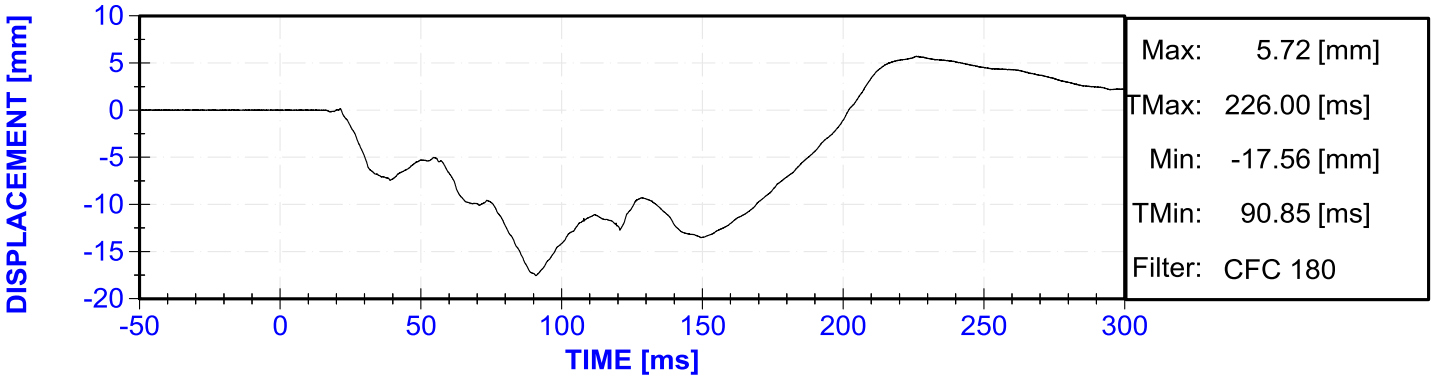
V2P1 CHEST UPPER RIGHT D [CFC_180]



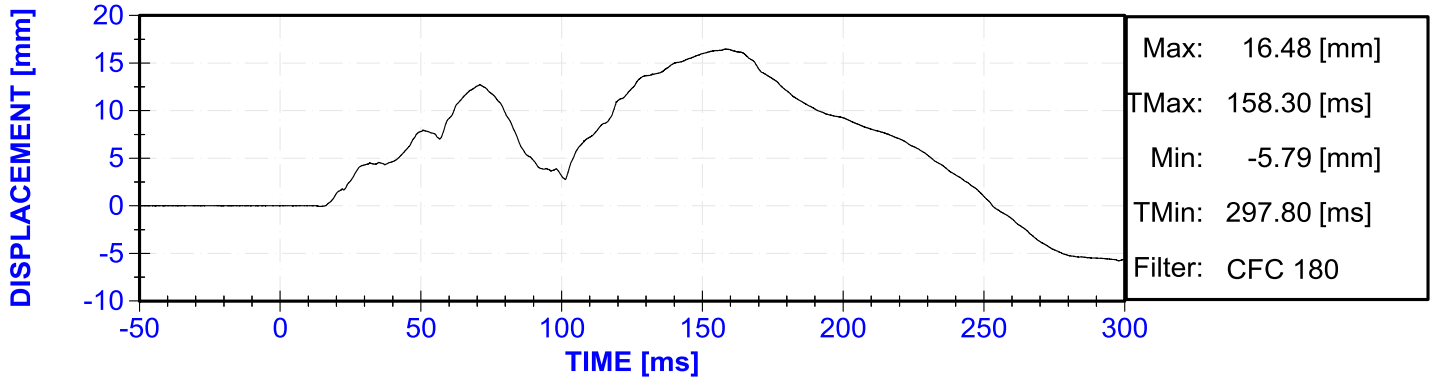
V2P1 CHEST LOWER LEFT X [CFC_180]



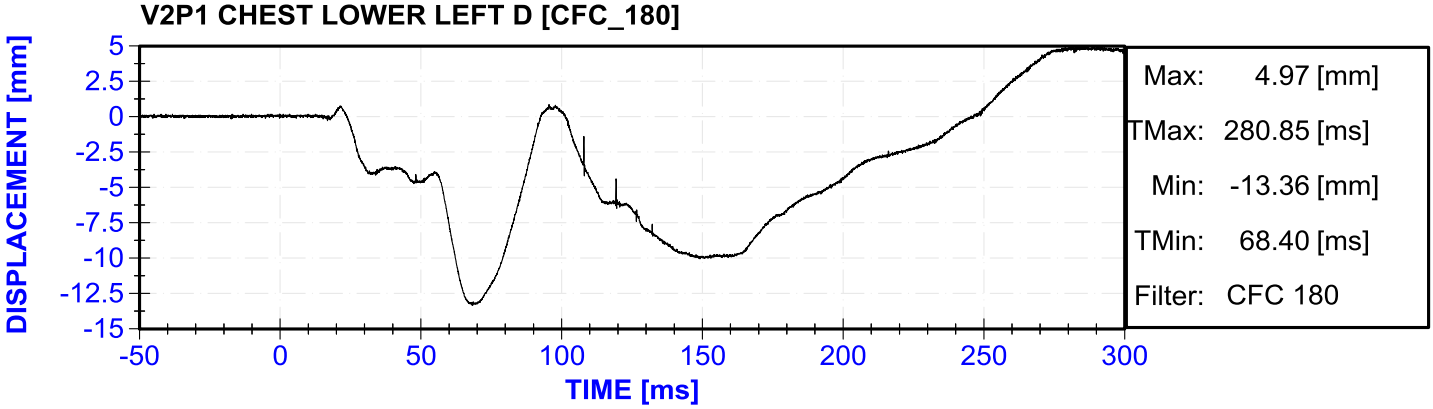
V2P1 CHEST LOWER LEFT Y [CFC_180]



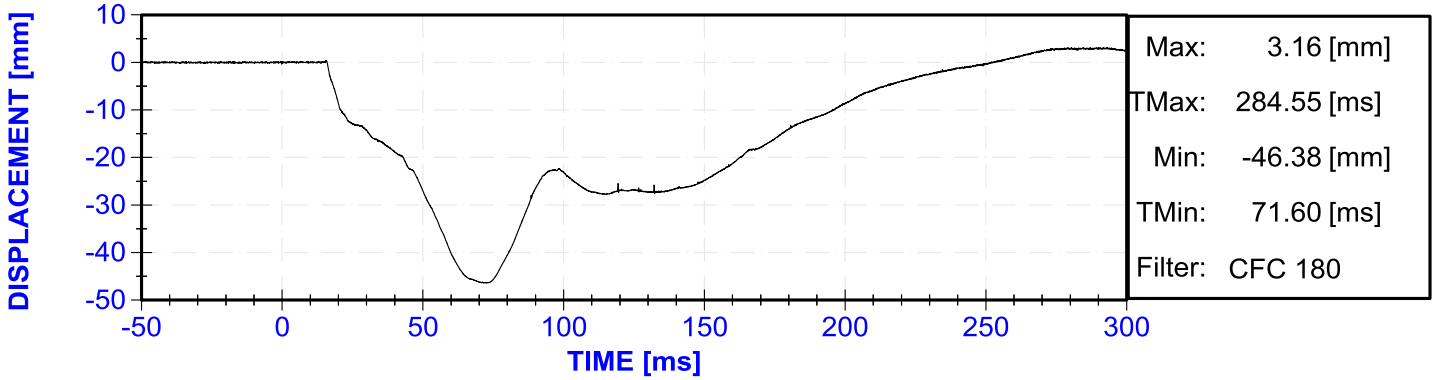
V2P1 CHEST LOWER LEFT Z [CFC_180]



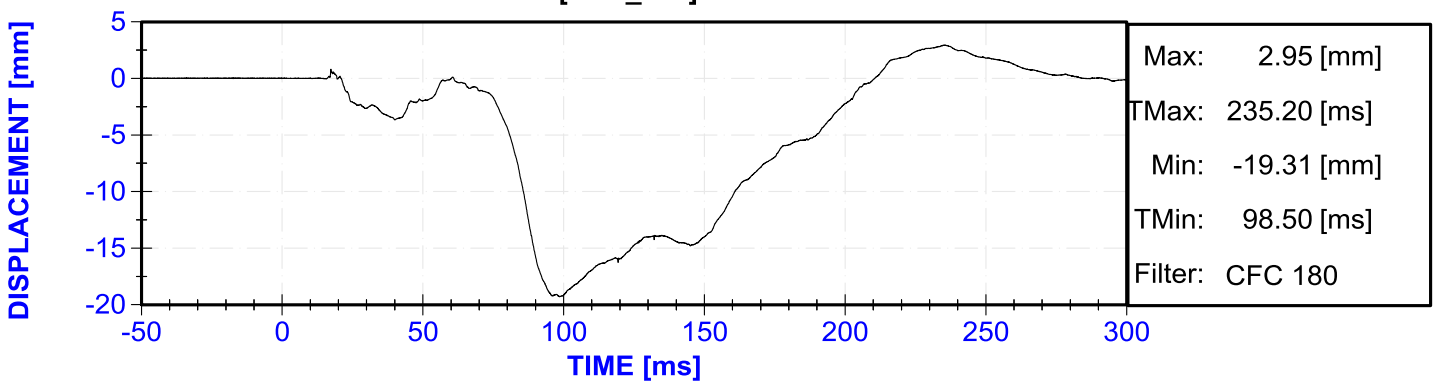
V2P1 CHEST LOWER LEFT D [CFC_180]



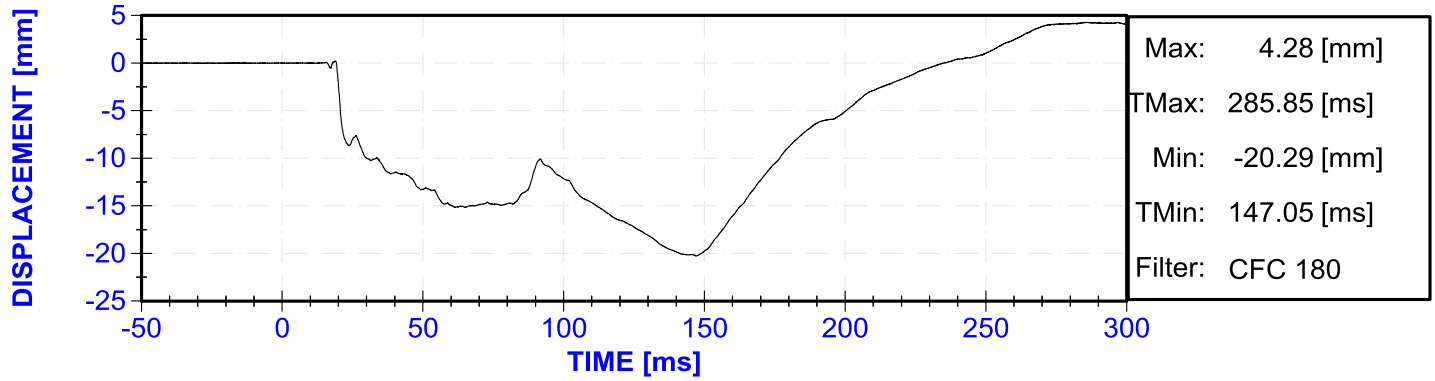
V2P1 CHEST LOWER RIGHT X [CFC_180]



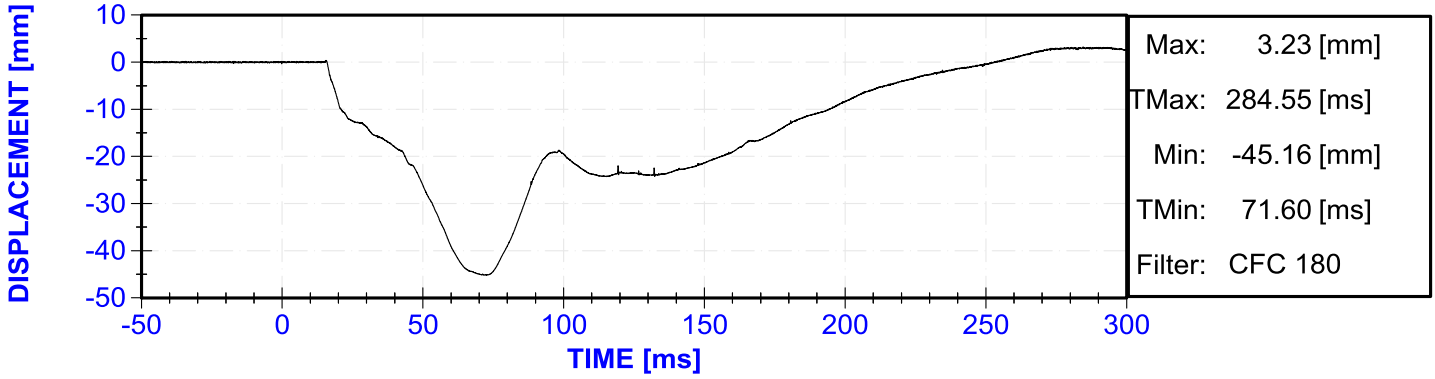
V2P1 CHEST LOWER RIGHT Y [CFC_180]



V2P1 CHEST LOWER RIGHT Z [CFC_180]

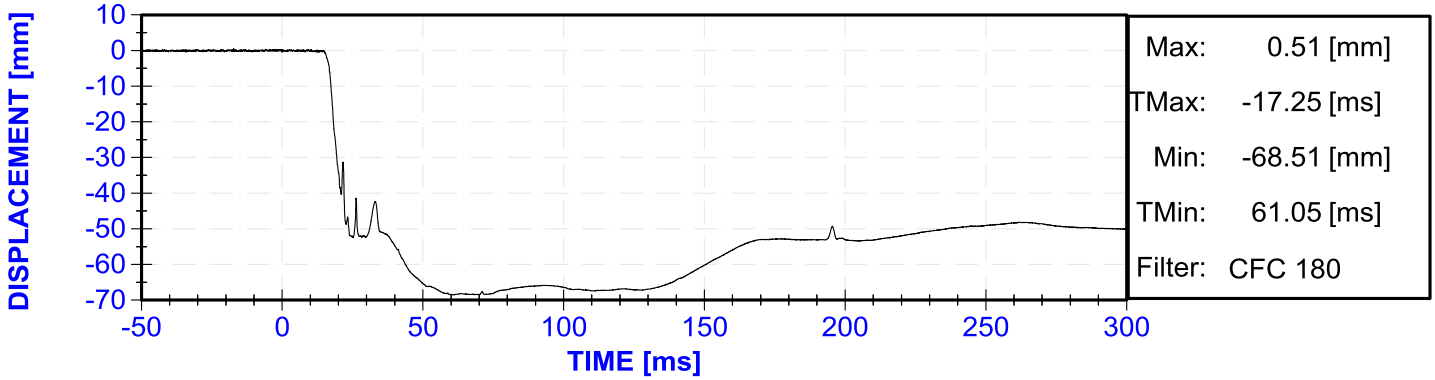


V2P1 CHEST LOWER RIGHT D [CFC_180]



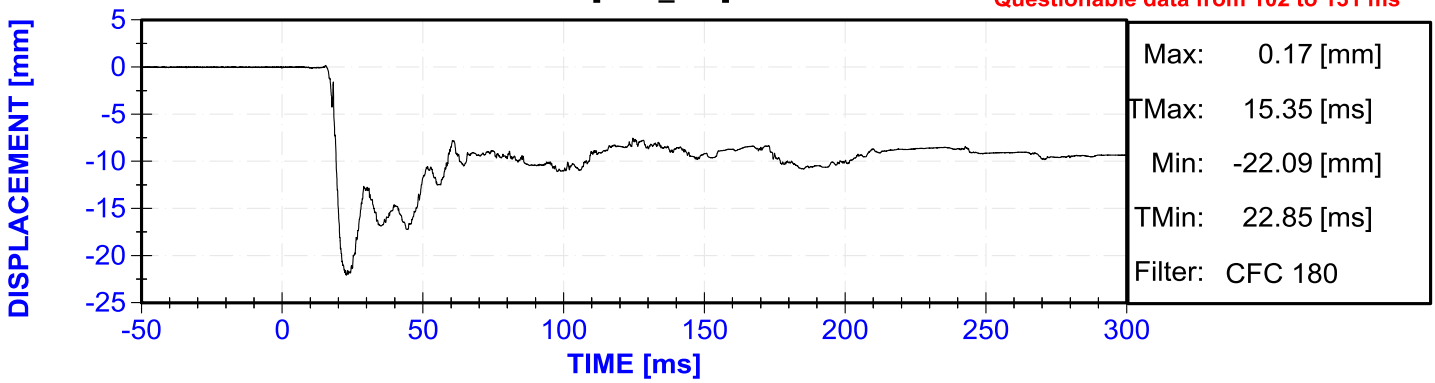
V2P1 ABDOMEN LEFT LOWER X [CFC_180]

Questionable data from 102 to 131 ms



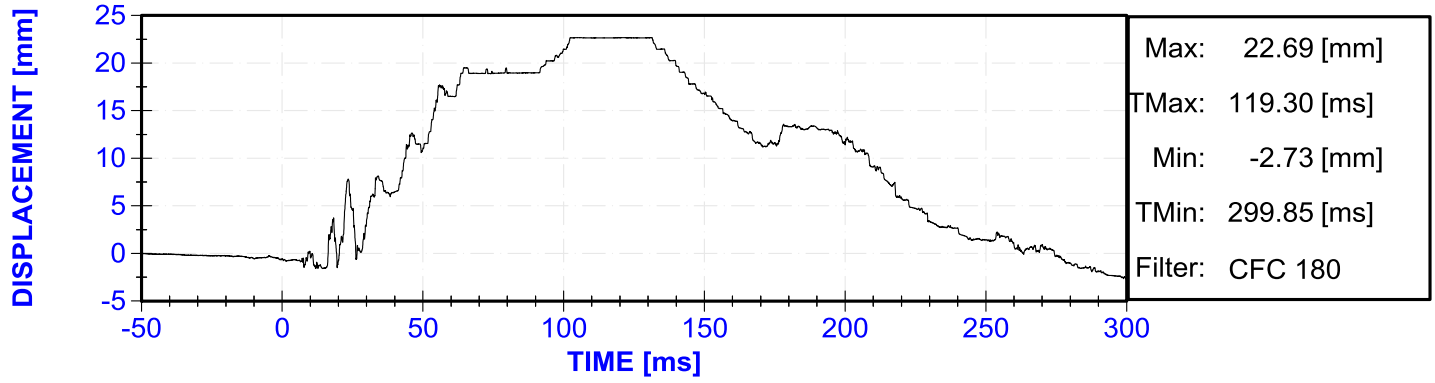
V2P1 ABDOMEN LEFT LOWER Y [CFC_180]

Questionable data from 102 to 131 ms



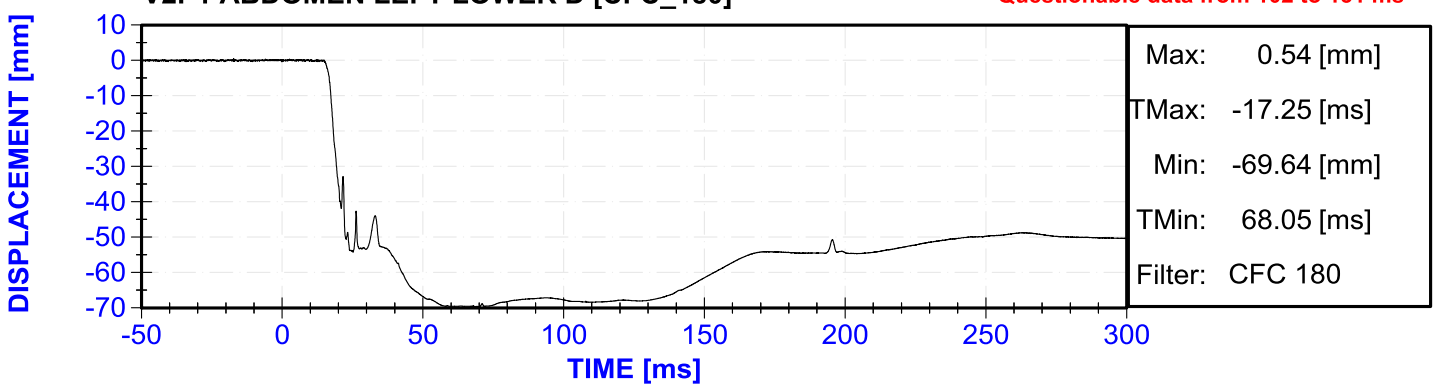
V2P1 ABDOMEN LEFT LOWER Z [CFC_180]

Questionable data from 102 to 131 ms

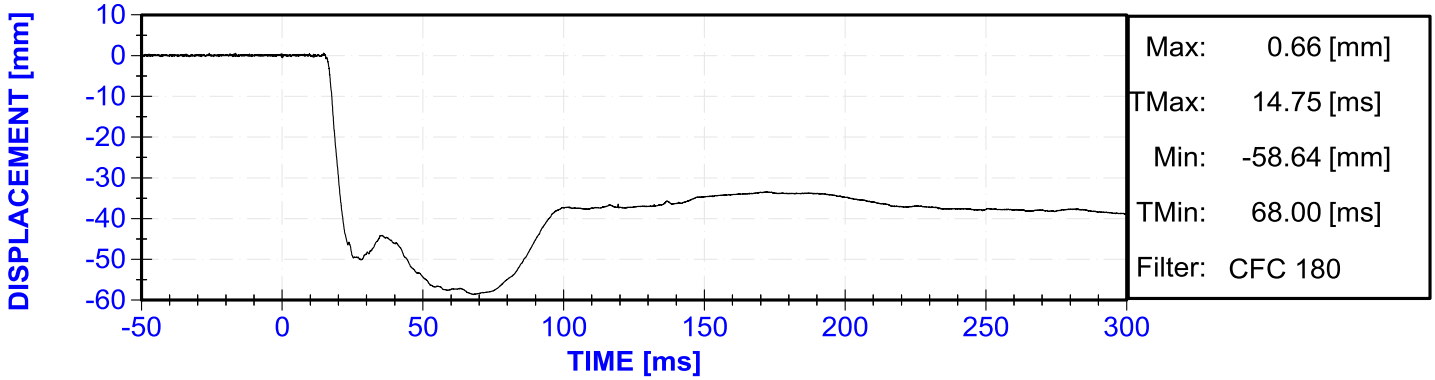


V2P1 ABDOMEN LEFT LOWER D [CFC_180]

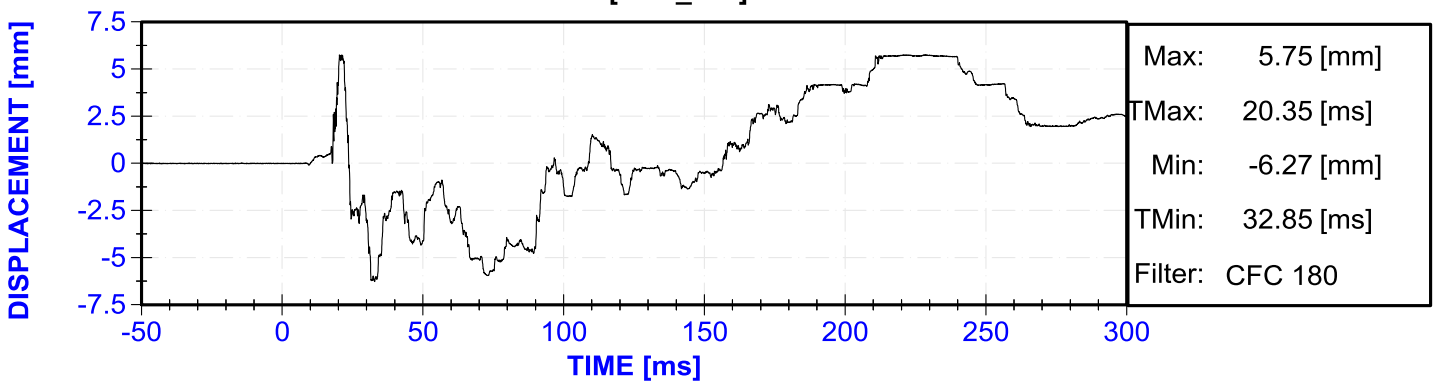
Questionable data from 102 to 131 ms



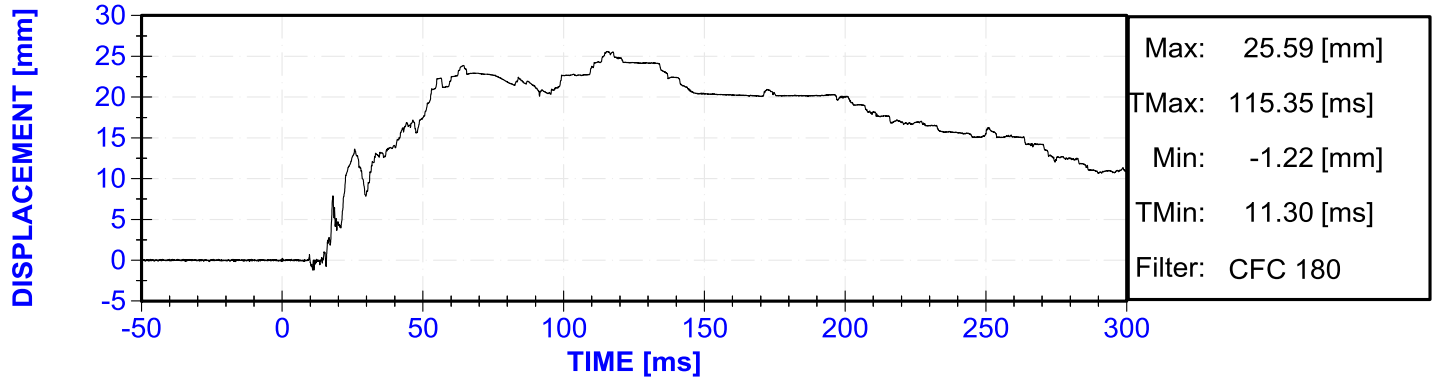
V2P1 ABDOMEN RIGHT LOWER X [CFC_180]



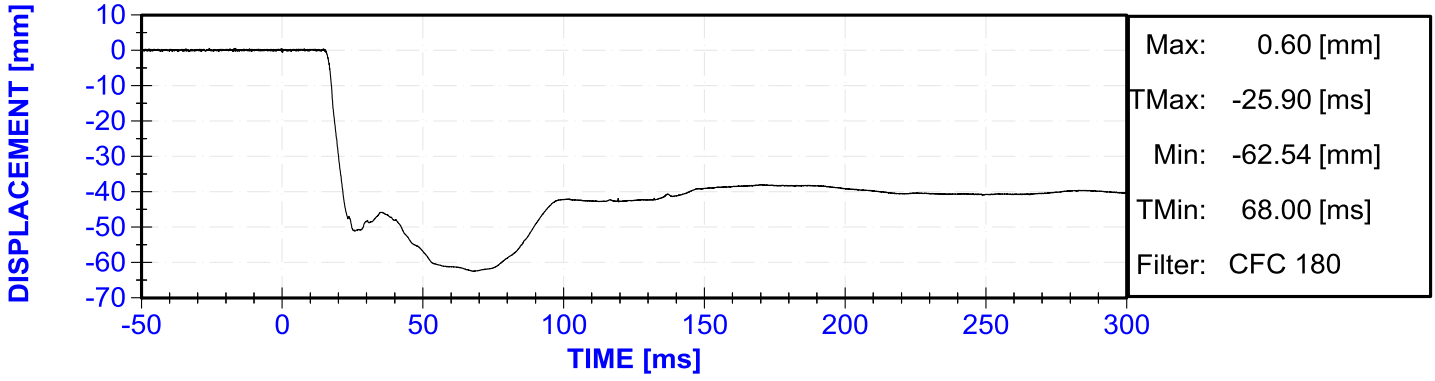
V2P1 ABDOMEN RIGHT LOWER Y [CFC_180]



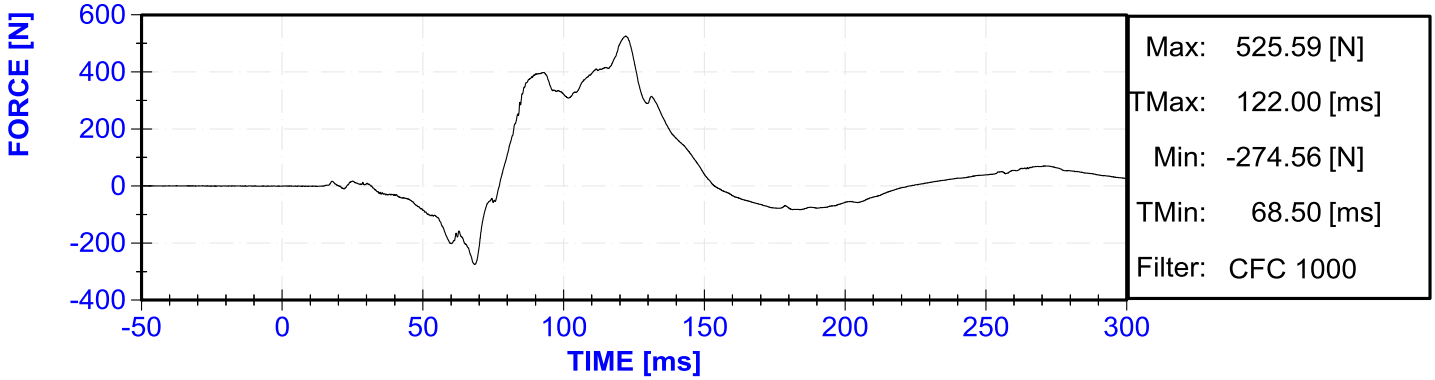
V2P1 ABDOMEN RIGHT LOWER Z [CFC_180]



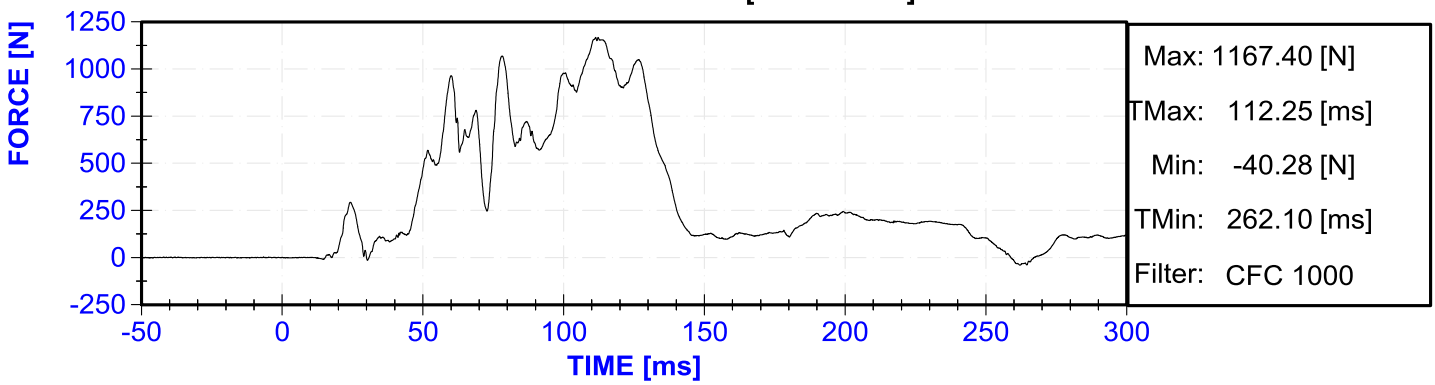
V2P1 ABDOMEN RIGHT LOWER D [CFC_180]



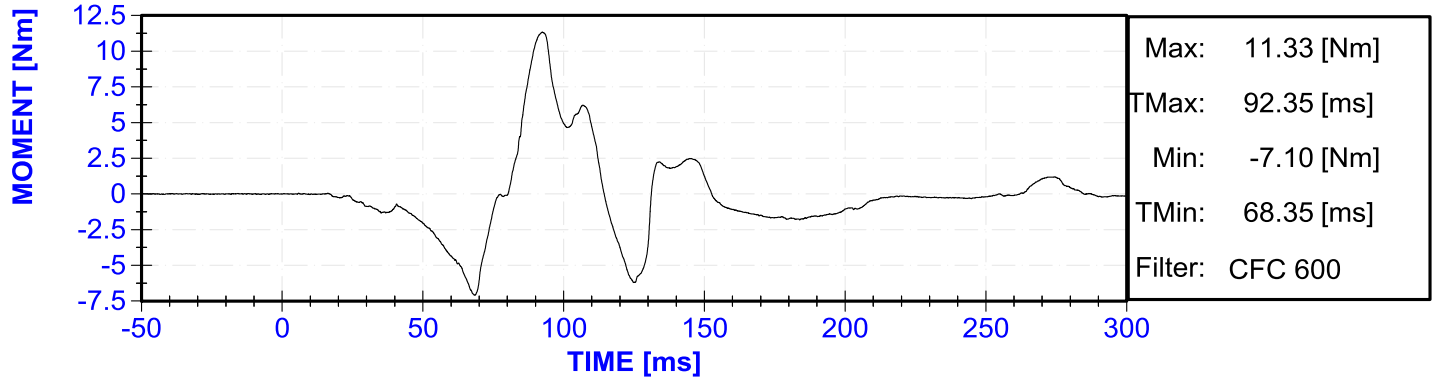
V2P2 NECK OCCIPITAL CONDYLE FORCE X [THORTEST]



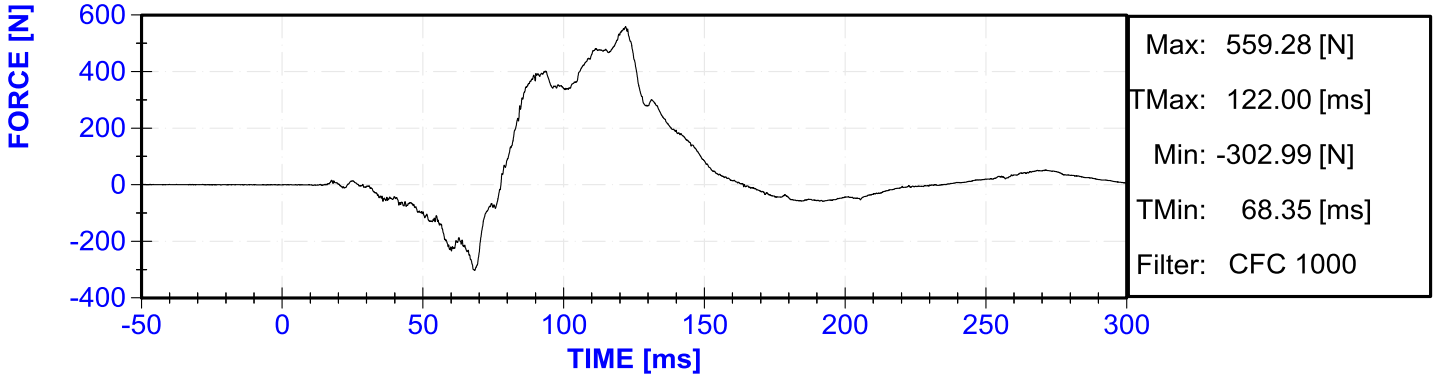
V2P2 NECK OCCIPITAL CONDYLE FORCE Z [THORTEST]



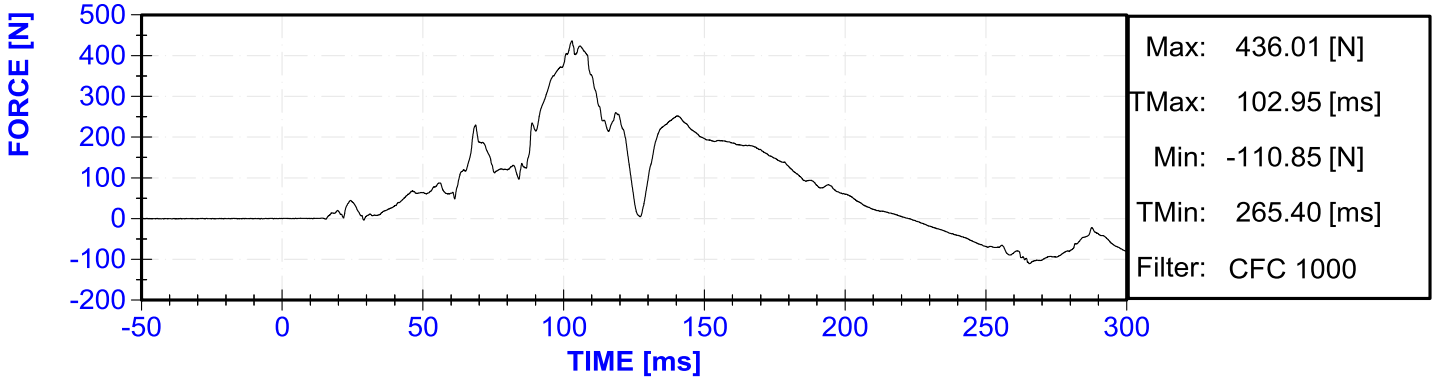
V2P2 NECK OCCIPITAL CONDYLE MY [THORTEST]



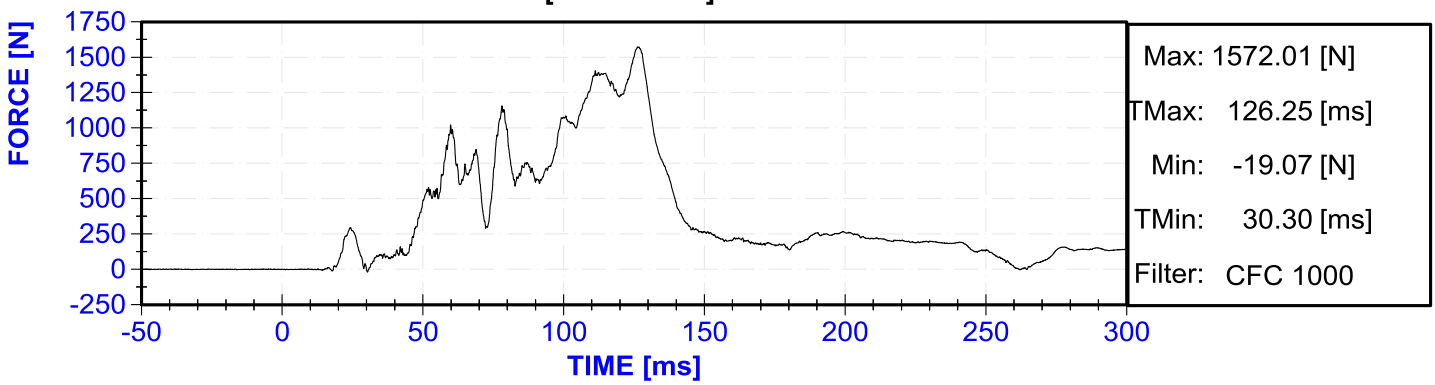
V2P2 NECK UPPER FORCE X [THORTEST]



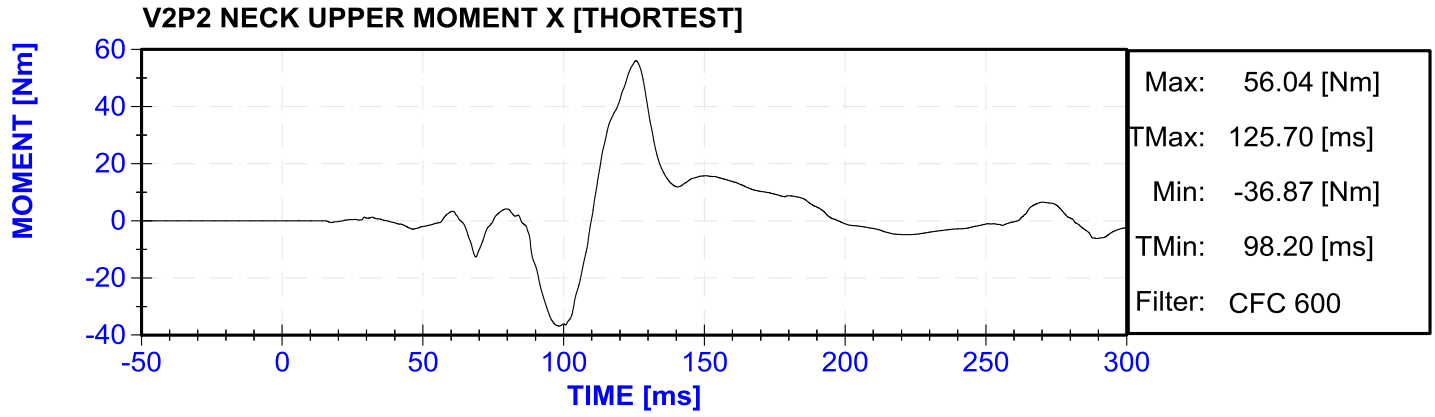
V2P2 NECK UPPER FORCE Y [THORTEST]



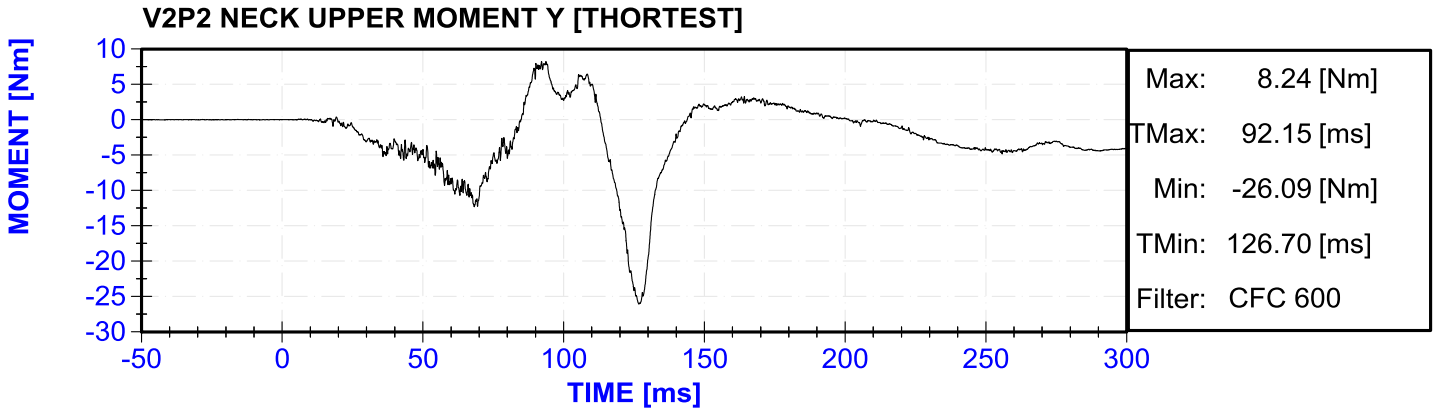
V2P2 NECK UPPER FORCE Z [THORTEST]



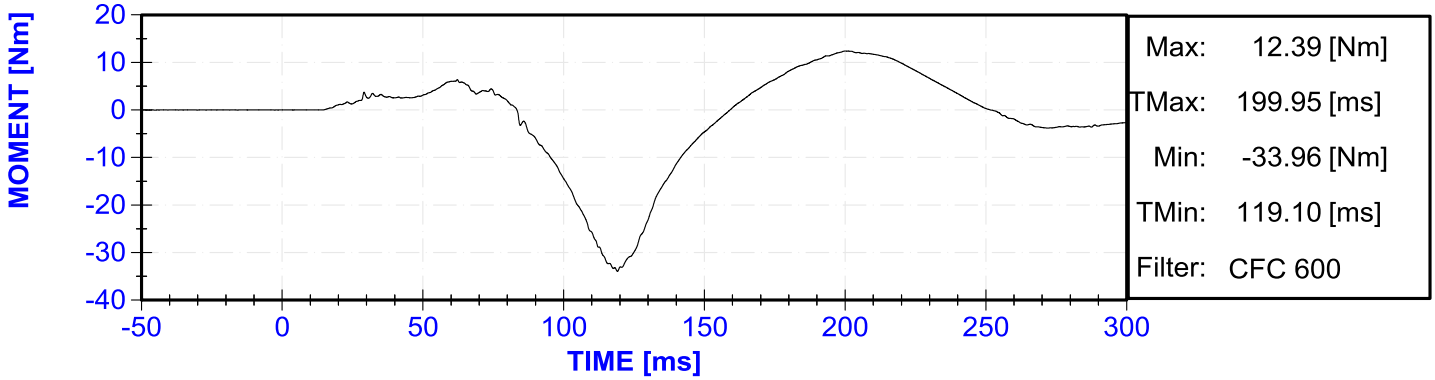
V2P2 NECK UPPER MOMENT X [THORTEST]



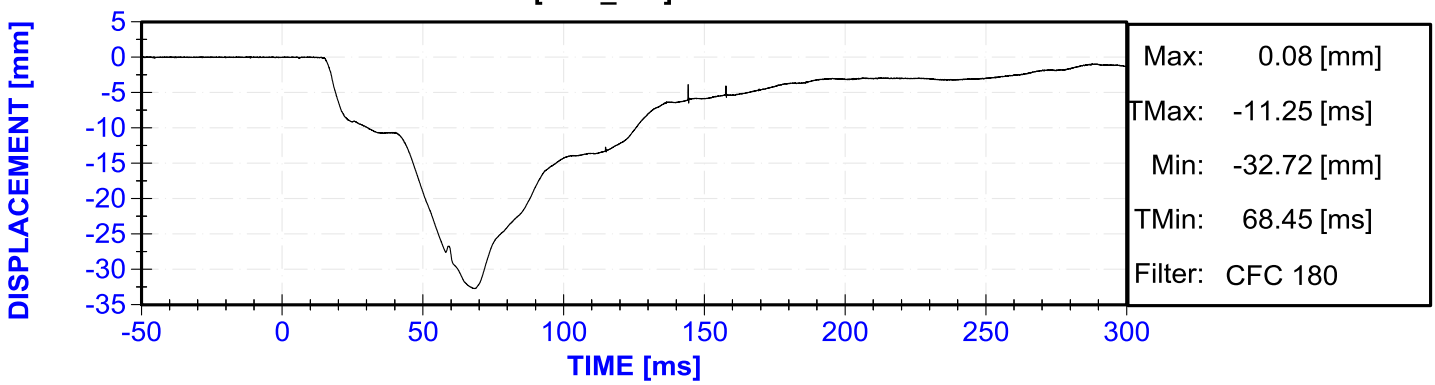
V2P2 NECK UPPER MOMENT Y [THORTEST]



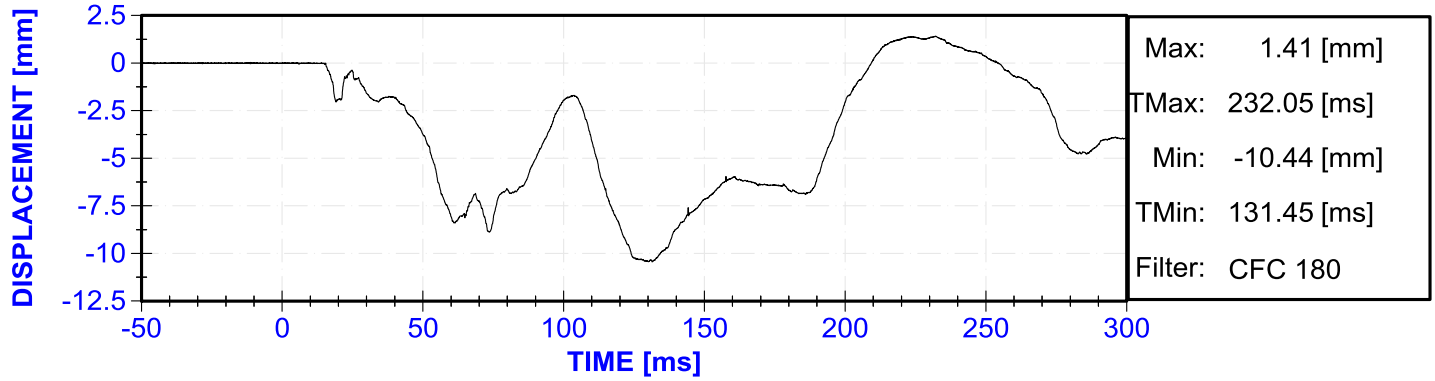
V2P2 NECK UPPER MOMENT Z [THORTEST]



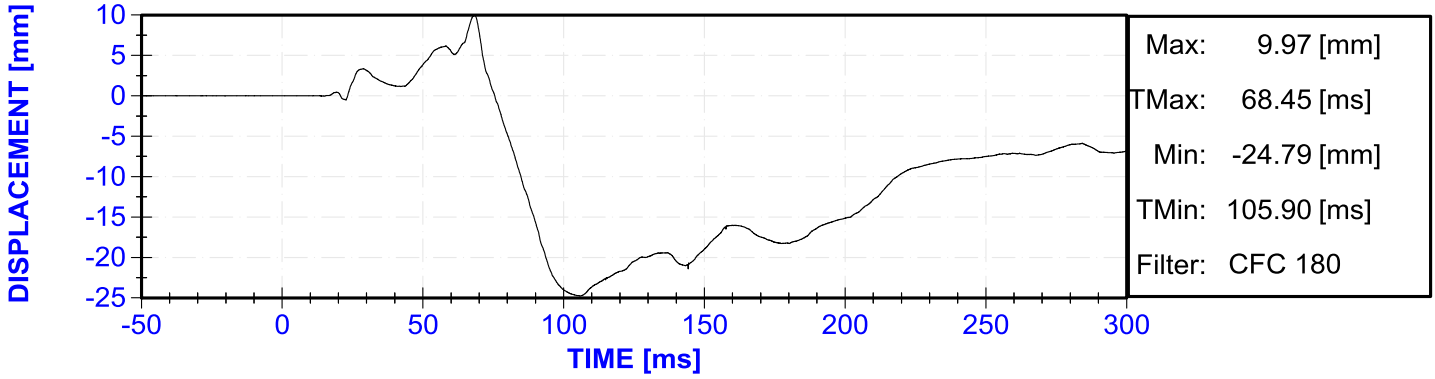
V2P2 CHEST UPPER LEFT X [CFC_180]



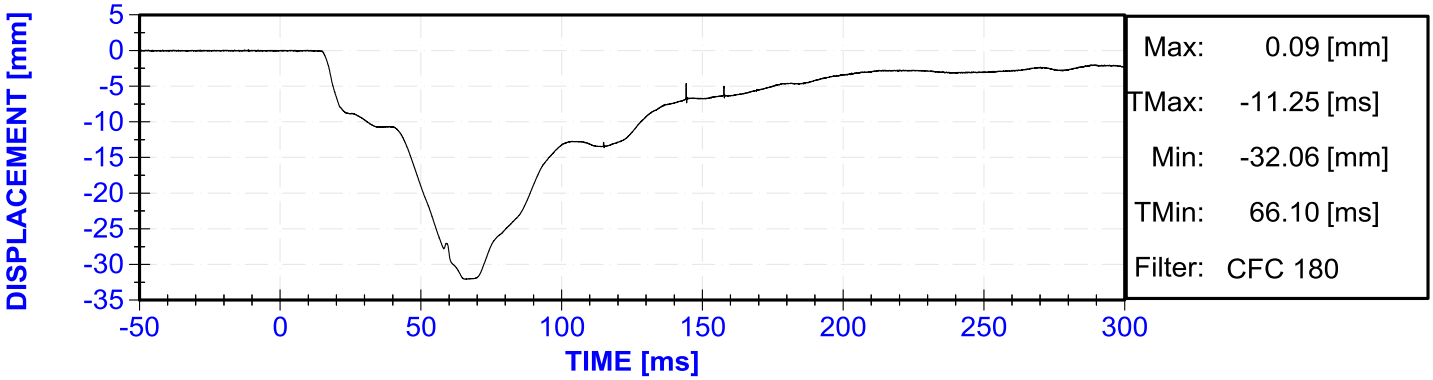
V2P2 CHEST UPPER LEFT Y [CFC_180]



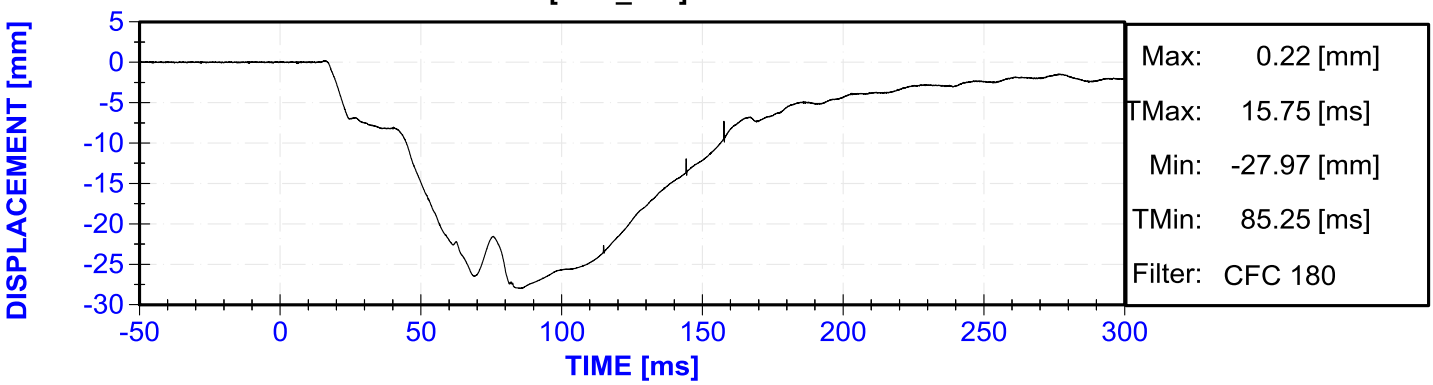
V2P2 CHEST UPPER LEFT Z [CFC_180]



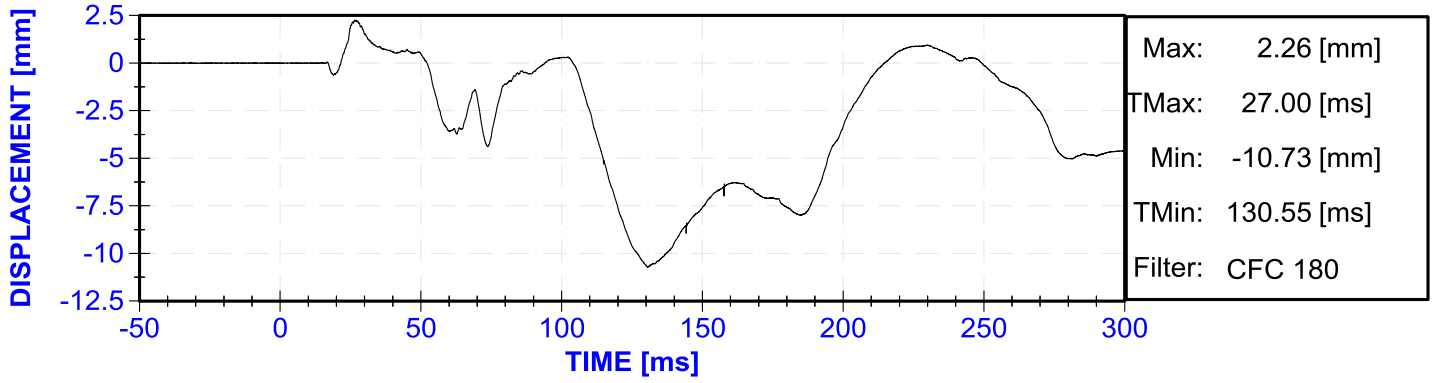
V2P2 CHEST UPPER LEFT D [CFC_180]



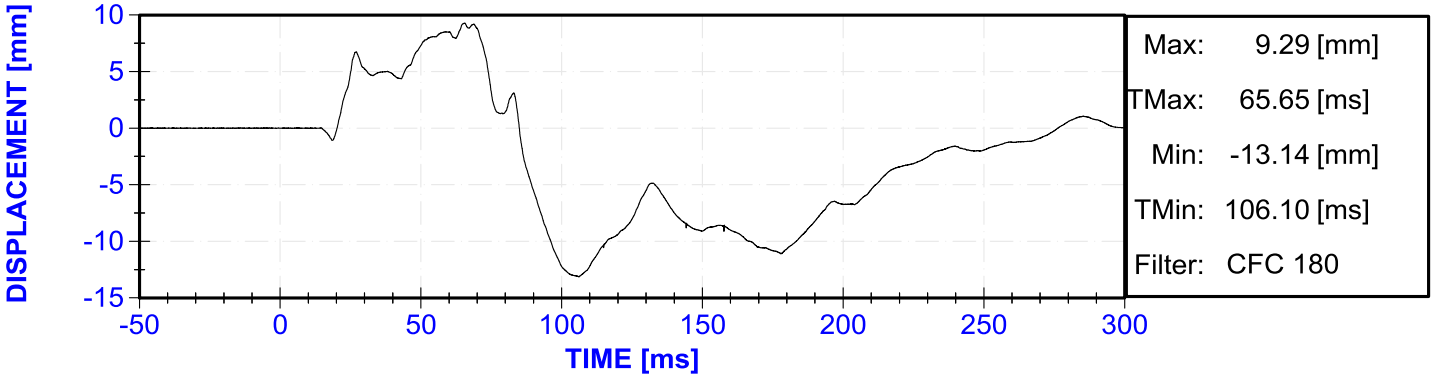
V2P2 CHEST UPPER RIGHT X [CFC_180]



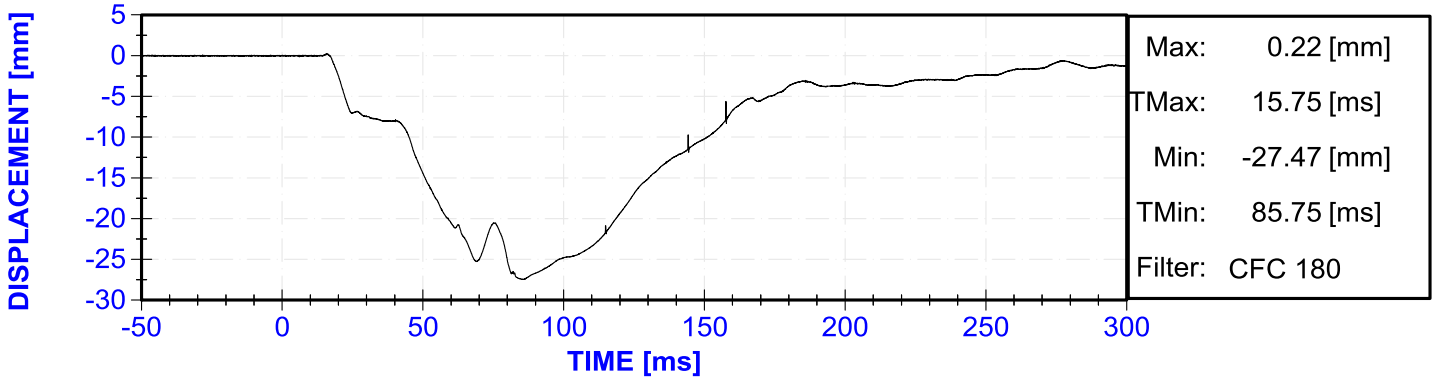
V2P2 CHEST UPPER RIGHT Y [CFC_180]



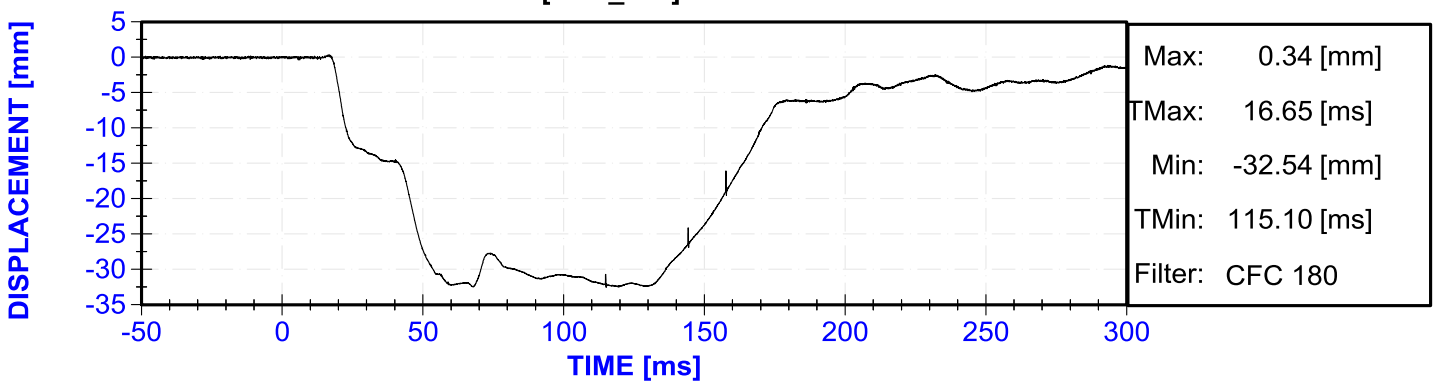
V2P2 CHEST UPPER RIGHT Z [CFC_180]



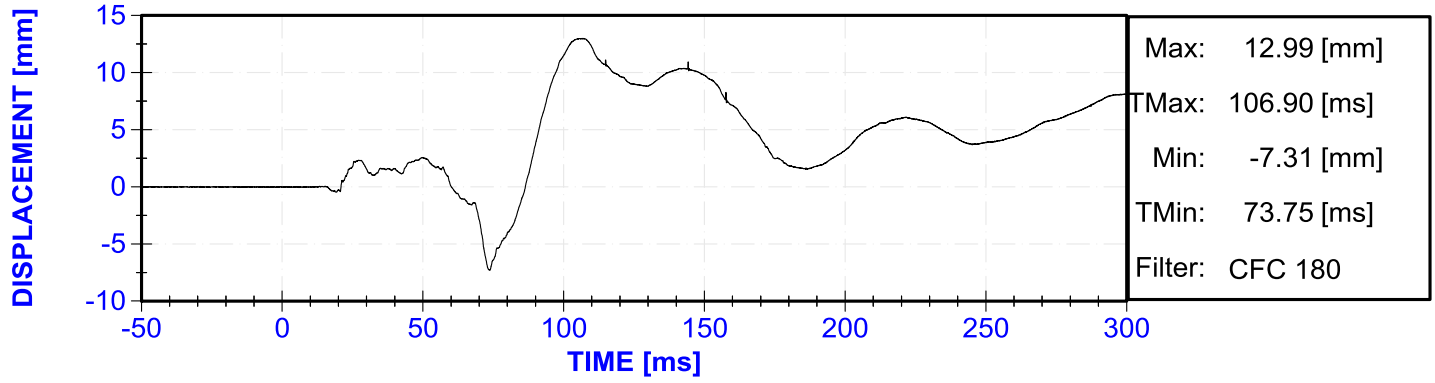
V2P2 CHEST UPPER RIGHT D [CFC_180]



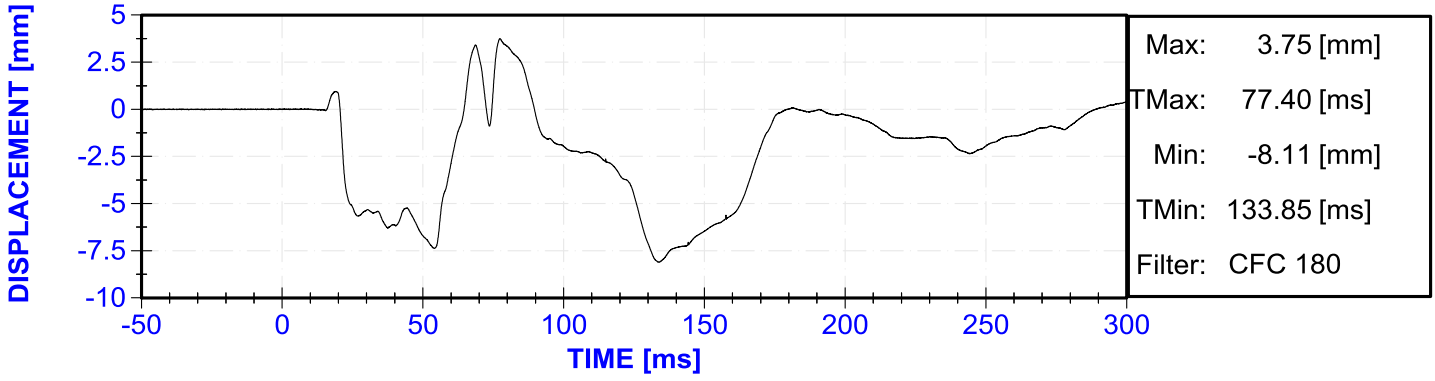
V2P2 CHEST LOWER LEFT X [CFC_180]



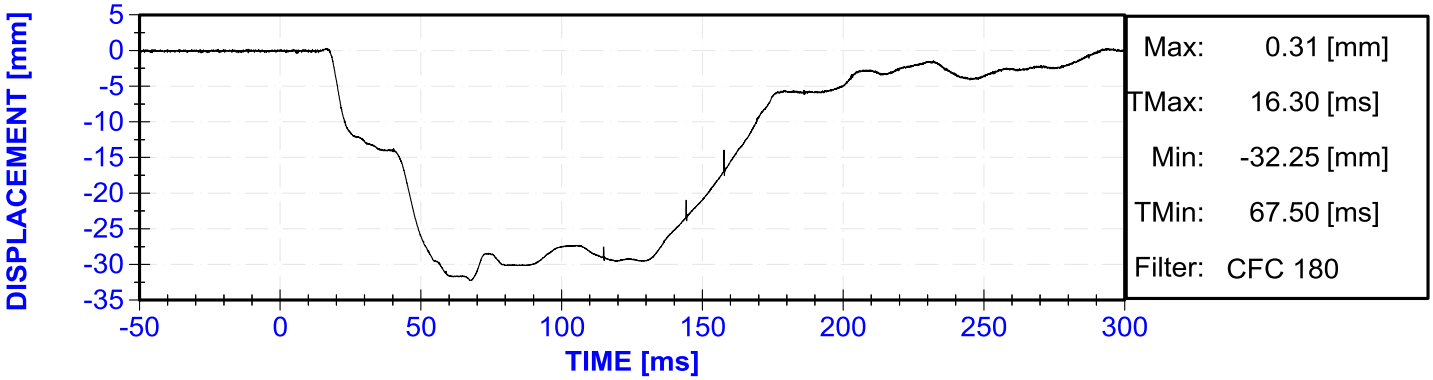
V2P2 CHEST LOWER LEFT Y [CFC_180]



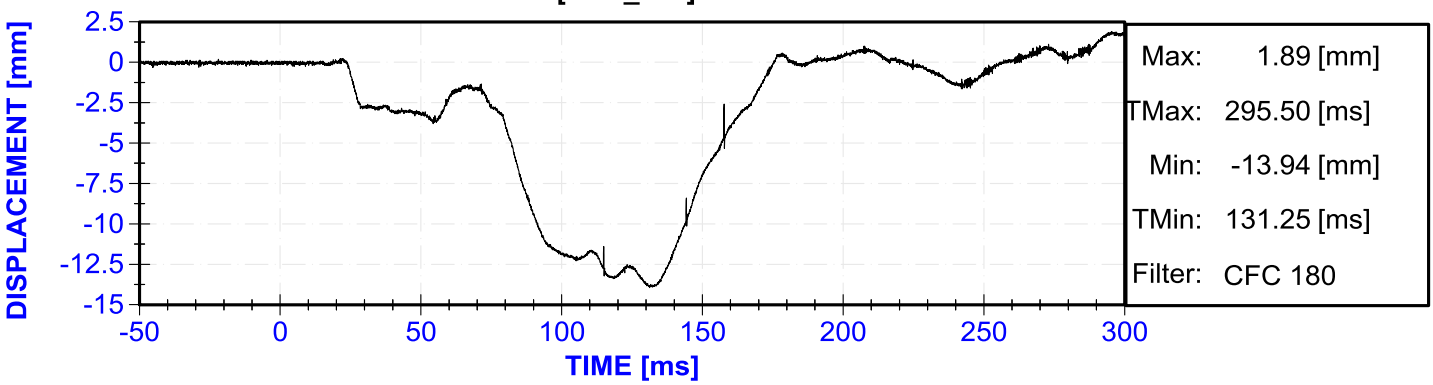
V2P2 CHEST LOWER LEFT Z [CFC_180]



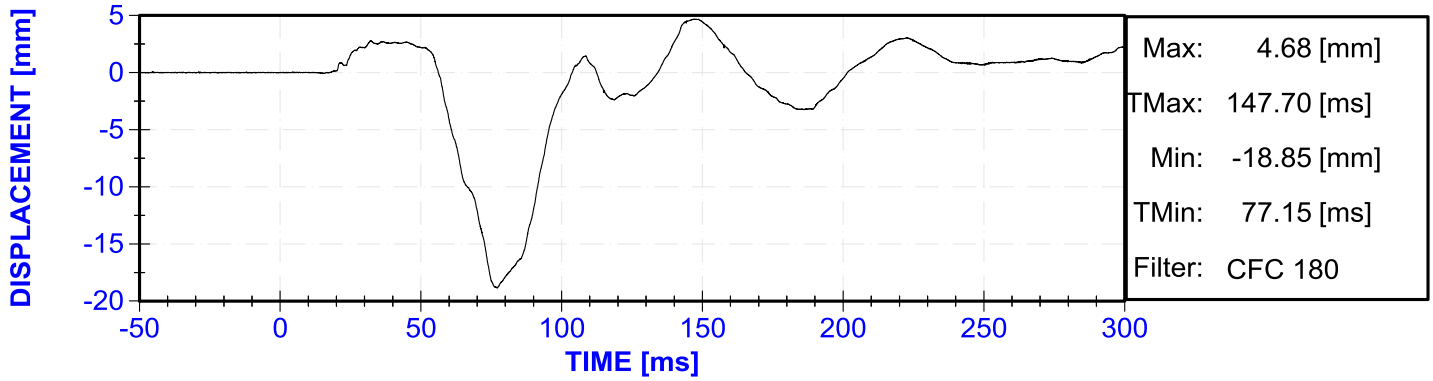
V2P2 CHEST LOWER LEFT D [CFC_180]



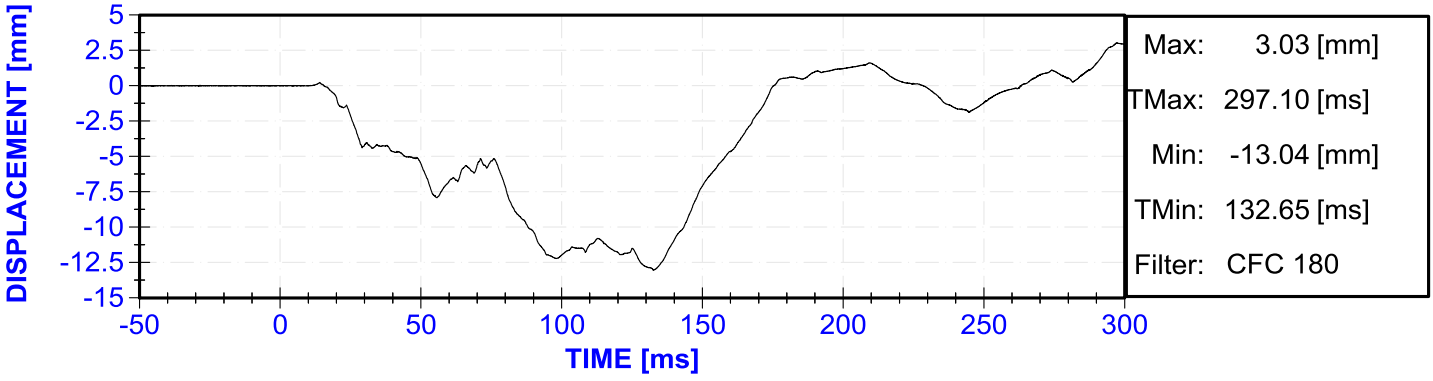
V2P2 CHEST LOWER RIGHT X [CFC_180]



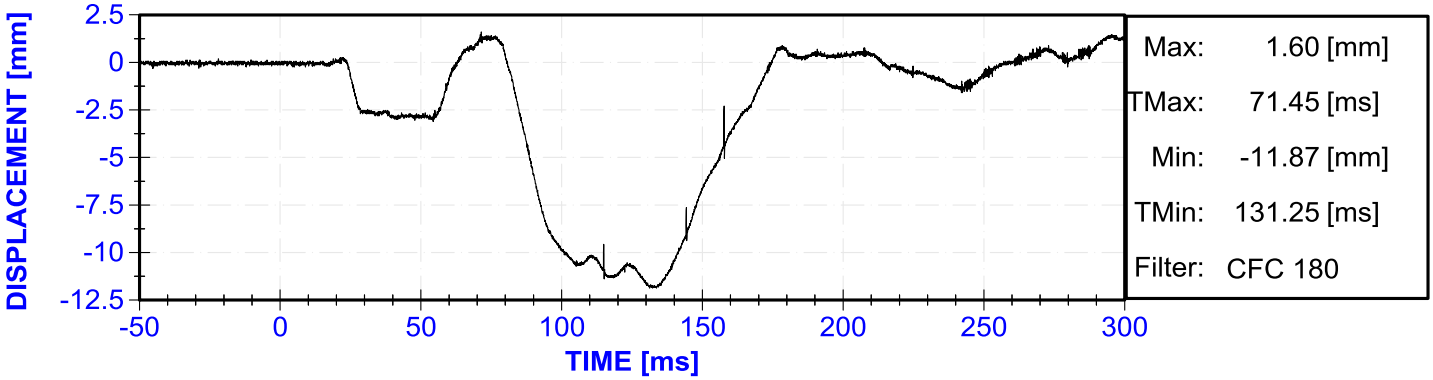
V2P2 CHEST LOWER RIGHT Y [CFC_180]



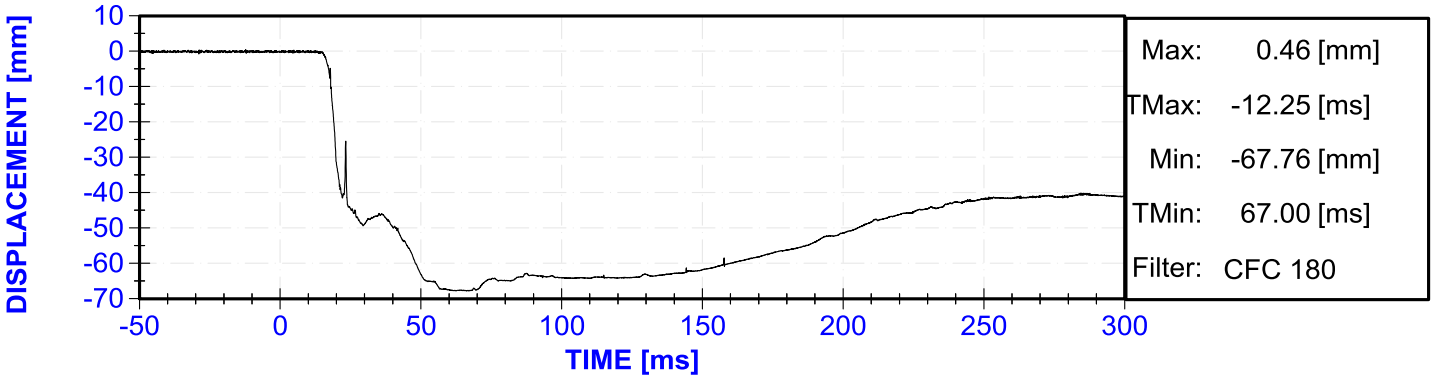
V2P2 CHEST LOWER RIGHT Z [CFC_180]



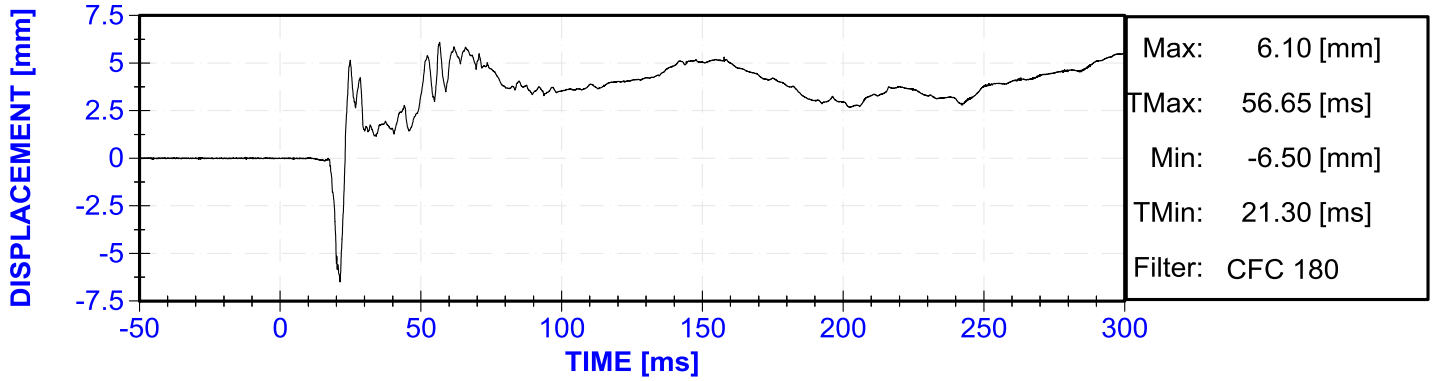
V2P2 CHEST LOWER RIGHT D [CFC_180]



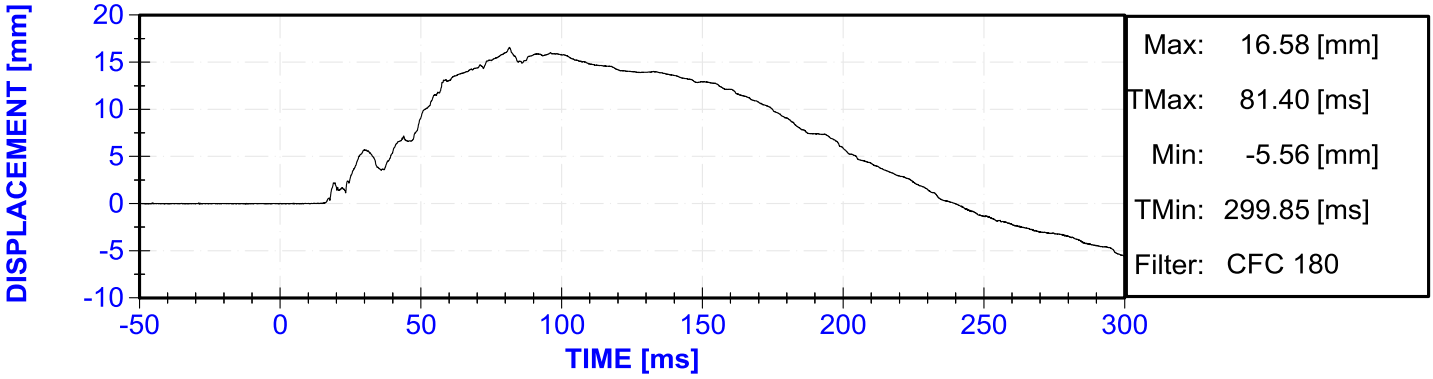
V2P2 ABDOMEN LEFT LOWER X [CFC_180]



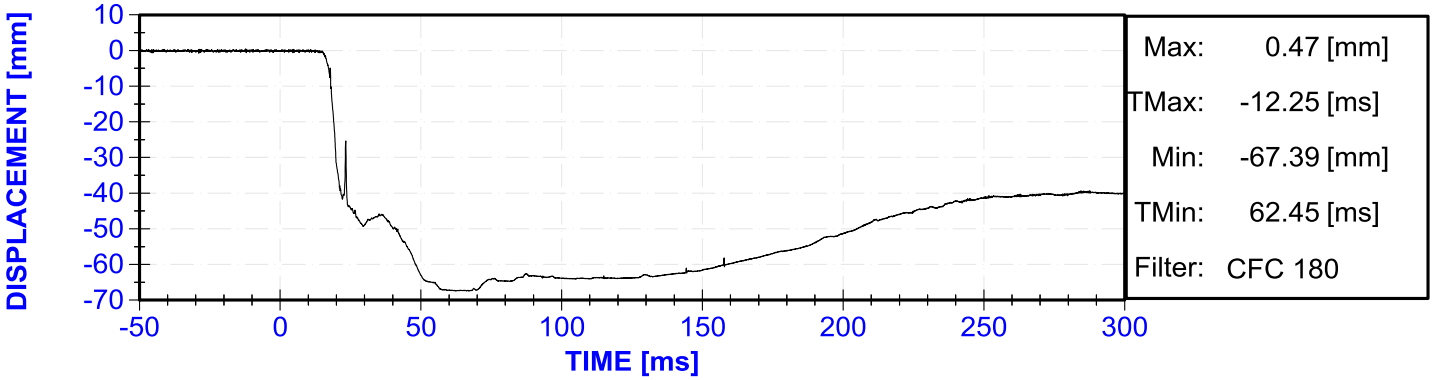
V2P2 ABDOMEN LEFT LOWER Y [CFC_180]



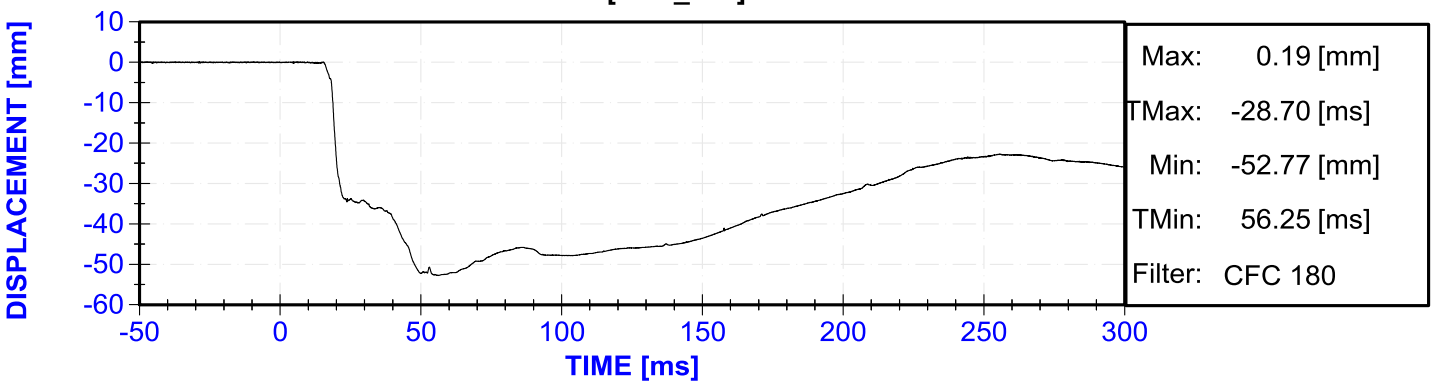
V2P2 ABDOMEN LEFT LOWER Z [CFC_180]



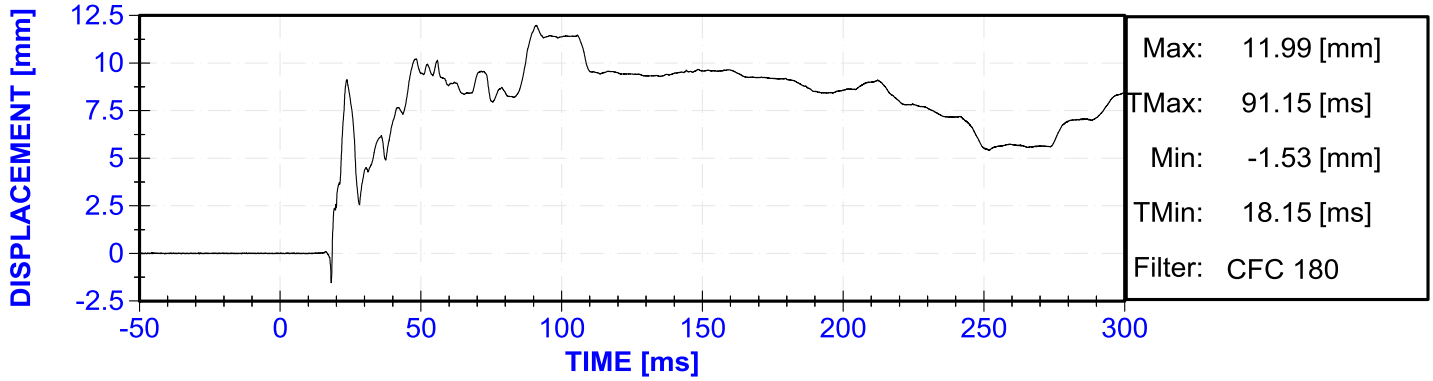
V2P2 ABDOMEN LEFT LOWER D [CFC_180]



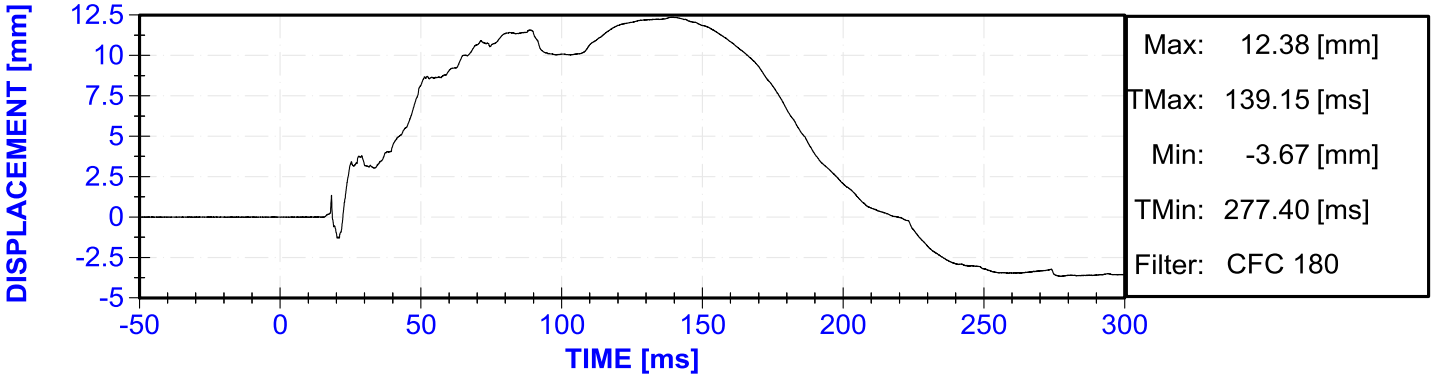
V2P2 ABDOMEN RIGHT LOWER X [CFC_180]

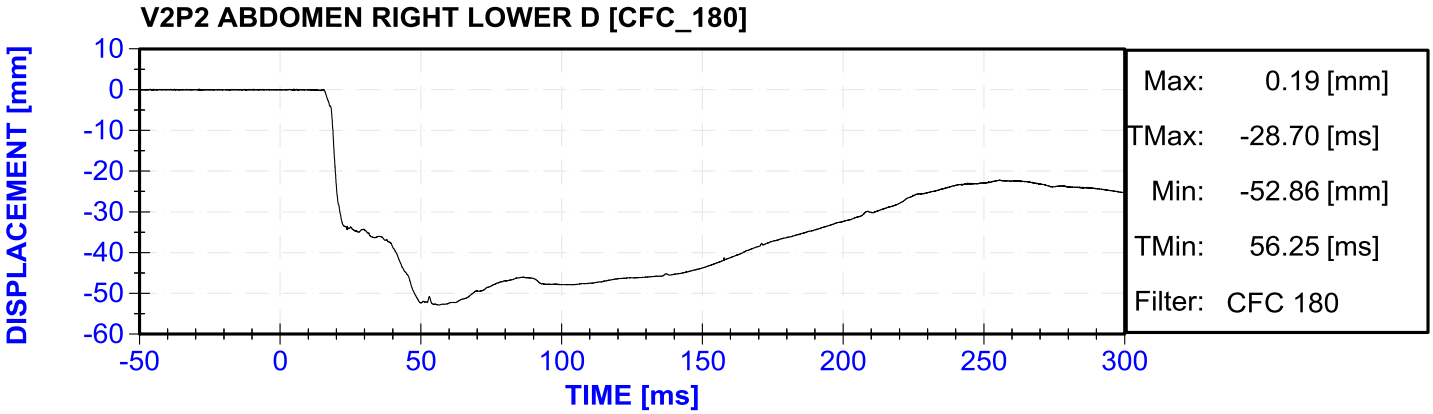


V2P2 ABDOMEN RIGHT LOWER Y [CFC_180]



V2P2 ABDOMEN RIGHT LOWER Z [CFC_180]




V2P2 ABDOMEN RIGHT LOWER D [CFC_180]
DISPLACEMENT [mm]
10
0
-10
-20
-30
-40
-50
-60
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 0.19 [mm]
TMax: -28.70 [ms]
Min: -52.86 [mm]
TMin: 56.25 [ms]
Filter: CFC 180

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	007
THOR TK	50^{TH} Male	016

Table C-2: Ankle Offset Files

THOR – TK S/N: 007					
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
-0.83479	-16.049		0.0405	-11.961	
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
-0.9575	-14.97		-6.842	13.223	

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

THOR – TK S/N: 0007								
Sensor	**Manufacturer/ Serial #**	**Capacity**	**Units (E)**	**Units (M)**	**Range**	**CFC**	**Sensitivity (mv/V/EU)**	**Initial Offset (EU)**
HEAD CG X	MFG: ENDEVCO S/N: P74967	2000	g	g	-1000	1000	0.0185	0
HEAD CG Y	MFG: ENDEVCO S/N: P71875	2000	g	g	-1000	1000	0.0176	0
HEAD CG Z	MFG: ENDEVCO S/N: P74784	2000	g	g	-1000	1000	0.01999	0
HDCG Wx	MFG: DTS S/N: ARS4643	36000	deg/s	deg/s	-18000	1000	0.0921	0
HDCG Wy	MFG: DTS S/N: ARS4651	36000	deg/s	deg/s	-18000	1000	0.09301	0
HDCG Wz	MFG: DTS S/N: ARS4650	36000	deg/s	deg/s	-18000	1000	0.09444	0
NEKU Fx	MFG: Denton S/N: 94	18000	lbf	N	-9000	1000	-0.00022811	0
NEKU Fy	MFG: Denton S/N: 94	18000	lbf	N	-9000	1000	0.00022894	0
NEKU Fz	MFG: Denton S/N: 94	26000	lbf	N	-13000	1000	-0.00008764	0
NEKU Mx	MFG: Denton S/N: 94	1200	in-lbf	N-m	-600	600	-0.00591849	0
NEKU My	MFG: Denton S/N: 94	1200	in-lbf	N-m	-600	600	0.00598399	0
NEKU Mz	MFG: Denton S/N: 94	1200	in-lbf	N-m	-600	600	0.00965262	0
NEKL Fx	MFG: DENTON S/N: 88	26000	lbf	N	-13000	1000	0.00017038	0
NEKL Fy	MFG: DENTON S/N: 88	26000	lbf	N	-13000	1000	0.0001704	0
NEKL Fz	MFG: DENTON S/N: 88	26000	lbf	N	-13000	1000	-0.00007065	0
NEKL Mx	MFG: DENTON S/N: 88	1200	in-lbf	N-m	-600	600	-0.0040085	0
NEKL My	MFG: DENTON S/N: 88	1200	in-lbf	N-m	-600	600	0.00400231	0
NEKL Mz	MFG: DENTON S/N: 88	1200	in-lbf	N-m	-600	600	0.0067779	0
NKCF Fz	MFG: DENTON S/N: 93	90000	lbf	N	-45000	1000	0.00086877	0

THOR – TK (Continued) S/N: 0007								
Sensor	**Manufacturer/ Serial #**	**Capacity**	**Units (E)**	**Units (M)**	**Range**	**CFC**	**Sensitivity (mv/V/EU)**	**Initial Offset (EU)**
NKCR Fz	MFG: DENTON S/N: 132	90000	lbf	N	-45000	1000	0.00071044	0
HDOT RDy	MFG: Sfernice S/N: 0942	340	deg	deg	-170	180	3.038	0
SPNU Ax	MFG: ENDEVCO S/N: P74970	1000	g	g	-500	180	0.02212	0
SPNU Ay	MFG: ENDEVCO S/N: P74979	1000	g	g	-500	180	0.01907	0
SPNU Az	MFG: ENDEVCO S/N: P75158	1000	g	g	-500	180	0.01723	0
SPNM Ax	MFG: ENDEVCO S/N: P75155	1000	g	g	-500	180	0.01993	0
SPNM Ay	MFG: ENDEVCO S/N: P75150	1000	g	g	-500	180	0.01954	0
SPNM Az	MFG: ENDEVCO S/N: P75153	1000	g	g	-500	180	0.02378	0
CHLU Dx	MFG: FTSS S/N: AC3556	3.3	V	mm	3.3	600	1000	
CHLU Ry	MFG: Sfernice S/N: AC6043	150	deg	deg	-75	180	3.0419	8.364
CHLU Rz	MFG: Sfernice S/N: AC6041	150	deg	deg	-75	180	3.0642	12.383
CHRU Dx	MFG: FTSS S/N: AC2288	3.3	V	mm	3.3	600	1000	
CHRU Ry	MFG: Sfernice S/N: AC6045	150	deg	deg	-75	180	3.0685	4.271
CHRU Rz	MFG: Sfernice S/N: AC6044	150	deg	deg	-75	180	3.0637	-7.104
CHLL Dx	MFG: FTSS S/N: AC3555	3.3	V	mm	3.3	600	1000	
CHLL Ry	MFG: Sfernice S/N: AC6158	150	deg	deg	-75	180	3.0696	-2.058
CHLL Rz	MFG: Sfernice S/N: AC6159	150	deg	deg	-75	180	3.0682	12.064
CHRL Dx	MFG: FTSS S/N: AC2287	3.3	V	mm	3.3	600	1000	
CHRL Ry	MFG: Sfernice S/N: AC6042	150	deg	deg	-75	180	2.6324	4.158
CHRL Rz	MFG: Sfernice S/N: AC6040	150	deg	deg	-75	180	3.0327	-3.550
ABDL Dx	MFG: Denton S/N: 173	3.3	V	mm	3.3	600	12.97679	
ABDL Ry	MFG: Contelec S/N: DS-558	150	deg	deg	-75	180	3.0172	1.067
ABDL Rz	MFG: Contelec S/N: DS-556	150	deg	deg	-75	180	3.0149	4.797
ABDR Dx	MFG: Denton S/N: 172	3.3	V	mm	3.3	600	13.03657	
ABDR Ry	MFG: Contelec S/N: DS-523	150	deg	deg	-75	180	3.0277	16.200
ABDR Rz	MFG: Contelec S/N: DS-557	150	deg	deg	-75	180	3.0114	-4.094
SPNL Fx	MFG: Denton S/N: 122	26000	lbf	N	-13000	1000	-0.0001395	0
SPNL Fy	MFG: Denton S/N: 122	26000	lbf	N	-13000	1000	0.00014053	0
SPNL Fz	MFG: Denton S/N: 122	36000	lbf	N	-18000	1000	-0.0000533	0
SPNL Mx	MFG: Denton S/N: 122	1400	in-lbf	N-m	-700	1000	-0.00209586	0
SPNL My	MFG: Denton S/N: 122	1400	in-lbf	N-m	-700	1000	0.00184981	0
PVCG Ax	MFG: ENDEVCO S/N: P74965	1000	g	g	-500	1000	0.0202	0
PVCG Ay	MFG: ENDEVCO S/N: P74976	1000	g	g	-500	1000	0.01703	0
PVCG Az	MFG: ENDEVCO S/N: P49439	1000	g	g	-500	1000	0.01961	0
PVAL Fx	MFG: DENTON S/N: 75	44000	lbf	N	-22000	600	0.00012174	0
PVAL Fy	MFG: DENTON S/N: 75	27000	lbf	N	-13500	600	-0.00005981	0
PVAL Fz	MFG: DENTON S/N: 75	27000	lbf	N	-13500	600	0.00016528	0
PVAR Fx	MFG: DENTON S/N: 75	44000	lbf	N	-22000	600	0.00012302	0
PVAR Fy	MFG: DENTON S/N: 75	26000	lbf	N	-13000	600	-0.00006078	0
PVAR Fz	MFG: DENTON S/N: 75	26000	lbf	N	-13000	600	-0.0001662	0
PILL Fx	MFG: Denton S/N: 75	26000	lbf	N	-13000	600	-0.00006743	0
PILR Fx	MFG: Denton S/N: 76	26000	lbf	N	-13000	600	-0.00006867	0
FMRL Fx	MFG: Humanetics S/N: DJ1040Fx	30000	N	N	-15000	600	0.0001436	0
FMRL Fy	MFG: Humanetics S/N: DJ1040Fy	30000	N	N	-15000	600	0.0001441	0
FMRL Fz	MFG: Humanetics S/N: DJ1040Fz	40000	N	N	-20000	600	-0.0000728	0
FMRL Mx	MFG: Humanetics S/N: DJ1040Mx	700	N-m	N-m	-350	600	0.0064454	0

THOR – TK (Continued) S/N: 0007								
Sensor	**Manufacturer/ Serial #**	**Capacity**	**Units (E)**	**Units (M)**	**Range**	**CFC**	**Sensitivity (mv/V/EU)**	**Initial Offset (EU)**
FMRL My	MFG: Humanetics S/N: DJ1040My	700	N-m	N-m	-350	600	0.0064621	0
FMRL Mz	MFG: Humanetics S/N: DJ1040Mz	600	N-m	N-m	-300	600	0.009063	0
KNEL Dx	MFG: Space Age Controls S/N: 025670	80	mm	mm	-40	180	23.8618	0
TBLU Fz	MFG: DENTON S/N: 110Fz	50000	N	N	-25000	600	-0.0000908	0
TBLU Mx	MFG: DENTON S/N: 110Mx	800	N-m	N-m	-400	600	0.0072731	0
TBLU My	MFG: DENTON S/N: 110My	800	N-m	N-m	-400	600	0.0072771	0
TBLL Fz	MFG: Denton S/N: 120Fz	50000	N	N	-25000	600	-0.00009686	0
TBLL Mx	MFG: Denton S/N: 120Mx	800	N-m	N-m	-400	600	0.00750986	0
TBLL My	MFG: Denton S/N: 120My	800	N-m	N-m	-400	600	0.0075842	0
ANKL Rx	MFG: Contelec S/N: ANKLX-0371	200	deg	deg	-100	180	2.995	-0.83479
ANKL Ry	MFG: Contelec S/N: ANKLY-0367	200	deg	deg	-100	180	3.014	-16.049
FOTL Az	MFG: ENDEVCO S/N: P51711	3000	g	g	-1500	1000	0.01972	0
FMRR Fx	MFG: Humanetics S/N: DJ1045Fx	30000	N	N	-15000	600	0.0001461	0
FMRR Fy	MFG: Humanetics S/N: DJ1045Fy	30000	N	N	-15000	600	0.0001465	0
FMRR Fz	MFG: Humanetics S/N: DJ1045Fz	40000	N	N	-20000	600	-0.0000756	0
FMRR Mx	MFG: Humanetics S/N: DJ1045Mx	700	N-m	N-m	-350	600	0.0065482	0
FMRR My	MFG: Humanetics S/N: DJ1045My	700	N-m	N-m	-350	600	0.006518	0
FMRR Mz	MFG: Humanetics S/N: DJ1045Mz	600	N-m	N-m	-300	600	0.0097325	0
KNER Dx	MFG: Space Age Controls S/N: 019588	80	mm	mm	-40	180	23.9349	0
TBRU Fz	MFG: DENTON S/N: 107Fz	50000	N	N	-25000	600	-0.0000955	0
TBRU Mx	MFG: DENTON S/N: 107Mx	800	N-m	N-m	-400	600	0.0074272	0
TBRU My	MFG: DENTON S/N: 107My	800	N-m	N-m	-400	600	0.007333	0
TBRL Fz	MFG: Denton S/N: 75Fz	50000	N	N	-25000	600	-0.00009964	0
TBRL Mx	MFG: Denton S/N: 75Mx	800	N-m	N-m	-400	600	0.00736028	0
TBRL My	MFG: Denton S/N: 75My	800	N-m	N-m	-400	600	0.00736294	0
ANKR Rx	MFG: Contelec S/N: ANKRX-0368	200	deg	deg	-100	180	3.017	0.0405
ANKR Ry	MFG: Contelec S/N: ANKRY-0369	200	deg	deg	-100	180	3.009	-11.961
FOTR Az	MFG: ENDEVCO S/N: P64128	3000	g	g	-1500	1000	0.02344	0

THOR – TK S/N: 016								
Sensor	**Manufacturer/ Serial #**	**Capacity**	**Units (E)**	**Units (M)**	**Range**	**CFC**	**Sensitivity (mv/V/EU)**	**Initial Offset (EU)**
HEAD CG X	MFG: First Technology S/N: 294	2000	g	g	-1000	1000	0.0177	0
HEAD CG Y	MFG: First Technology S/N: 156	2000	g	g	-1000	1000	0.02065	0
HEAD CG Z	MFG: ENDEVCO S/N: P49194	2000	g	g	-1000	1000	0.01721	0
HDCG Wx	MFG: ENDEVCO S/N: P52086	36000	deg/s	deg/s	-18000	1000	0.09262	0
HDCG Wy	MFG: ENDEVCO S/N: P52043	36000	deg/s	deg/s	-18000	1000	0.09378	0
HDCG Wz	MFG: DTS S/N: ARS4727	36000	deg/s	deg/s	-18000	1000	0.09563	0
NEKU Fx	MFG: DTS S/N: ARS4712	18000	lbf	N	-9000	1000	0.0002406	0
NEKU Fy	MFG: DTS S/N: ARS4714	18000	lbf	N	-9000	1000	0.00024081	0
NEKU Fz	MFG: DENTON S/N: 77	26000	lbf	N	-13000	1000	-0.00008546	0
NEKU Mx	MFG: DENTON S/N: 77	1200	in-lbf	N-m	-600	600	0.00584857	0
NEKU My	MFG: DENTON S/N: 77	1200	in-lbf	N-m	-600	600	0.00609285	0

THOR – TK (Continued) S/N: 016								
Sensor	**Manufacturer/ Serial #**	**Capacity**	**Units (E)**	**Units (M)**	**Range**	**CFC**	**Sensitivity (mv/V/EU)**	**Initial Offset (EU)**
NEKU Mz	MFG: DENTON S/N: 77	1200	in-lbf	N-m	-600	600	0.00980132	0
NEKL Fx	MFG: DENTON S/N: 80	26000	lbf	N	-13000	1000	-0.00017312	0
NEKL Fy	MFG: DENTON S/N: 80	26000	lbf	N	-13000	1000	0.00017328	0
NEKL Fz	MFG: DENTON S/N: 80	26000	lbf	N	-13000	1000	-0.00006903	0
NEKL Mx	MFG: DENTON S/N: 80	1200	in-lbf	N-m	-600	600	-0.00417667	0
NEKL My	MFG: DENTON S/N: 80	1200	in-lbf	N-m	-600	600	0.00421295	0
NEKL Mz	MFG: DENTON S/N: 80	1200	in-lbf	N-m	-600	600	0.00690093	0
NKCF Fz	MFG: DENTON S/N: 80	90000	lbf	N	-45000	1000	0.00052317	0
NKCR Fz	MFG: DENTON S/N: 75	90000	lbf	N	-45000	1000	0.0004801	0
HDOT RDy	MFG: Sfernice S/N: DI7189	340	deg	deg	-170	180	3.038	0
SPNU Ax	MFG: ENDEVCO S/N: P64099	1000	g	g	-500	180	0.01844	0
SPNU Ay	MFG: ENDEVCO S/N: P58838	1000	g	g	-500	180	0.01739	0
SPNU Az	MFG: ENDEVCO S/N: P58834	1000	g	g	-500	180	0.0188	0
SPNM Ax	MFG: ENDEVCO S/N: P64002	1000	g	g	-500	180	0.01799	0
SPNM Ay	MFG: ENDEVCO S/N: P58735	1000	g	g	-500	180	0.01841	0
SPNM Az	MFG: ENDEVCO S/N: P64111	1000	g	g	-500	180	0.01674	0
CHLU Dx	MFG: FTSS S/N: DI4715	3.3	V	mm	3.3	600	1000	
CHLU Ry	MFG: Denton S/N: DI2382	150	deg	deg	-75	180	3.0087	8.434
CHLU Rz	MFG: Denton S/N: DI2383	150	deg	deg	-75	180	3.0074	11.913
CHRU Dx	MFG: FTSS S/N: DI4716	3.3	V	mm	3.3	600	1000	
CHRU Ry	MFG: Denton S/N: DI2381	150	deg	deg	-75	180	3.0077	7.451
CHRU Rz	MFG: Denton S/N: DI2380	150	deg	deg	-75	180	3.0199	-9.781
CHLL Dx	MFG: FTSS S/N: DI4718	3.3	V	mm	3.3	600	1000	
CHLL Ry	MFG: Denton S/N: DI2386	150	deg	deg	-75	180	3.0211	3.758
CHLL Rz	MFG: Denton S/N: DI6129	150	deg	deg	-75	180	3.01218	7.021
CHRL Dx	MFG: FTSS S/N: DI4717	3.3	V	mm	3.3	600	1000	
CHRL Ry	MFG: Denton S/N: DI2385	150	deg	deg	-75	180	3.016	.5991
CHRL Rz	MFG: Denton S/N: DI2384	150	deg	deg	-75	180	3.0217	-8.613
ABDL Dx	MFG: Honeywell S/N: 183	3.3	V	mm	3.3	600	1000	
ABDL Ry	MFG: Denton S/N: 219	150	deg	deg	-75	180	3.218	4.171
ABDL Rz	MFG: Denton S/N: 218	150	deg	deg	-75	180	3.165	1.789
ABDR Dx	MFG: Denton S/N: 184	3.3	V	mm	3.3	600	1000	
ABDR Ry	MFG: Denton S/N: 220	150	deg	deg	-75	180	3.182	5.652
ABDR Rz	MFG: Denton S/N: 221	150	deg	deg	-75	180	3.168	-1.162
SPNL Fx	MFG: Denton S/N: 123	26000	lbf	N	-13000	1000	0.00139138	0
SPNL Fy	MFG: Denton S/N: 123	26000	lbf	N	-13000	1000	0.00013943	0
SPNL Fz	MFG: Denton S/N: 123	36000	lbf	N	-18000	1000	-0.00005291	0
SPNL Mx	MFG: Denton S/N: 123	1400	in-lbf	N-m	-700	1000	-0.00209586	0
SPNL My	MFG: Denton S/N: 123	1400	in-lbf	N-m	-700	1000	0.00182945	0
PVCG Ax	MFG: ENDEVCO S/N: P64087	1000	g	g	-500	1000	0.01834	0
PVCG Ay	MFG: ENDEVCO S/N: P50065	1000	g	g	-500	1000	0.01785	0
PVCG Az	MFG: ENDEVCO S/N: P64123	1000	g	g	-500	1000	0.01914	0
PVAL Fx	MFG: DENTON S/N: 77	44000	lbf	N	-22000	600	-0.00011976	0
PVAL Fy	MFG: DENTON S/N: 77	27000	lbf	N	-13500	600	-0.00005959	0
PVAL Fz	MFG: DENTON S/N: 77	27000	lbf	N	-13500	600	-0.00016344	0

THOR – TK (Continued) S/N: 016								
Sensor	**Manufacturer/ Serial #**	**Capacity**	**Units (E)**	**Units (M)**	**Range**	**CFC**	**Sensitivity (mv/V/EU)**	**Initial Offset (EU)**
PVAR Fx	MFG: DENTON S/N: 84	44000	lbf	N	-22000	600	0.00012055	0
PVAR Fy	MFG: DENTON S/N: 84	26000	lbf	N	-13000	600	-0.00006006	0
PVAR Fz	MFG: DENTON S/N: 84	26000	lbf	N	-13000	600	0.00016272	0
PILL Fx	MFG: Denton S/N: DI4774	26000	lbf	N	-13000	1000	-0.00012118	0
PILR Fx	MFG: Denton S/N: DI4775	26000	lbf	N	-13000	1000	-0.00012068	0
FMRL Fx	MFG: Denton S/N: DH9717	30000	N	N	-15000	600	0.0001446	0
FMRL Fy	MFG: Denton S/N: DH9717	30000	N	N	-15000	600	0.0001458	0
FMRL Fz	MFG: Denton S/N: DH9717	40000	N	N	-20000	600	-0.0000724	0
FMRL Mx	MFG: Denton S/N: DH9717	700	N-m	N-m	-350	600	0.0065482	0
FMRL My	MFG: Denton S/N: DH9717	700	N-m	N-m	-350	600	0.0065257	0
FMRL Mz	MFG: Denton S/N: DH9717	600	N-m	N-m	-300	600	0.0091723	0
KNEL Dx	MFG: Space Age Controls S/N: D2103665B	80	mm	mm	-40	180	22.147	0
TBLU Fz	MFG: Denton S/N: 89	50000	N	N	-25000	600	-0.0000921	0
TBLU Mx	MFG: Denton S/N: 89	800	N-m	N-m	-400	600	0.0073598	0
TBLU My	MFG: Denton S/N: 89	800	N-m	N-m	-400	600	0.0073288	0
TBLL Fz	MFG: Denton S/N: 142	50000	N	N	-25000	600	-0.0000948	0
TBLL Mx	MFG: Denton S/N: 142	800	N-m	N-m	-400	600	0.0073026	0
TBLL My	MFG: Denton S/N: 142	800	N-m	N-m	-400	600	0.0073735	0
ANKL Rx	MFG: Contelec S/N: LX0019	200	deg	deg	-100	180	3.04982	-0.9575
ANKL Ry	MFG: Contelec S/N: LX0019	200	deg	deg	-100	180	2.96419	-14.97
FOTL Az	MFG: ENDEVCO S/N: P52001	3000	g	g	-1500	1000	0.0191	0
FMRR Fx	MFG: Denton S/N: DH9722	30000	N	N	-15000	600	0.0001474	0
FMRR Fy	MFG: Denton S/N: DH9722	30000	N	N	-15000	600	0.0001474	0
FMRR Fz	MFG: Denton S/N: DH9722	40000	N	N	-20000	600	-0.0000737	0
FMRR Mx	MFG: Denton S/N: DH9722	700	N-m	N-m	-350	600	0.0065614	0
FMRR My	MFG: Denton S/N: DH9722	700	N-m	N-m	-350	600	0.0065759	0
FMRR Mz	MFG: Denton S/N: DH9722	600	N-m	N-m	-300	600	0.0089348	0
KNER Dx	MFG: Space Age Controls S/N: D2103657B	80	mm	mm	-40	180	23.135	0
TBRU Fz	MFG: Denton S/N: 95	50000	N	N	-25000	600	-0.0000918	0
TBRU Mx	MFG: Denton S/N: 95	800	N-m	N-m	-400	600	0.0073681	0
TBRU My	MFG: Denton S/N: 95	800	N-m	N-m	-400	600	0.0072947	0
TBRL Fz	MFG: Denton S/N: 164	50000	N	N	-25000	600	-0.0000956	0
TBRL Mx	MFG: Denton S/N: 164	800	N-m	N-m	-400	600	0.0075105	0
TBRL My	MFG: Denton S/N: 164	800	N-m	N-m	-400	600	0.0073588	0
ANKR Rx	MFG: Contelec S/N: LX0018	200	deg	deg	-100	180	3.13066	-6.842
ANKR Ry	MFG: Contelec S/N: LX0018	200	deg	deg	-100	180	2.95682	13.223
FOTR Az	MFG: ENDEVCO S/N: P64102	3000	g	g	-1500	1000	0.01986	0

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

THOR – TK S/N: 007			
Sensor	**IR-TRACC Exponent**	**IR-TRACC Slope**	**IR-TRACC Intercept**
CHLU Dx	-0.4675	-34.009493	120.7103
CHRU Dx	-0.4675	-34.871682	125.2528
CHLL Dx	-0.4675	-34.916600	123.9557
CHRL Dx	-0.4675	-34.121632	121.9603
ABDL Dx	-0.43568	31.6159	3.688
ABDR Dx	-0.40940	31.7099	3.774
THOR – TK S/N: 016			
Sensor	**IR-TRACC Exponent**	**IR-TRACC Slope**	**IR-TRACC Intercept**
CHLU Dx	-0.48024	33.0284	3.680
CHRU Dx	-0.4675	-34.919035	121.2325
CHLL Dx	-0.4672	33.6317	3.612
CHRL Dx	-0.48206	32.0908	3.791
ABDL Dx	-0.47743	38.9774	3.894
ABDR Dx	-0.48020	53.1720	2.874

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 007

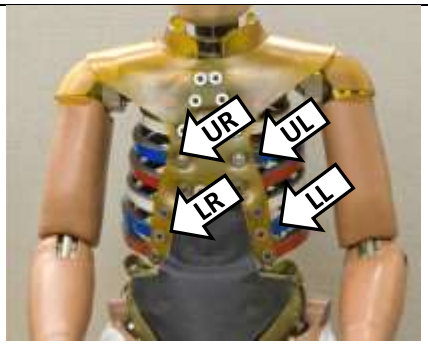
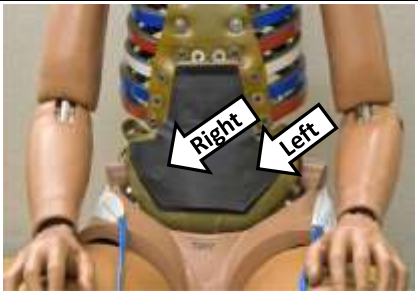


Figure 1. Manipulation to determine thoracic IR-TRACC polarity.

UR				UL			
Channel	**Initial**	**Final**	**Measured** / **Expected**	**Channel**	**Initial**	**Final**	**Measured** / **Expected**
DX (V)	.1501	.1760	Increase / **Increase**	DX (V)	.1759	.2025	Increase / **Increase**
RY (Deg)	4.271	-.331	Increase / **Decrease**	RY (Deg)	8.364	5.141	Decrease / **Decrease**
RZ (Deg)	-7.104	-5.851	Decrease / **Increase**	RZ (Deg)	12.383	13.858	Decrease / **Increase**

LR				LL			
Channel	**Initial**	**Final**	**Measured** / **Expected**	**Channel**	**Initial**	**Final**	**Measured** / **Expected**
DX (V)	.0781	.1042	Increase / **Increase**	DX (V)	.0921	.1323	Increase / **Increase**
RY (Deg)	4.158	.9250	Increase / **Decrease**	RY (Deg)	-2.058	-4.612	Decrease / **Decrease**
RZ (Deg)	-3.550	-1.357	Decrease / **Increase**	RZ (Deg)	12.064	17.925	Increase / **Increase**



Abdomen Left				Abdomen Right			
Channel	**Initial**	**Final**	**Measured** / **Expected**	**Channel**	**Initial**	**Final**	**Measured** / **Expected**
DX (V)	.0431	.1373	Increase / **Increase**	DX (V)	.0329	.9302	Increase / **Increase**
RY (Deg)	1.067	-3.028	Decrease / **Decrease**	RY (Deg)	16.200	8.392	Increase / **Decrease**
RZ (Deg)	4.797	10.073	Increase / **Increase**	RZ (Deg)	-4.094	.4204	Decrease / **Increase**

THOR 0016

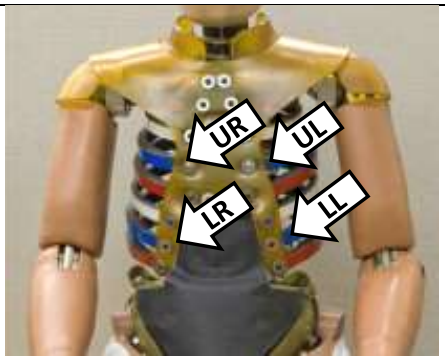
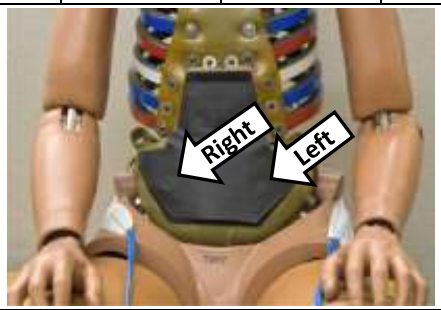


Figure 2. Manipulation to determine thoracic IR-TRACC polarity.

UR				UL			
Channel	**Initial**	**Final**	**Measured** / **Expected**	**Channel**	**Initial**	**Final**	**Measured** / **Expected**
DX (V)	.1312	.2071	Increase / **Increase**	DX (V)	.1357	.2316	Increase / **Increase**
RY (Deg)	7.451	2.791	Increase / **Decrease**	RY (Deg)	8.434	1.591	Decrease / **Decrease**
RZ (Deg)	-9.781	-6.440	Decrease / **Increase**	RZ (Deg)	11.913	16.909	Decrease / **Increase**
LR				**LL**			
Channel	**Initial**	**Final**	**Measured** / **Expected**	**Channel**	**Initial**	**Final**	**Measured** / **Expected**
DX (V)	.0856	.1421	Increase / **Increase**	DX (V)	.0753	.1350	Increase / **Increase**
RY (Deg)	.5991	-3.319	Increase / **Decrease**	RY (Deg)	3.758	-1.598	Decrease / **Decrease**
RZ (Deg)	-8.613	-1.556	Decrease / **Increase**	RZ (Deg)	7.021	15.472	Increase / **Increase**



Abdomen Left				Abdomen Right			
Channel	**Initial**	**Final**	**Measured** / **Expected**	**Channel**	**Initial**	**Final**	**Measured** / **Expected**
DX (V)	.0512	.1152	Increase / **Increase**	DX (V)	.1361	.2685	Increase / **Increase**
RY (Deg)	4.171	-2.343	Decrease / **Decrease**	RY (Deg)	5.652	-.500	Increase / **Decrease**
RZ (Deg)	1.789	10.213	Increase / **Increase**	RZ (Deg)	-1.162	2.668	Decrease / **Increase**

THOR Inspection Checklist

Date: **12/13/2012**
NHTSA Representative: **James Saunders**
Witness(es):
Inspection type (check one): ☒PRE ☐POST
Dummy S/N: **007**
Dummy Description: **Thor NT 50th Male**
Date of last Certification or Inspection: **12/10/2012**
Tests conducted since last full certification or inspection: Since last inspection: **RC5141 Left side Camry** Since last certification: **RD5227 Right side Versa** **RC5142 Right side Camry** **RD5226 Left side Versa** **RD4200 Left side Elantra** **RC5141 Left side Camry**
Known errors in data channels (no data, clipping, unexpected drops): V2P1 NKCF FZ - Noise spikes on data - Mechanical noise V2P1 NKCR FZ - Noise spikes on data - Mechanical noise
Physical evidence of damage:
Anecdotal evidence of damage:
Equipment delivered to Borrower:

HEAD	
Y / N	Rear head cap mounts securely to head
Y / N	Head skin fits securely over skull **-slightly small, does not fit 100% in rear**
Y / N	Head skin shows no sign of tears or damage **-nicks/cuts** 
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 If N – indicate which interface (where plate/puck 1 attach to upper neck load cell): **-debonding above pucks 4, 5** 
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	

SPINE	
Y / N	No evidence of debonding between thoracic spine flex joint and metal plates **-tears in left/right sides?** 
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	
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 stop slightly debonded** 
OTHER	
THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material **-top interior left ribs 2, 5** **-top interior right rib 4**
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	

ABDOMEN	
Y / N	No evidence of tearing, cuts, or broken stitches in upper abdomen bag and zipper **-holes in left, right sides near 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
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	**-holes in pelvis flesh near ASIS anterior surfaces** 

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 **-cuts/tears/hole in both knee flesh covers** 
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
OTHER	**-Both feet starting to tear at rear** 

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

THOR Inspection Checklist

Date: **12/17/2012**
NHTSA Representative: **James Saunders**
Witness(es):
Inspection type (check one): ☐ PRE ☒ POST
Dummy S/N: **007**
Dummy Description: **Thor NT 50th Male**
Date of last Certification or Inspection: **12/13/2012**
Tests conducted since last full certification or inspection: Since last inspection: **RC5369 Left side CR-V** Since last certification: **RD5227 Right side Versa** **RC5142 Right side Camry** **RD5226 Left side Versa** **RD4200 Left side Elantra** **RC5141 Left side Camry** **RC5369 Left side CR-V**
Known errors in data channels (no data, clipping, unexpected drops): V2P1 ABDL RY - Questionable between 102-131ms V2P1 FOTL AZ - Spikes at 40 & 57ms V2P1 FOTR AZ - Spikes at 48& 67ms
Physical evidence of damage:
Anecdotal evidence of damage:
Equipment delivered to Borrower:

HEAD	
Y / N	Rear head cap mounts securely to head
Y / N	Head skin fits securely over skull **-slightly small, does not fit 100% in rear**
Y / N	Head skin shows no sign of tears or damage **-nicks/cuts** 
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 If N – indicate which interface (where plate/puck 1 attach to upper neck load cell): **-debonding above pucks 4, 5** 
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	

SPINE	
Y / N	No evidence of debonding between thoracic spine flex joint and metal plates **-tears in left/right sides?** 
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	

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 stop slightly debonded** 
OTHER	

THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material **-top interior left ribs 2, 5** **-top interior right rib 4** 
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	**-Right arm has a gouge near elbow** 
ABDOMEN	
Y / N	No evidence of tearing, cuts, or broken stitches in upper abdomen bag and zipper **-holes in left, right sides near 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
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	**-holes in pelvis flesh near ASIS anterior surfaces**  
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 **-cuts/tears/hole in both knee flesh covers** 
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
OTHER	**-Both feet starting to tear at rear** 

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

THOR Inspection Checklist

Date: **12/13/2012**
NHTSA Representative: **James Saunders**
Witness(es):
Inspection type (check one): ☒ PRE ☐ POST
Dummy S/N: **0016**
Dummy Description: **Thor NT 50th Male**
Date of last Certification or Inspection: **12/10/2012**
Tests conducted since last full certification or inspection: Since last inspection: **RC5141 Left side Camry** Since last certification: **RD5227 Right side Versa** **RC5142 Right side Camry** **RD5226 Left side Versa** **RD4200 Left side Elantra** **RC5141 Left side Camry**
Known errors in data channels (no data, clipping, unexpected drops): V2P2 PVCG AX - Noise spikes at 79 & 116ms - OK V2P2 PVAR FX - Questionable between 109 &125ms - Nothing observable V2P2 PVAR FY - Noise spikes at 109 &125ms - Nothing observable V2P2 FMRL FX - Noise spikes on data - loose connector - repaired V2P2 FMRL FY - Noise spikes on data - loose connector - repaired V2P2 FOTL AZ - Channel Failed - Known Dead channel V2P2 TBRL MY - Questionable between 53 & 63ms - OK
Physical evidence of damage:
Anecdotal evidence of damage:
Equipment delivered to Borrower: **Thor 16 ATD**

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 If N – indicate which interface (where plate/puck 1 attach to upper neck load cell): **-cracks in neck rubber, 2-3, 3-4** **-Lower rear neck stop is missing** 
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	

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	
SHOULDER	
Y / N	Urethane shoulder pads show no evidence of contact **-small white mark on left shoulder** 
Y / N	Clavicles securely attached to sternum and shoulder
Y / N	No evidence of debonding, tearing, or permanent compression of posterior soft stops
OTHER	-Stops on shoulder interacting with mechanism that rotates on the y-axis are breaking.  
THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material **-slight contact top right of rib #2 under arm** 
Y / N	No evidence of debonding between rib damping material and ribs **-right front of rib #5** 
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	- **Left lower IR-Tracc sticks during compression**
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 **-torn stitches on left/right side at leg zipper** 
Y / N	Lower abdomen insert securely attached to spine
Y / N	Lower abdomen insert shows no evidence of permanent set
OTHER	

PELVIS	
Y / N	Pelvis flesh fits securely over pelvis bones
Y / N	H-point tool fits securely into hole on both sides of pelvis
OTHER	

FEMUR	
Y / N	Acetabular load cells firmly attached
Y / N	Femur load cells firmly attached
Y / N	No evidence of deformation of knee slider bump stop
Y / N	No cuts, tears, or scuffing of knee flesh
OTHER	
LOWER EXTREMITY (LX)	
Y / N	Rotational potentiometers in ankle securely attached
Y / N	Achilles tendon provides resistance to dorsiflexion
Y / N	No evidence of debonding, tearing, or permanent compression of ankle soft stops **-ankle roll stops cracked** 
OTHER	**-Right leg skin is tearing** **-Right leg has a chip out of structural ring**  

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

THOR Inspection Checklist

Date: **12/17/2012**

NHTSA Representative: **James Saunders**

Witness(es):

Inspection type (check one): ☐ PRE ☒ POST

Dummy S/N: **0016**

Dummy Description: **Thor NT 50th Male**

Date of last Certification or Inspection: **12/13/2012**

Tests conducted since last full certification or inspection:
Since last inspection:
RC5369 Left side CR-V
Since last certification:
RD5227 Right side Versa
RC5142 Right side Camry
RD5226 Left side Versa
RD4200 Left side Elantra
RC5141 Left side Camry
RC5369 Left side CR-V

Known errors in data channels (no data, clipping, unexpected drops):

V2P2 PVCG AX - Noise spikes at 79 & 116ms - OK
V2P2 PVAR FX - Questionable between 109 &125ms - Nothing observable
V2P2 PVAR FY - Noise spikes at 109 &125ms - Nothing observable
V2P2 FMRL FX - Noise spikes on data - loose connector - repaired
V2P2 FMRL FY - Noise spikes on data - loose connector - repaired
V2P2 FOTL AZ - Channel Failed - Known Dead channel
V2P2 TBRL MY - Questionable between 53 & 63ms - OK

Physical evidence of damage:

Anecdotal evidence of damage:

Equipment delivered to Borrower:

Thor 16 ATD

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 **-Small scrapes on right side of head** 
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 If N – indicate which interface (where plate/puck 1 attach to upper neck load cell): **-cracks in neck rubber, 2-3, 3-4** **-Lower rear neck stop is missing** 
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	
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	

SHOULDER	
Y / N	Urethane shoulder pads show no evidence of contact **-small white mark on left shoulder** 
Y / N	Clavicles securely attached to sternum and shoulder
Y / N	No evidence of debonding, tearing, or permanent compression of posterior soft stops
OTHER	**-Stops on shoulder interacting with mechanism that rotates on the y-axis are breaking.**  

THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material **-slight contact top right of rib #2 under arm** 
Y / N	No evidence of debonding between rib damping material and ribs **-right front of rib #5** 
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	- **Left lower IR-Tracc sticks during compression**

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 **-torn stitches on left/right side at leg zipper**  
Y / N	Lower abdomen insert securely attached to spine
Y / N	Lower abdomen insert shows no evidence of permanent set
OTHER	

PELVIS	
Y / N	Pelvis flesh fits securely over pelvis bones
Y / N	H-point tool fits securely into hole on both sides of pelvis
OTHER	

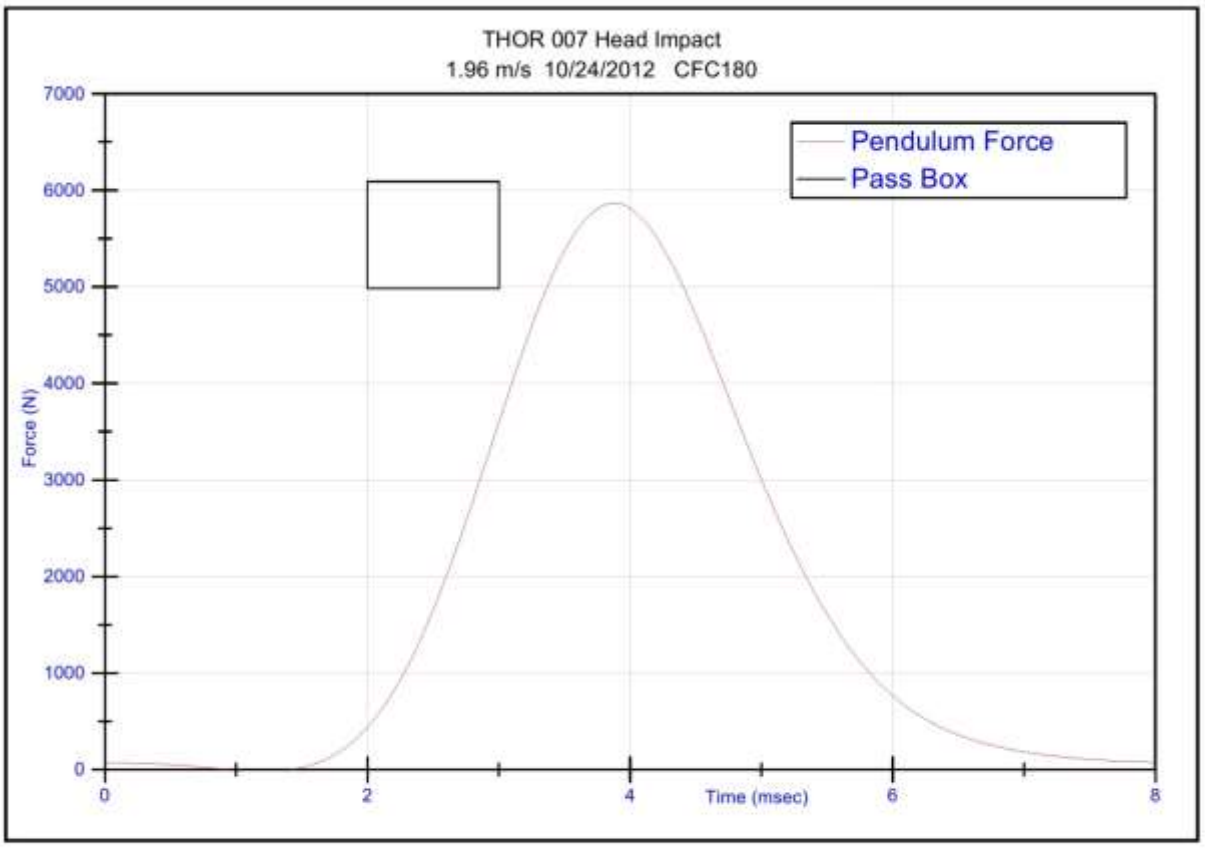
FEMUR	
Y / N	Acetabular load cells firmly attached
Y / N	Femur load cells firmly attached
Y / N	No evidence of deformation of knee slider bump stop
Y / N	No cuts, tears, or scuffing of knee flesh
OTHER	
LOWER EXTREMITY (LX)	
Y / N	Rotational potentiometers in ankle securely attached
Y / N	Achilles tendon provides resistance to dorsiflexion
Y / N	No evidence of debonding, tearing, or permanent compression of ankle soft stops **-ankle roll stops cracked** 
OTHER	**-Right leg skin is tearing** **-Right leg has a chip out of structural ring**  

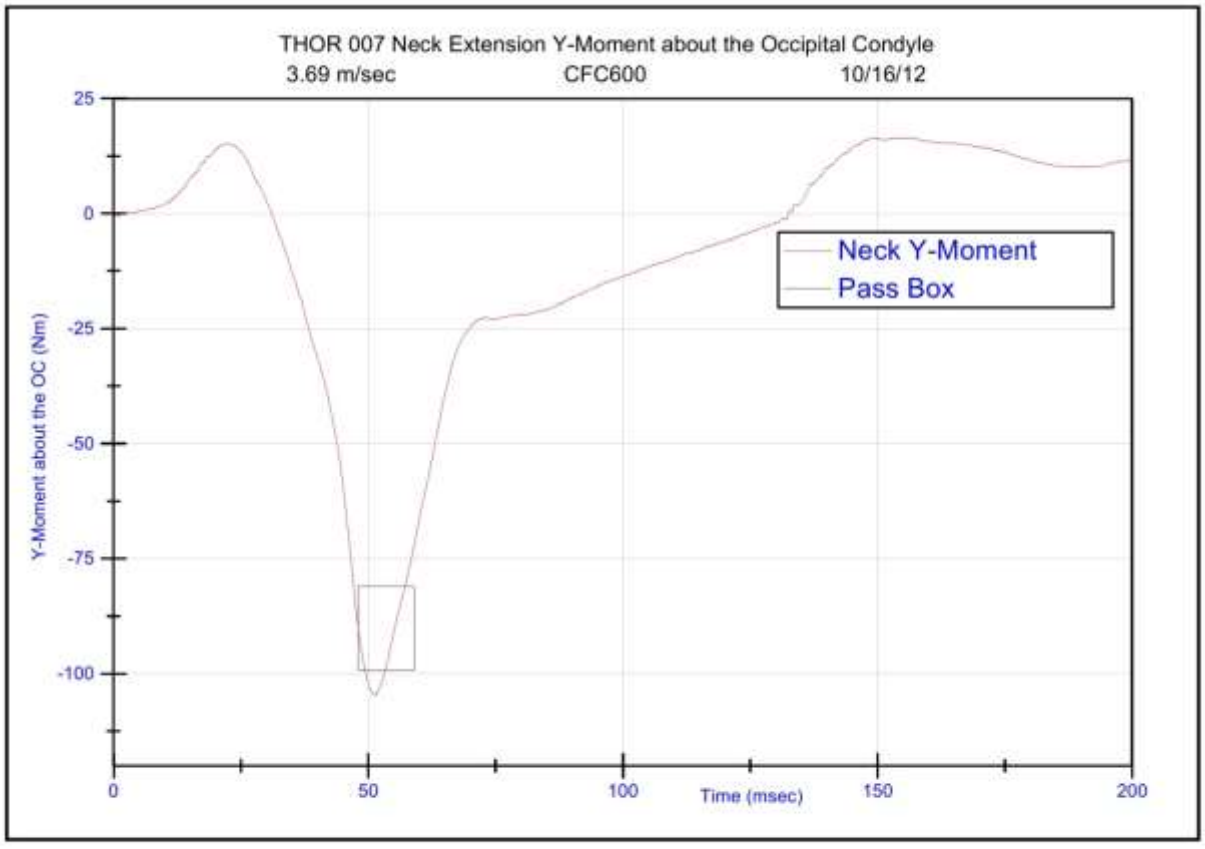
JACKET	
Y / N	Rib stiffeners show no sign of permanent deformation
Y / N	No evidence of tears or holes in jacket fabric, Velcro, or zippers
OTHER	

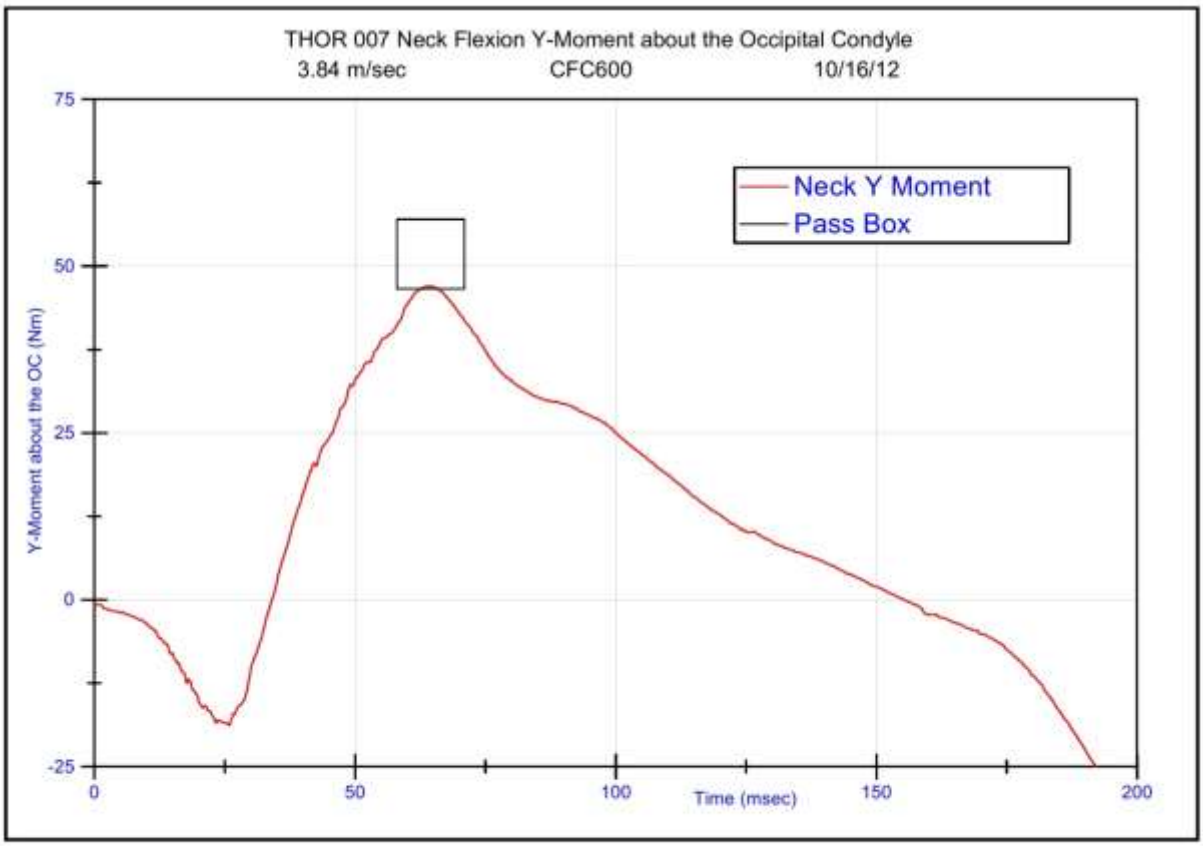
Test Data/Sensor Repair Notes

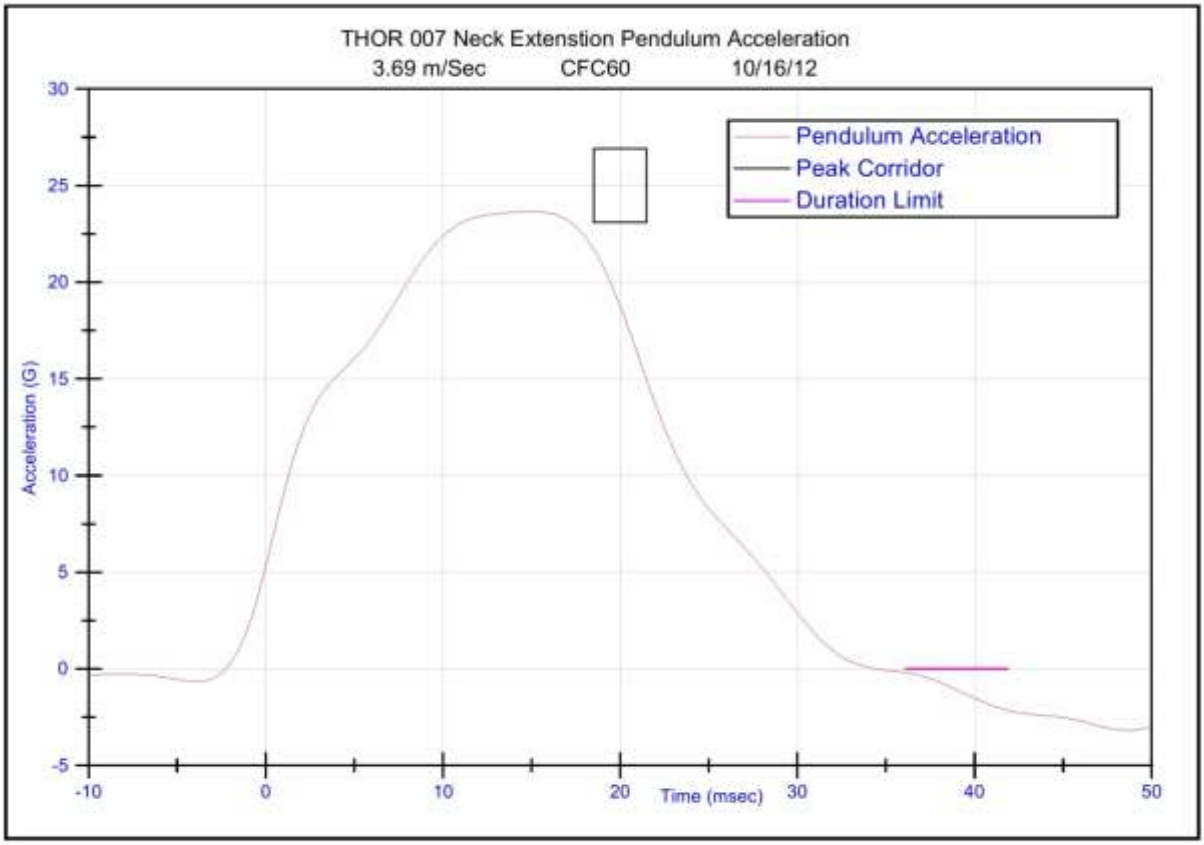
DUMMY CALIBRATIONS

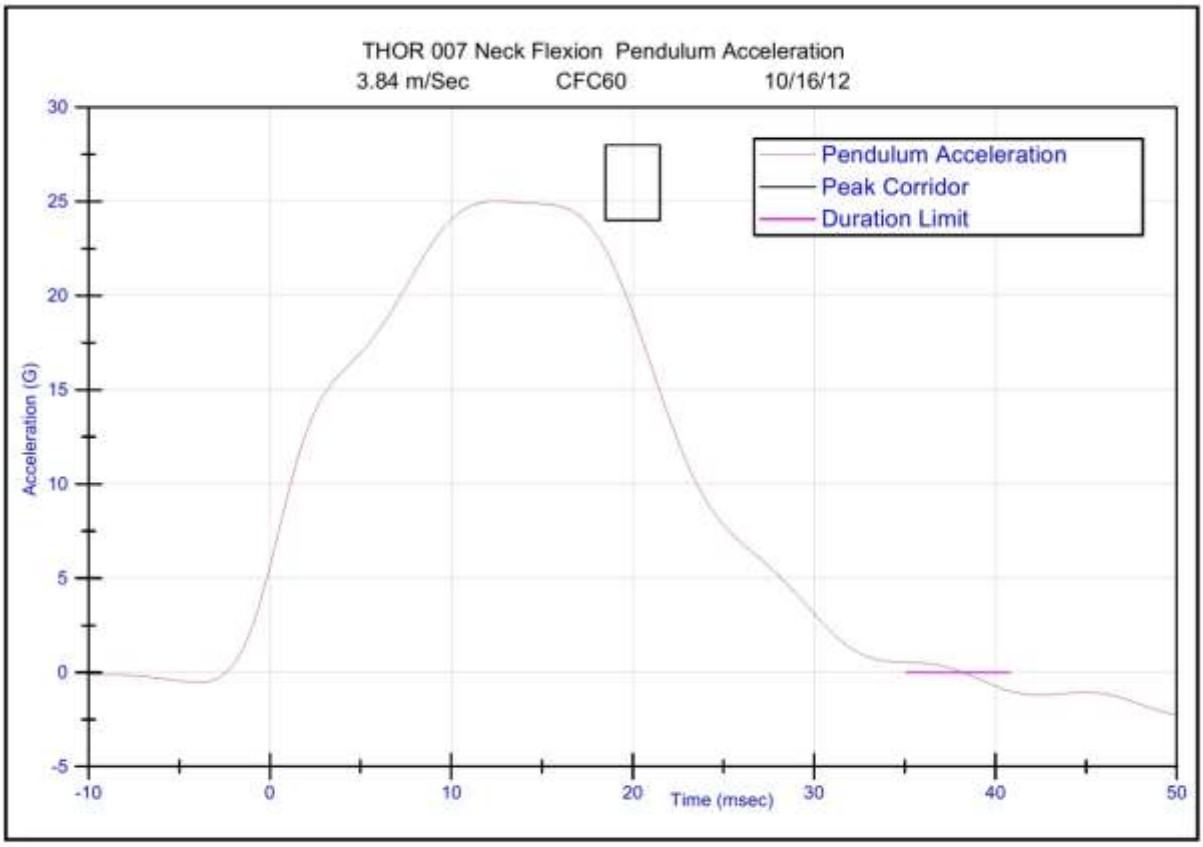
50% ADULT MALE THOR007 DUMMY CALIBRATIONS

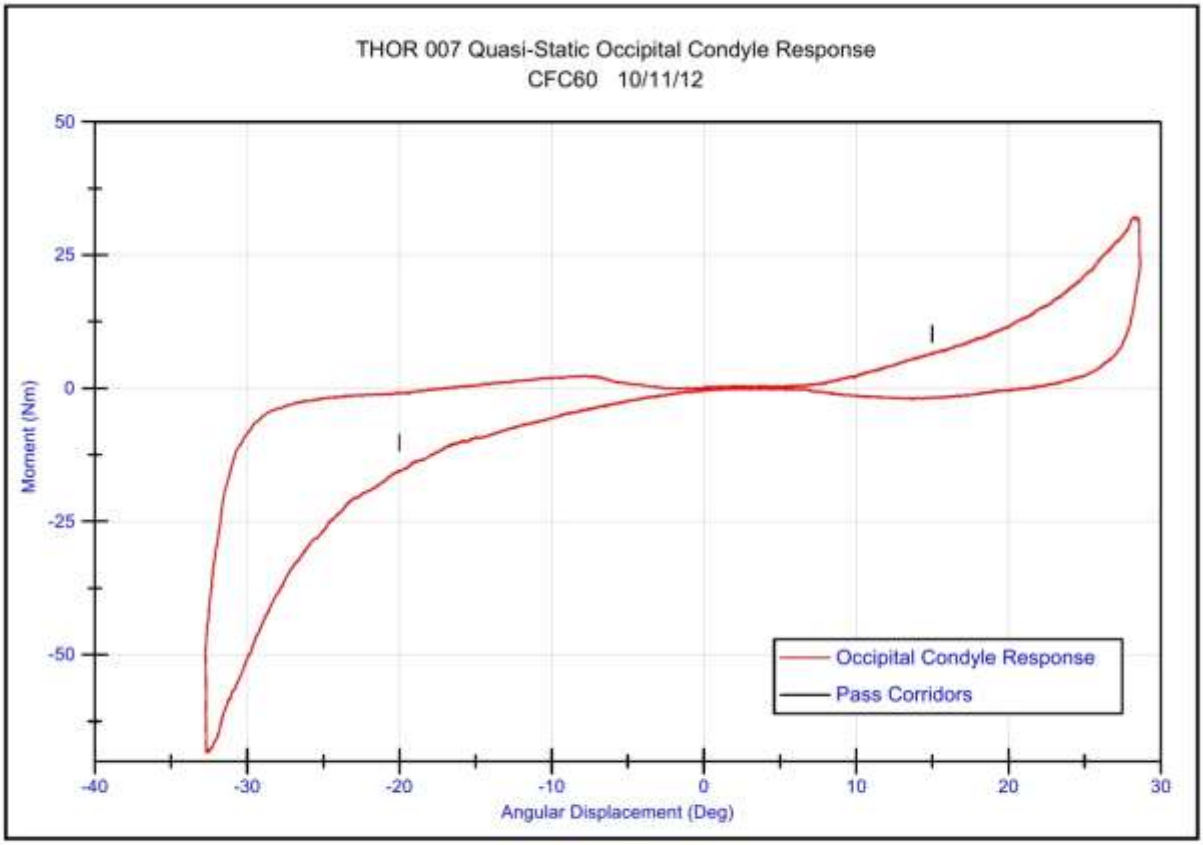

THOR 007 Head Impact
1.96 m/s 10/24/2012 CFC180
Pendulum Force
Pass Box
Force (N)
7000
6000
5000
4000
3000
2000
1000
0
0
2
4
6
8
Time (msec)

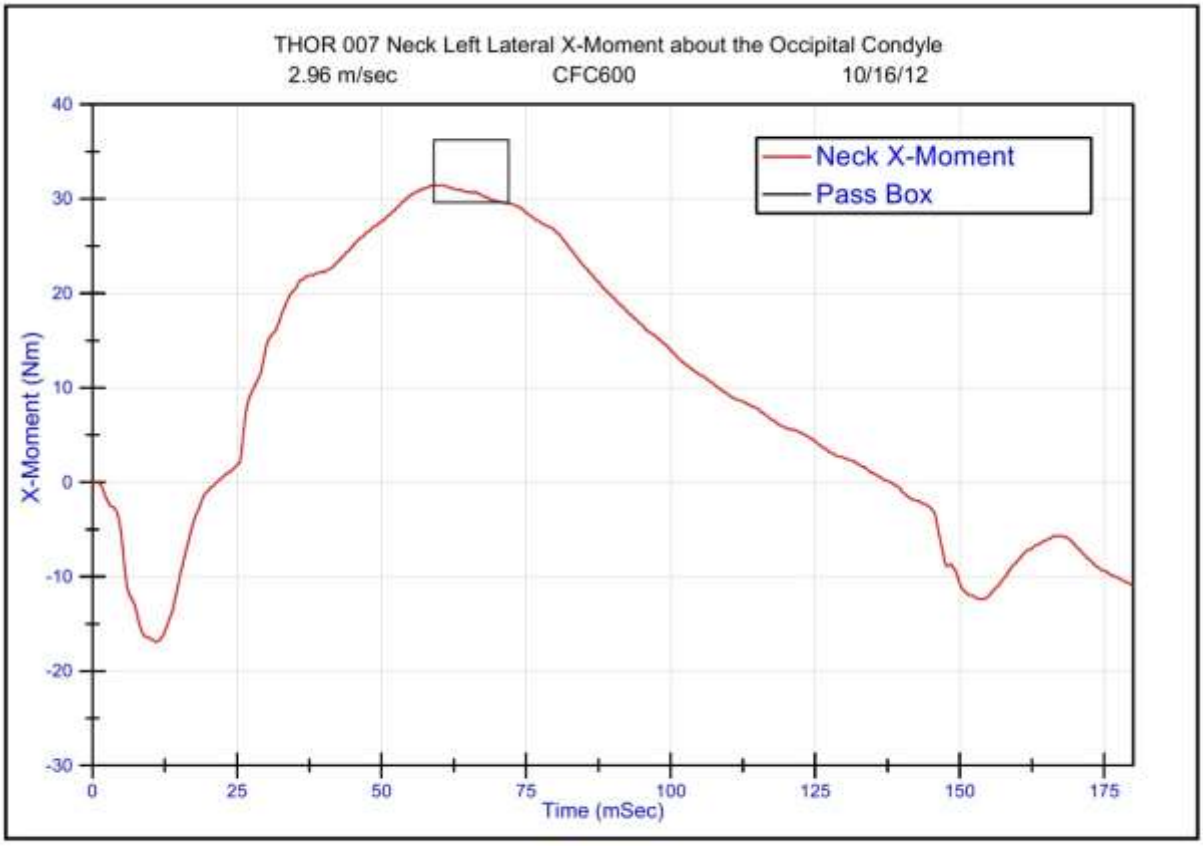

THOR 007 Neck Extension Y-Moment about the Occipital Condyle
3.69 m/sec CFC600 10/16/12
Neck Y-Moment
Pass Box
Y-Moment about the OC (Nm)
25
0
-25
-50
-75
-100
0
50
100
150
200
Time (msec)

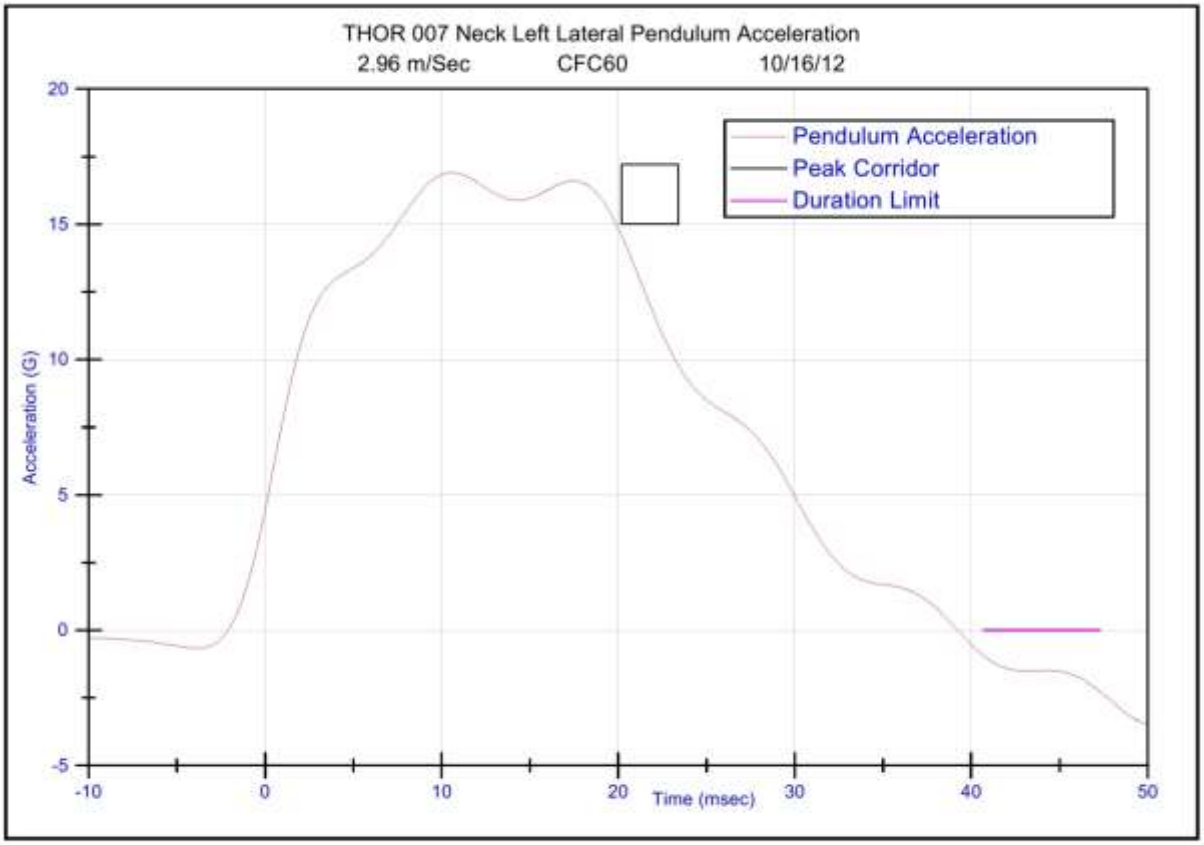

THOR 007 Neck Flexion Y-Moment about the Occipital Condyle
3.84 m/sec
CFC600
10/16/12
Neck Y Moment
Pass Box
Y-Moment about the OC (Nm)
Time (msec)
75
50
25
0
-25
0
50
100
150
200

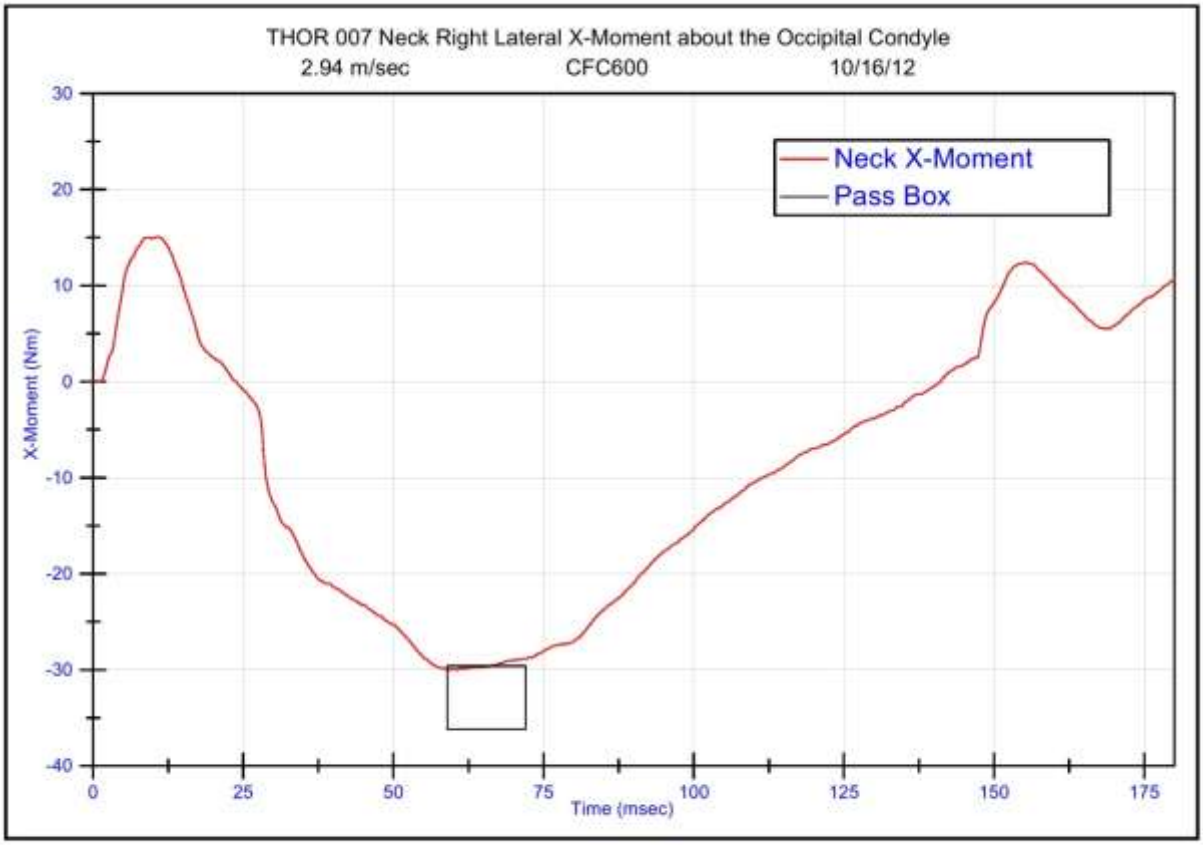

THOR 007 Neck Extenstion Pendulum Acceleration
3.69 m/Sec
CFC60
10/16/12
Pendulum Acceleration
Peak Corridor
Duration Limit
Acceleration (G)
Time (msec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50

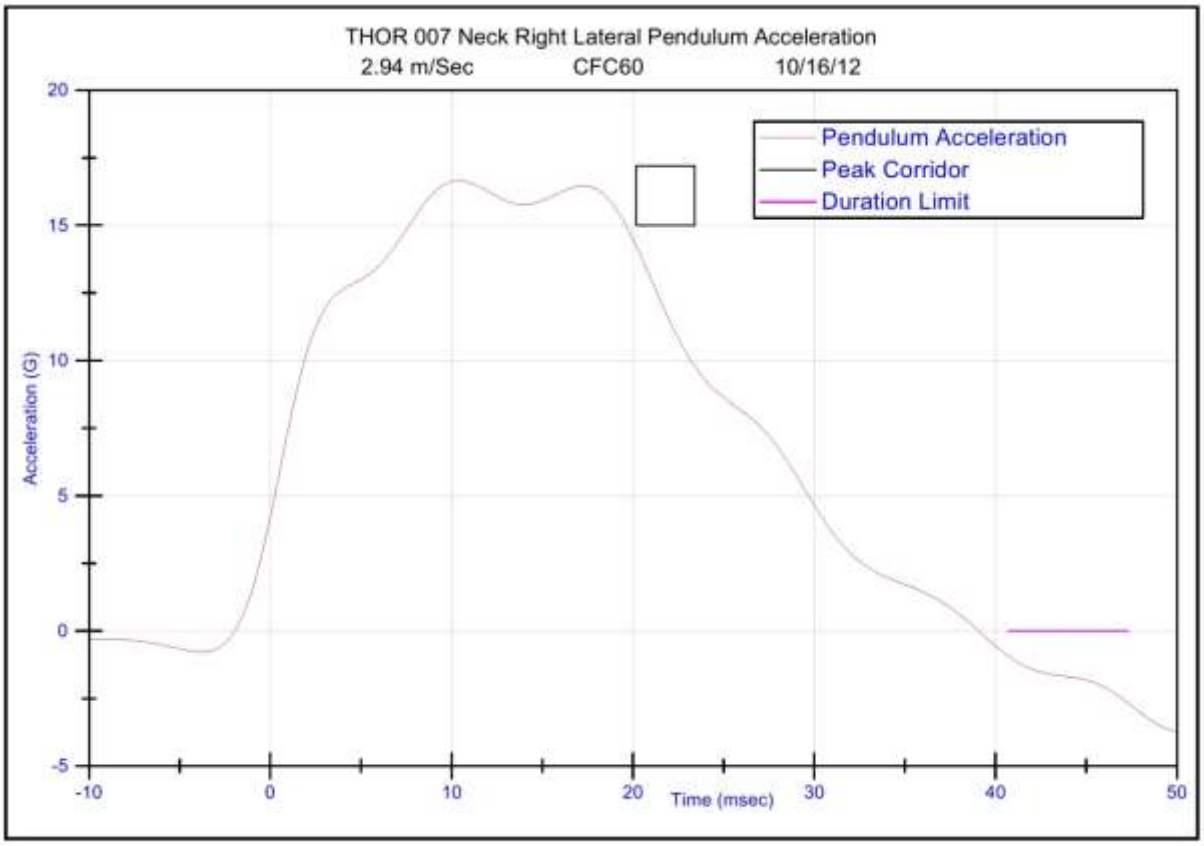

THOR 007 Neck Flexion Pendulum Acceleration
3.84 m/Sec CFC60 10/16/12
Pendulum Acceleration
Peak Corridor
Duration Limit
Acceleration (G)
Time (msec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50

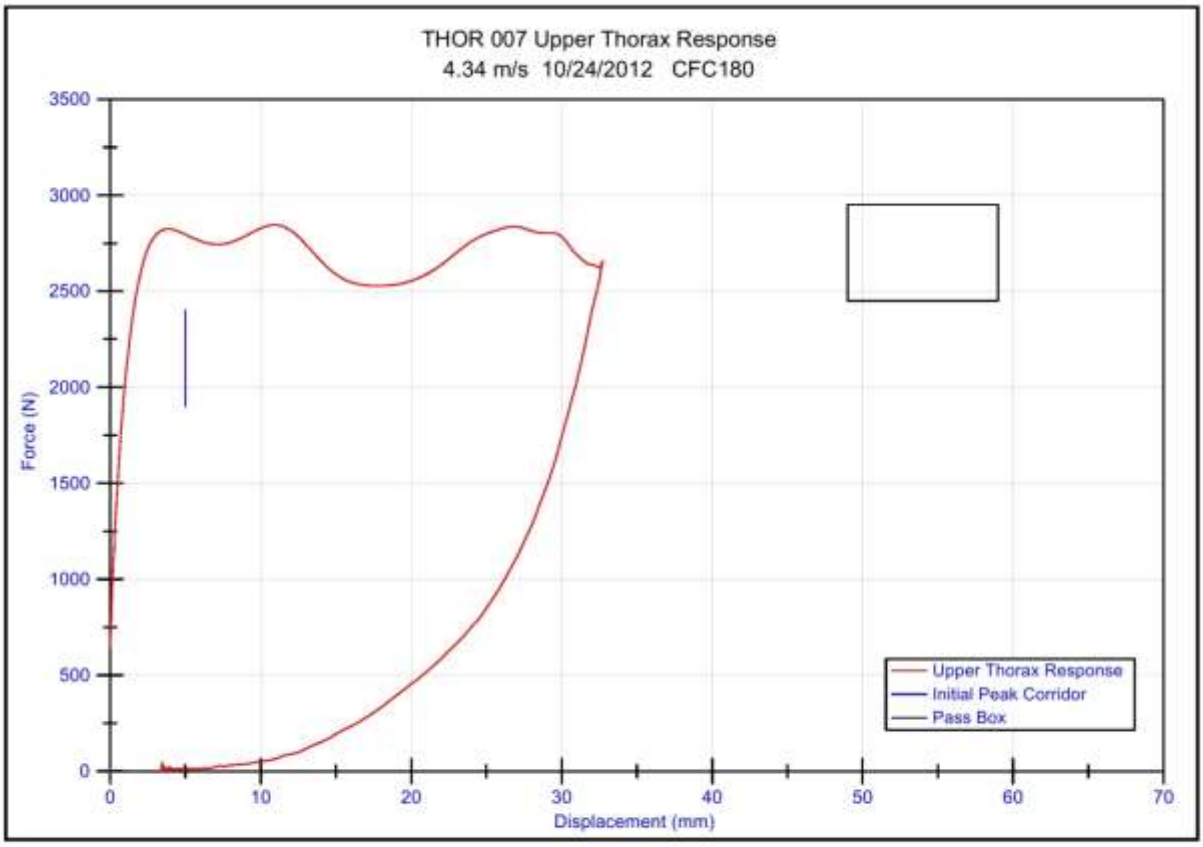

THOR 007 Quasi-Static Occipital Condyle Response
CFC60 10/11/12
Occipital Condyle Response
Pass Corridors
Moment (Nm)
Angular Displacement (Deg)
50
25
0
-25
-50
-40
-30
-20
-10
0
10
20
30

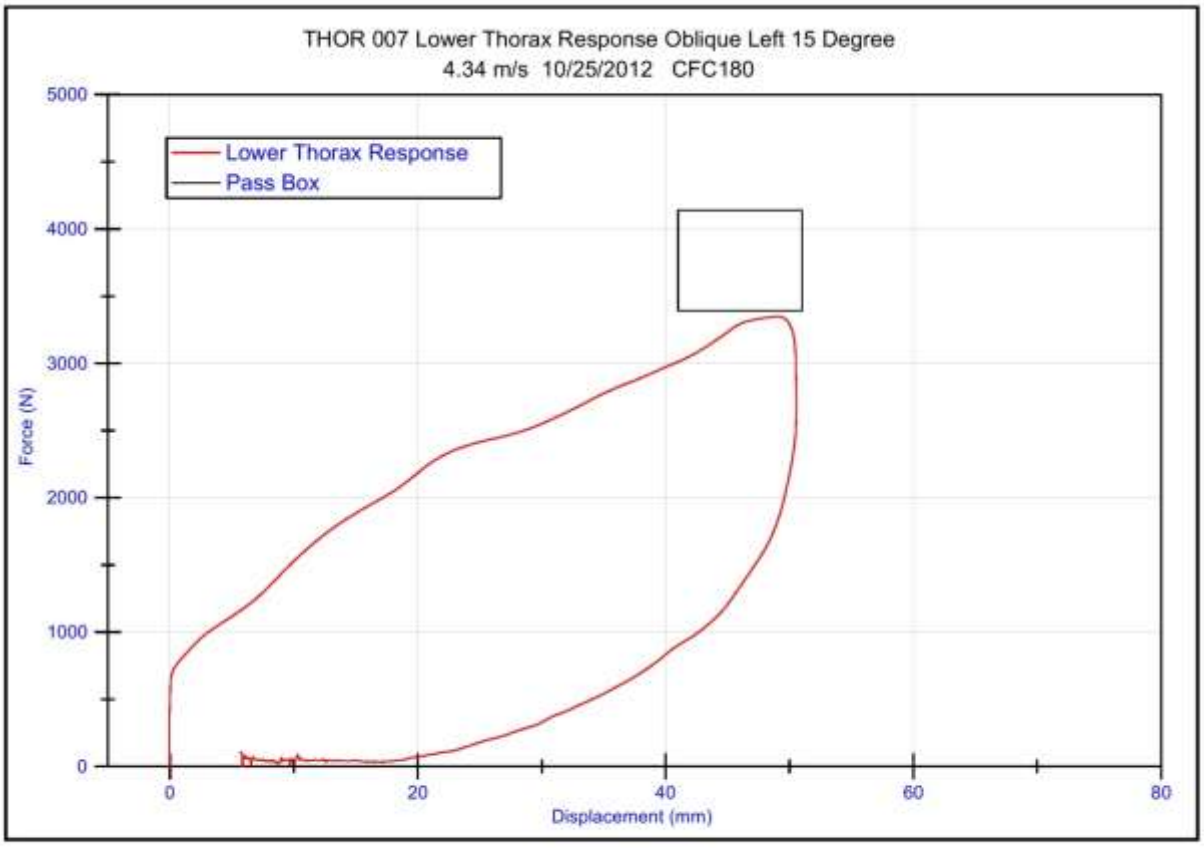

THOR 007 Neck Left Lateral X-Moment about the Occipital Condyle
2.96 m/sec
CFC600
10/16/12
Neck X-Moment
Pass Box
X-Moment (Nm)
Time (mSec)
40
30
20
10
0
-10
-20
-30
0
25
50
75
100
125
150
175

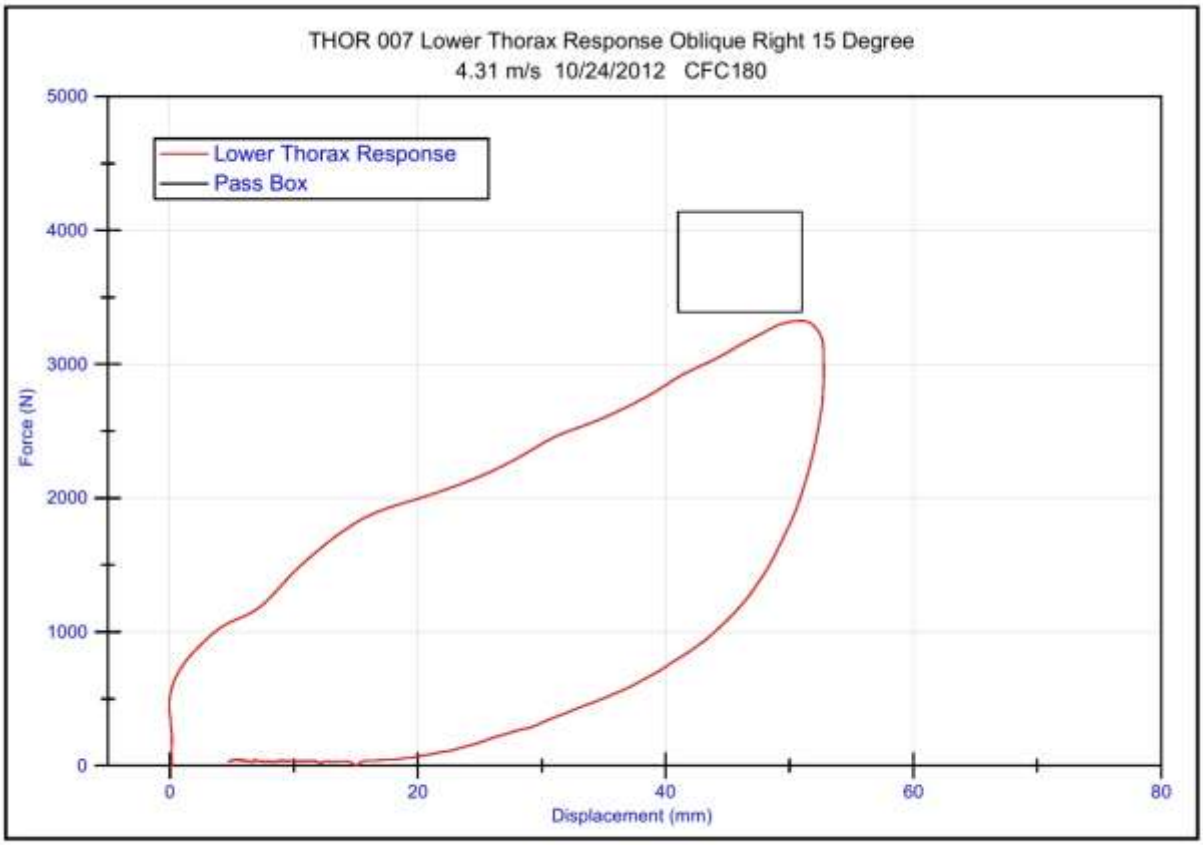

THOR 007 Neck Left Lateral Pendulum Acceleration
2.96 m/Sec
CFC60
10/16/12
Pendulum Acceleration
Peak Corridor
Duration Limit
Acceleration (G)
Time (msec)
20
15
10
5
0
-5
-10
0
10
20
30
40
50

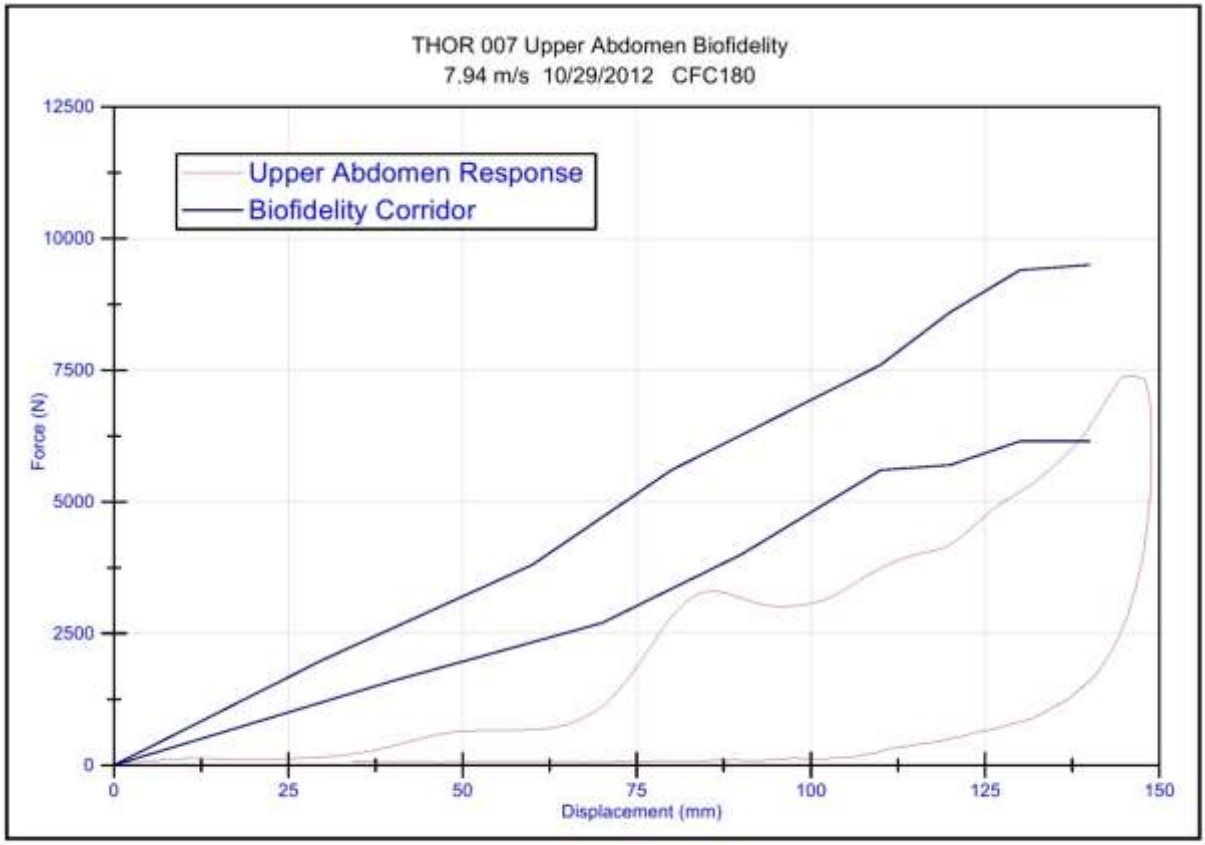

THOR 007 Neck Right Lateral X-Moment about the Occipital Condyle
2.94 m/sec
CFC600
10/16/12
Neck X-Moment
Pass Box
X-Moment (Nm)
Time (msec)
30
20
10
0
-10
-20
-30
-40
0
25
50
75
100
125
150
175

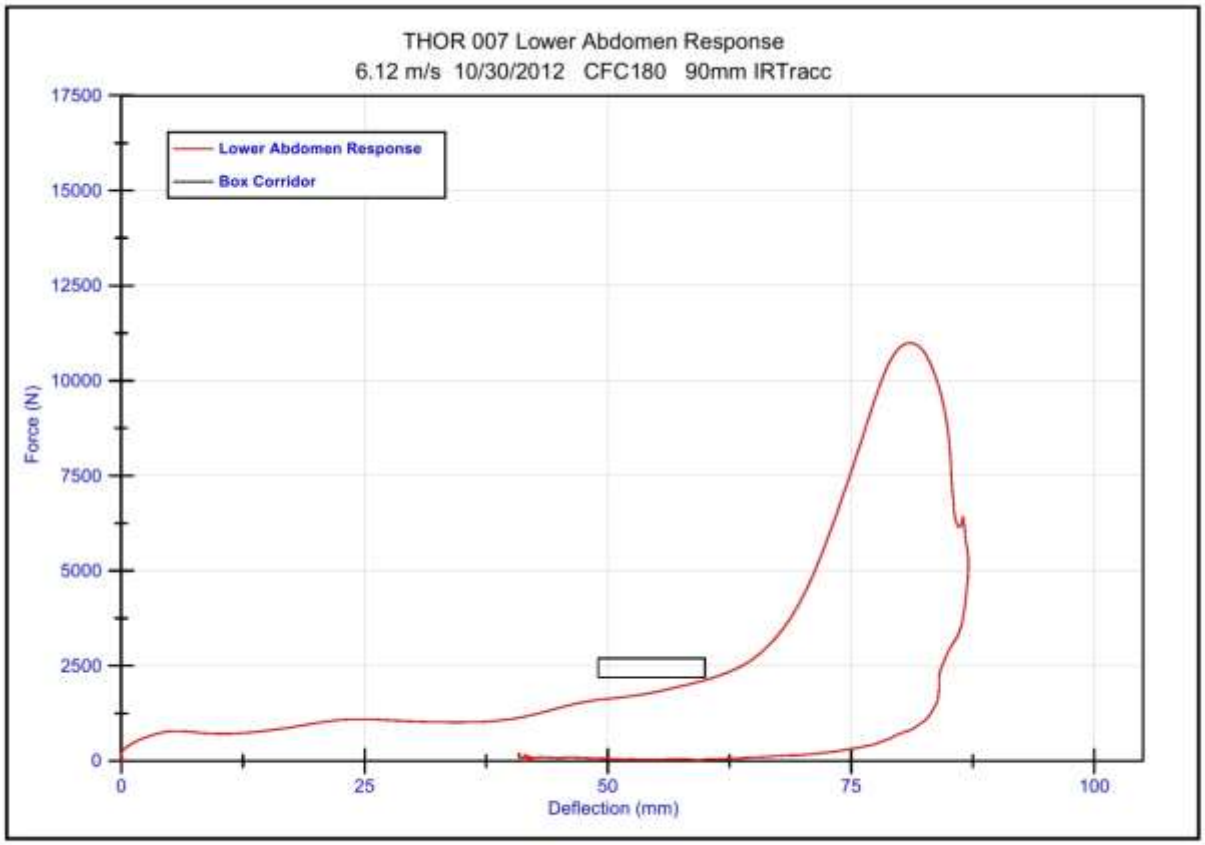

THOR 007 Neck Right Lateral Pendulum Acceleration
2.94 m/Sec
CFC60
10/16/12
Pendulum Acceleration
Peak Corridor
Duration Limit
Acceleration (G)
Time (msec)
20
15
10
5
0
-5
-10
0
10
20
30
40
50

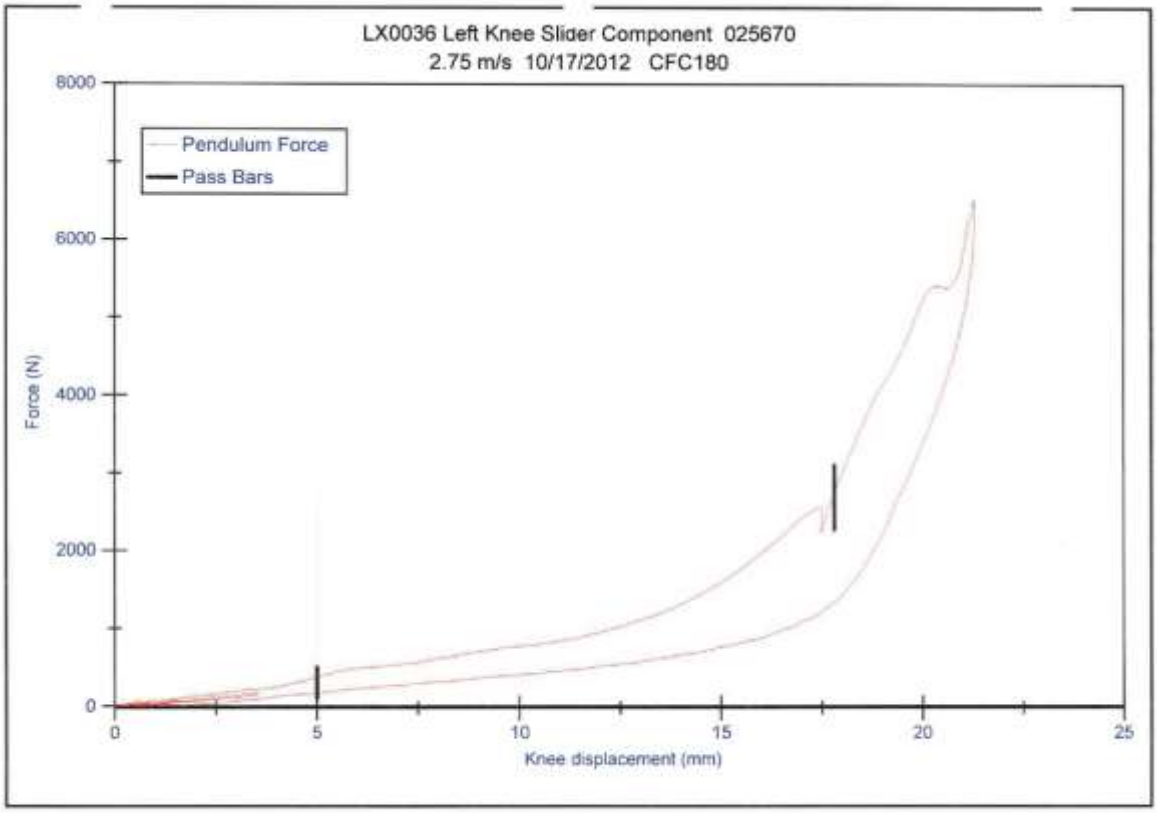

THOR 007 Upper Thorax Response
4.34 m/s 10/24/2012 CFC180
Force (N)
Displacement (mm)
Upper Thorax Response
Initial Peak Corridor
Pass Box

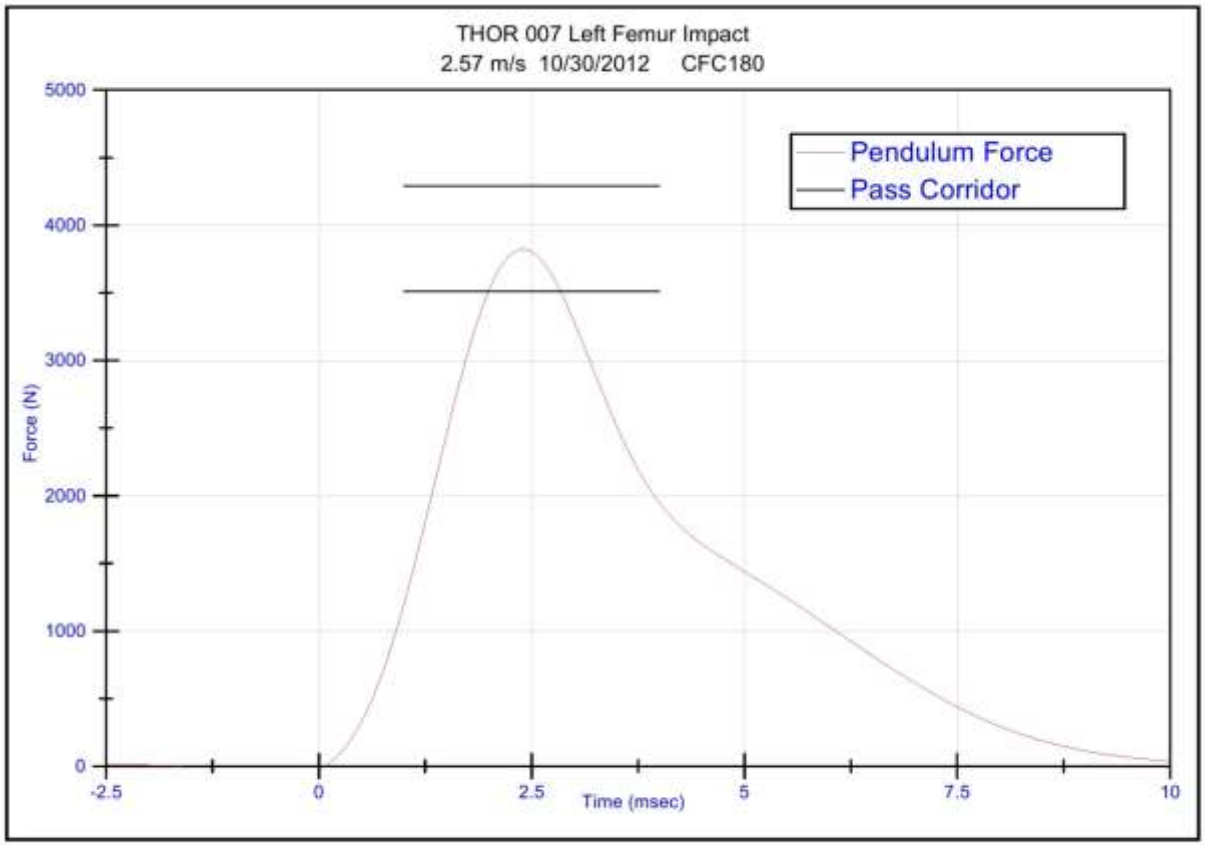

THOR 007 Lower Thorax Response Oblique Left 15 Degree
4.34 m/s 10/25/2012 CFC180
Force (N)
Displacement (mm)
Lower Thorax Response
Pass Box

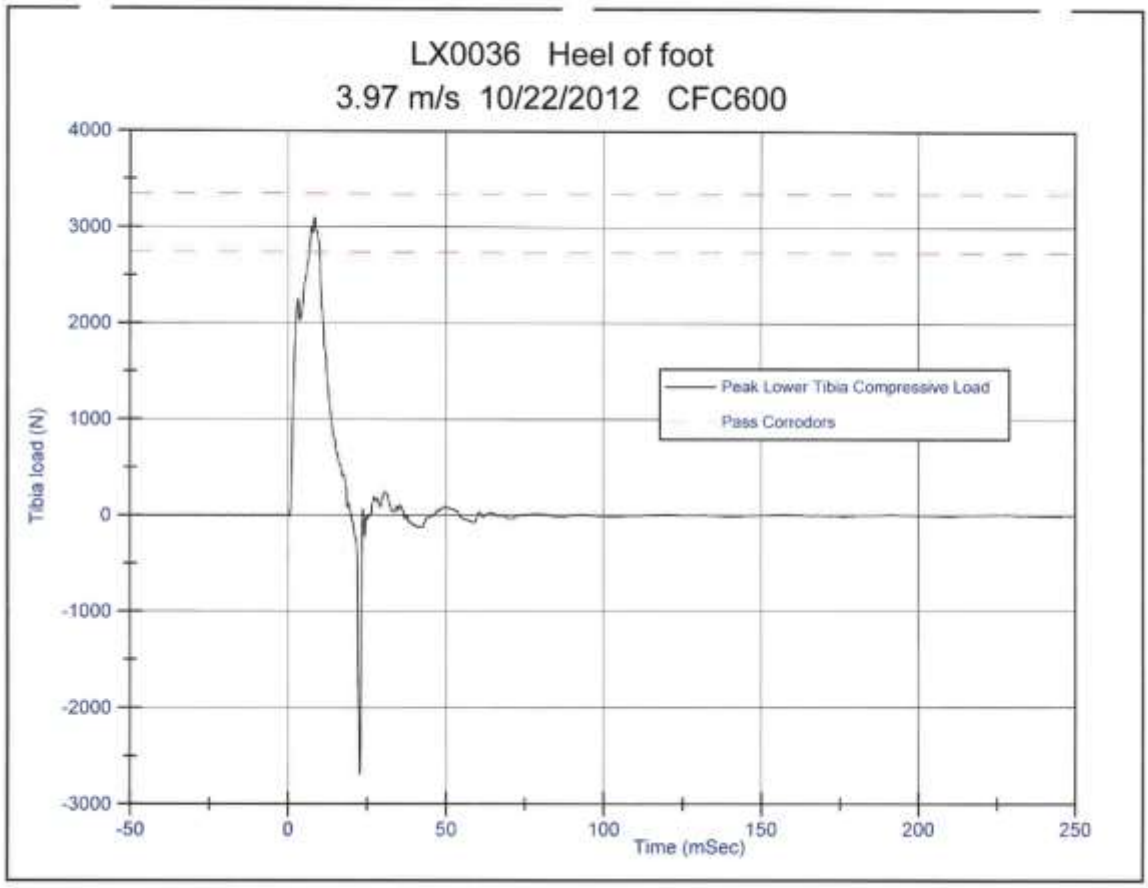

THOR 007 Lower Thorax Response Oblique Right 15 Degree
4.31 m/s 10/24/2012 CFC180
Lower Thorax Response
Pass Box
Force (N)
Displacement (mm)
5000
4000
3000
2000
1000
0
0
20
40
60
80

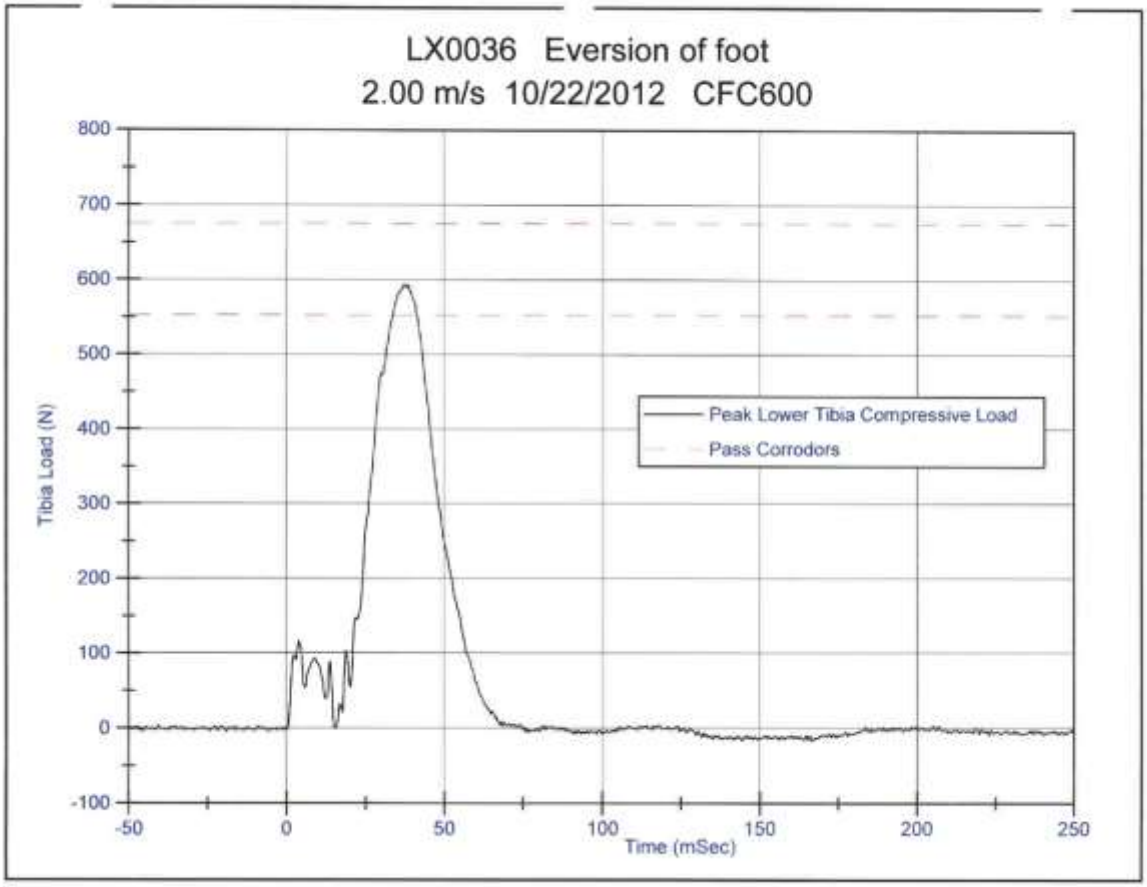

THOR 007 Upper Abdomen Biofidelity
7.94 m/s 10/29/2012 CFC180
Upper Abdomen Response
Biofidelity Corridor
Force (N)
Displacement (mm)
12500
10000
7500
5000
2500
0
0
25
50
75
100
125
150

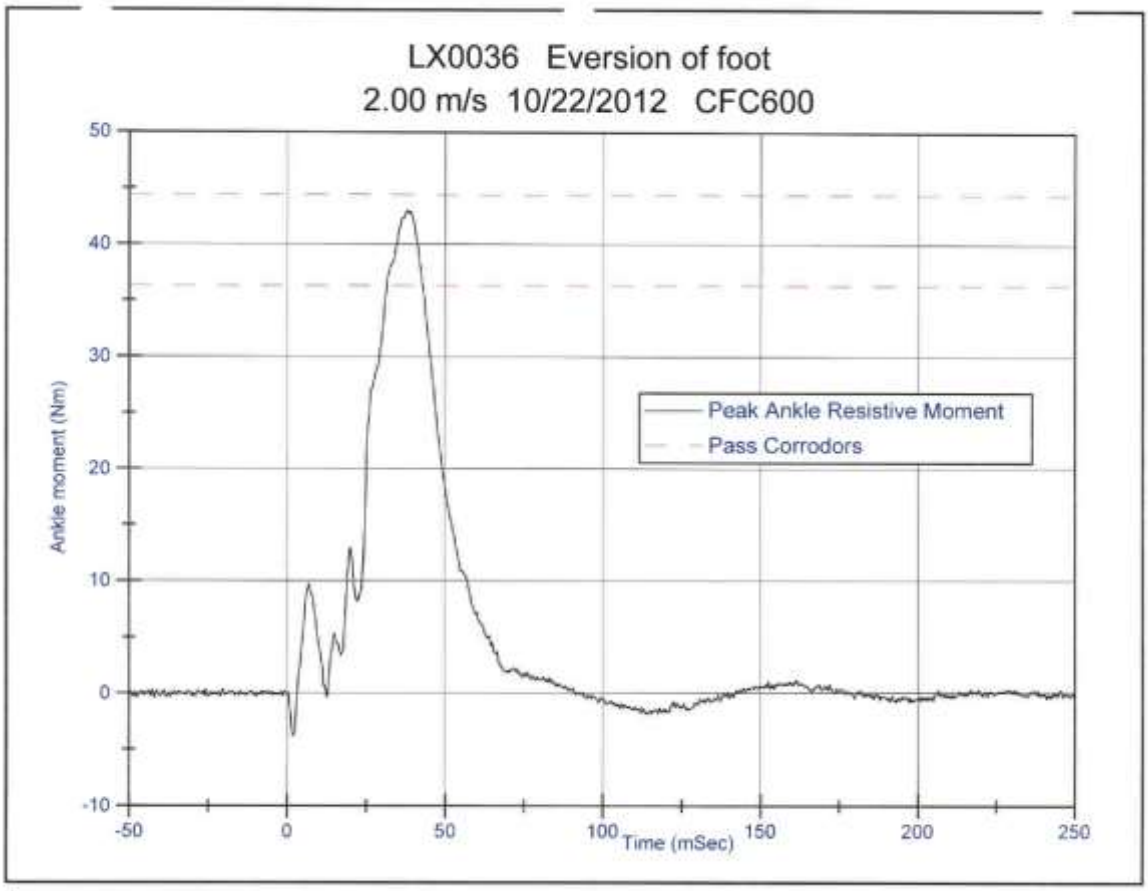

THOR 007 Lower Abdomen Response
6.12 m/s 10/30/2012 CFC180 90mm IRTracc
Lower Abdomen Response
Box Corridor
Force (N)
17500
15000
12500
10000
7500
5000
2500
0
0
25
50
75
100
Deflection (mm)

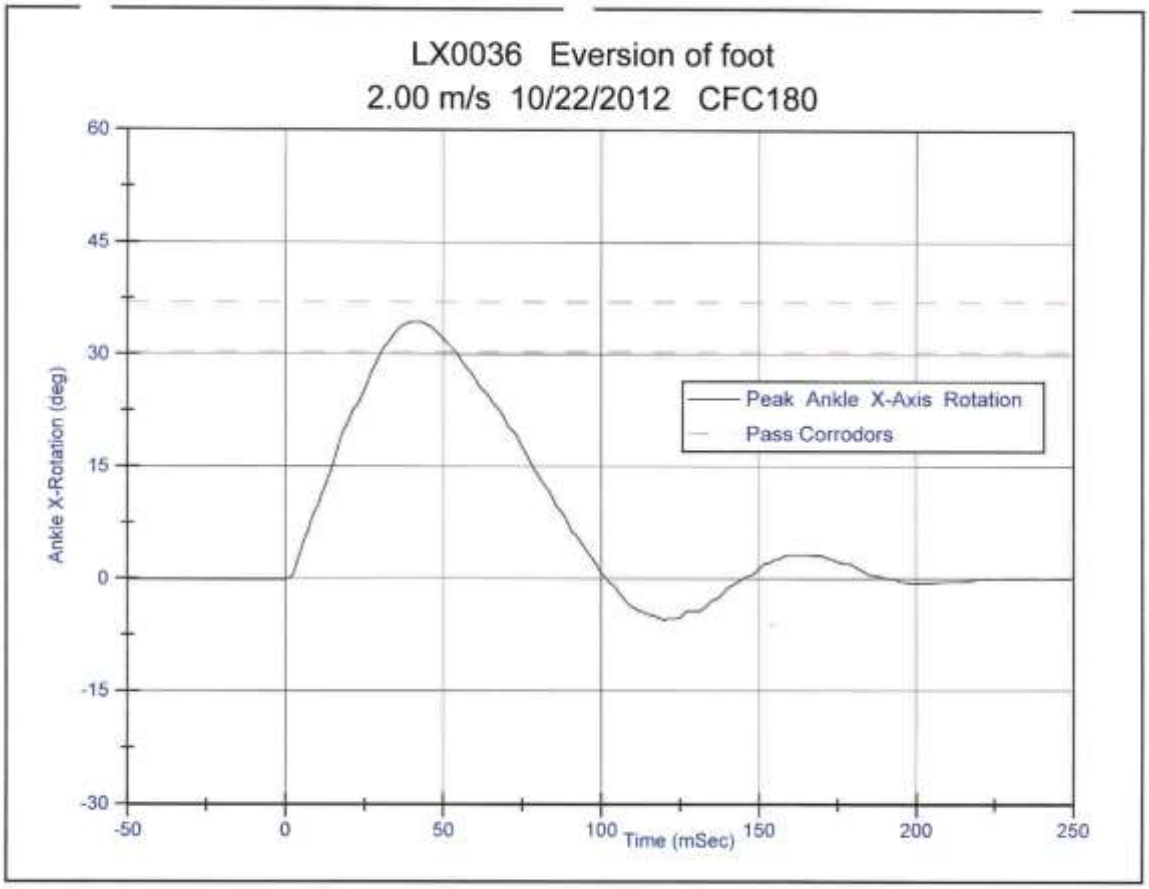

LX0036 Left Knee Slider Component 025670
2.75 m/s 10/17/2012 CFC180
Pendulum Force
Pass Bars
Force (N)
Knee displacement (mm)
8000
6000
4000
2000
0
0
5
10
15
20
25

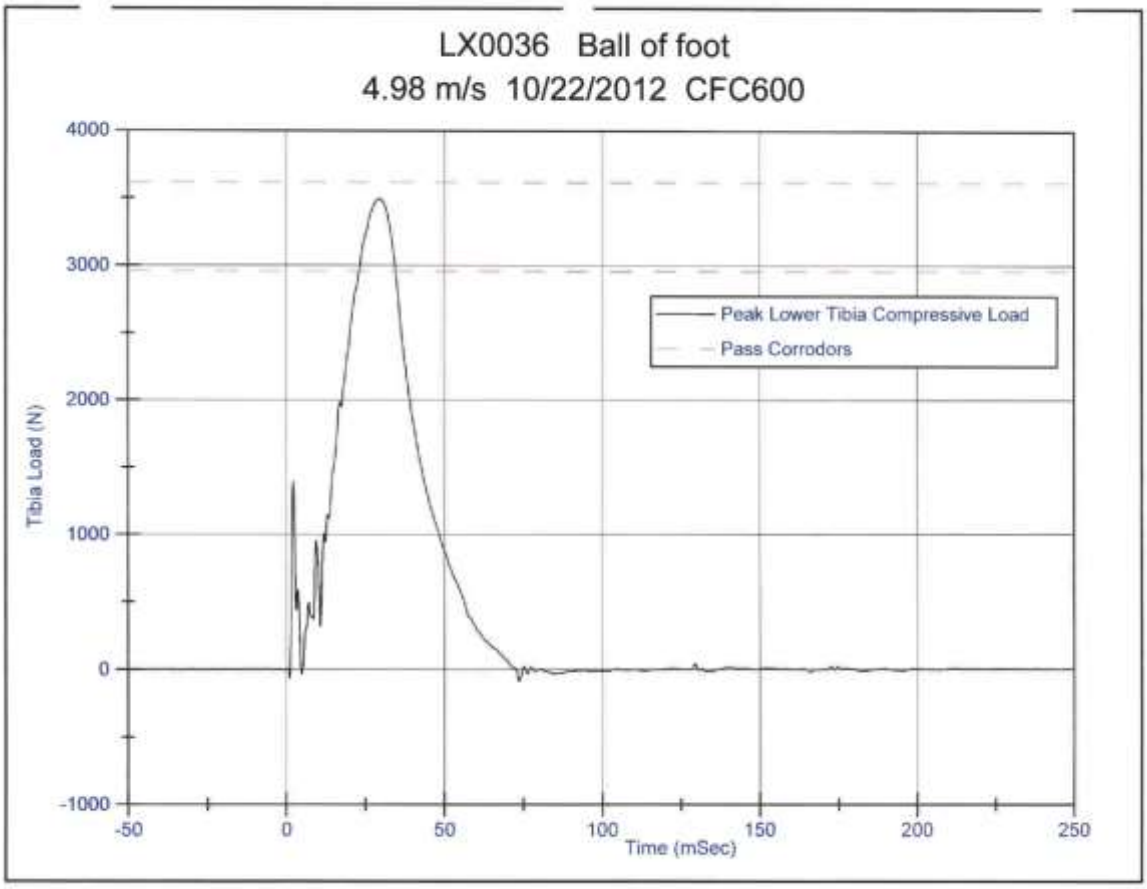

THOR 007 Left Femur Impact
2.57 m/s 10/30/2012 CFC180
Pendulum Force
Pass Corridor
Force (N)
Time (msec)
5000
4000
3000
2000
1000
0
-2.5
0
2.5
5
7.5
10

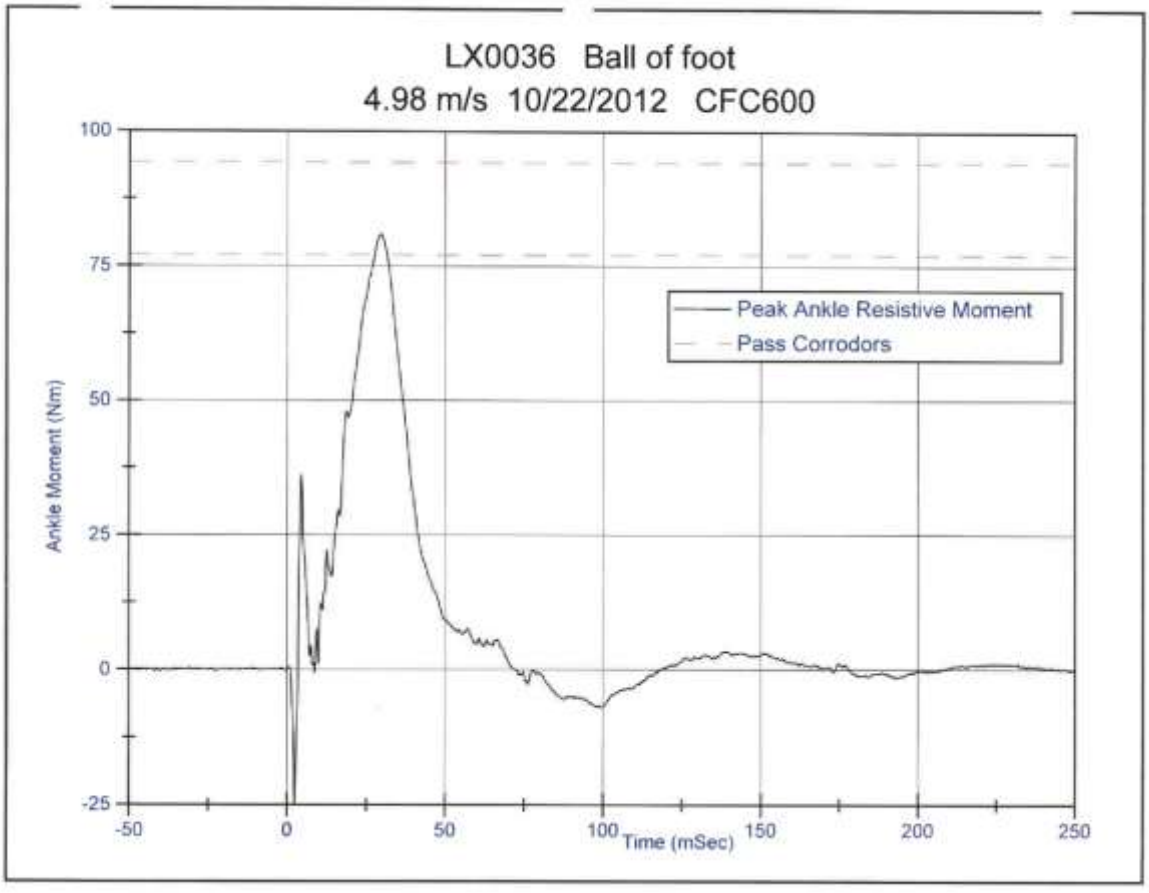

LX0036 Heel of foot
3.97 m/s 10/22/2012 CFC600
Tibia load (N)
Time (mSec)
Peak Lower Tibia Compressive Load
Pass Corrodors

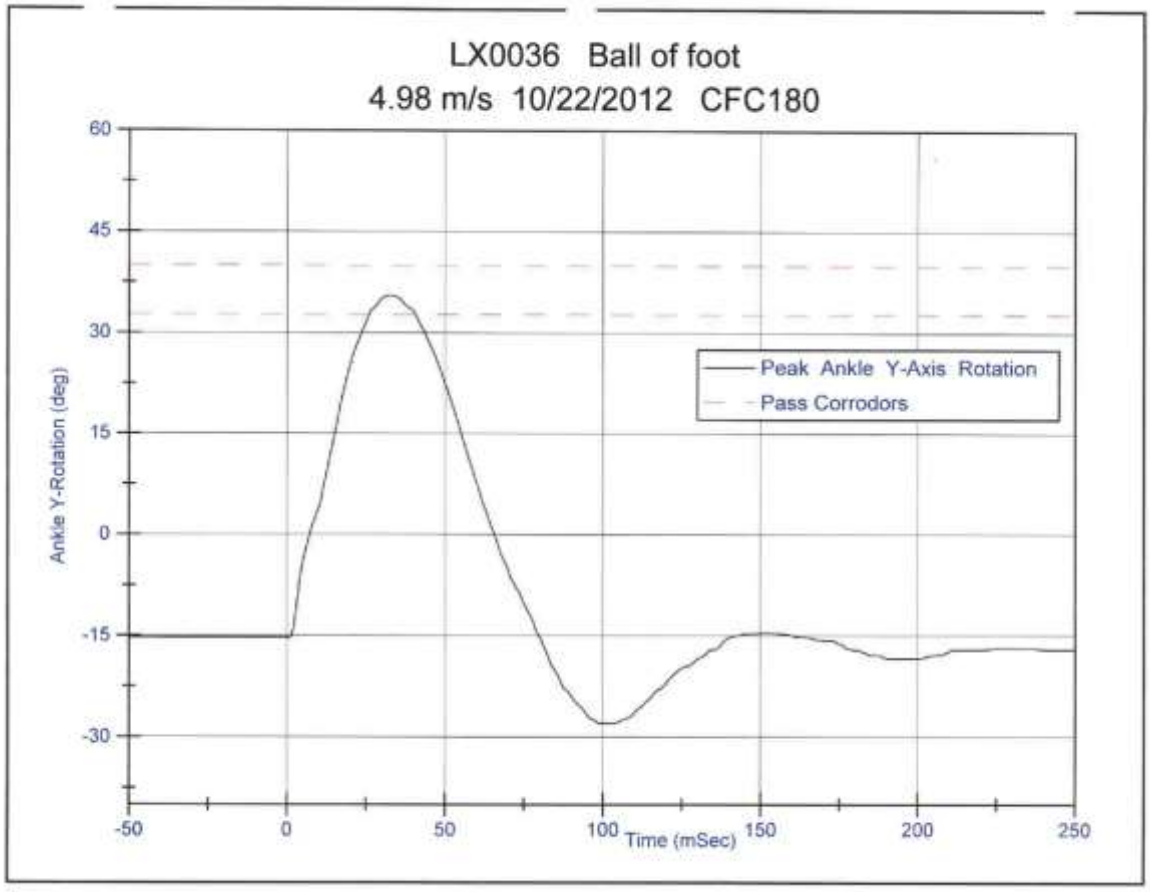

LX0036 Eversion of foot
2.00 m/s 10/22/2012 CFC600
Tibia Load (N)
Time (mSec)
Peak Lower Tibia Compressive Load
Pass Corrodors

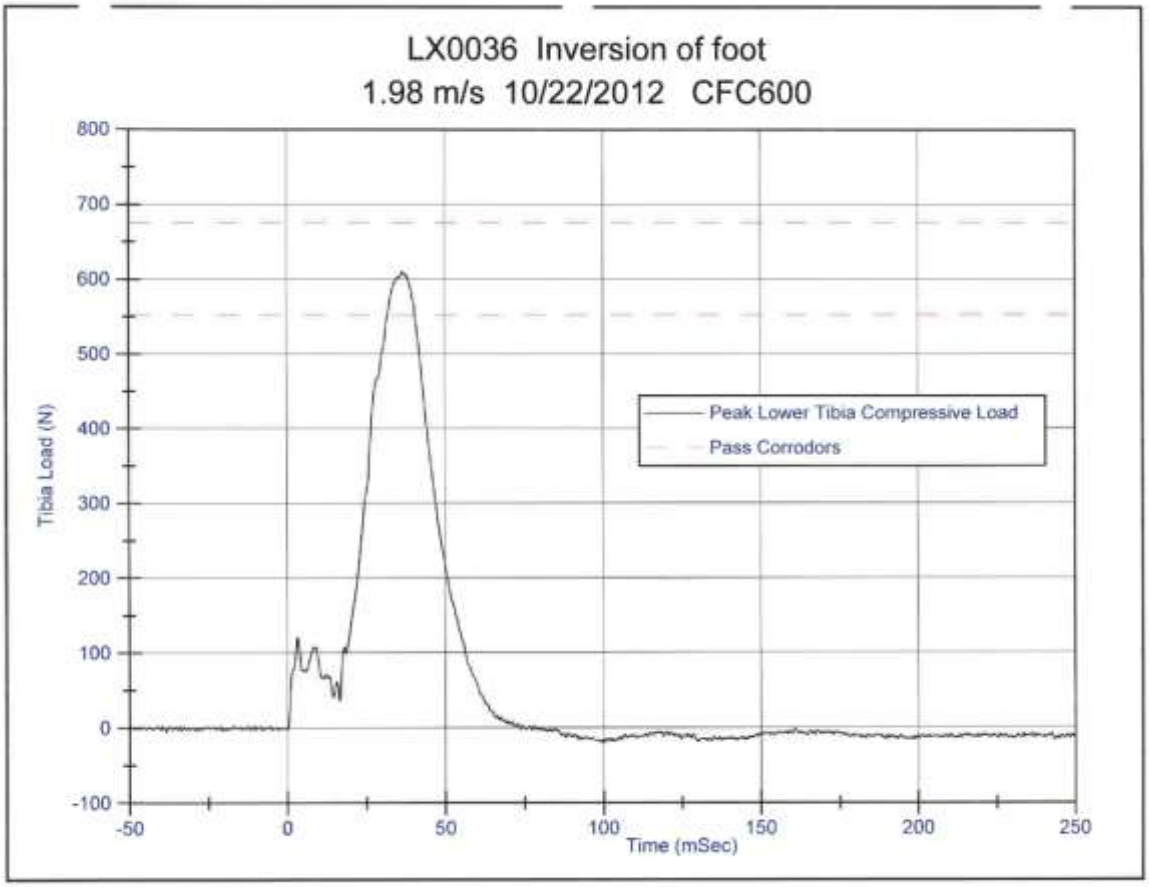

LX0036 Eversion of foot
2.00 m/s 10/22/2012 CFC600
Ankle moment (Nm)
50
40
30
20
10
0
-10
-50
0
50
100
150
200
250
Time (mSec)
Peak Ankle Resistive Moment
Pass Corrodors

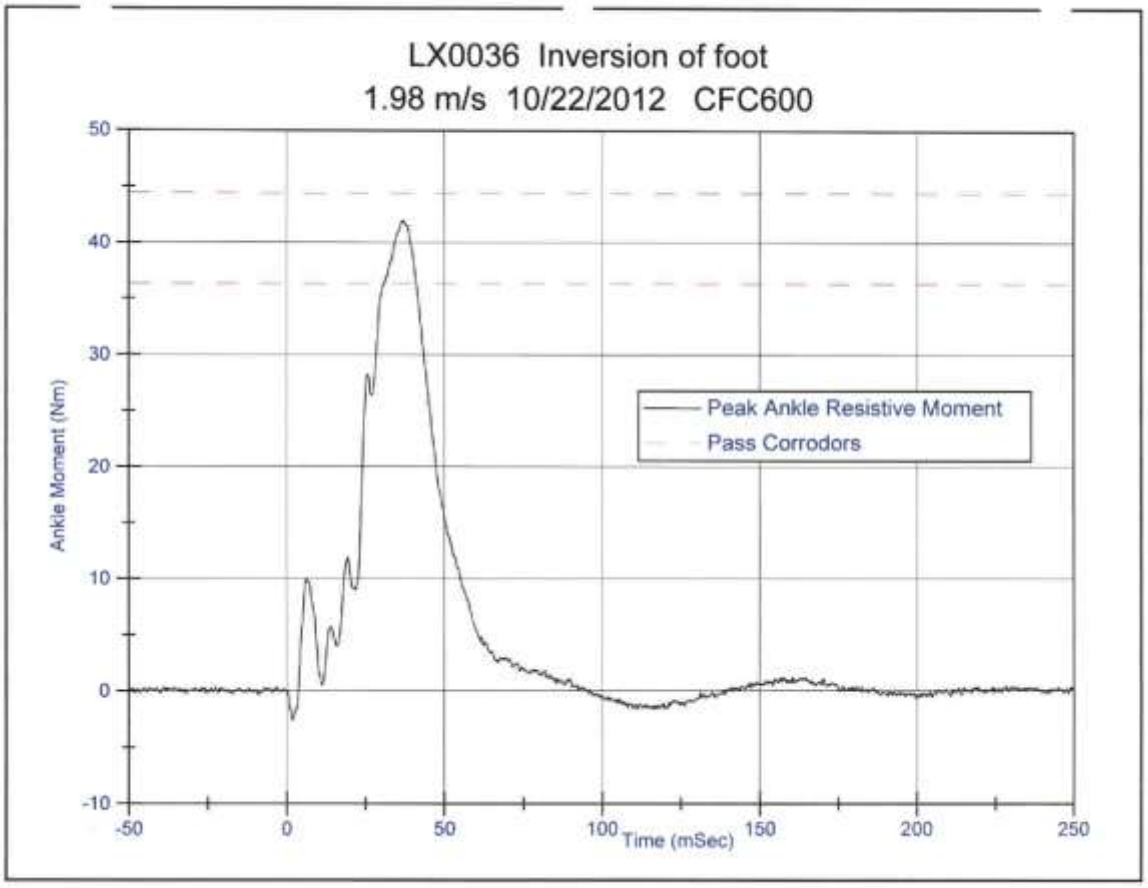

LX0036 Eversion of foot
2.00 m/s 10/22/2012 CFC180
Ankle X-Rotation (deg)
60
45
30
15
0
-15
-30
-50
0
50
100
150
200
250
Time (mSec)
Peak Ankle X-Axis Rotation
Pass Corrodors

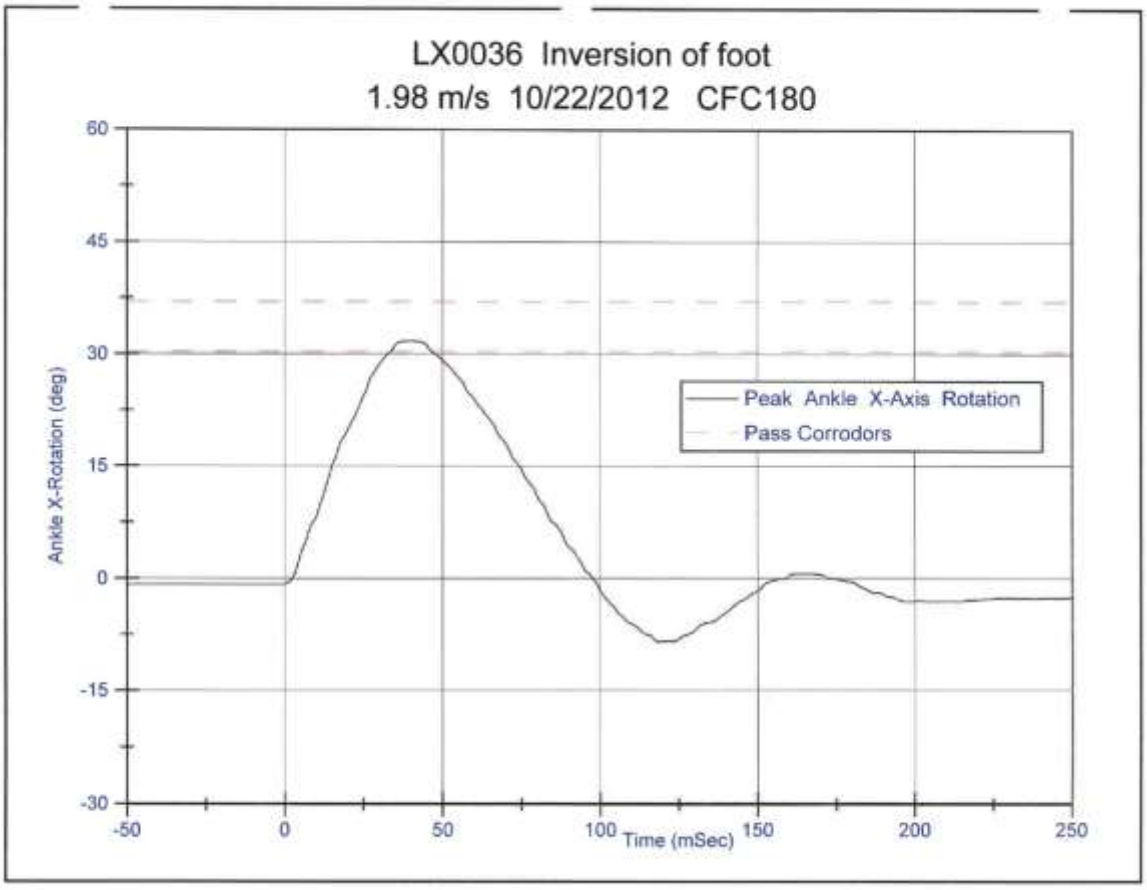

LX0036 Ball of foot
4.98 m/s 10/22/2012 CFC600
Peak Lower Tibia Compressive Load
Pass Corrodors
Tibia Load (N)
Time (mSec)
4000
3000
2000
1000
0
-1000
-50
0
50
100
150
200
250

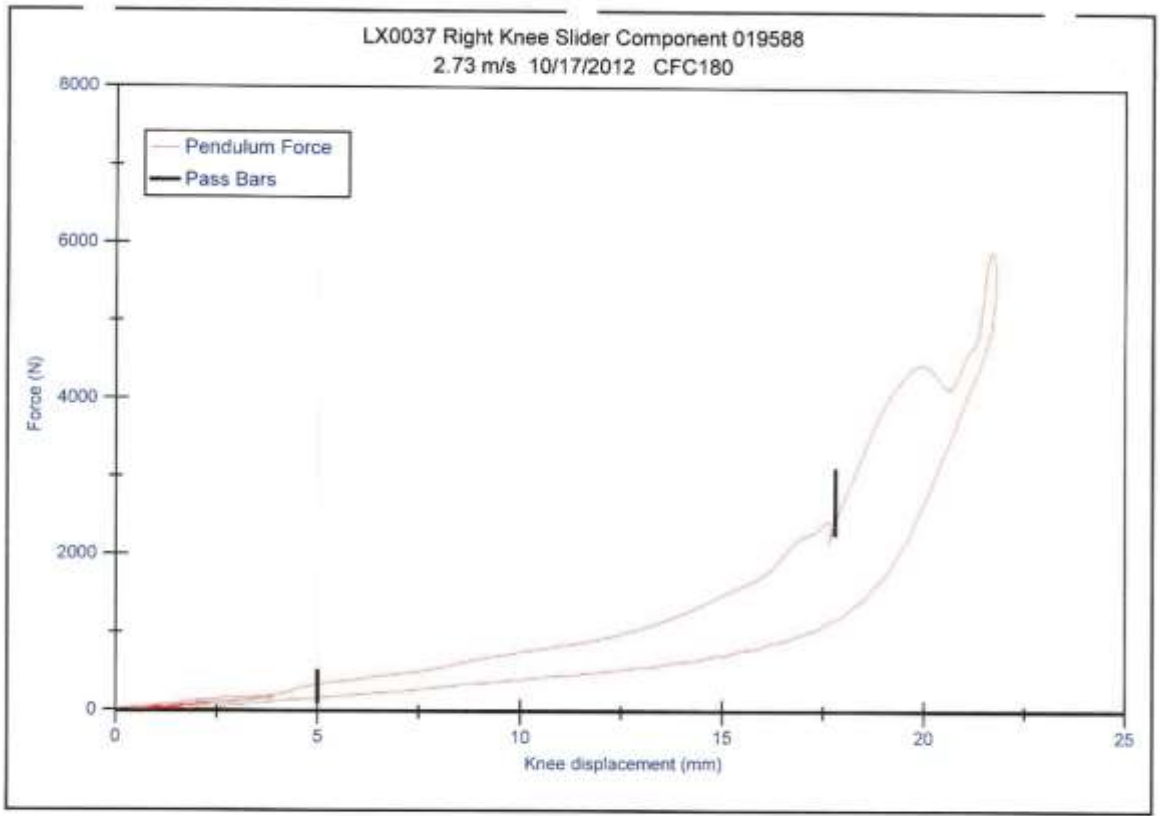

LX0036 Ball of foot
4.98 m/s 10/22/2012 CFC600
Peak Ankle Resistive Moment
Pass Corrodors
Ankle Moment (Nm)
Time (mSec)
100
75
50
25
0
-25
-50
0
50
100
150
200
250

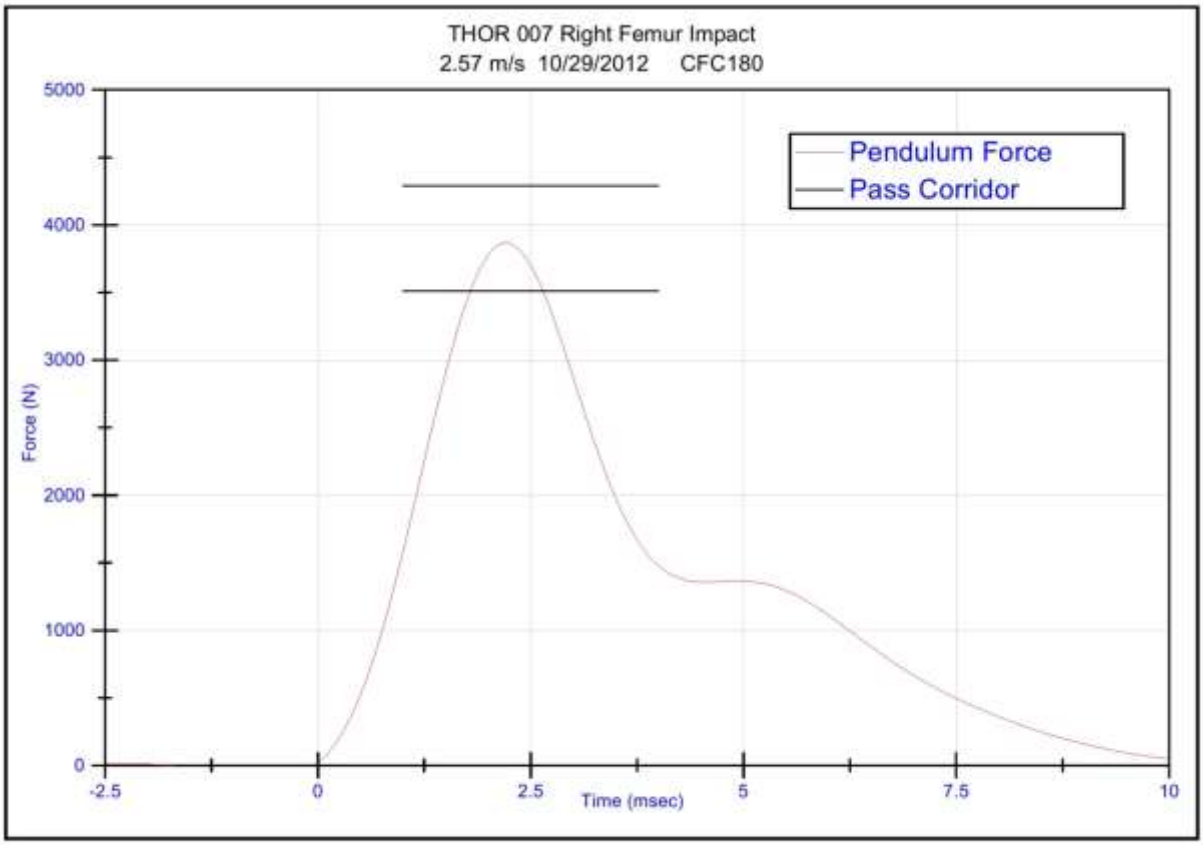

LX0036 Ball of foot
4.98 m/s 10/22/2012 CFC180
Ankle Y-Rotation (deg)
60
45
30
15
0
-15
-30
-50
0
50
100
150
200
250
Time (mSec)
Peak Ankle Y-Axis Rotation
Pass Corrodors

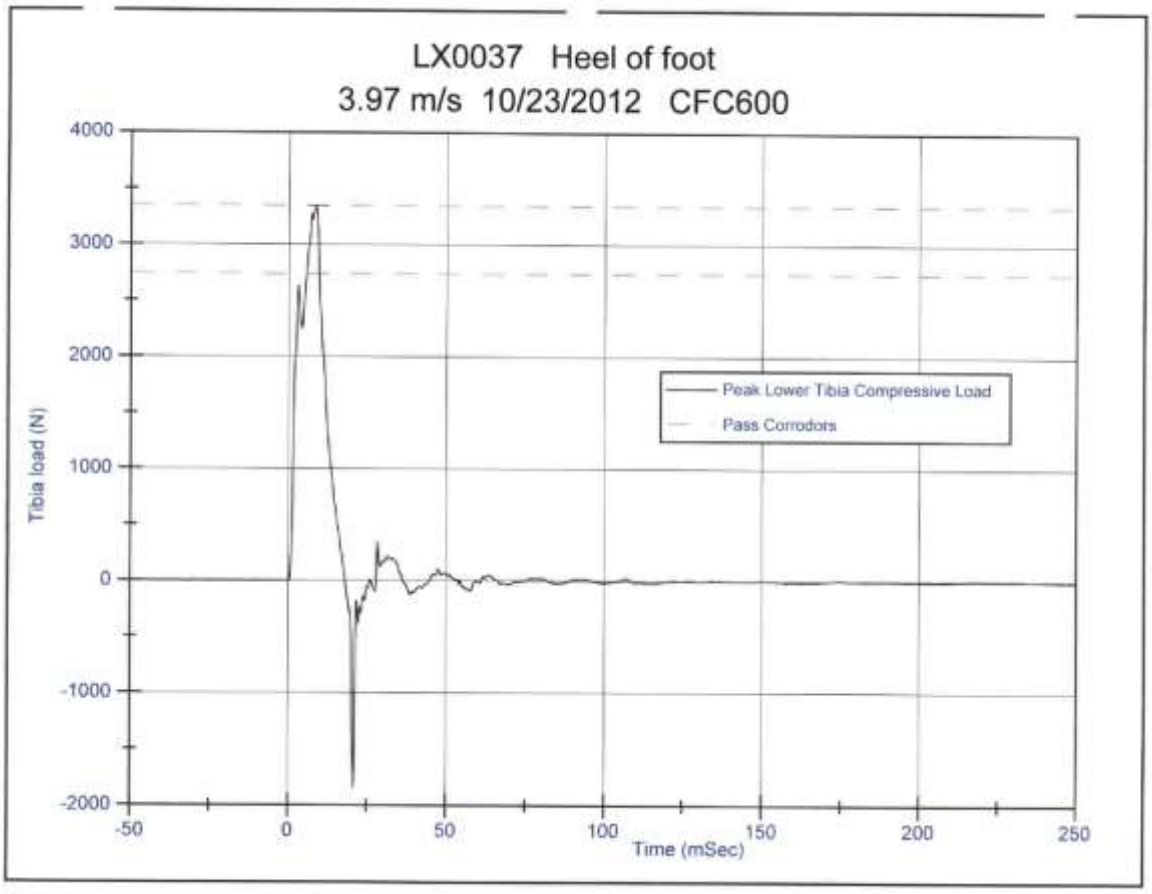

LX0036 Inversion of foot
1.98 m/s 10/22/2012 CFC600
Tibia Load (N)
800
700
600
500
400
300
200
100
0
-100
-50
0
50
100
150
200
250
Time (mSec)
Peak Lower Tibia Compressive Load
Pass Corrodors

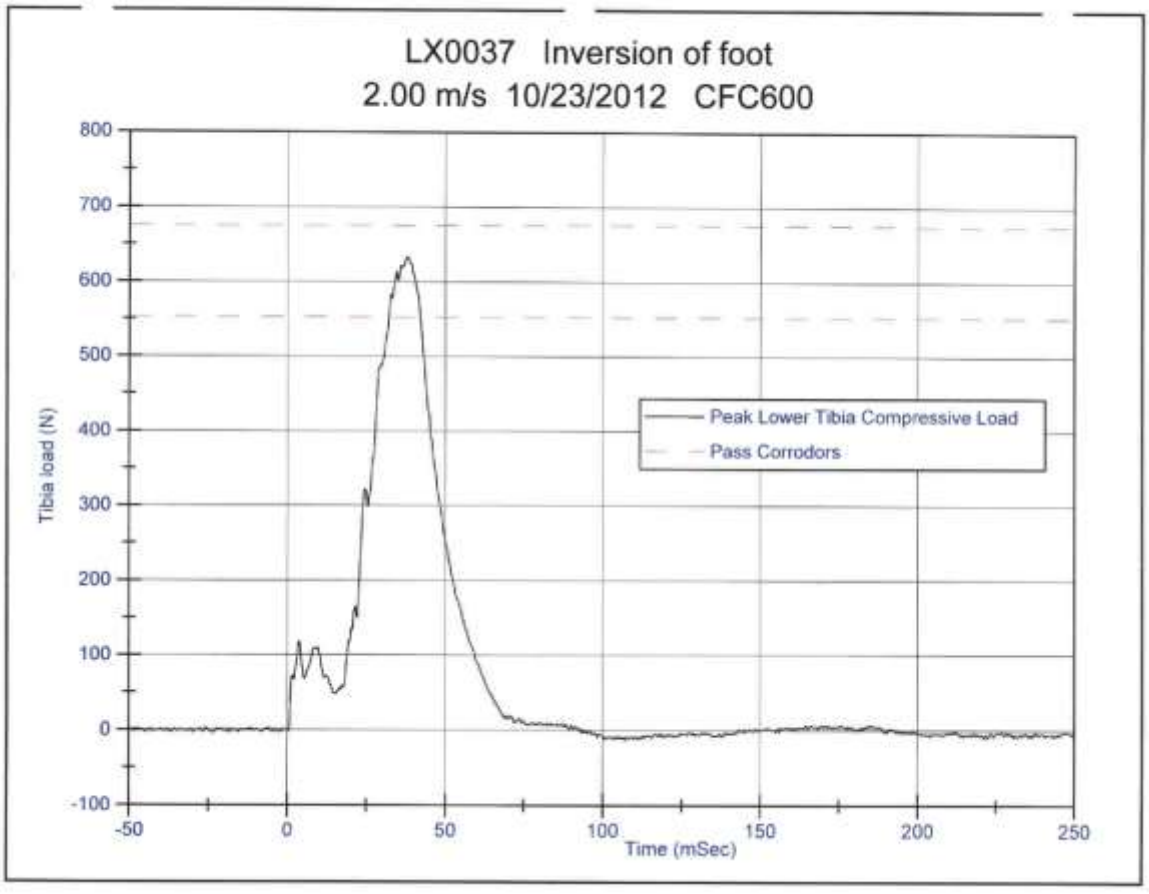

LX0036 Inversion of foot
1.98 m/s 10/22/2012 CFC600
Ankle Moment (Nm)
50
40
30
20
10
0
-10
-50
0
50
100
150
200
250
Time (mSec)
Peak Ankle Resistive Moment
Pass Corrodors

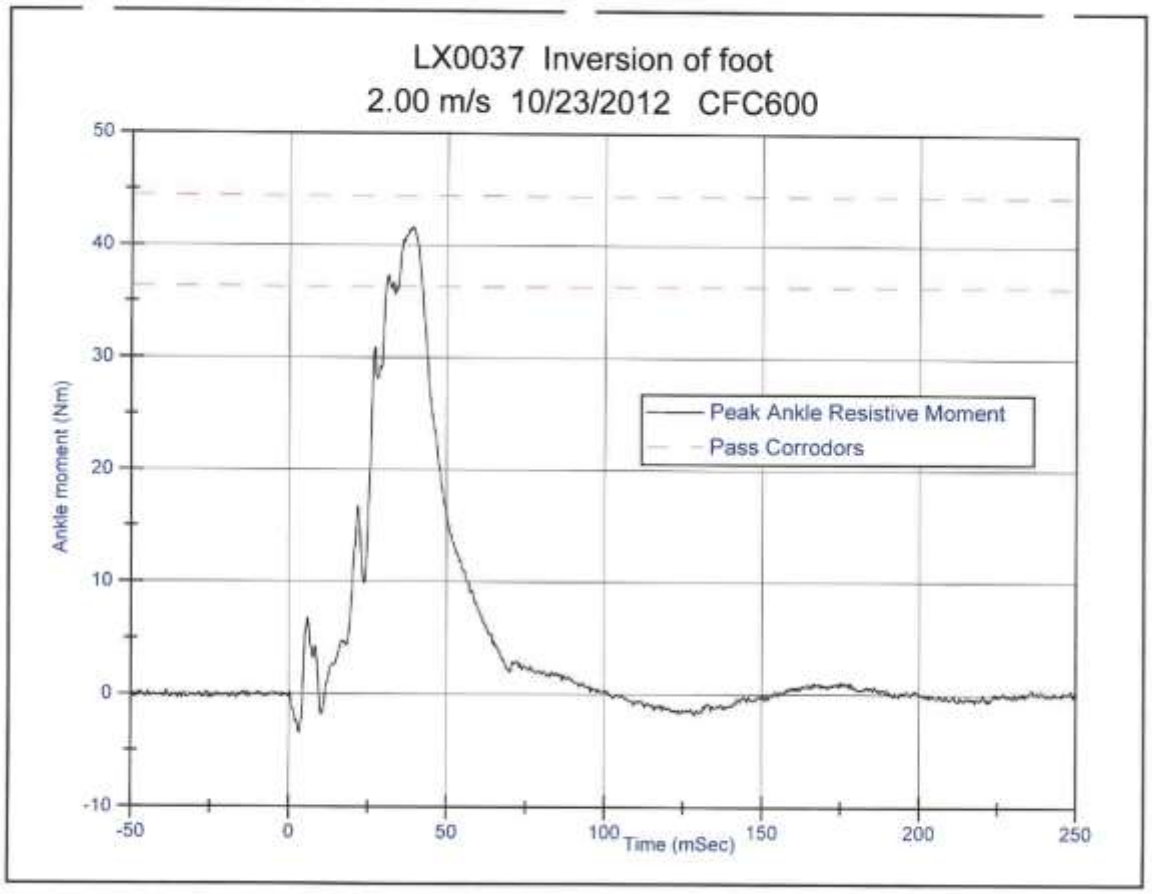

LX0036 Inversion of foot
1.98 m/s 10/22/2012 CFC180
Ankle X-Rotation (deg)
60
45
30
15
0
-15
-30
-50
0
50
100
150
200
250
Time (mSec)
Peak Ankle X-Axis Rotation
Pass Corrodors

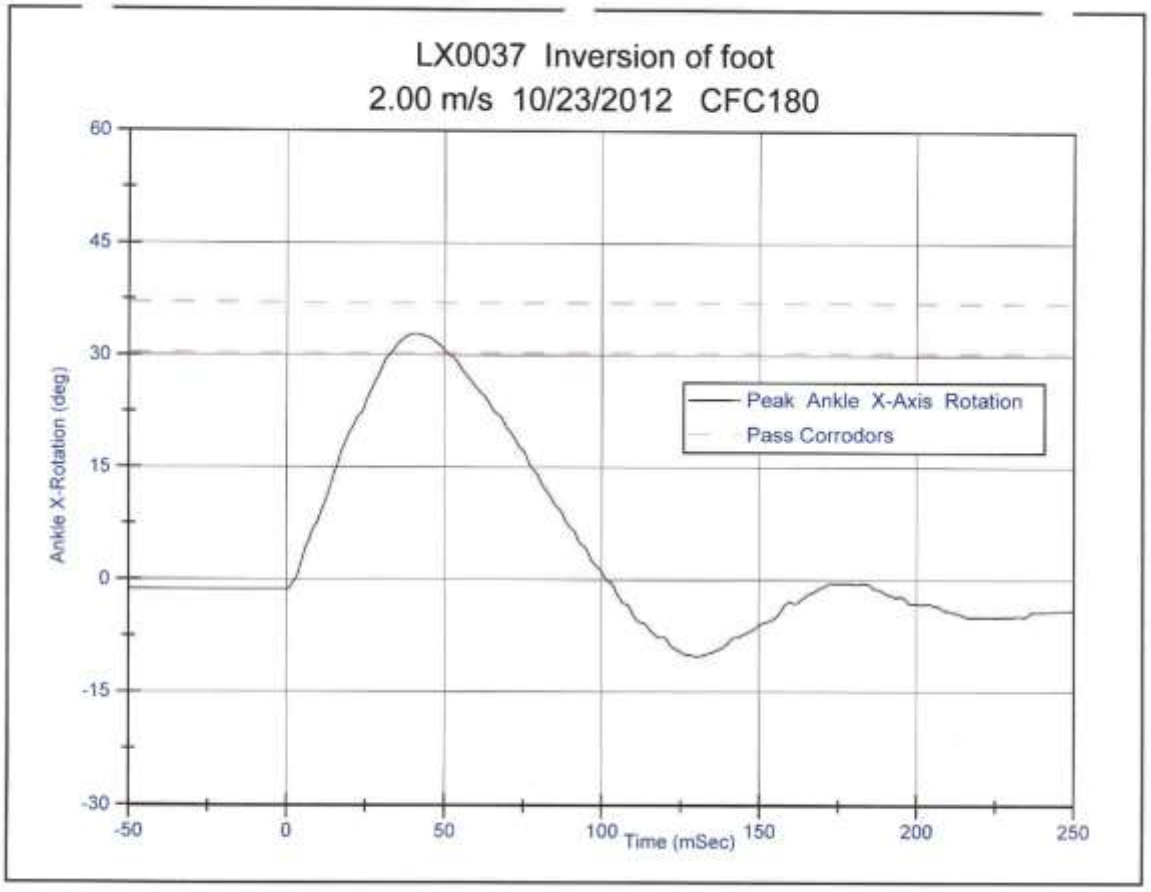

LX0037 Right Knee Slider Component 019588
2.73 m/s 10/17/2012 CFC180
Pendulum Force
Pass Bars
Force (N)
Knee displacement (mm)
8000
6000
4000
2000
0
0
5
10
15
20
25

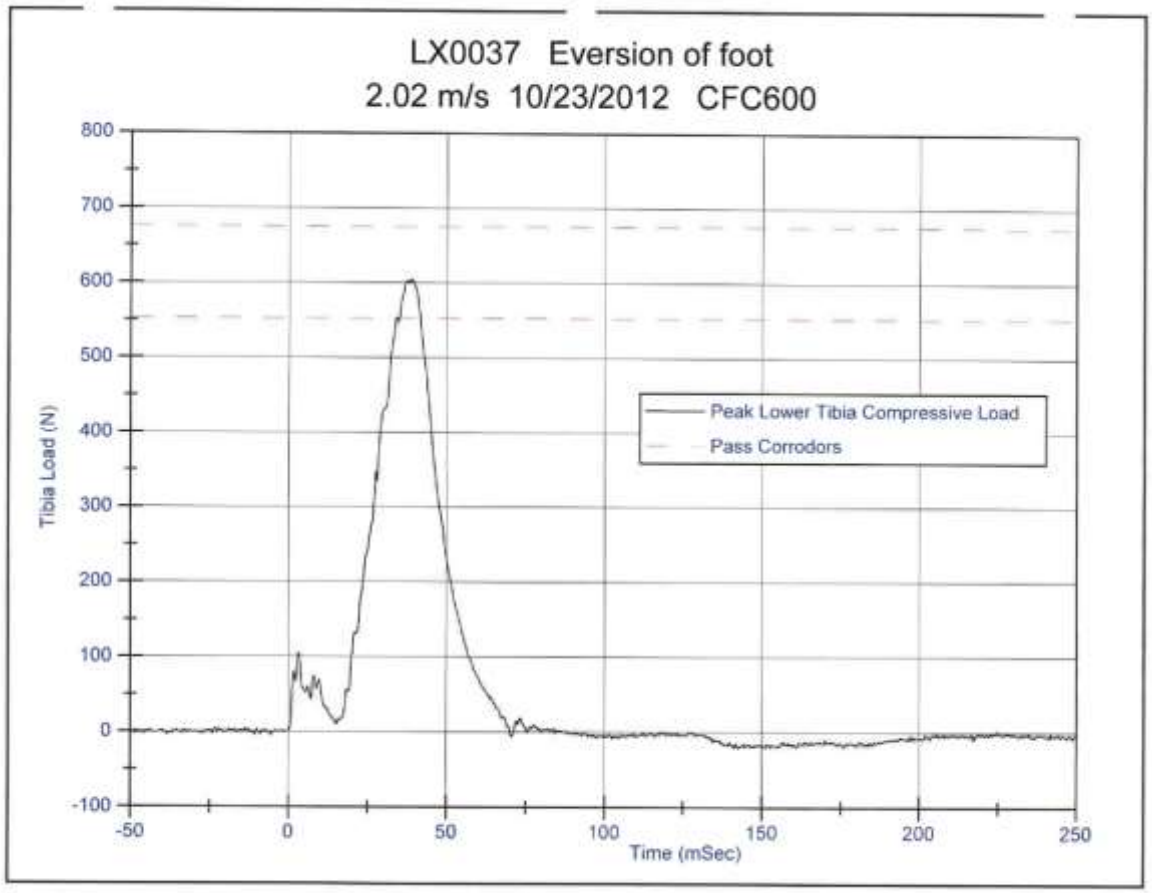

THOR 007 Right Femur Impact
2.57 m/s 10/29/2012 CFC180
Pendulum Force
Pass Corridor
Force (N)
Time (msec)
5000
4000
3000
2000
1000
0
-2.5
0
2.5
5
7.5
10

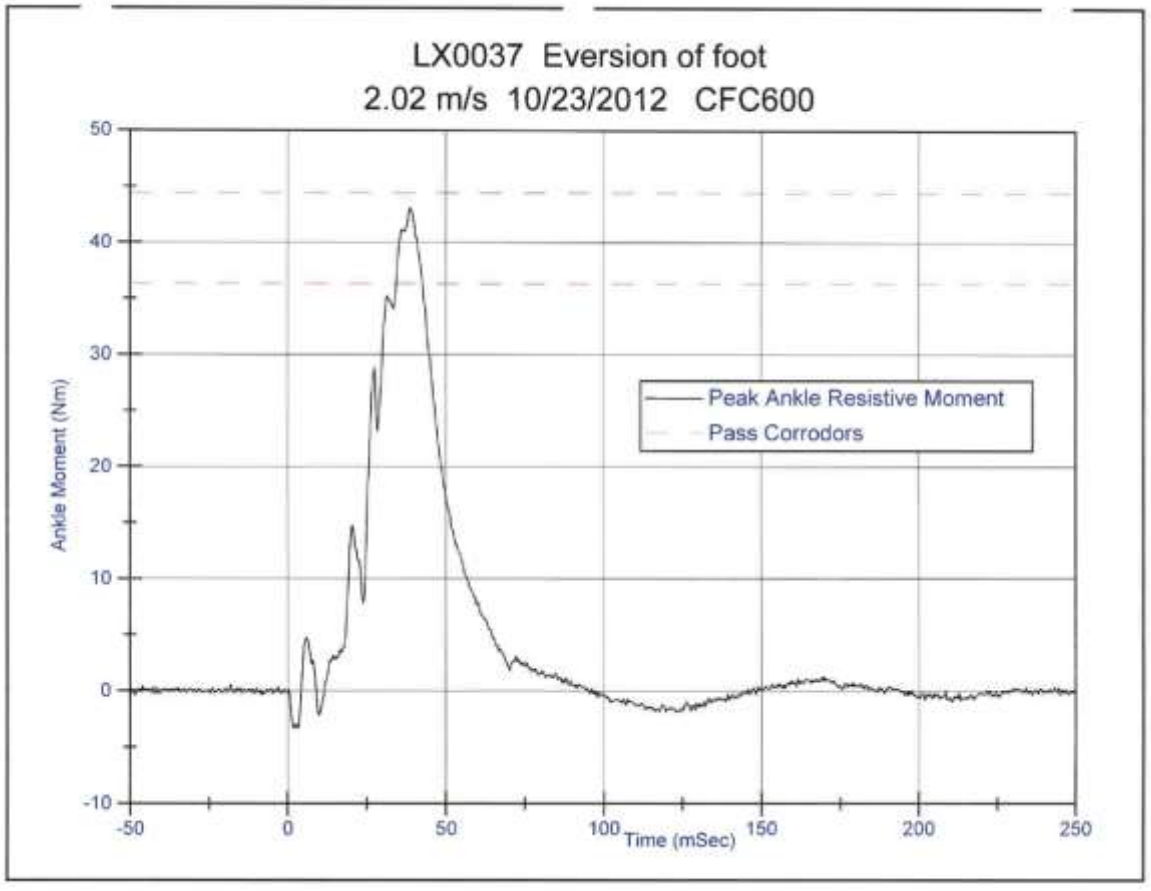

LX0037 Heel of foot
3.97 m/s 10/23/2012 CFC600
Tibia load (N)
Time (mSec)
Peak Lower Tibia Compressive Load
Pass Corrodors
4000
3000
2000
1000
0
-1000
-2000
-50
0
50
100
150
200
250

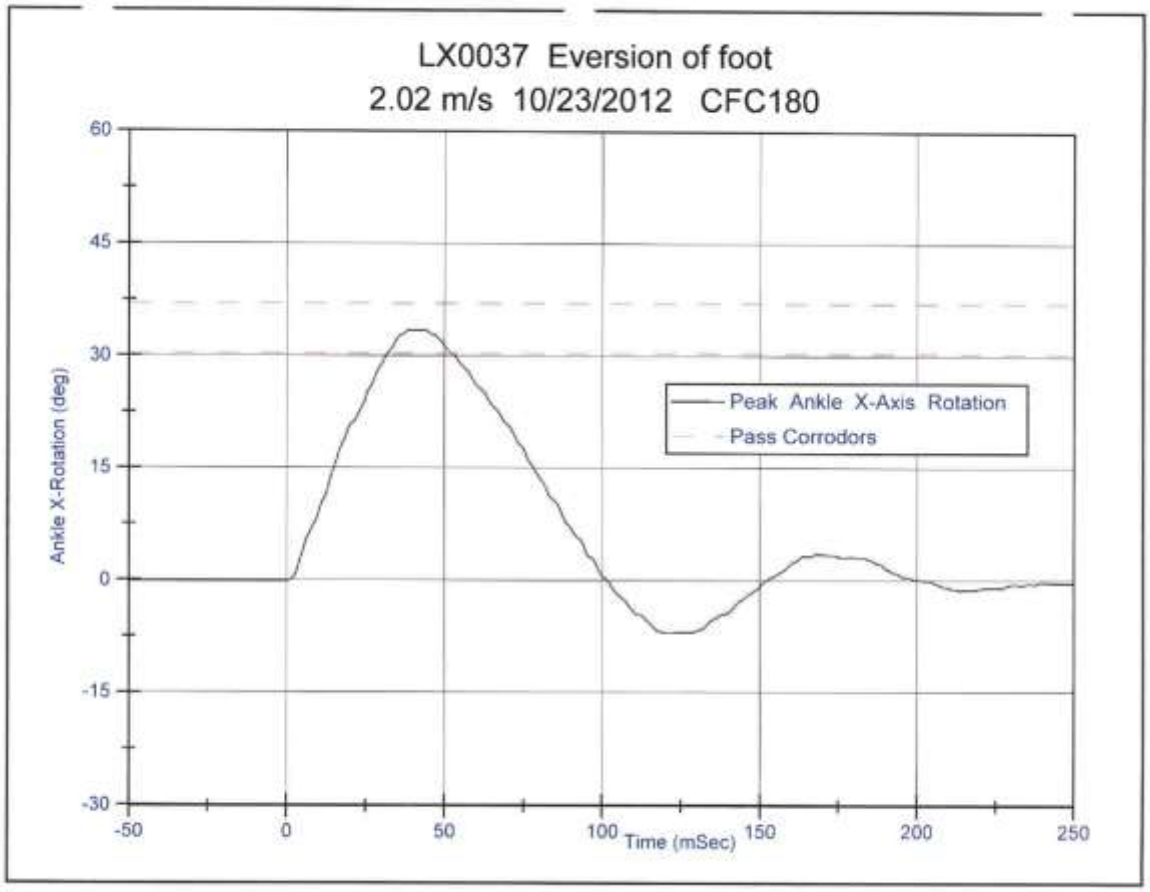

LX0037 Inversion of foot
2.00 m/s 10/23/2012 CFC600
Tibia load (N)
Time (mSec)
Peak Lower Tibia Compressive Load
Pass Corrodors
800
700
600
500
400
300
200
100
0
-100
-50
0
50
100
150
200
250

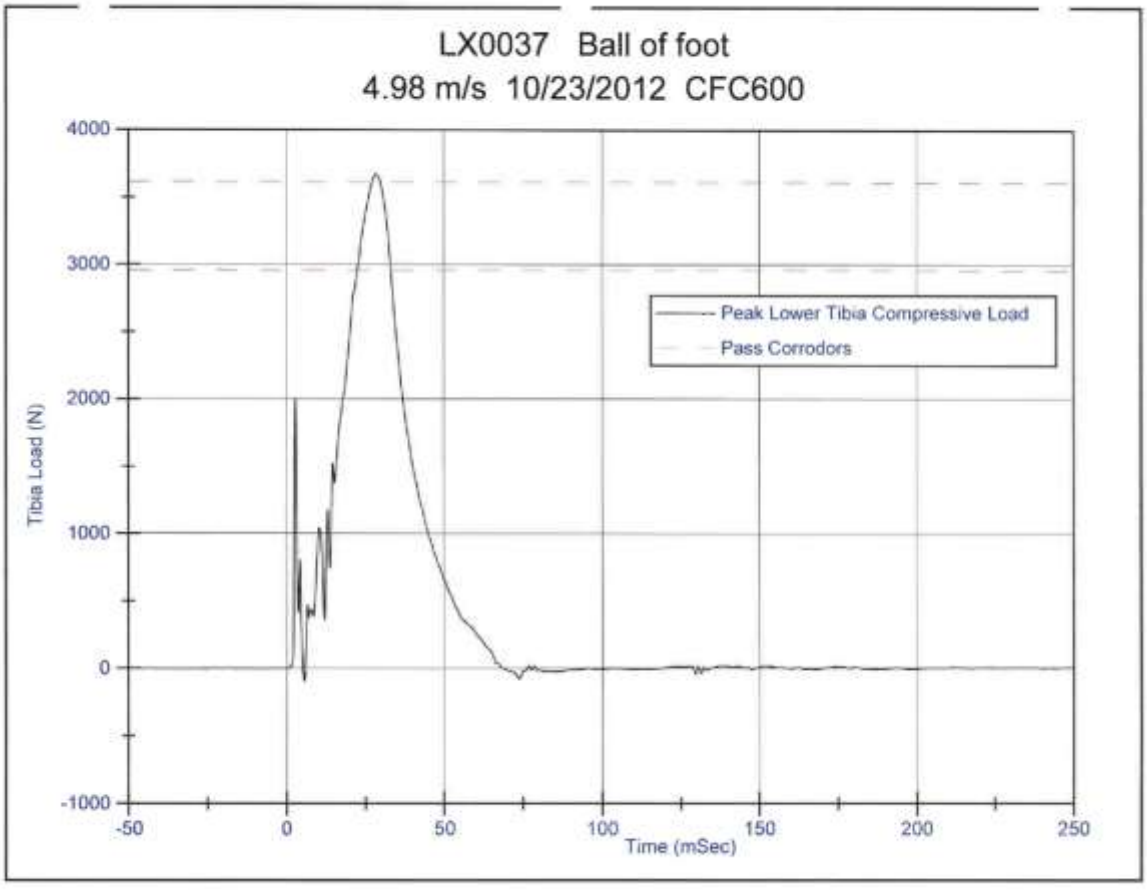

LX0037 Inversion of foot
2.00 m/s 10/23/2012 CFC600
Ankle moment (Nm)
50
40
30
20
10
0
-10
-50
0
50
100
150
200
250
Time (mSec)
Peak Ankle Resistive Moment
Pass Corrodors

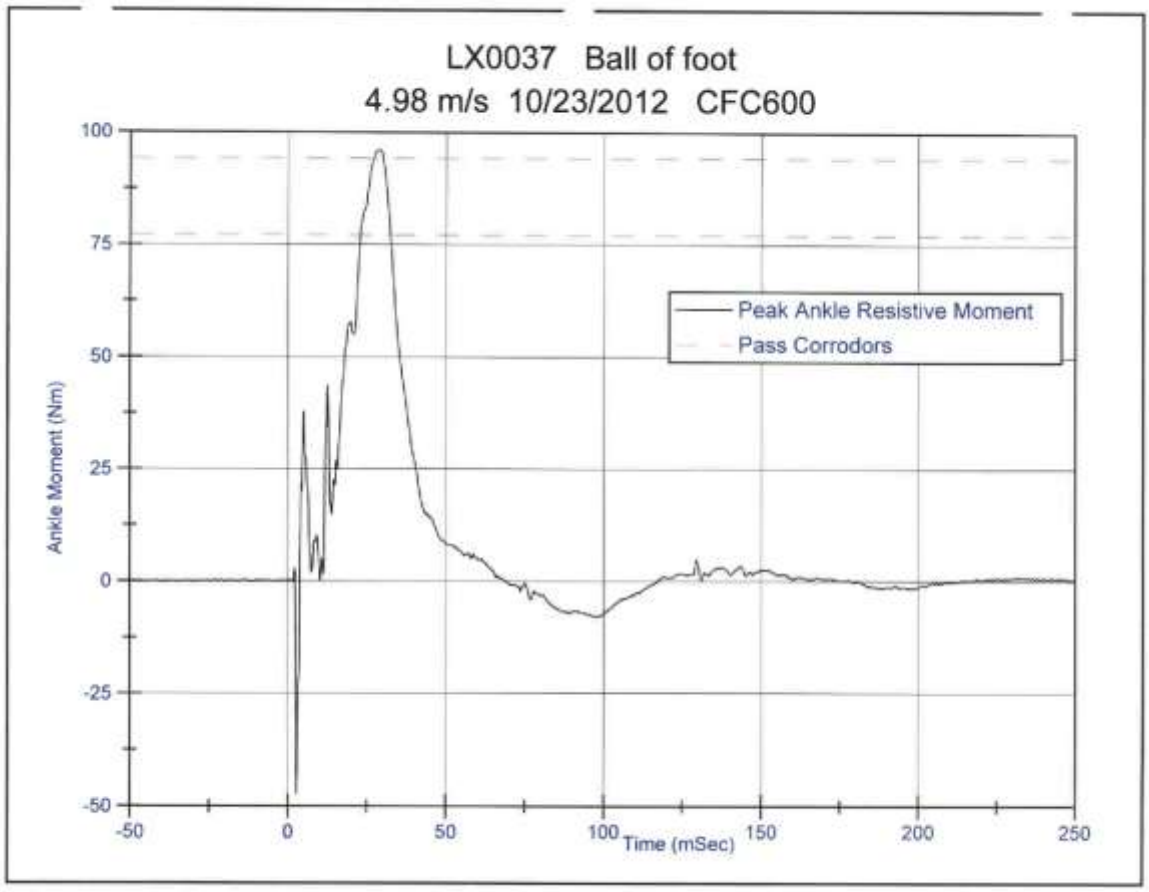

LX0037 Inversion of foot
2.00 m/s 10/23/2012 CFC180
Ankle X-Rotation (deg)
60
45
30
15
0
-15
-30
-50
0
50
100
150
200
250
Time (mSec)
Peak Ankle X-Axis Rotation
Pass Corrodors

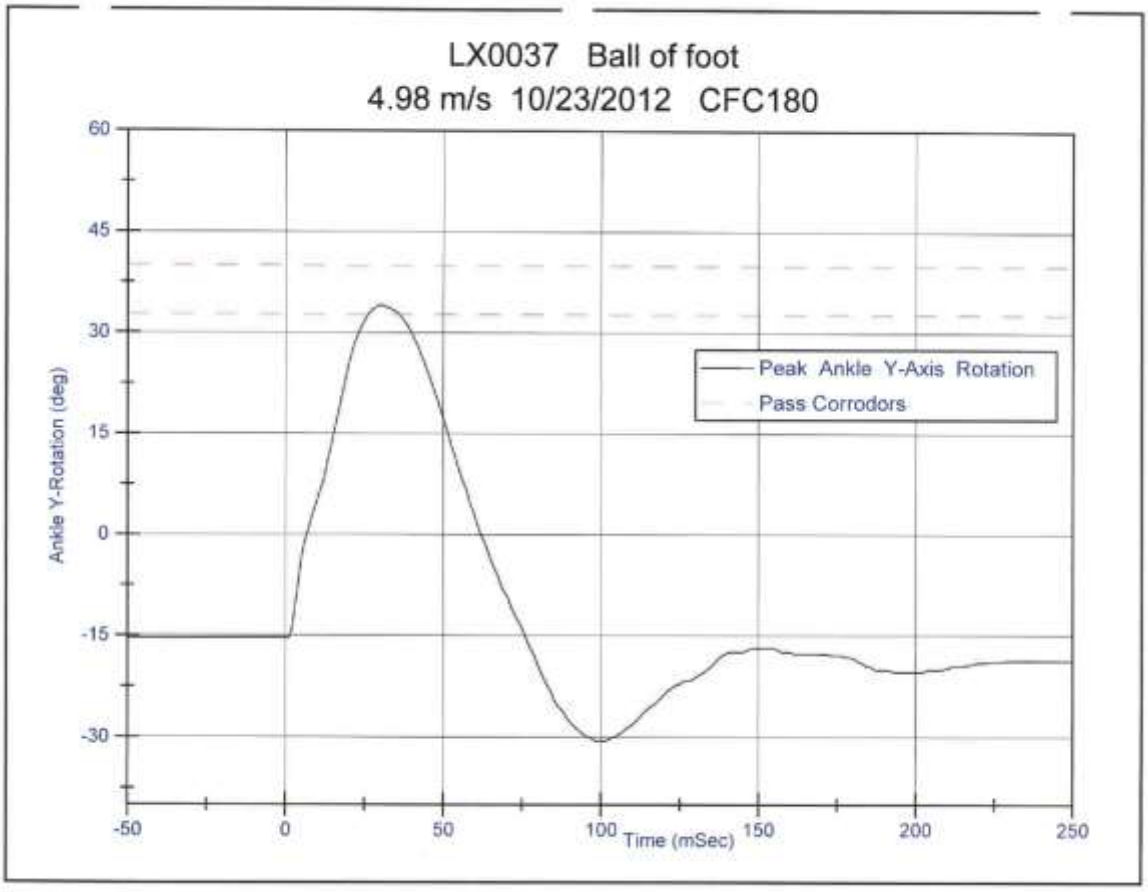

LX0037 Eversion of foot
2.02 m/s 10/23/2012 CFC600
Tibia Load (N)
800
700
600
500
400
300
200
100
0
-100
-50
0
50
100
150
200
250
Time (mSec)
Peak Lower Tibia Compressive Load
Pass Corrodors


LX0037 Eversion of foot
2.02 m/s 10/23/2012 CFC600
Ankle Moment (Nm)
50
40
30
20
10
0
-10
-50
0
50
100
150
200
250
Time (mSec)
Peak Ankle Resistive Moment
Pass Corrodors

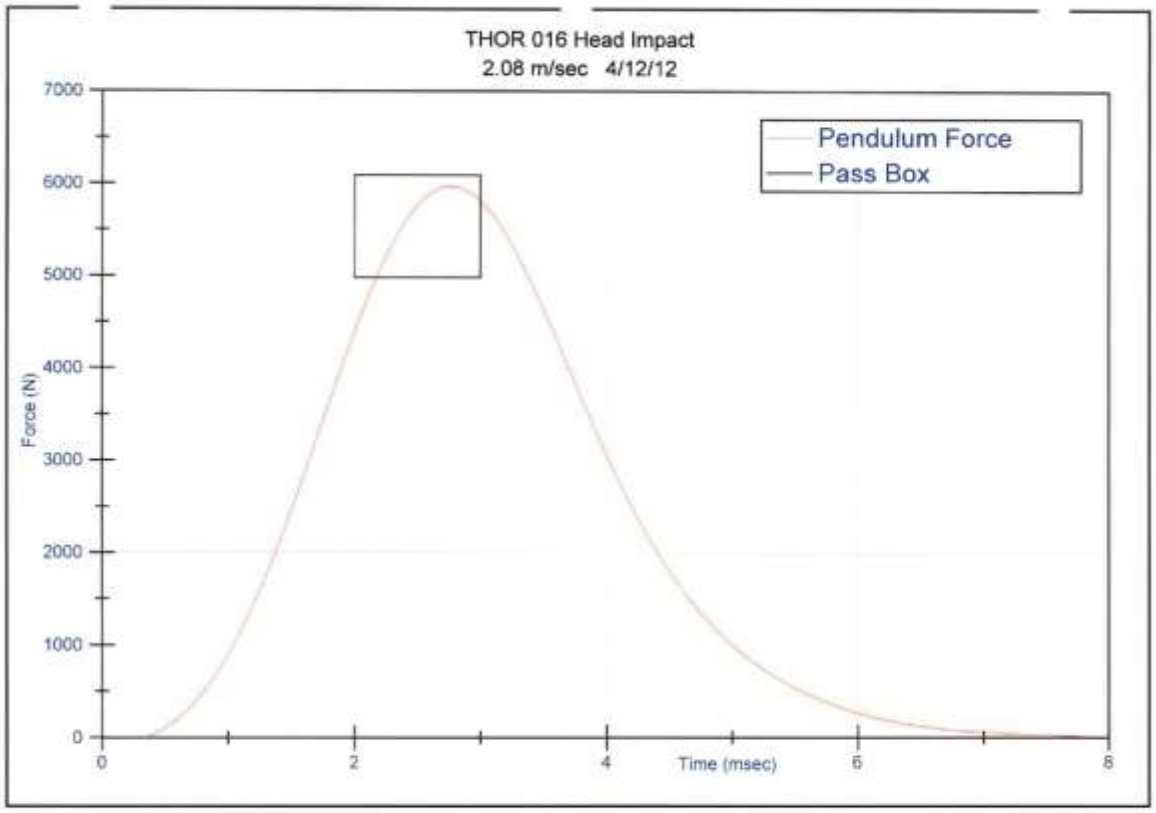

LX0037 Eversion of foot
2.02 m/s 10/23/2012 CFC180
Ankle X-Rotation (deg)
60
45
30
15
0
-15
-30
-50
0
50
100
150
200
250
Time (mSec)
Peak Ankle X-Axis Rotation
Pass Corrodors

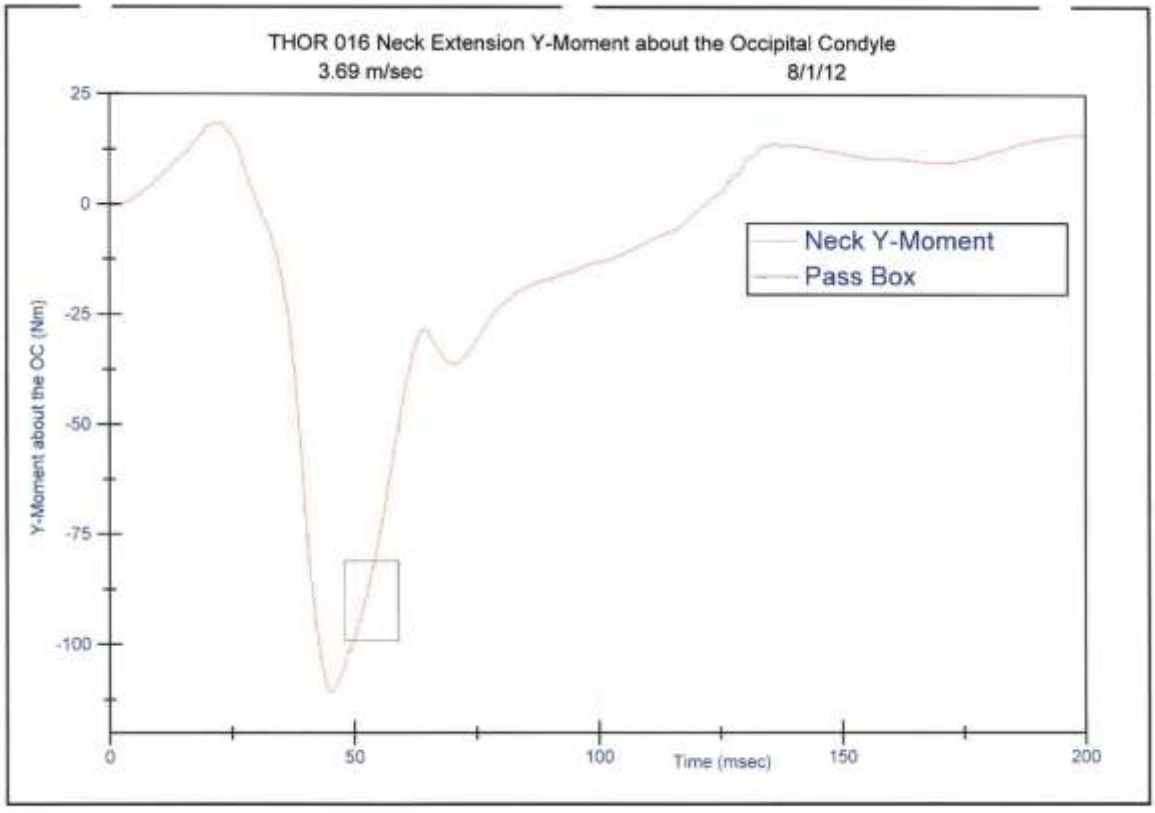

LX0037 Ball of foot
4.98 m/s 10/23/2012 CFC600
Tibia Load (N)
4000
3000
2000
1000
0
-1000
-50
0
50
100
150
200
250
Time (mSec)
Peak Lower Tibia Compressive Load
Pass Corrodors

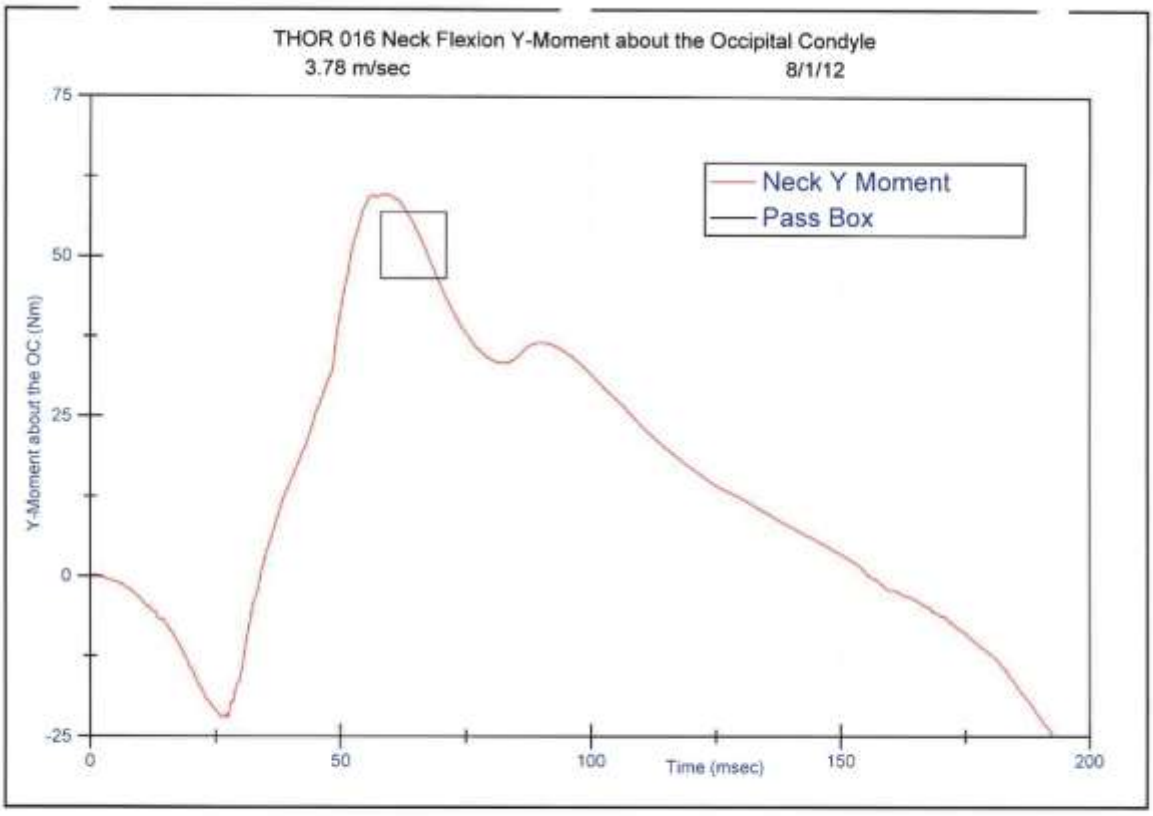

LX0037 Ball of foot
4.98 m/s 10/23/2012 CFC600
Peak Ankle Resistive Moment
Pass Corrodors
Ankle Moment (Nm)
Time (mSec)
100
75
50
25
0
-25
-50
-50
0
50
100
150
200
250

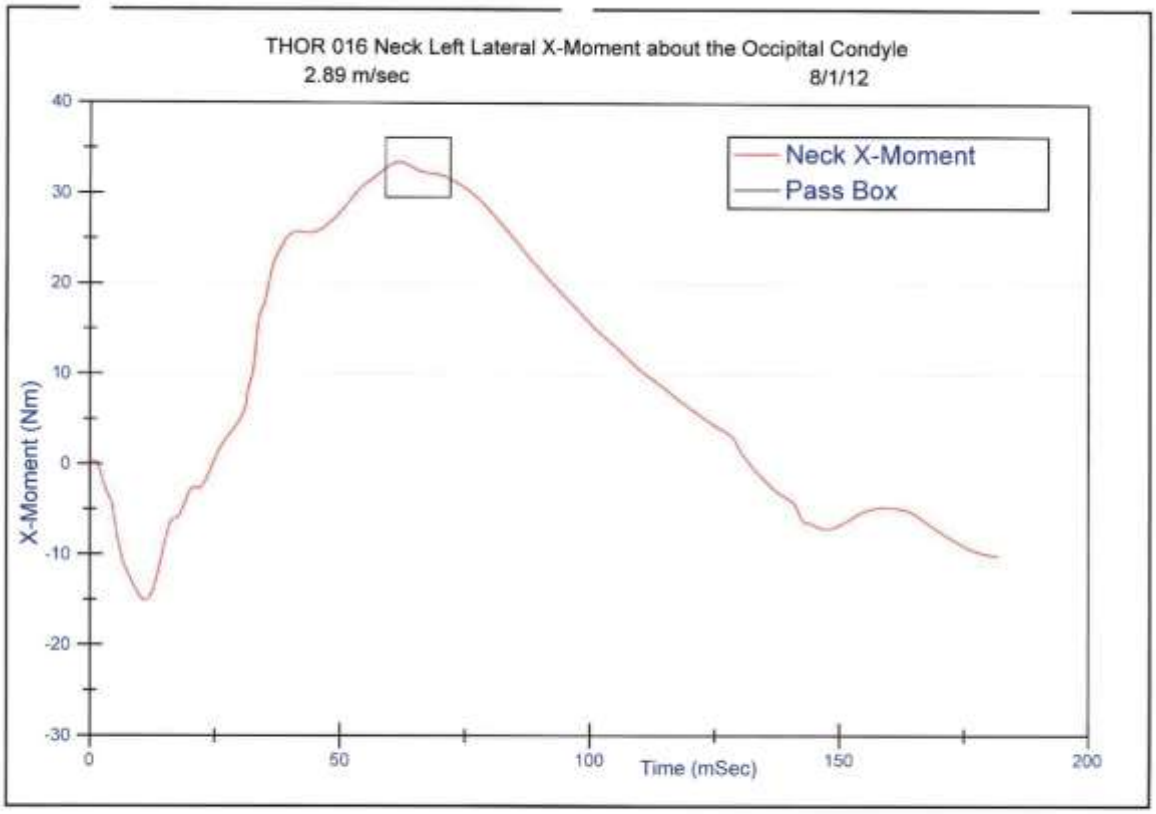

LX0037 Ball of foot
4.98 m/s 10/23/2012 CFC180
Peak Ankle Y-Axis Rotation
Pass Corrodors
Ankle Y-Rotation (deg)
Time (mSec)
60
45
30
15
0
-15
-30
-50
0
50
100
150
200
250

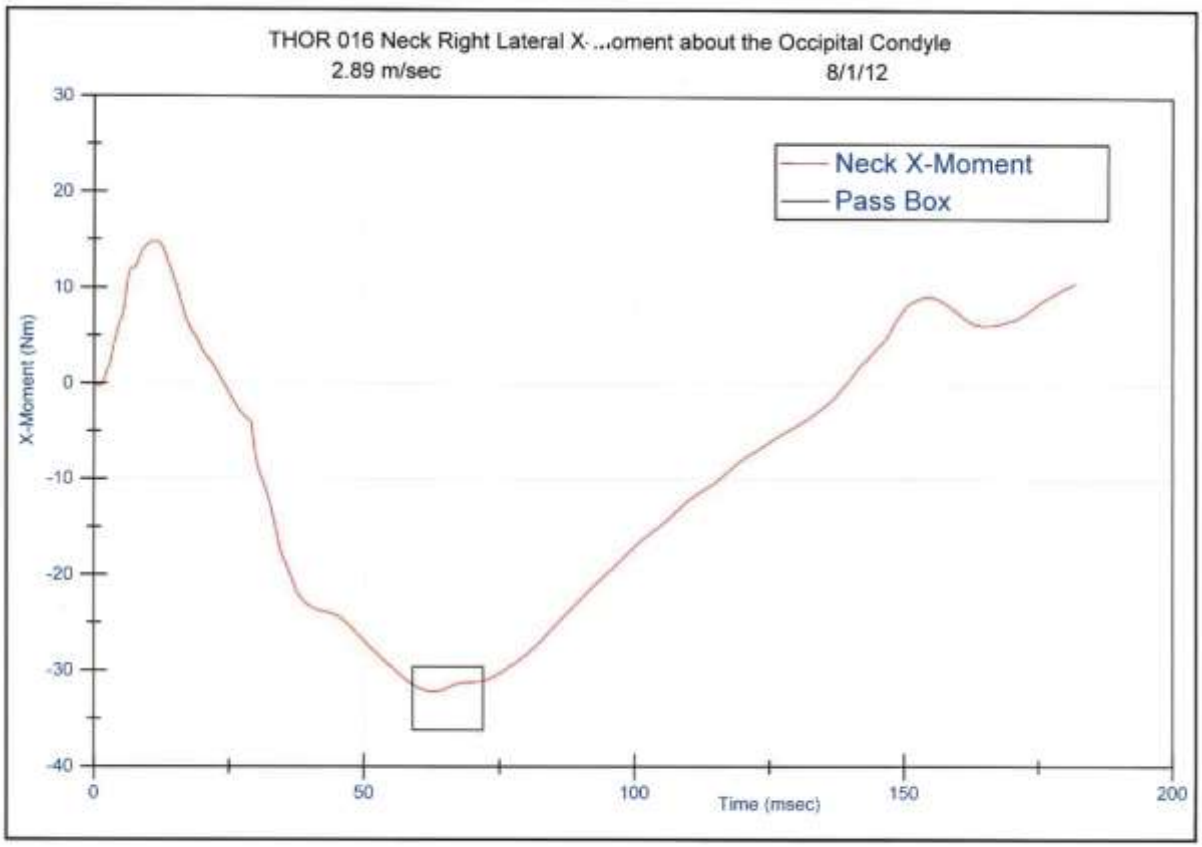
50% ADULT MALE THOR016 DUMMY CALIBRATIONS

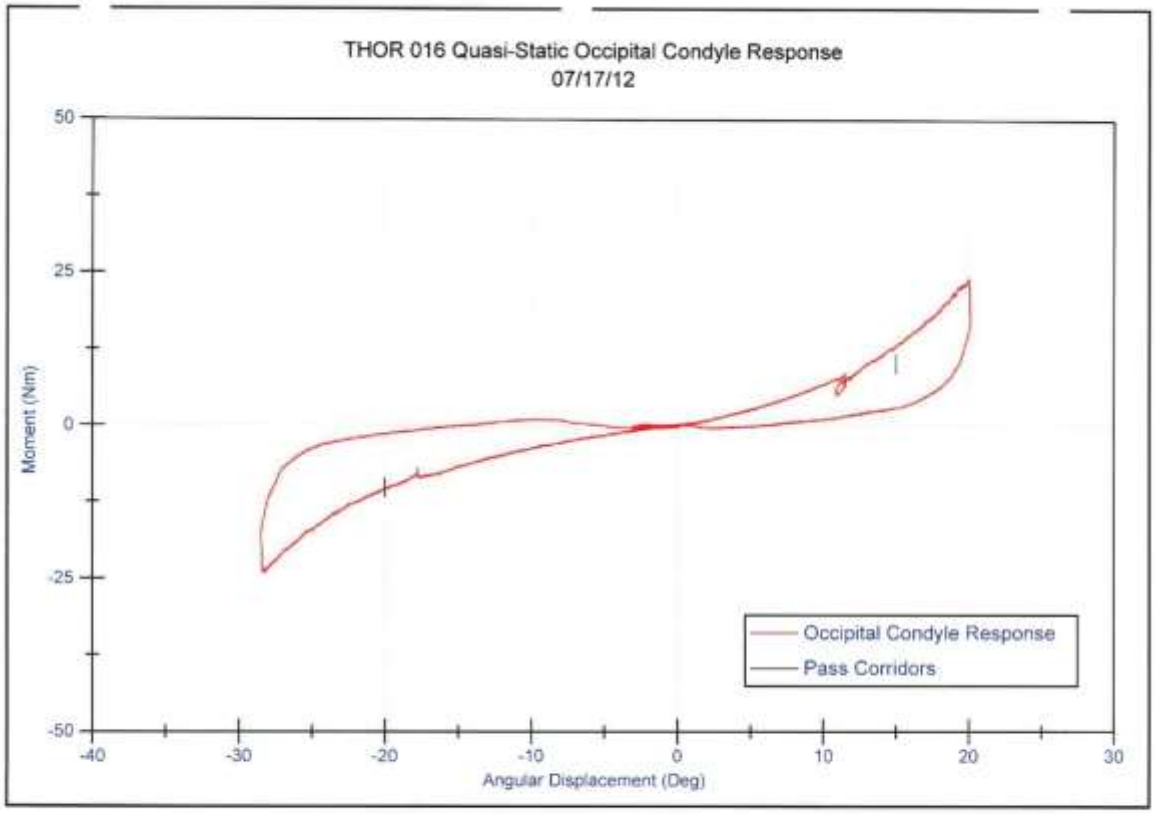

THOR 016 Head Impact
2.08 m/sec 4/12/12
Pendulum Force
Pass Box
Force (N)
7000
6000
5000
4000
3000
2000
1000
0
0
2
4
6
8
Time (msec)

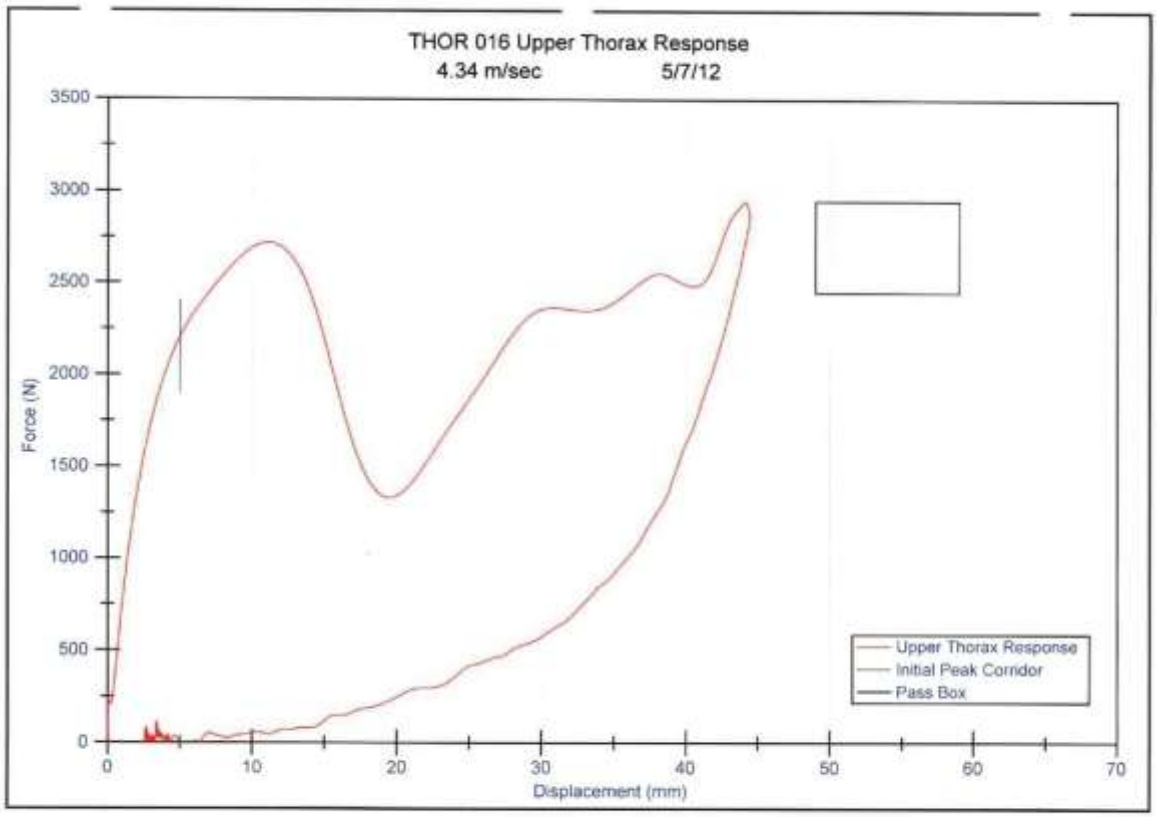

THOR 016 Neck Extension Y-Moment about the Occipital Condyle
3.69 m/sec
8/1/12
Neck Y-Moment
Pass Box
Y-Moment about the OC (Nm)
25
0
-25
-50
-75
-100
0
50
100
150
200
Time (msec)

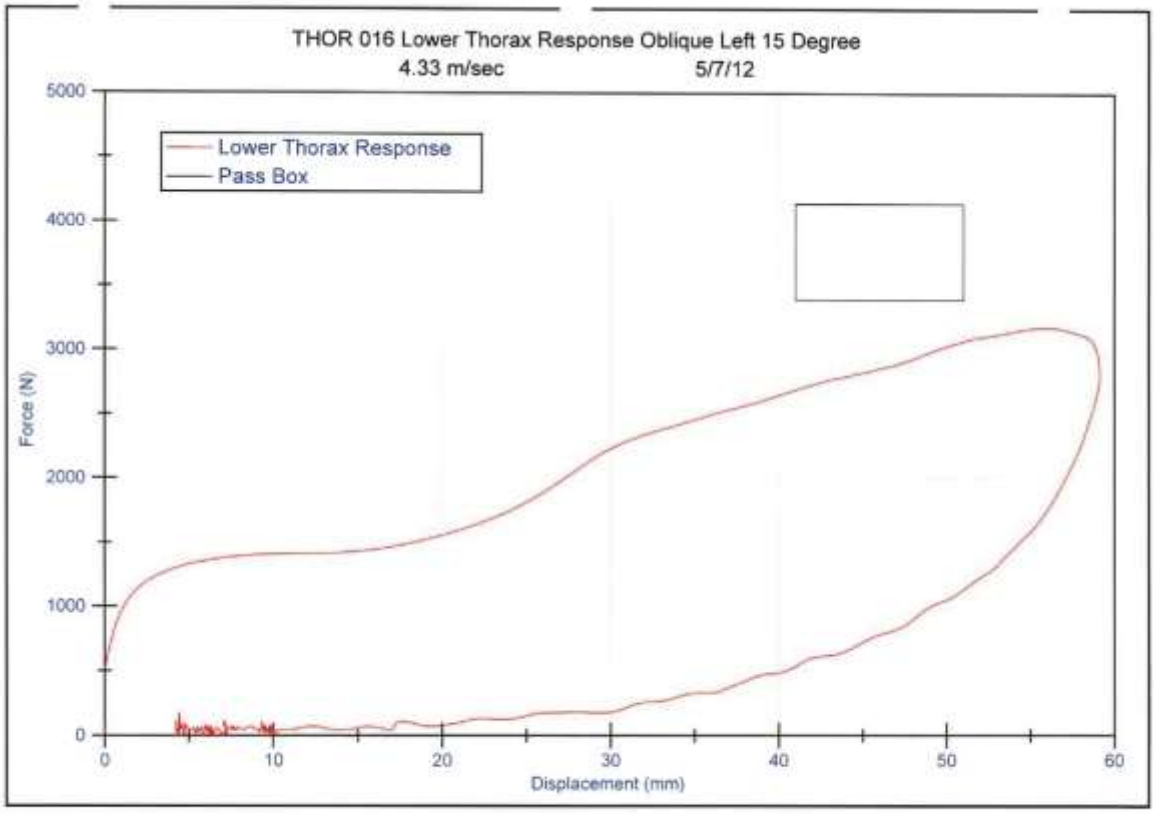

THOR 016 Neck Flexion Y-Moment about the Occipital Condyle
3.78 m/sec
8/1/12
Neck Y Moment
Pass Box
Y-Moment about the OC (Nm)
75
50
25
0
-25
0
50
100
150
200
Time (msec)

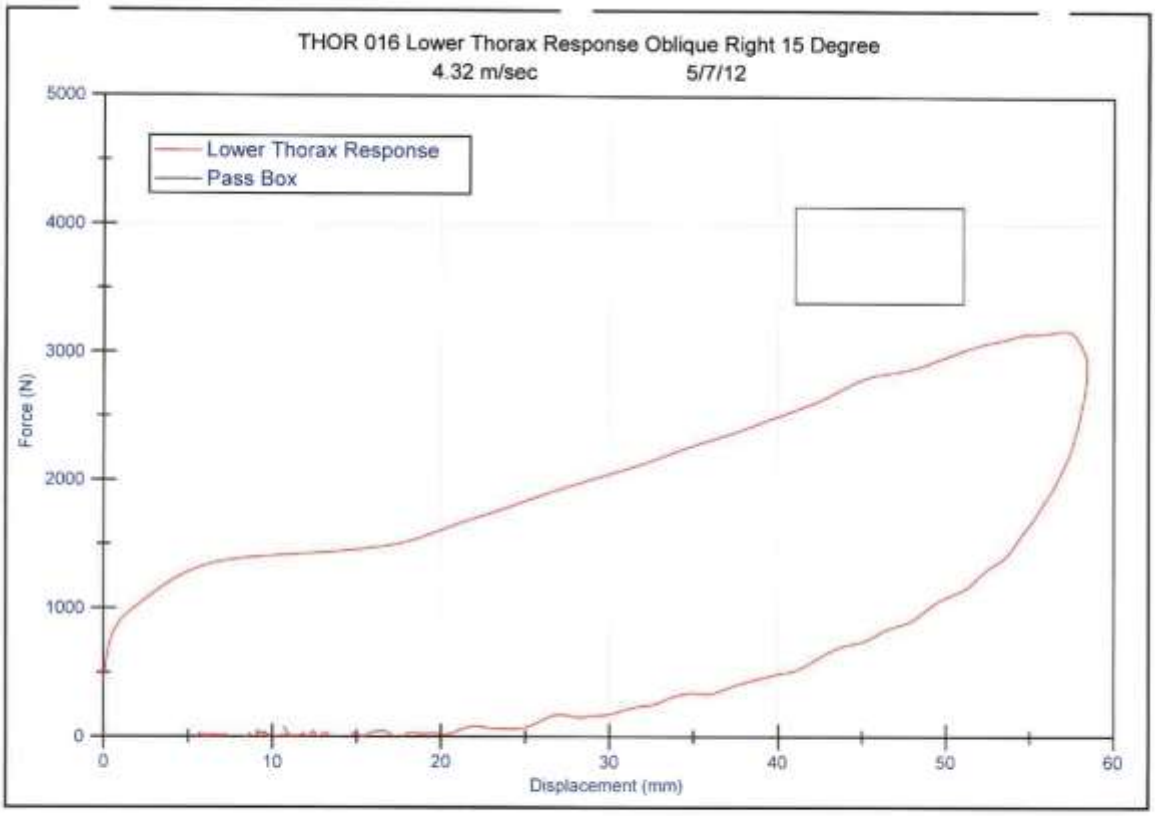

THOR 016 Neck Left Lateral X-Moment about the Occipital Condyle
2.89 m/sec
8/1/12
Neck X-Moment
Pass Box
X-Moment (Nm)
40
30
20
10
0
-10
-20
-30
0
50
100
150
200
Time (mSec)

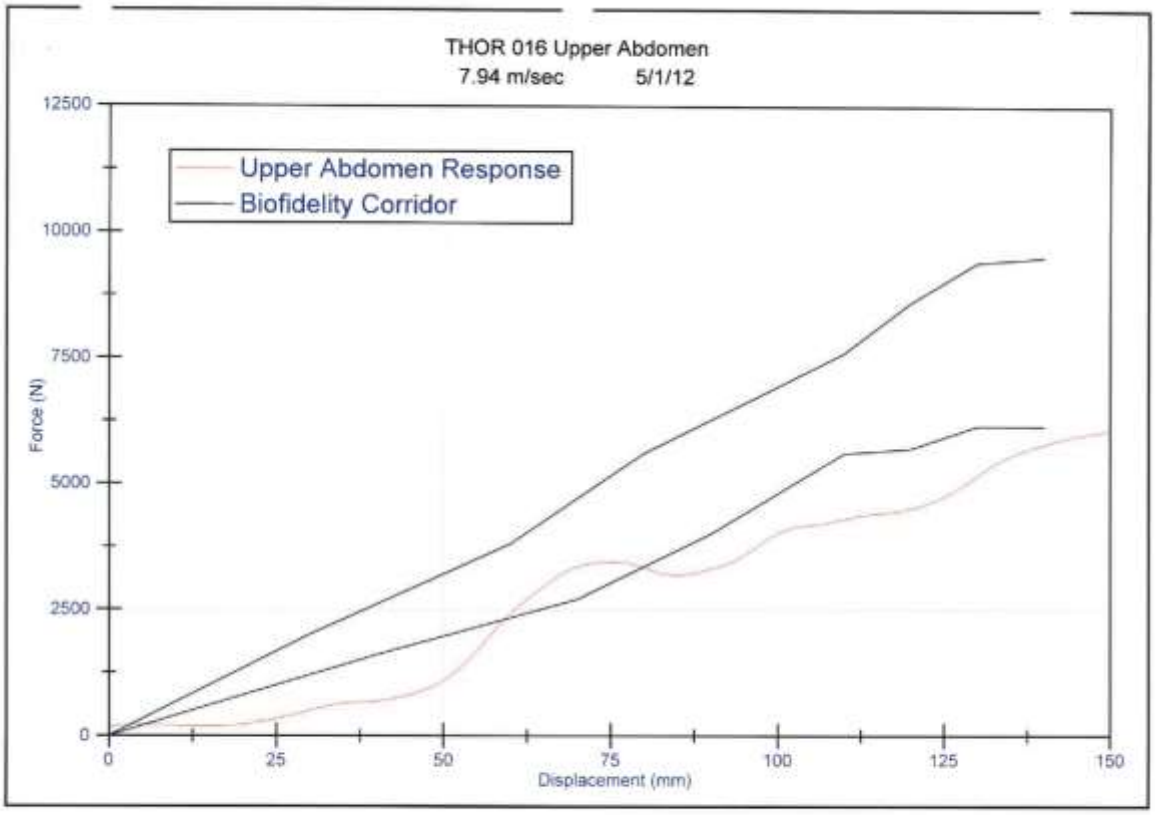

THOR 016 Neck Right Lateral X- ...oment about the Occipital Condyle
2.89 m/sec
8/1/12
Neck X-Moment
Pass Box
X-Moment (Nm)
Time (msec)
30
20
10
0
-10
-20
-30
-40
0
50
100
150
200

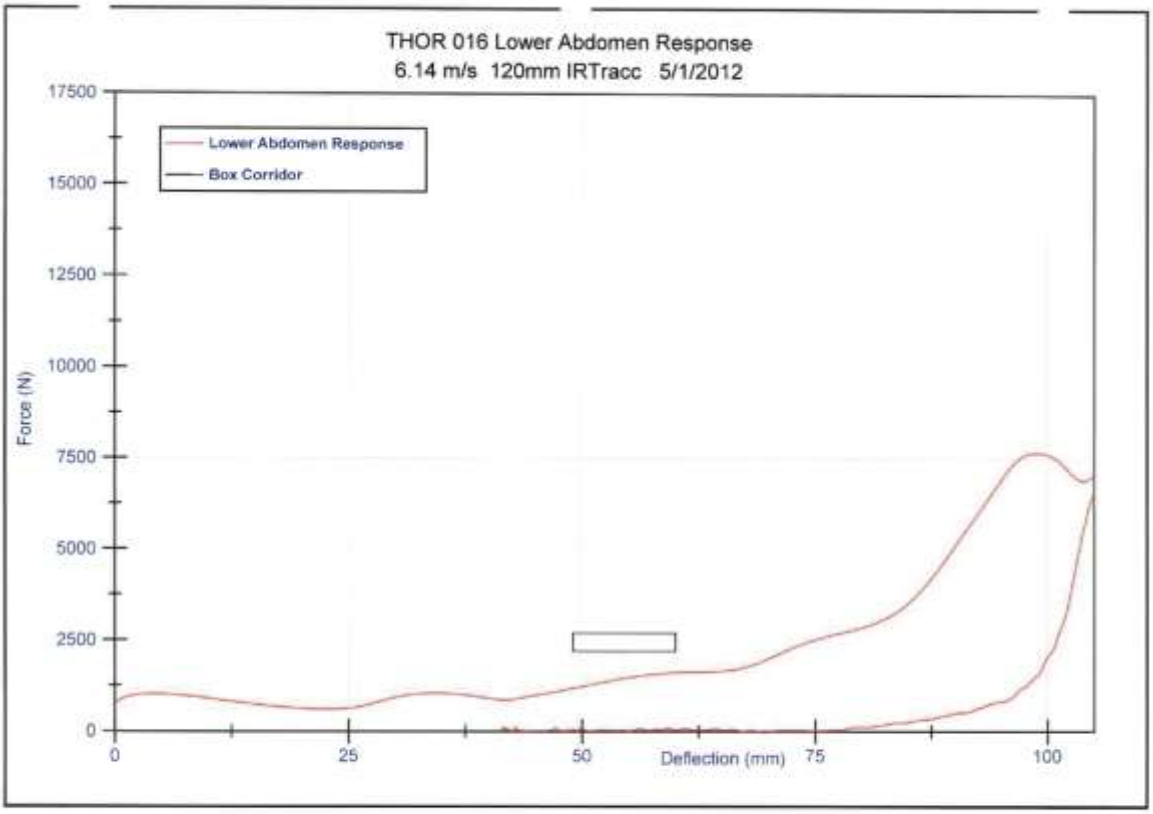

THOR 016 Quasi-Static Occipital Condyle Response
07/17/12
Occipital Condyle Response
Pass Corridors
Moment (Nm)
Angular Displacement (Deg)
50
25
0
-25
-50
-40
-30
-20
-10
0
10
20
30


THOR 016 Upper Thorax Response
4.34 m/sec 5/7/12
Force (N)
Displacement (mm)
Upper Thorax Response
Initial Peak Corridor
Pass Box

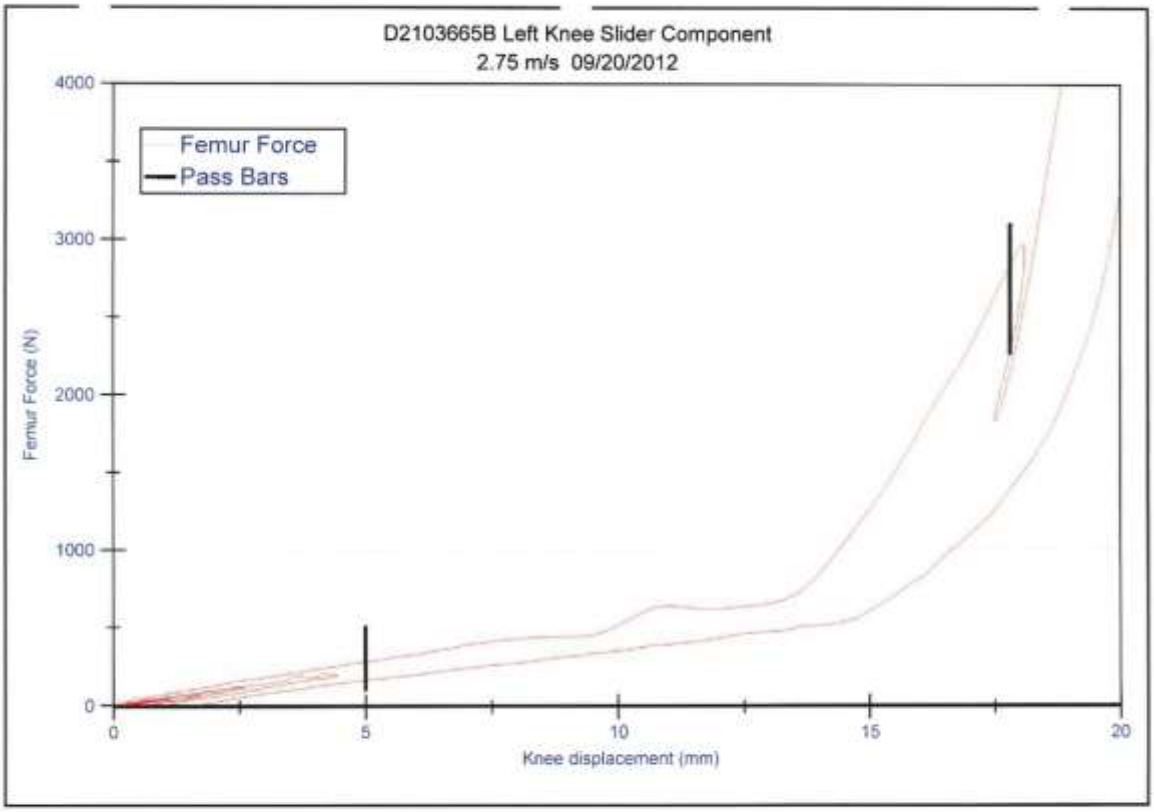

THOR 016 Lower Thorax Response Oblique Left 15 Degree
4.33 m/sec 5/7/12
Force (N)
Displacement (mm)
Lower Thorax Response
Pass Box

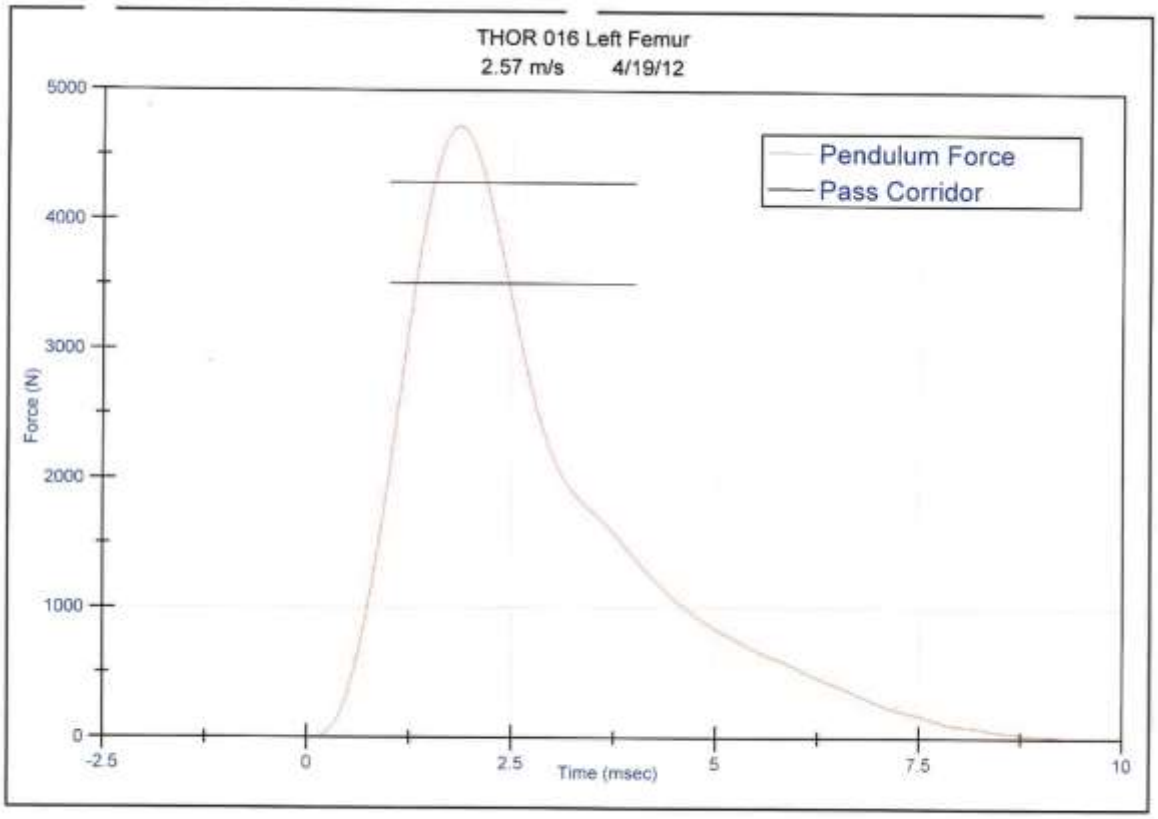

THOR 016 Lower Thorax Response Oblique Right 15 Degree
4.32 m/sec 5/7/12
Lower Thorax Response
Pass Box
Force (N)
Displacement (mm)
0
1000
2000
3000
4000
5000
0
10
20
30
40
50
60

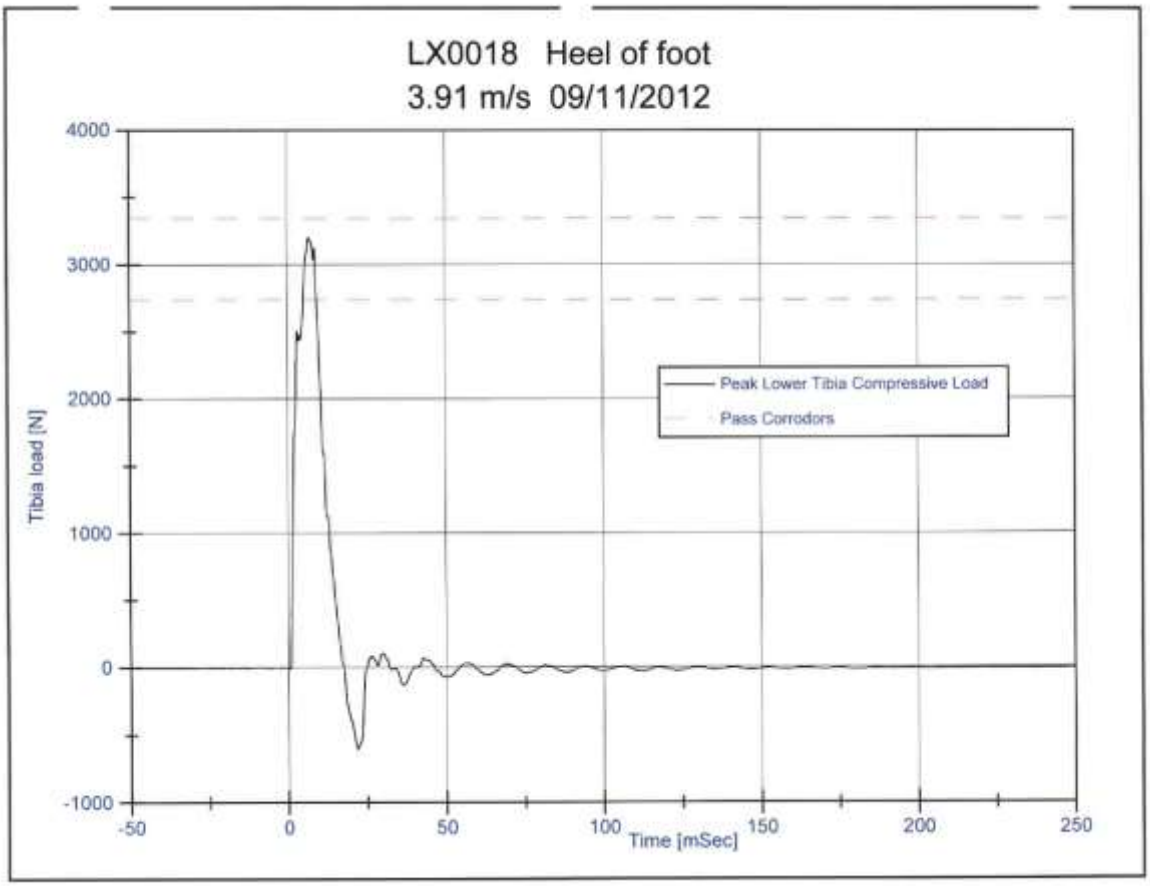

THOR 016 Upper Abdomen
7.94 m/sec 5/1/12
Upper Abdomen Response
Biofidelity Corridor
Force (N)
Displacement (mm)
0
2500
5000
7500
10000
12500
0
25
50
75
100
125
150

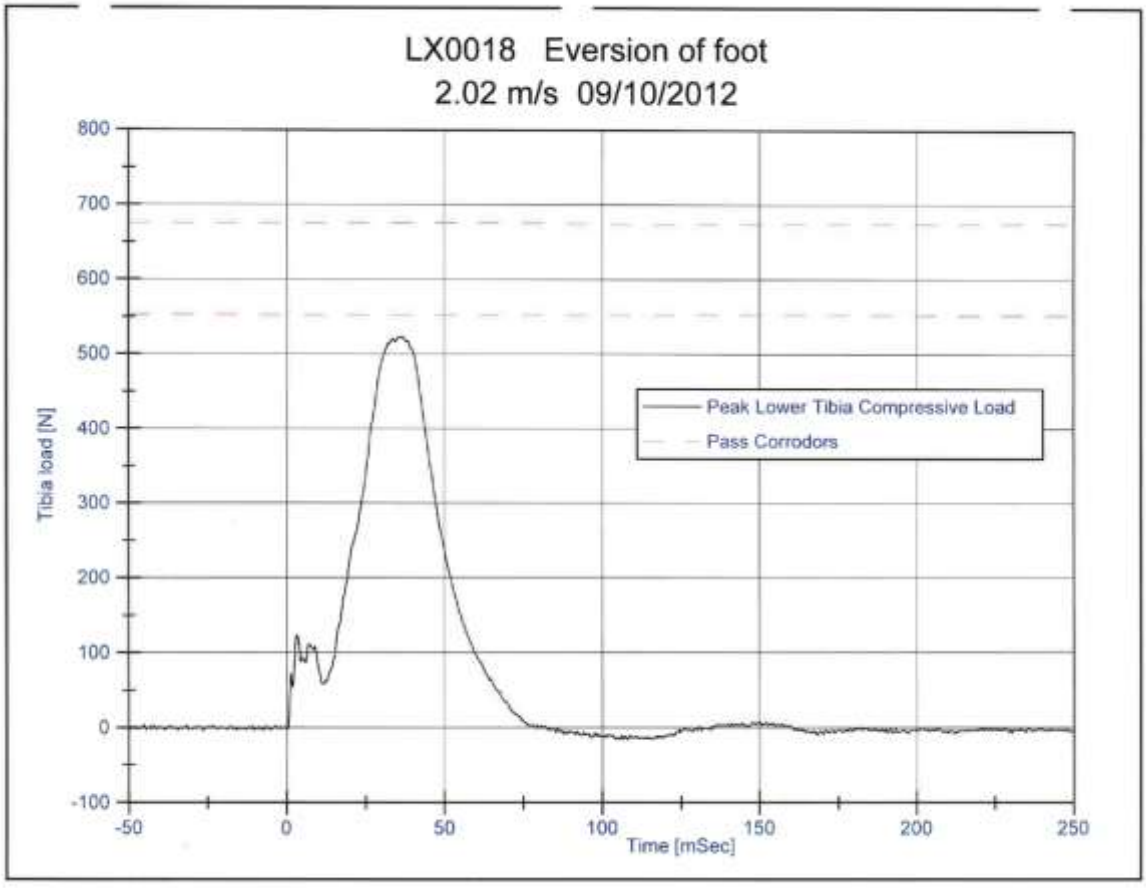

THOR 016 Lower Abdomen Response
6.14 m/s 120mm IRTracc 5/1/2012
Lower Abdomen Response
Box Corridor
Force (N)
17500
15000
12500
10000
7500
5000
2500
0
0
25
50
75
100
Deflection (mm)

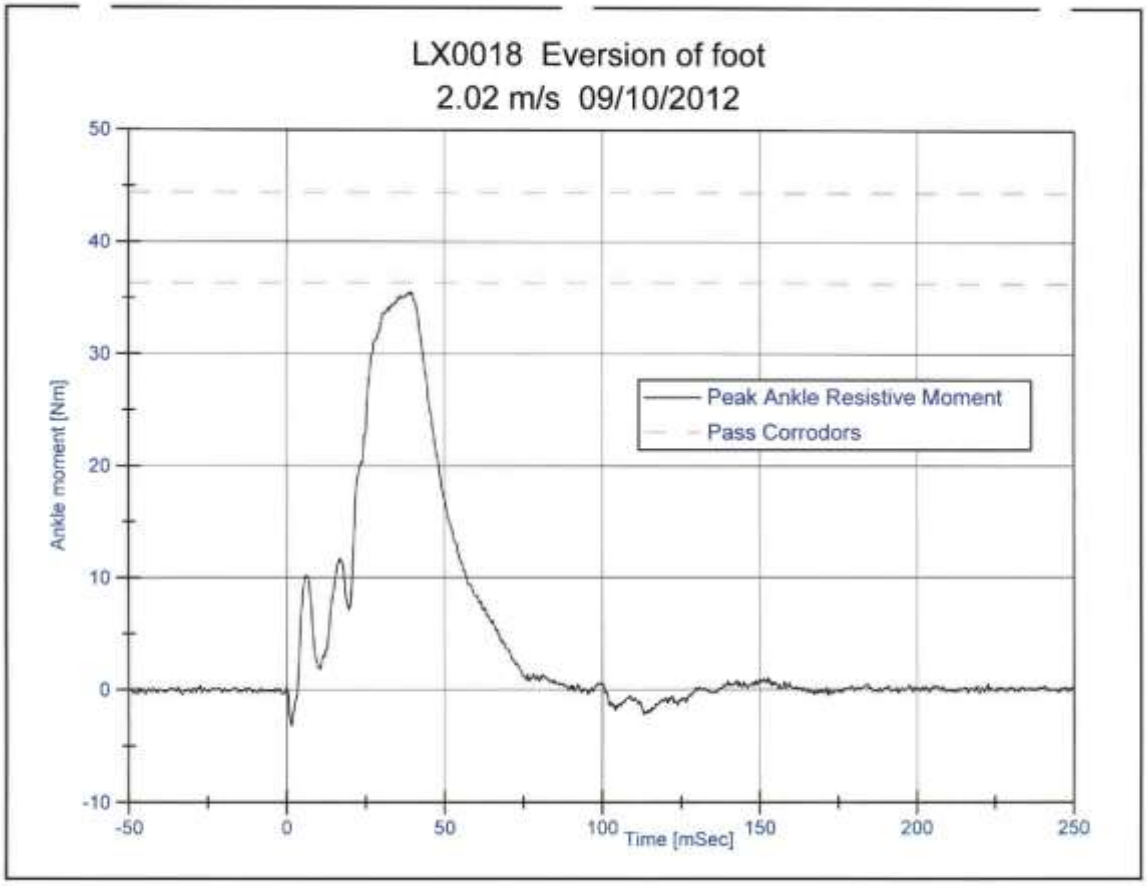
THOR 016 LEG CALIBRATIONS
LX0018 / LX0019

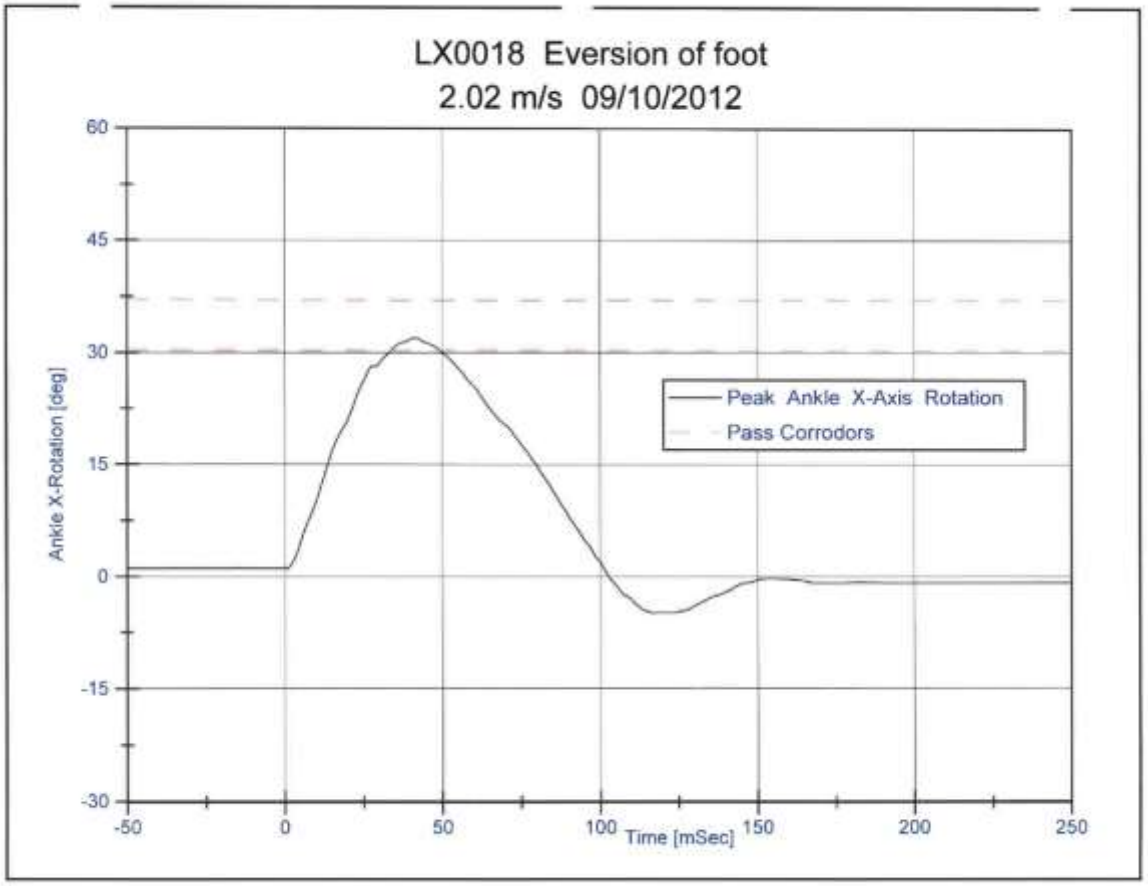

D2103665B Left Knee Slider Component
2.75 m/s 09/20/2012
Femur Force
Pass Bars
Femur Force (N)
Knee displacement (mm)
4000
3000
2000
1000
0
0
5
10
15
20

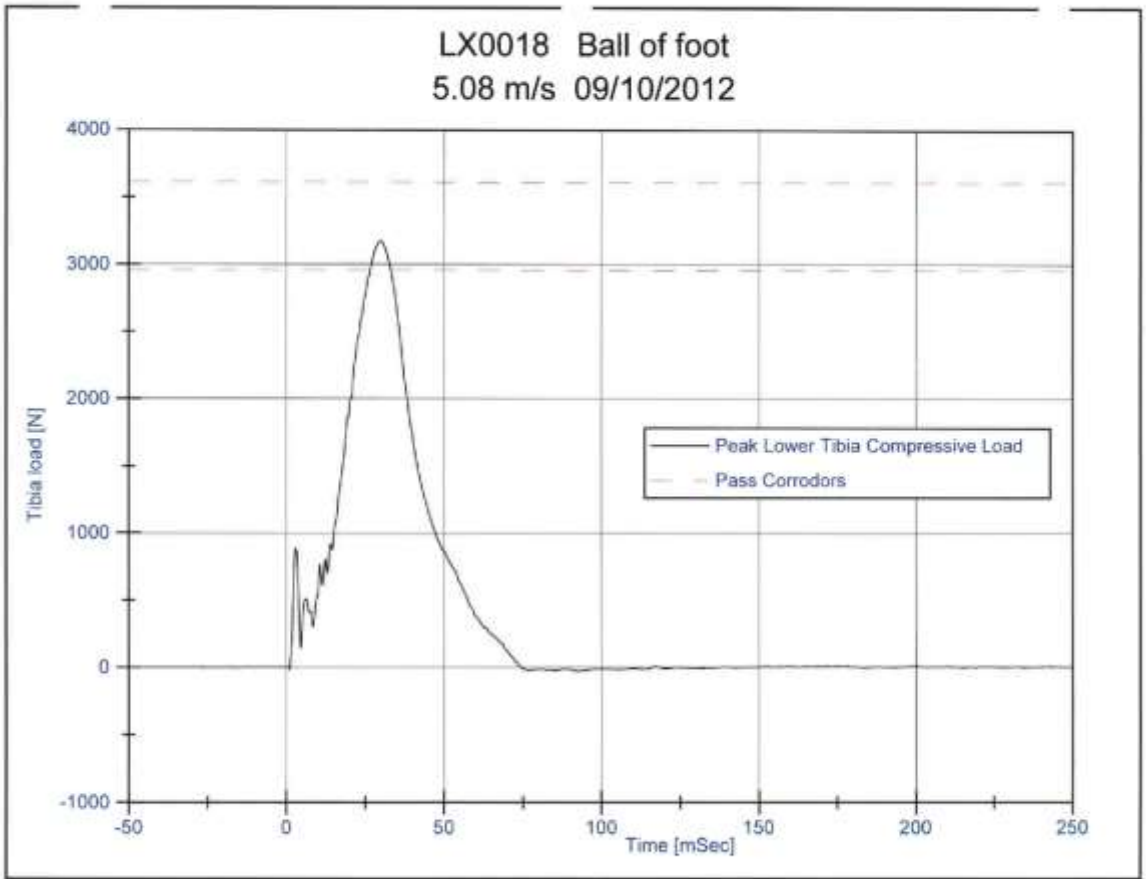

THOR 016 Left Femur
2.57 m/s 4/19/12
Pendulum Force
Pass Corridor
Force (N)
Time (msec)
5000
4000
3000
2000
1000
0
-2.5
0
2.5
5
7.5
10

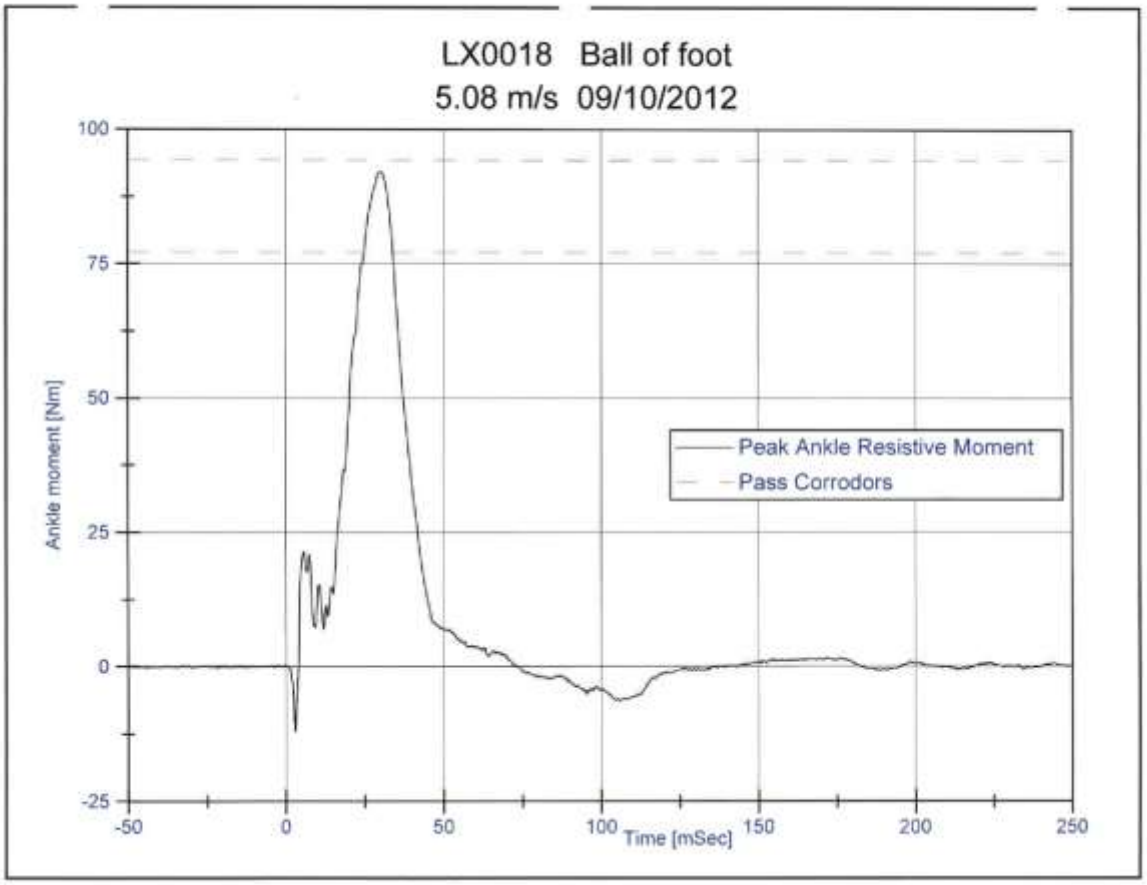

LX0018 Heel of foot
3.91 m/s 09/11/2012
Tibia load [N]
4000
3000
2000
1000
0
-1000
-50
0
50
100
150
200
250
Time [mSec]
Peak Lower Tibia Compressive Load
Pass Corrodors

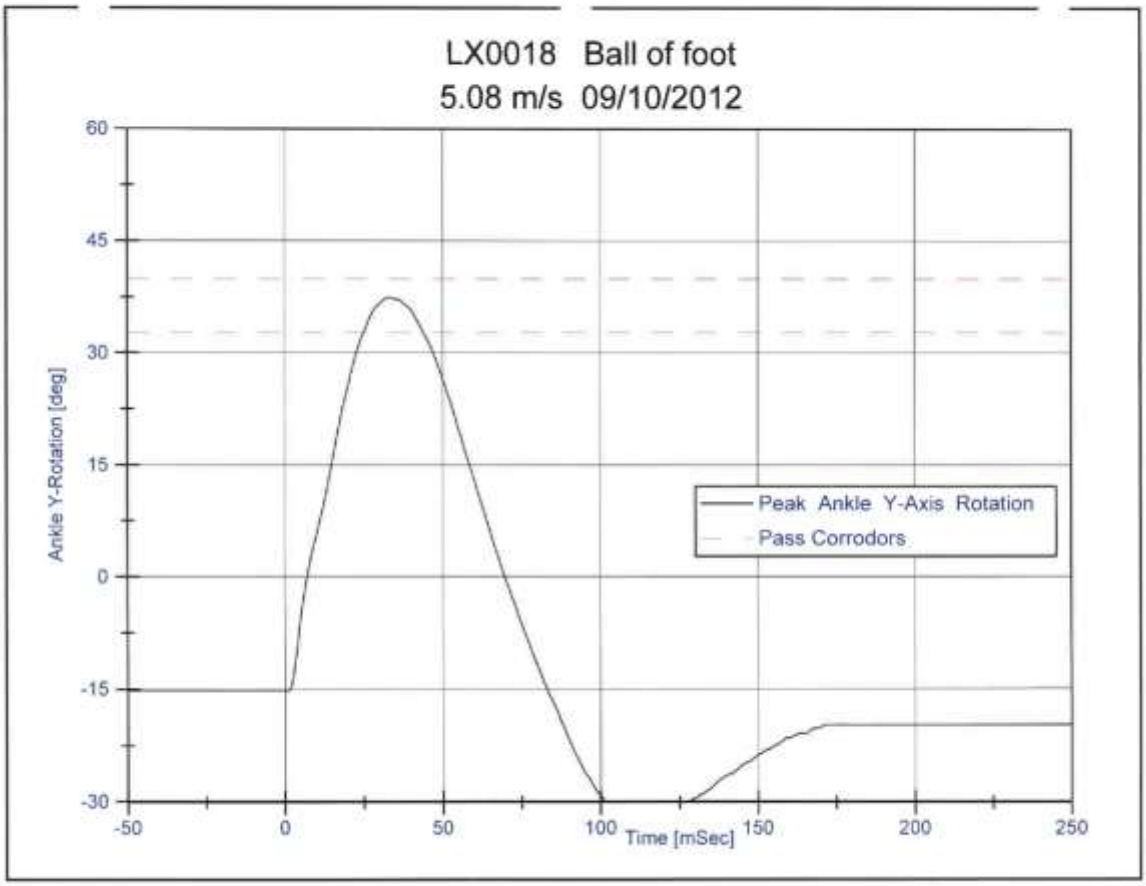

LX0018 Eversion of foot
2.02 m/s 09/10/2012
Tibia load [N]
800
700
600
500
400
300
200
100
0
-100
-50
0
50
100
150
200
250
Time [mSec]
Peak Lower Tibia Compressive Load
Pass Corrodors

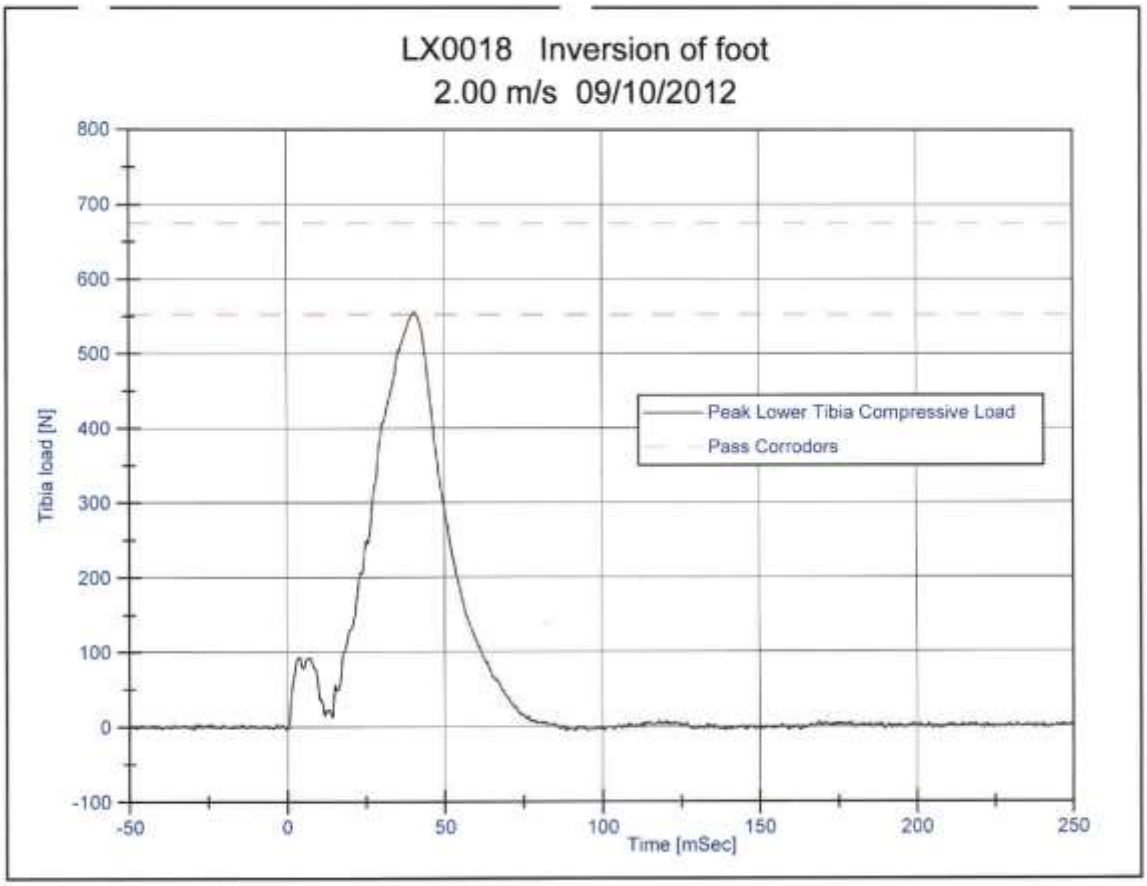

LX0018 Eversion of foot
2.02 m/s 09/10/2012
Ankle moment [Nm]
Time [mSec]
Peak Ankle Resistive Moment
Pass Corrodors
50
40
30
20
10
0
-10
-50
0
50
100
150
200
250

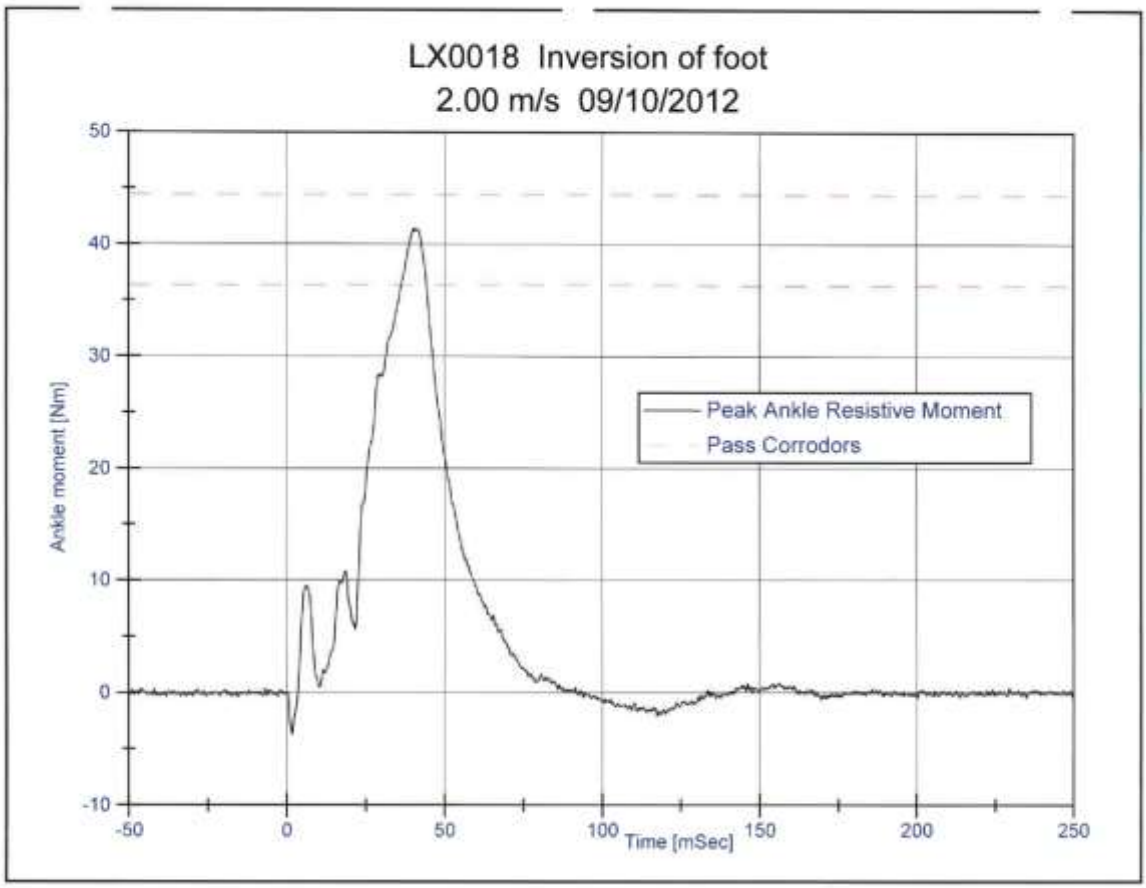

LX0018 Eversion of foot
2.02 m/s 09/10/2012
Ankle X-Rotation [deg]
Time [mSec]
Peak Ankle X-Axis Rotation
Pass Corrodors
60
45
30
15
0
-15
-30
-50
0
50
100
150
200
250

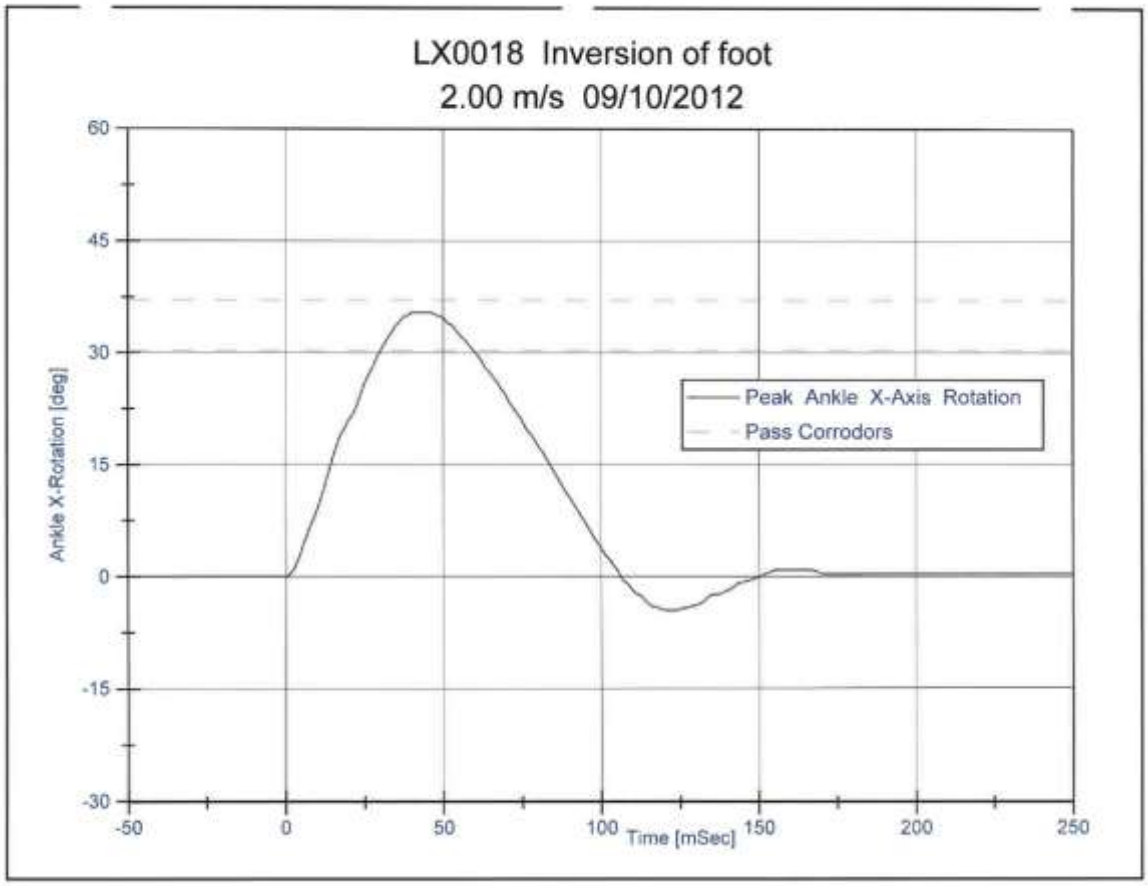

LX0018 Ball of foot
5.08 m/s 09/10/2012
Tibia load [N]
4000
3000
2000
1000
0
-1000
-50
0
50
100
150
200
250
Time [mSec]
Peak Lower Tibia Compressive Load
Pass Corrodors

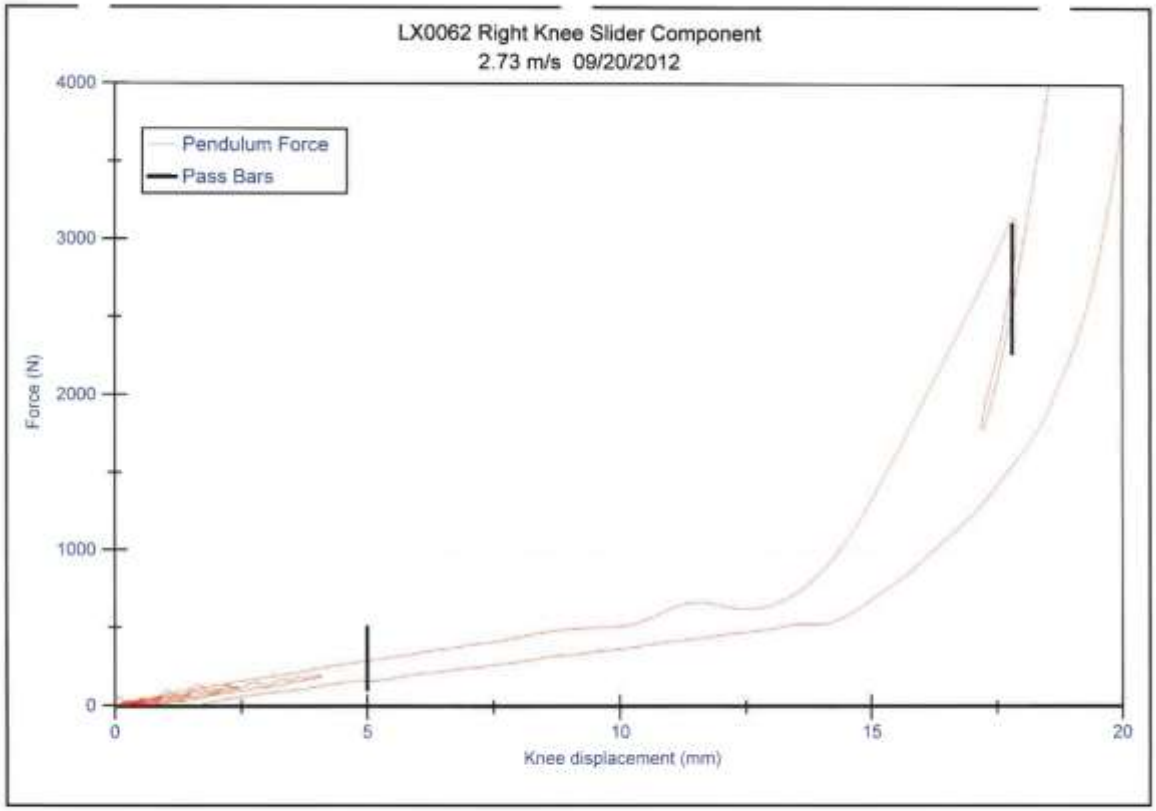

LX0018 Ball of foot
5.08 m/s 09/10/2012
Ankle moment [Nm]
100
75
50
25
0
-25
-50
0
50
100
150
200
250
Time [mSec]
Peak Ankle Resistive Moment
Pass Corrodors

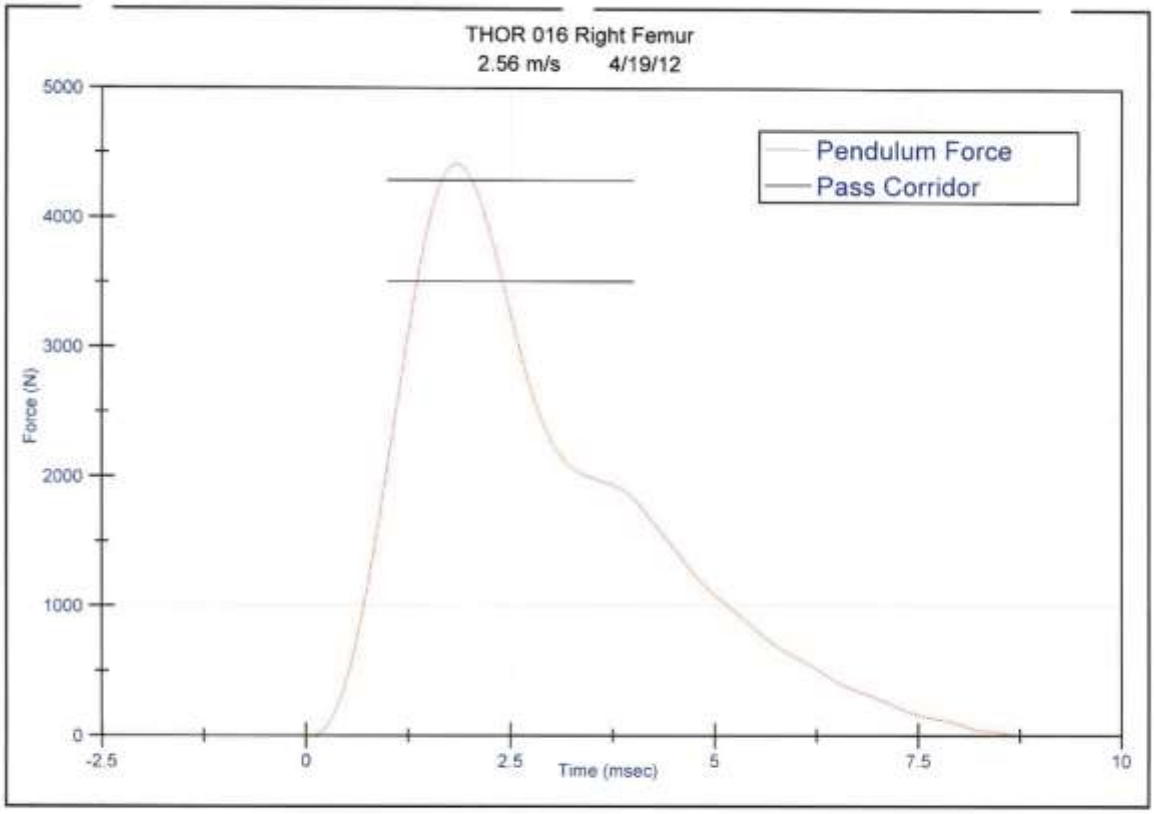

LX0018 Ball of foot
5.08 m/s 09/10/2012
Ankle Y-Rotation [deg]
60
45
30
15
0
-15
-30
-50
0
50
100
150
200
250
Time [mSec]
Peak Ankle Y-Axis Rotation
Pass Corrodors

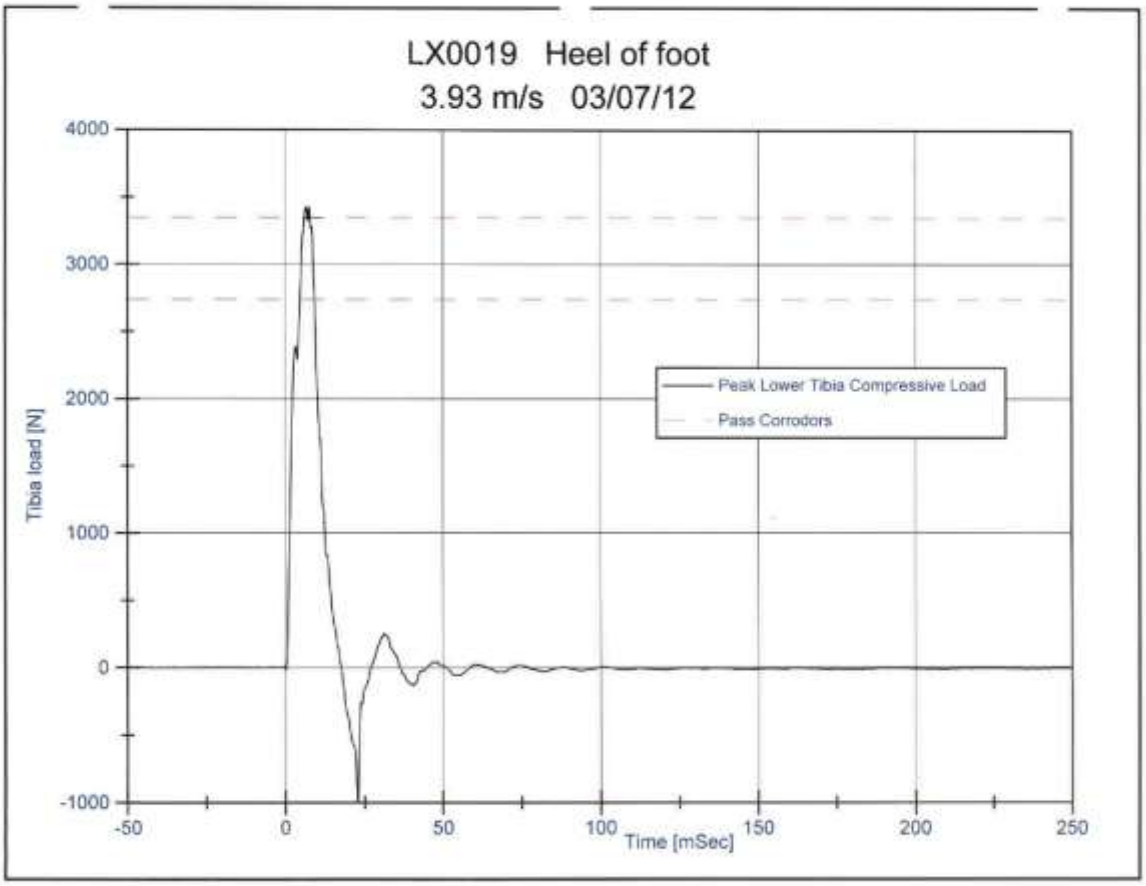

LX0018 Inversion of foot
2.00 m/s 09/10/2012
Tibia load [N]
800
700
600
500
400
300
200
100
0
-100
-50
0
50
100
150
200
250
Time [mSec]
Peak Lower Tibia Compressive Load
Pass Corrodors

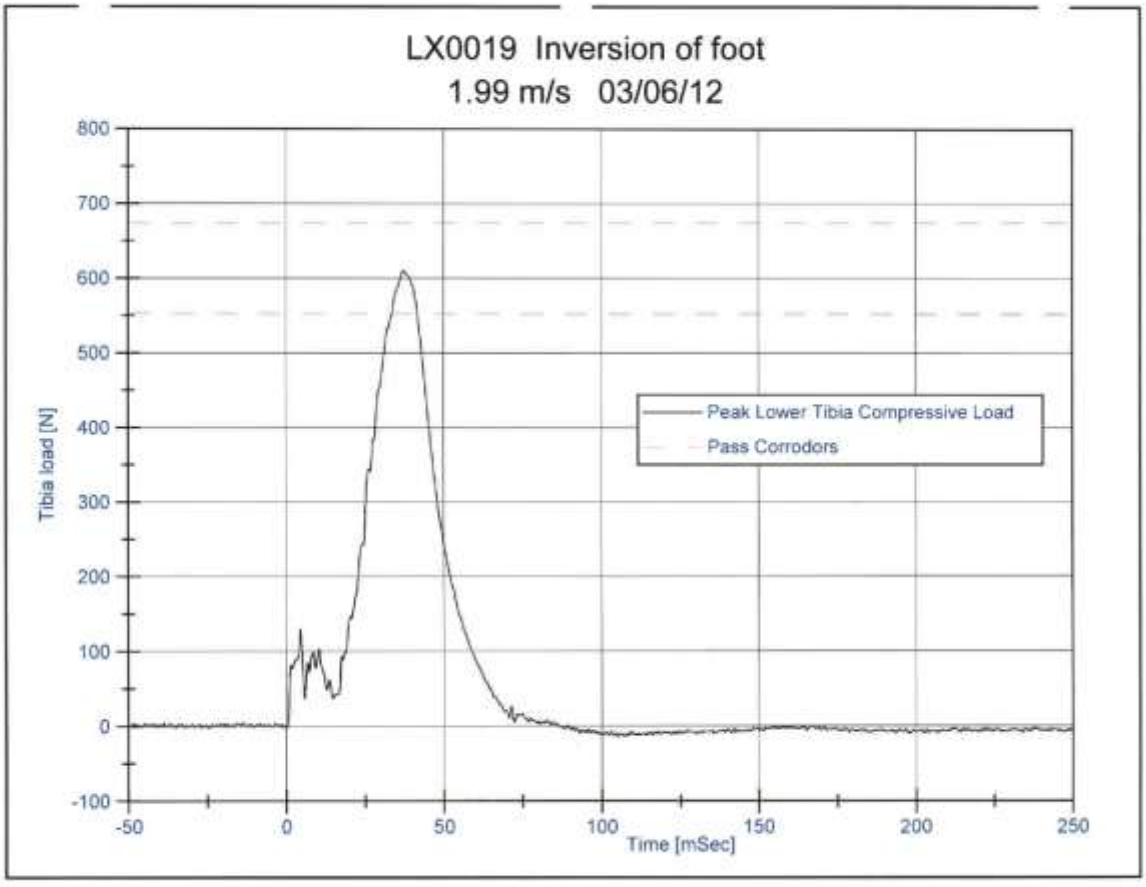

LX0018 Inversion of foot
2.00 m/s 09/10/2012
Ankle moment [Nm]
50
40
30
20
10
0
-10
-50
0
50
100
150
200
250
Time [mSec]
Peak Ankle Resistive Moment
Pass Corrodors

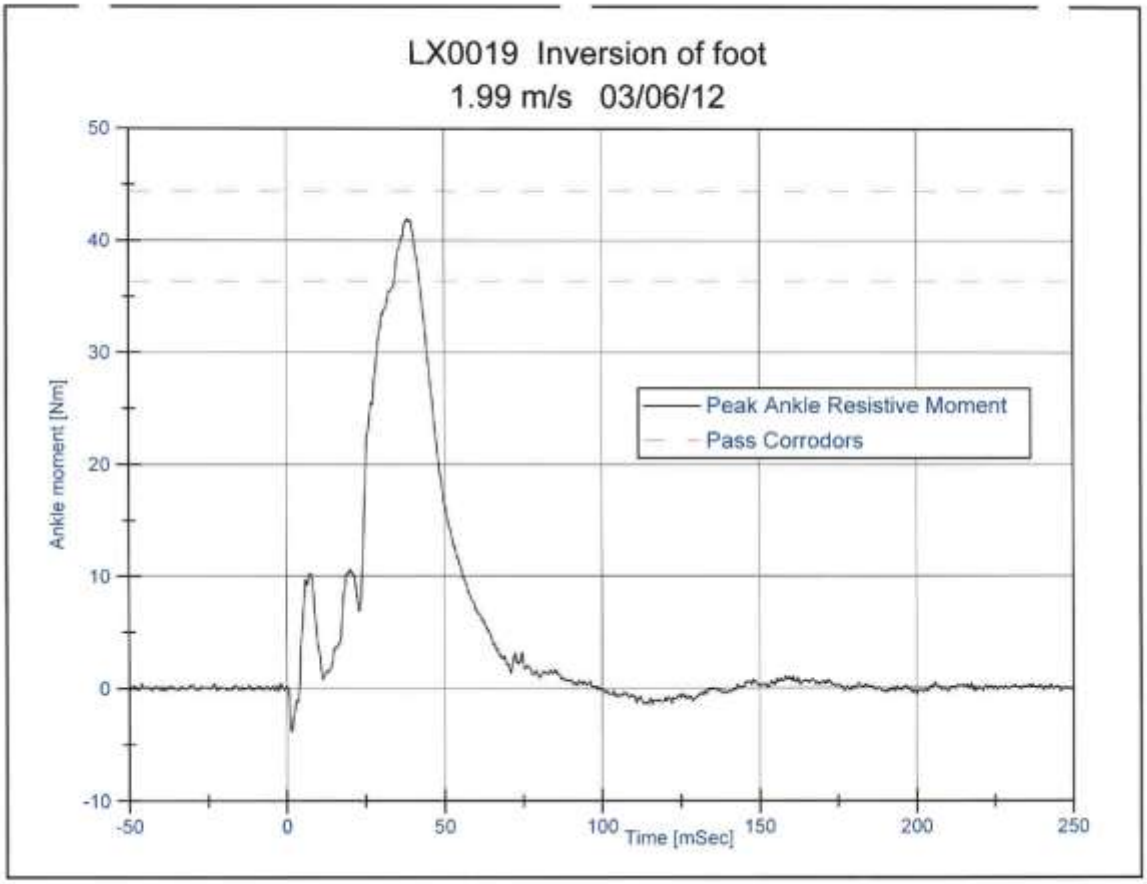

LX0018 Inversion of foot
2.00 m/s 09/10/2012
Ankle X-Rotation [deg]
60
45
30
15
0
-15
-30
-50
0
50
100
150
200
250
Time [mSec]
Peak Ankle X-Axis Rotation
Pass Corrodors

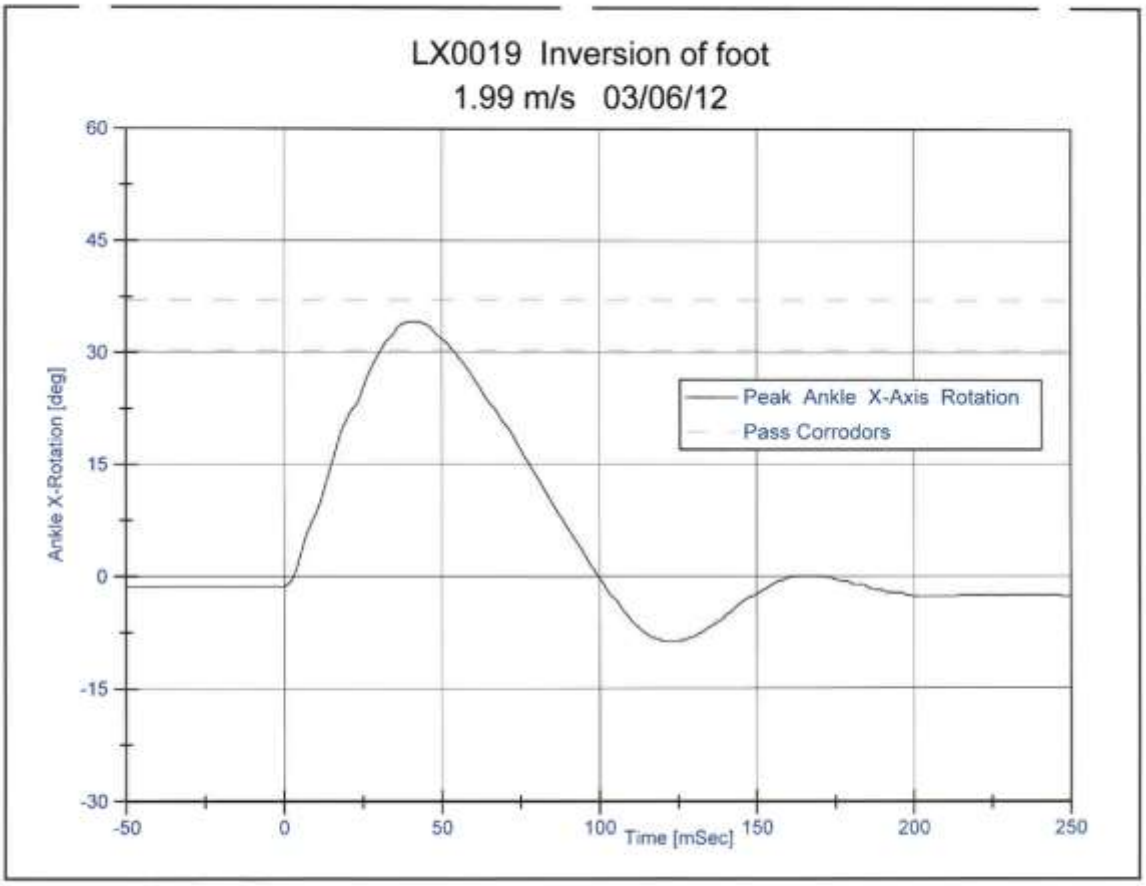

LX0062 Right Knee Slider Component
2.73 m/s 09/20/2012
Pendulum Force
Pass Bars
Force (N)
4000
3000
2000
1000
0
0
5
10
15
20
Knee displacement (mm)

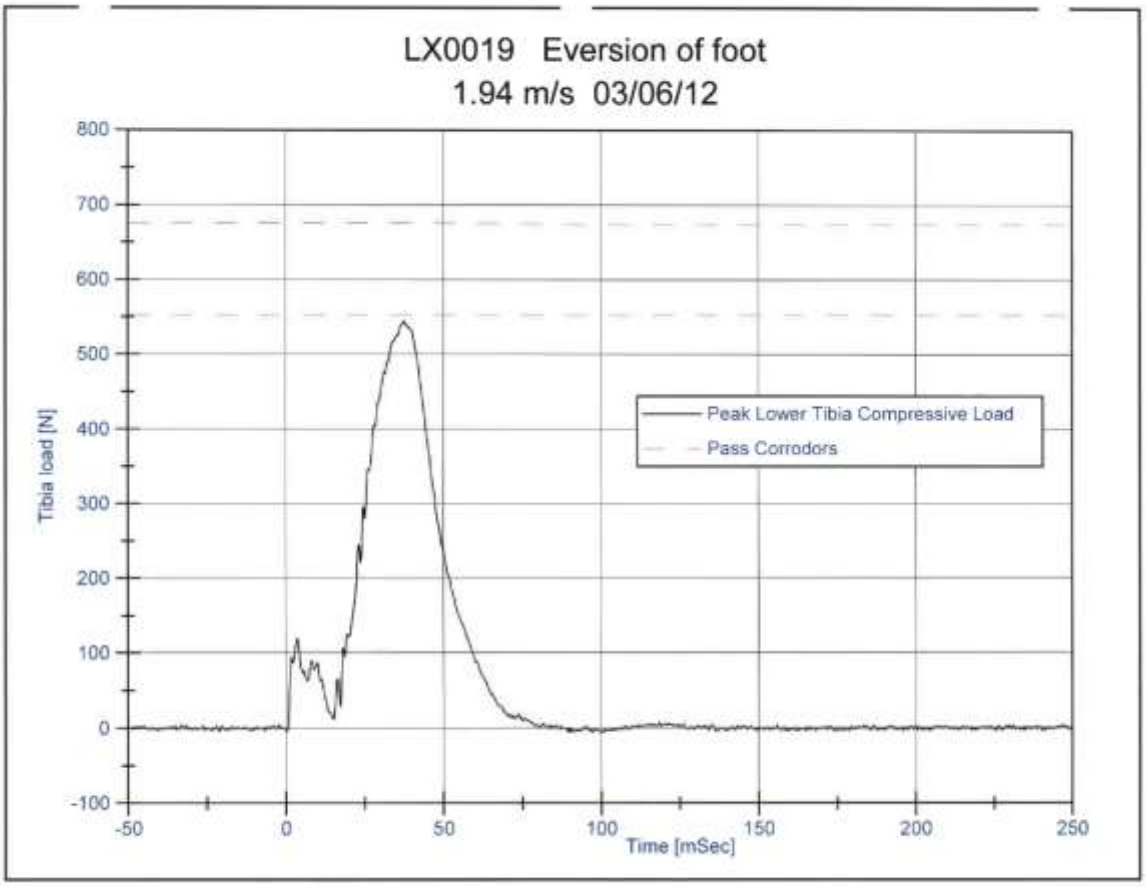

THOR 016 Right Femur
2.56 m/s 4/19/12
Pendulum Force
Pass Corridor
Force (N)
5000
4000
3000
2000
1000
0
-2.5
0
2.5
5
7.5
10
Time (msec)

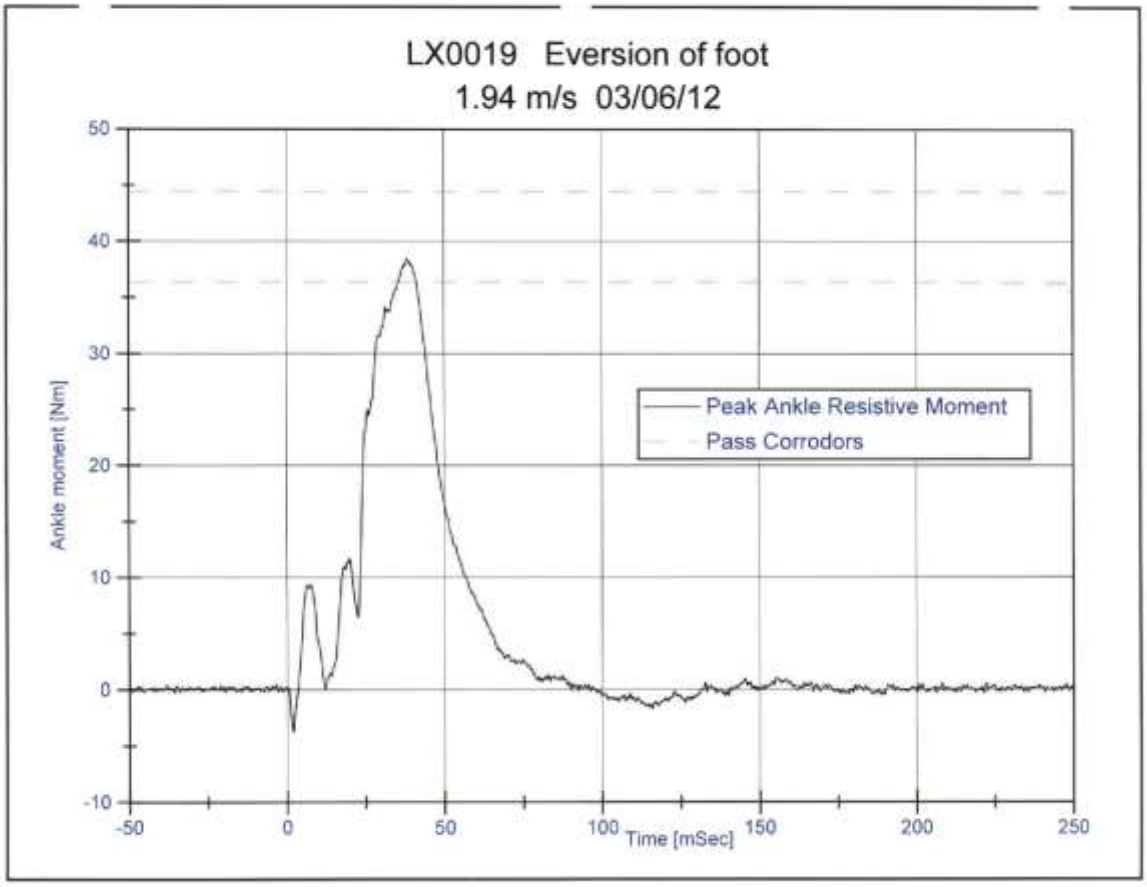

LX0019 Heel of foot
3.93 m/s 03/07/12
Tibia load [N]
Time [mSec]
Peak Lower Tibia Compressive Load
Pass Corrodors
4000
3000
2000
1000
0
-1000
-50
0
50
100
150
200
250

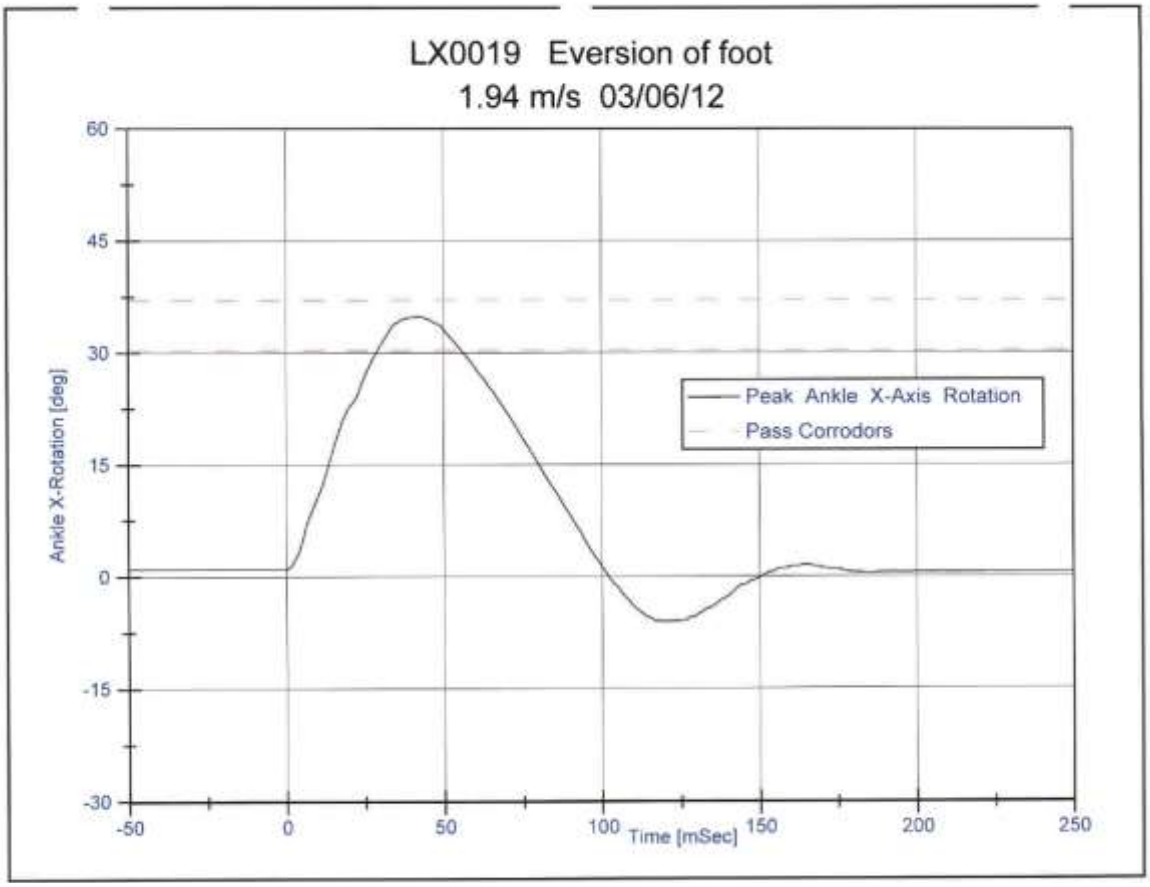

LX0019 Inversion of foot
1.99 m/s 03/06/12
Tibia load [N]
Time [mSec]
Peak Lower Tibia Compressive Load
Pass Corrodors
800
700
600
500
400
300
200
100
0
-100
-50
0
50
100
150
200
250

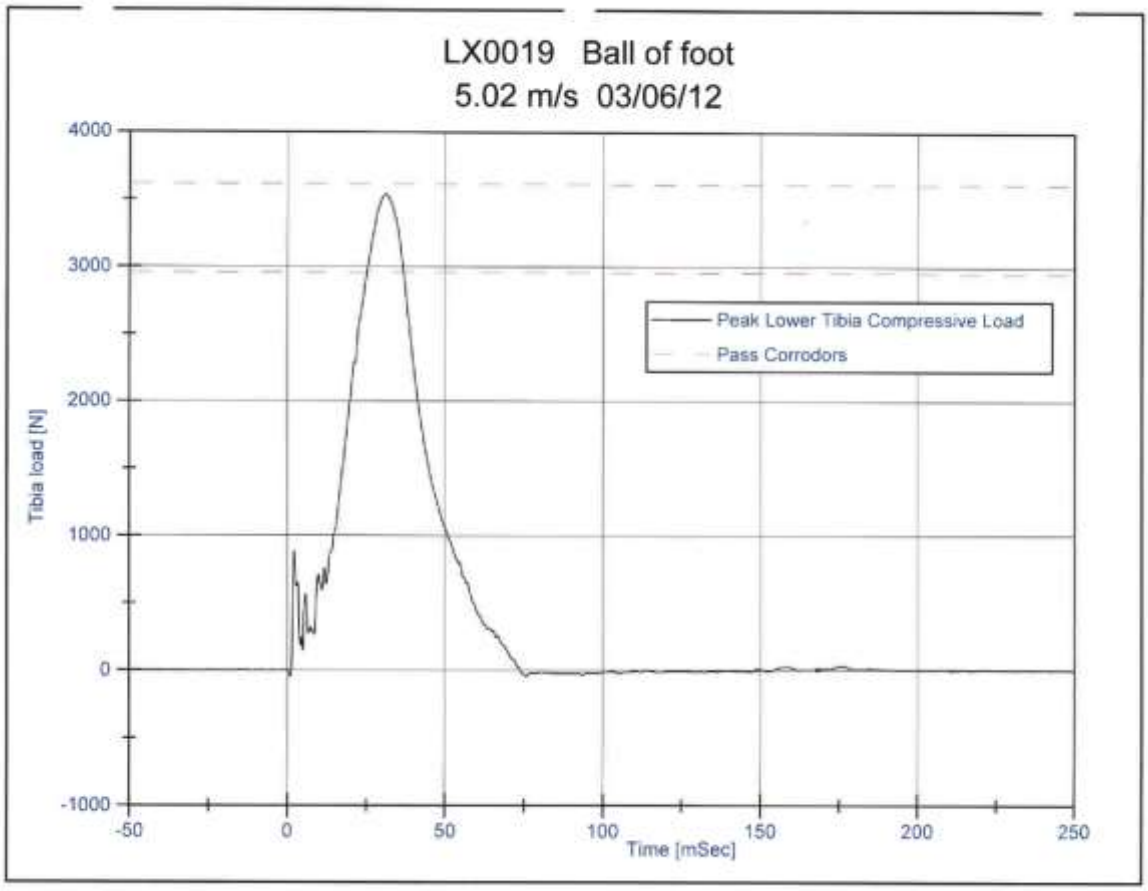

LX0019 Inversion of foot
1.99 m/s 03/06/12
Ankle moment [Nm]
Time [mSec]
Peak Ankle Resistive Moment
Pass Corrodors
50
40
30
20
10
0
-10
-50
0
50
100
150
200
250

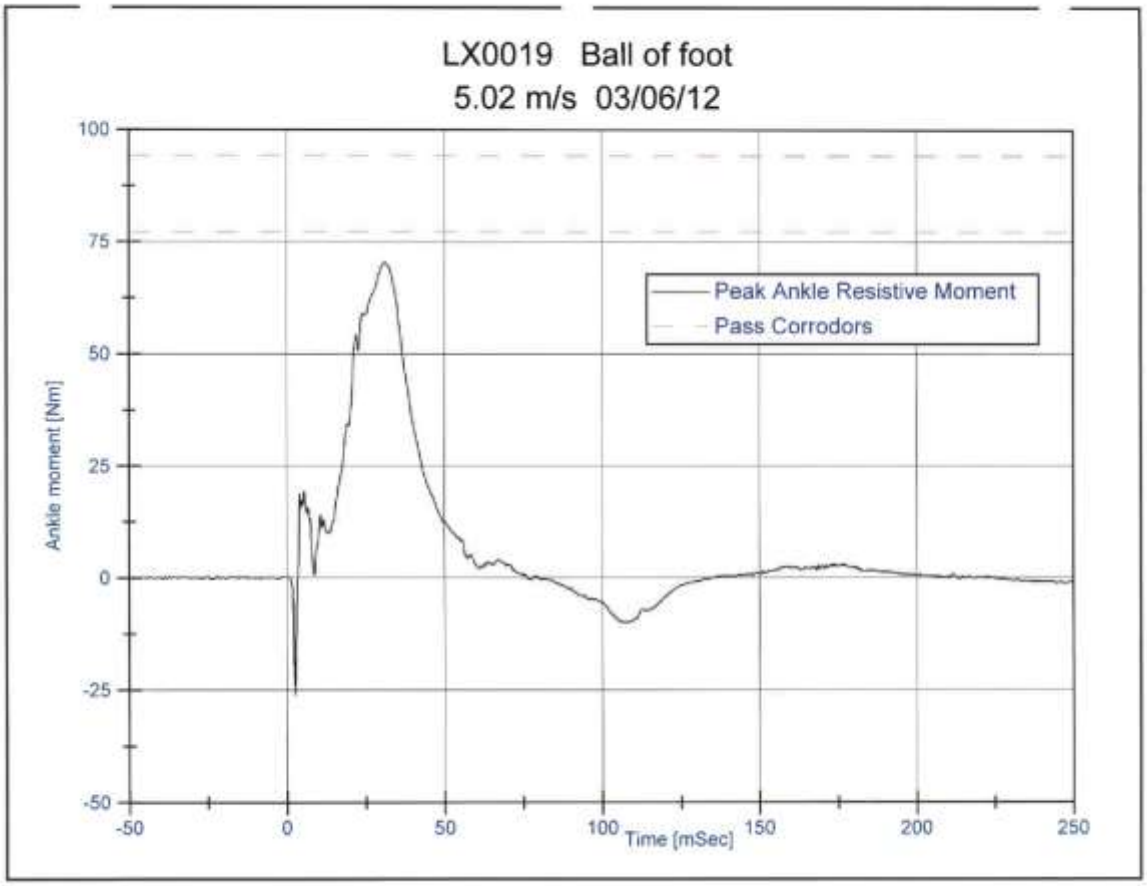

LX0019 Inversion of foot
1.99 m/s 03/06/12
Ankle X-Rotation [deg]
Time [mSec]
Peak Ankle X-Axis Rotation
Pass Corrodors
60
45
30
15
0
-15
-30
-50
0
50
100
150
200
250

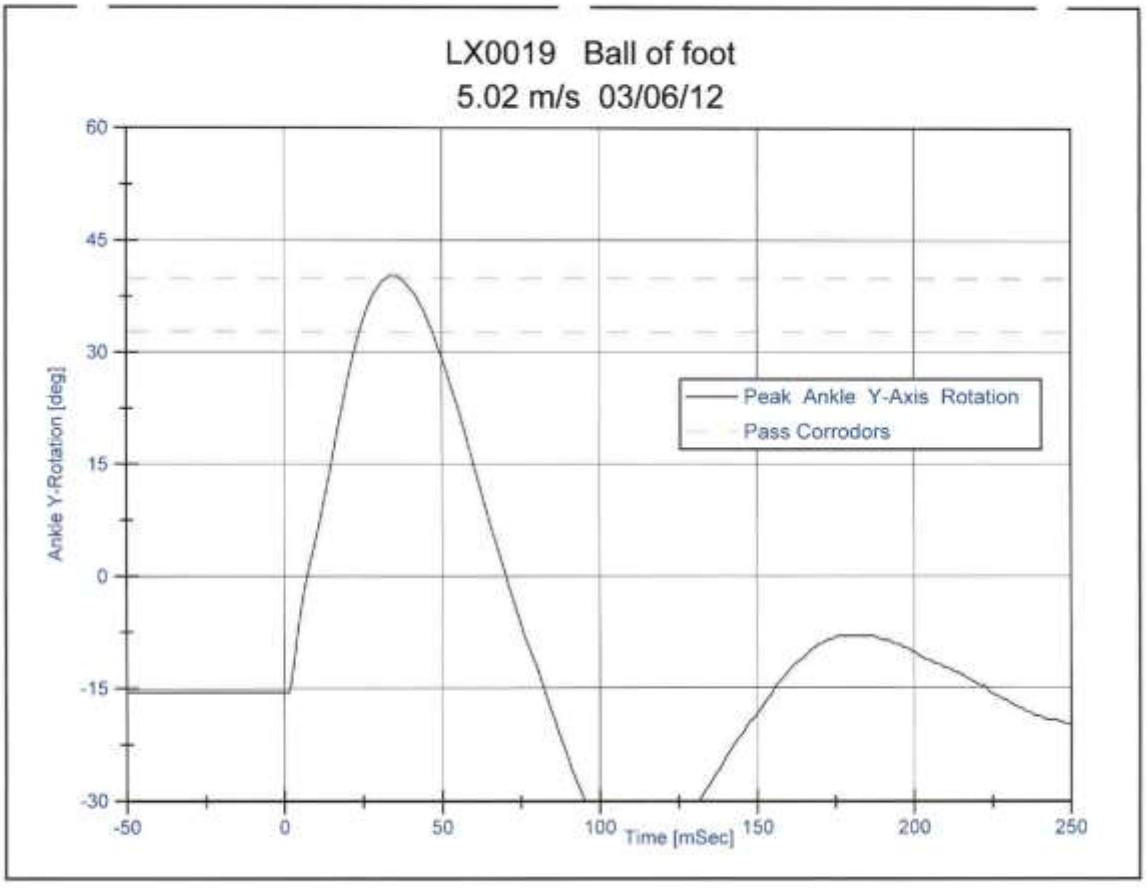

LX0019 Eversion of foot
1.94 m/s 03/06/12
Tibia load [N]
800
700
600
500
400
300
200
100
0
-100
-50
0
50
100
150
200
250
Time [mSec]
Peak Lower Tibia Compressive Load
Pass Corrodors


LX0019 Eversion of foot
1.94 m/s 03/06/12
Ankle moment [Nm]
50
40
30
20
10
0
-10
-50
0
50
100
150
200
250
Time [mSec]
Peak Ankle Resistive Moment
Pass Corrodors


LX0019 Eversion of foot
1.94 m/s 03/06/12
Ankle X-Rotation [deg]
60
45
30
15
0
-15
-30
-50
0
50
100
150
200
250
Time [mSec]
Peak Ankle X-Axis Rotation
Pass Corrodors


LX0019 Ball of foot
5.02 m/s 03/06/12
Tibia load [N]
4000
3000
2000
1000
0
-1000
-50
0
50
100
150
200
250
Time [mSec]
Peak Lower Tibia Compressive Load
Pass Corrodors


LX0019 Ball of foot
5.02 m/s 03/06/12
Peak Ankle Resistive Moment
Pass Corrodors
Ankle moment [Nm]
Time [mSec]
100
75
50
25
0
-25
-50
-50
0
50
100
150
200
250


LX0019 Ball of foot
5.02 m/s 03/06/12
Peak Ankle Y-Axis Rotation
Pass Corrodors
Ankle Y-Rotation [deg]
Time [mSec]
60
45
30
15
0
-15
-30
-50
0
50
100
150
200
250

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

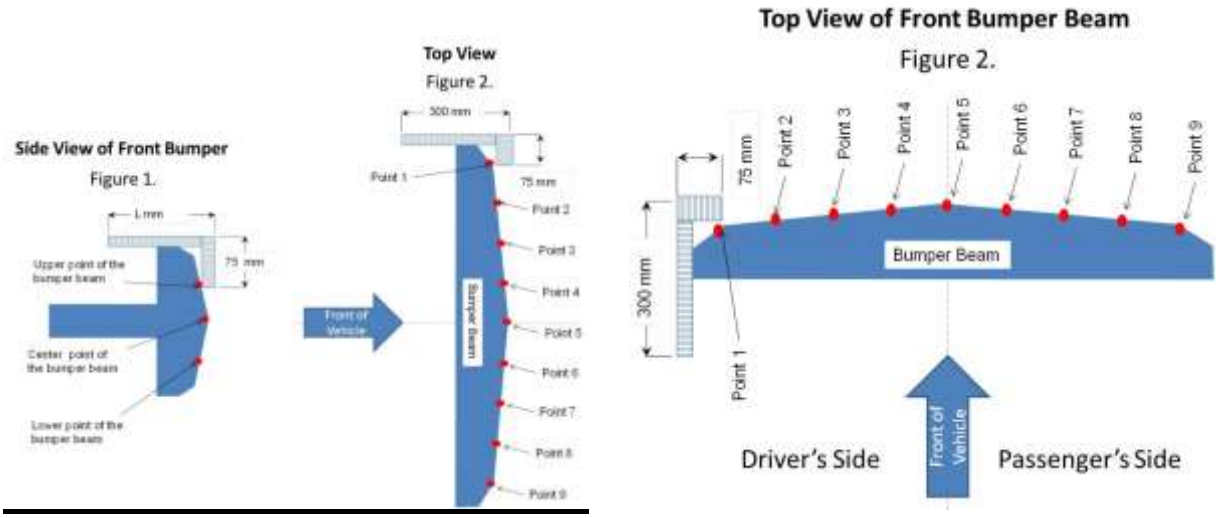
The Brake Pedal Reference Point is the x, y, and z location of the geometric center of the brake pedal pad (top surface) in the VCS.

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 plan 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 22 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 5 cm from the A3 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 5 cm from the B3 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 5 cm from the C3 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 5 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 5 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 5 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 5 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 5 cm

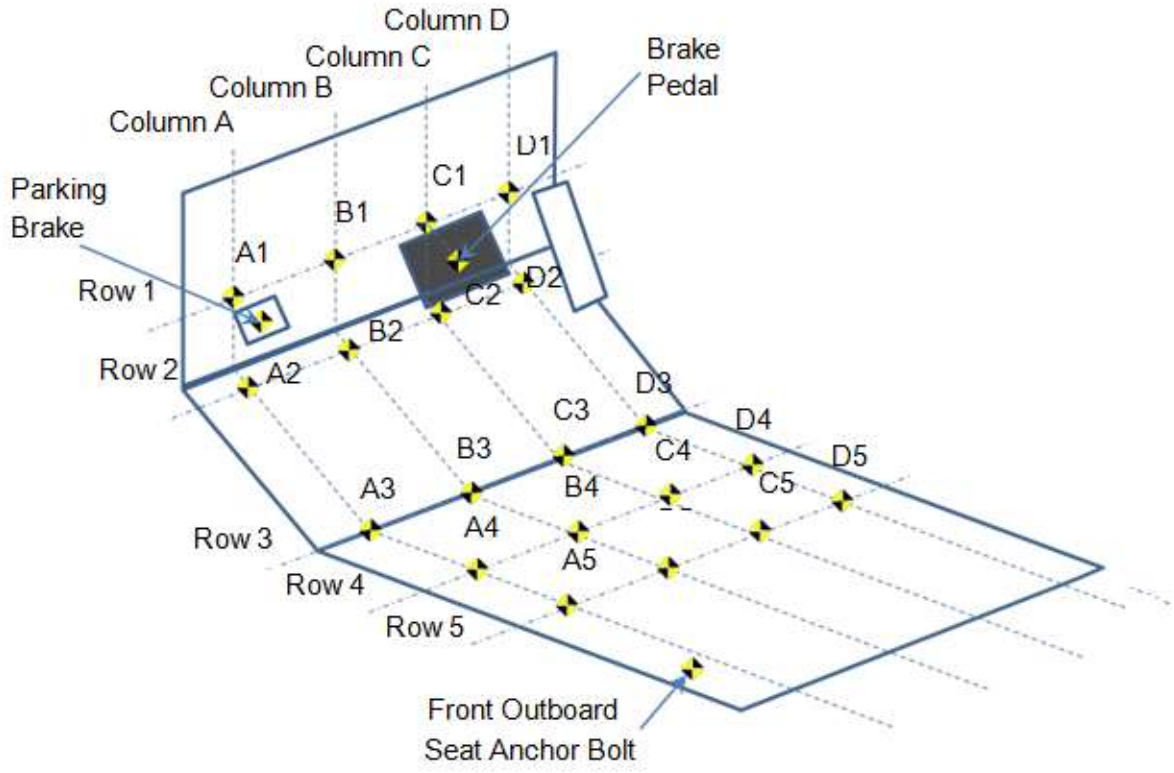
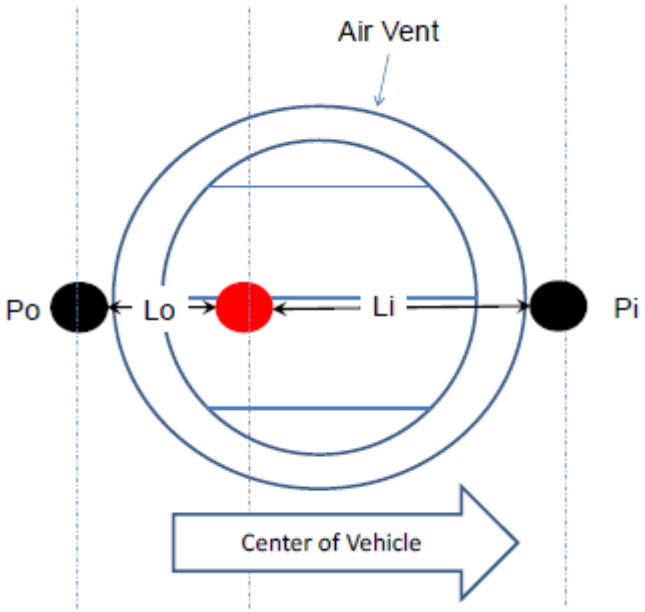


Figure 22: Lower interior intrusion measurements

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.



$$dp = \frac{Li}{Lo + Li}[X_o, Y_o, Z_o] + \frac{Lo}{Lo + Li}[X_o, Y_o, Z_o]$$

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 25 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 15 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 subtracting 0 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 25 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 15 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 subtracting 0 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 floor reference. The lateral coordinate of the A3 is obtained by subtracting 25 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 floor reference. The lateral coordinate of the B3 is obtained by subtracting 15 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 floor reference. The lateral coordinate of the C3 is obtained by subtracting 0 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT A4

The longitudinal coordinate of the A4 measurement location is obtained by subtracting 5 cm from the A3 reference. The lateral coordinate of the A4 is obtained by subtracting 25 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT B4

The longitudinal coordinate of the B4 measurement location is obtained by subtracting 5 cm from the B3 reference. The lateral coordinate of the B4 is obtained by subtracting 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT C4

The longitudinal coordinate of the C4 measurement location is obtained by subtracting 5 cm from the C3 reference. The lateral coordinate of the C4 is obtained by subtracting 0 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT A5

The longitudinal coordinate of the A5 measurement location is obtained by subtracting 5 cm from the A4 reference. The lateral coordinate of the A5 is obtained by subtracting 25 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT B5

The longitudinal coordinate of the B5 measurement location is obtained by subtracting 5 cm from the B4 reference. The lateral coordinate of the B5 is obtained by subtracting 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT C5

The longitudinal coordinate of the C5 measurement location is obtained by subtracting 5 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.

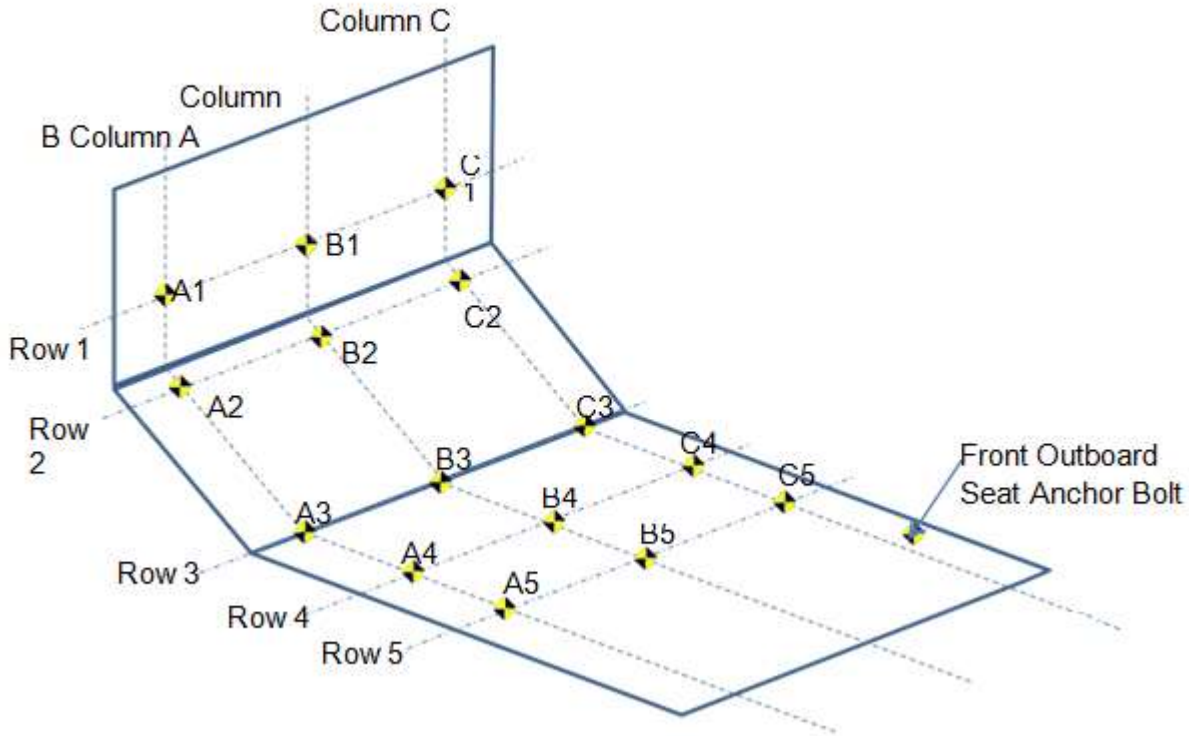


Figure 24: Passenger side lower interior measurements

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

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.

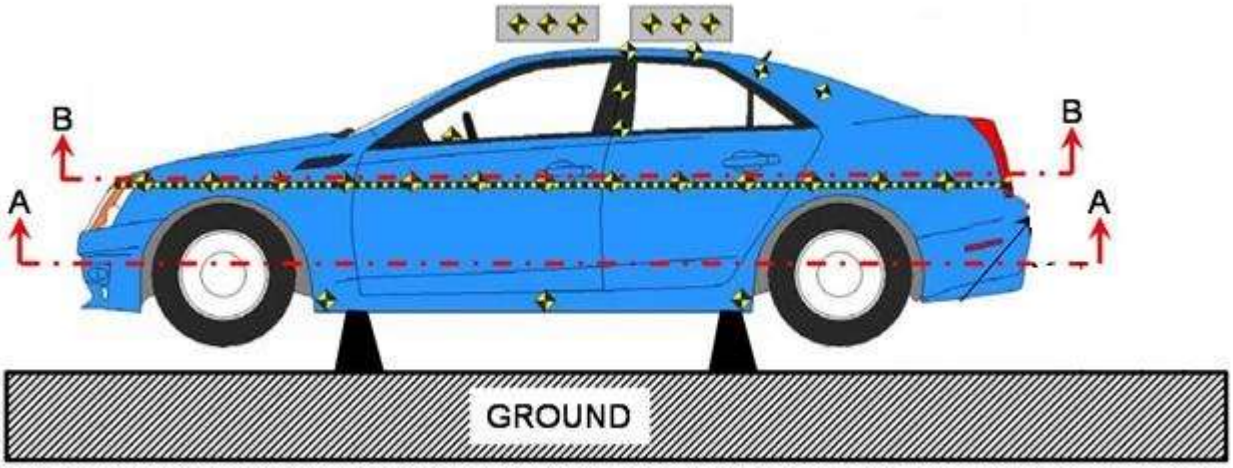


Figure 26: Pre-Test Vehicle Profile

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.

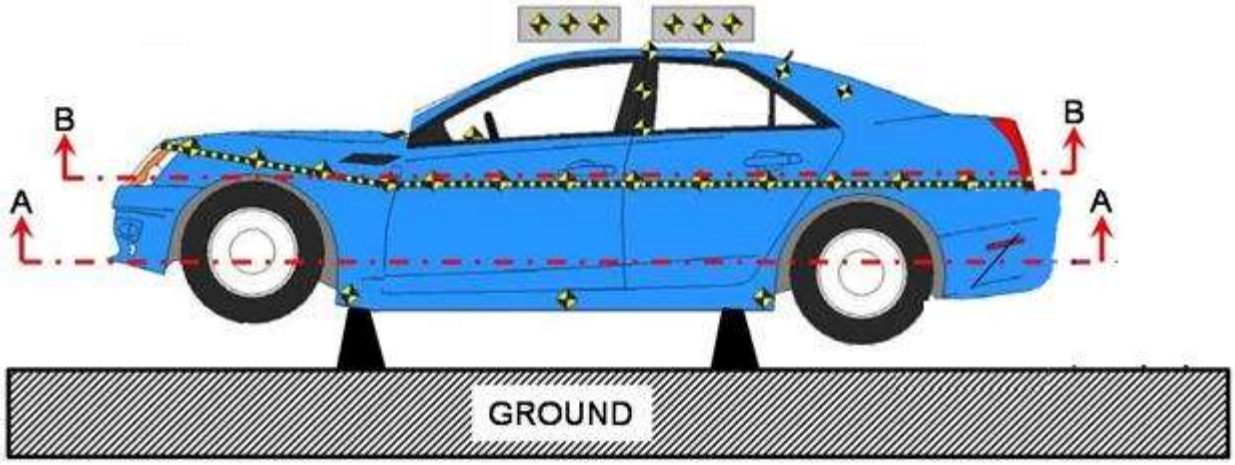


Figure 27: Post-Test Vehicle Profile

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.