

**REPORT NUMBER: R&D-KAR-20-015**

**VEHICLE TO RIGID BARRIER CRASH TEST IN SUPPORT OF  
NHTSA'S FRONTAL RESEARCH CRASH TEST PROGRAM  
LEFT SIDE 30° FRONTAL RIGID BARRIER IMPACT**

**HONDA OF AMERICA MFG., INC.  
2020 HONDA ACCORD 4-DOOR SEDAN**

**NHTSA No: R20205383**

**PREPARED BY:  
APPLUS IDIADA KARCO ENGINEERING, LLC.  
9270 HOLLY ROAD  
ADELANTO, CA 92301**



**AUGUST 13, 2021**

**FINAL REPORT**

**PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
VEHICLE SAFETY RESEARCH  
1200 NEW JERSEY AVE, SE, ROOM W46-446  
WASHINGTON, D.C. 20590**



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	<b>15. Supplementary Notes</b>																																																
<b>16. Abstract</b>  A 40.0 km/h Right Side 30° Frontal Rigid Barrier Impact Test was conducted on a 2020 Honda Accord 4-door sedan in accordance with Contract DTNH22-14-D-00360L, Task Order #693JJ918F000199. 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 Applus IDIADA KARCO Engineering, LLC. facility in Adelanto, California on July 30, 2021.  The impact velocity of the vehicle was 39.74 km/h and the ambient temperature at the barrier face at the time of impact was 32.8°C. The vehicle's post-test maximum crush was 410.4 mm measured to the left of the vehicle's centerline. The test vehicle's performance was as follows:																																																	
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th>Driver Hybrid III 50th</th> <th>Passenger THOR</th> </tr> <tr> <th>Result</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC<sub>15</sub>)</td> <td></td> <td>67.59</td> <td>85.00</td> </tr> <tr> <td>Brain Injury Criteria (BrIC)</td> <td></td> <td></td> <td>0.69</td> </tr> <tr> <td>Nij</td> <td></td> <td>0.20</td> <td></td> </tr> <tr> <td>Peak Neck Tension</td> <td>N</td> <td>818.17</td> <td>719.10</td> </tr> <tr> <td>Peak Neck Compression</td> <td>N</td> <td>-747.15</td> <td>-776.40</td> </tr> <tr> <td>Peak Chest Deflection</td> <td>mm</td> <td>-18.87</td> <td>32.50</td> </tr> <tr> <td>Peak Abdomen Deflection</td> <td>mm</td> <td></td> <td>34.90</td> </tr> <tr> <td>Peak Resultant Acetabulum Force</td> <td>N</td> <td></td> <td>1907.40</td> </tr> <tr> <td>Peak Femur Force</td> <td>N</td> <td>-4623.29</td> <td>3566.60</td> </tr> <tr> <td>Peak Tibia Index</td> <td></td> <td></td> <td>0.44</td> </tr> </tbody> </table>				Measurement Description	Units	Driver Hybrid III 50th	Passenger THOR	Result	Result	Head Injury Criteria (HIC <sub>15</sub> )		67.59	85.00	Brain Injury Criteria (BrIC)			0.69	Nij		0.20		Peak Neck Tension	N	818.17	719.10	Peak Neck Compression	N	-747.15	-776.40	Peak Chest Deflection	mm	-18.87	32.50	Peak Abdomen Deflection	mm		34.90	Peak Resultant Acetabulum Force	N		1907.40	Peak Femur Force	N	-4623.29	3566.60	Peak Tibia Index			0.44
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## SECTION 1

### TEST PURPOSE AND PROCEDURE

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

This 40.0 km/h (24.9 mph) Left Side 30° Frontal Rigid Barrier Impact Test is part of the Frontal Research Crash Test Program outlined in Contract No. DTNH22-14-D-00360L, Task Order #693JJ918F000199. The purpose of this test is to obtain vehicle crashworthiness and occupant restraint system performance data for research purposes.

This test was conducted in accordance with the instructions set forth for a 40.0 km/h Left Side 30° Frontal Rigid Barrier Impact, outlined in Contract No. DTNH22-14-D-00360L, Task Order #693JJ918F000199. Data 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 was obtained, in addition to the data required by Contract No. DTNH22-14-D-00360L, Task Order #693JJ918F000199.

**SECTION 2**  
**SUMMARY OF TEST RESULTS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

A 40.0 km/h Left Side 30° Frontal Rigid Barrier Impact Test was conducted on a 2020 Honda Accord 4-door sedan. The test was performed at Applus IDIADA KARCO Engineering, LLC. on July 30, 2021.

The test was documented by one (1) real-time and eighteen (18) high-speed video cameras. Pre- and post-test photographs of the test vehicle and test setup were taken using a digital still camera. Photographic documentation of the test is presented in Appendix A of this report.

One (1) 50<sup>th</sup> percentile adult male Hybrid III anthropomorphic test device (ATD) (Serial No. 168) was seated in the left front seating position (P1 – Driver) and one 50<sup>th</sup> percentile adult male THOR (ATD) (Serial No. EG2595) was seated in the right front passenger seating position (P2). The driver was positioned according to instructions specified in FMVSS 208 Appendix F, Dummy Positioning Procedures for Driver and Passenger Test Dummy Conforming to Subpart E of Part 572. The passenger was positioned according to instructions specified in the THOR 50<sup>th</sup> Percentile Male Dummy Seating & Positioning Procedures: Passenger Position.

The driver was restrained with frontal, knee, torso/pelvis, and curtain airbags. The passenger was restrained with frontal and knee airbags. Both ATDs were unbelted for this test.

**SECTION 2 ... (CONTINUED)**  
**SUMMARY OF TEST RESULTS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

One hundred and seventy-two (172) channels of data from the two (2) ATD's and the test vehicle were collected using Diversified Technical Systems, Inc. data acquisition systems. Appendix B contains dummy data plots, as well as vehicle response data plots.

There was 100% total windshield retention. There was no intrusion into the protected zone of the windshield during any portion of the impact event. The maximum static crush of the vehicle was 410.4 mm measured on the left of the vehicle's centerline.

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

Structural observations include the following:

- The front end including the bumper, grille, and hood were crushed, with the damage concentrated on the left side

The driver ATD's visible contact points were:

- Head contacted the front airbag, headliner, Windshield, A-Pillar, and Curtain Airbag
- Torso contacted the front and Torso/Pelvis Airbag
- Left leg contacted the knee airbag and knee bolster
- Right leg contacted the knee airbag and knee bolster

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

- Head contacted the front airbag, A-Pillar
- Torso contacted the front airbag
- Left leg contacted the knee airbag
- Right leg contacted the knee airbag

**SECTION 2 ... (CONTINUED)**  
**SUMMARY OF TEST RESULTS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
 Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**PRIMARY IMPACT DATA**

Measured Parameter	Units	Value
Velocity at Impact	km/h	39.74
Vehicle Test Weight	kg	1622.5
Vehicle Maximum Static Crush	mm	410.4
Number of Data Channels		172
Number of Real-Time Cameras		1
Number of High-Speed Cameras		18

**DUMMY CONTACTS**

Description	Driver	Picture Ref.	Passenger	Picture Ref.
Dummy Type	Hybrid III, S/N: 168		THOR, S/N: EG2595	
Head Contact	Front Airbag, Headliner, Windshield, A-Pillar, and Curtain Airbag	A-44, A-89, A-90, A-91a, A-91b	Front Airbag, Windshield	A-93, A-95, A-99
Upper Torso Contact	Front Airbag, Torso/Pelvis Airbag	A-56, A-90	Front Airbag	A-105
Lower Torso Contact	Front Airbag	A-56	Front Airbag	A-105
Left Leg Contact	Knee Airbag, Knee Bolster	A-80, A-82, A-91	Knee Airbag	A-107, A-111
Right Leg Contact	Knee Airbag, Knee Bolster	A-80, A-82, A-91	Knee Airbag	A-107, A-111

**SECTION 2 ... (CONTINUED)**  
**SUMMARY OF TEST RESULTS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**DATA ANOMALIES**

Channel Description	Explanation
P2TH ACETABULUM RIGHT X FORCE	No Data Collected, Known Channel Failure
P1H3 HEAD AYR	No Data Collected, Channel Failed
DRIVER FLOOR PAN X	Mounting block decoupled at 25 ms
DRIVER FLOOR PAN Y	Mounting block decoupled at 25 ms
DRIVER FLOOR PAN Z	Mounting block decoupled at 25 ms

**SECTION 2 ... (CONTINUED)**  
**SUMMARY OF TEST RESULTS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
 Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

<b>Driver, Hybrid III 50th Percentile Male S/N 168</b>					
<b>Injury Reading</b>	<b>Units</b>	<b>Limit</b>	<b>Value</b>	<b>t<sup>1</sup></b>	<b>t<sup>2</sup></b>
HIC 15		700	67.585	97.1	112.1
Nij		1	0.200	73.9	<b>NCF</b>
Upper Neck Force Z (Tension)	N	4170	818.166	97.6	
Upper Neck Force Z (Compression)	N	4000	-747.145	111.4	
Upper Neck Moment Y (Flexion)	Nm	310	69.653	72.5	
Upper Neck Moment Y (Extension)	Nm	135	-11.940	152.8	
Chest Deflection	mm	63	-18.871	114.8	
3 ms Chest Clip	g	60	30.000	100.4	103.4
Femur Force, Left	N	10000	-4388.950	80.9	
Femur Force, Right	N	10000	-4623.293	88.6	

**SECTION 2 ... (CONTINUED)**  
**SUMMARY OF TEST RESULTS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
 Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

Passenger, THOR S/N EG2595					
LOCATION	DESCRIPTION	UNIT	SOURCE	MAX	MIN
Head	HIC 15ms		Compute	85.0	
	Brain Injury Criteria (BrIC)		Compute	0.685	
	Head Rotational Velocity X	Deg/s	60	357.4	-376.2
	Head Rotational Velocity Y	Deg/s	60	415.5	-2065.7
	Head Rotational Velocity Z	Deg/s	60	559.4	-481.2
Neck	Upper Neck Z-axis Force	N	1000	719.1	-776.4
	Upper Neck Y-axis Moment	Nm	600	24.4	-12.3
Chest	Upper Left Resultant Chest Deflection	mm	Compute	32.5	
	Upper Right Resultant Chest Deflection	mm	Compute	12.5	
	Lower Left Resultant Chest Deflection	mm	Compute	27.0	
	Lower Right Resultant Chest Deflection	mm	Compute	25.9	
Abdomen	Lower Left X-axis Deflection	mm	Compute	2.0	-34.9
	Lower Right X-axis Deflection	mm	Compute	4.8	-10.0
Acetabulum	Left Acetabulum Resultant Force	N	Compute	1907.4	
	Right Acetabulum Resultant Force	N	Compute	1682.9	
Femur	Left Femur Force, FZ	N	600	297.3	-3484.5
	Right Femur Force, FZ	N	600	232.9	-3566.6
Tibia	Left Upper Tibia, FZ	N	600	163.3	-1928.8
	Left Upper Tibia Index		Compute	0.441	
	Right Upper Tibia, FZ	N	600	150.6	-1790.8
	Right Upper Tibia Index		Compute	0.222	
	Left Lower Tibia, FZ	N	600	107.4	-2083.3
	Left Lower Tibia Index		Compute	0.170	
	Right Lower Tibia, FZ	N	600	103.8	-2147.9
	Right Lower Tibia Index		Compute	0.107	
Ankle	Left Ankle Rotation, RX	Deg	180	22.3	-18.6
	Left Ankle Rotation, RY	Deg	180	-2.7	-19.5
	Left Ankle Dorsiflexion Moment, MY	Nm	Compute	67.2	-21.0
	Left Ankle In/Eversion Moment, MX	Nm	Compute	26.1	-11.0
	Right Ankle Rotation, RX	Deg	180	4.4	-3.3
	Right Ankle Rotation, RY	Deg	180	2.0	-20.4
	Right Ankle Dorsiflexion Moment, MY	Nm	Compute	61.8	-32.0
	Right Ankle In/Eversion Moment, MX	Nm	Compute	7.5	-10.0

Anomalies:

Acetabulum Fx not functional

### SECTION 3

#### OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383

Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

#### CONVERSION FACTORS

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	1.609344
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.574
Pressure	Tire Pressures	lbf/in <sup>2</sup>	kPa	6.895
Temperature	General Use	°F	°C	$=(T_f - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf-ft	N•m	1.355

**DATA SHEET NO. 1**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
 Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**TEST VEHICLE INFORMATION AND OPTIONS**

NHTSA Number	R20205383
Model Year	2020
Make	Honda
Model	Accord
Body Style	4-Door Sedan
VIN	1HGCV1F1XLA145390
Body Color	Silver
Odometer Reading (km / mi)	220/137
Engine Displacement (L)	1.5
Type / No. of Cylinders	Inline 4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	CVT
Overdrive	Yes
Final Drive	FWD
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

Traction Control System	Yes
Power Steering	Yes
Power Window Auto-Reverse	Yes
Driver Frontal Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Front Pass. Frontal Airbag	Yes
Front Pass. Curtain Airbag	Yes
Front Pass. Head/Torso Airbag	No
Front Pass. Torso Airbag	No
Front Pass. Torso/Pelvis Airbag	Yes
Front Pass. Pelvis Airbag	No
Front Pass. Knee Airbag	Yes
Driver Seat Belt Pretensioner	Yes
Driver Load Limiter	Yes
Front Pass. Seat Belt Pretensioner	Yes
Front Pass. Load Limiter	Yes
Other Safety Restraint	No

Does Owner's Manual provide instructions to turn off automatic door locks? Yes

**DATA FROM CERTIFICATION LABEL**

Manufactured By	Honda of America Mfg., Inc.
Date of Manufacture	Sep-20

GVWR (kg)	1950
GAWR Front (kg)	1070
GAWR Rear (kg)	960

**VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION**

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Designated Seating Capacity	2	3		5
Capacity Weight (VCW) (kg)				385.0
DSC x 68.04 (kg)				340.2
Cargo Weight (RCLW) (kg)				44.8

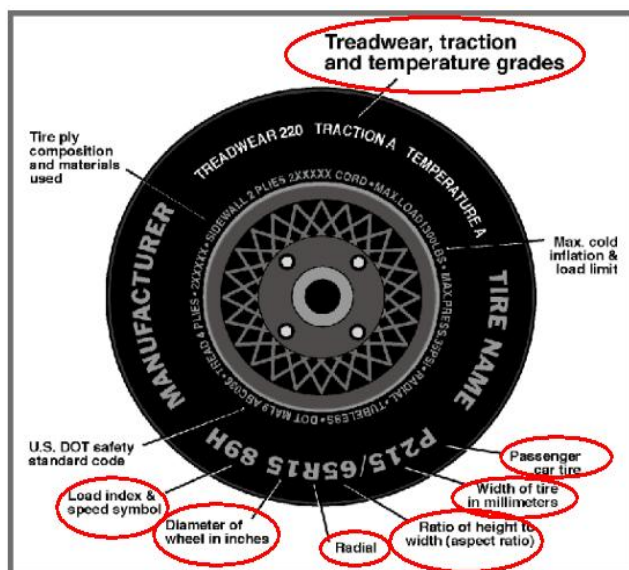
A  
B  
A-B\*

\*A maximum RCLW of 136.0 kg is used for a truck, MPV, or bus

## DATA SHEET NO. 1 ... (CONTINUED)

### GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
 Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21



Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	350	350
Cold Pressure (kPa)	220	220
Recommended Tire Size	225/50R17	225/50R17
Tire Size on Vehicle	225/50R17	225/50R17
Tire Manufacturer	Hankook	Hankook
Tire Model	Kinergy GT	Kinergy GT
Treadware	500	500
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	2 Steel, 1 Polyester, 1 Nylon	2 Steel, 1 Polyester, 1 Nylon
Load Index/Speed Symbol	94V	94V
Tire Material	Steel, Polyester, Nylon	Steel, Polyester, Nylon
DOT Safety Code Left	1T7AB 1B 1120	1T7AB 1B 1120
DOT Safety Code Right	1T7AB 1B 1020	1T7AB 1B 1120

**DATA SHEET NO. 1 ... (CONTINUED)**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
 Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**TEST VEHICLE WEIGHTS**

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	431.0	287.5		512.0	307.5	
Right	kg	423.5	277.5		504.0	299.0	
Ratio	%	60.2%	39.8%	100.0%	62.6%	37.4%	100.0%
Total	kg	854.5	565.0	1419.5	1016.0	606.5	1622.5

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1419.5	A
Weight of THOR-50M and AM50	kg	164.0	B
Rated Cargo/Luggage Weight (RCLW)	kg	44.8	C
Calculated Vehicle Target Weight (TVTW)	kg	1628.3	A+B+C

**TEST VEHICLE ATTITUDES**

Condition	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	711	720	727	734	1125
As Tested	mm	696	698	692	696	1057
Post-Test	mm	729	728	687	694	

**GENERAL TEST VEHICLE DATA**

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2827
Total Vehicle Length at Left Side	mm	4758
Total Vehicle Length at Centerline	mm	4882
Total Vehicle Length at Right Side	mm	4774
Weight of Ballast/Equipment in Cargo Area	kg	83.9
Weight of Vehicle Components Removed	kg	56.5
Amount of Stoddard Solvent in Fuel Tank	L	52.10

**VEHICLE COMPONENTS REMOVED TO MEET TEST WEIGHT:**

Rear Seat Assembly, Rear Bumper Fascia, Taillights, Rear Bumper, Trunk Lid, Spare Tire and Tools

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

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
 Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**TARGET VEHICLE STRUCTURAL MEASUREMENTS**

No.	Description	Units	Pre-Test
1	Total Length	mm	4882
2	Total Width	mm	1857
3*	Bumper Top Height	mm	599
4*	Bumper Bottom Height	mm	434
5*	Longitudinal Member Top Height	mm	599
6	Distance Between Longitudinal Members	mm	956
7	Longitudinal Member Width	mm	94
8*	Engine Top Height	mm	930
9*	Engine Bottom Height	mm	219
10	Engine and Gearbox Width	mm	548
11	Front Bumper to Engine Distance	mm	421
12*	Front Shock Absorber Fixing Height	mm	1020
13*	Bonnet Leading Edge Height	mm	900
14	Front Shock Absorber Fixing Width	mm	1180
15	Front Bumper to Front Axle Distance	mm	935
16	Front Axle to A-Pillar Distance	mm	552
17	A-Pillar to B-Pillar Distance	mm	1064
18	B-Pillar to Rear Axle Distance	mm	1217
19	B-Pillar to C-Pillar Distance	mm	964
20*	Roof Sill Bottom Height	mm	1555
21*	Roof Sill Top Height	mm	1665
22*	Floor Sill Bottom Height	mm	330
23*	Floor Sill Top Height	mm	420

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

**DATA SHEET NO. 2**

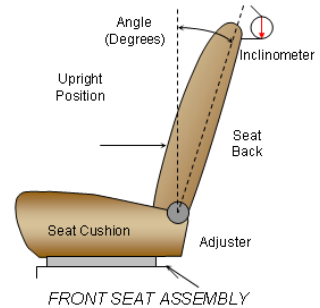
**SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383

Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**NOMINAL DESIGN RIDING POSITION**

The driver seat back was initially set to the manufacturer’s designated angle listed in FORM 208 but was moved rearward per THOR seating procedure to level the head. The passenger seat back was set to the manufacturer’s designated angle listed in FORM 208.

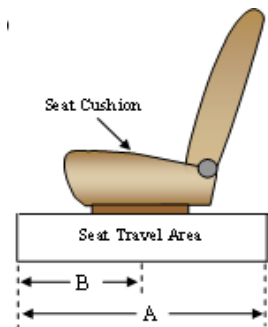


**SEAT BACK ANGLE**

Seating Position	Unit	FORM 208 Position	After ATD Positioning
Driver Seat Back Angle	Degrees	2.7	4.7
Passenger Seat Back Angle	Degrees	2.7	4.0

**SEAT FORE / AFT POSITIONING**

The driver seat travel is measured from the forward most position to the rear most position with the seat cushion set at mid angle. The driver seat was initially positioned 25 mm rearward of mid-track before being moved as far forward as possible where the ATD did not contact any interior panels, up to mid-track. The passenger seat travel is measured from the forward most possible position to the rear most possible position. The passenger seat is set to the middle of the fore-aft travel.



**SEAT FORE/AFT POSITIONS**

Seating Position	Total Fore/Aft Travel (mm)	Placed in Position (mm)
Driver Seat	240	120
Passenger Seat	240	120

**SEAT BELT UPPER ANCHORAGE**

The seat belt upper anchorage is positioned to the manufacturer’s design position for a 50<sup>th</sup> percentile adult male ATD for the driver and passenger. Position “H” is the uppermost position, followed by position “M1” and “M2.” Position “L” is the lowermost position.

**SEAT BELT UPPER ANCHORAGES**

Seating Position	Total No. of Positions	Placed in Position
Driver Seat	4	H
Passenger Seat	4	H

**DATA SHEET NO. 2 ... (CONTINUED)**

**SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL**

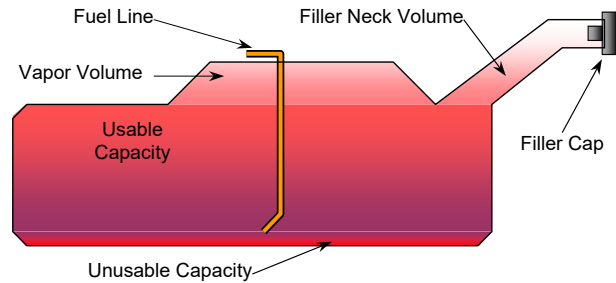
Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
 Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**FUEL TANK CAPACITY**

Description	Liters
Usable Capacity of "Standard Tank"	56.02
Usable Capacity of "Optional Tank"	
93% of Usable Capacity	52.10
Actual Amount of Stoddard Solvent Used	52.10
1/3 of Usable Capacity	18.67

**FUEL PUMP**

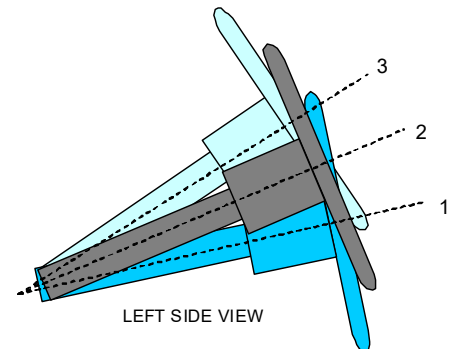
Fuel was evacuated according to the specifications provided by the manufacturer in Form 208. The electric fuel pump operates when the electrical system is activated.



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. A digital inclinometer is used to measure a plate which is placed across the rim of the steering wheel for angular measurements. A tape measure is used to measure telescoping steering wheel travel.



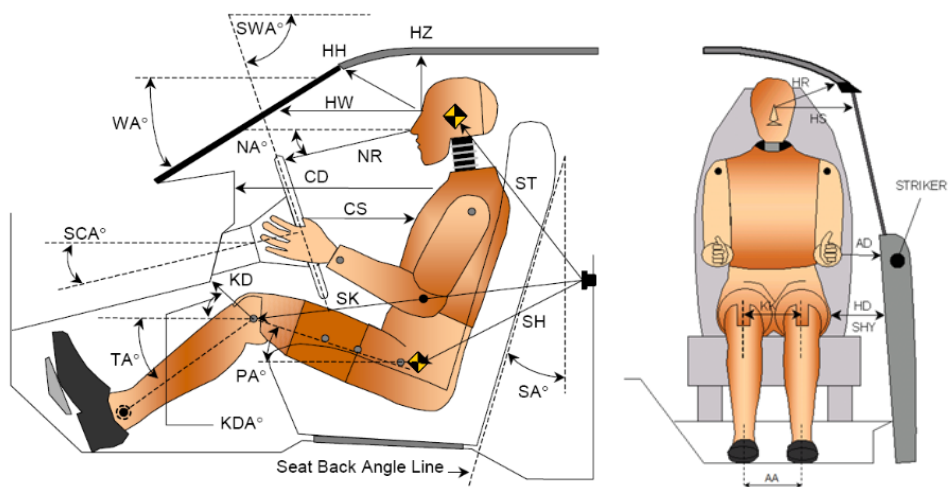
STEERING COLUMN ASSEMBLY

**STEERING COLUMN POSITIONING**

	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	17.2	32
Geometric Center Position, No. 2	20.1	52
Uppermost Position, No. 3	22.7	72
Telescoping Steering Wheel Travel		40
Test Position	20.0	52

**DATA SHEET NO. 3**  
**DUMMY CLEARANCE DIMENSIONS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
 Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21



**LEFT SIDE VIEW**

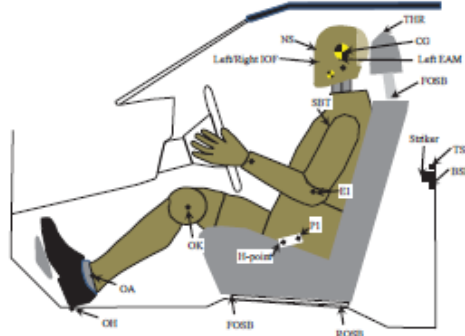
Code	Measurement Description	Driver S/N# 168		Passenger S/N# EG2595	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
HZ	Nasion to Roof (Z Distance)	238		200	
HH	Nasion to Header (3D Distance)	355		407	
HW	Nasion to Windshield Point 1 Inside (X Distance)	689		658	
NR	Tip of Nose to Top of Steering Wheel (3D Distance)	389			
CD	Chest Point 1 to Dash Point 1 (3D Distance)	544		577	
CS	Chest Point 2 to Center of Steering Wheel (X Distance)	320			
CBS	Chest Point 3 to Bottom of Steering Wheel (X Distance)	216			
IKD	Inboard Knee to Dash Point 3 (3D Distance)			144	
OKD	Outboard Knee to Dash Point 2 (3D Distance)	401		122	
HR	Nasion to Side Header (3D Distance)			209	
HS	Nasion to Side Window Distance (Y Distance)	350		359	
AD	Elbow to Door (Y Distance)	181		55	
HD	H-Point to Door (Y Distance)			138	
HLHL	Inboard Heel to Outboard Heel (Y Distance)	366		229	
KK	Inboard Knee to Outboard Knee (Y Distance)			220	
SH	Striker to H-Point (3D Distance)	432		428	
HRA	Head Restraint Post Angle			4.0	
	H-Point Tool Angle		29.1		23.2
	Torso Angle		10.2		18.9
	Windshield Angle		58.2		59.3
	Head Angle (X)		0.2		-0.6
	Head Angle (Y)		0.1		0.5
	T1 Angle (X)				
	T1 Angle (Y)				
	T6 Angle (X)				
	T6 Angle (Y)				
	T12 Angle (X)				
	T12 Angle (Y)				
	Pelvis Angle (X)				
	Pelvis Angle (Y)		29.1		

**DATA SHEET NO. 4**

**DUMMY CMM MEASUREMENTS RELATIVE TO VCS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383

Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21



Description	Units	Driver S/N# EG2595			Passenger S/N# 168		
		X	Y	Z	X	Y	Z
Center of Upper Striker Bolt	mm	2312	-808	-169	2316	806	-169
Center of Lower Striker Bolt	mm	2316	-809	-133	2320	808	-133
Center of Striker Bar	mm	2348	-809	-155	2351	808	-154
Front Outboard Seat Bolt	mm	2844	-603	341	2845	602	332
Rear Outboard Seat Bolt	mm	2408	-605	351	2412	603	340
Center of Steering Wheel Hub	mm	2916	-378	-252			
Outer Head Restraint Post	mm				2506	449	-539
Right Head CG	mm	2407	-300	-546	2504	296	-533
Left Head CG	mm	2406	-456	-546			
Right EAM	mm	2415	-305	-521			
Left EAM	mm	2413	-453	-522			
Nasion	mm	2497	-378	-561	2591	374	-534
Right IOF	mm	2500	-347	-523			
Left IOF	mm	2498	-412	-524			
Tip of Nose	mm	2501	-376	-524	2611	377	-490
Tip of Chin	mm	2498	-379	-421	2582	375	-414
Chest Point 1	mm	2541	-379	-294	2613	372	-274
Chest Point 2	mm	2561	-382	-249			
Chest Point 3	mm	2642	-378	-98			
Shoulder Point 1	mm	2400	-572	-332	2480	562	-273
Shoulder Point 2	mm	2472	-560	-323			
Elbow	mm	2637	-602	-101	2561	640	-38
Center of H-Point Tool	mm	2554	-647	74			
H-Point on H-Point Tool	mm	2627	-614	103	2620	656	128
H-Point on ATD Skin	mm	2627	-574	104	2619	554	132
Outboard Knee	mm	3017	-570	-42	2997	526	10
Inboard Knee	mm				3027	241	22
Outboard Ankle	mm	3332	-581	236	3323	497	203
Inboard Ankle	mm				3325	260	194
Outboard Heel	mm	3354	-560	377	3328	513	384
Inboard Heel	mm	3352	-201	379	3342	306	381

Reference Point:

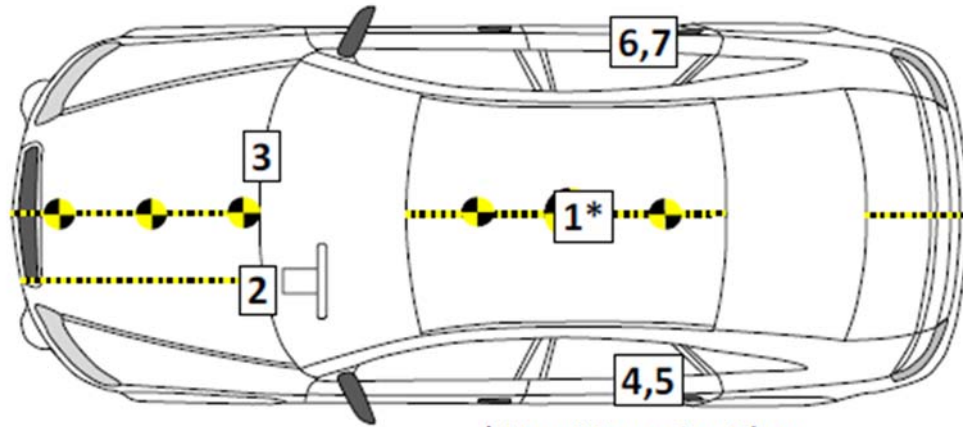
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

**DATA SHEET NO. 5**

**VEHICLE INSTRUMENTATION DATA**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383

Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21



\* Use Mounting Plate

**VEHICLE ACCELEROMETER PRE-TEST LOCATIONS RELATIVE TO VCS**

No.	Instrumentation Location	Axes	Units	Coordinates (mm)		
				X	Y	Z
1	Vehicle CG (Acceleration and Angular Rate)	x, y, z	g, °/s	2106	-2	231
2	Driver Floor Pan	x, y, z	°/s	3671	-341	177
3	Passenger Floor Pan	x, y, z	g	3661	356	209
4	Door Sill LR	x, y	g	1937	-742	274
5	Door Sill LR Redundant	x, y	g	1917	-737	272
6	Door Sill RR	x, y	g	1944	729	276
7	Door Sill RR Redundant	x, y	g	1921	728	276

Reference Point:

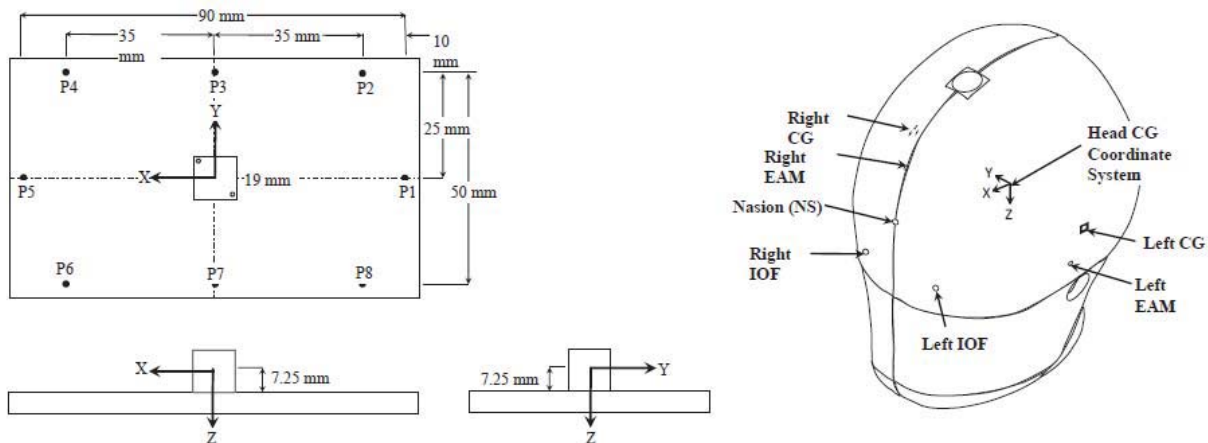
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

## DATA SHEET NO. 5 ... (CONTINUED)

### VEHICLE INSTRUMENTATION DATA

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
 Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

#### ANGULAR RATE SENSOR MOUNTING PLATE & THOR HEAD POINT DEFINITIONS



#### CG ARS MOUNTING PLATE - VEHICLE COORDINATE SYSTEM

No.	Description	Units	X	Y	Z
P1	Plate Point 1	mm	2139	-1	234
P2	Plate Point 2	mm	2149	-24	235
P3	Plate Point 3	mm	2183	29	234
P4	Plate Point 4	mm	2219	29	234
P5	Plate Point 5	mm	2229	-3	235
P6	Plate Point 6	mm	2217	-20	234
P7	Plate Point 7	mm	2217	-19	233
P8	Plate Point 8	mm	2149	-22	233

#### DRIVER HEAD POINTS IN RELATION TO HEAD CG COORDINATE SYSTEM

Description	Units	x	y	z
Left CG	mm	66	-44	46
Left EAM	mm	74	-37	71
Left IOF	mm	153	3	73
Right IOF	mm	152	68	72
Nasion	mm	158	36	36
Right EAM	mm	73	106	74
Right CG	mm	66	112	47

**DATA SHEET NO. 5 ... (CONTINUED)**

**VEHICLE INSTRUMENTATION DATA**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383

Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

Location No.	Description	Axes	Units	Positive Direction		Negative Direction	
				Max	Time (ms)	Min	Time (ms)
1	Vehicle CG	x	g	1.4	141.7	-23.0	39.4
		y	g	17.0	38.9	-3.3	44.9
		z	g	11.0	40.2	-8.9	28.8
	Vehicle CG Rotation	x	°/s	50.3	71.3	-37.5	9.3
		y	°/s	47.4	51.8	-42.2	112.9
		z	°/s	21.0	44.0	-40.4	299.8
2	Driver Floor Pan	x	g	1.6	8.5	-16.4	24.2
		y	g	12.1	13.5	-4.9	24.9
		z	g	23.1	4.4	-2.3	13.1
3	Passenger Floor Pan	x	g	1.3	141.0	20.3	39.3
		y	g	23.2	36.8	-6.7	73.5
		z	g	19.3	51.4	-2.3	22.3
4	Door Sill LR	x	g	0.6	0.1	21.4	65.0
		y	g	11.4	39.0	-3.1	45.4
5	Door Sill LR Redundant	x	g	0.6	0.1	-20.0	65.0
		y	g	11.7	39.2	-2.1	45.4
6	Door Sill RR	x	g	1.0	160.2	-18.9	51.9
		y	g	13.2	38.8	-3.6	44.9
7	Door Sill RR Redundant	x	g	0.8	142.9	-19.3	51.6
		y	g	12.1	38.8	-3.4	44.9

Note: See Appendix B for all vehicle data plots

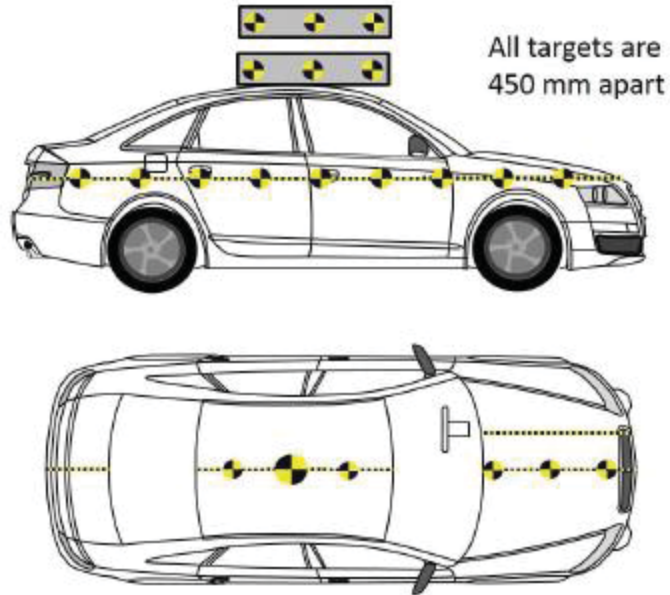
**DATA SHEET NO. 6**

**PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

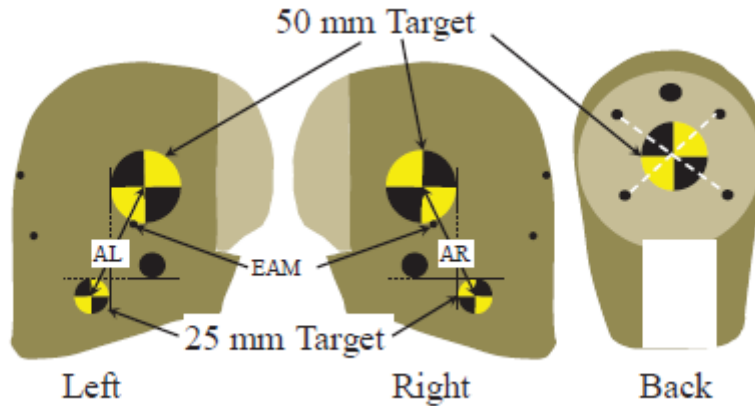
Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383

Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**VEHICLE TARGETS**



**ATD HEAD TARGETS**



**Driver**

Target	Units	Measurement
AL	mm	97
AR	mm	98

**DATA SHEET NO. 7**

**TEST VEHICLE SUMMARY OF RESULTS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**INSTRUMENTATION**

<b>Instrumentation</b>	<b>Number of Channels Collected</b>
Driver Dummy Sensors	43
Passenger Dummy Sensors	99
Vehicle Structure Sensors	20
Airbag Timing Sensor	10
Total	172

**CAMERA COVERAGE**

<b>Type of Camera</b>	<b>Number of Cameras Collected</b>
High-Speed Vehicle Onboard	4
High-Speed Off-Board	14
Real-Time Panning	1
Total	19

**DATA SHEET NO. 8**  
**POST TEST OBSERVATIONS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
 Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**TEST DUMMY INFORMATION AND CONTACT**

Description	Driver	Passenger
Dummy Type/Serial No.	AM50 / 168	THOR-50M / EG2595
Lower Leg Type		LX
Head Contact	Front Airbag, Headliner, Windshield, A-Pillar, Curtain Airbag	Front Airbag, A-Pillar
Upper Torso Contact	Front Airbag, Torso/Pelvis Airbag	Front Airbag
Lower Torso Contact	Front Airbag	Front Airbag
Left Knee Contact	Knee Airbag, Knee Bolster	Knee Airbag
Right Knee Contact	Knee Airbag, Knee Bolster	Knee Airbag

**DOOR OPENING AND SEAT TRACK INFORMATION**

Description	Driver	Passenger
Locked / Unlocked Doors	Unlocked	Unlocked
Front Door Opening	Remained closed and latched, operational	Remained closed and latched, operational
Rear Door Opening	Remained closed and latched, operational	Remained closed and latched, operational
Seat Track Shift (mm)	None	None
Seat Back Failure	None	None
Glazing Damage	None	

**POST TEST STRUCTURAL OBSERVATIONS**

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Good
Windshield Damage	Broken
Window Damage	None
Other Notable Effects	None

**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

Restraint Type	Driver		Passenger	
	Installed	Operated	Installed	Operated
Front Airbag	Yes	Yes	Yes	Yes
Side Airbag 1 (Curtain)	Yes	Yes	No	
Side Airbag 2 (Torso/Pelvis)	Yes	Yes	Yes	No
Knee Airbag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes

**DATA SHEET NO. 9**

**VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383

Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

No.	Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4882	4662	-219
2	Rear Surface of Vehicle to Front of Engine	4461	4356	-105
3	RSOV to Firewall	3837	3775	-62
4	RSOV to Upper Leading Edge of Right Door	3481	3458	-23
5	RSOV to Upper Leading Edge of Left Door	3475	3451	-25
6	RSOV to Lower Leading Edge of Right Door	3455	3432	-23
7	RSOV to Lower Leading Edge of Left Door	3454	3429	-24
8	RSOV to Upper Trailing Edge of Right Door	2282	2259	-24
9	RSOV to Upper Trailing Edge of Left Door	2279	2254	-25
10	RSOV to Lower Trailing Edge of Right Door	2286	2265	-21
11	RSOV to Lower Trailing Edge of Left Door	2283	2257	-25
12	RSOV to Bottom of A-Pillar, Right Side	3404	3380	-24
13	RSOV to Bottom of A-Pillar, Left Side	3396	3371	-25
14	RSOV to Firewall, Right Side	4039	4006	-33
15	RSOV to Firewall, Left Side	4024	3981	-42
16	RSOV to Steering Column	2940	2949	9
17	Center of Steering Column to A-Pillar	456	422	-34
18	Center of Steering Column to Headliner	472	439	-33
19	RSOV to Right Side of Front Bumper	4774	4743	-31
20	RSOV to Left Side of Front Bumper	4758	4347	-410
21	Length of Engine Block	569	546	-23
RD	RSOV to Right Side of Dash Panel	3117	3096	-21
CD	RSOV to Center of Dash Panel	3071	3051	-20
LD	RSOV to Left Side of Dash Panel	3112	3090	-22

All measurements in millimeters.

**DATA SHEET NO. 10**

**ACCIDENT INVESTIGATION DIVISION DATA**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
 Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

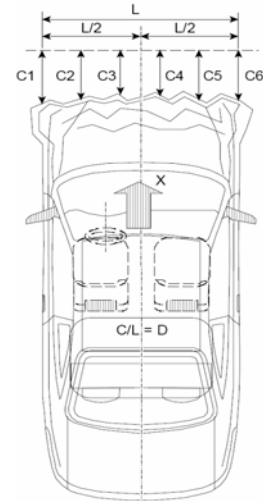
**VEHICLE INFORMATION**

VIN: 1HGCV1F1XLA145390  
 Vehicle Size Category: Passenger Car

Wheelbase (mm): 2827  
 Test Weight (kg): 1622.5

**ACCELEROMETER DATA**

Accelerometer Locations: Vehicle CG<sub>x</sub>  
 Cal. Procedure/Interval: Vibration Test / 6 months  
 Integration Algorithm: NHTSA Standard  
 Linearity: Good  
 Impact Velocity (km/h): 39.74



**CRUSH PROFILE**

Collision Deformation Classification: 12FLEW2  
 Midpoint of Damage: Vehicle Centerline  
 Damage Region Length (mm): 1201  
 Impact Mode: Left Side 30° Frontal

**Crush Measurements**

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	4733	4347	-386
C2	Crush Zone 2 at Left Side	mm	4804	4517	-287
C3	Crush Zone 3 at Left Side	mm	4836	4614	-222
C4	Crush Zone 4 at Right Side	mm	4838	4706	-132
C5	Crush Zone 5 at Right Side	mm	4806	4744	-62
C6	Crush Zone 6 at Right Side	mm	4749	4743	-6
L	C1 to C6	mm	1201		

**DATA SHEET NO. 11**

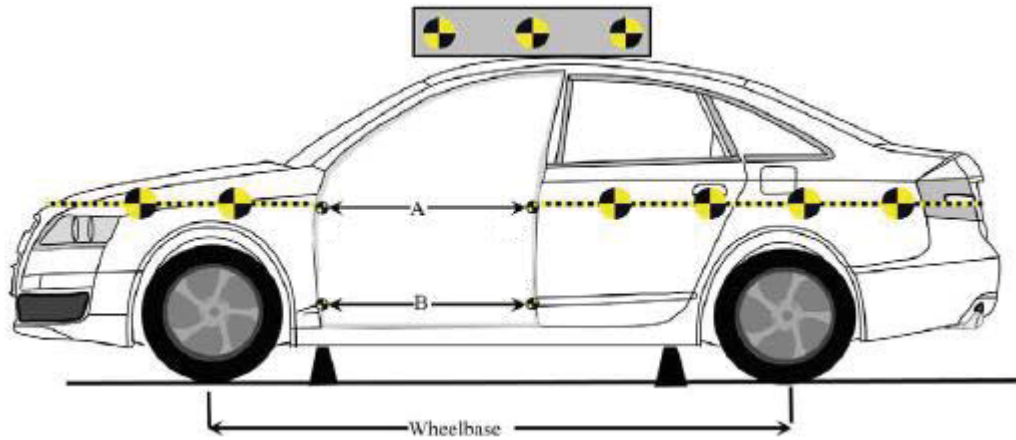
**VEHICLE INTRUSION MEASUREMENTS RELATIVE TO VCS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383

Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**DOOR OPENING WIDTH**

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Driver Side Upper	mm	911	909	2
B	Driver Side Lower	mm	797	795	2
D	Passenger Side Upper	mm	907	907	0
E	Passenger Side Lower	mm	785	784	1



**DATA SHEET NO. 11 ... (CONTINUED)**

**VEHICLE INTRUSION MEASUREMENTS RELATIVE TO VCS**

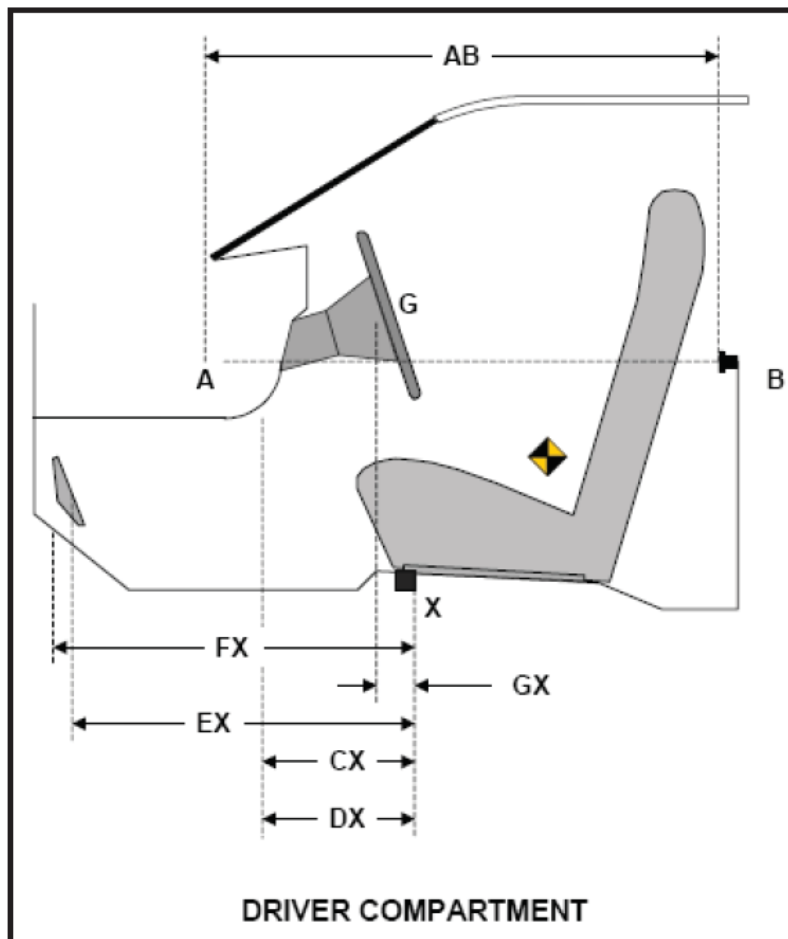
Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383

Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**DRIVER COMPARTMENT INTRUSION**

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	891	894	-3
CX	Left Knee Bolster to X	mm	281	270	10
DX	Right Knee Bolster to X	mm	269	274	-5
EX	Brake Pedal to X	mm	591	578	13
FX	Footrest to X	mm	694	692	3
GX	Center of Steering Column Wheel Hub to X	mm	71	105	-33

X = Front of Seat Track (Stationary)



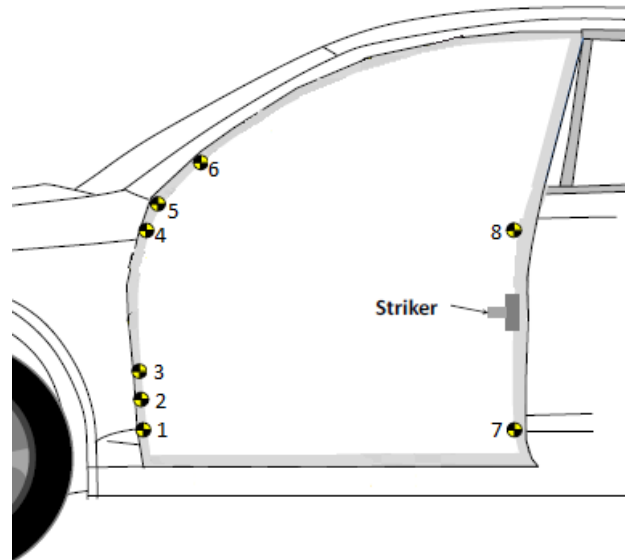
**DATA SHEET NO. 11 ... (CONTINUED)**

**VEHICLE INTRUSION MEASUREMENTS RELATIVE TO VCS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383

Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**DRIVER SIDE DOOR SILL INTRUSIONS**



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

Point	Pre-Test			Post-Test			Difference		
	x	y	z	x	y	z	x	y	z
1	3314	-771	201	3312	-772	199	-3	-1	-1
2	3332	-768	130	3331	-770	100	-2	-2	-30
3	3323	-769	54	3325	-769	44	2	-1	-10
4	3266	-760	-247	3265	-763	-246	-1	-3	2
5	3235	-747	-321	3234	-749	-323	0	-2	-2
6	3153	-728	-398	3154	-730	-397	1	-3	1
7	2518	-768	204	2517	-772	208	0	-4	4
8	2355	-756	-246	2356	-759	-246	2	-2	0

All measurements in millimeters.

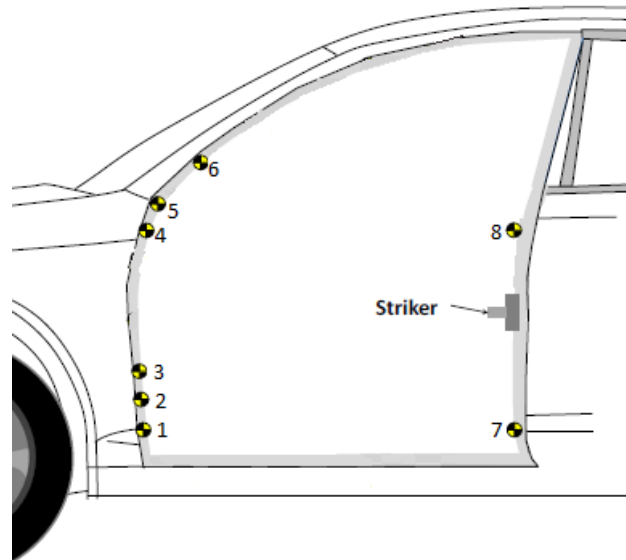
**DATA SHEET NO. 11 ... (CONTINUED)**

**VEHICLE INTRUSION MEASUREMENTS RELATIVE TO VCS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383

Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**PASSENGER SIDE DOOR SILL INTRUSIONS**



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

Point	Pre-Test			Post-Test			Difference		
	x	y	z	x	y	z	x	y	z
1	3313	770	204	3313	768	197	1	-3	-6
2	3338	764	130	3337	766	122	0	1	-8
3	3325	763	50	3329	764	41	4	1	-9
4	3265	755	-247	3267	757	-249	1	1	-2
5	3238	741	-323	3240	742	-324	2	1	-1
6	3154	722	-400	3155	722	-402	1	-1	-2
7	2528	768	203	2529	770	201	2	2	-2
8	2358	756	-243	2359	757	-246	1	1	-3

All measurements in millimeters.

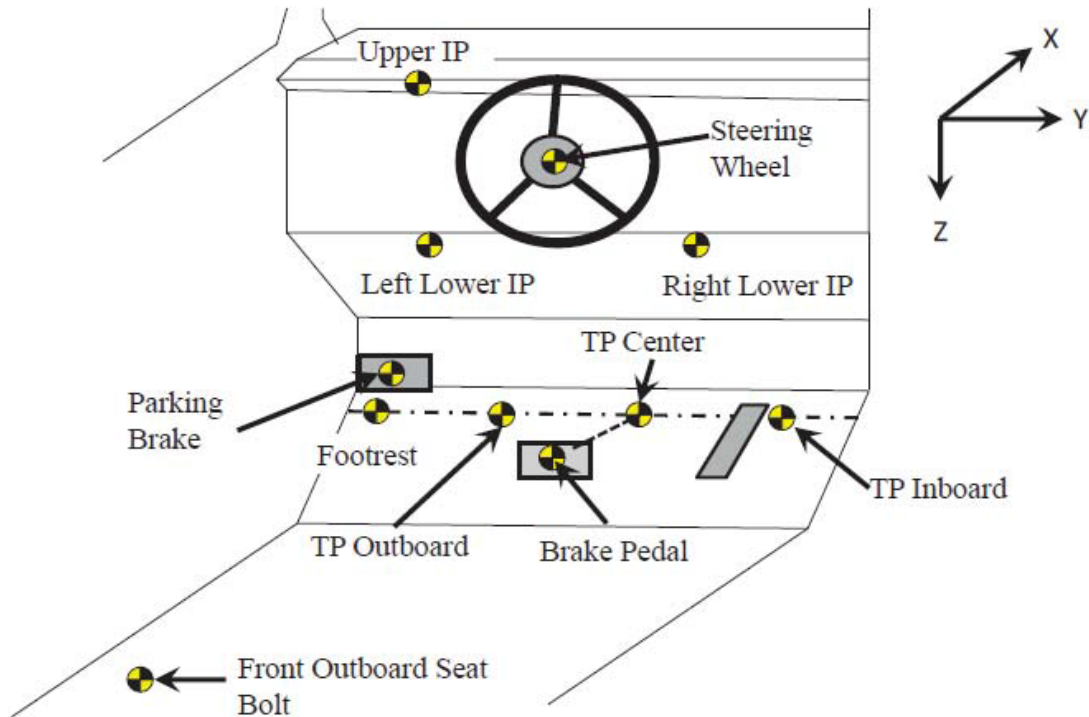
**DATA SHEET NO. 11 ... (CONTINUED)**

**VEHICLE INTRUSION MEASUREMENTS RELATIVE TO VCS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383

Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**DRIVER FLOOR PAN MEASUREMENTS**



Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	x	y	z	x	y	z	x	y	z
TP Inboard	3651	-202	209	3649	-200	209	-2	2	0
TP Center	3671	-347	201	3665	-341	198	-6	6	-3
TP Outboard	3609	-503	203	3605	-503	200	-4	1	-3
TP Footrest	3538	-598	202	3536	-597	201	-2	1	-1
Brake Pedal	3435	-345	203	3422	-353	204	-13	-8	1
Left Lower IP	3125	-527	-96	3115	-528	-97	-10	-1	-1
Right Lower IP	3113	-228	-98	3118	-232	-101	5	-4	-3
Upper IP	3079	-529	-149	3081	-528	-160	3	1	-10
Steering Wheel	2916	-377	-249	2949	-377	-274	34	0	-25
Front Outboard Bolt	2844	-606	339	2844	-603	342	0	2	3
Emergency Brake									

Reference point:

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

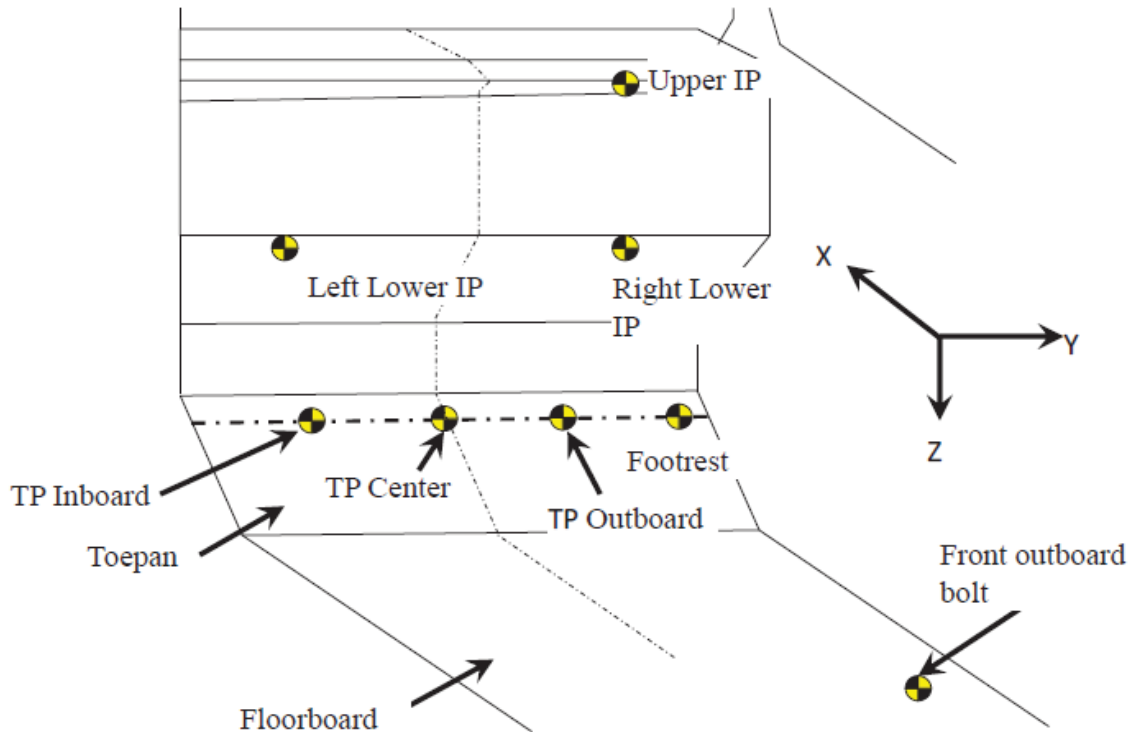
**DATA SHEET NO. 11 ... (CONTINUED)**

**VEHICLE INTRUSION MEASUREMENTS RELATIVE TO VCS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383

Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**PASSENGER FLOOR PAN MEASUREMENTS**



Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	x	y	z	x	y	z	x	y	z
TP Inboard	3645	221	205	3645	222	206	0	1	1
TP Center	3658	374	205	3657	376	208	-1	2	4
TP Outboard	3582	522	207	3586	518	212	3	-4	5
TP Footrest	3523	624	204	3525	622	204	2	-2	0
Left Lower IP	3093	217	-97	3099	214	-98	6	-3	-1
Right Lower IP	3122	523	-96	3120	518	-94	-1	-5	2
Upper IP	3068	524	-170	3073	521	-172	4	-3	-2
Front Outboard Seat Bolt	2849	604	331	2850	603	332	1	-1	2

Reference point:

+X – From the rear of the vehicle to the front of the vehicle

+Y – From the left side of the vehicle to the right side of the vehicle

+Z – From the top of the vehicle to the bottom of the vehicle

**DATA SHEET NO. 12**

**SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383  
 Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

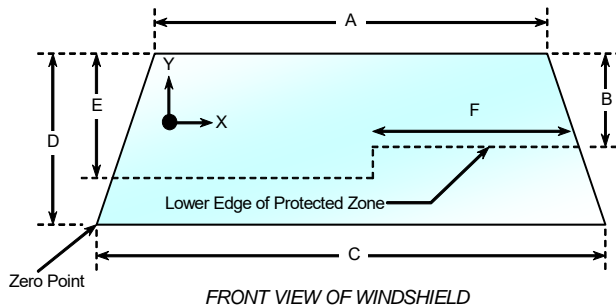
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with plastic molding and rubber cement.

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: 21.2° C

**WINDSHIELD PERIPHERY MEASUREMENTS**

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2218	2218	100.0%
Right Side	2218	2218	100.0%
Total	4436	4436	100.0%



Item	Units	Value
A	mm	1240
B	mm	340
C	mm	1502
D	mm	847
E	mm	495
F	mm	560

**AREAS OF PROTECTED ZONE FAILURES**

- A. Provide Coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one that is normally in contact with the windshield.
- B. Provide Coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component.

X	Y

X	Y

**DATA SHEET NO. 12 ... (CONTINUED)**

**SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383

Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21

**FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA**

Temperature at Time of Impact: 32.8° C Test Time: 6:31 PM

**Stoddard Solvent Spillage Measurements**

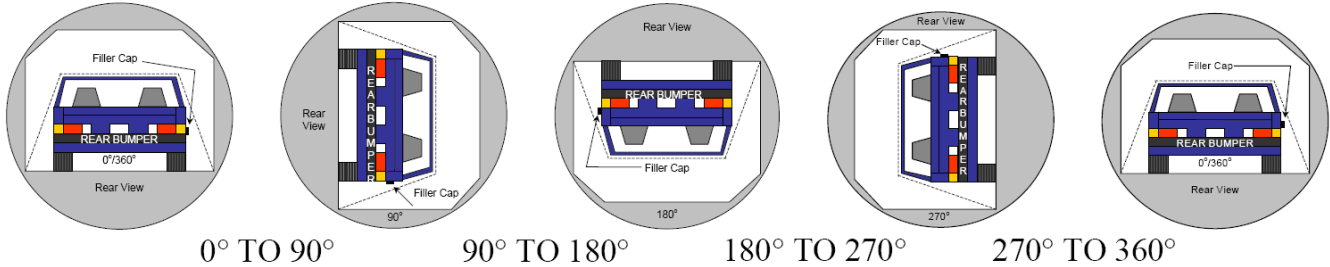
- A. From impact until vehicle motion ceases: 0 oz.  
(Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: 0 oz.  
(Maximum allowable = 5 oz.)
- C. For the following 25 minutes: 0 oz.  
(Maximum allowable = 1 oz./minute)
- D. Spillage: There was no Stoddard solvent spillage.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**DATA SHEET NO. 13**

**FMVSS 301 STATIC ROLLOVER RESULTS**

Test Vehicle: 2020 Honda Accord 4-Door Sedan NHTSA No. R20205383

Test Program: R&D Left Side 30° Frontal Rigid Barrier Impact Test Date: 07/30/21



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: There was no Stoddard solvent spillage.

**SOLVENT COLLECTION TIME TABLE IN SECONDS**

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	82	300	382
90° To 180°	83	300	383
180° To 270°	82	300	382
270° To 360°	82	300	382

**FMVSS 301 SPILLAGE TABLE**

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

**SOLVENT SPILLAGE LOCATION TABLE**

Test Phase	Spillage Location
0° To 90°	
90° To 180°	
180° To 270°	
270° To 360°	

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PHOTOGRAPHS**

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FIGURE 1. Test Vehicle Certification Label

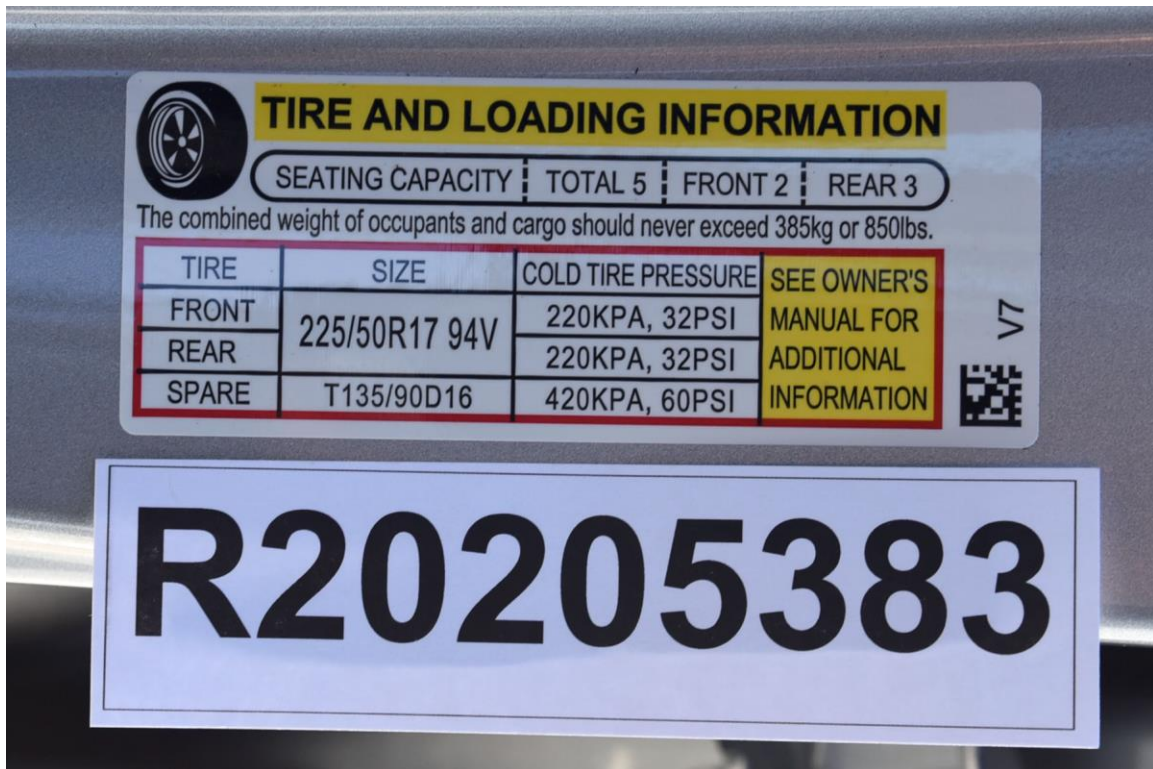


FIGURE 2. Test Vehicle Tire Placard



FIGURE 3. Pre-Test-Front Left Side Oblique View of Test Vehicle



FIGURE 4. Post-Test-Front Left Side Oblique View of Test Vehicle



FIGURE 5. Pre-Test Front View of Test Vehicle



FIGURE 6. Post-Test Front View of Test Vehicle



FIGURE 7. Pre-Test Left View of Test Vehicle



FIGURE 8. Post-Test Left View of Test Vehicle



FIGURE 9. Pre-Test Right View of Test Vehicle



FIGURE 10. Post-Test Right View of Test Vehicle



FIGURE 11. Pre-Test Left Front  $\frac{3}{4}$  View of Test Vehicle



FIGURE 12. Post-Test Left Front  $\frac{3}{4}$  View of Test Vehicle



FIGURE 13. Pre-Test Right Front  $\frac{3}{4}$  View of Test Vehicle



FIGURE 14. Post-Test Right Front  $\frac{3}{4}$  View of Test Vehicle



FIGURE 15. Pre-Test Right Rear  $\frac{3}{4}$  View of Test Vehicle



FIGURE 16. Post-Test Right Rear  $\frac{3}{4}$  View of Test Vehicle



FIGURE 17. Pre-Test Rear View of Test Vehicle



FIGURE 18. Post-Test Rear View of Test Vehicle



FIGURE 19. Pre-Test Left Rear  $\frac{3}{4}$  View of Test Vehicle



FIGURE 20. Post-Test Left Rear  $\frac{3}{4}$  View of Test Vehicle



FIGURE 21. Pre-Test Windshield View



FIGURE 22. Post-Test Windshield View



FIGURE 23. Pre-Test Engine Compartment View



FIGURE 24. Post-Test Engine Compartment View



FIGURE 25. Pre-Test Fuel Filler Cap View



FIGURE 26. Post-Test Fuel Filler Cap View

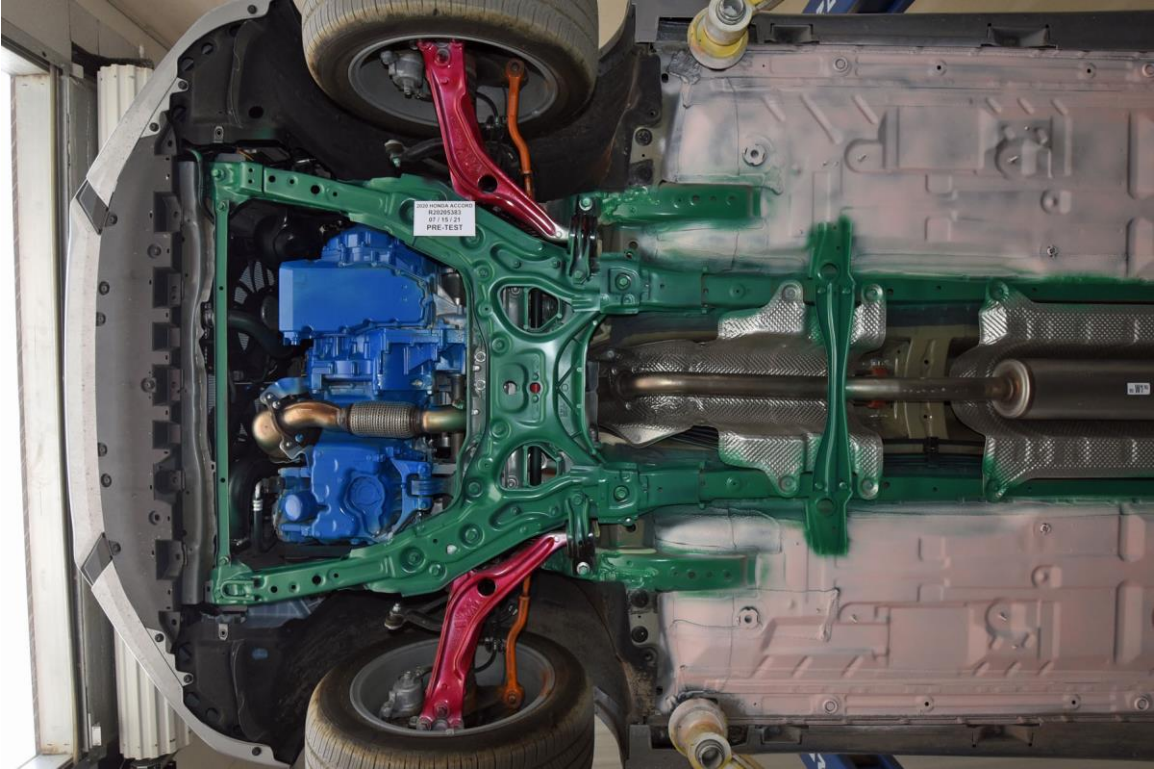


FIGURE 27. Pre-Test Front Underbody View

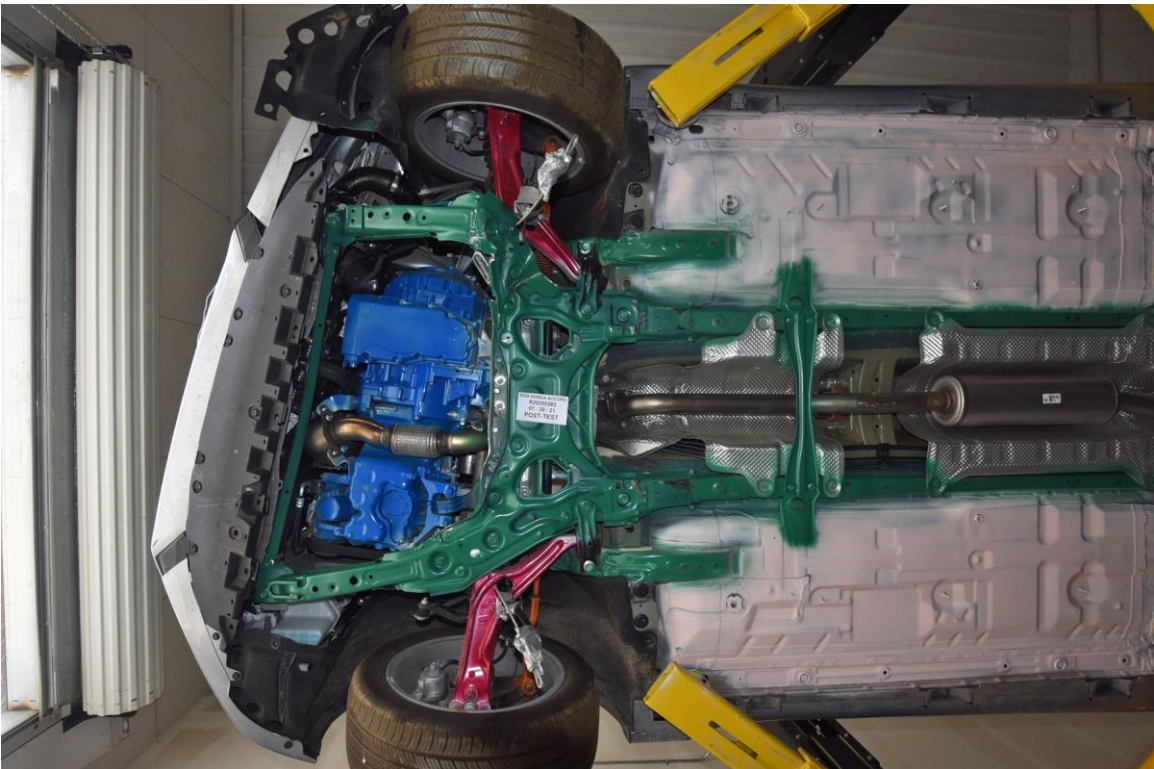


FIGURE 28. Post-Test Front Underbody View

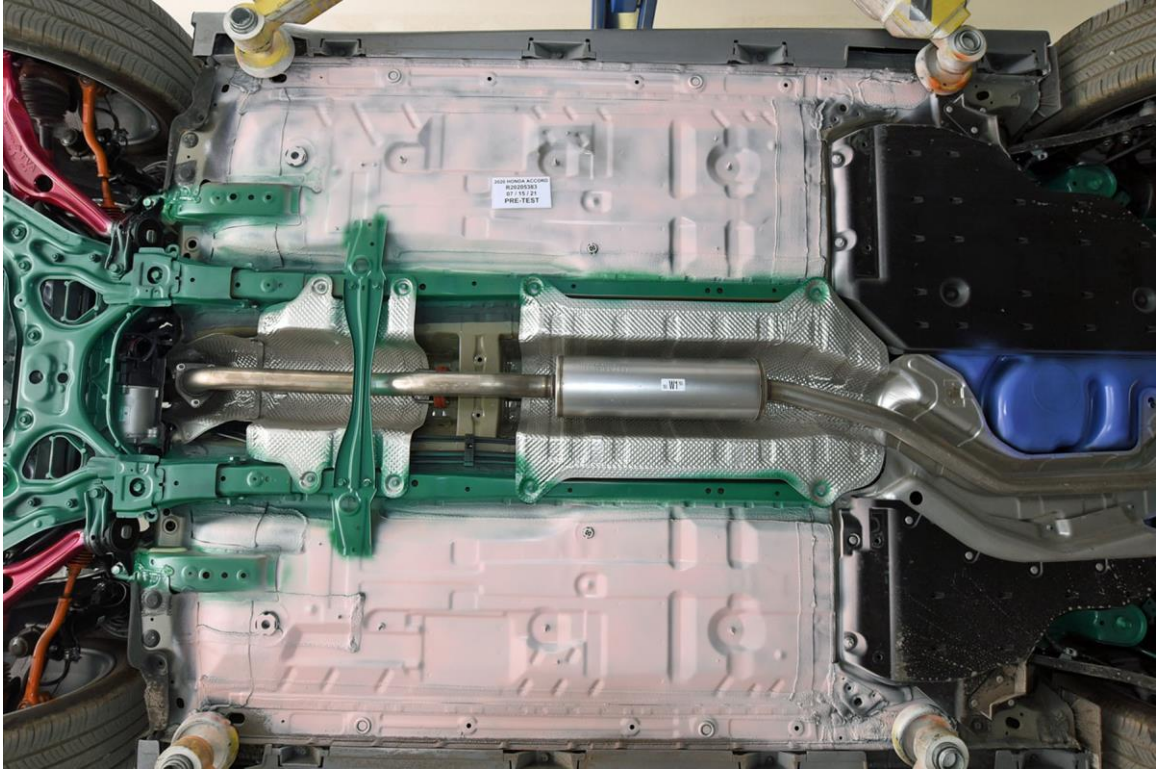


FIGURE 29. Pre-Test Mid Underbody View

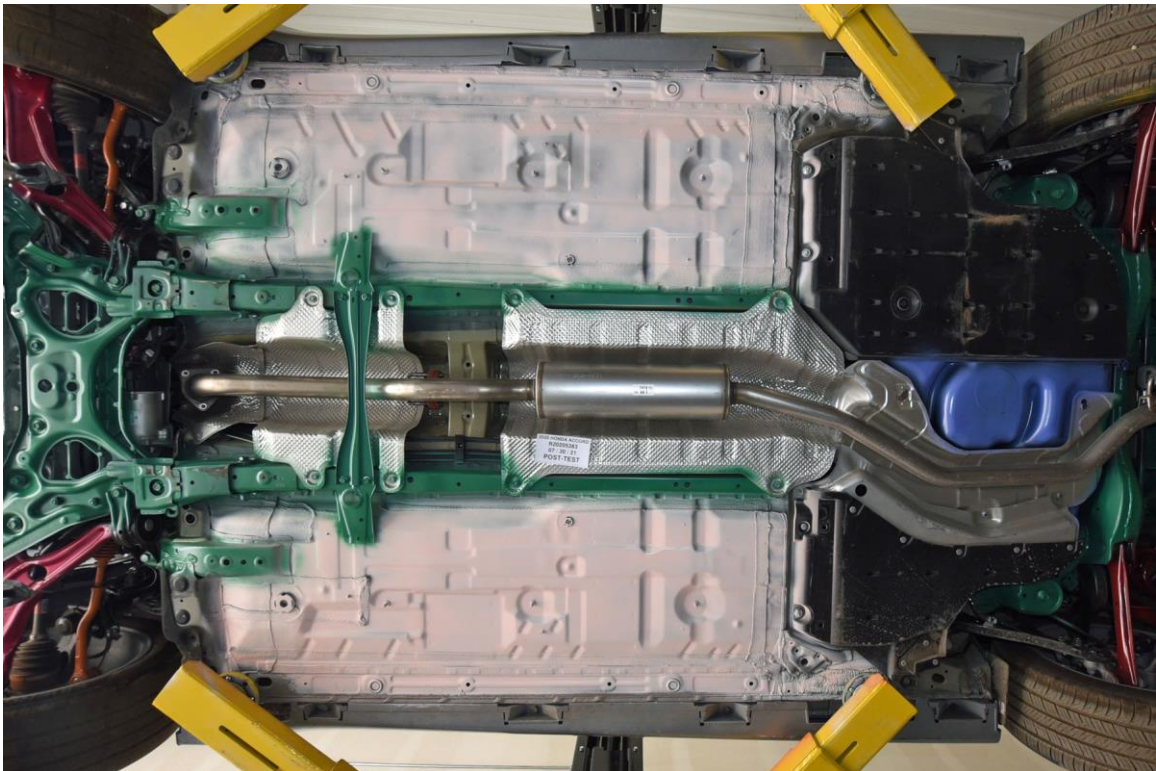


FIGURE 30. Post-Test Mid Underbody View

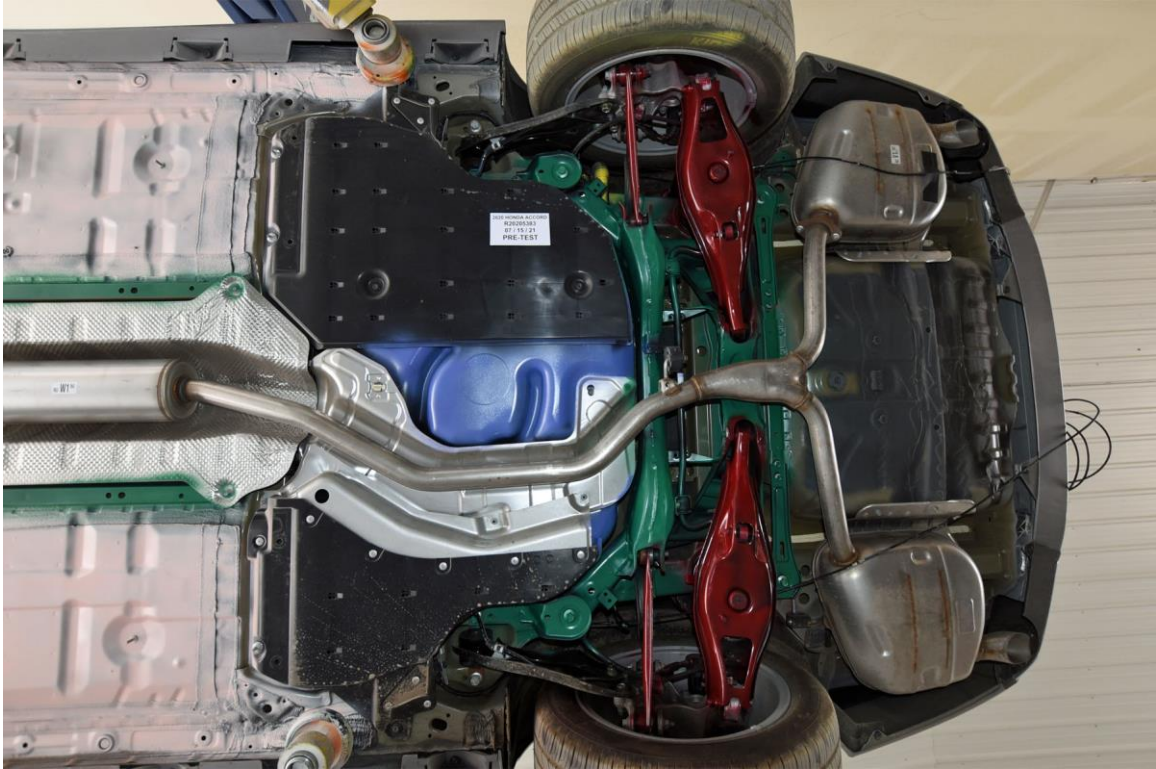


FIGURE 31. Pre-Test Rear Underbody View

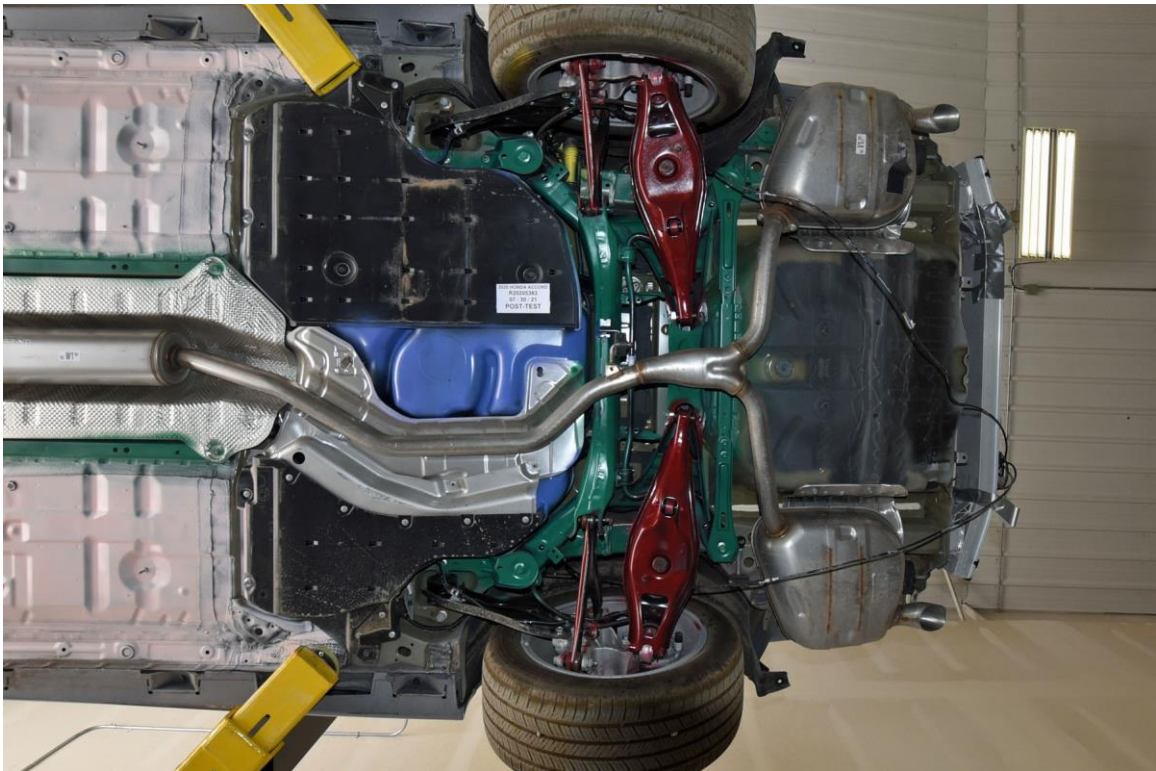


FIGURE 32. Post-Test Rear Underbody View



FIGURE 33. Pre-Test Bumper to Rail Attachments and Crush Initiators

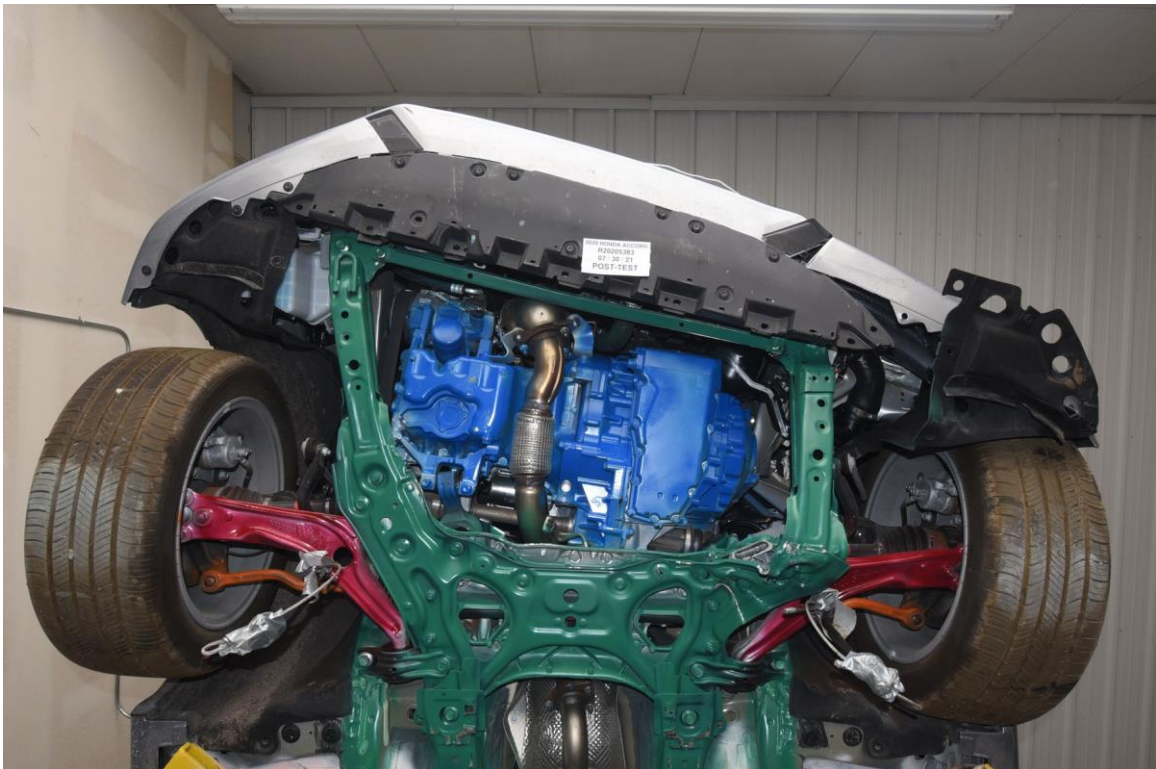


FIGURE 34. Post-Test Bumper to Rail Attachments and Crush Initiators



FIGURE 35. Pre-Test Driver Side Bumper to Rail Attachments and Crush Initiators



FIGURE 36. Post-Test Driver Side Bumper to Rail Attachments and Crush Initiators



FIGURE 37. Pre-Test Passenger Side Bumper to Rail Attachments and Crush Initiators

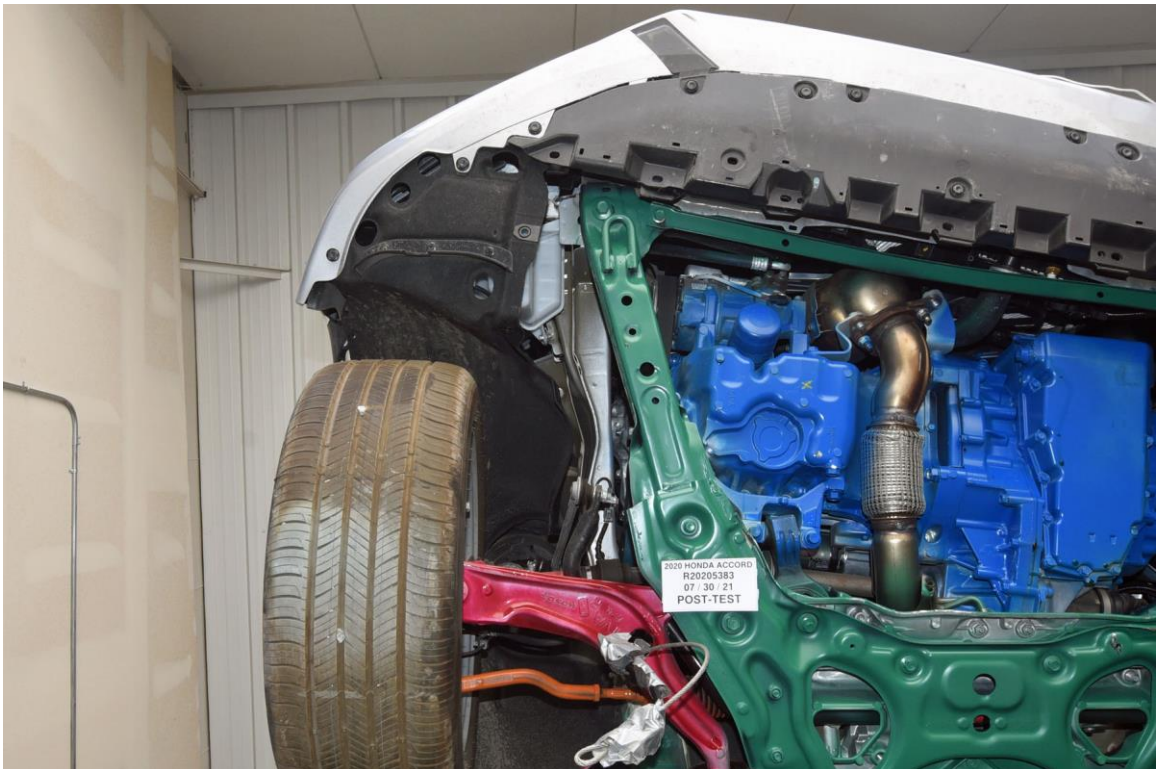


FIGURE 38. Post-Test Passenger Side Bumper to Rail Attachments and Crush Initiators



FIGURE 39. Pre-Test Driver Side Rocker

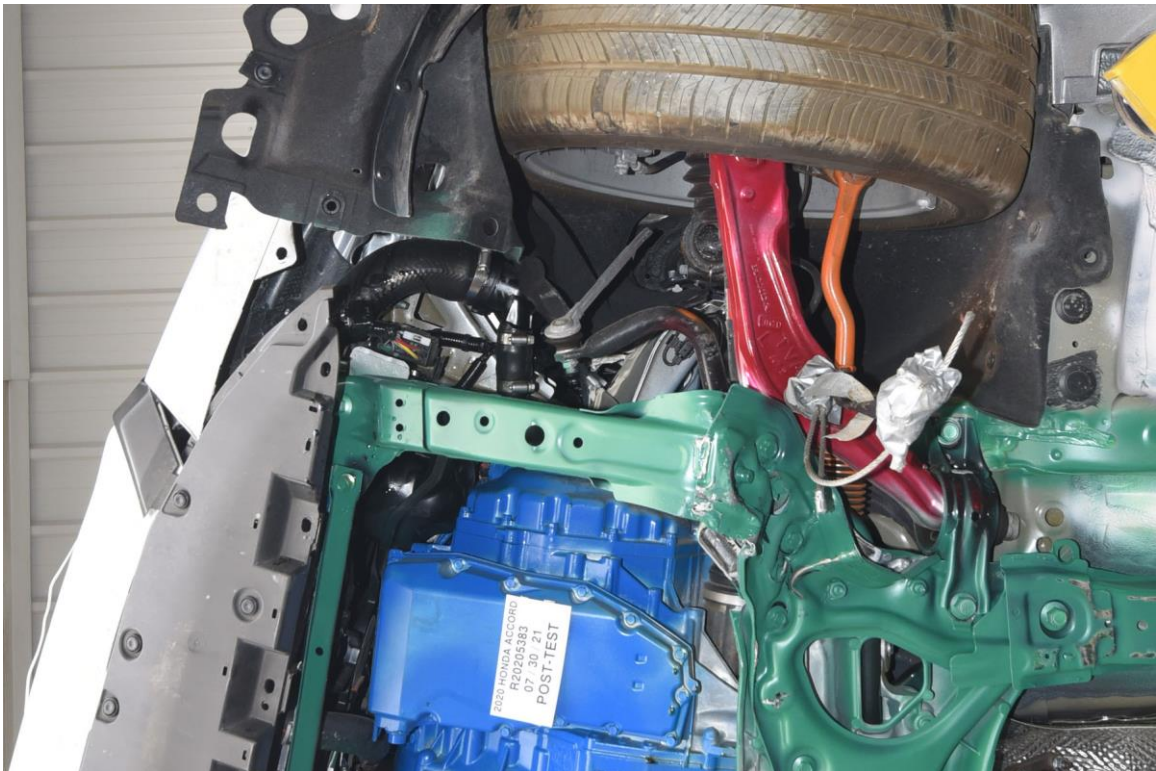


FIGURE 40. Post-Test Driver Side Rocker



FIGURE 41. Pre-Test Passenger Side Rocker



FIGURE 42. Post-Test Passenger Side Rocker



FIGURE 43. Pre-Test Driver Front Windshield View



FIGURE 44. Post-Test Driver Front Windshield View



FIGURE 45. Pre-Test Driver Side Front Window View



FIGURE 46. Post-Test Driver Side Front Window View



FIGURE 47. Pre-Test View of Driver Door Clearance



FIGURE 48. Post-Test View of Driver Door Clearance



FIGURE 49. Pre-Test Left Side View of Driver and Interior



FIGURE 50. Post-Test Left Side View of Driver and Interior



FIGURE 51. Pre-Test Left Side View of Steering Wheel Position



FIGURE 52. Post-Test Left Side View of Steering Wheel Position



FIGURE 53. Pre-Test Overhead View of Driver Thighs on Seat



FIGURE 54. Post-Test Overhead View of Driver Thighs on Seat



FIGURE 55. Pre-Test View of Driver Abdomen



FIGURE 56. Post-Test View of Driver Abdomen



FIGURE 57. Pre-Test Right Side View of Driver and Interior



FIGURE 58. Post-Test Right Side View of Driver and Interior



FIGURE 59. Pre-Test View of Driver Left Knee and Bolster



FIGURE 60. Post-Test View of Driver Left Knee and Bolster



FIGURE 61. Pre-Test View of Driver Right Knee and Bolster

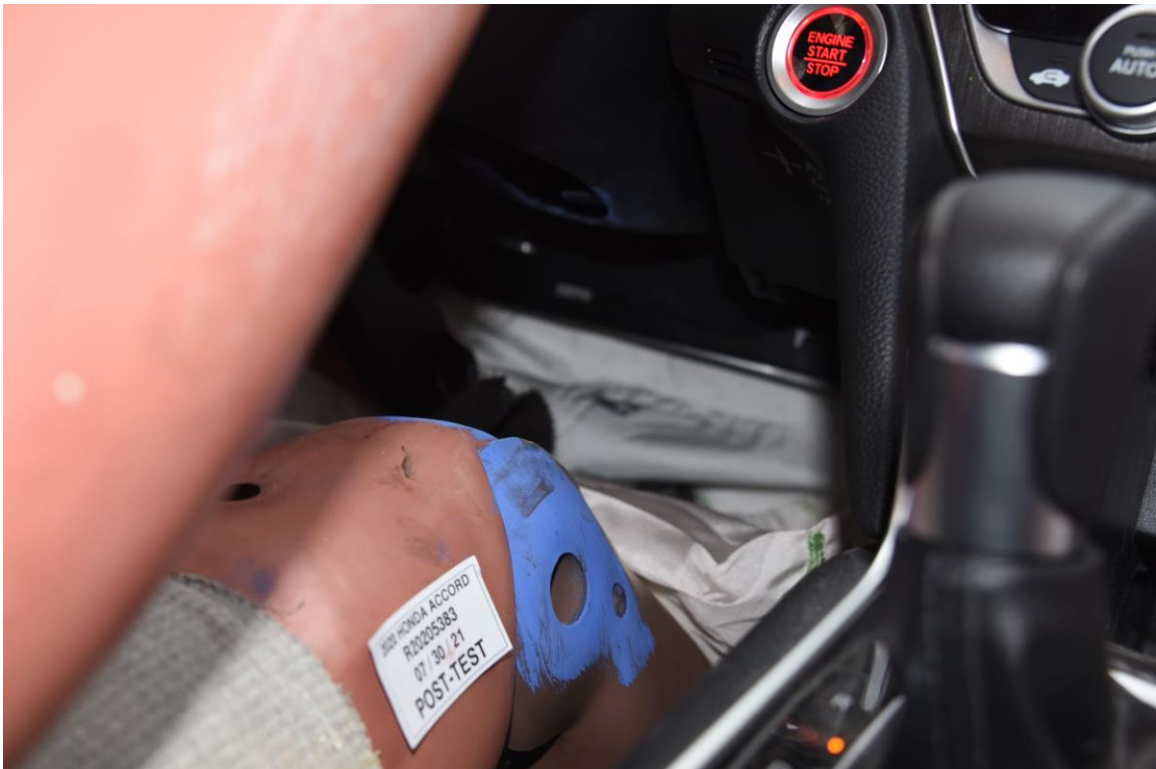


FIGURE 62. Post-Test View of Driver Right Knee and Bolster

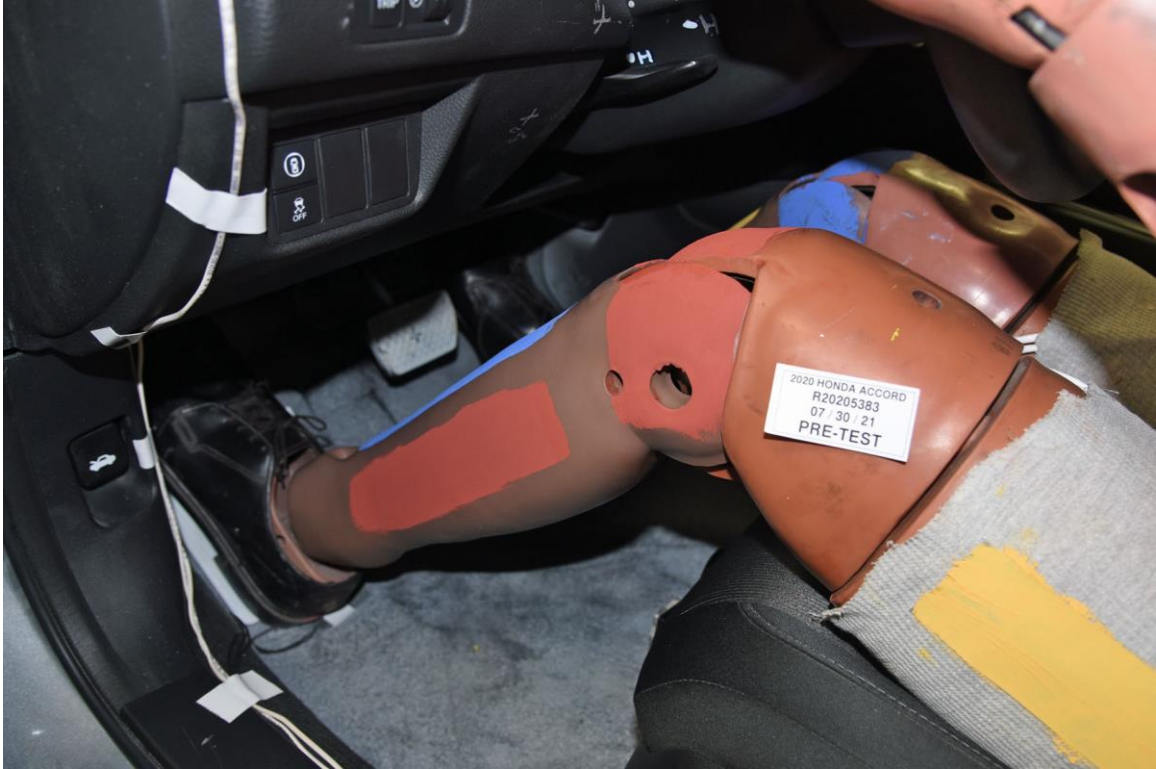


FIGURE 63. Pre-Test View of the Driver Left Leg



FIGURE 64. Post-Test View of the Driver Left Leg



FIGURE 65. Pre-Test View of the Driver Feet



FIGURE 66. Post-Test View of the Driver Feet



FIGURE 67. Pre-Test Driver Adjustable D-Ring



FIGURE 68. Post-Test Driver Adjustable D-Ring



FIGURE 69. Pre-Test Driver Seat Fore-Aft Markings



FIGURE 70. Post-Test Driver Seat Fore-Aft Markings



FIGURE 71. Pre-Test Driver Seat Back Markings



FIGURE 72. Post-Test Driver Seat Back Markings



FIGURE 73. Pre-Test Close-Up View of Driver Door Latch

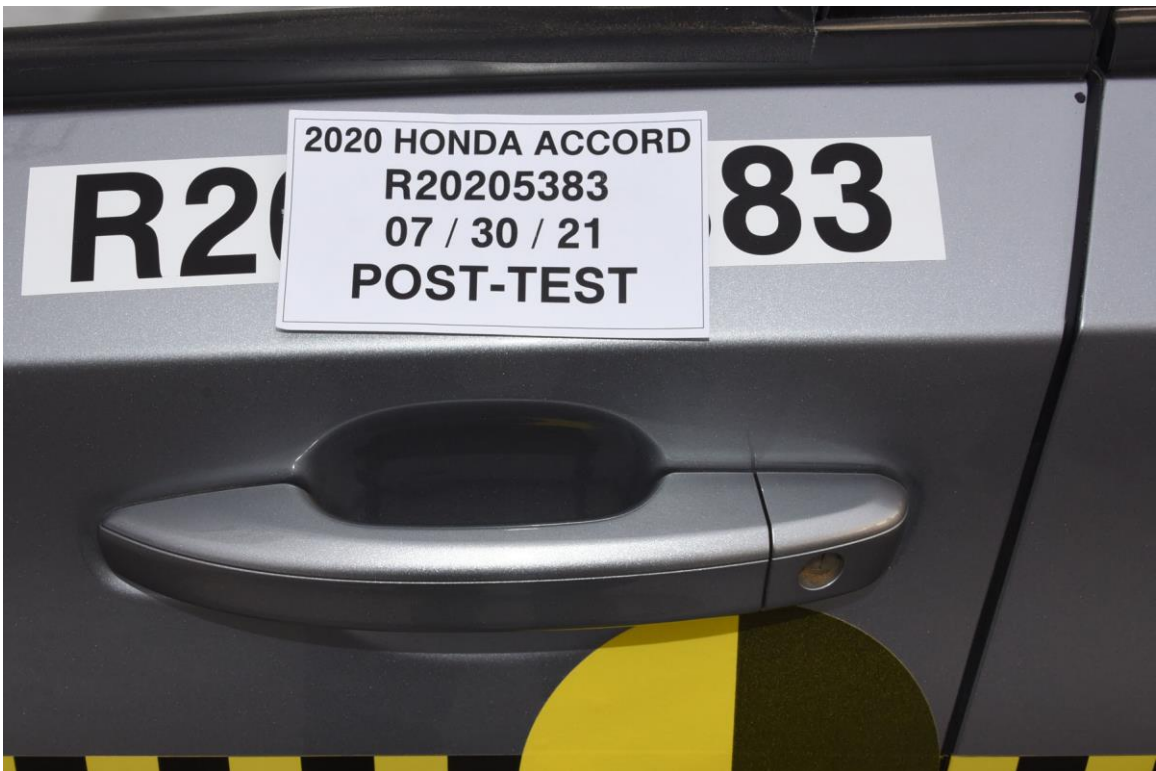


FIGURE 74. Post-Test Close-Up View of Driver Door Latch



FIGURE 75. Pre-Test Driver Inner Door Panel

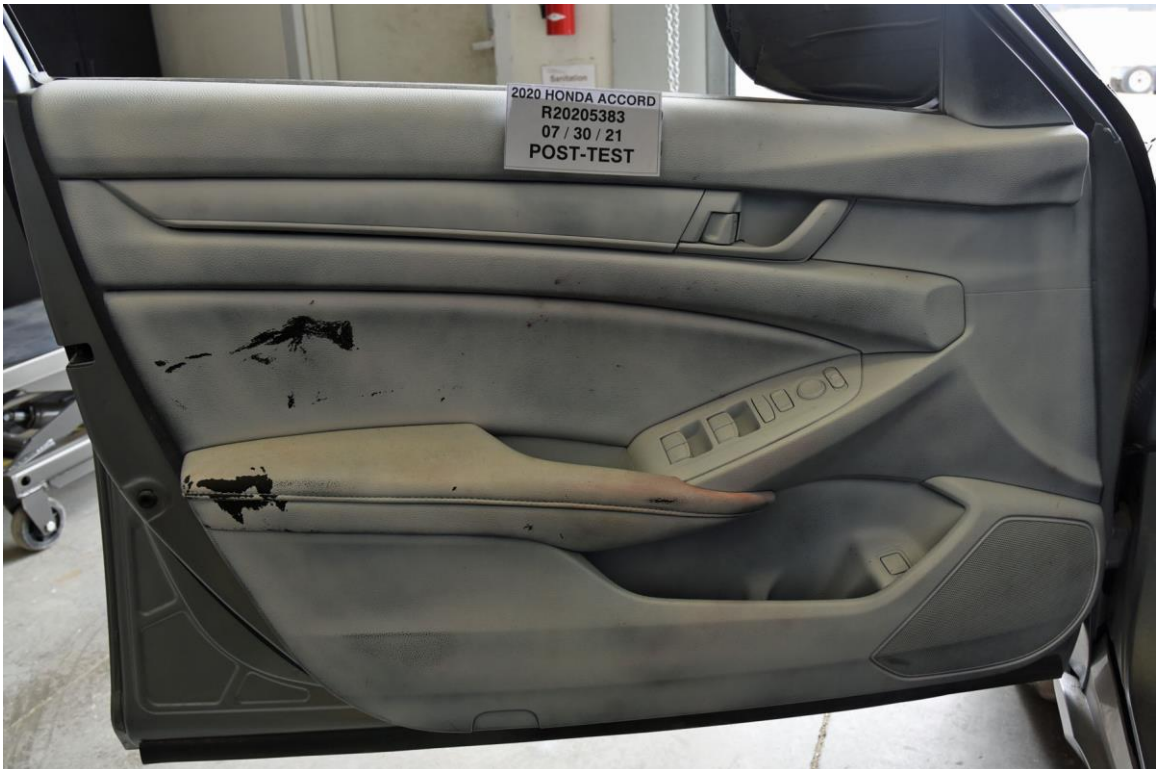


FIGURE 76. Post-Test Driver Inner Door Panel



FIGURE 77. Pre-Test Left Side View of Driver Knee Bolster



FIGURE 78. Post-Test Left Side View of Driver Knee Bolster



FIGURE 79. Pre-Test Overall View of Driver Knee Bolster



FIGURE 80. Post-Test Overall View of Driver Knee Bolster



FIGURE 81. Pre-Test Right Side View of Driver Knee Bolster



FIGURE 82. Post-Test Right Side View of Driver Knee Bolster



FIGURE 83. Pre-Test View of Driver Floor Pan from Outside of Vehicle



FIGURE 84. Post-Test View of Driver Floor Pan from Outside of Vehicle



FIGURE 85. Pre-Test View of Driver Floor Pan from Top of Seat



FIGURE 86. Post-Test View of Driver Floor Pan from Top of Seat



FIGURE 87. Pre-Test View of Driver Floor Pan from Center of Vehicle



FIGURE 88. Post-Test View of Driver Floor Pan from Center of Vehicle



FIGURE 89. Post-Test Driver Dummy Contact with Front Airbag



FIGURE 90. Post-Test Driver Dummy Contact with Side Airbag



FIGURE 91. Post-Test Driver Dummy Contact with Knee Airbag



FIGURE 91a. Post-Test Driver Dummy Contact with Headliner



FIGURE 91b. Post-Test Driver Dummy Contact with A-Pillar



FIGURE 92. Pre-Test Passenger Front Windshield View



FIGURE 93. Post-Test Passenger Front Windshield View



FIGURE 94. Pre-Test Passenger Side Front Window View



FIGURE 95. Post-Test Passenger Side Front Window View



FIGURE 96. Pre-Test View of Passenger Door Clearance



FIGURE 97. Post-Test View of Passenger Door Clearance



FIGURE 98. Pre-Test Right Side View of Passenger and Interior



FIGURE 99. Post-Test Right Side View of Passenger and Interior

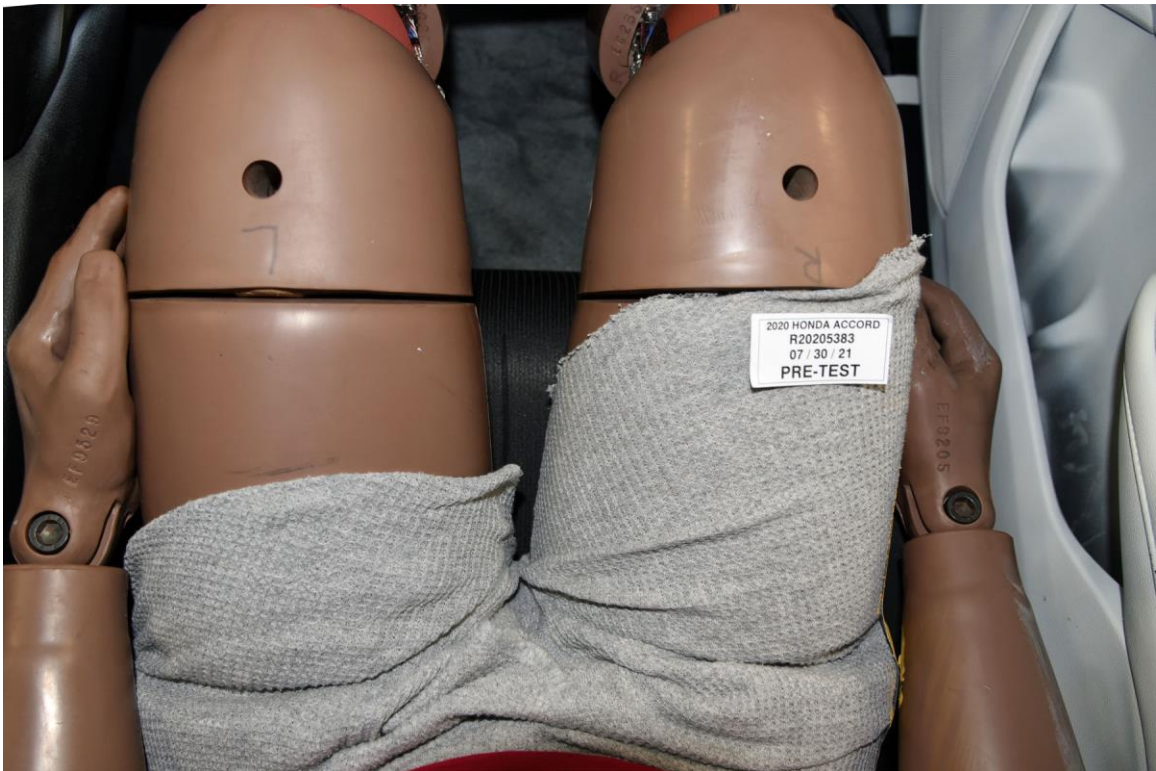


FIGURE 100. Pre-Test Overhead View of Passenger Thighs on Seat



FIGURE 101. Post-Test Overhead View of Passenger Thighs on Seat



FIGURE 102. Pre-Test View of Passenger Abdomen



FIGURE 103. Post-Test View of Passenger Abdomen



FIGURE 104. Pre-Test Left Side Passenger and Interior View



FIGURE 105. Post-Test Left Side Passenger and Interior View



FIGURE 106. Pre-Test View of Passenger Right Knee and Bolster



FIGURE 107. Post-Test View of Passenger Right Knee and Bolster



FIGURE 108. Pre-Test View of Passenger Left Knee and Bolster



FIGURE 109. Post-Test View of Passenger Left Knee and Bolster



FIGURE 110. Pre-Test View of the Passenger Feet



FIGURE 111. Post-Test View of the Passenger Feet



FIGURE 112. Pre-Test Passenger Adjustable D-Ring



FIGURE 113. Post-Test Passenger Adjustable D-Ring



FIGURE 114. Pre-Test Right Front Passenger Seat Fore-Aft Markings



FIGURE 115. Post-Test Right Front Passenger Seat Fore-Aft Markings



FIGURE 116. Pre-Test Passenger Seat Back Markings



FIGURE 117. Post-Test Passenger Seat Back Markings



FIGURE 118. Pre-Test Close-up View of Passenger Door Latch



FIGURE 119. Post-Test Close-up View of Passenger Door Latch



FIGURE 120. Pre-Test Passenger Inner Door Panel



FIGURE 121. Post-Test Passenger Inner Door Panel



FIGURE 122. Pre-Test Right Side View of Passenger Knee Bolster



FIGURE 123. Post-Test Right Side View of Passenger Knee Bolster



FIGURE 124. Pre-Test Center View of Passenger Knee Bolster



FIGURE 125. Post-Test Center View of Passenger Knee Bolster



FIGURE 126. Pre-Test Left Side View of Passenger Knee Bolster



FIGURE 127. Post-Test Left Side View of Passenger Knee Bolster



FIGURE 128. Pre-Test View of Passenger Floor Pan from Outside of Vehicle



FIGURE 129. Post-Test View of Passenger Floor Pan from Outside of Vehicle



FIGURE 130. Pre-Test View of Passenger Floor Pan from Top of Front Seat



FIGURE 131. Post-Test View of Passenger Floor Pan from Top of Front Seat



FIGURE 132. Pre-Test View of Passenger Floor Pan from Center of Vehicle



FIGURE 133. Post-Test View of Passenger Floor Pan from Center of Vehicle



FIGURE 134. Post-Test Driver Dummy Contact with Front Airbag

# Photograph Not Applicable

FIGURE 135. Post-Test Driver Dummy Contact with Side Airbag



FIGURE 136. Post-Test Driver Dummy Contact with Knee Airbag

# Photograph Not Applicable

## No Stoddard Solvent Spillage

FIGURE 137. Post-Test Stoddard Solvent Spillage Location View



FIGURE 138. Post-Test Speed Trap Read-Out



FIGURE 139. Vehicle at 0° on Static Rollover Device

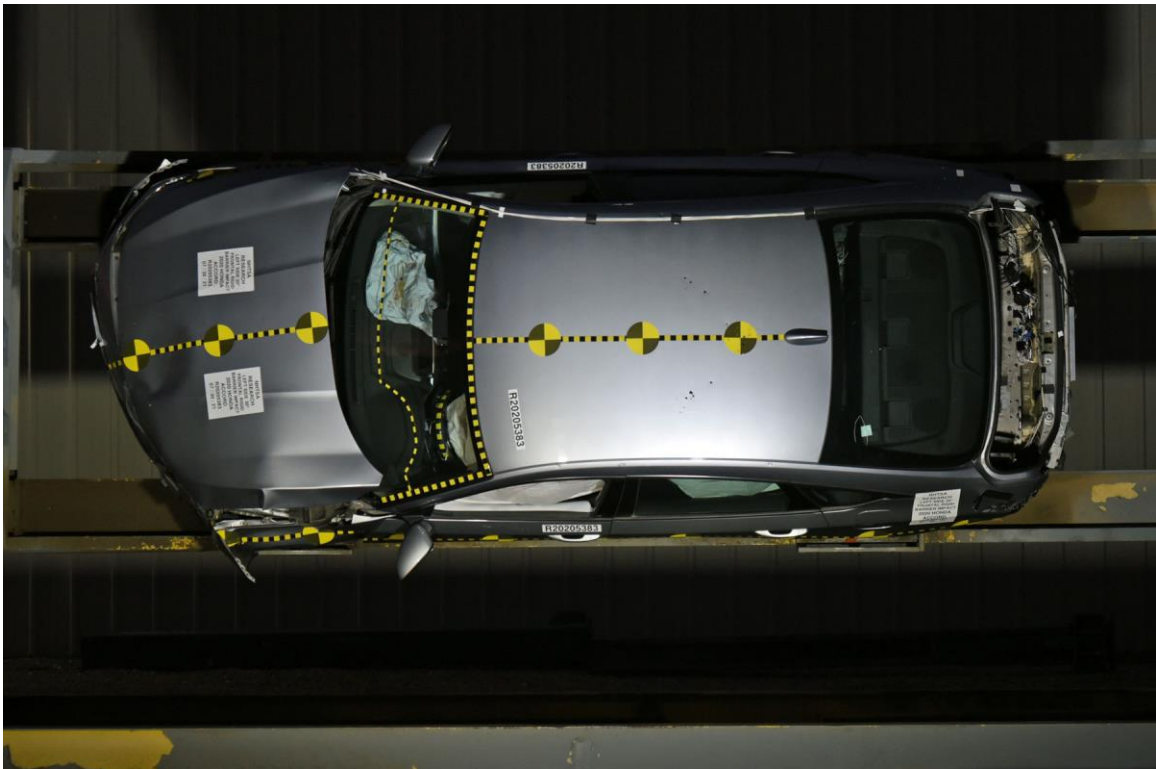


FIGURE 140. Vehicle at 90° on Static Rollover Device



FIGURE 141. Vehicle at 180° on Static Rollover Device

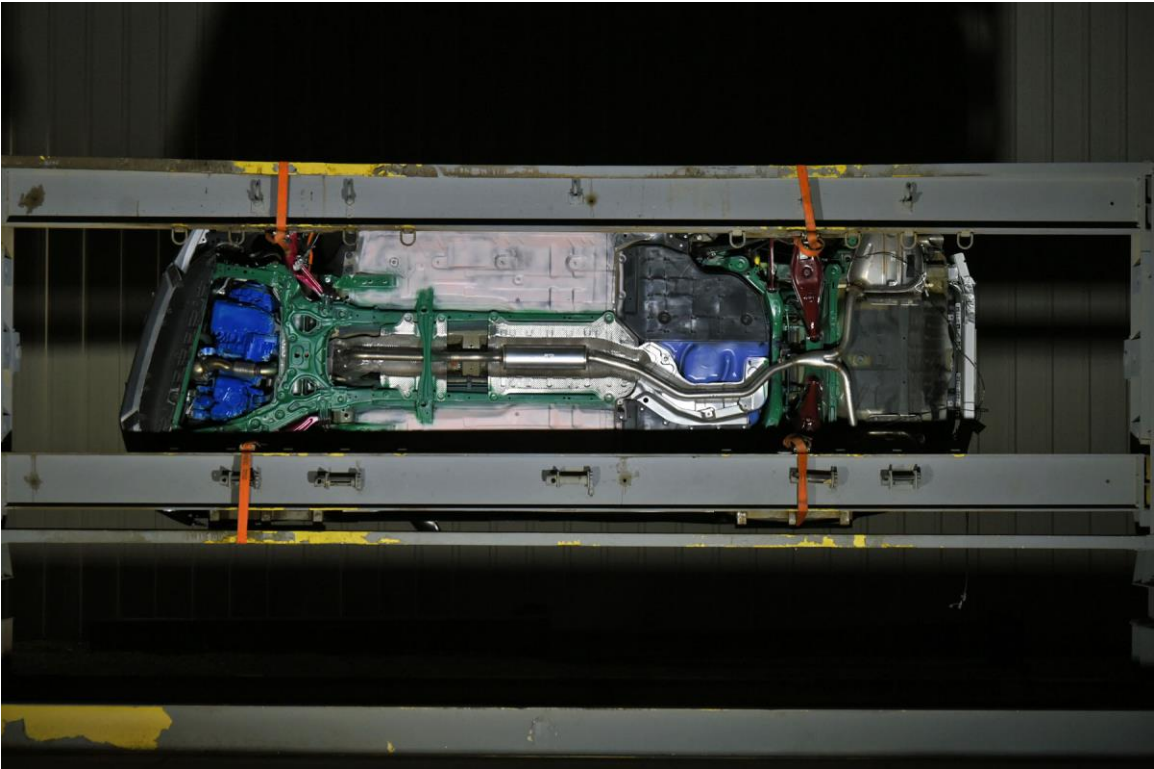


FIGURE 142. Vehicle at 270° on Static Rollover Device



FIGURE 143. Vehicle at 360° on Static Rollover Device



FIGURE 144. Frontal Impact Event

# Photograph Not Available

FIGURE 145. Monroney Label Photograph

**APPENDIX B**  
**VEHICLE AND DUMMY RESPONSE DATA TRACES**

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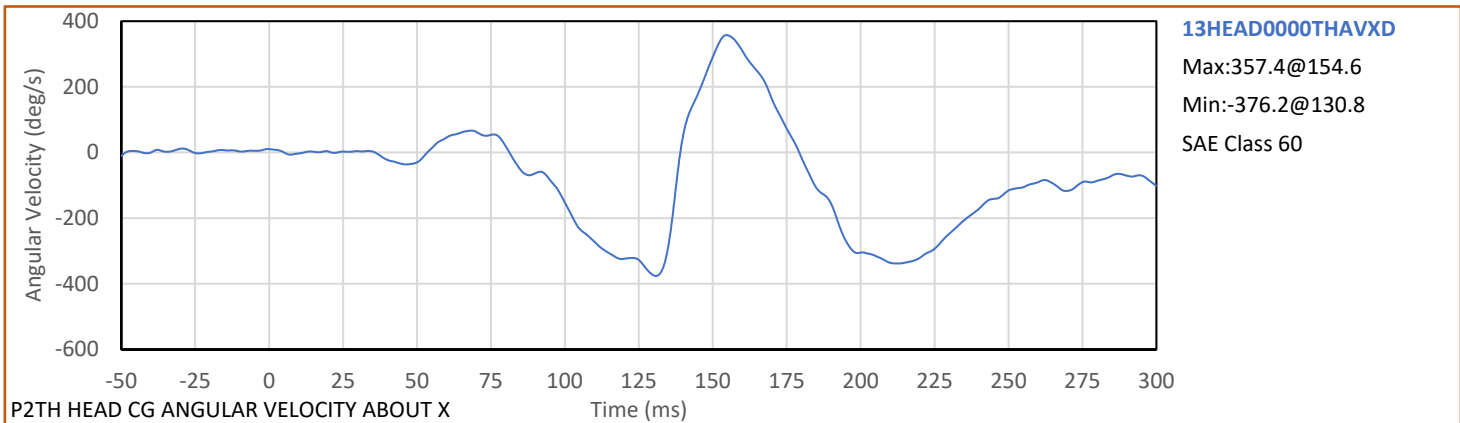
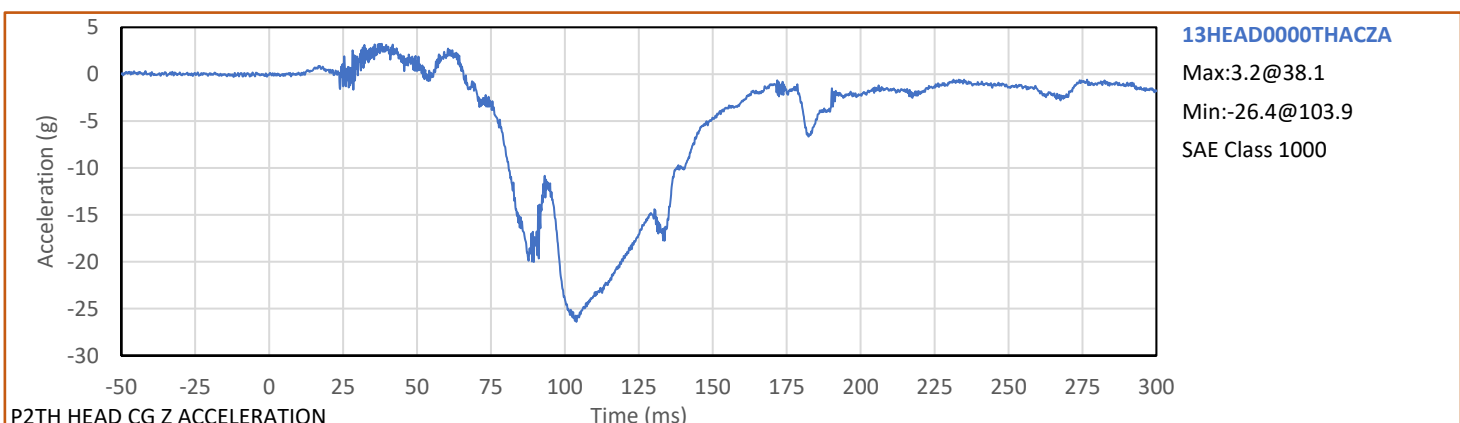
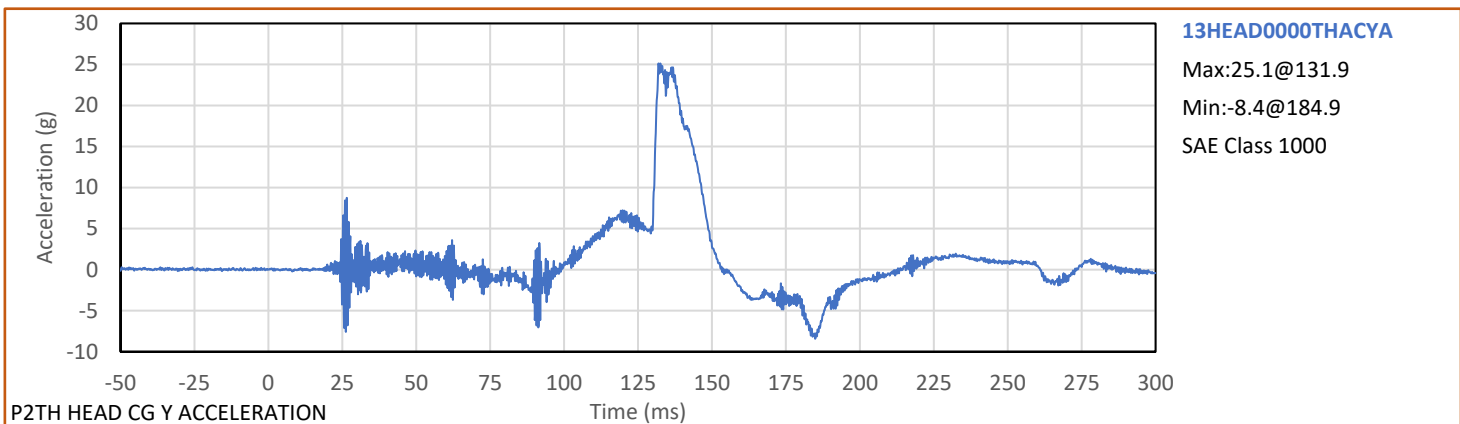
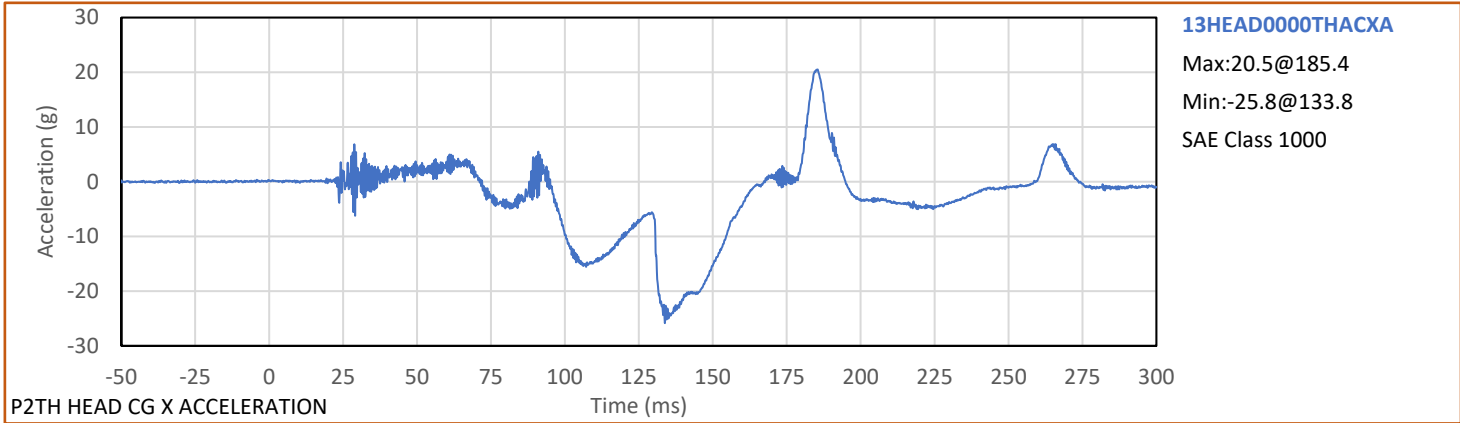
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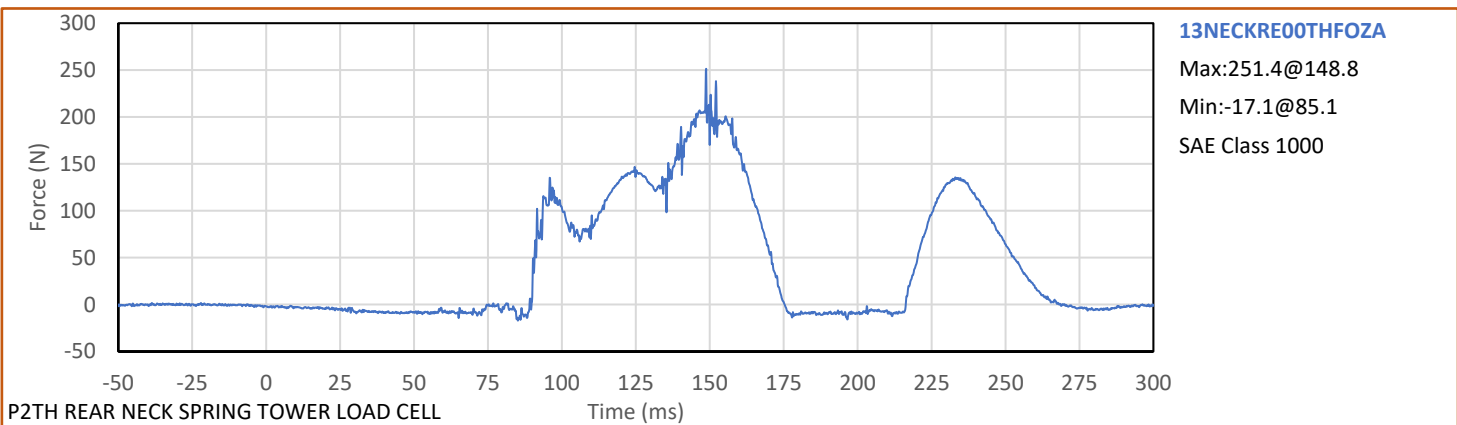
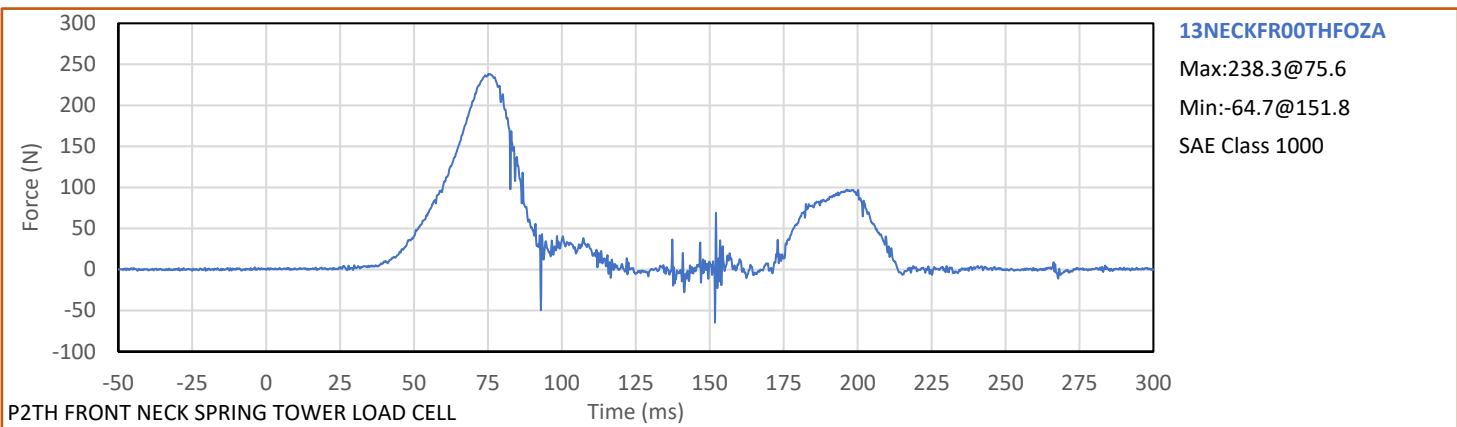
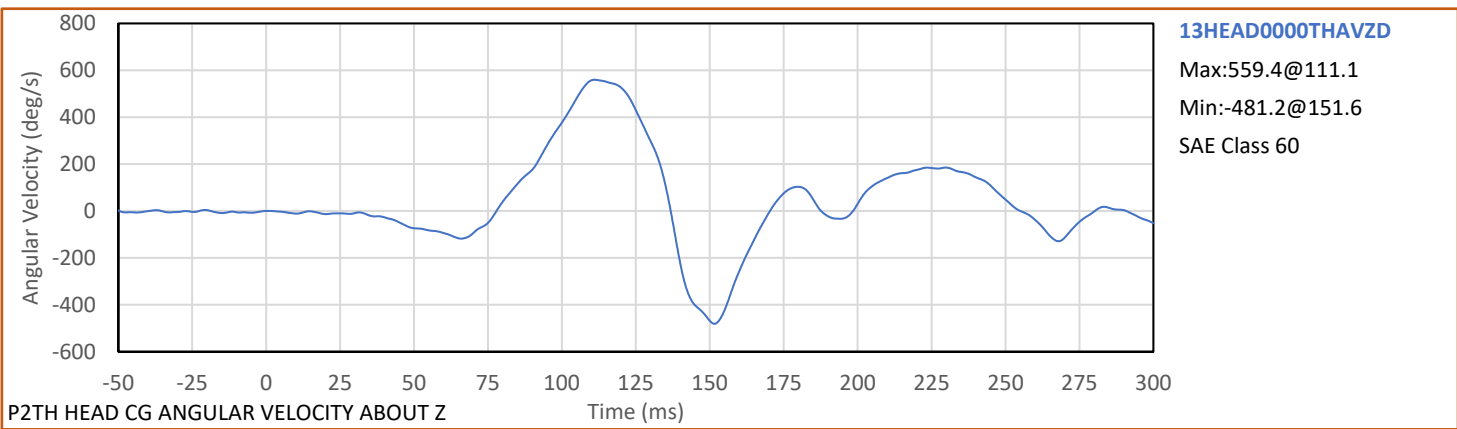
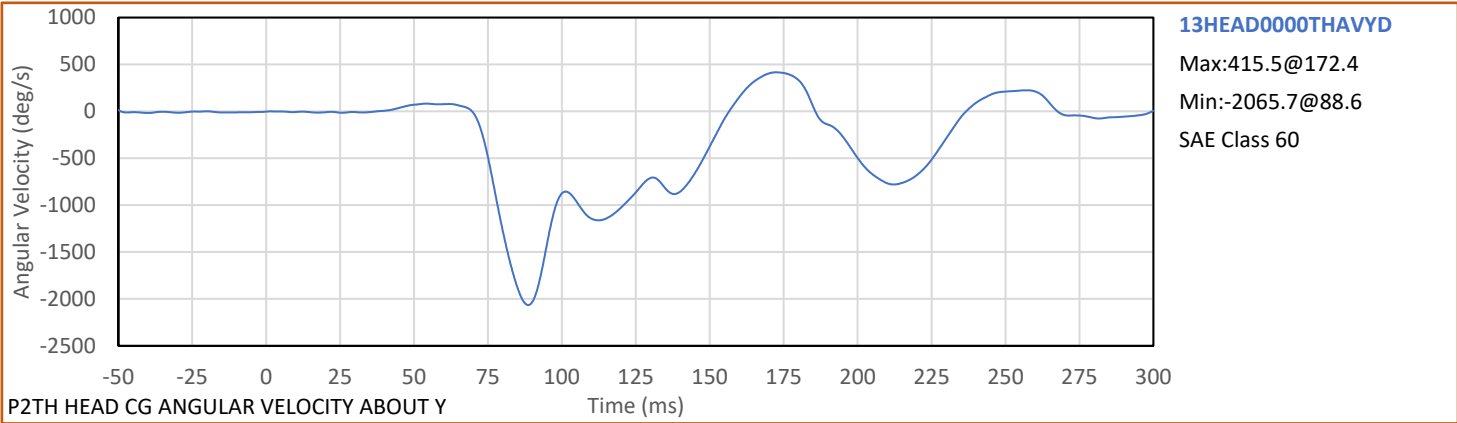
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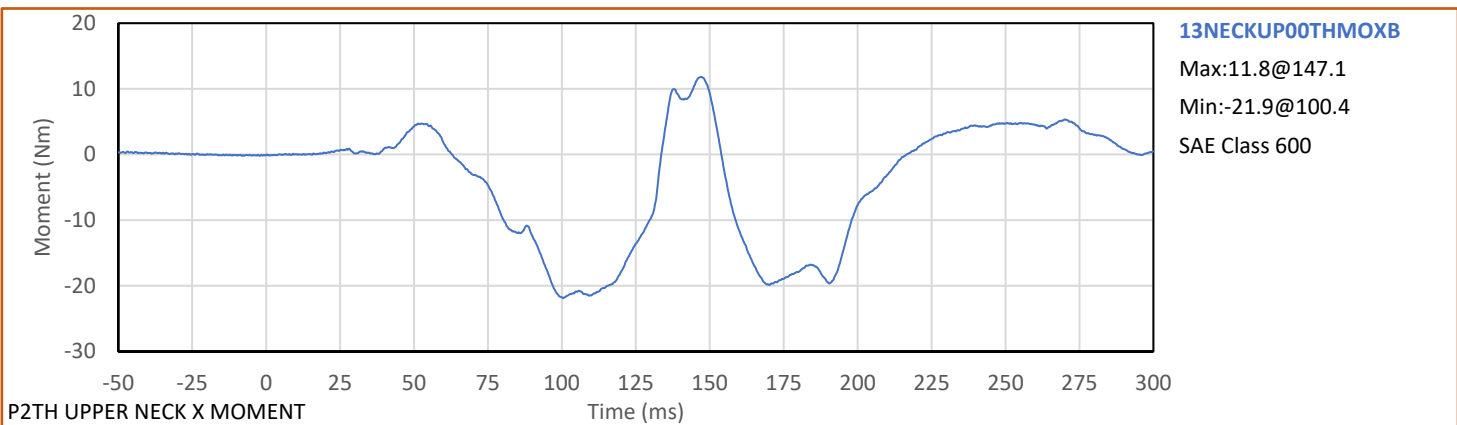
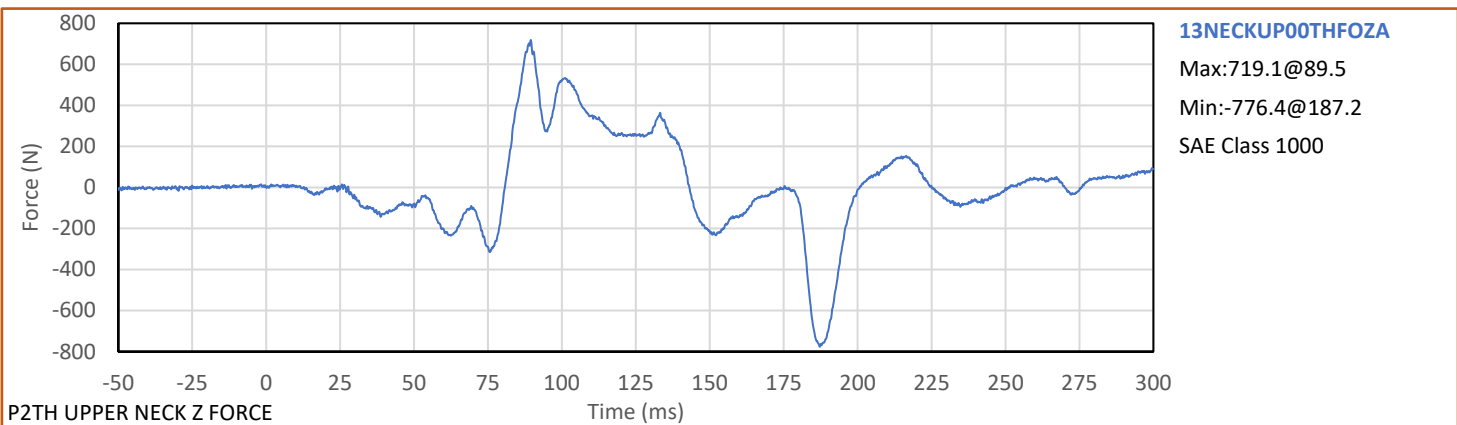
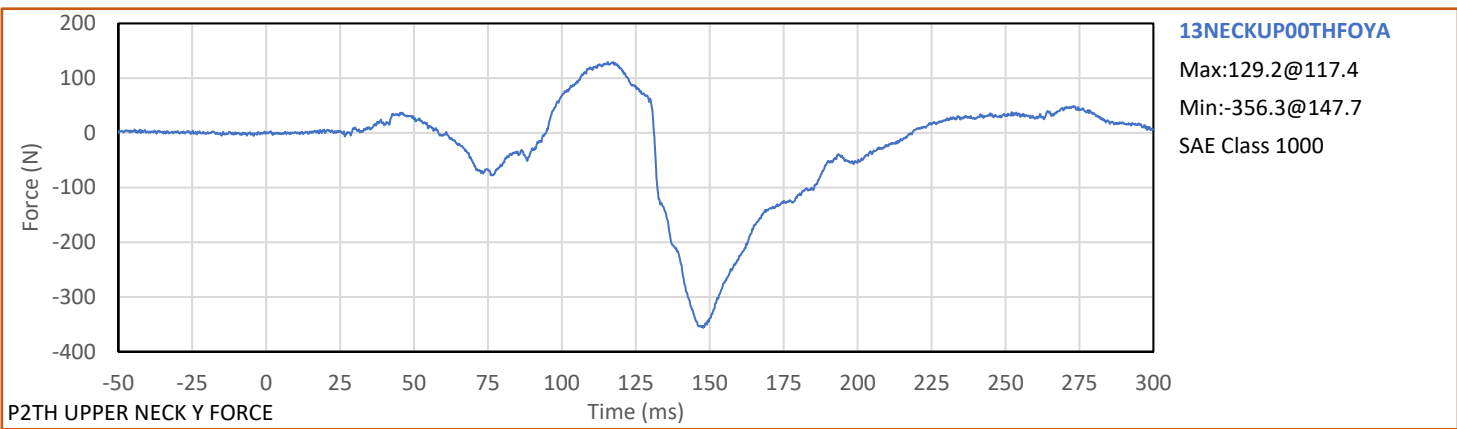
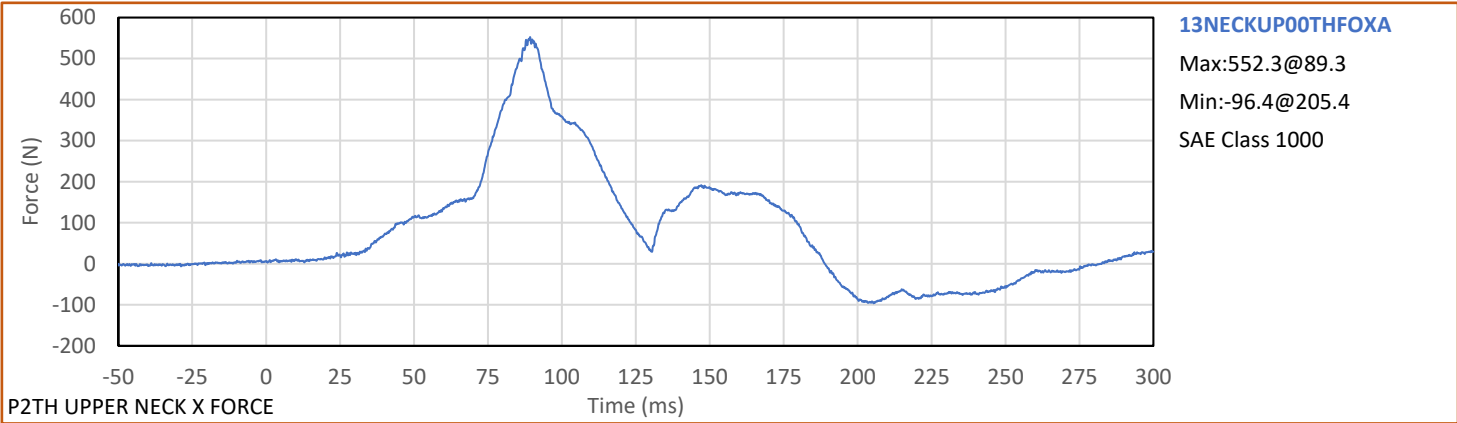
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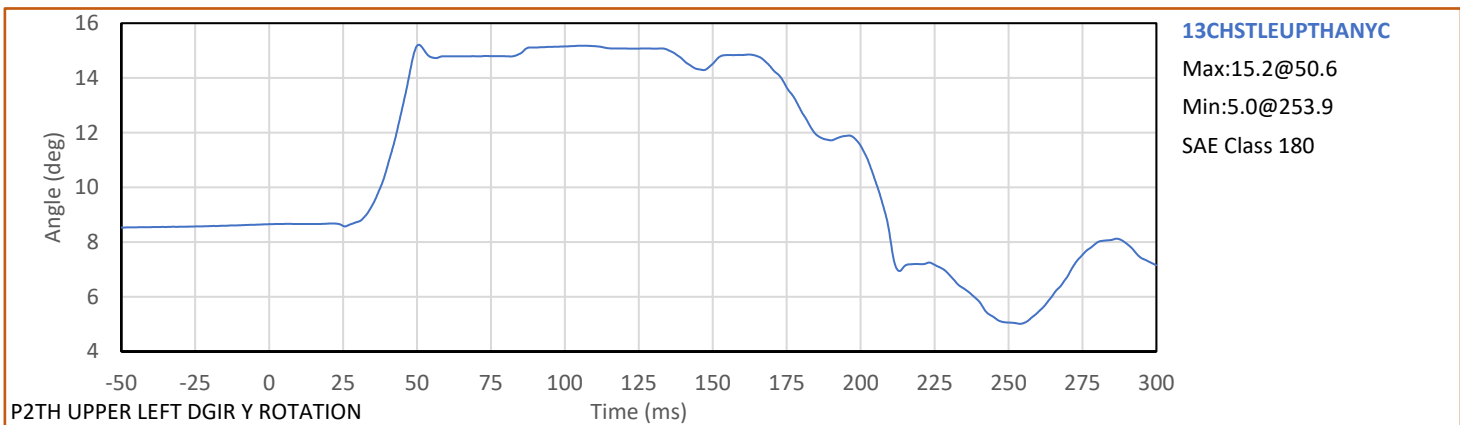
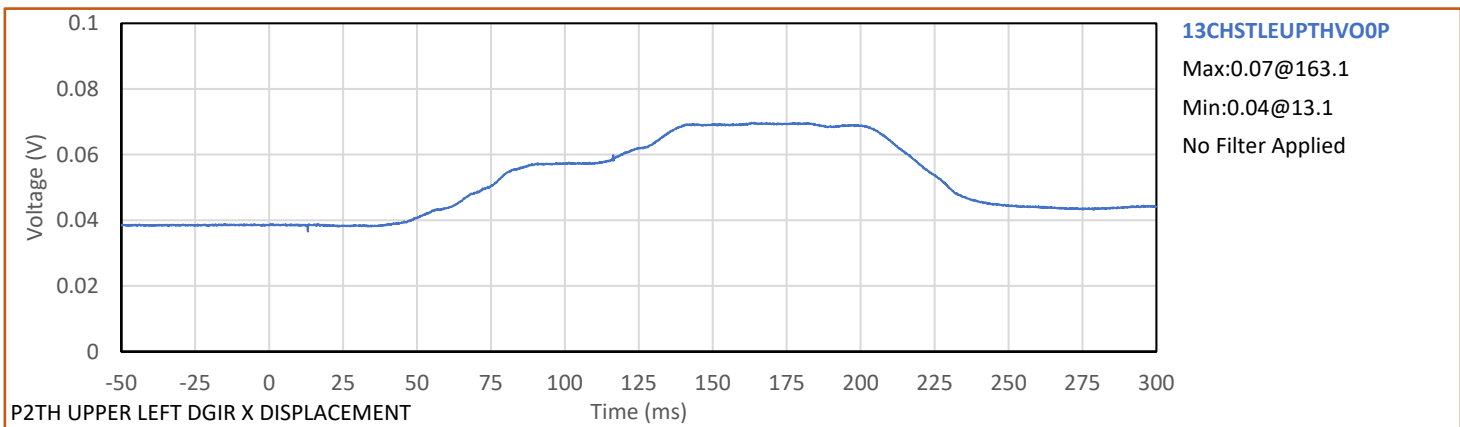
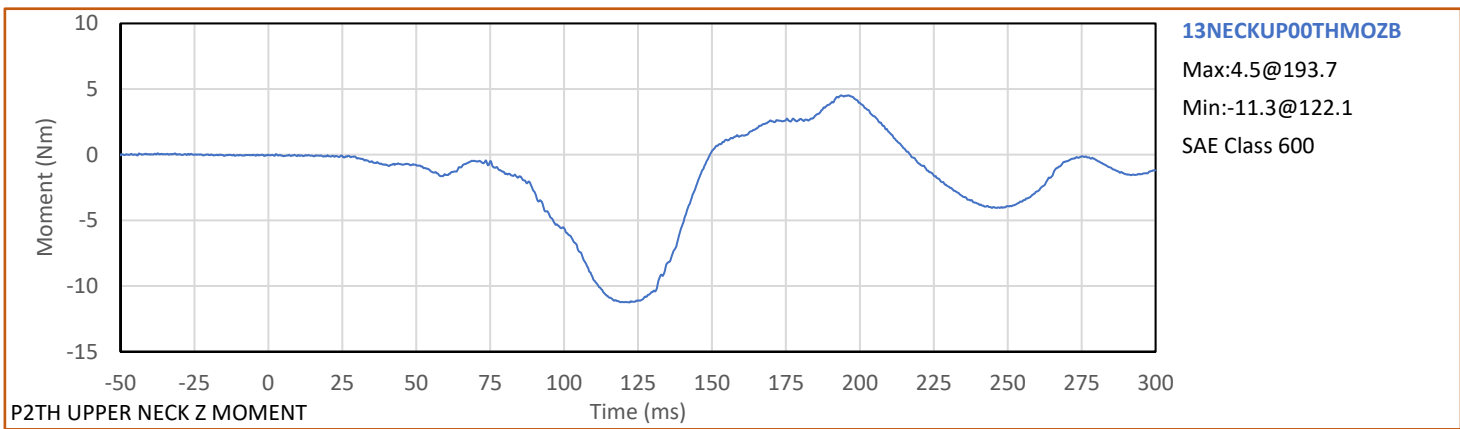
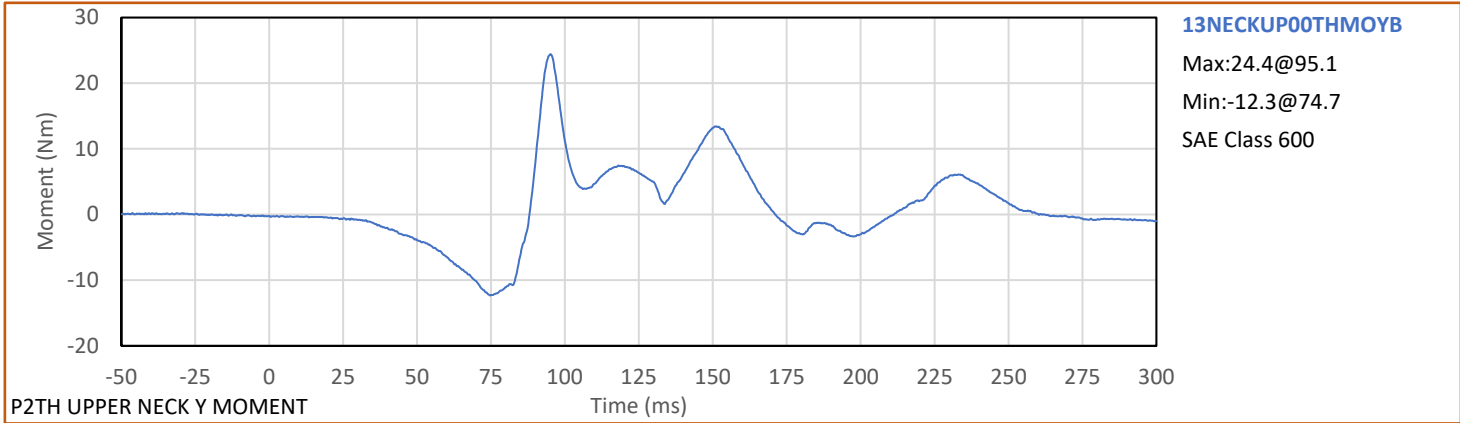
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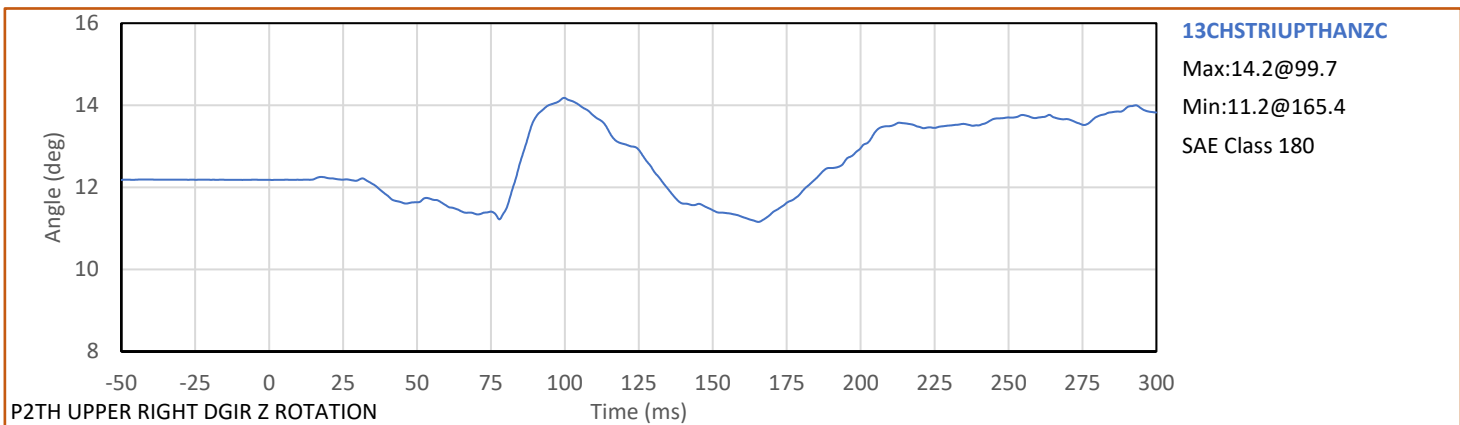
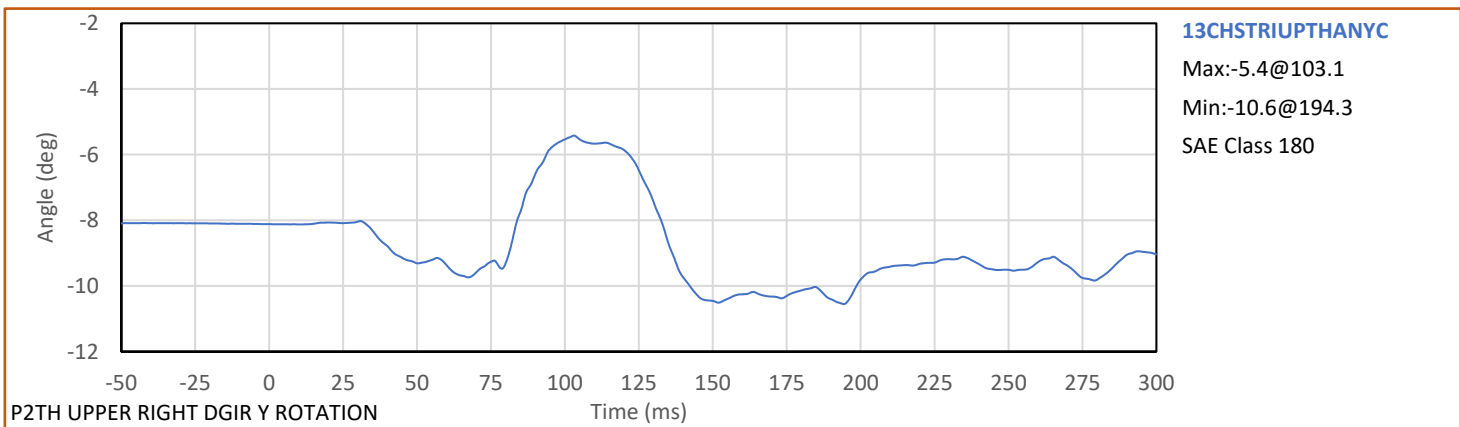
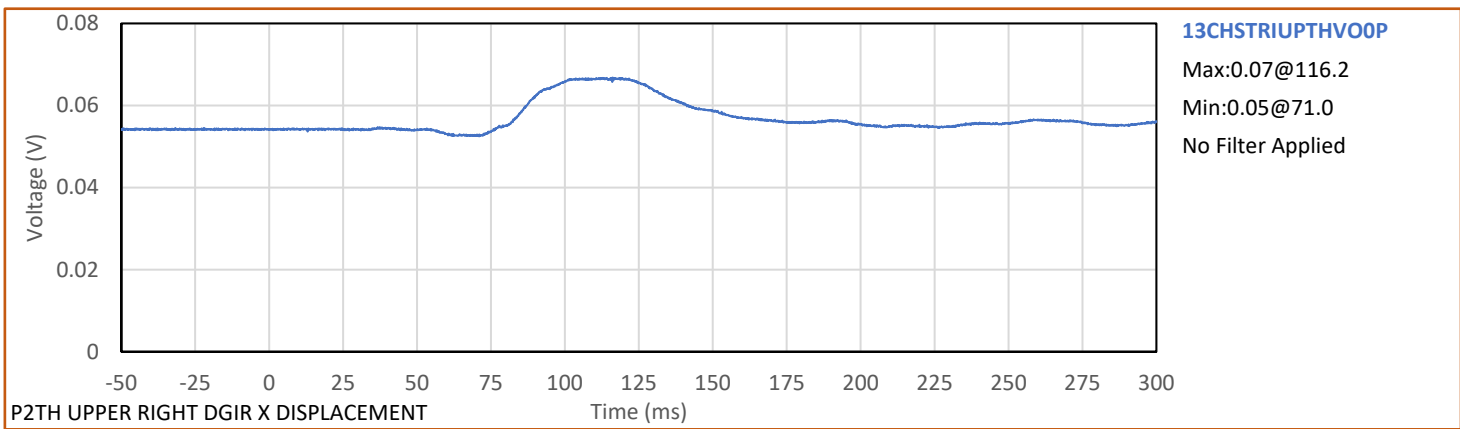
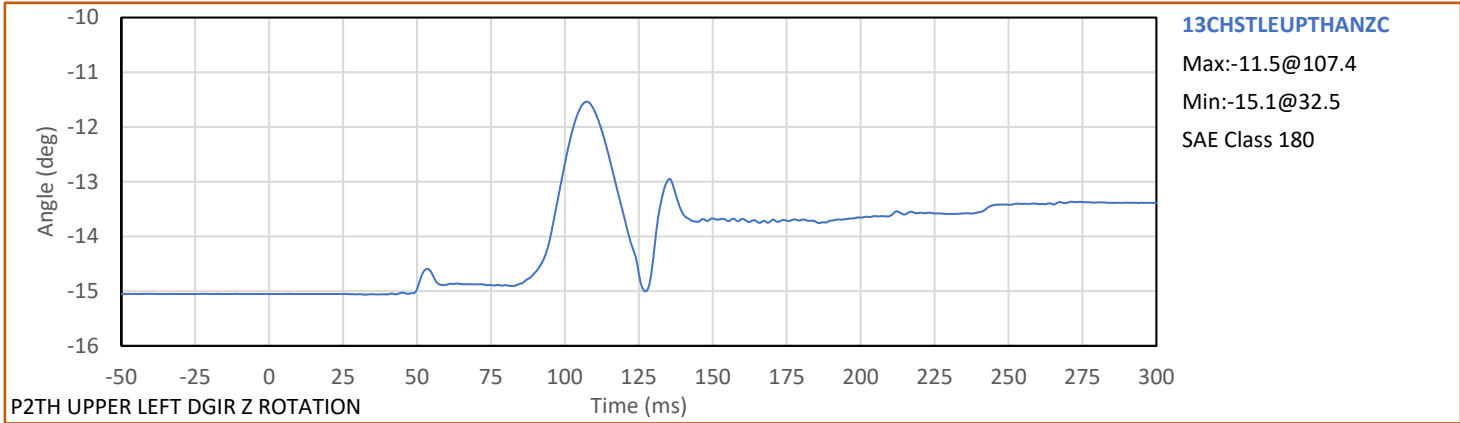
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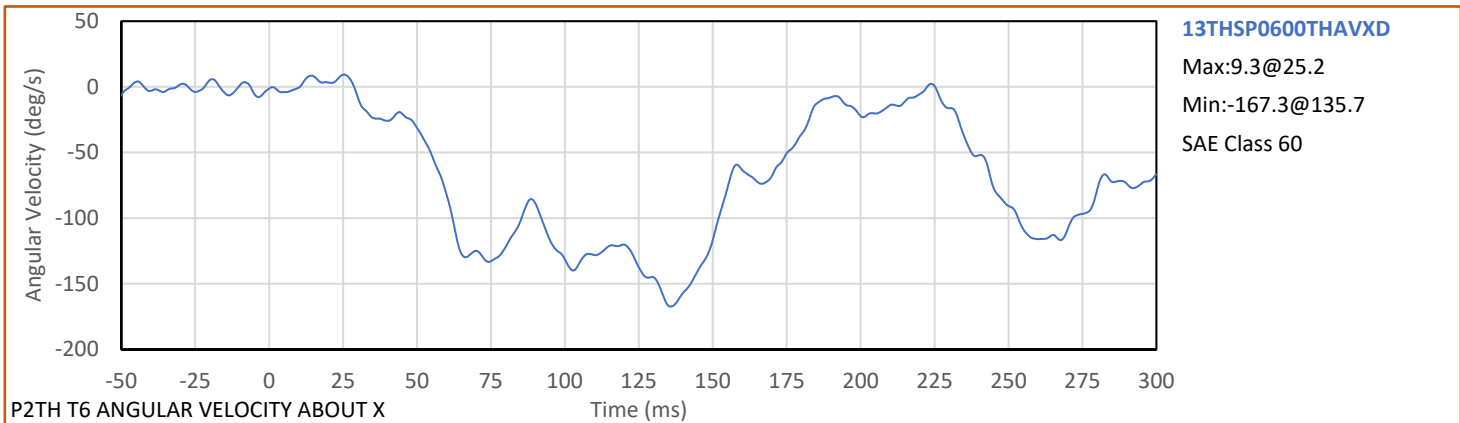
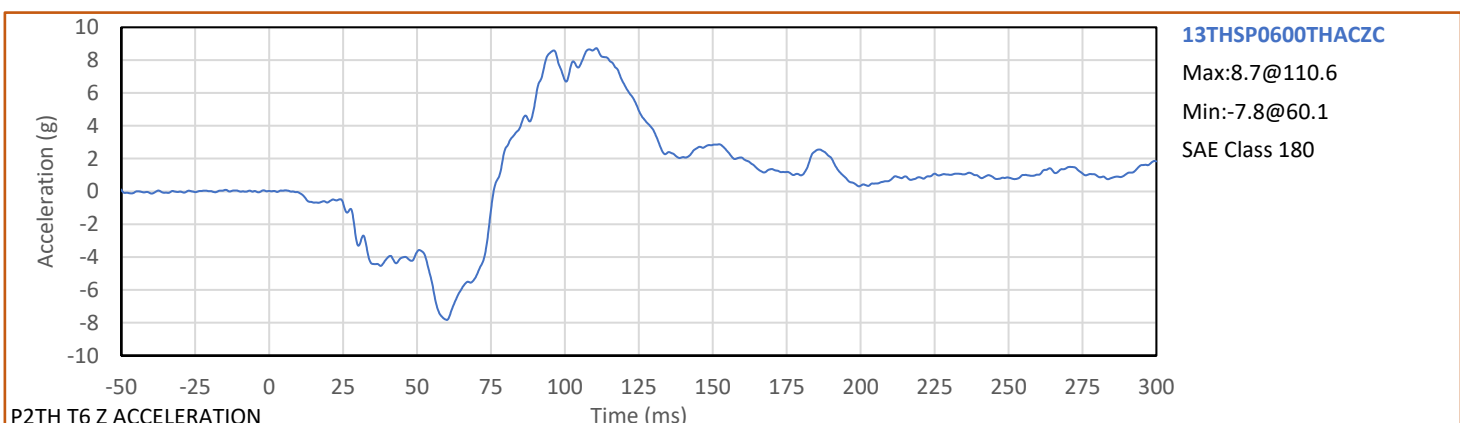
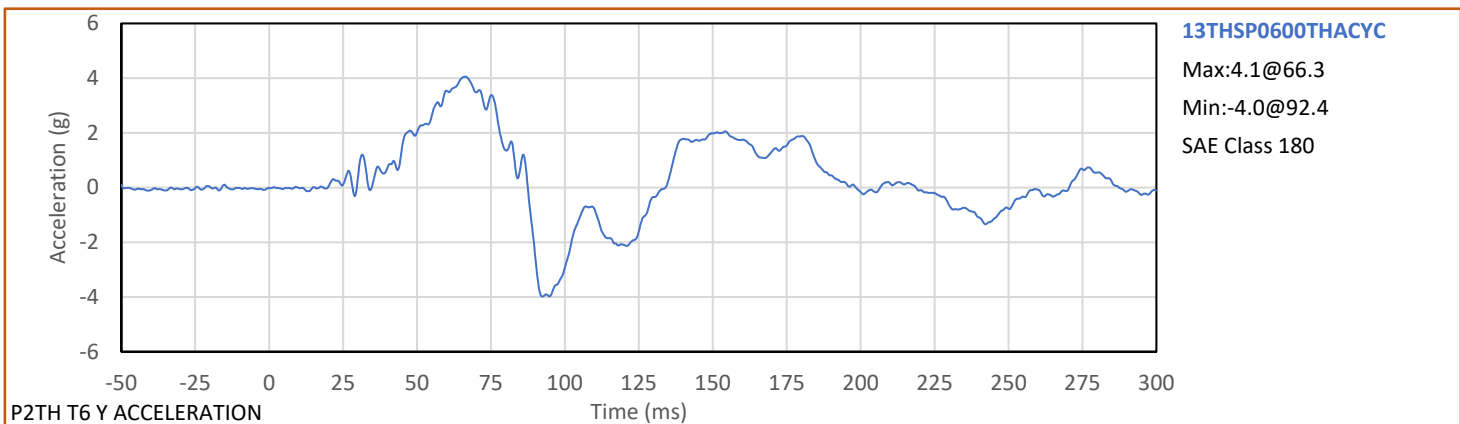
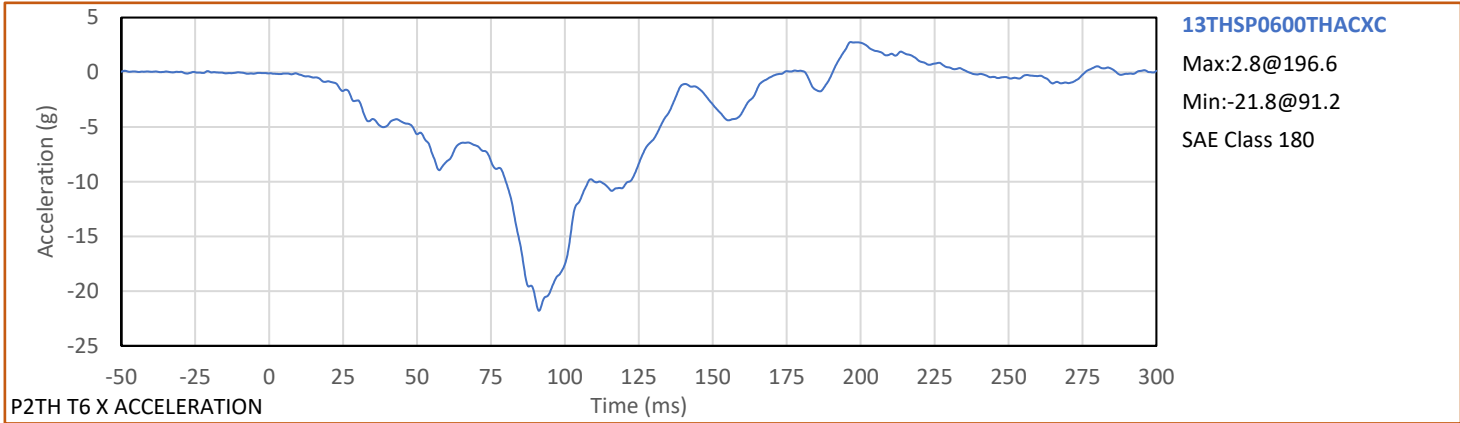


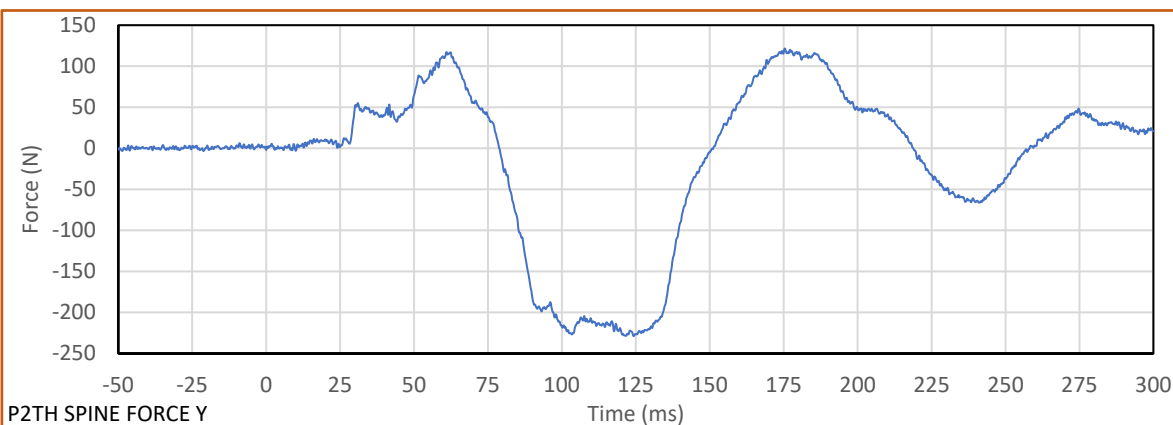
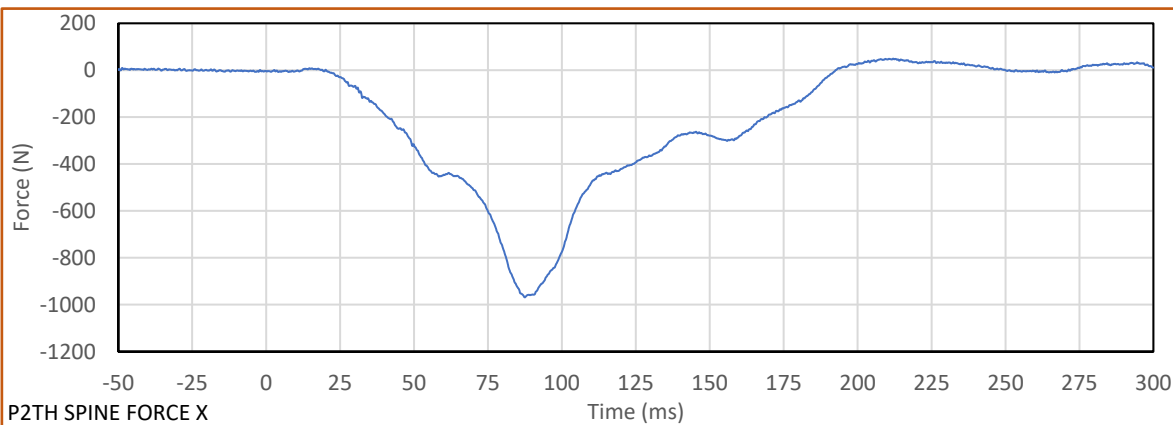
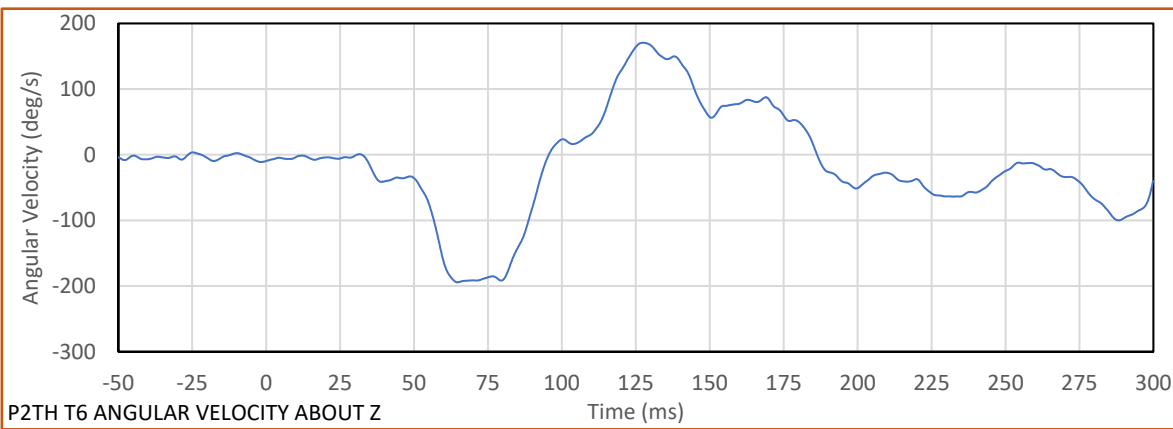
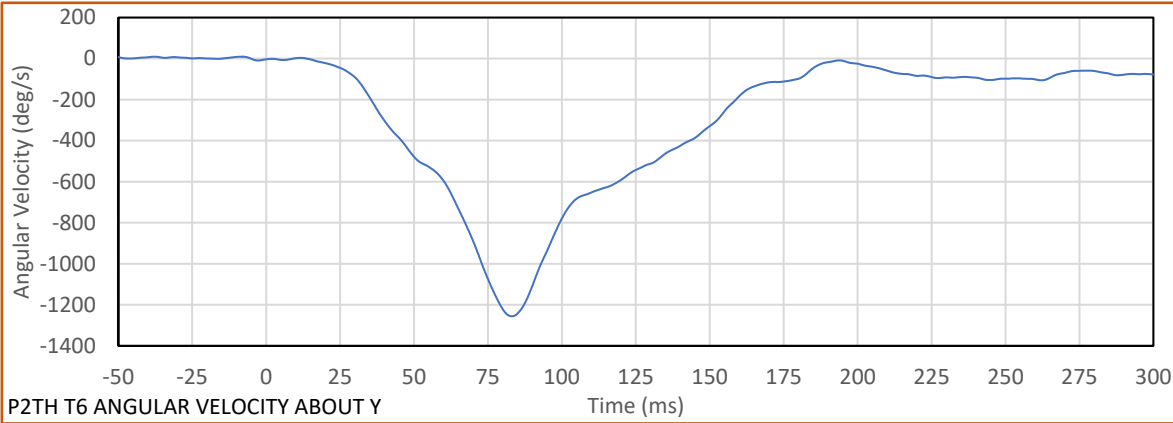


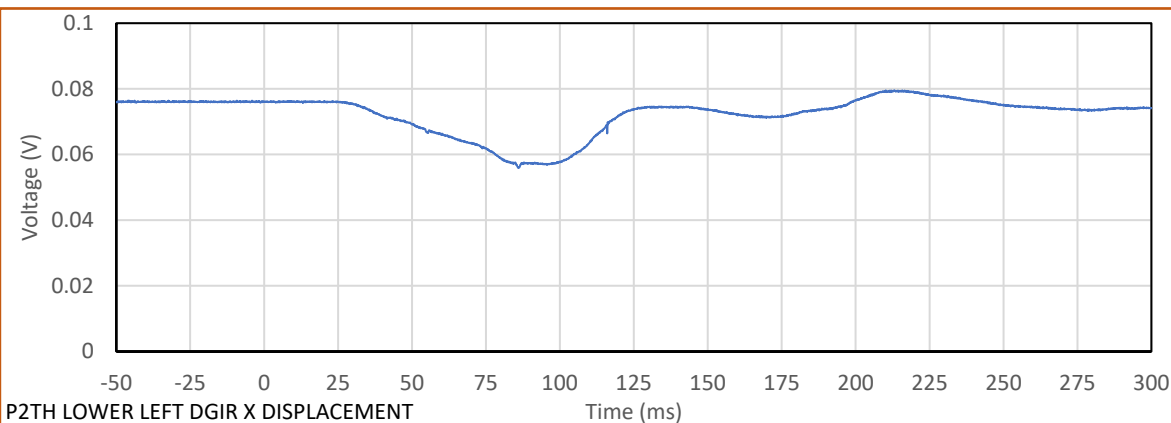
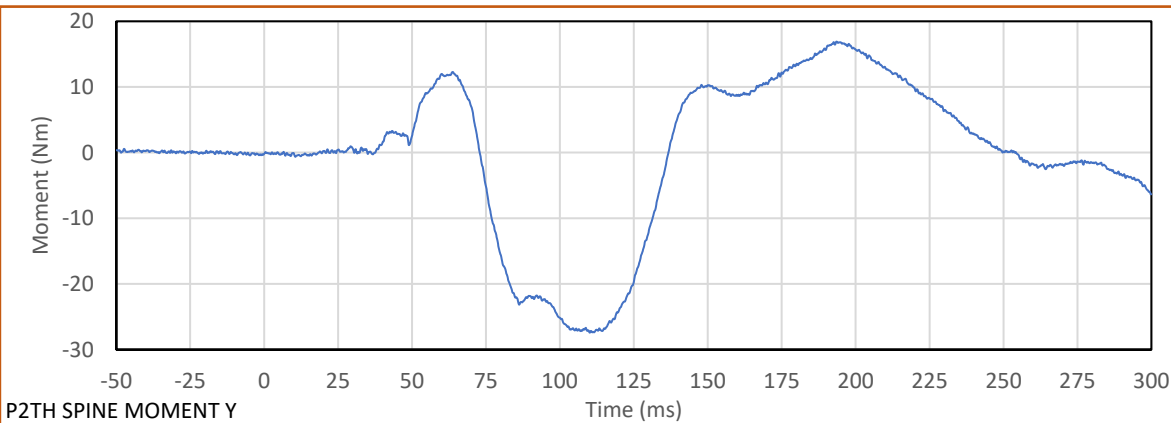
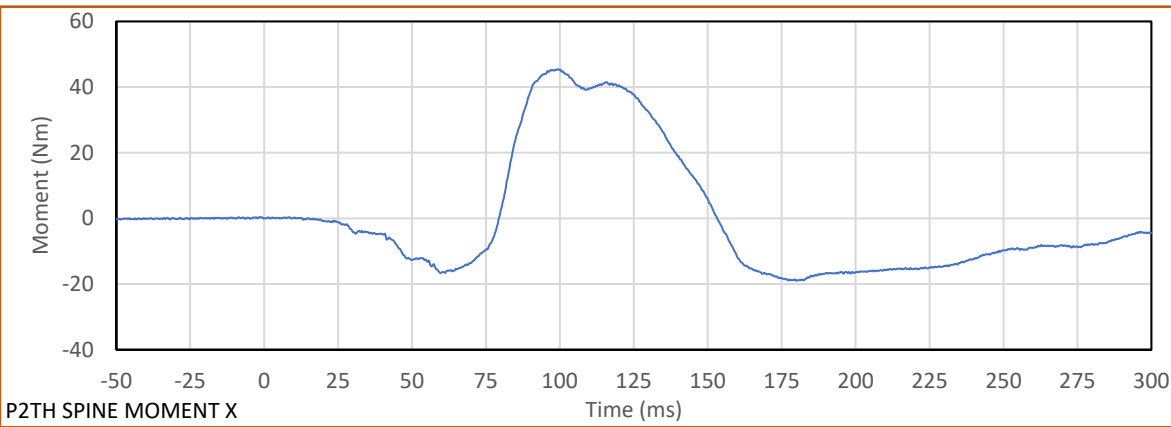
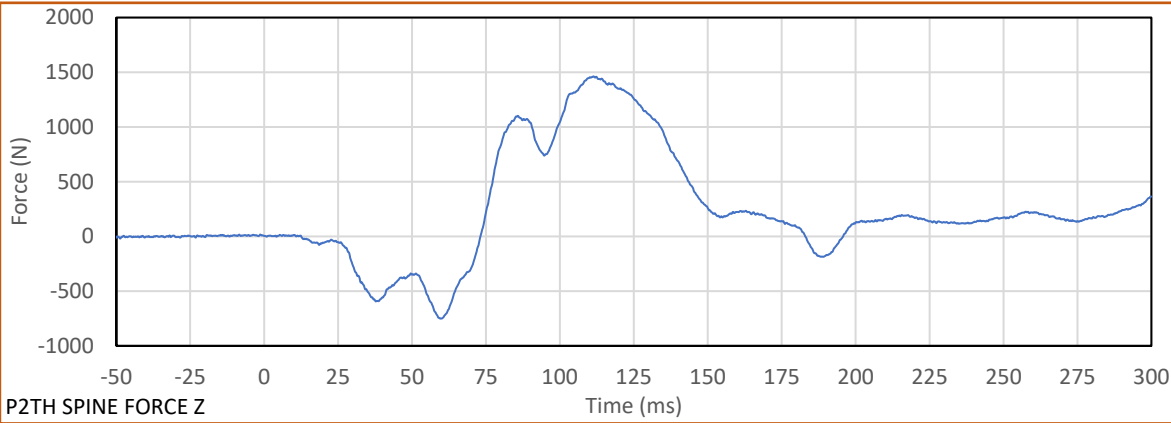


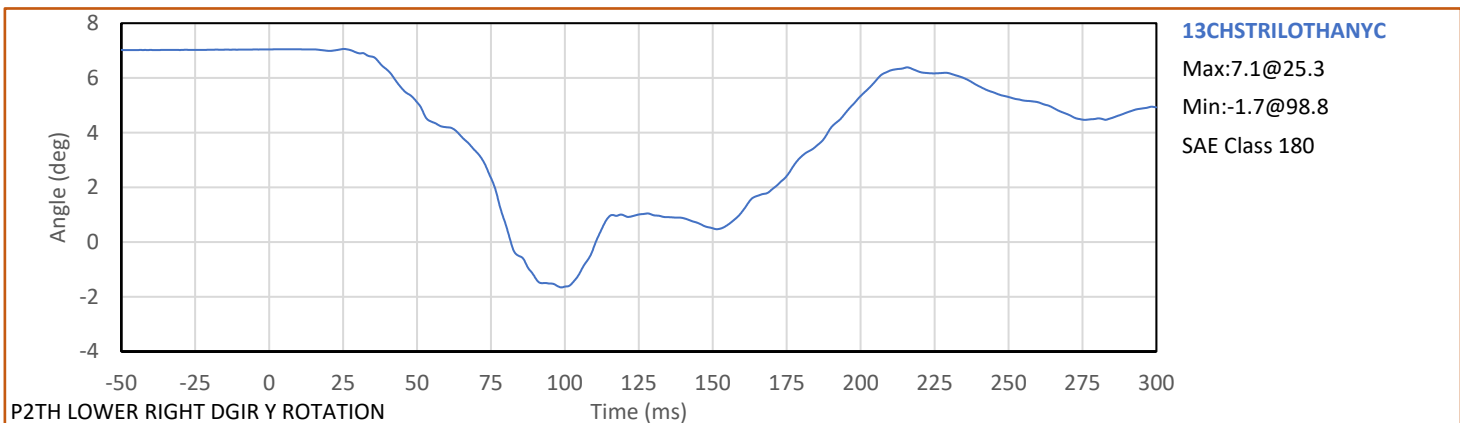
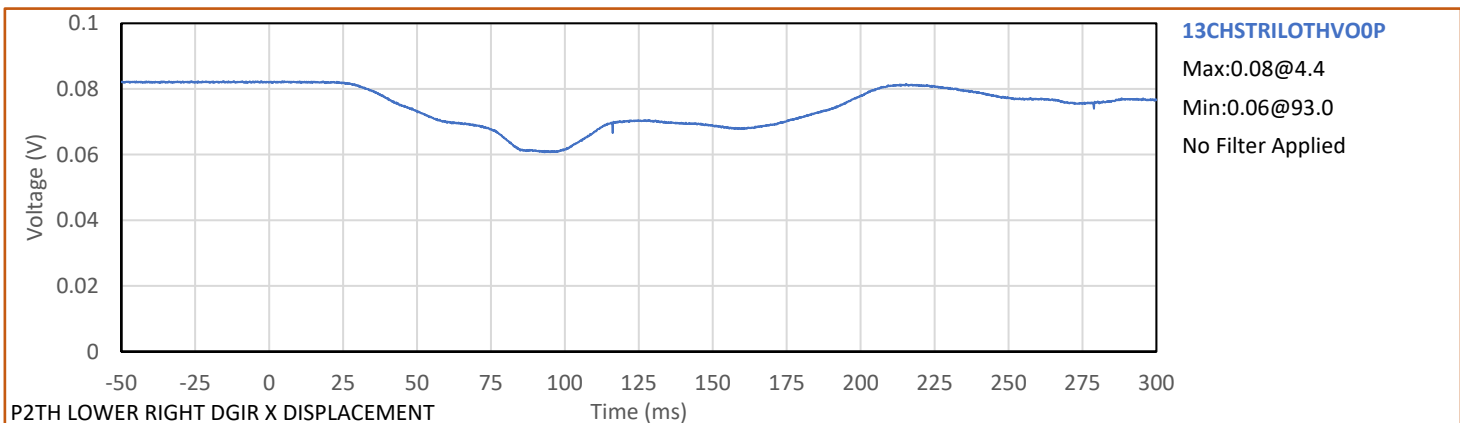
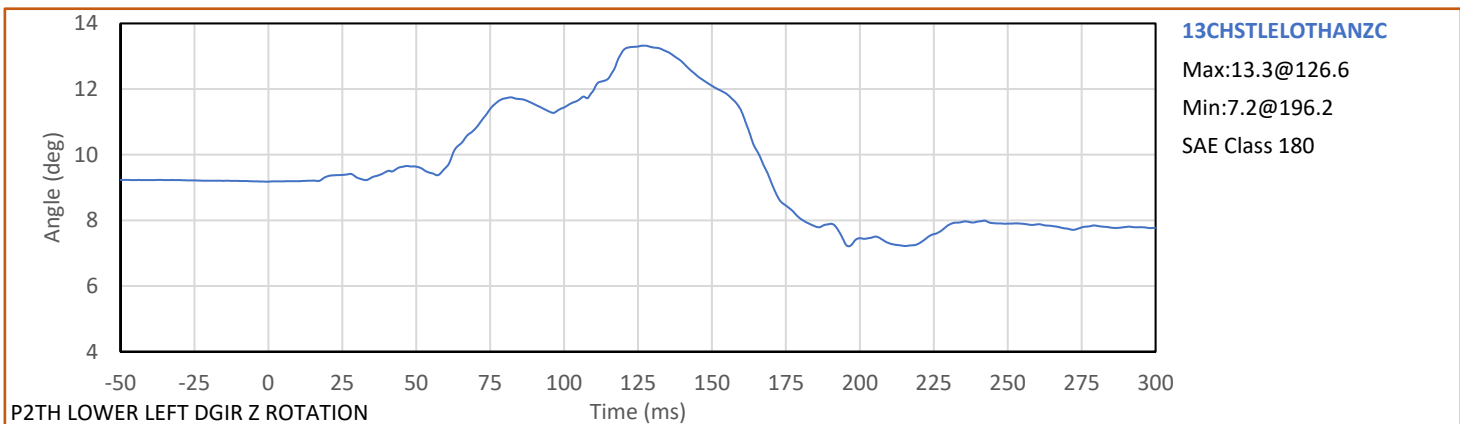
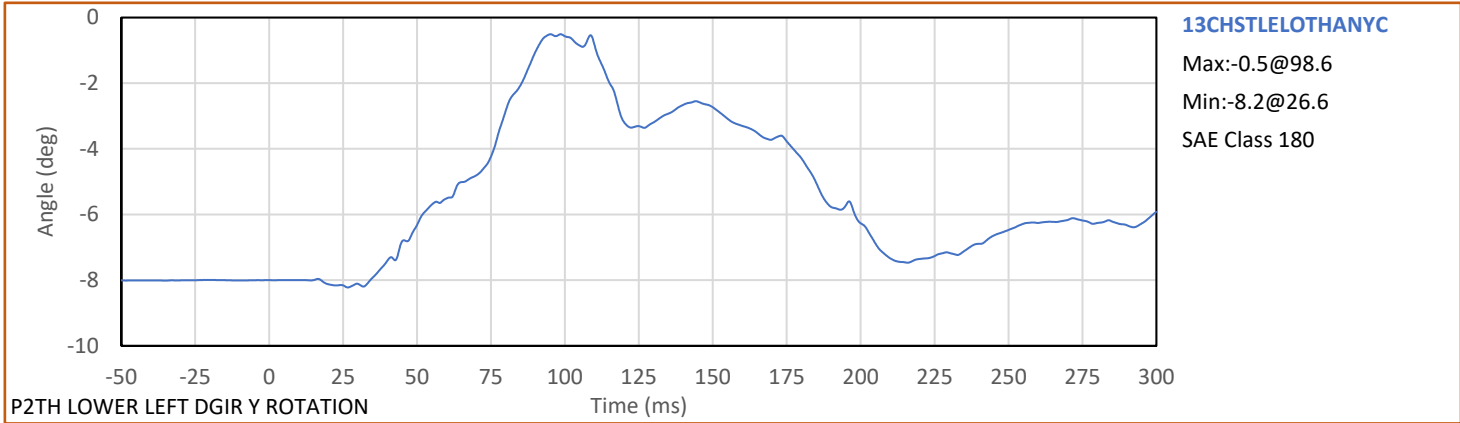


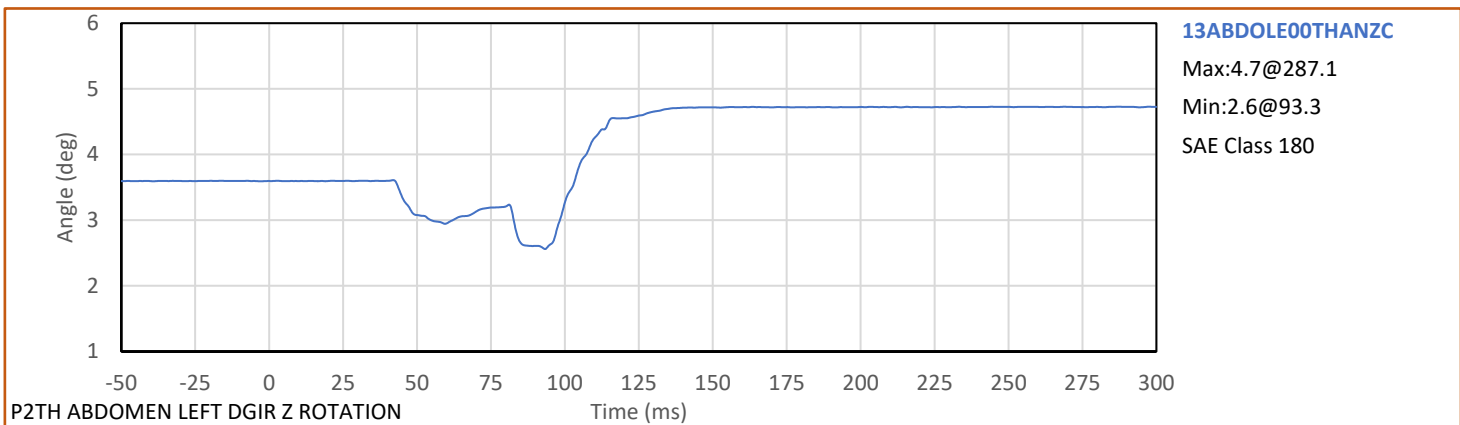
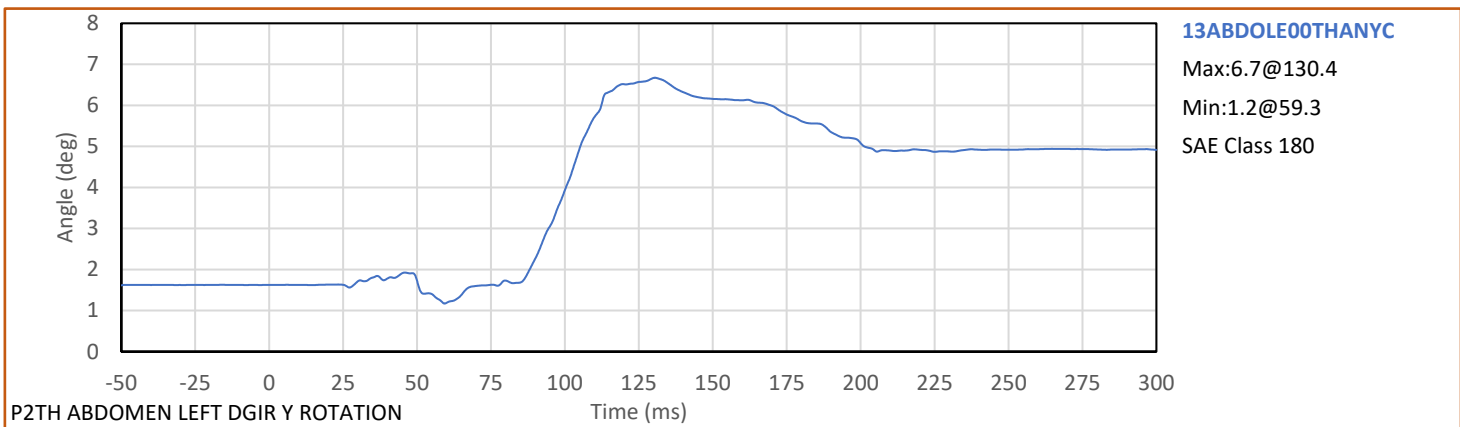
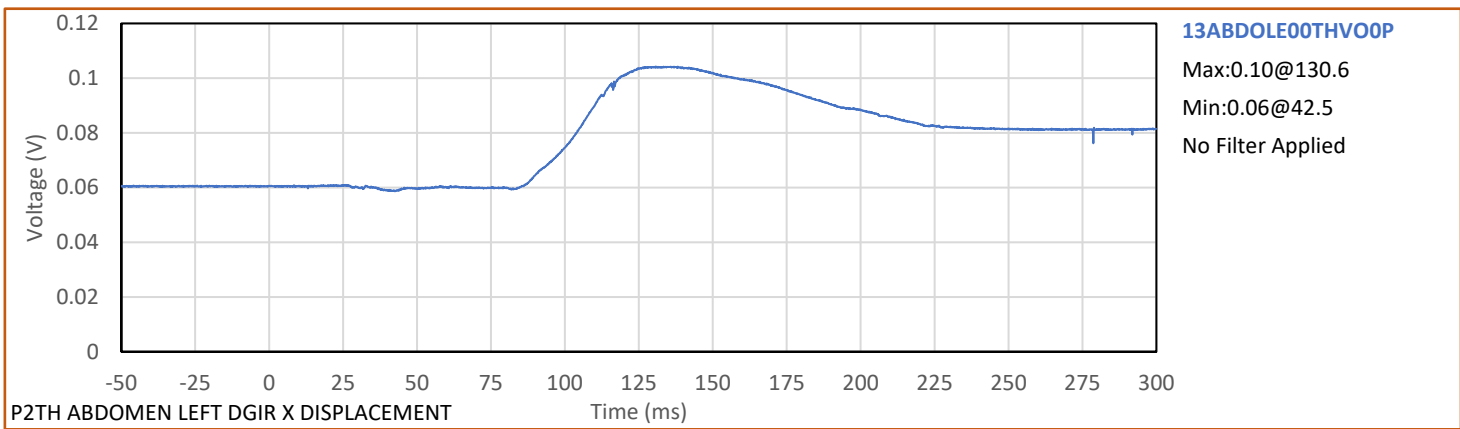
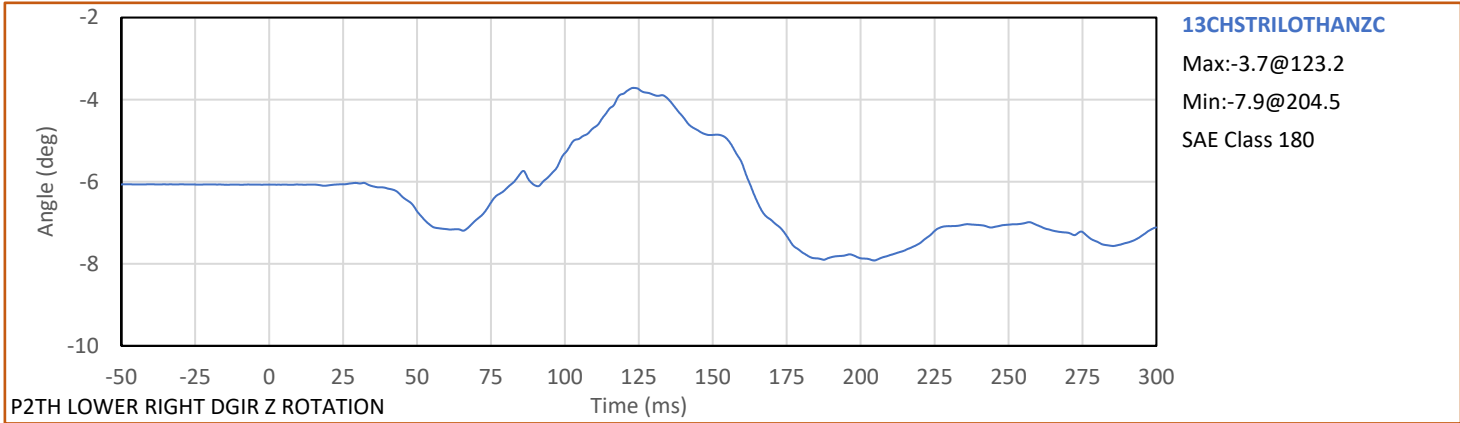


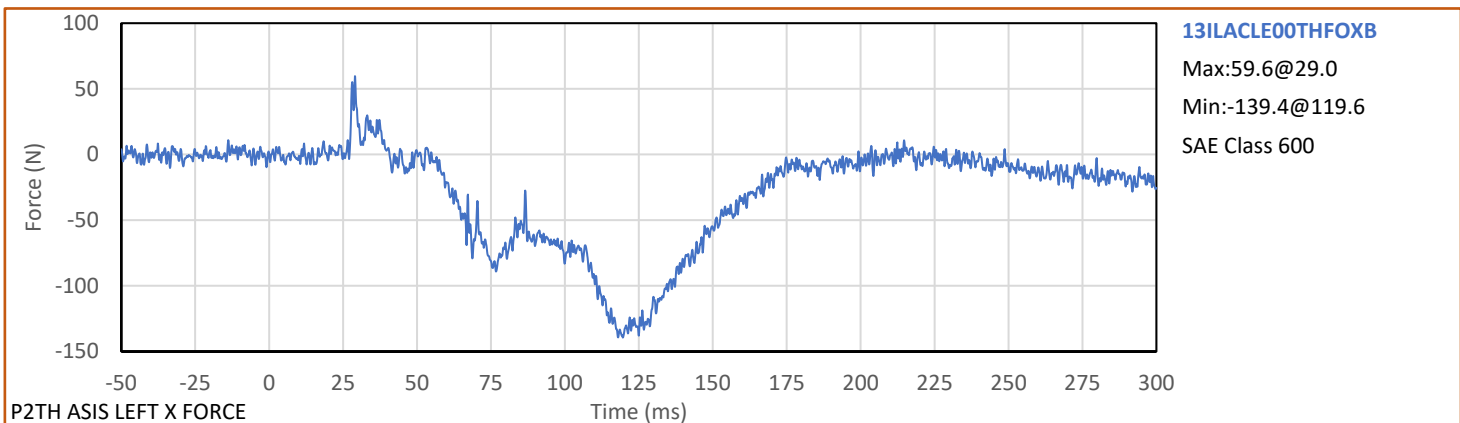
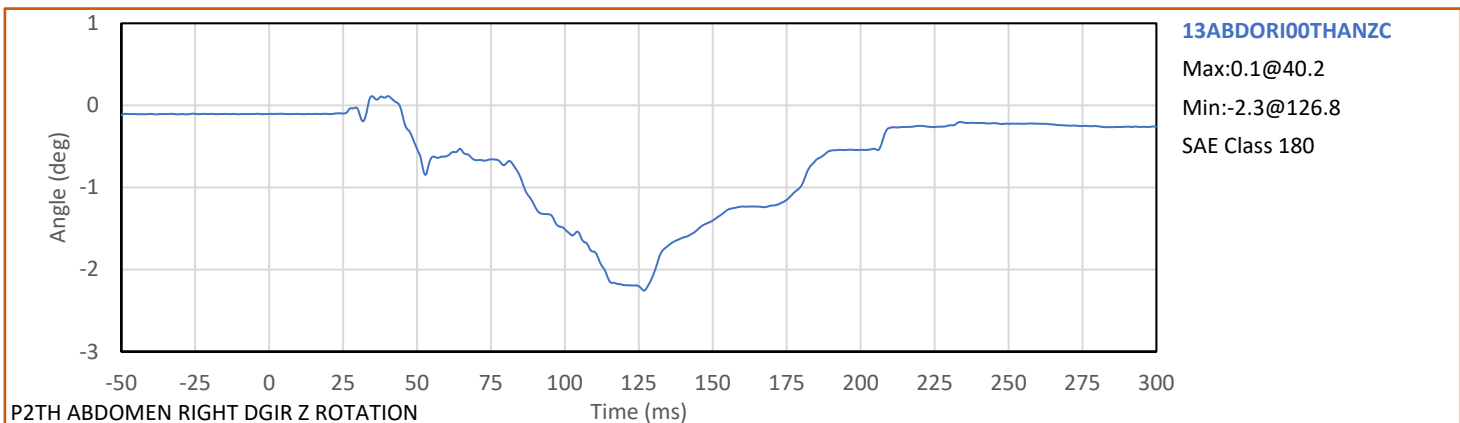
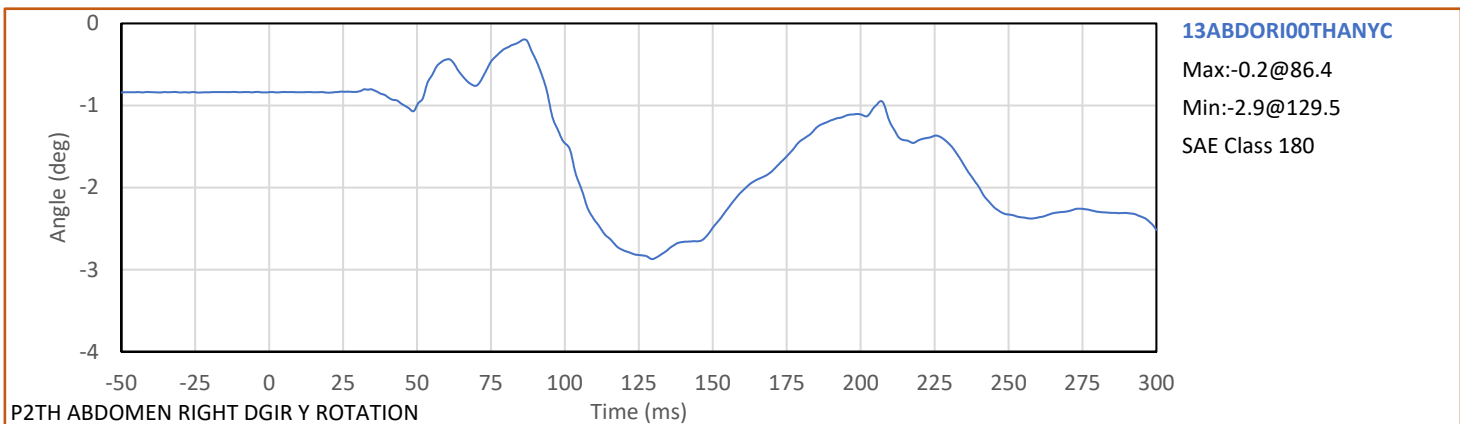
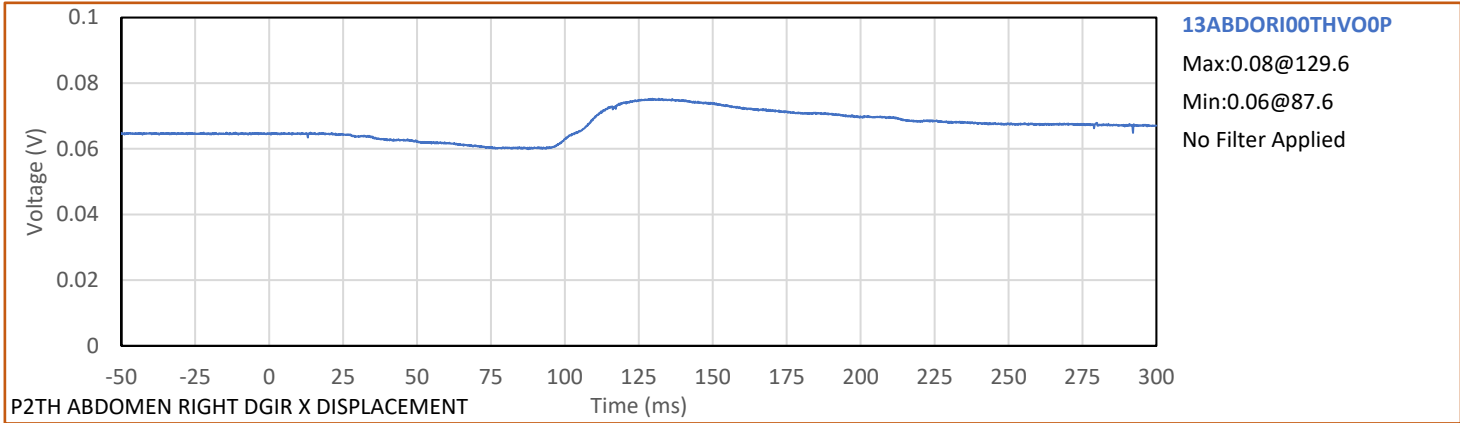


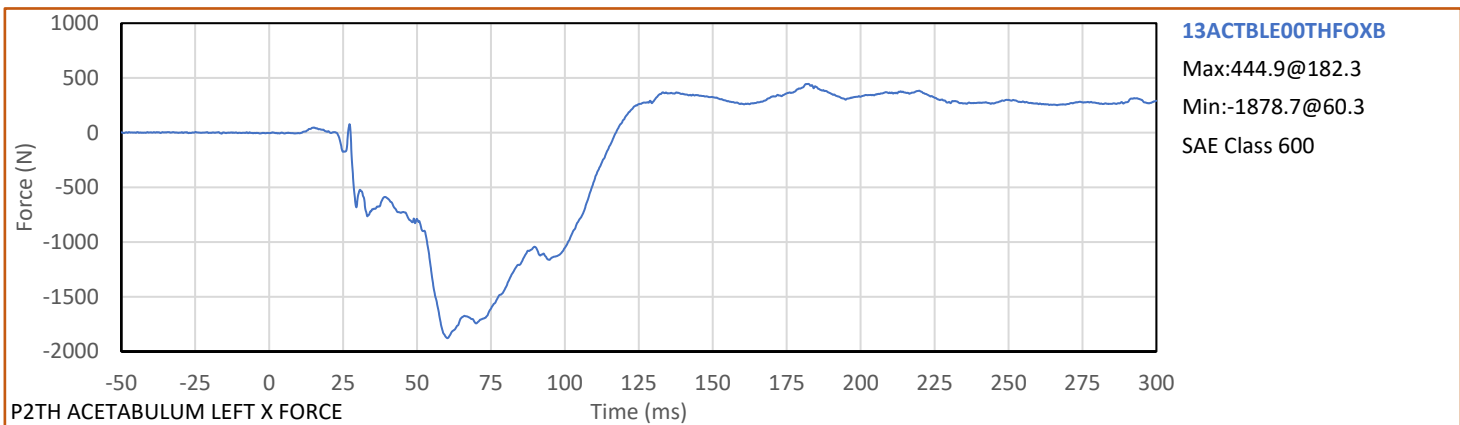
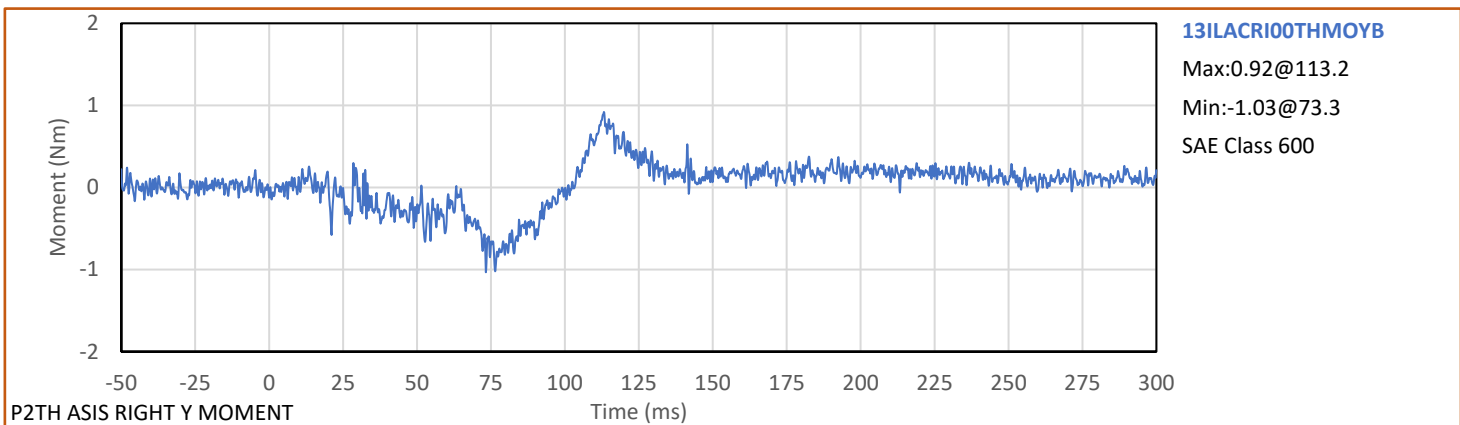
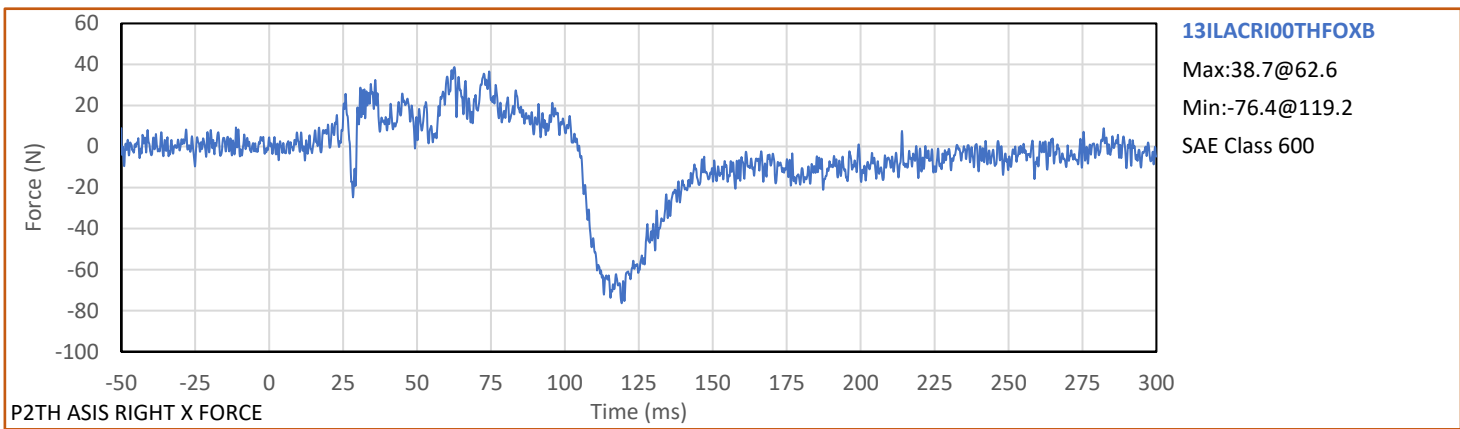
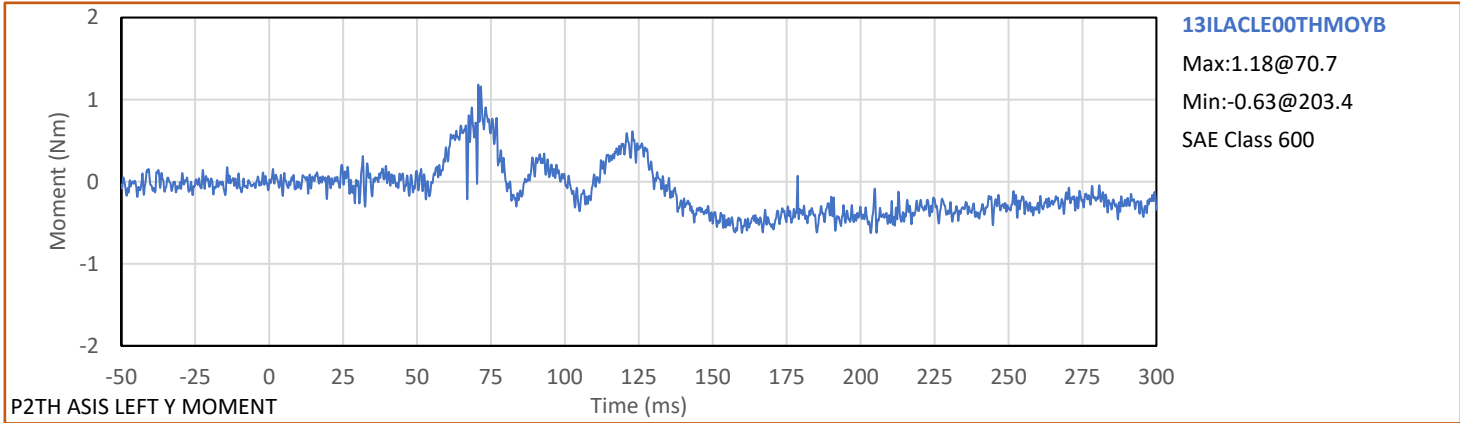


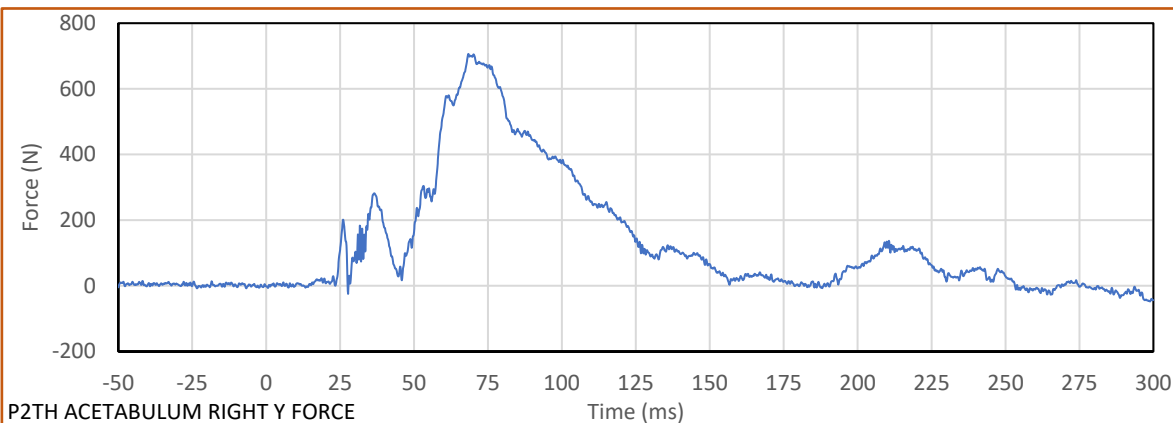
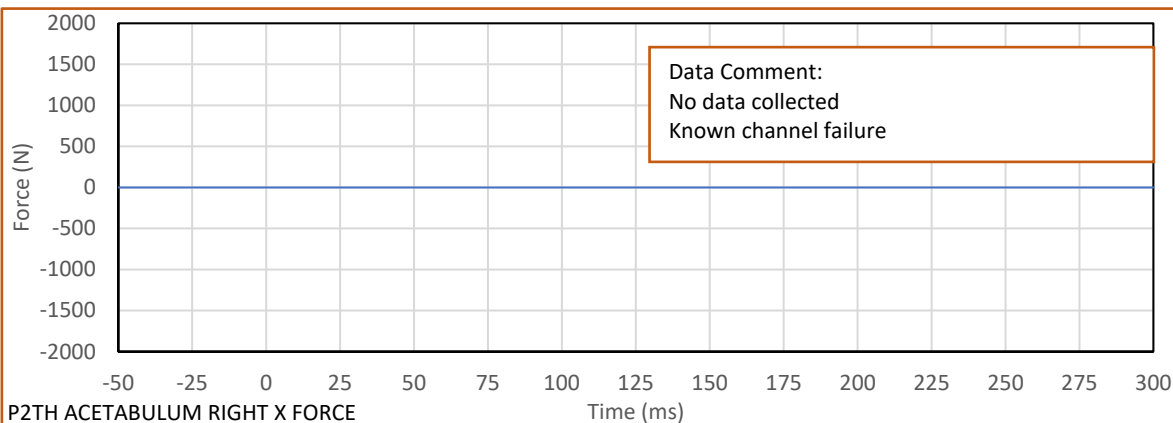
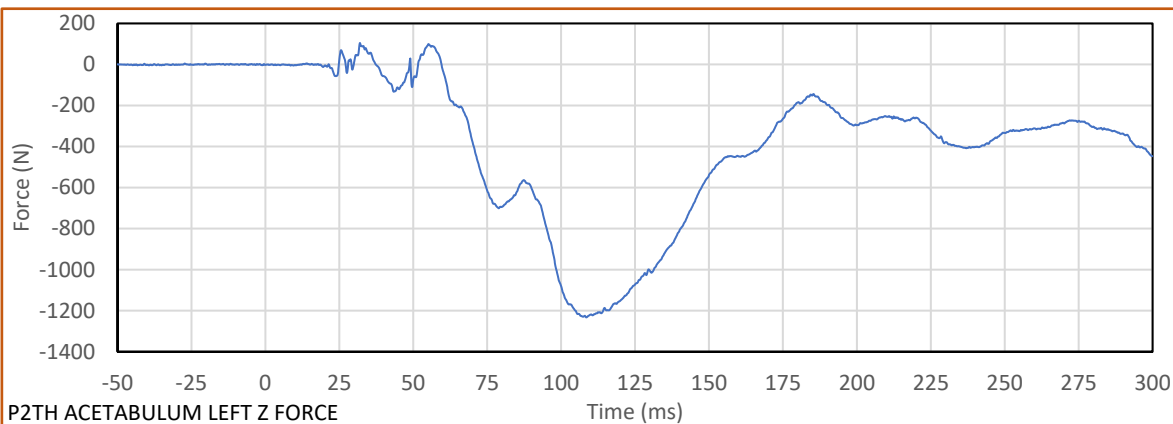
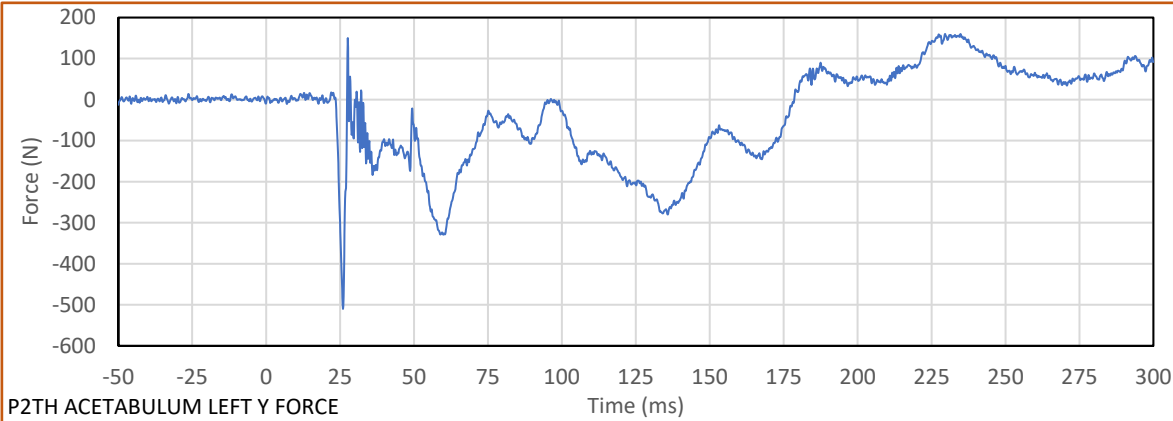


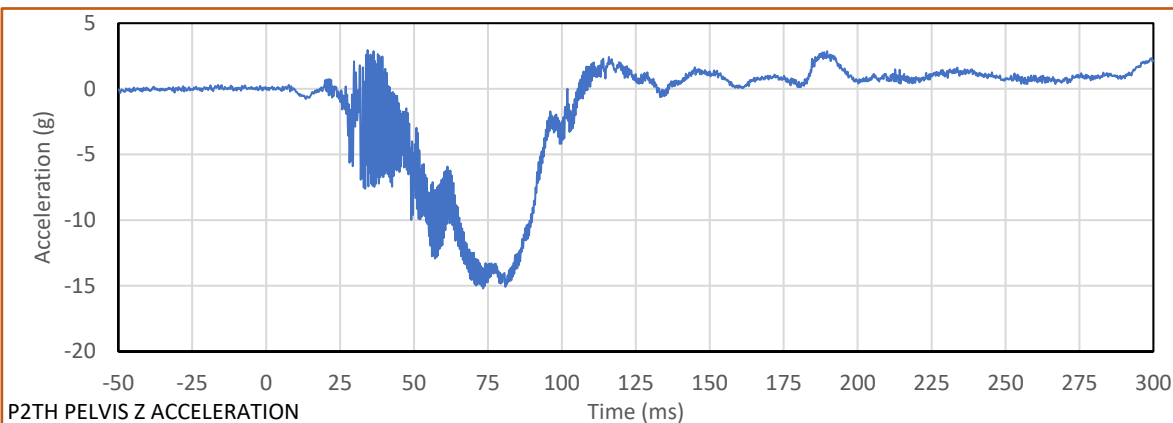
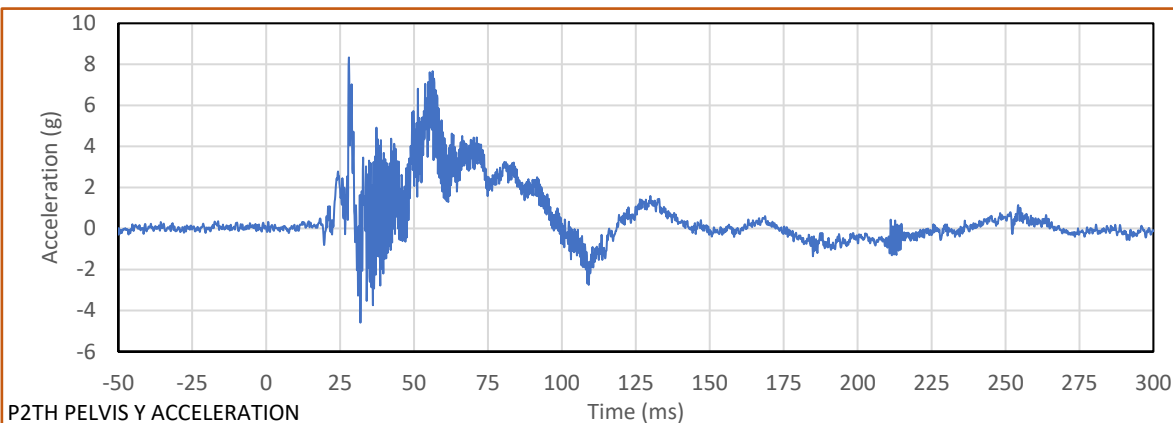
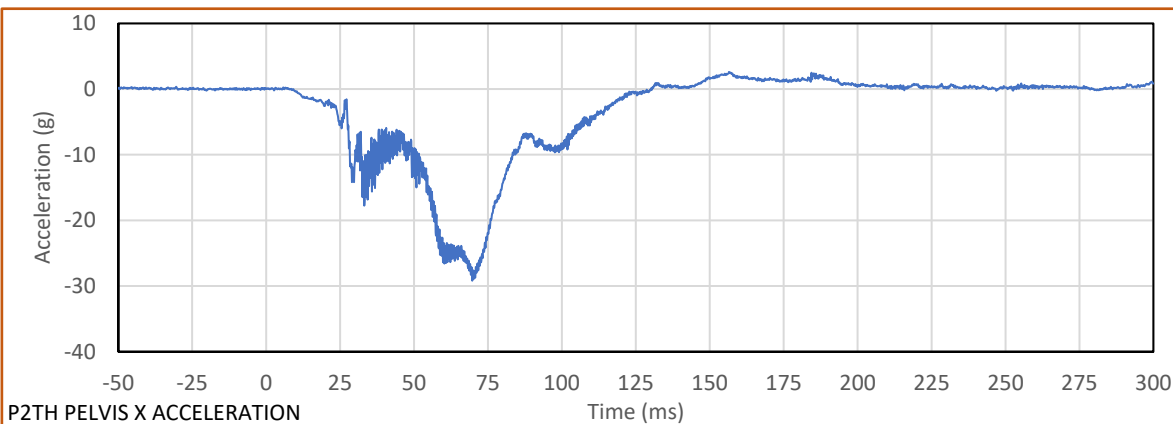
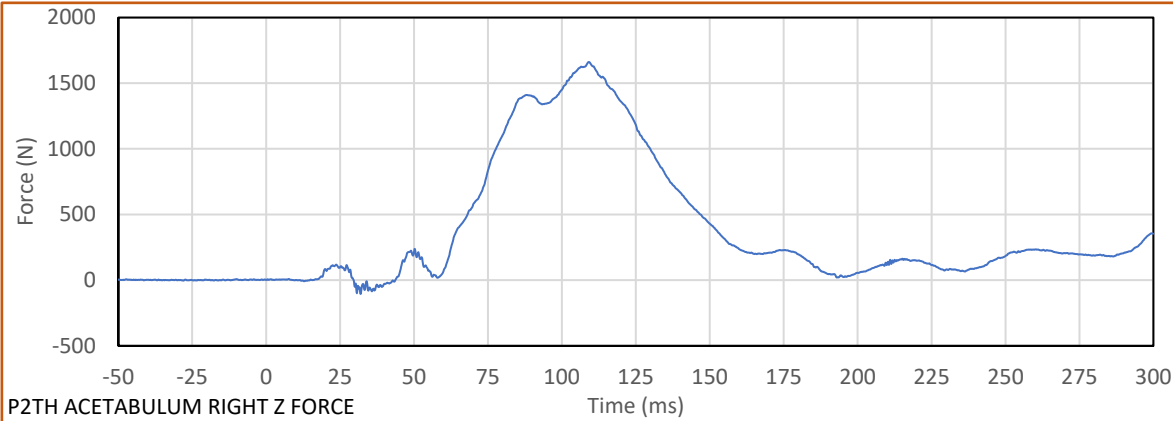


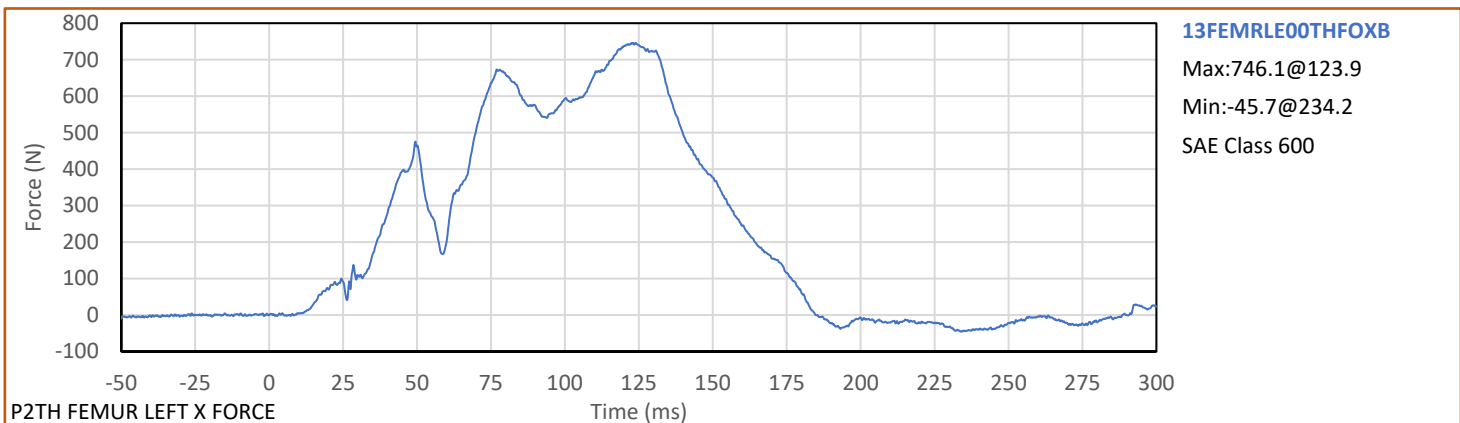
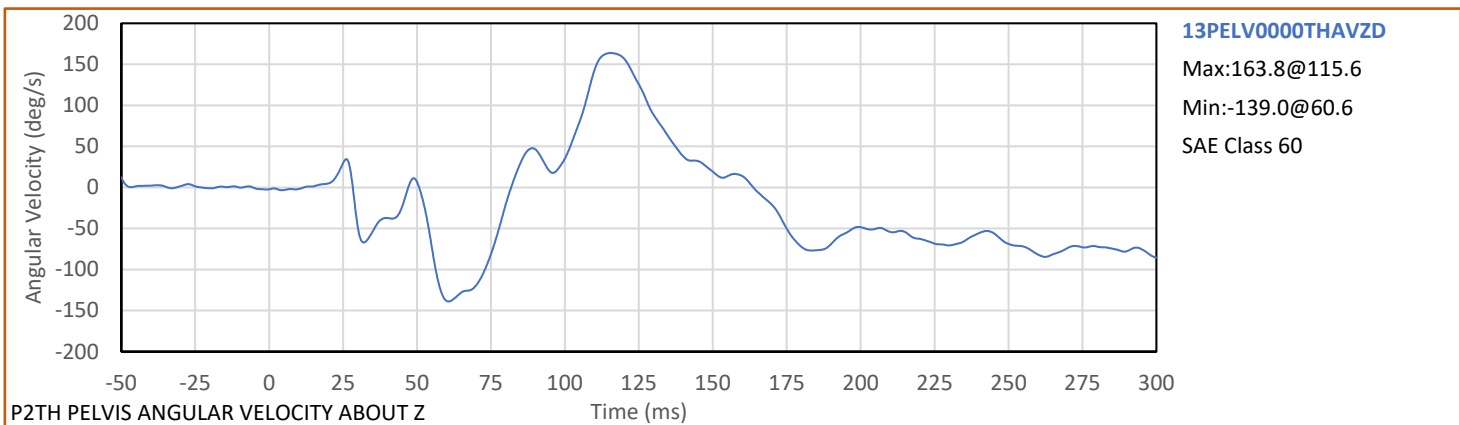
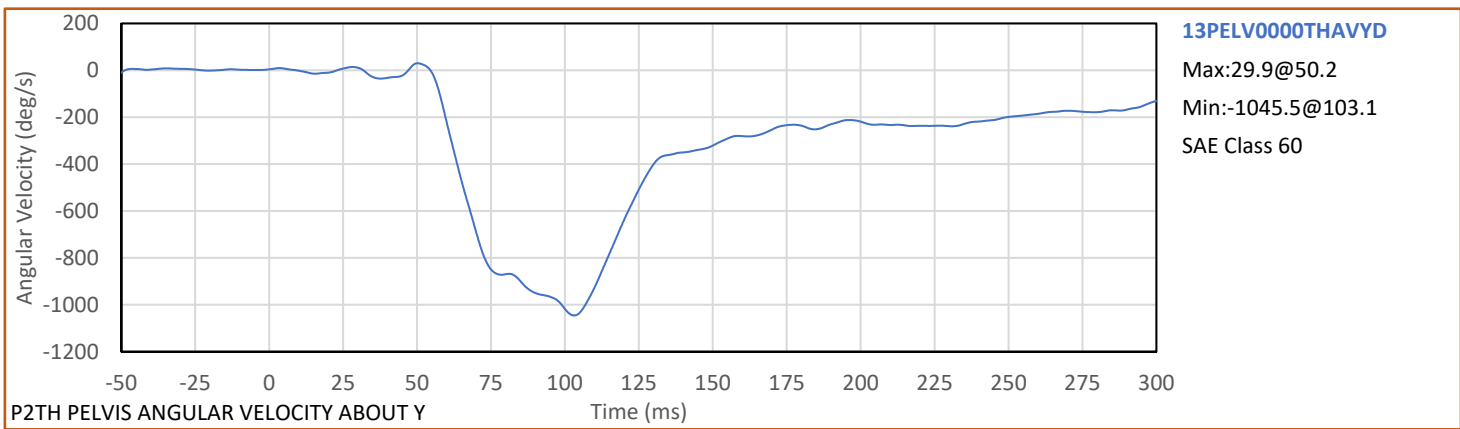
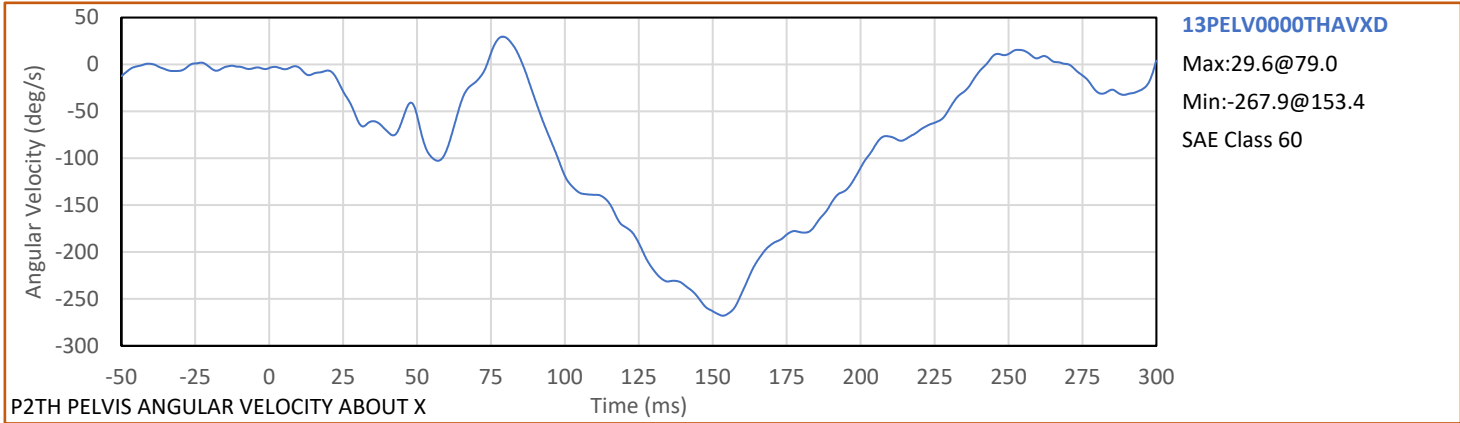


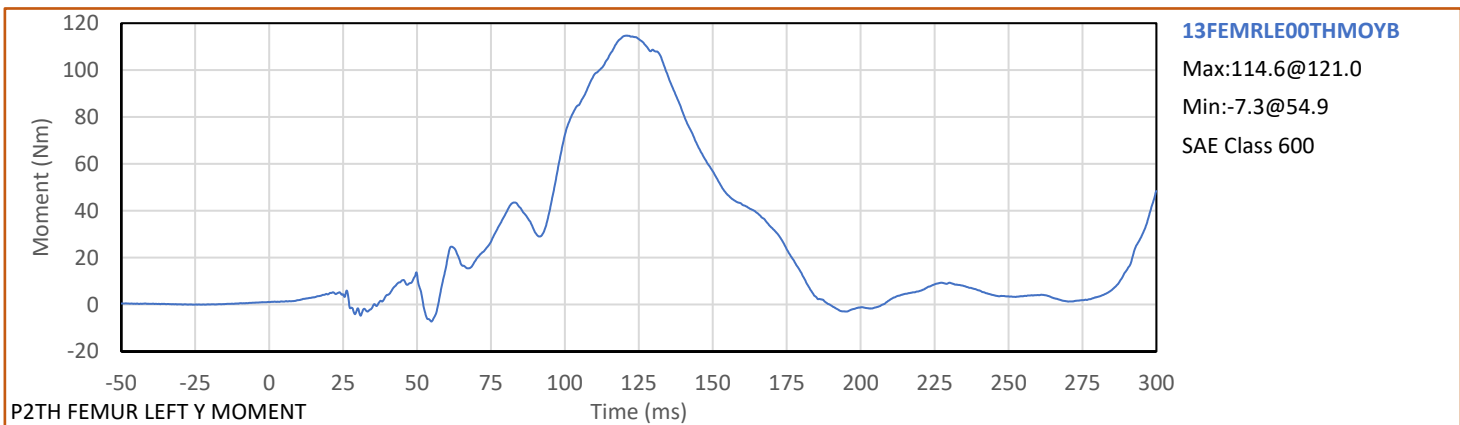
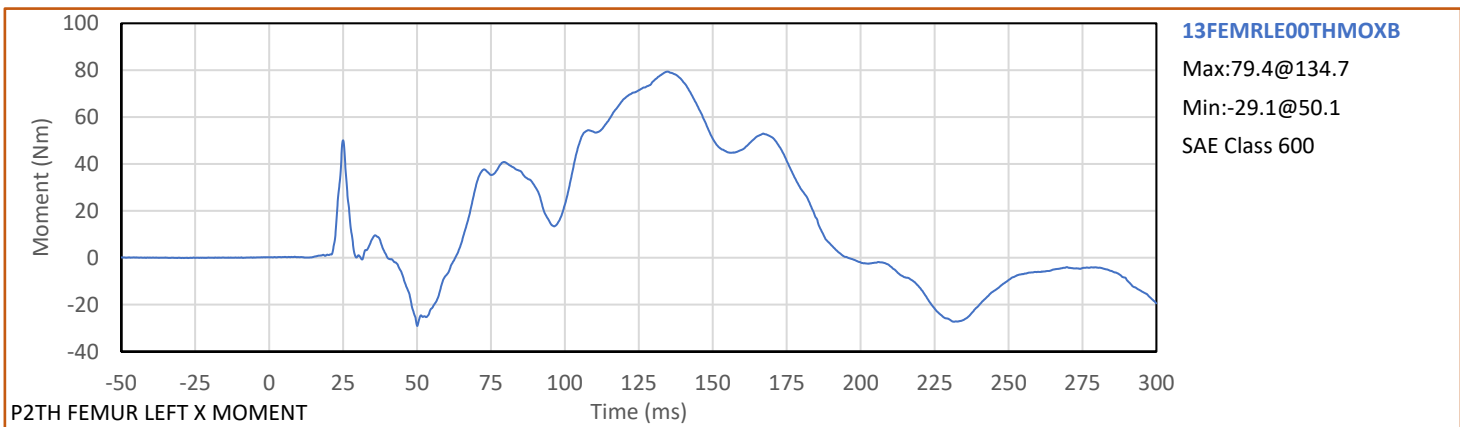
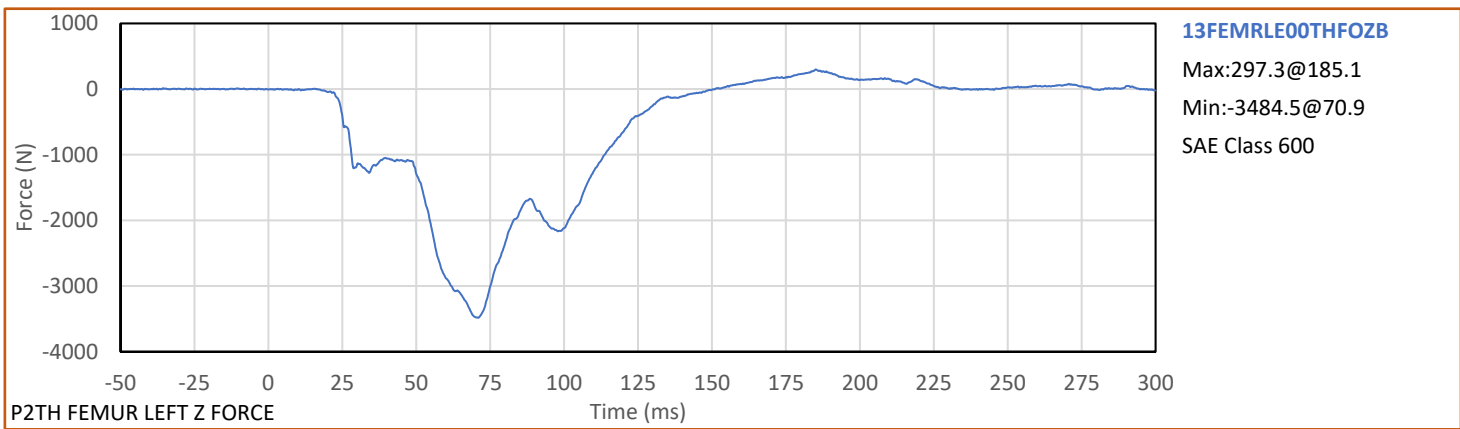
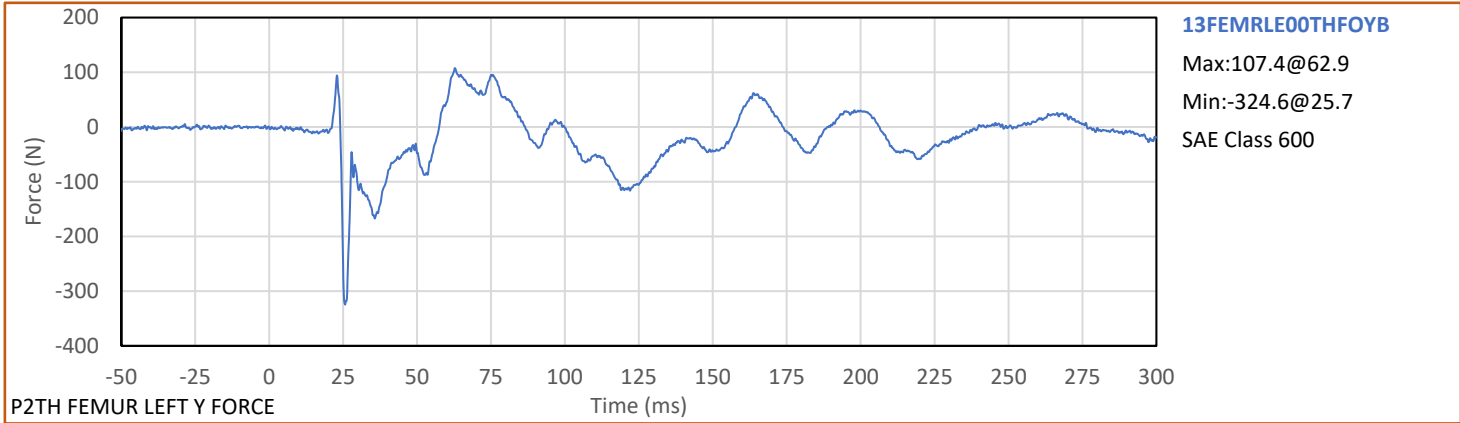


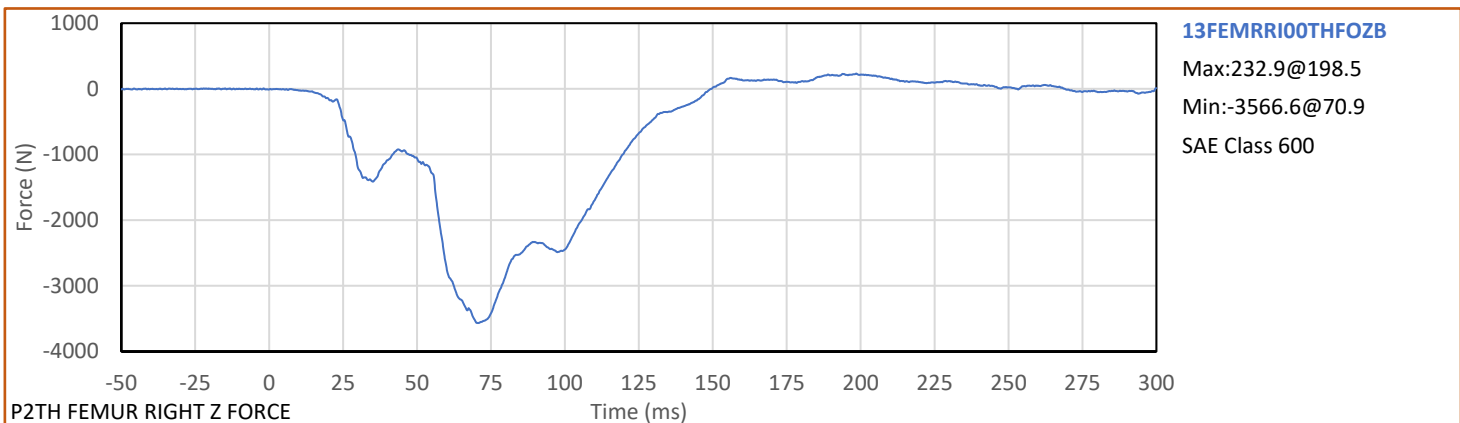
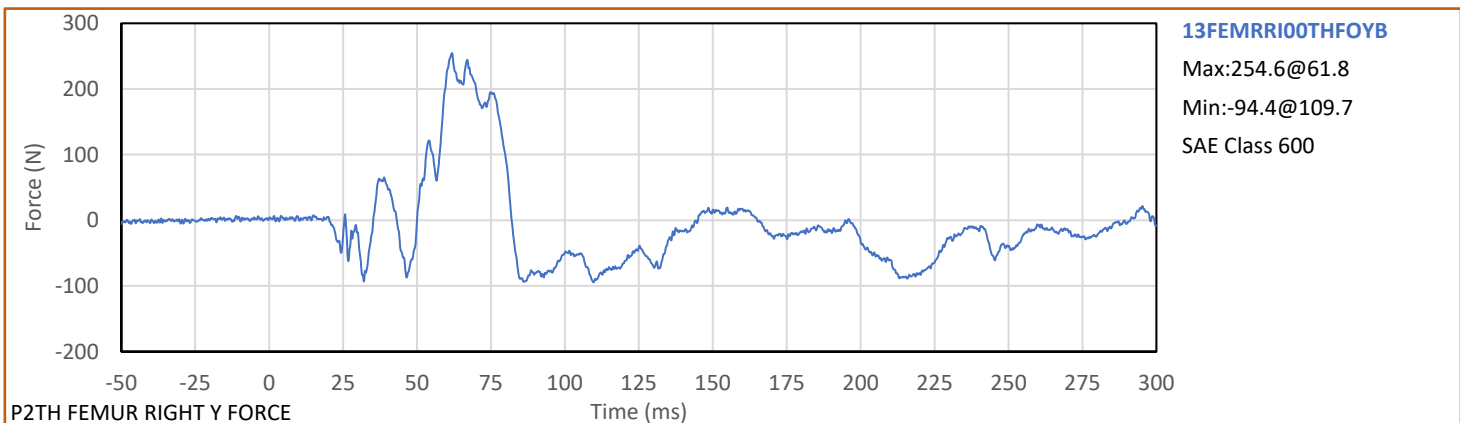
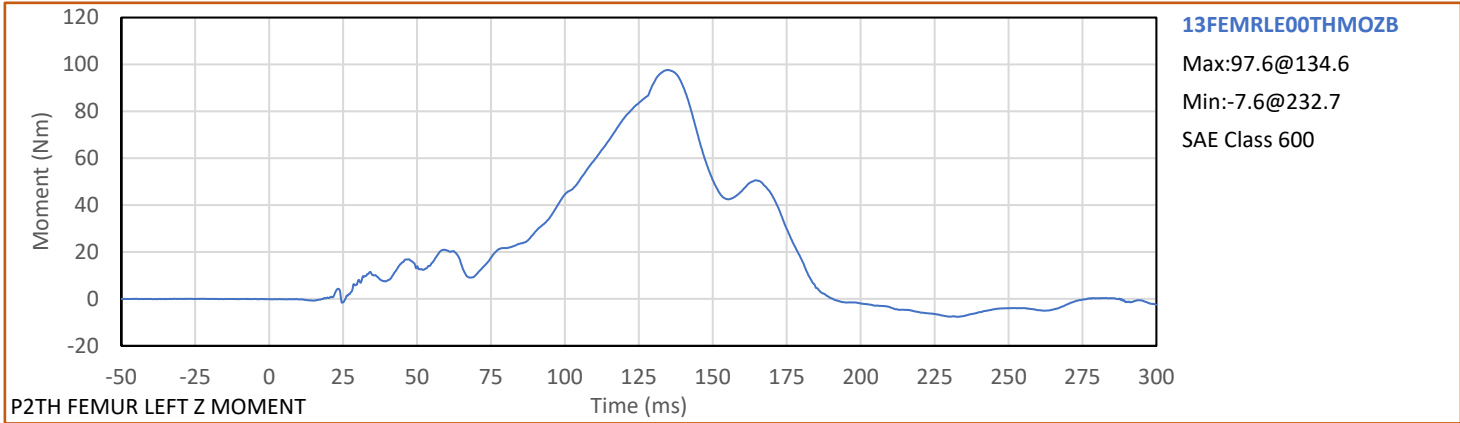


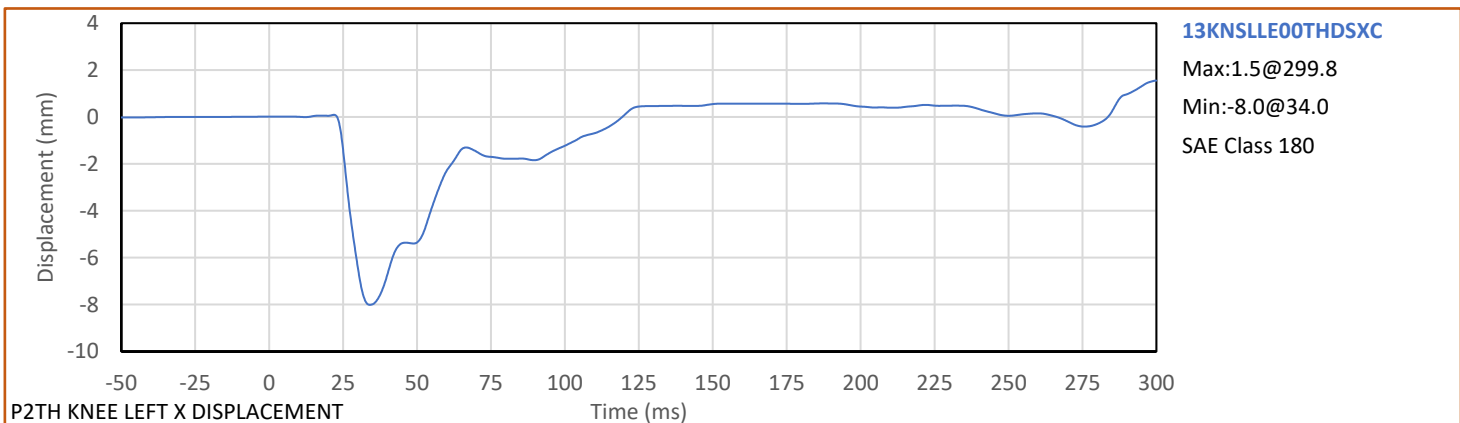
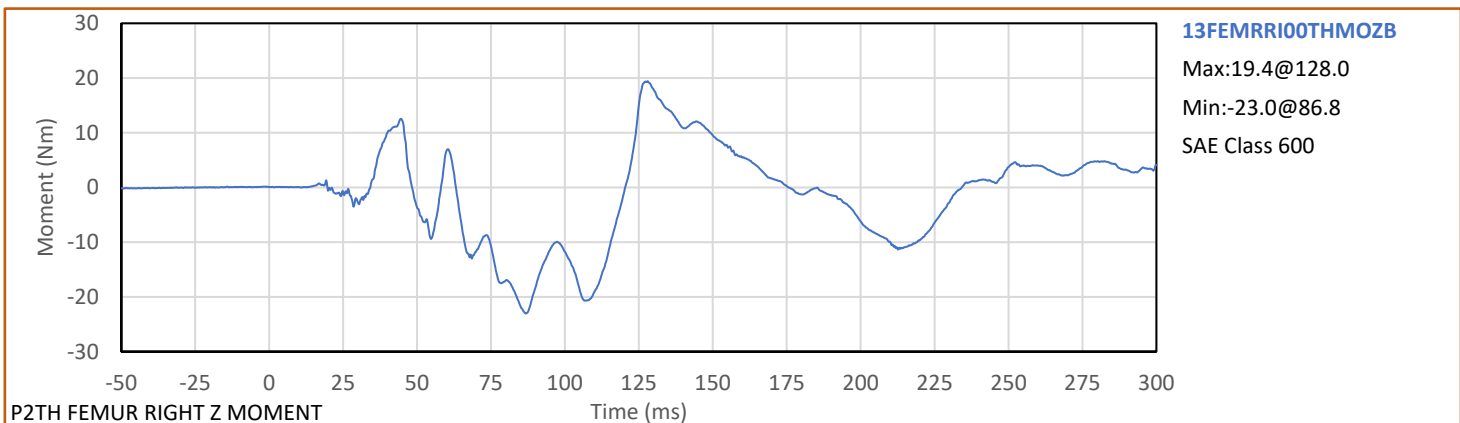
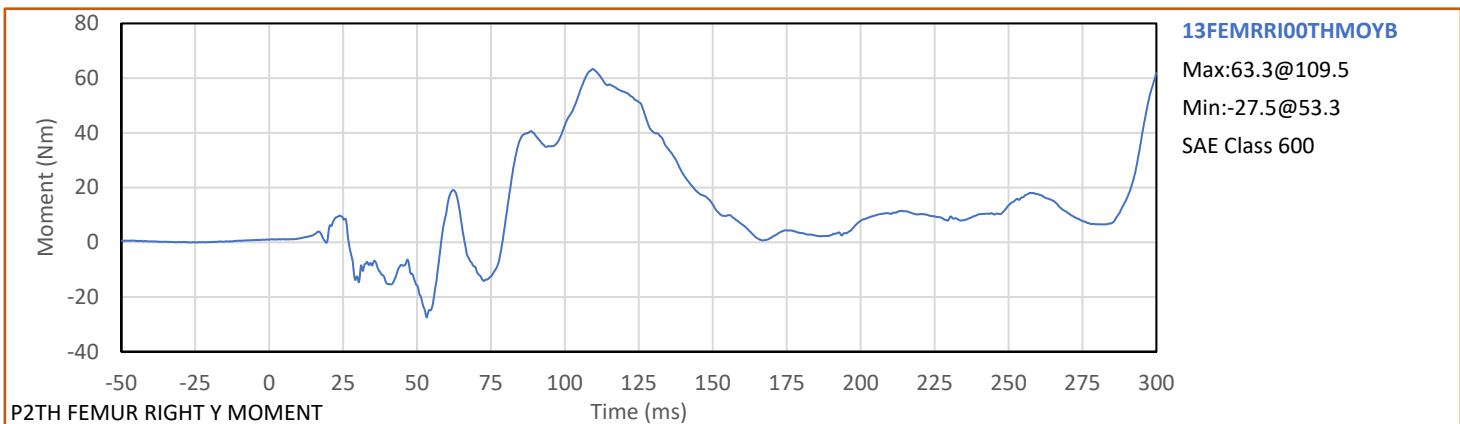
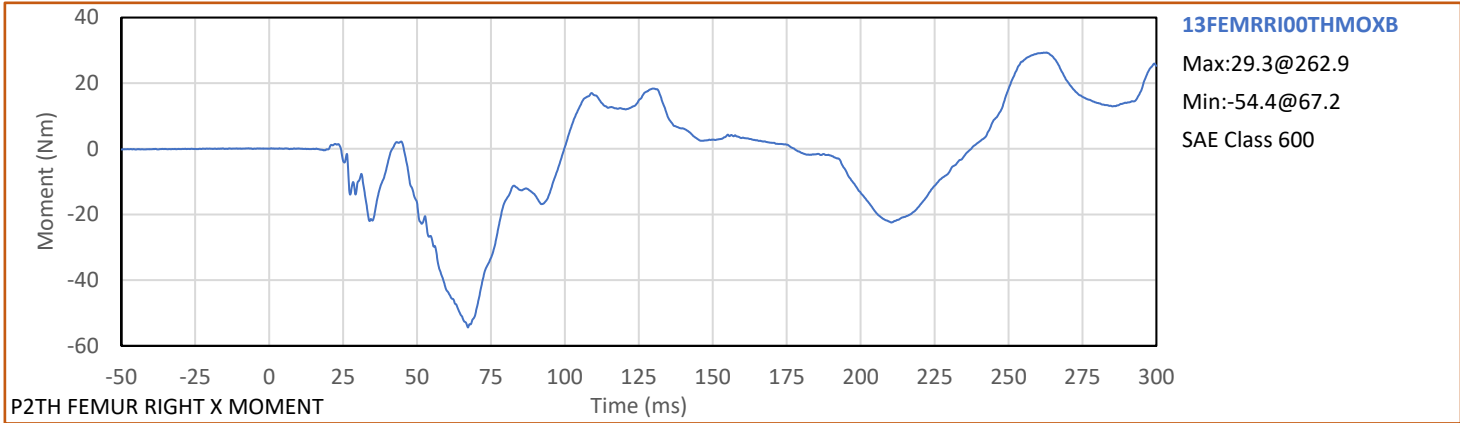


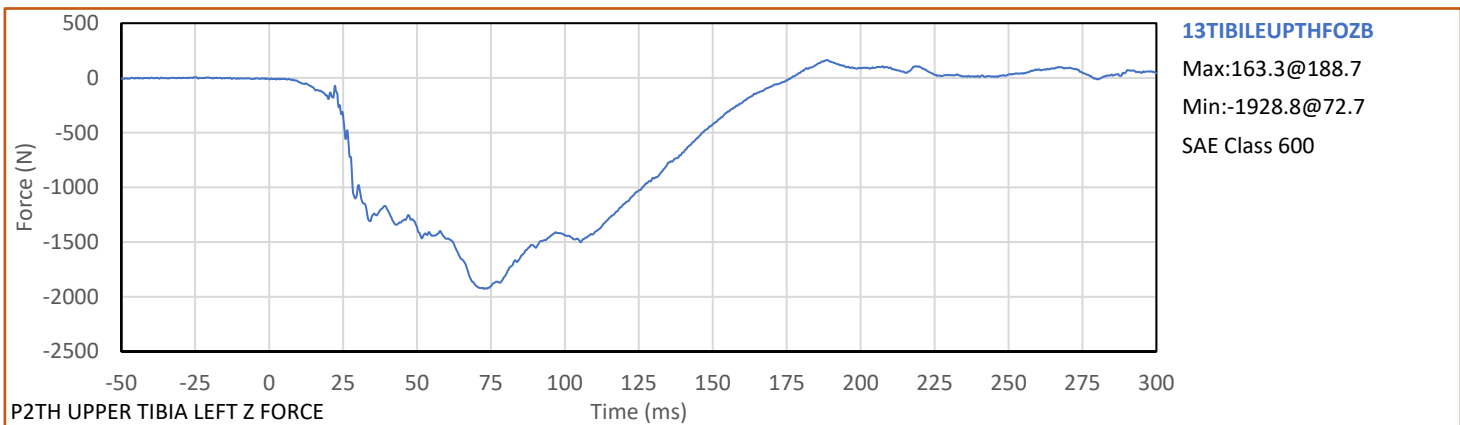
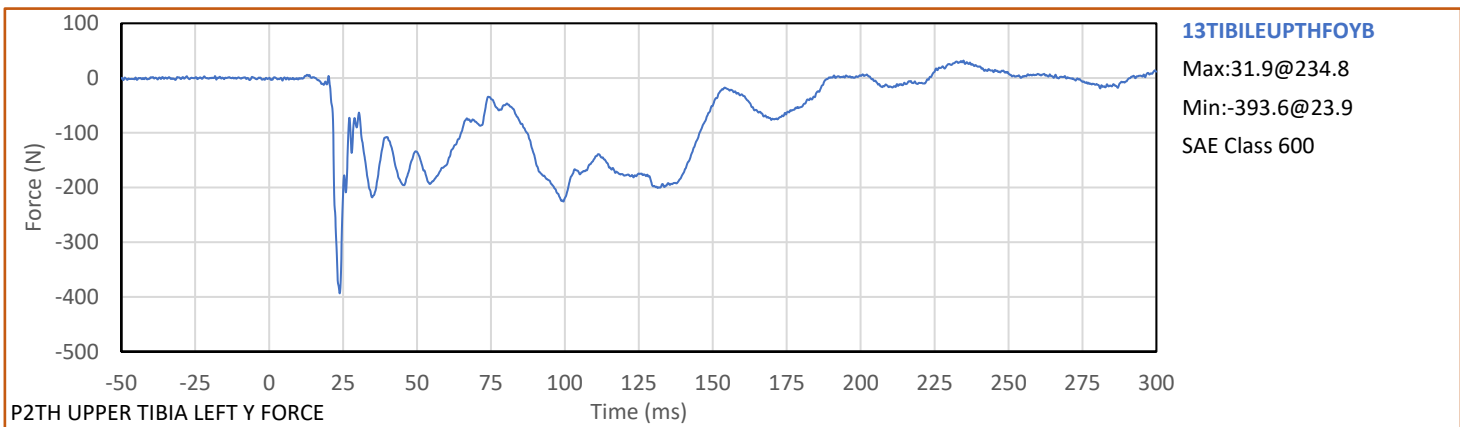
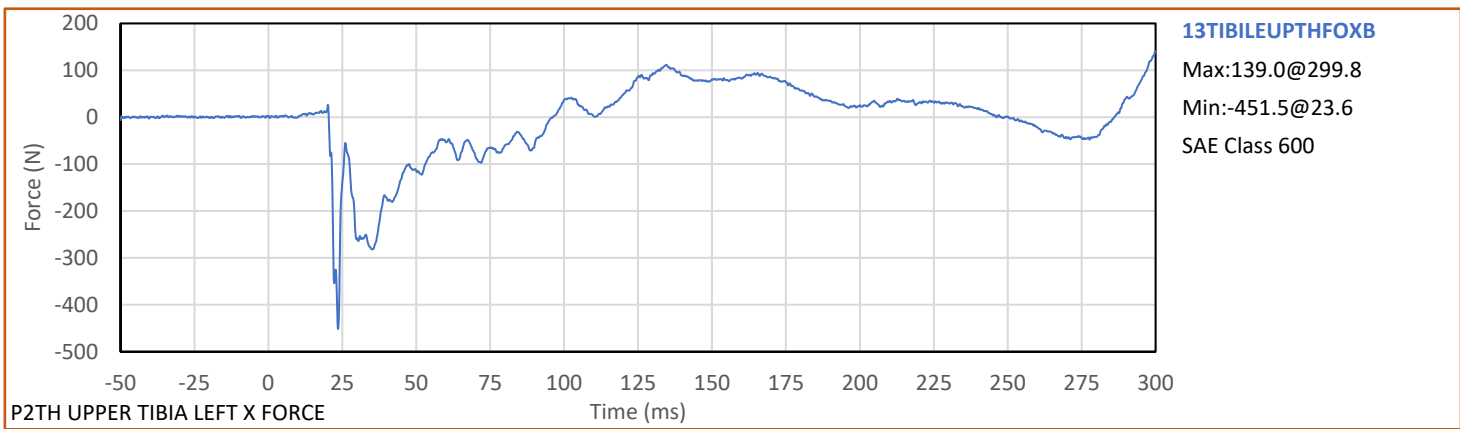
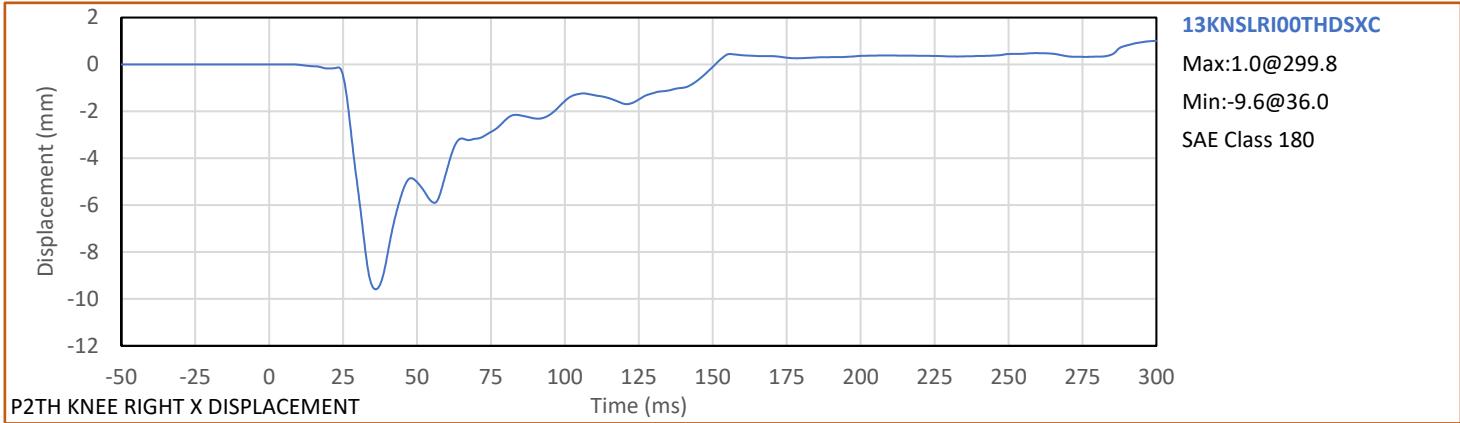


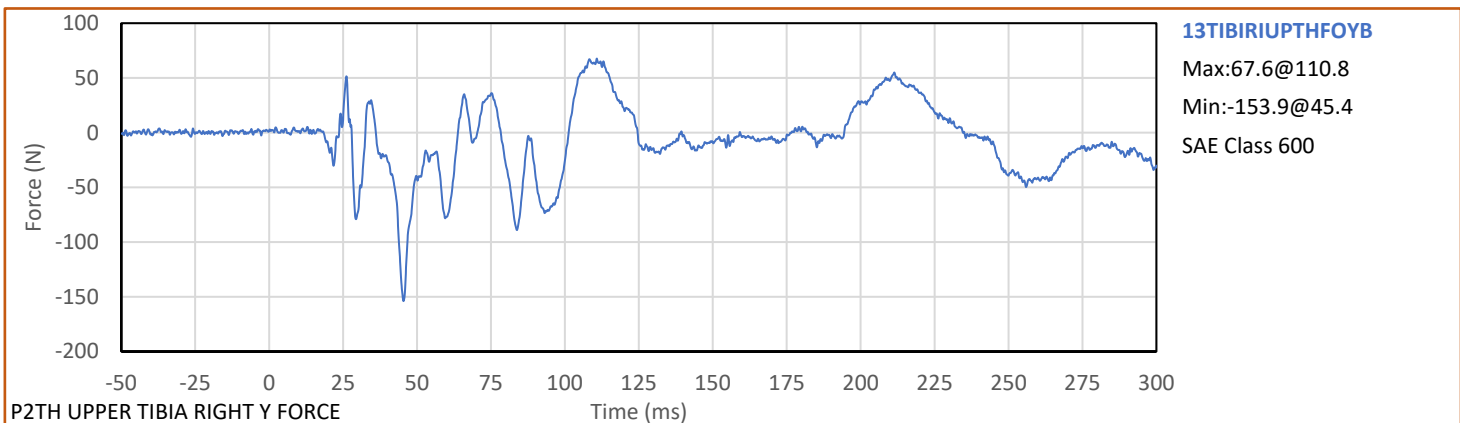
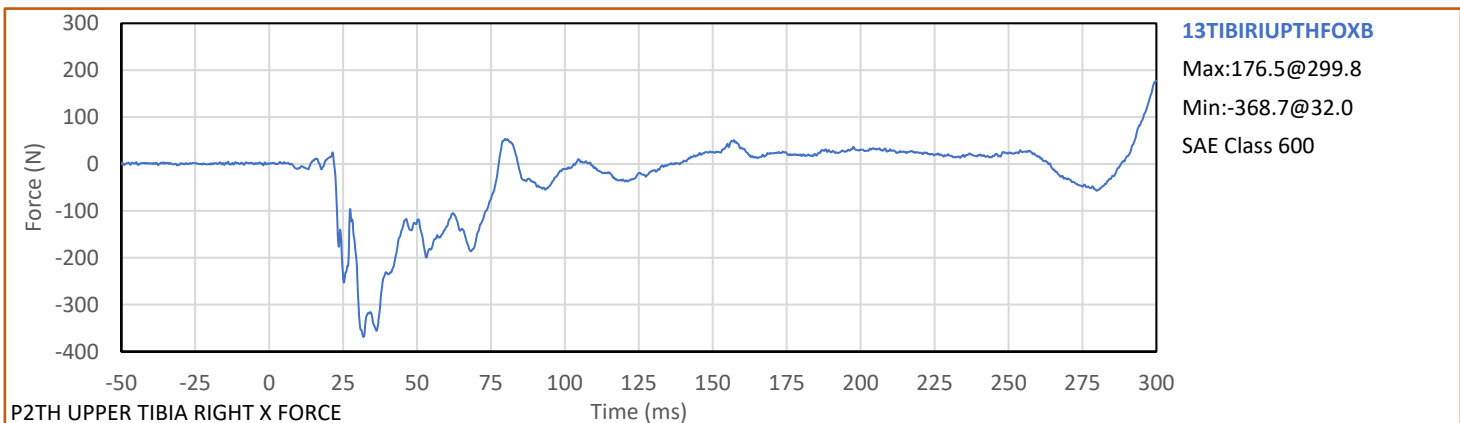
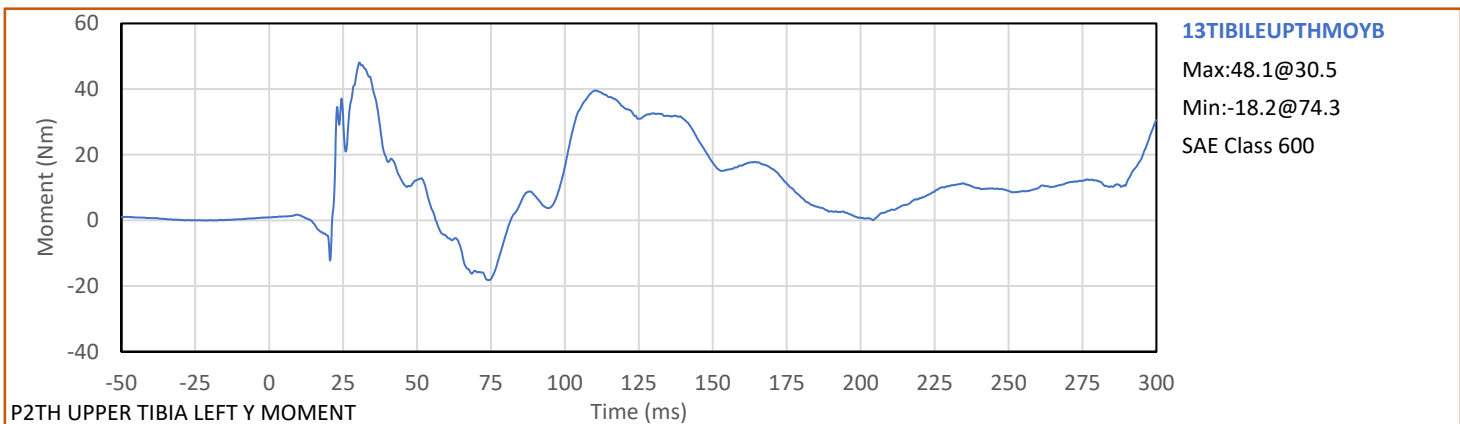
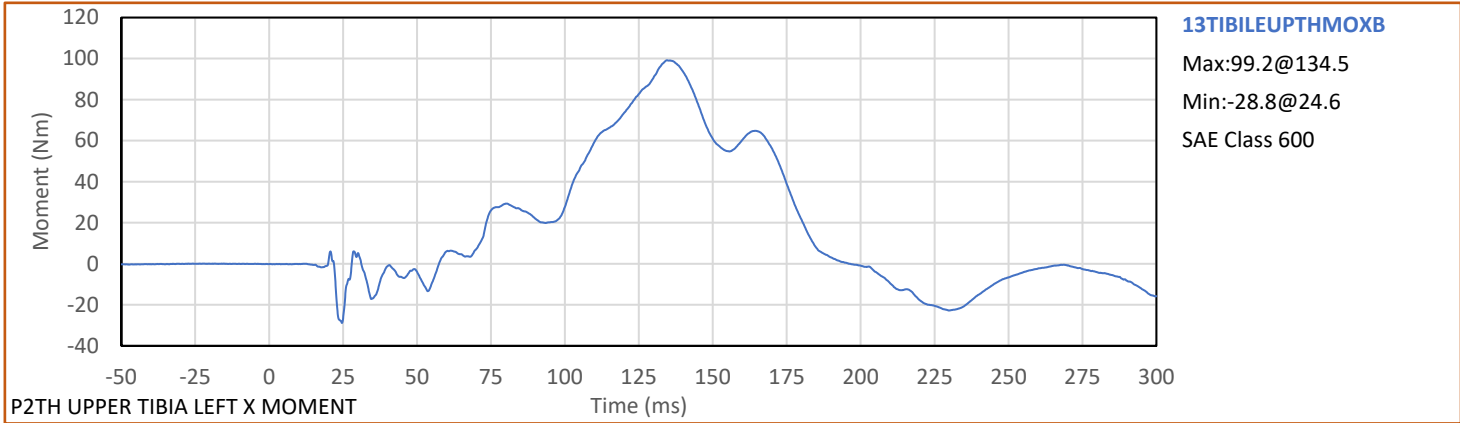


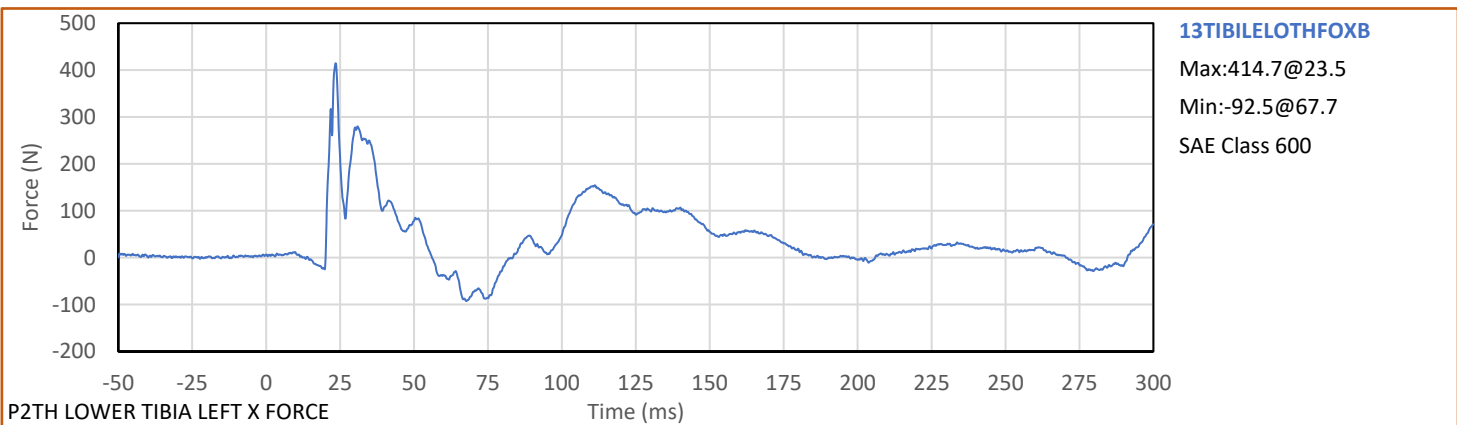
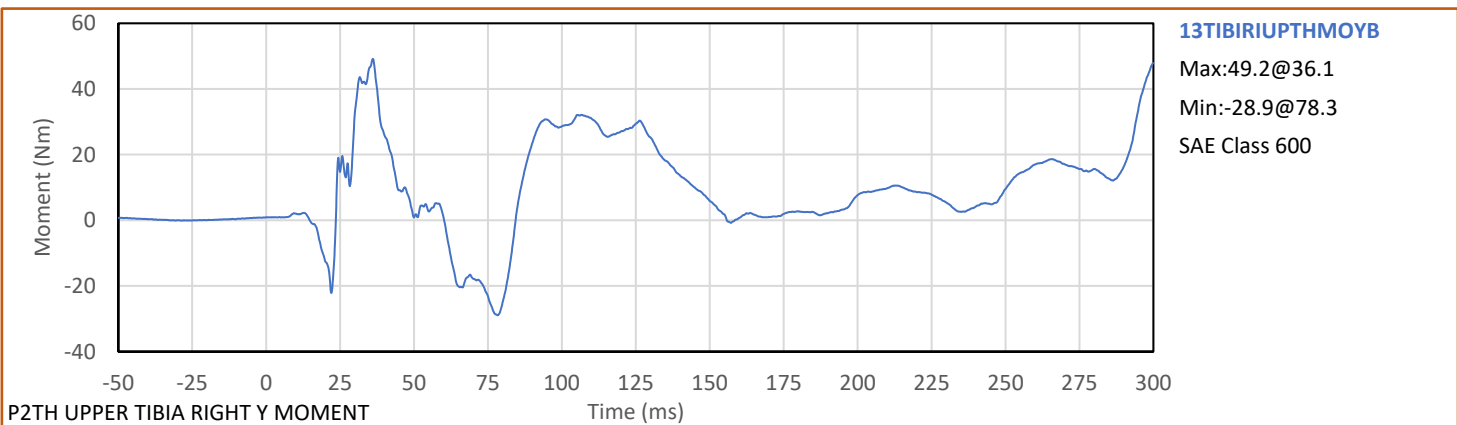
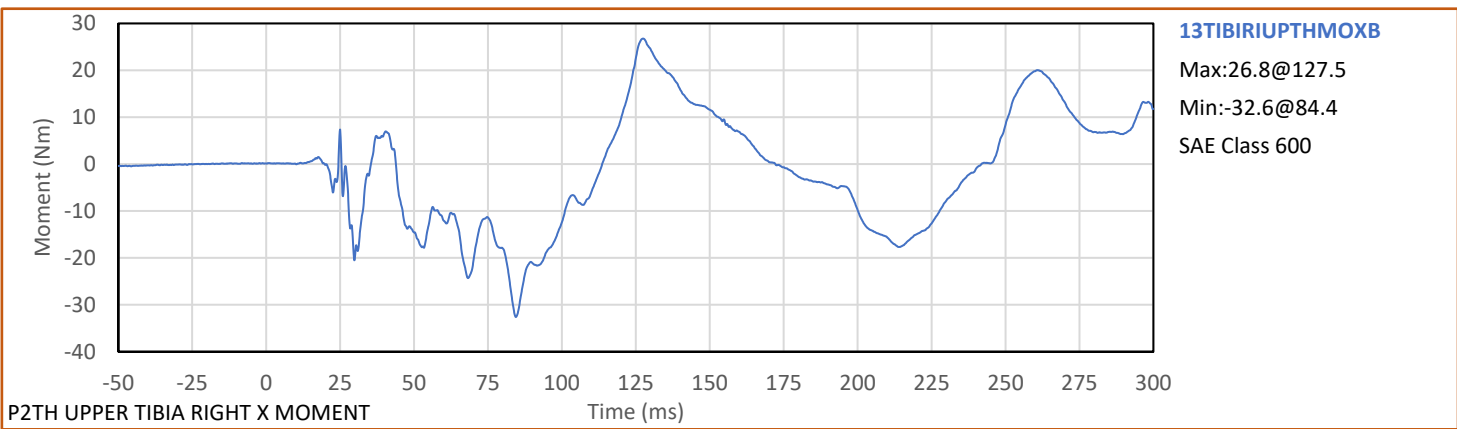
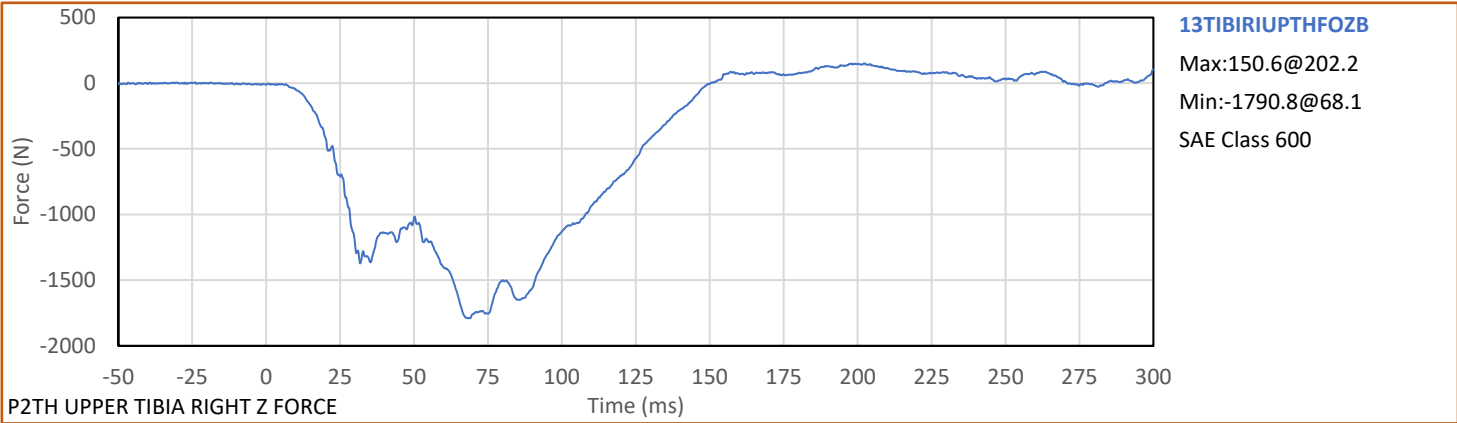


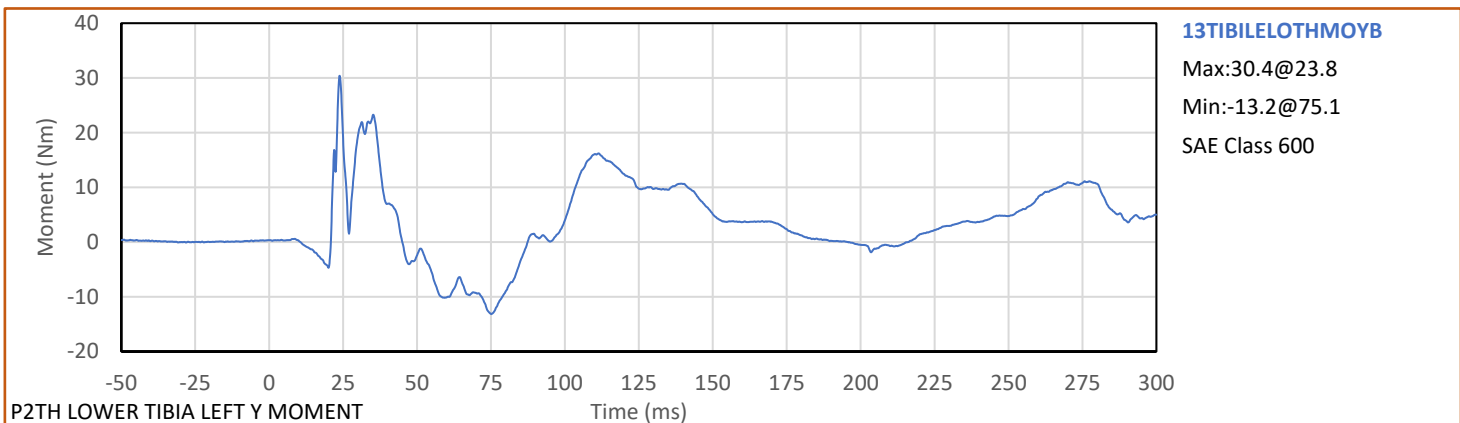
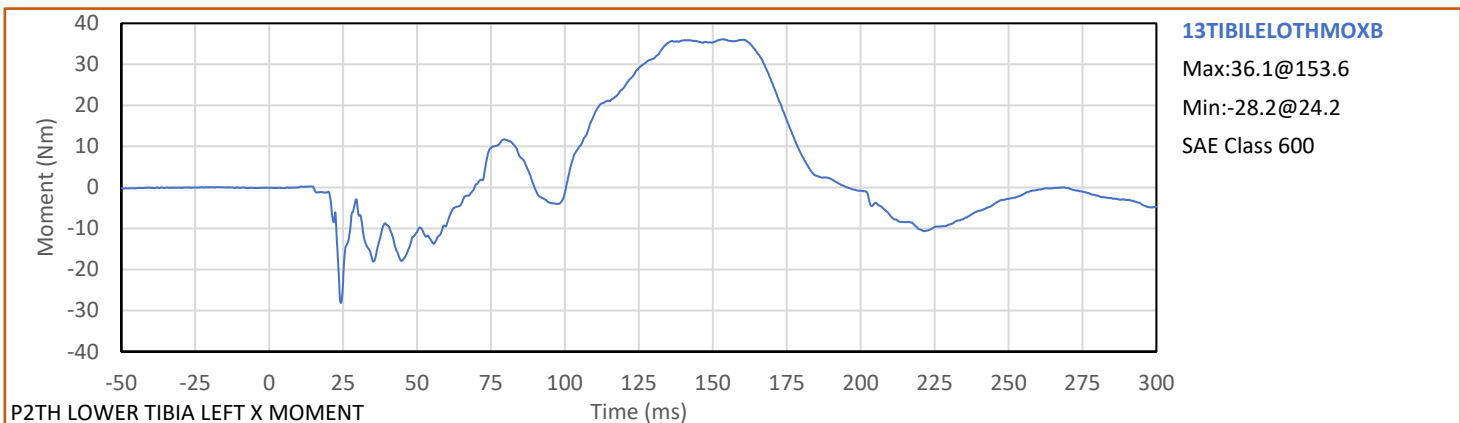
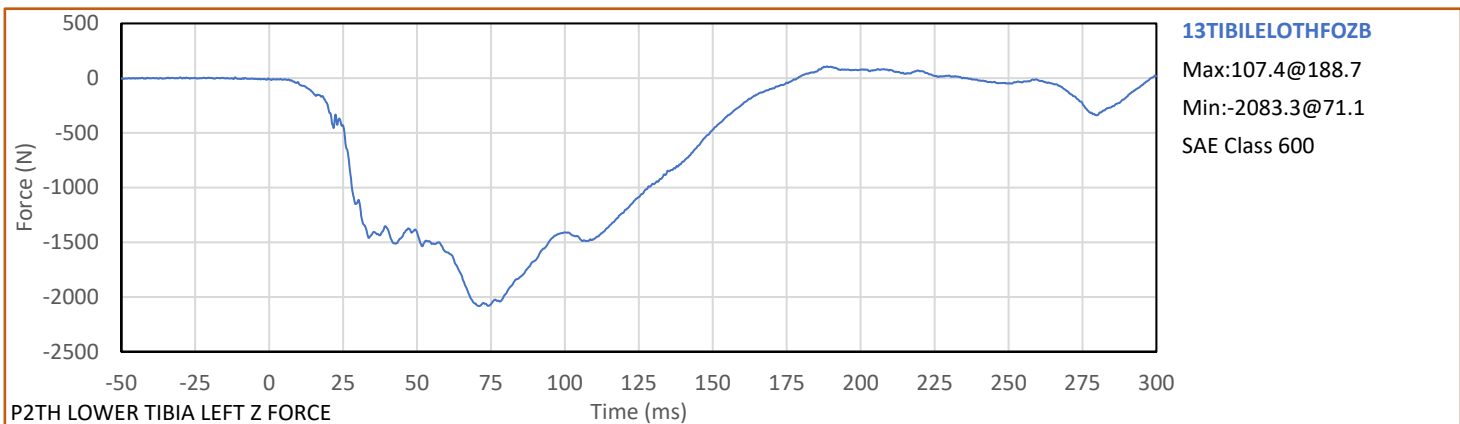


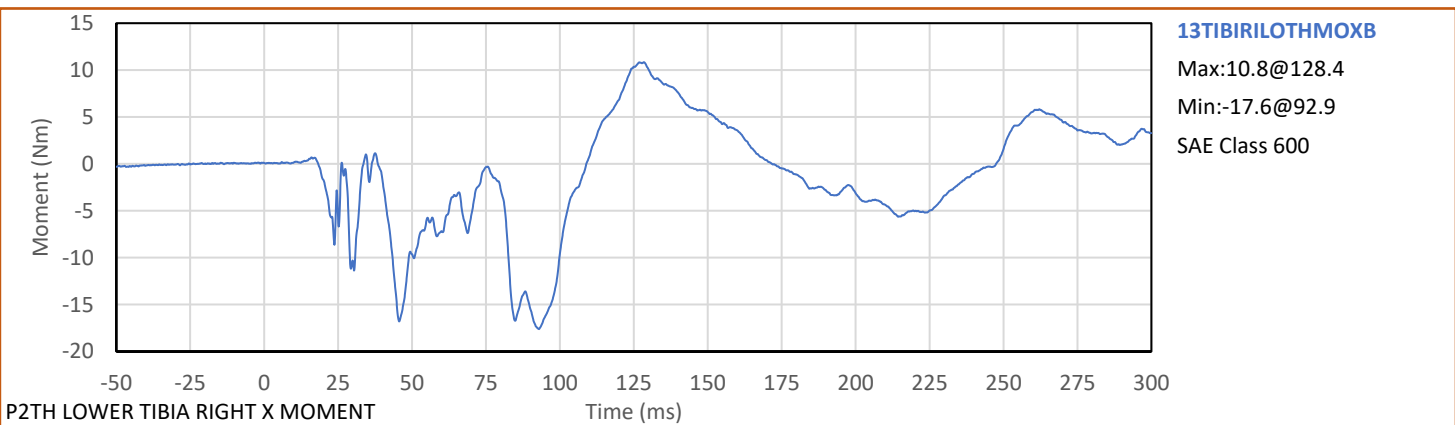
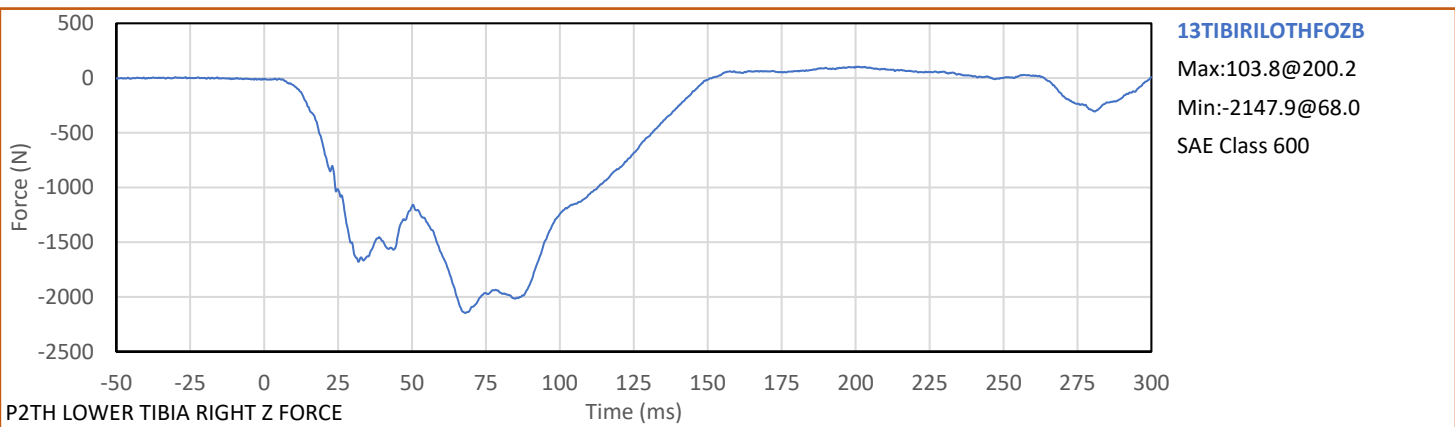
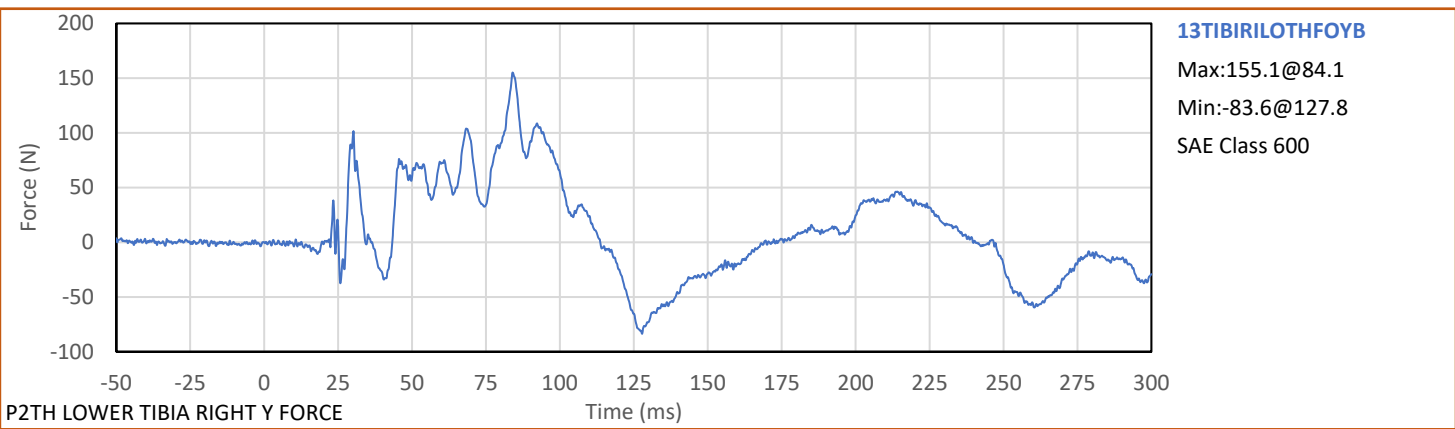
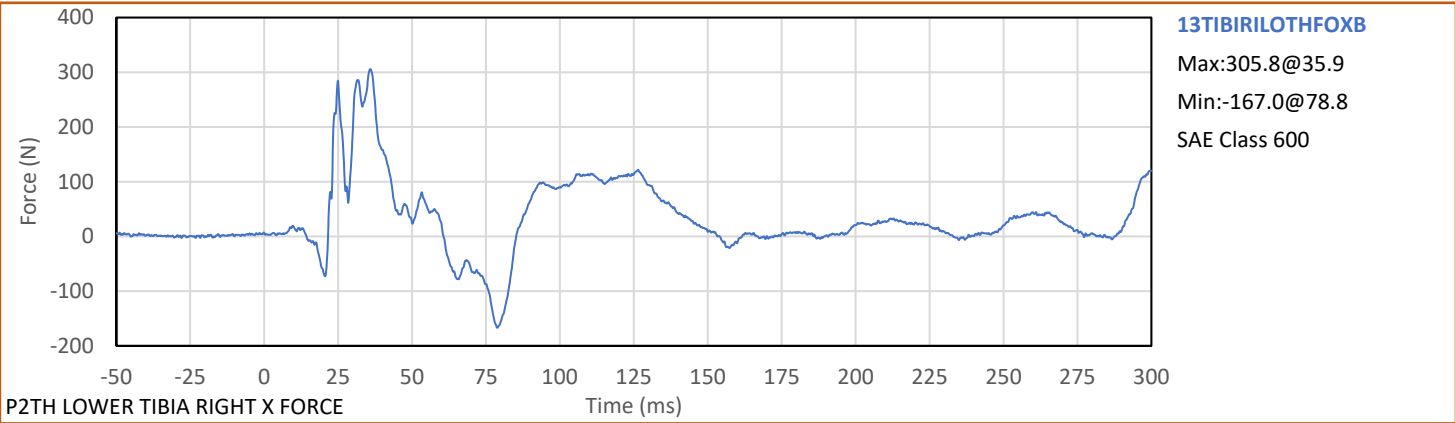


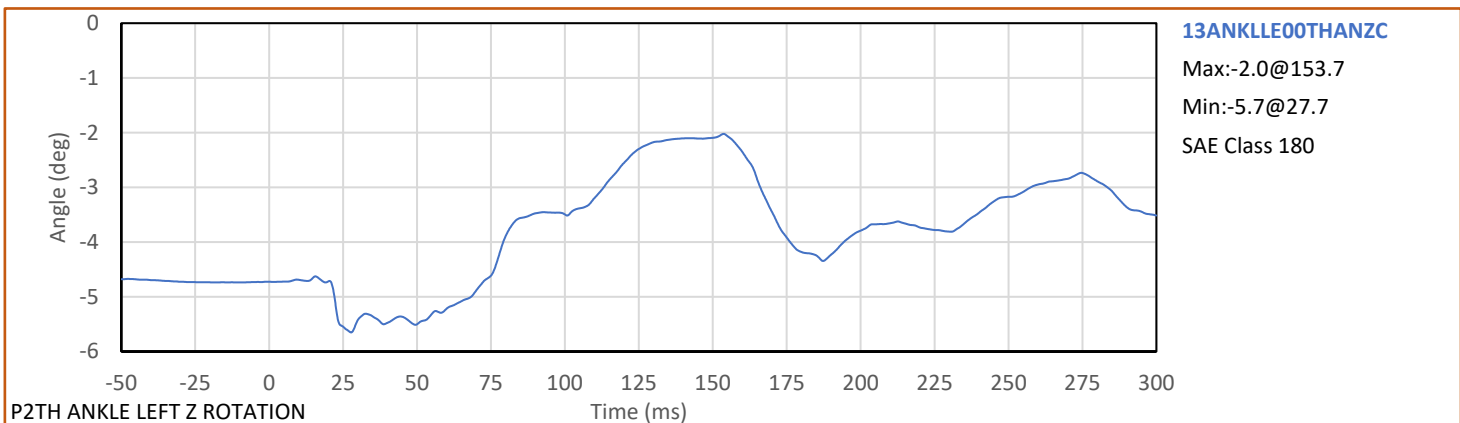
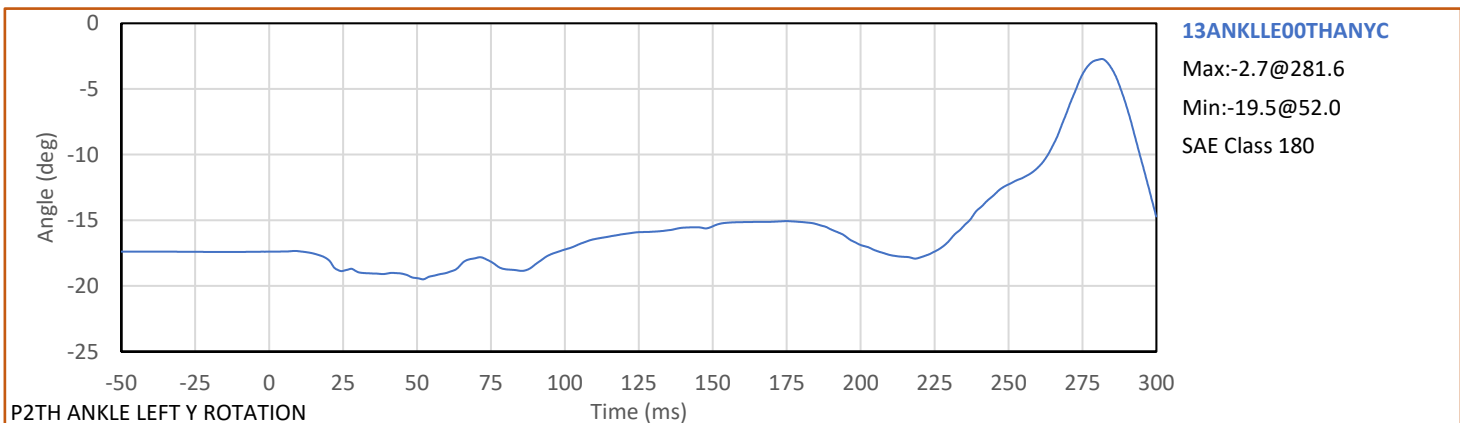
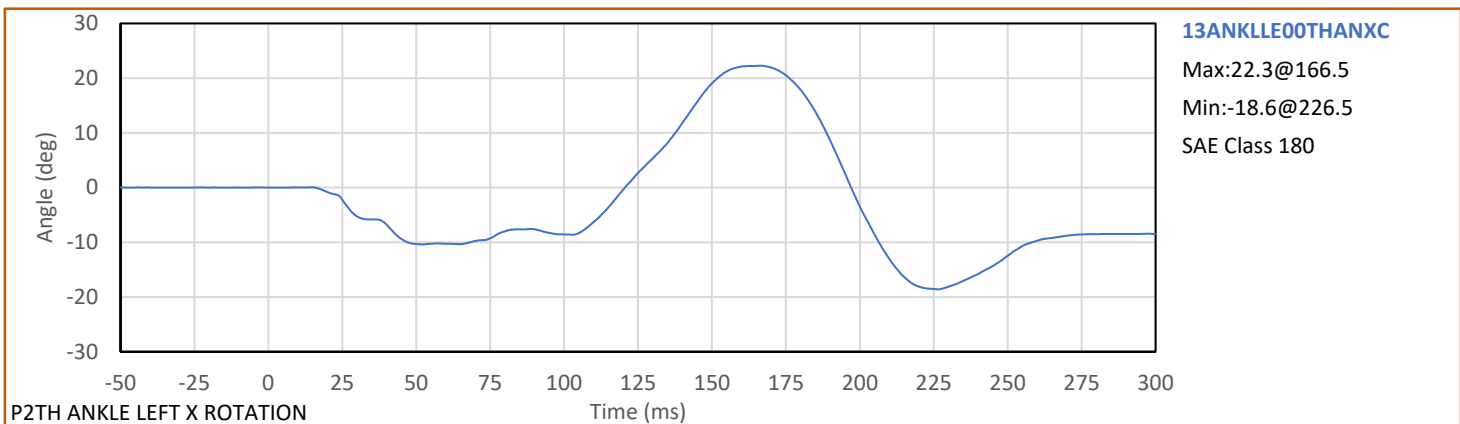
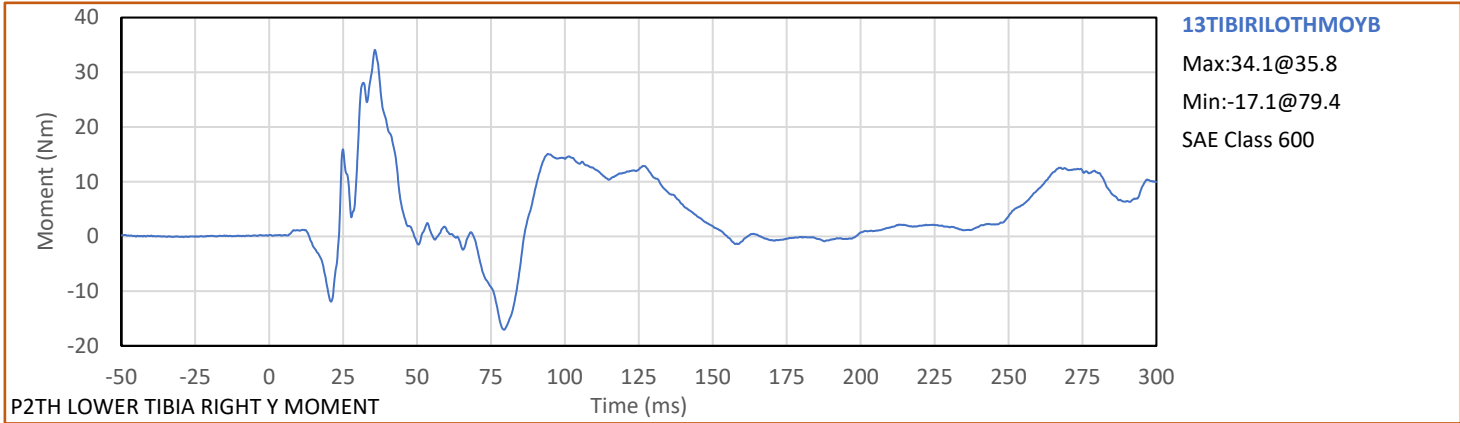






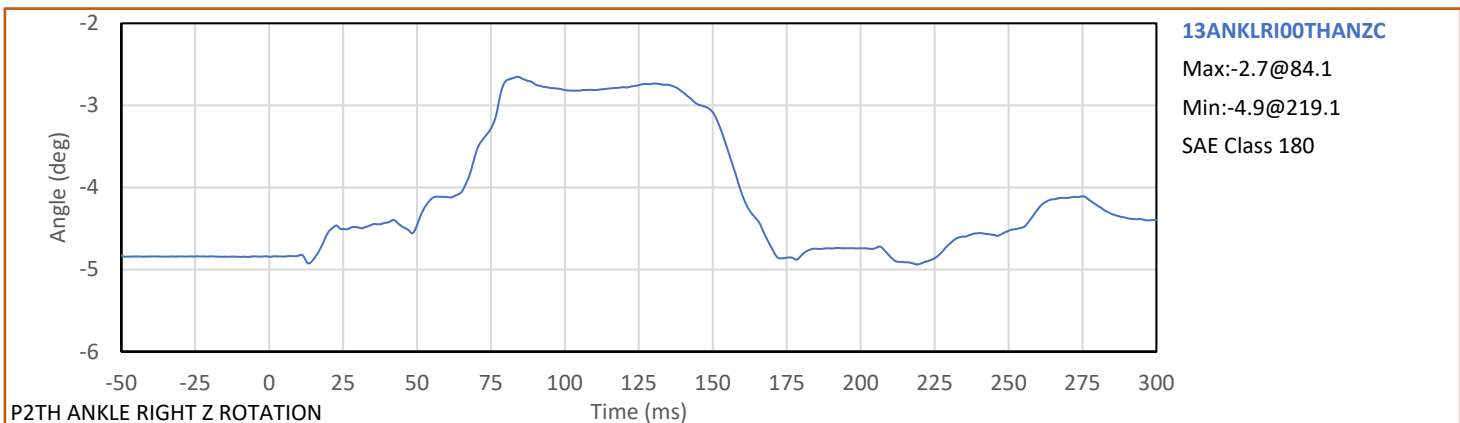
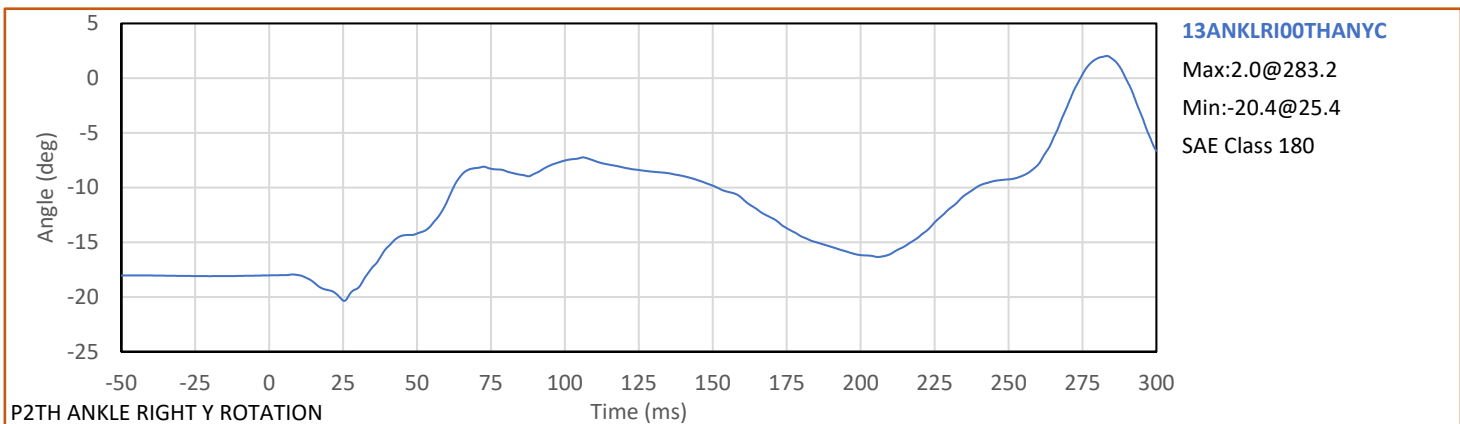
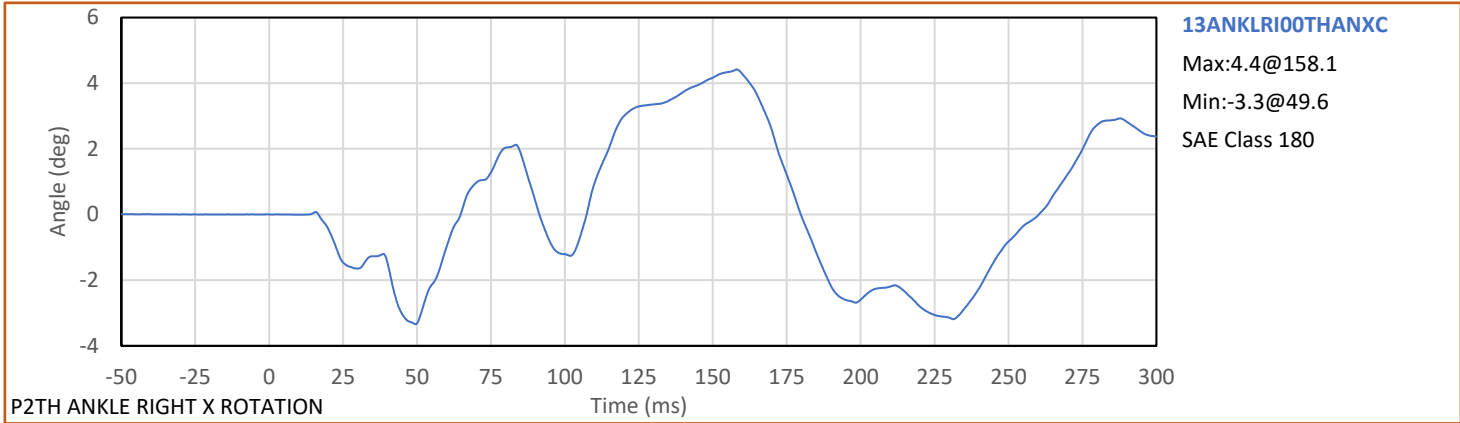


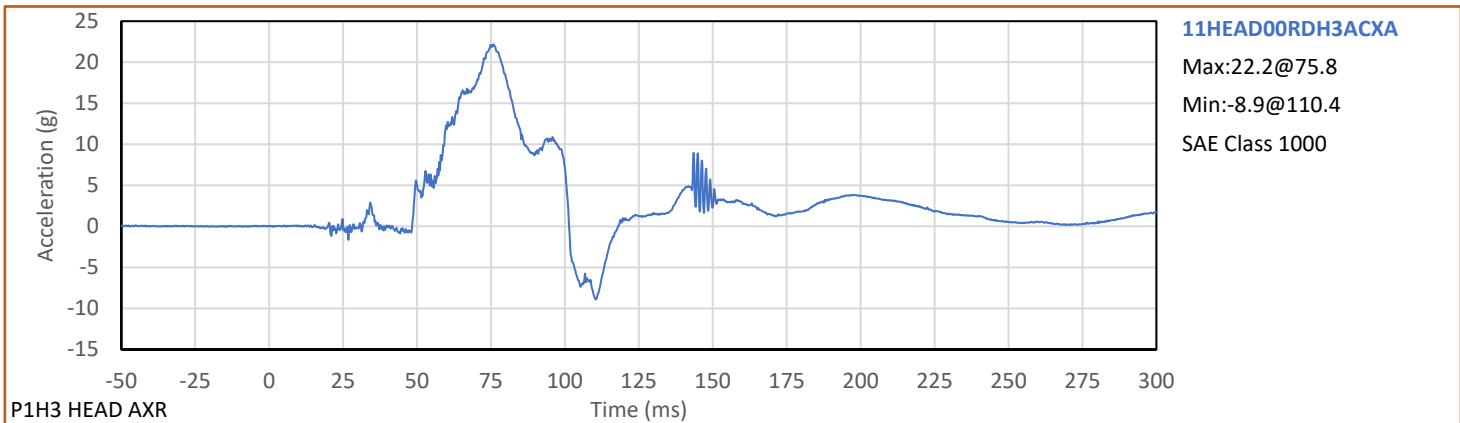
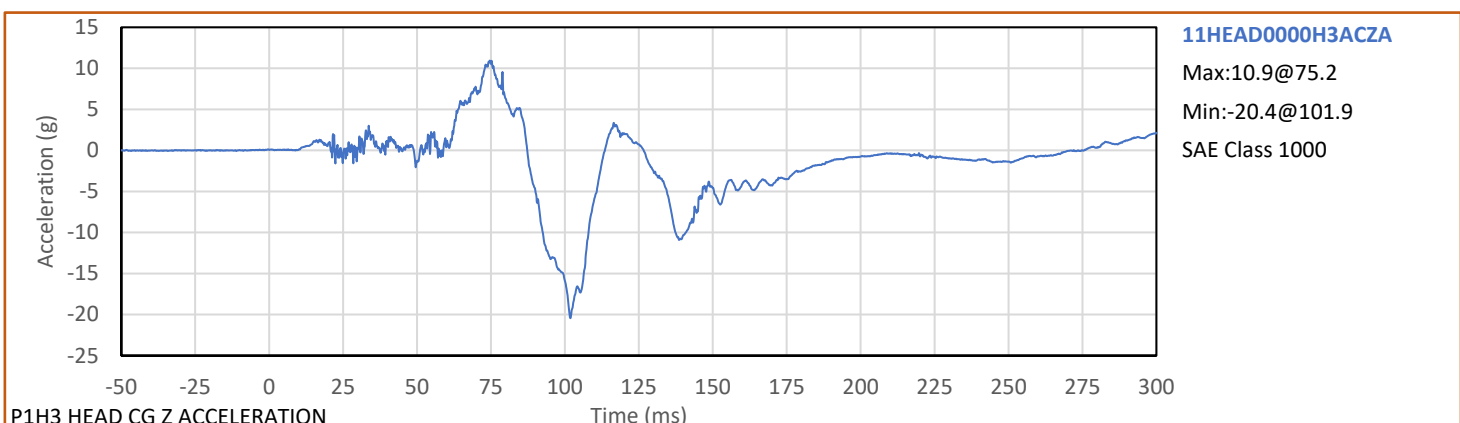
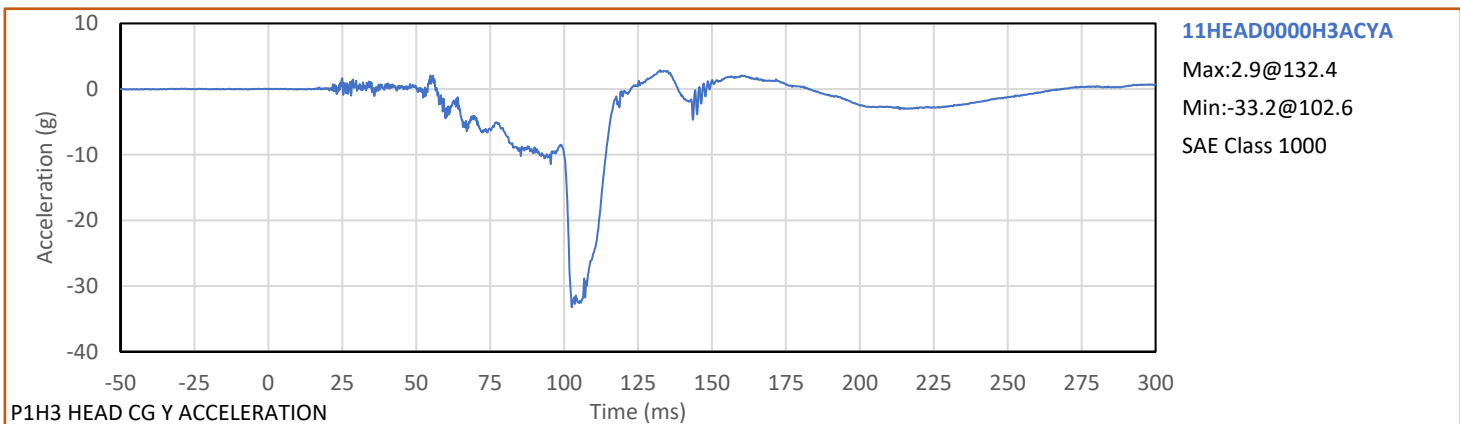
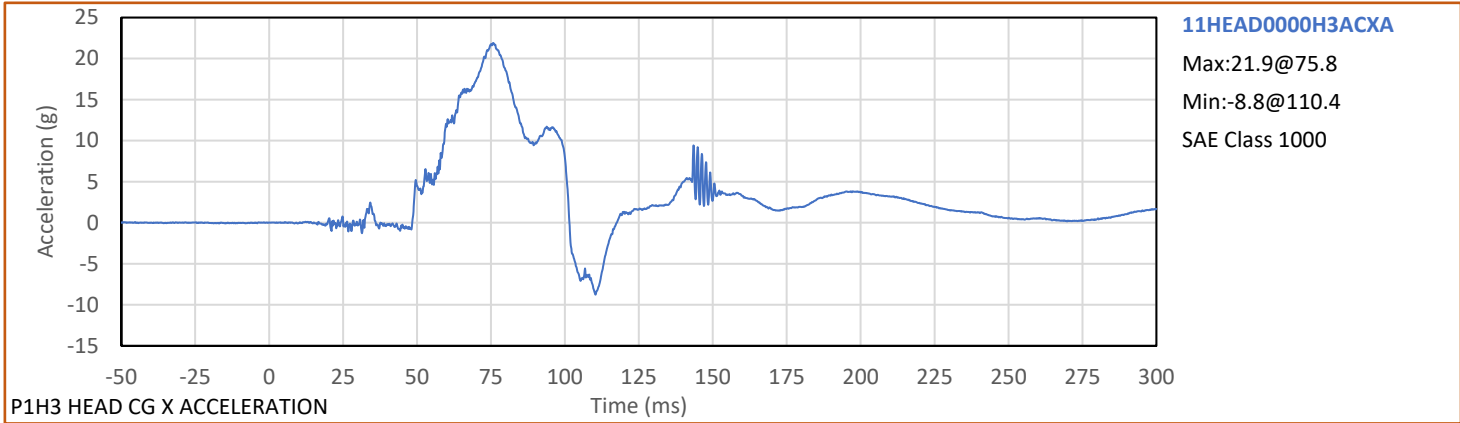


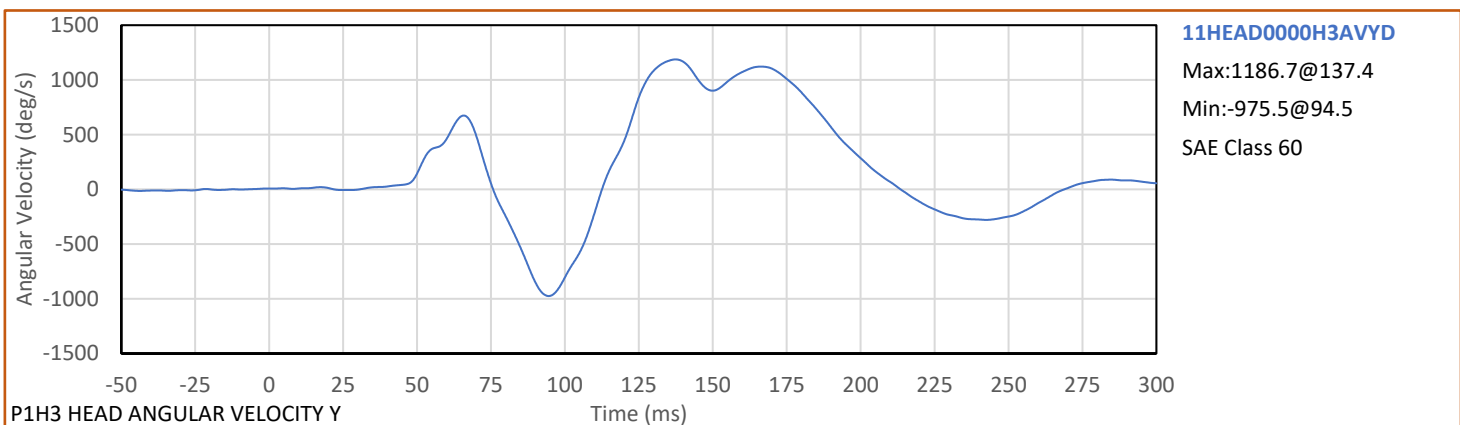
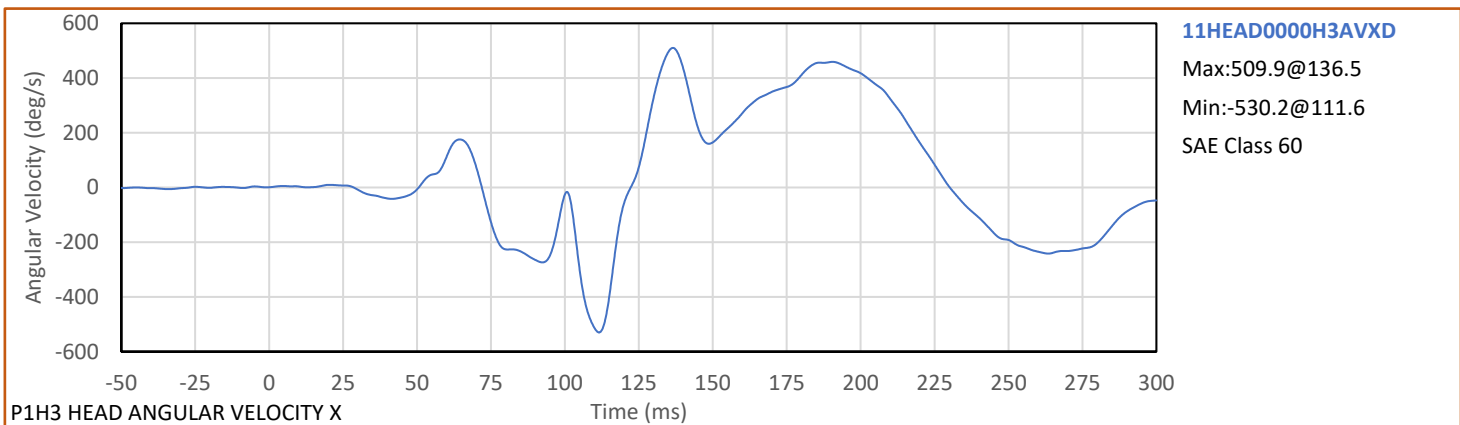
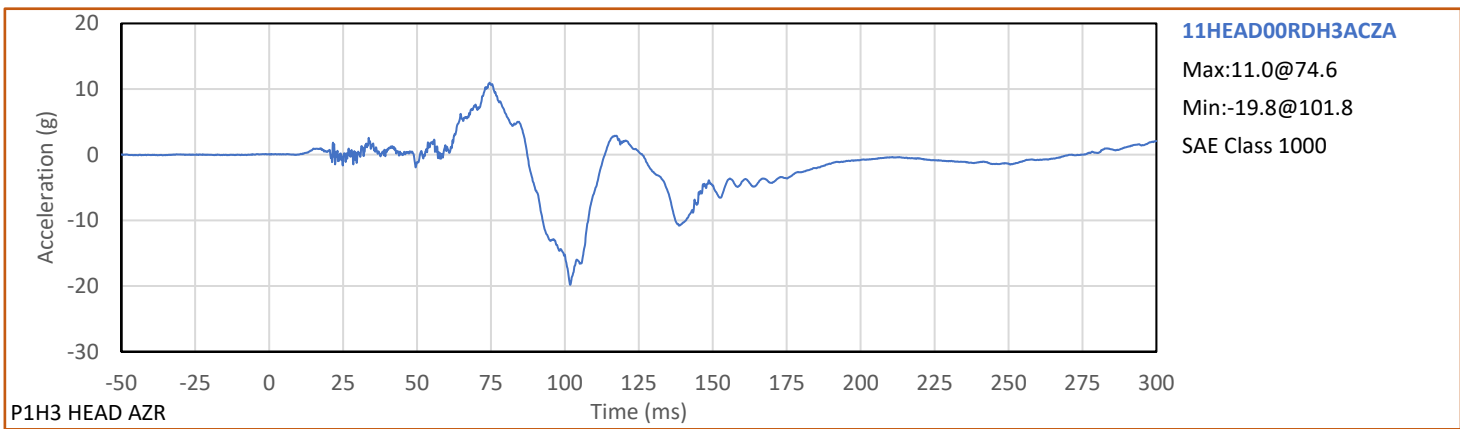
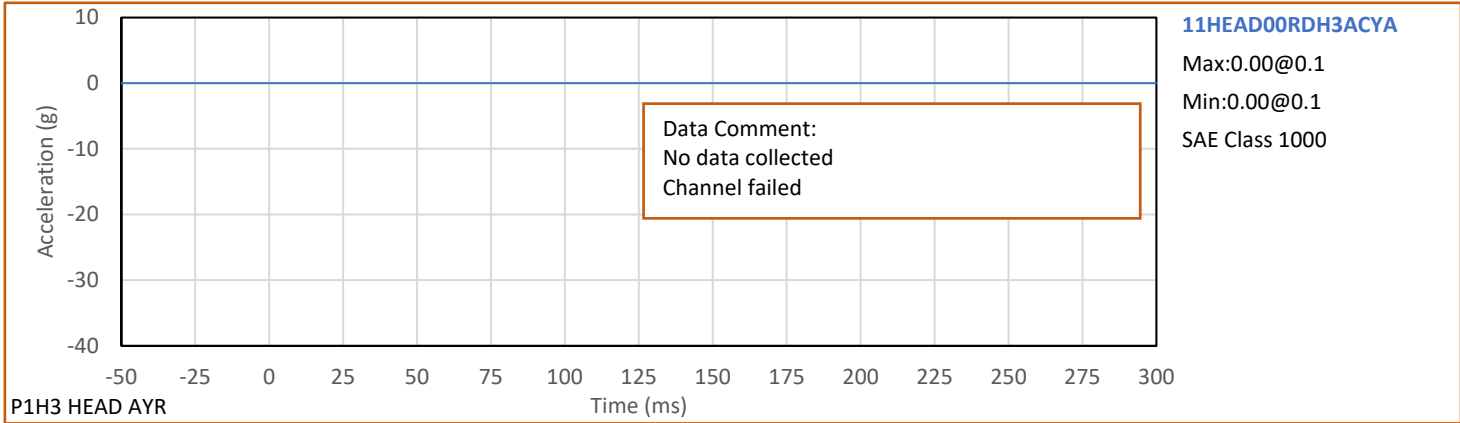


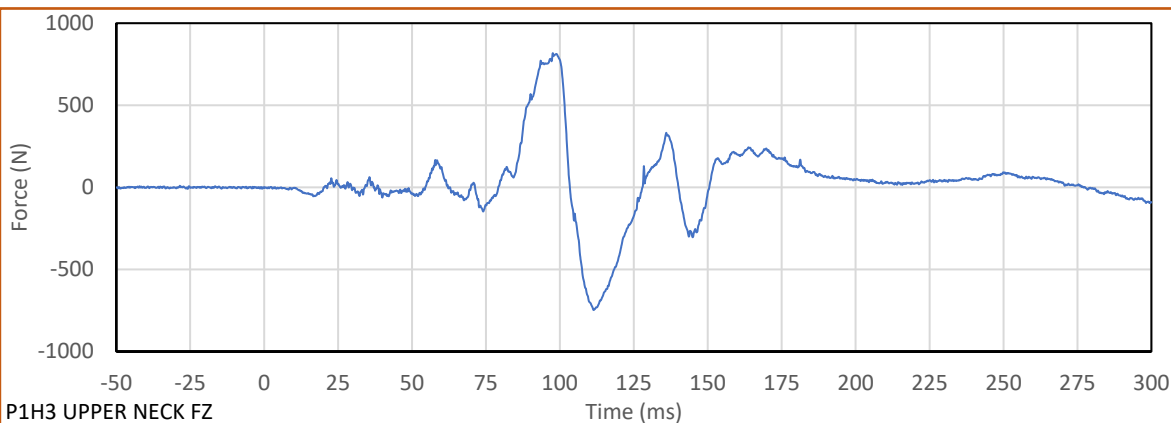
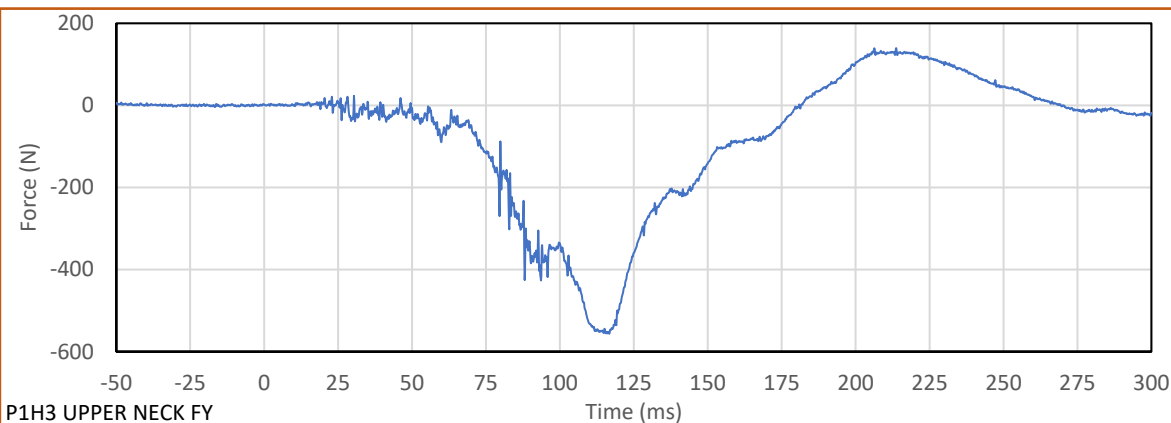
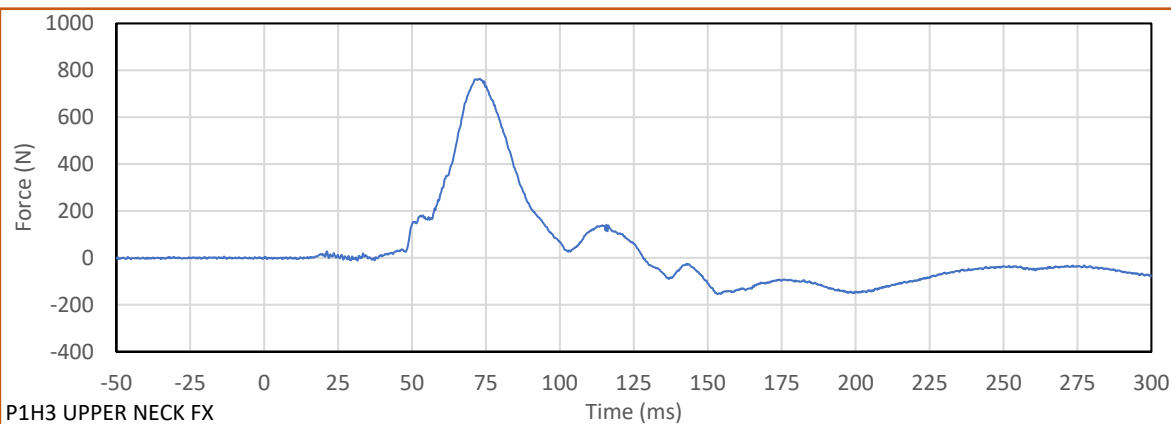
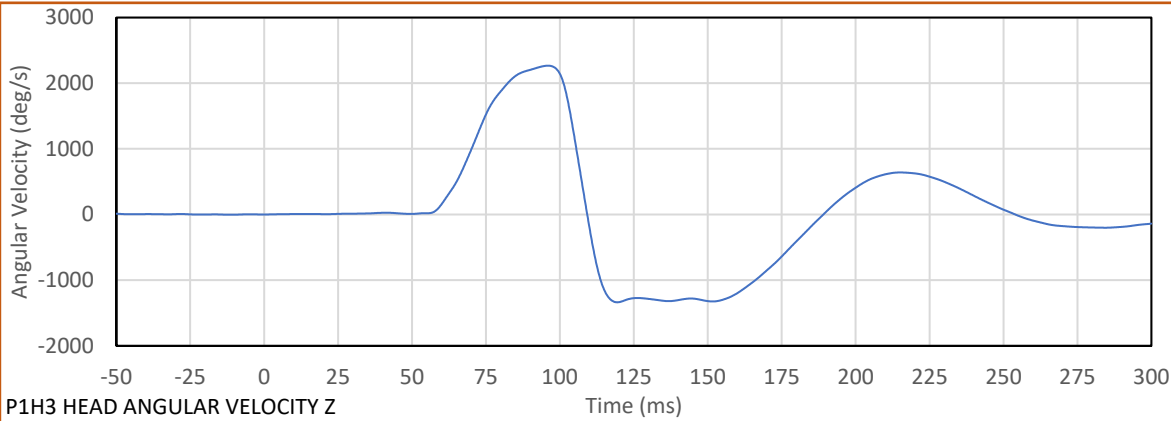
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Test Program: Left Side 30° Frontal Rigid Barrier Impact

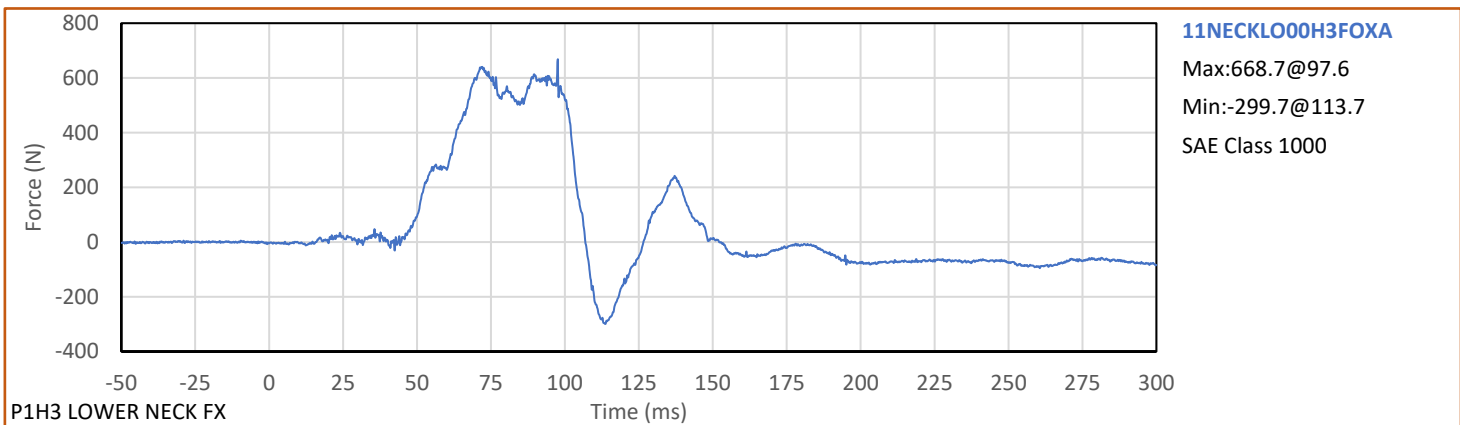
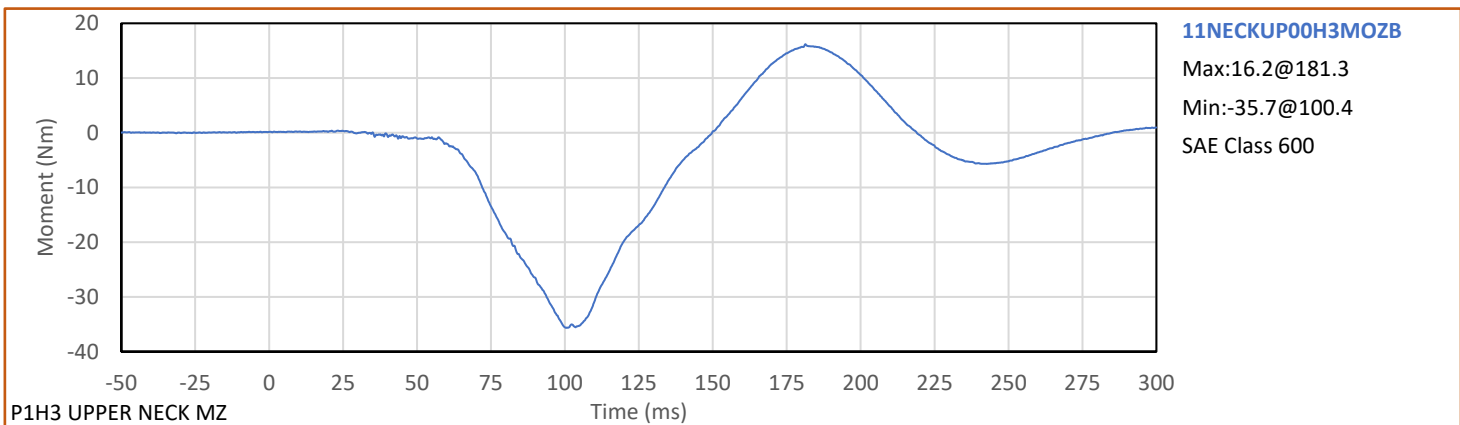
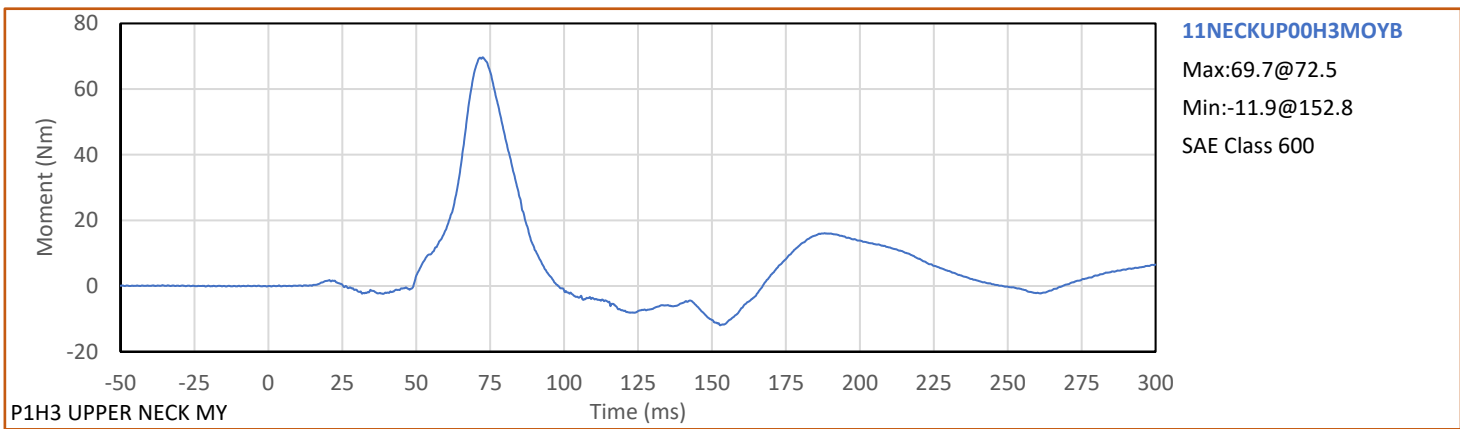
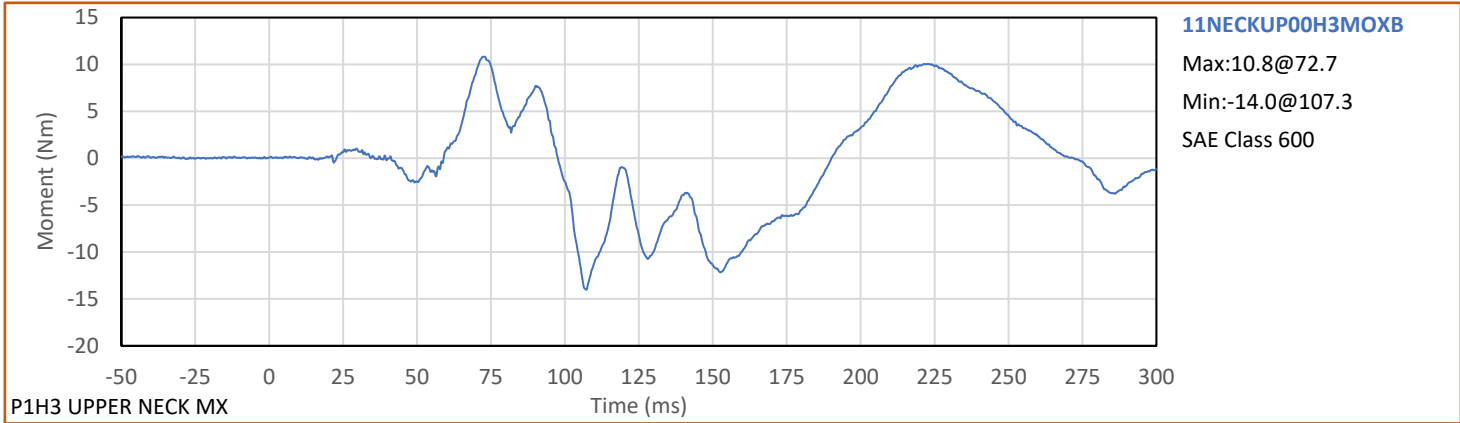
NHTSA No.: R20205383  
Test Date: 7/30/2021

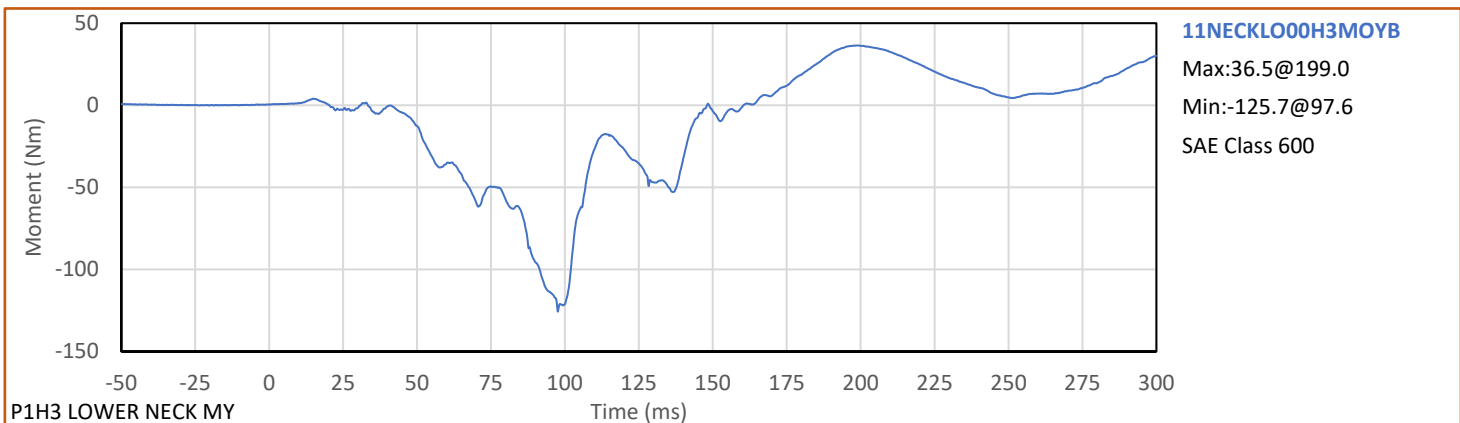
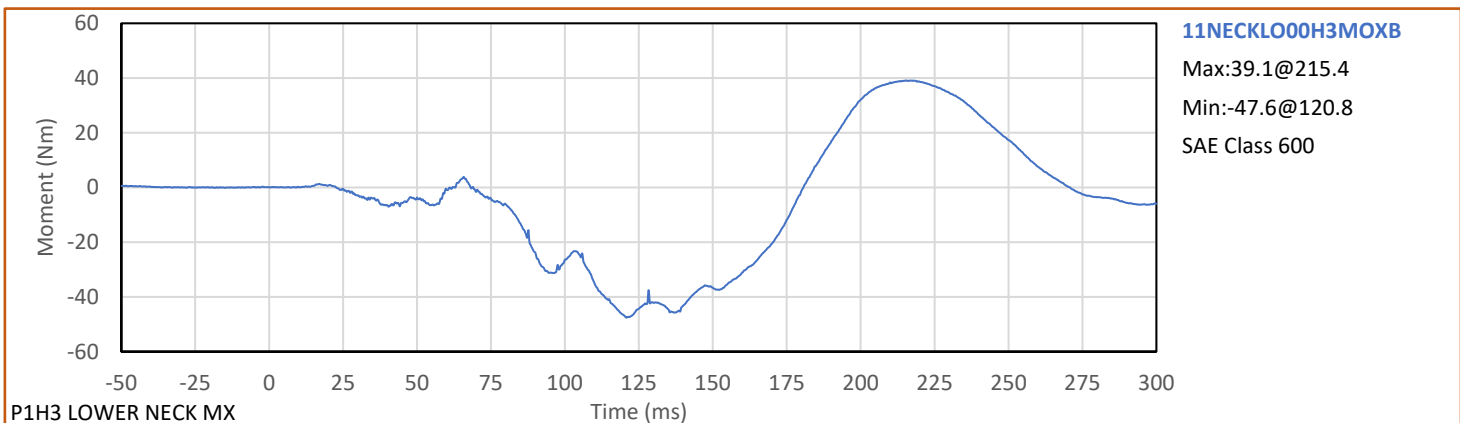
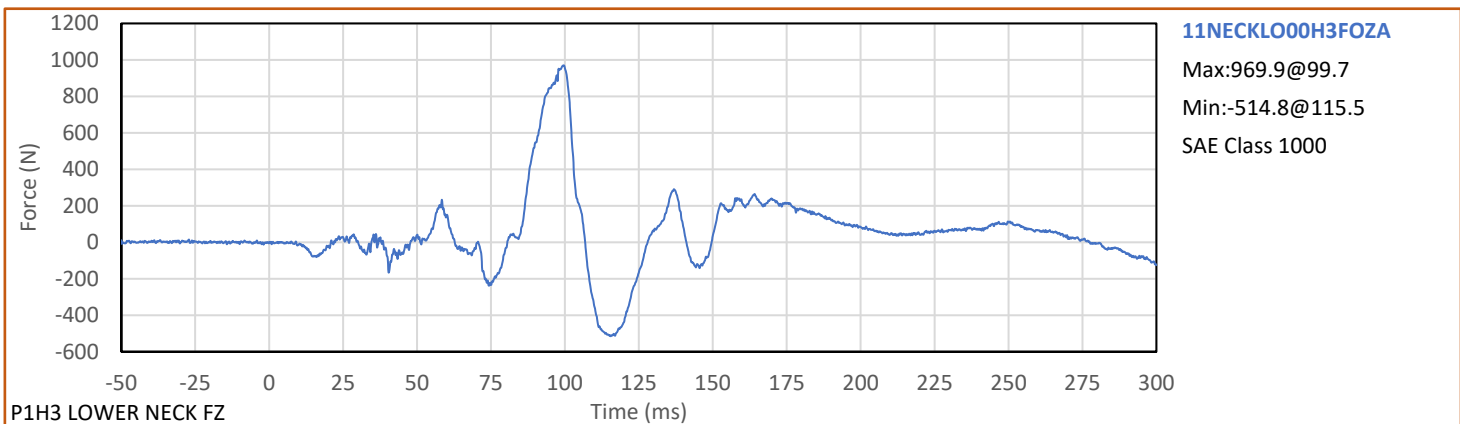
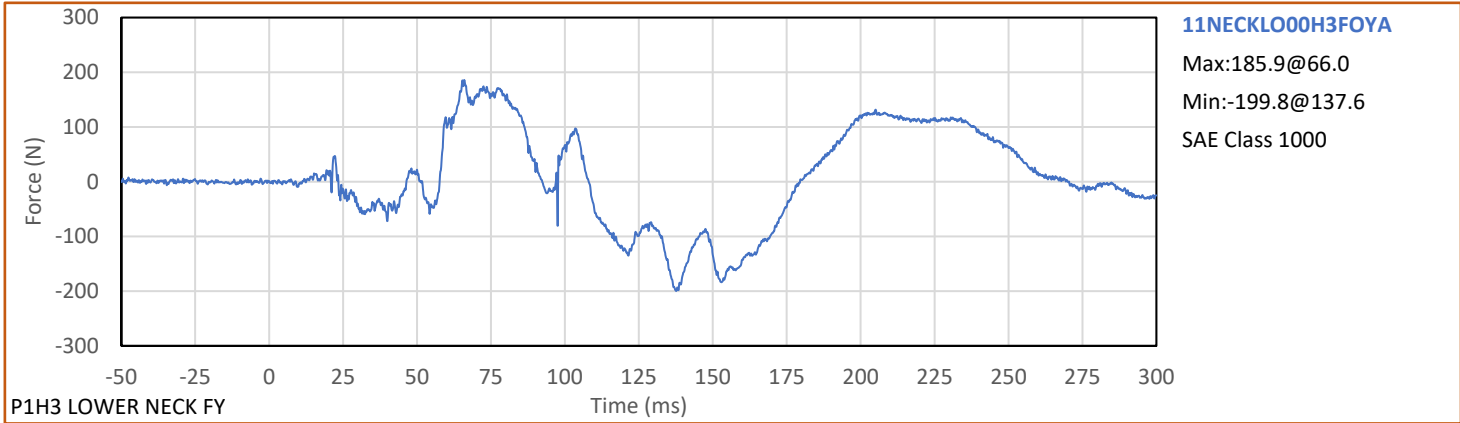


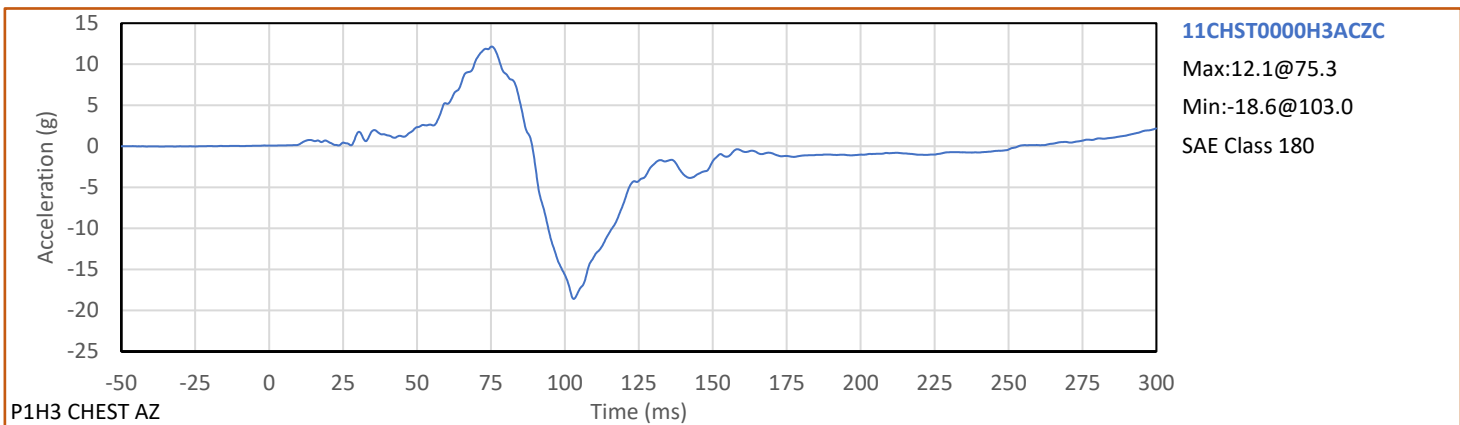
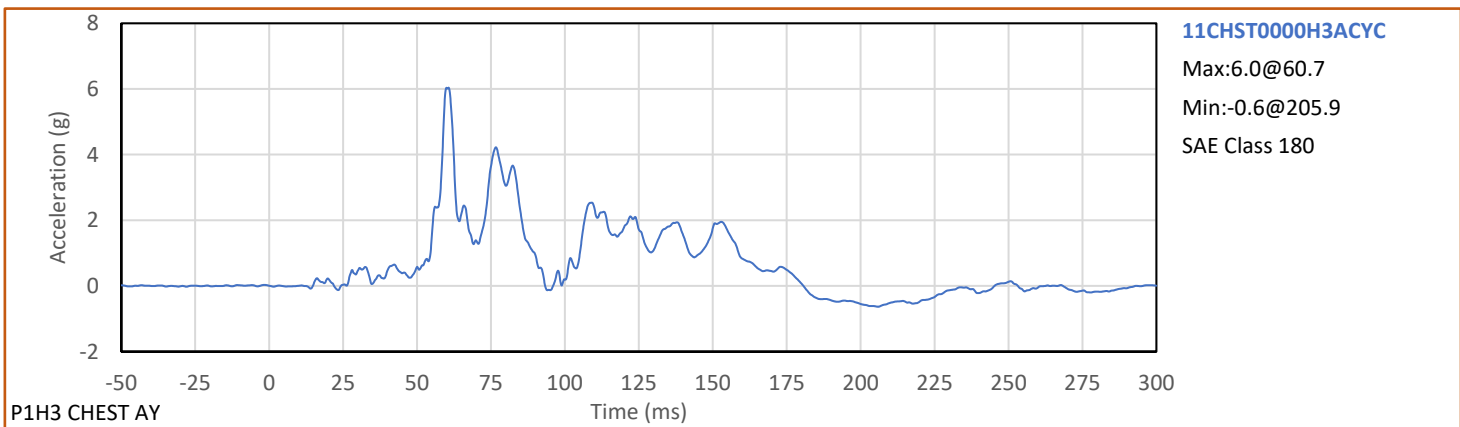
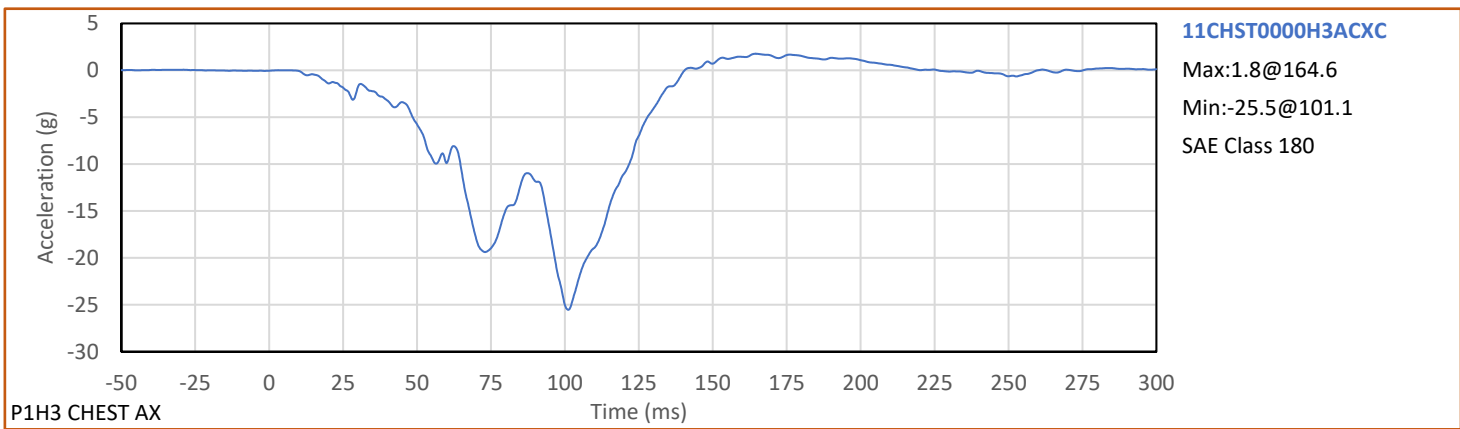
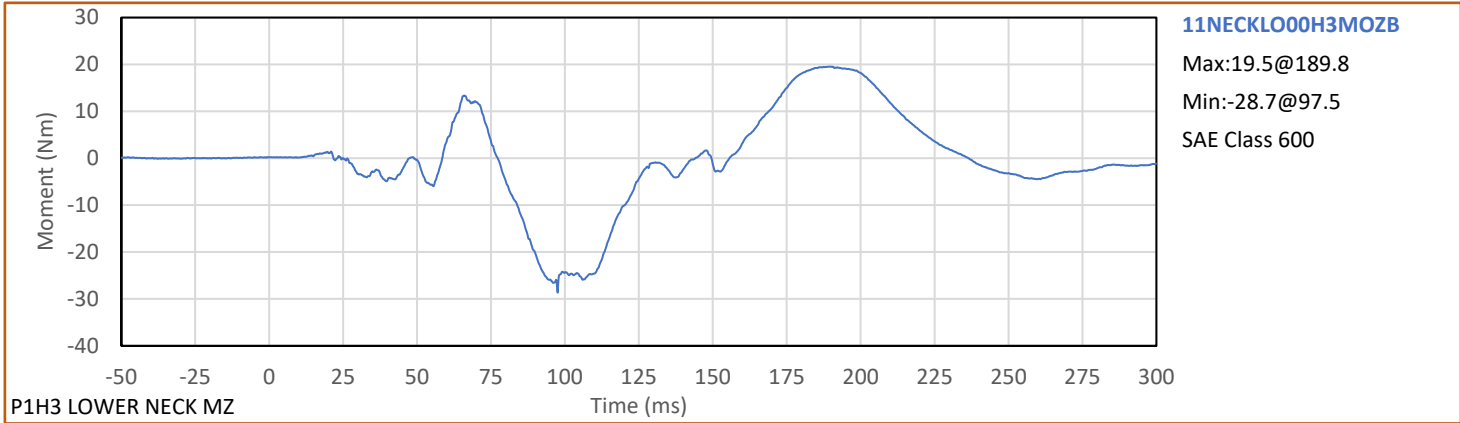


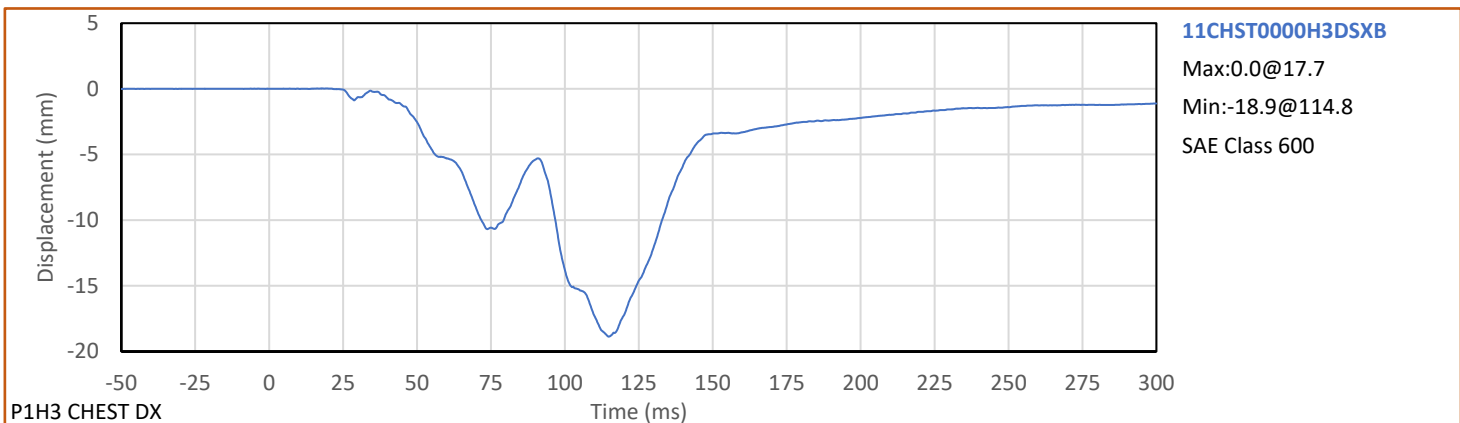
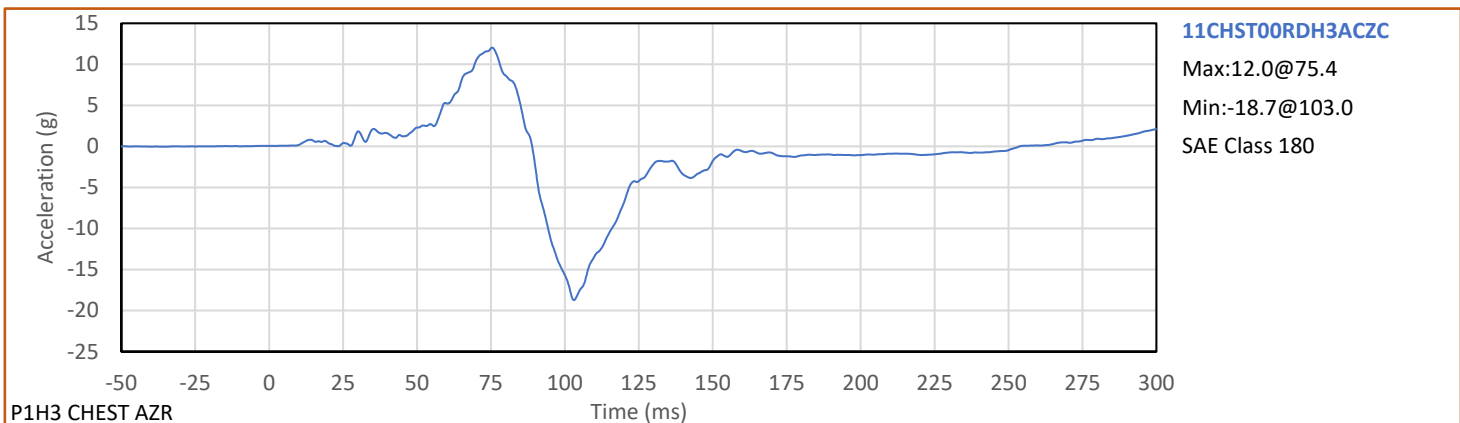
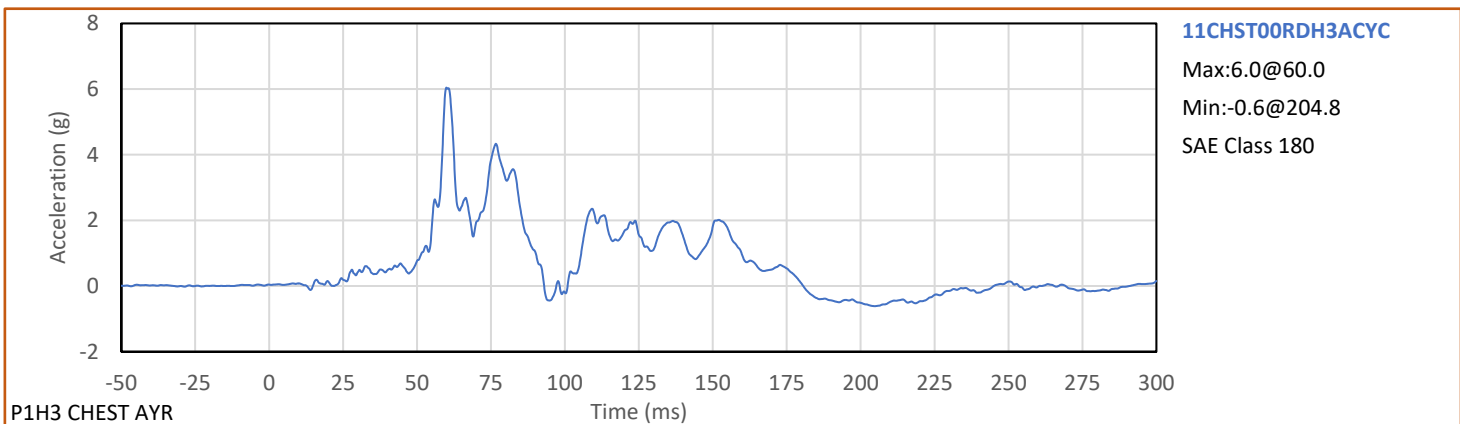
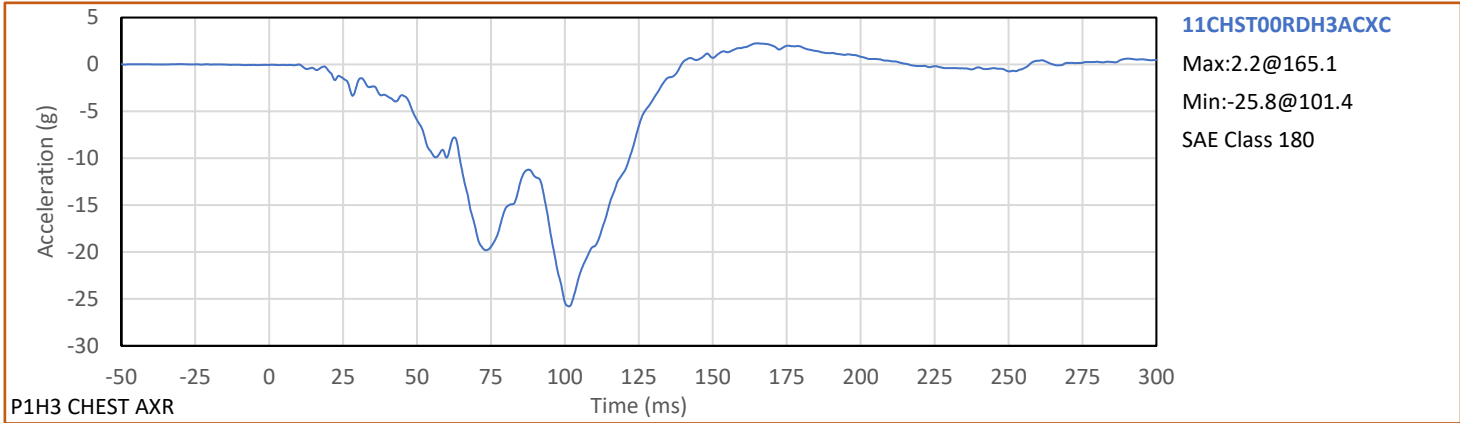


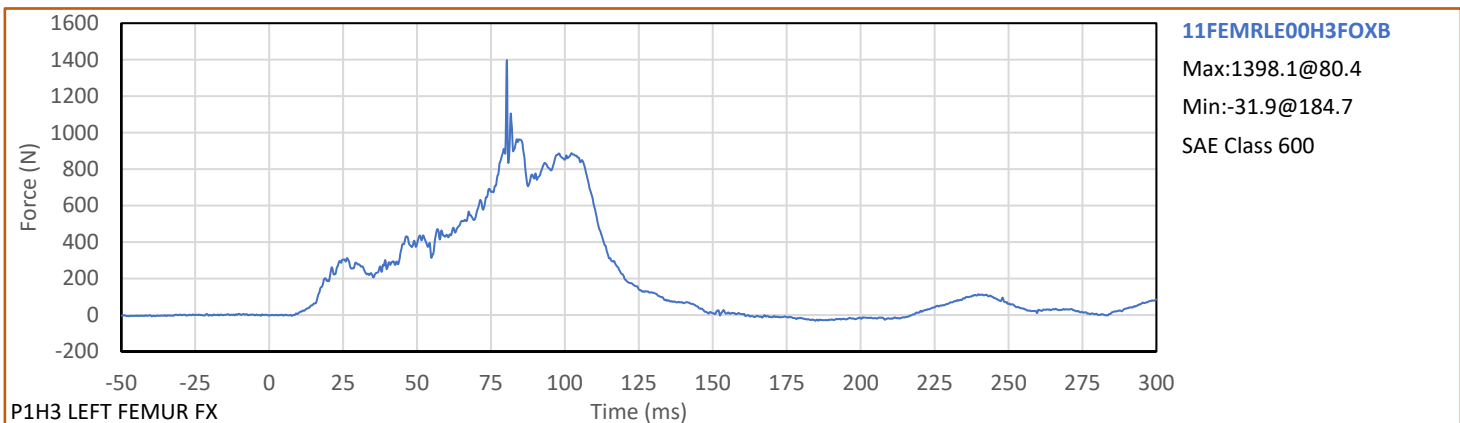
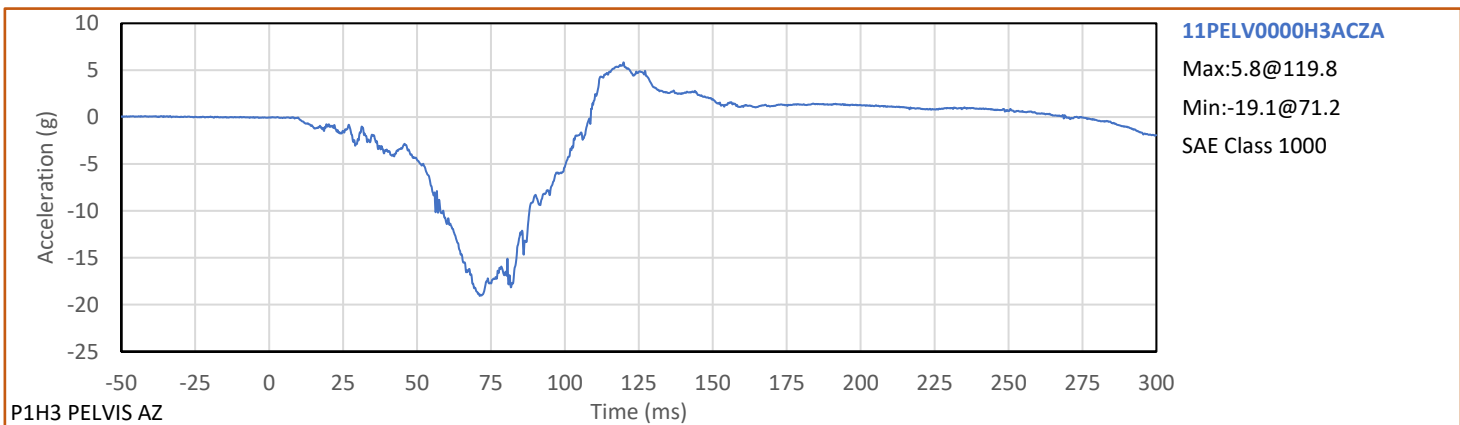
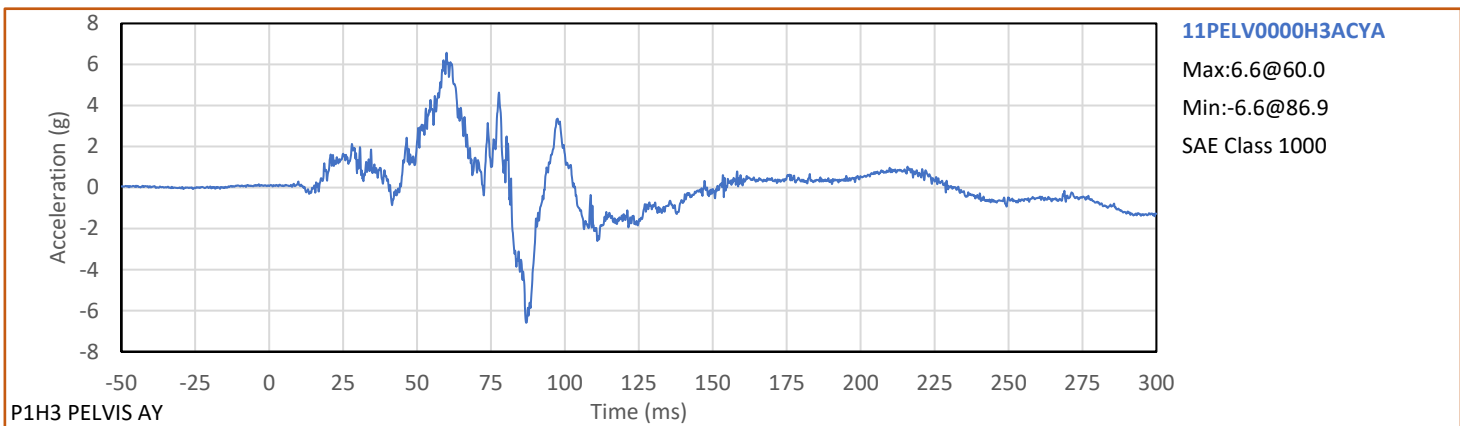
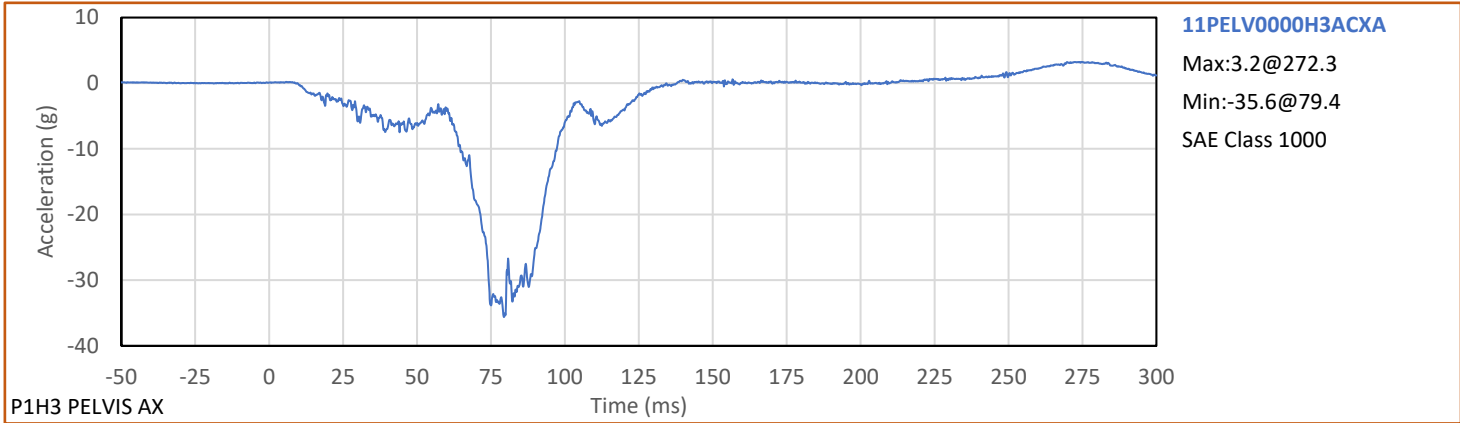


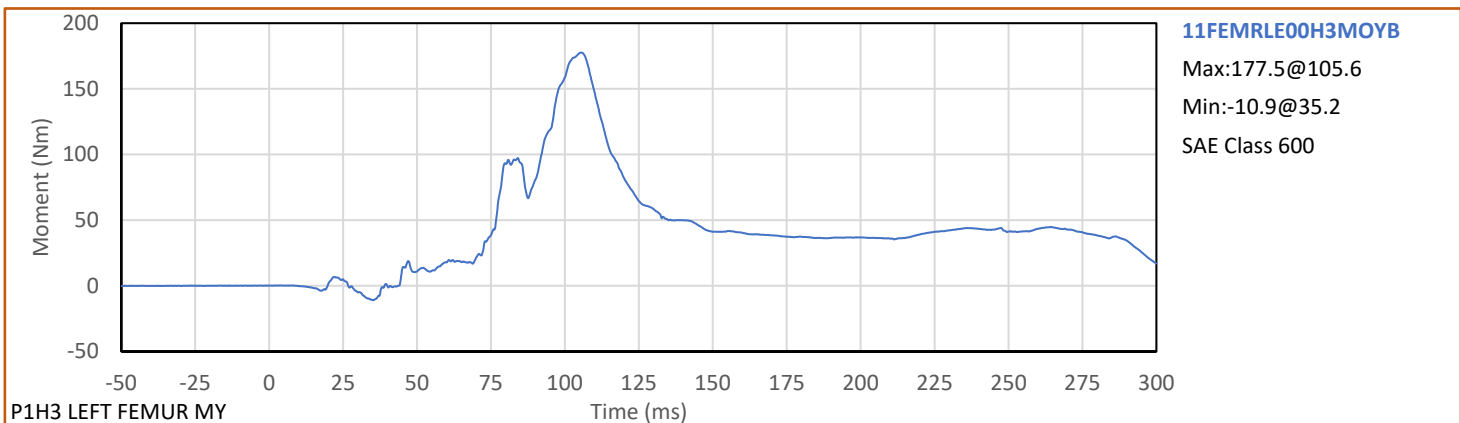
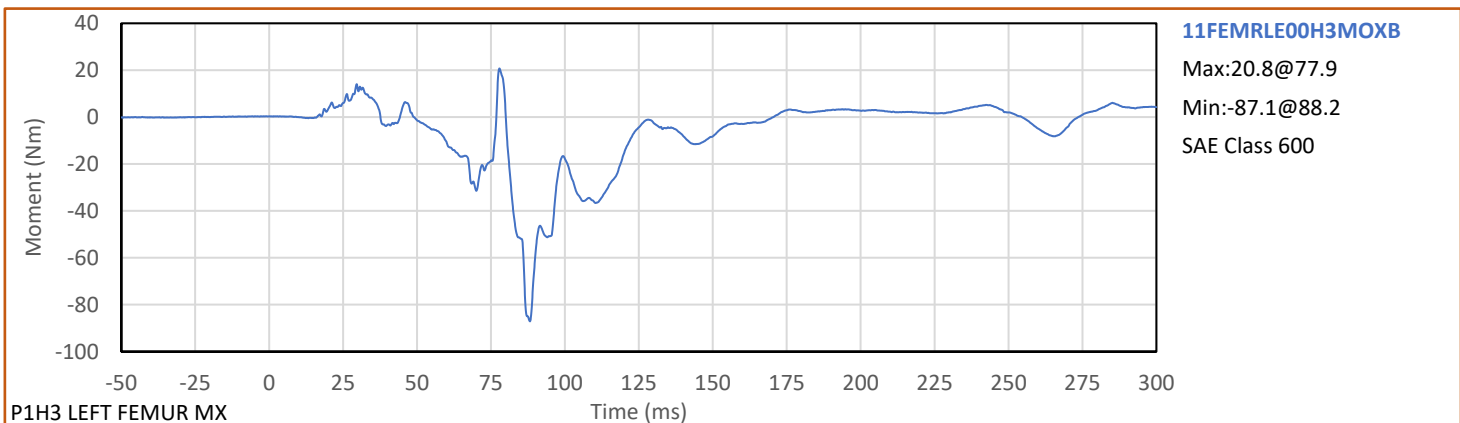
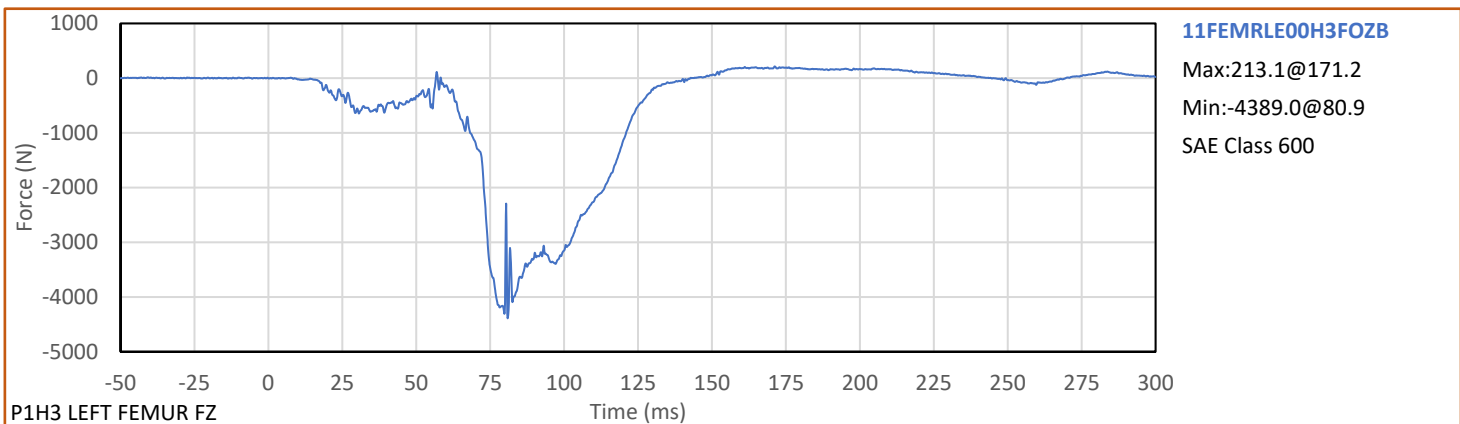
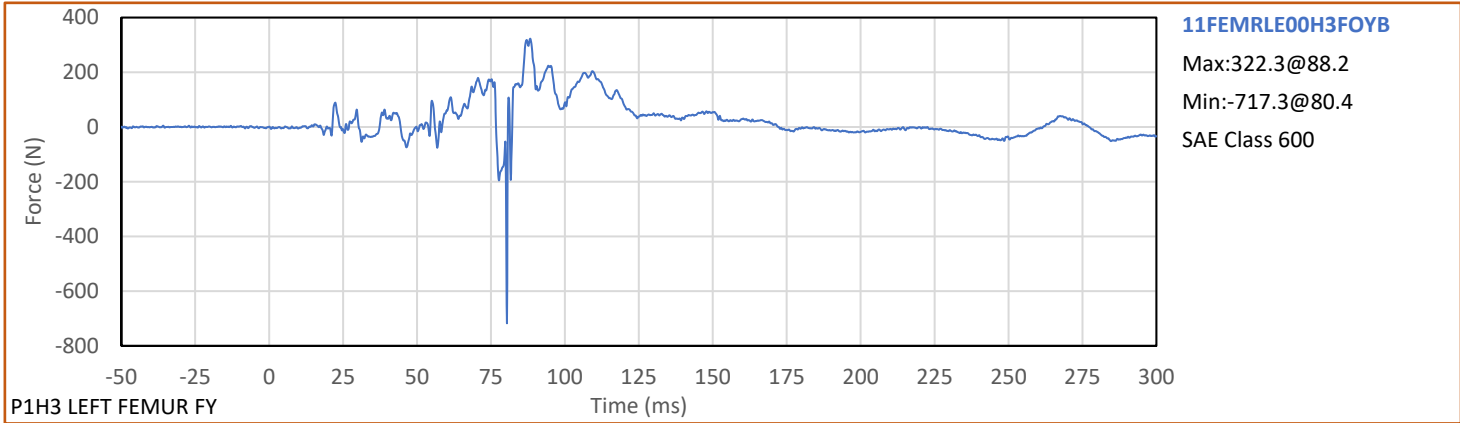


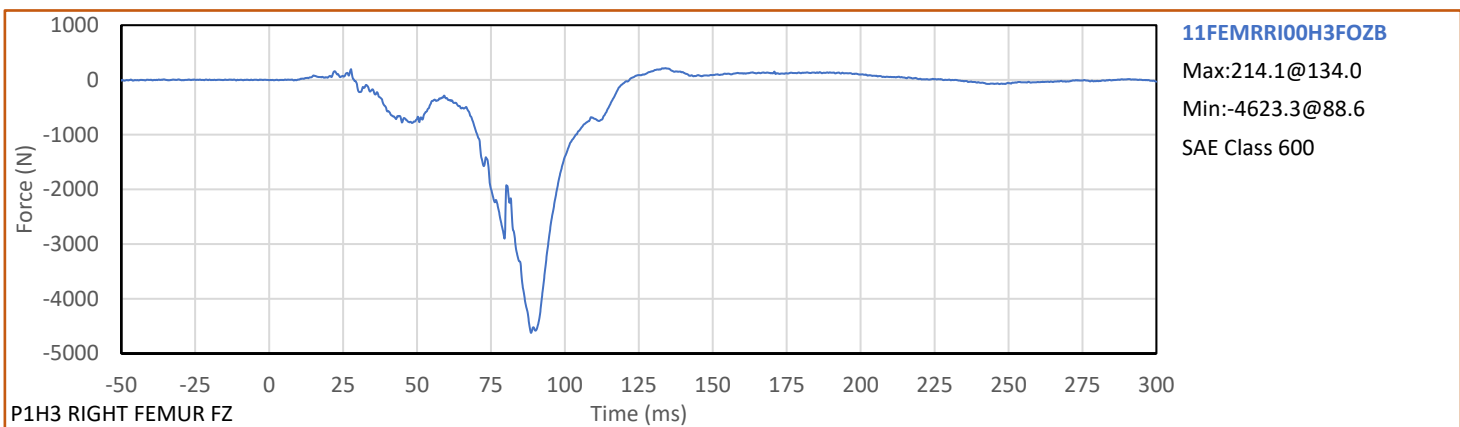
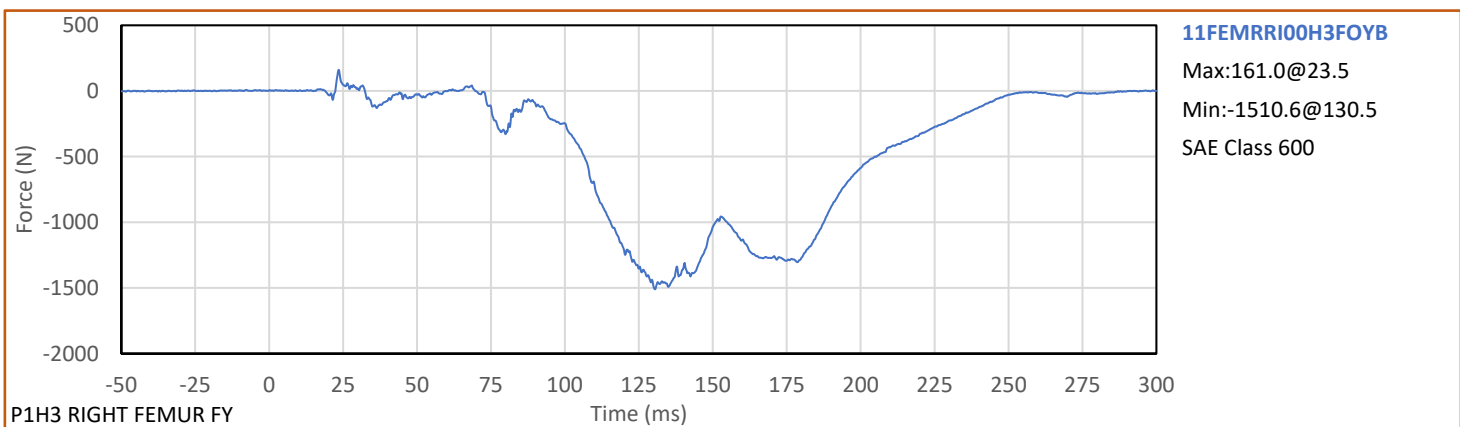
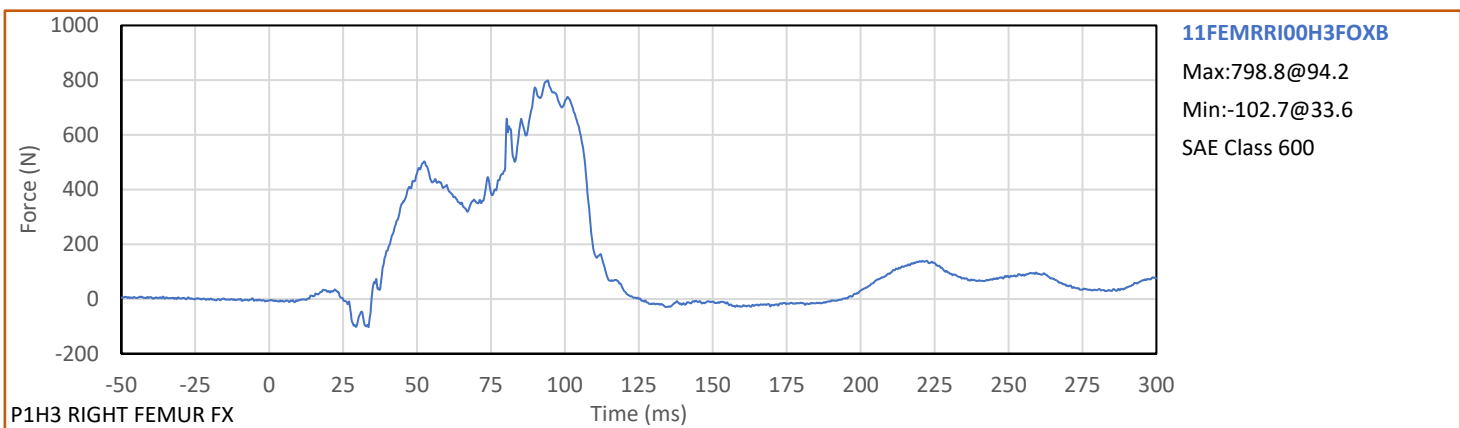
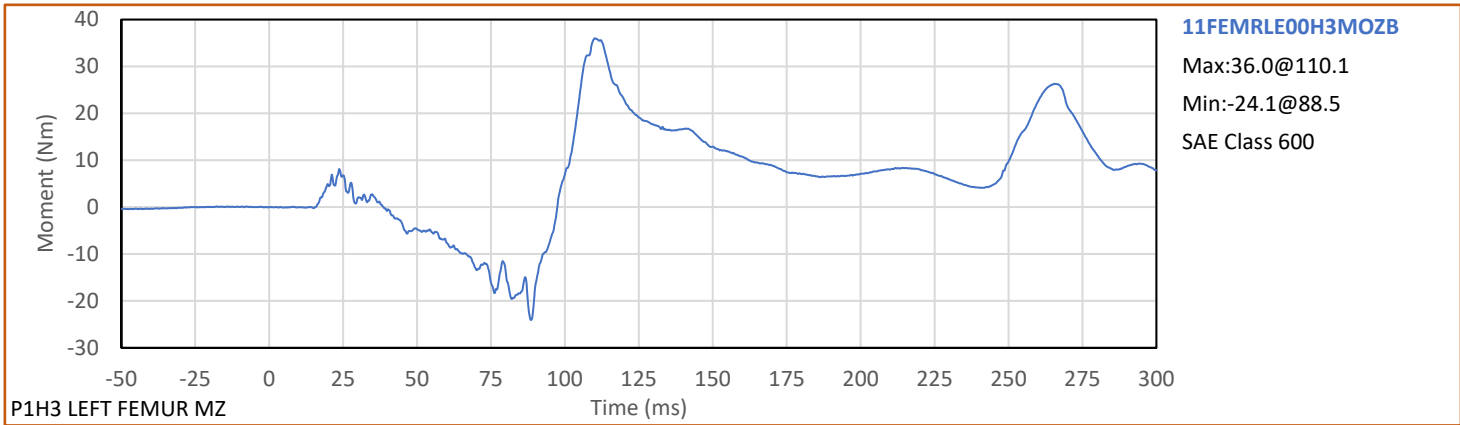


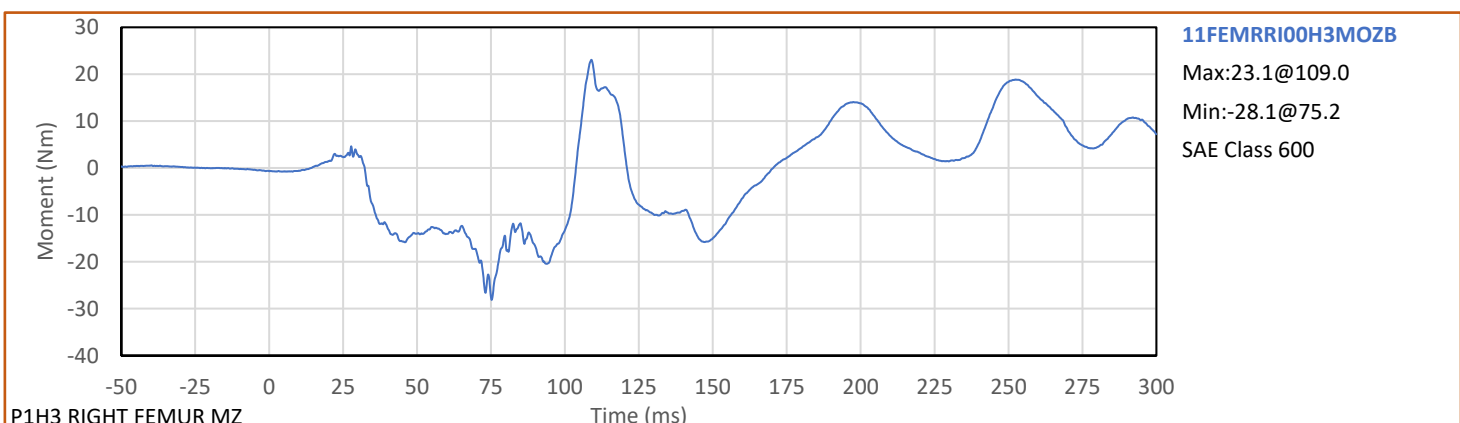
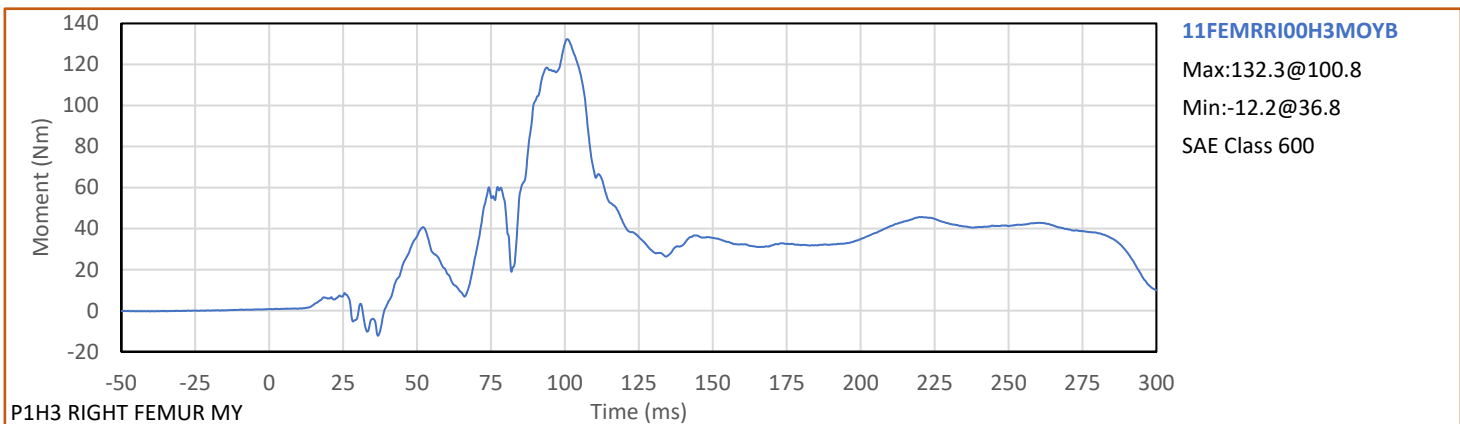
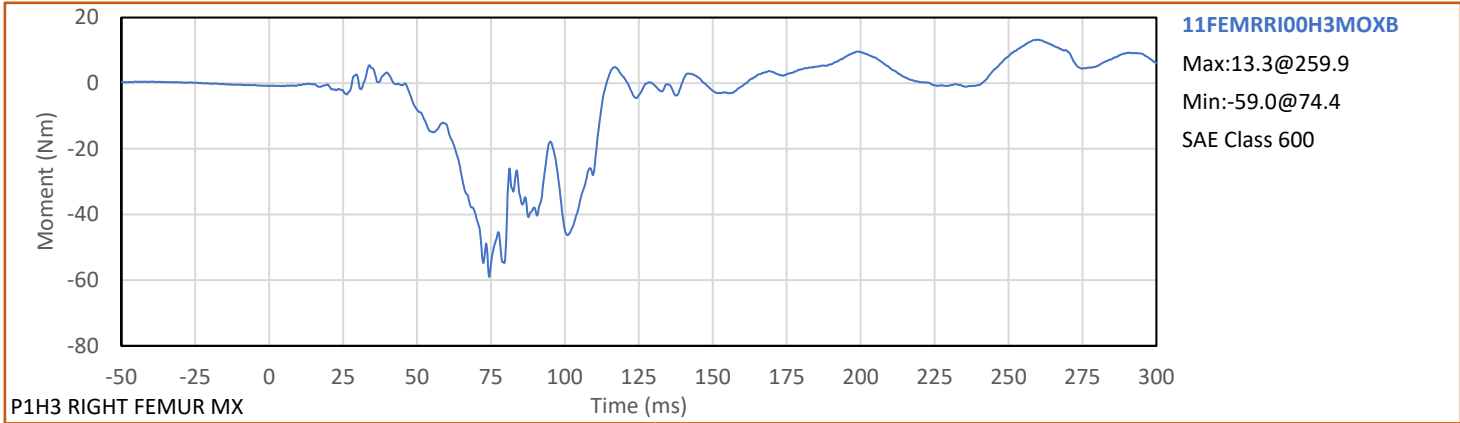


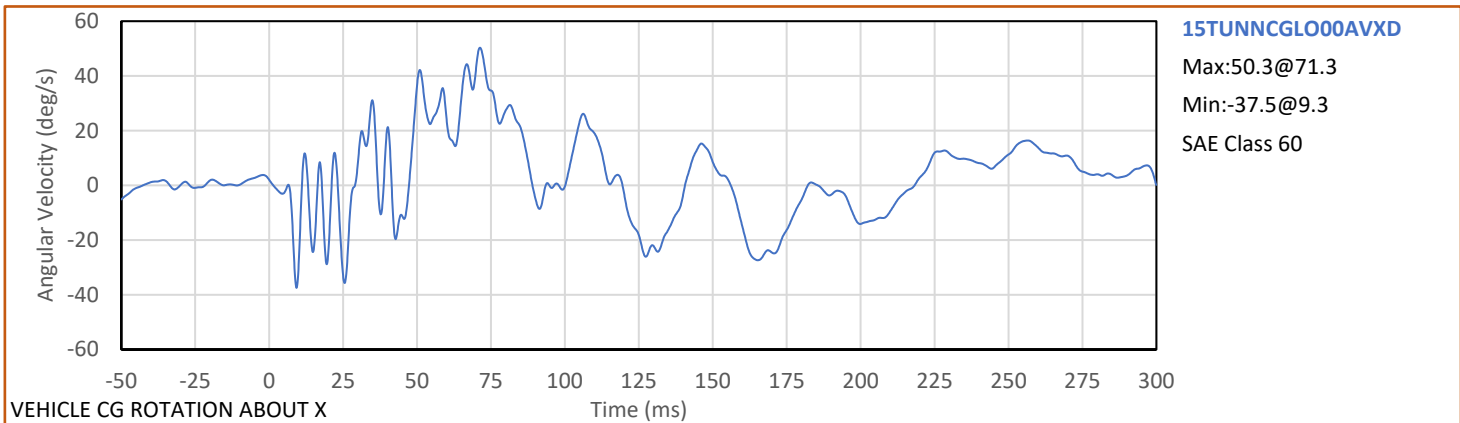
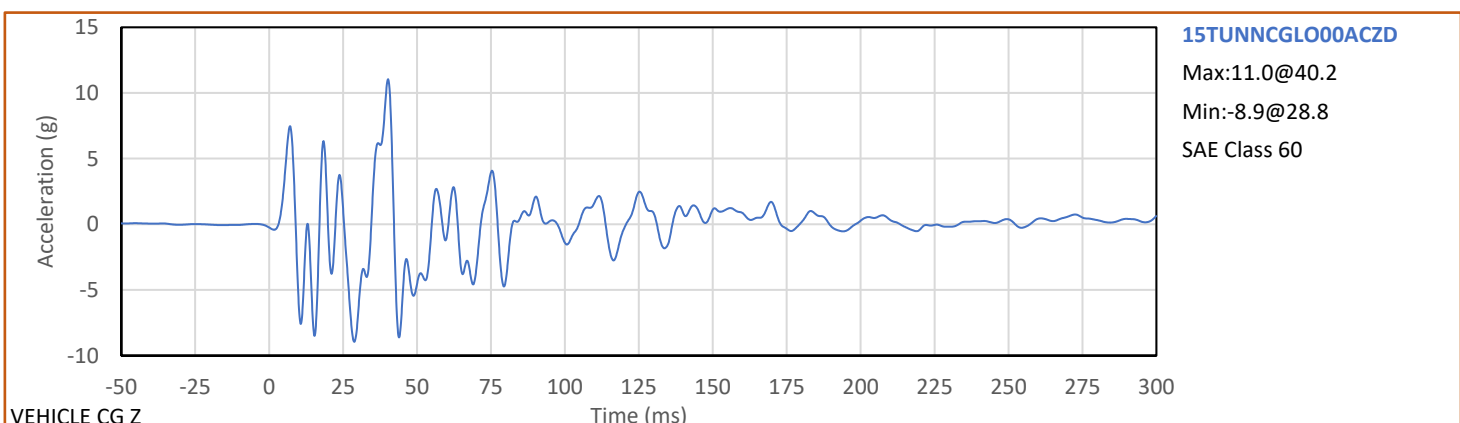
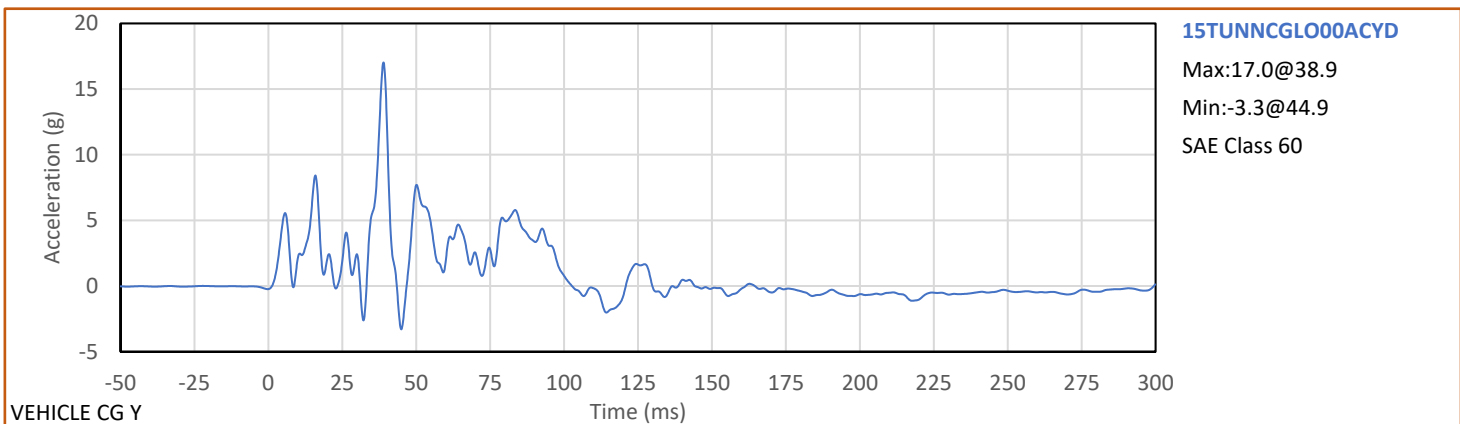
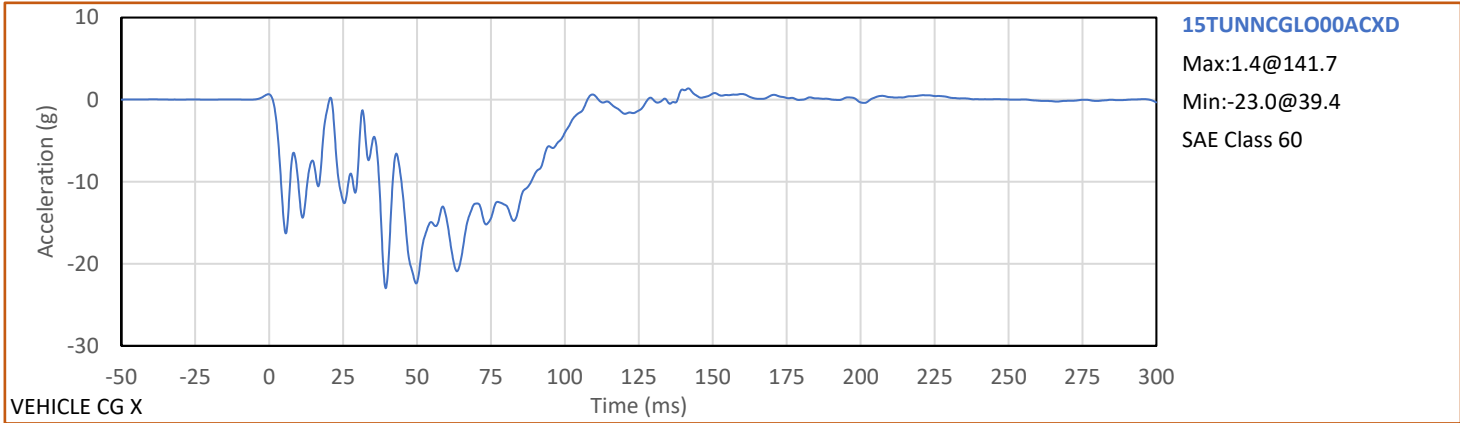


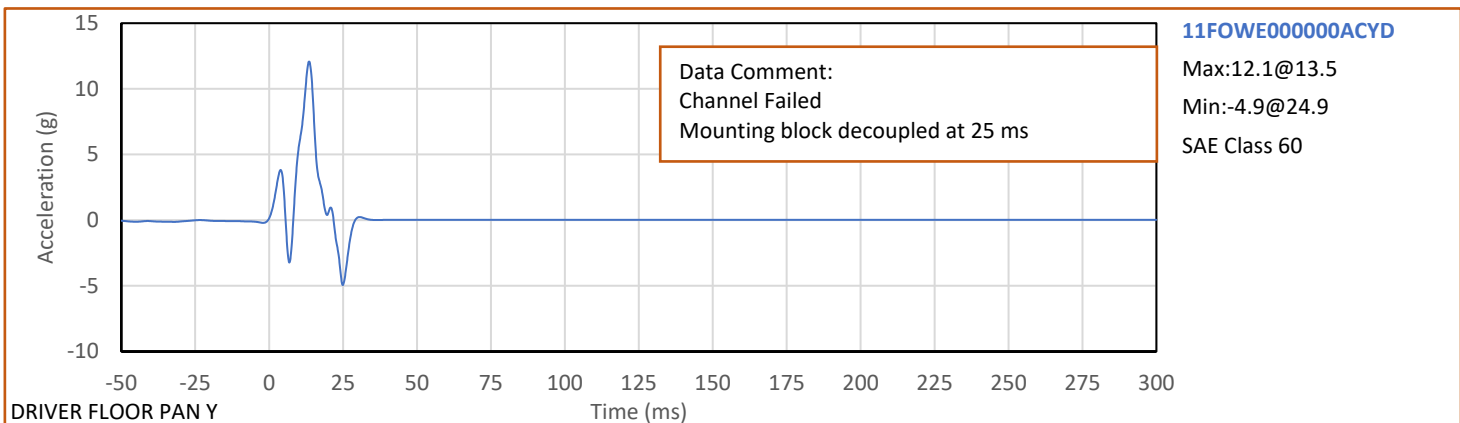
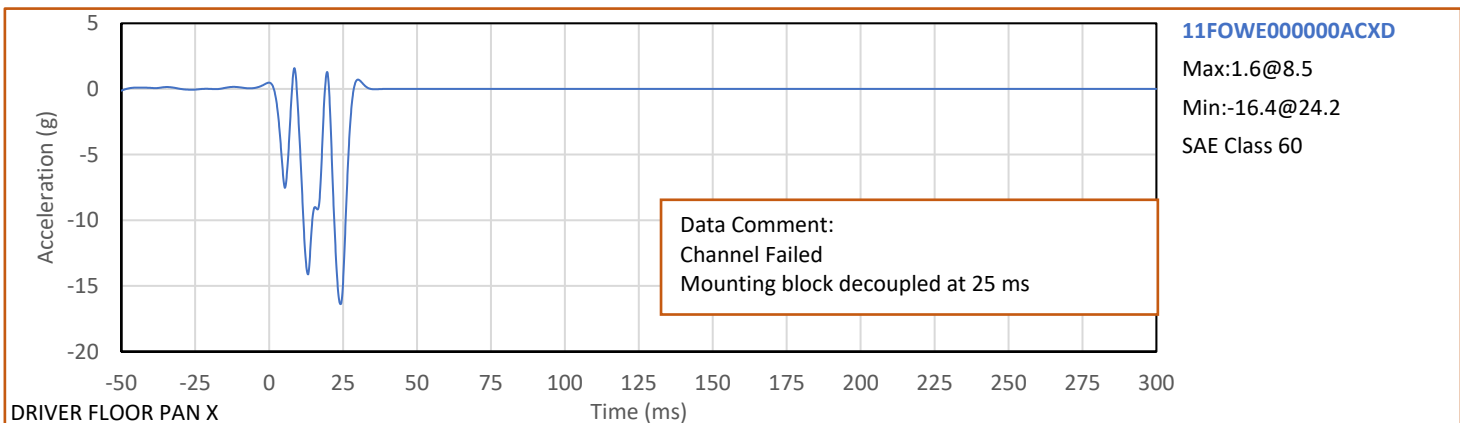
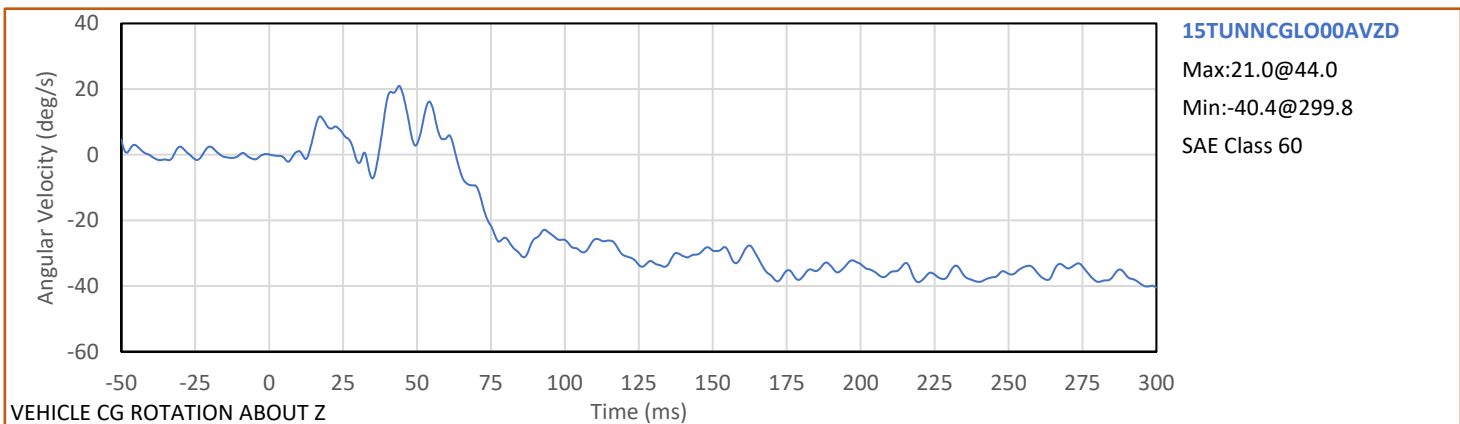
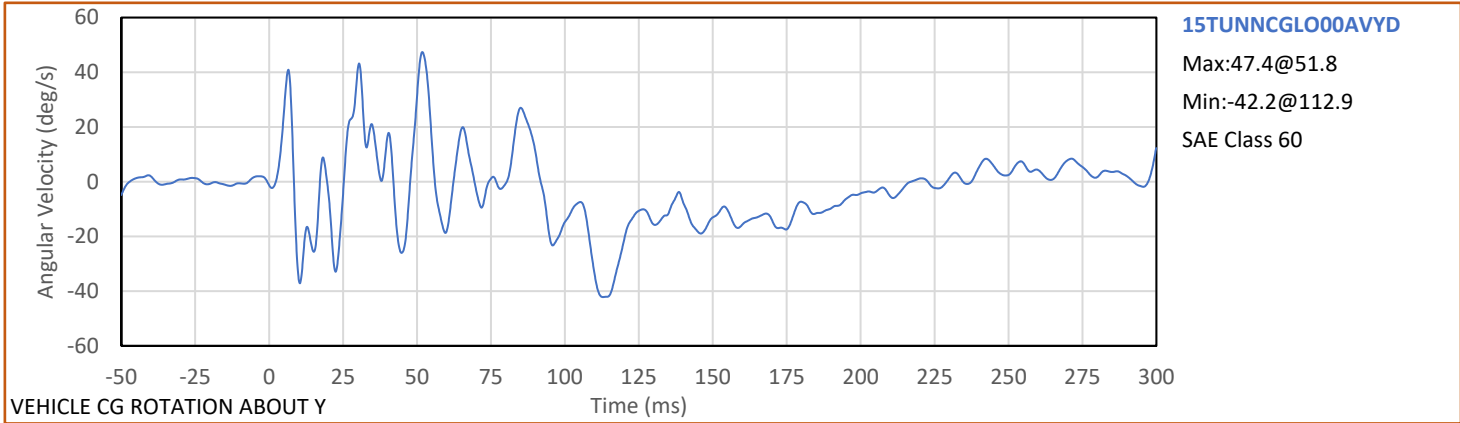


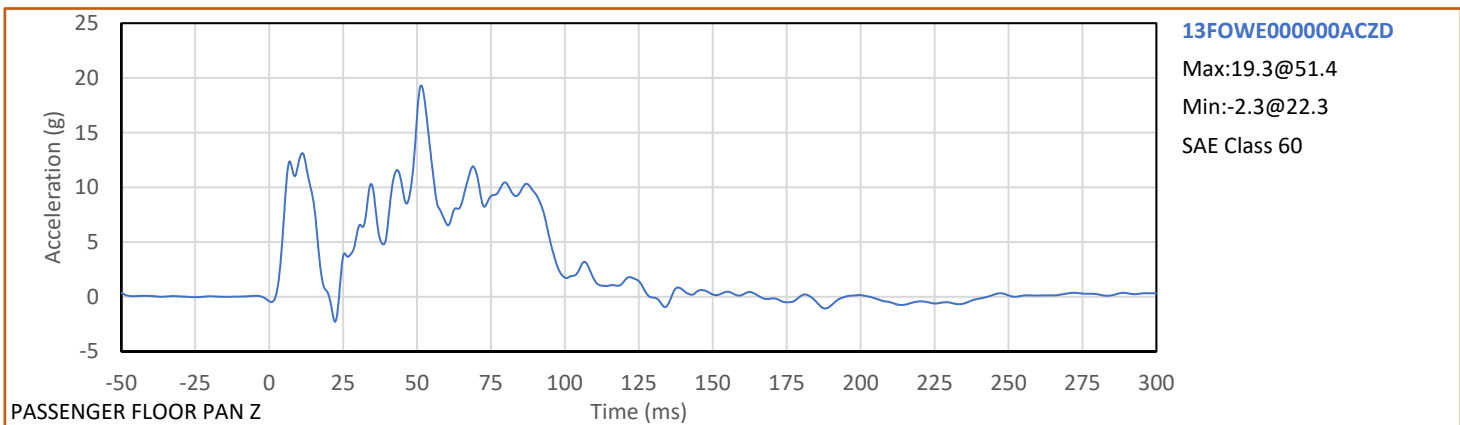
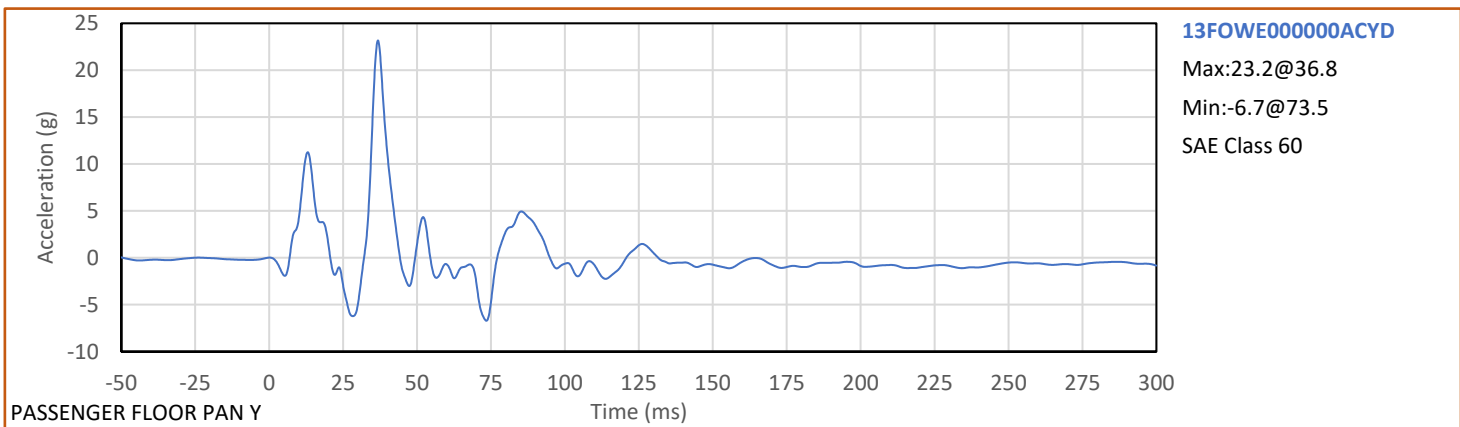
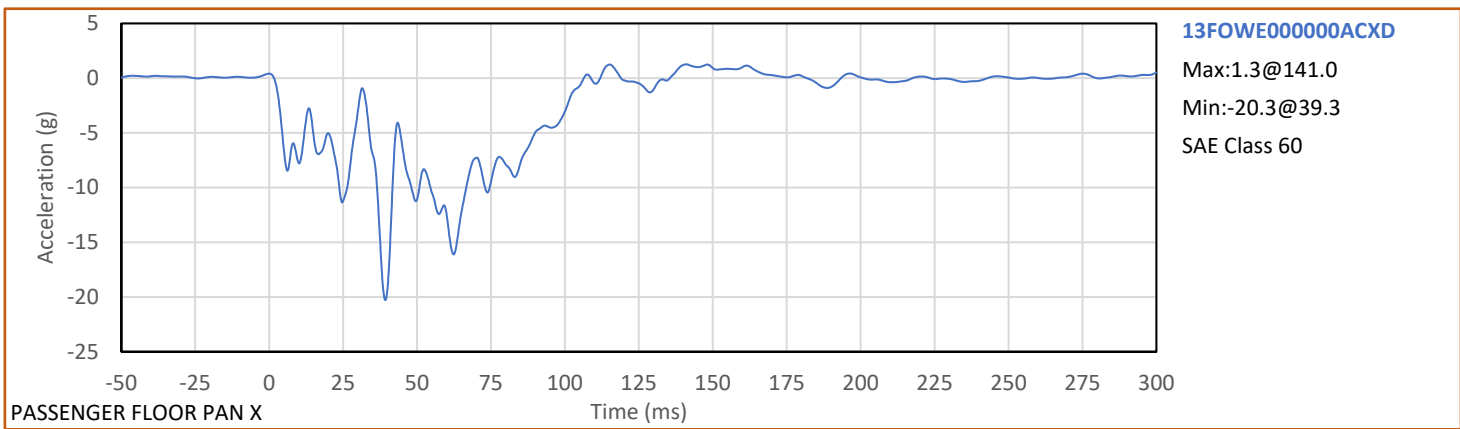
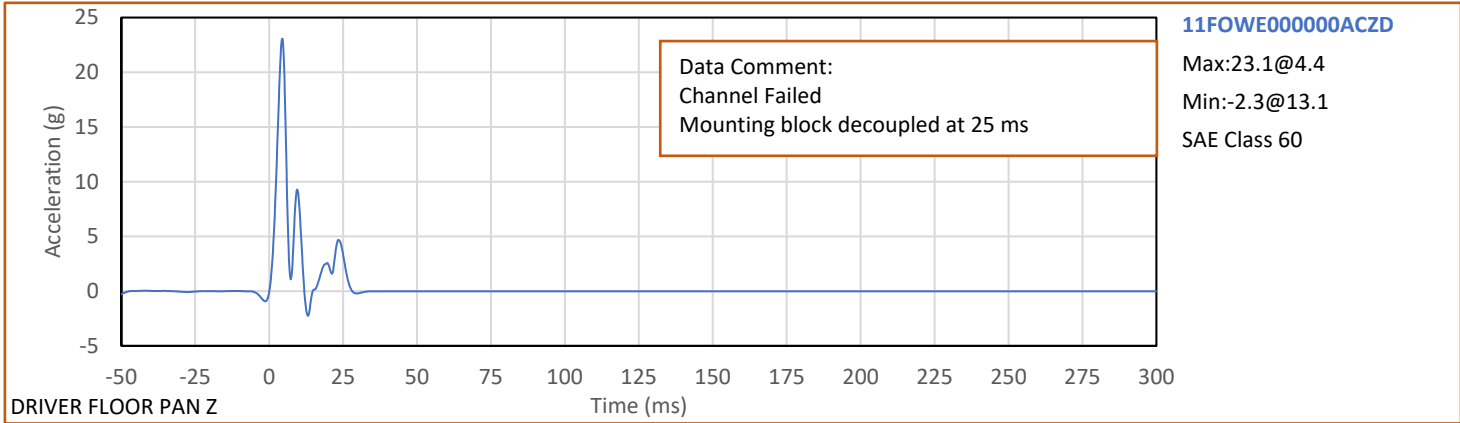


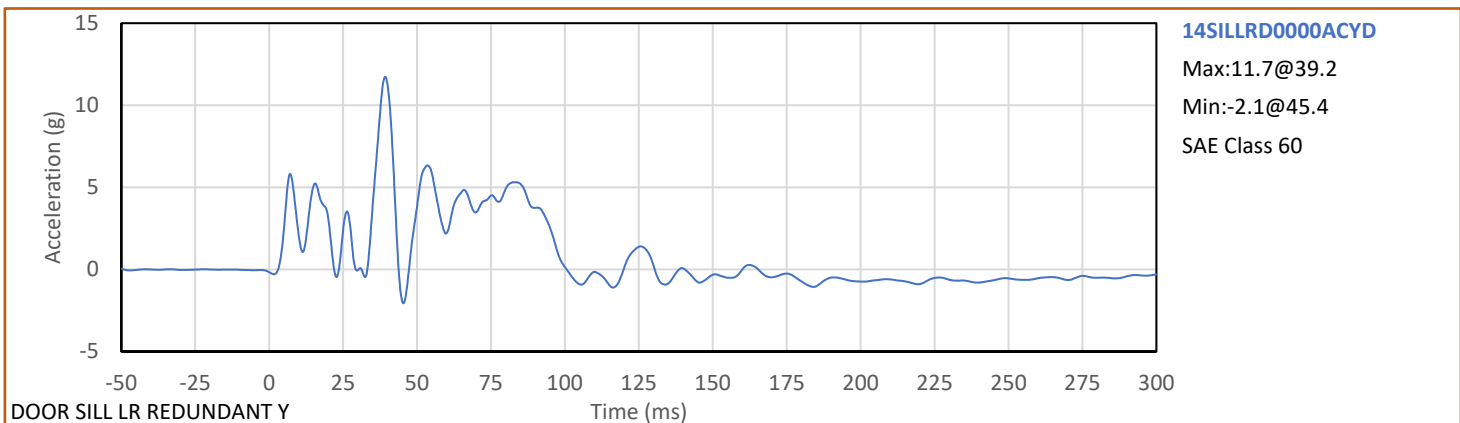
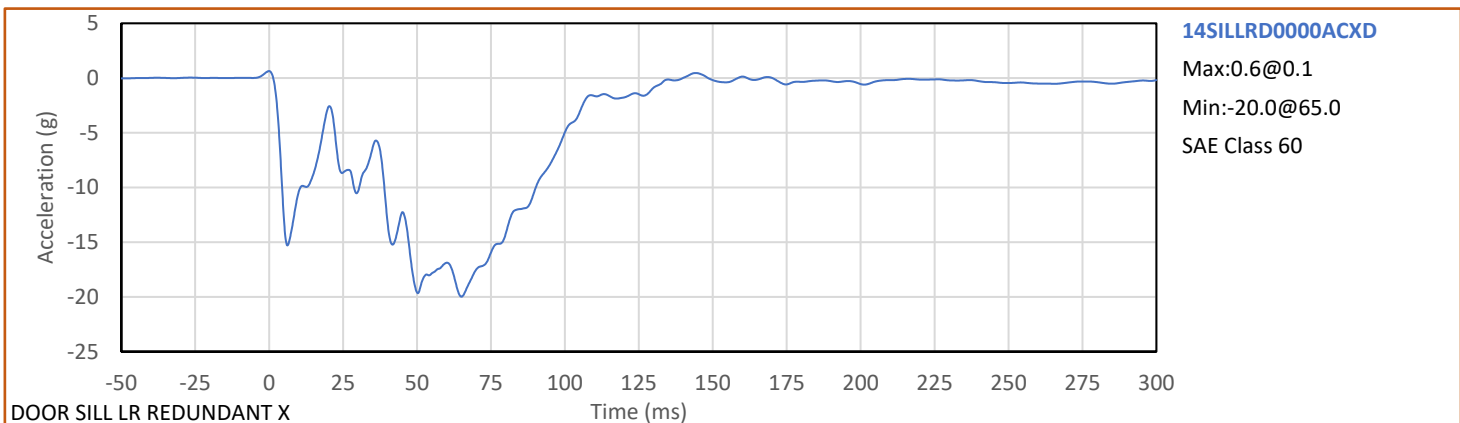
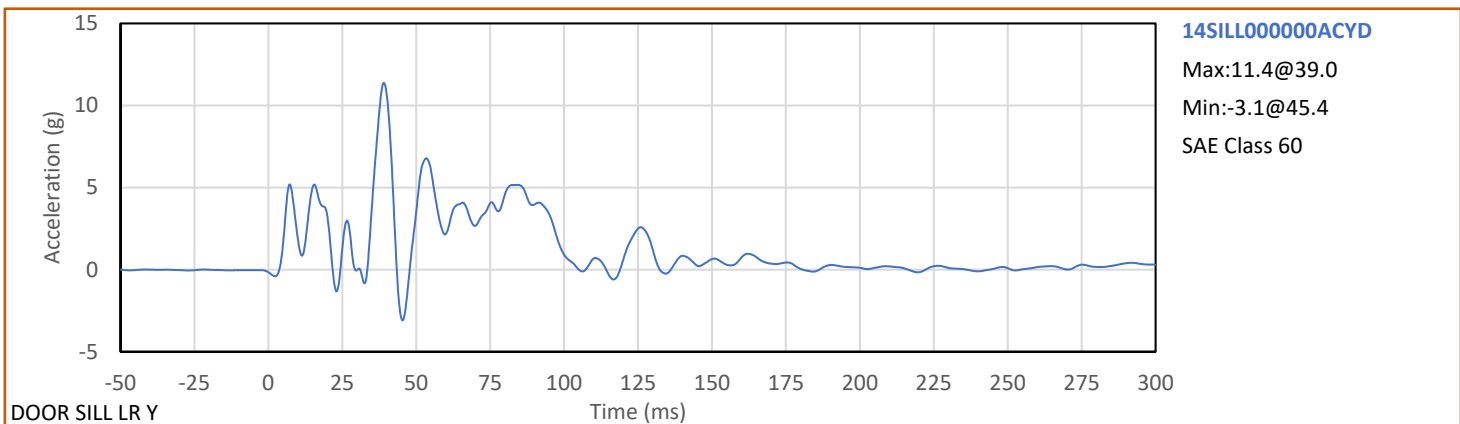
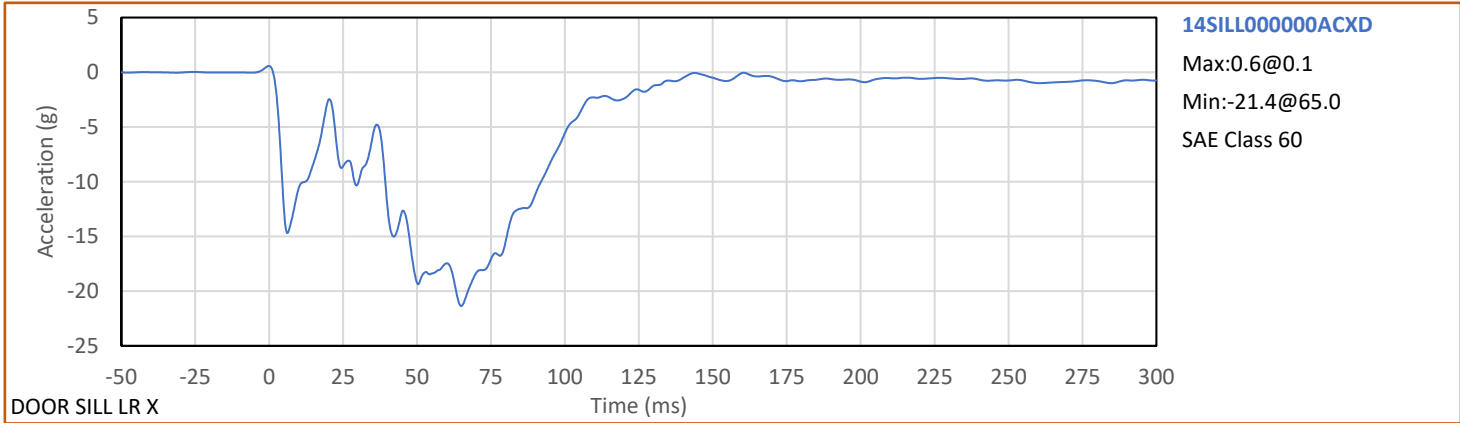


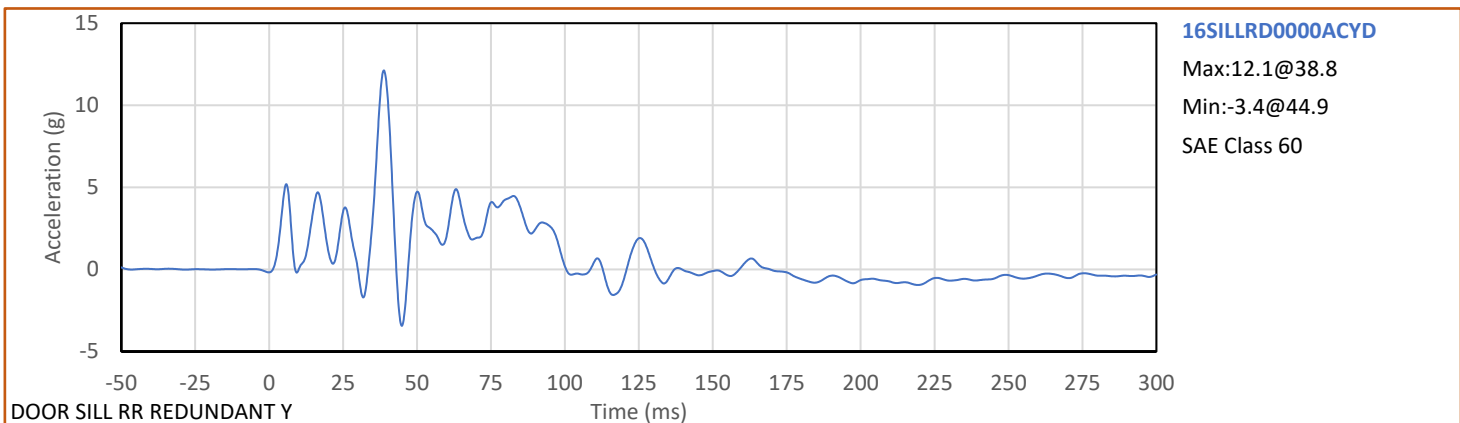
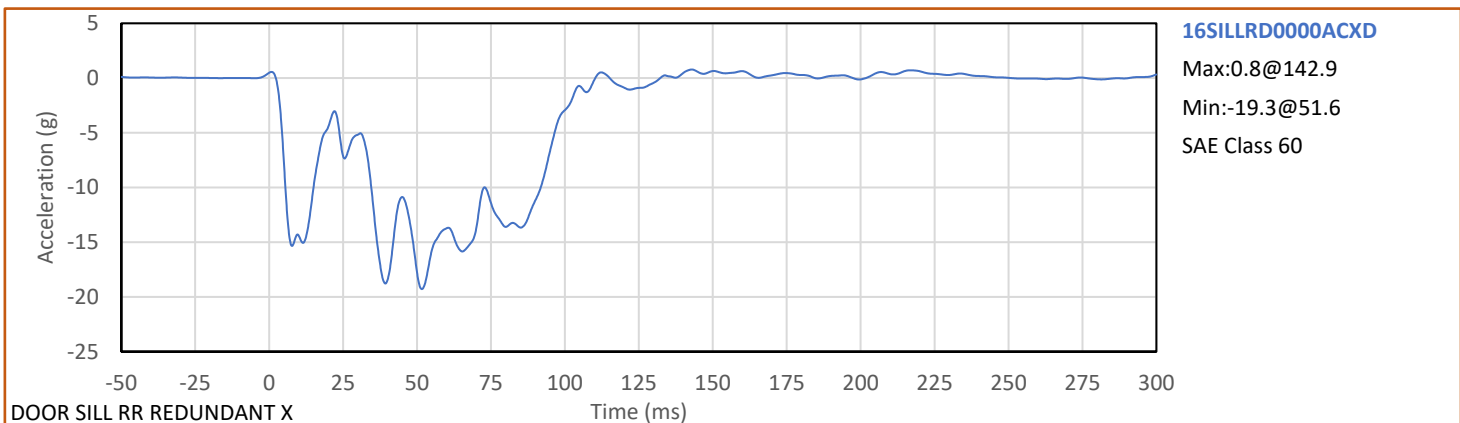
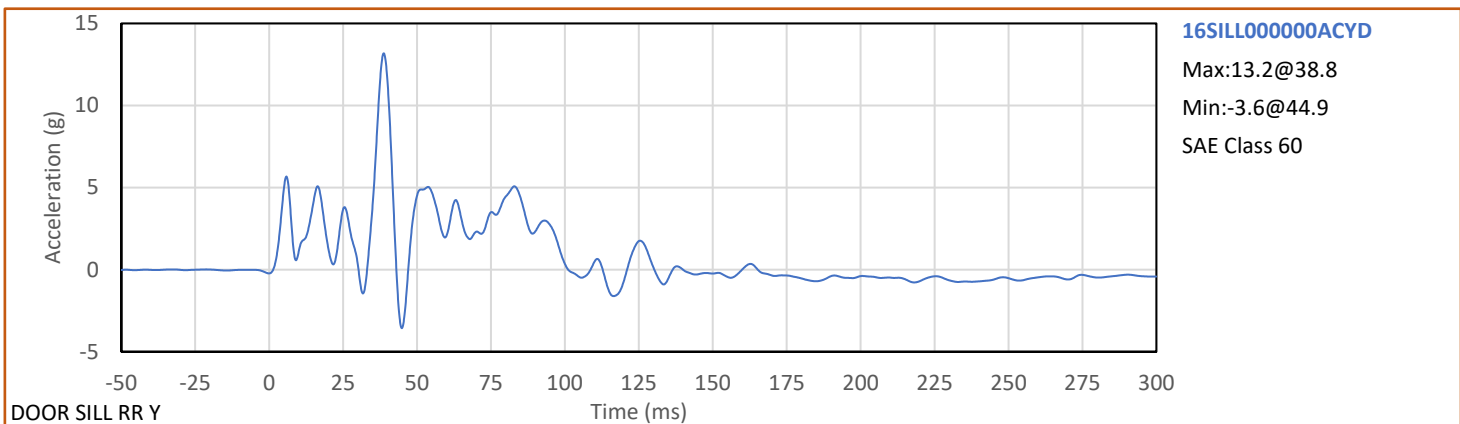
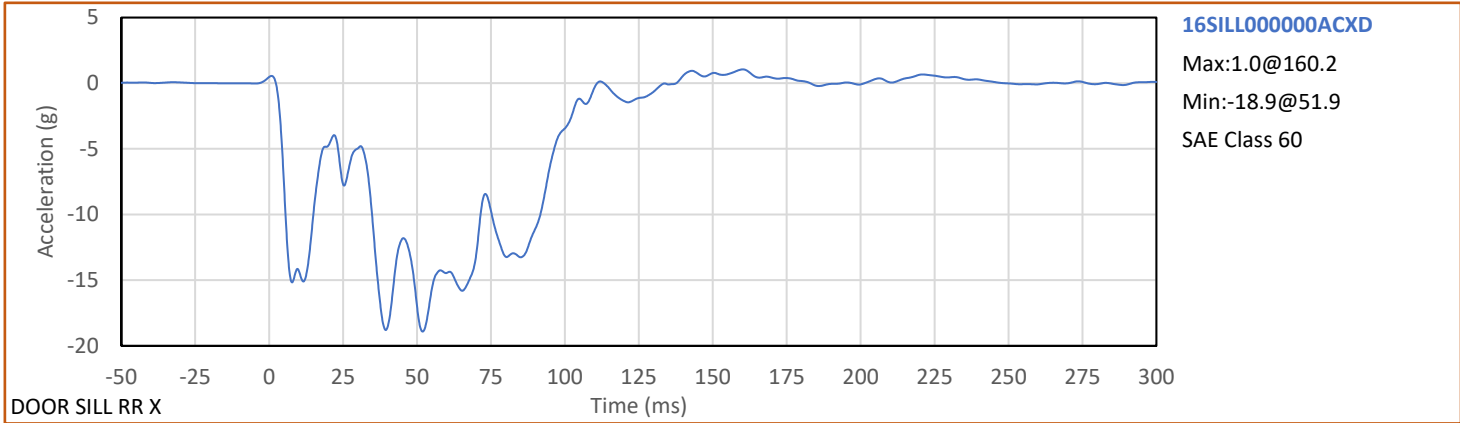


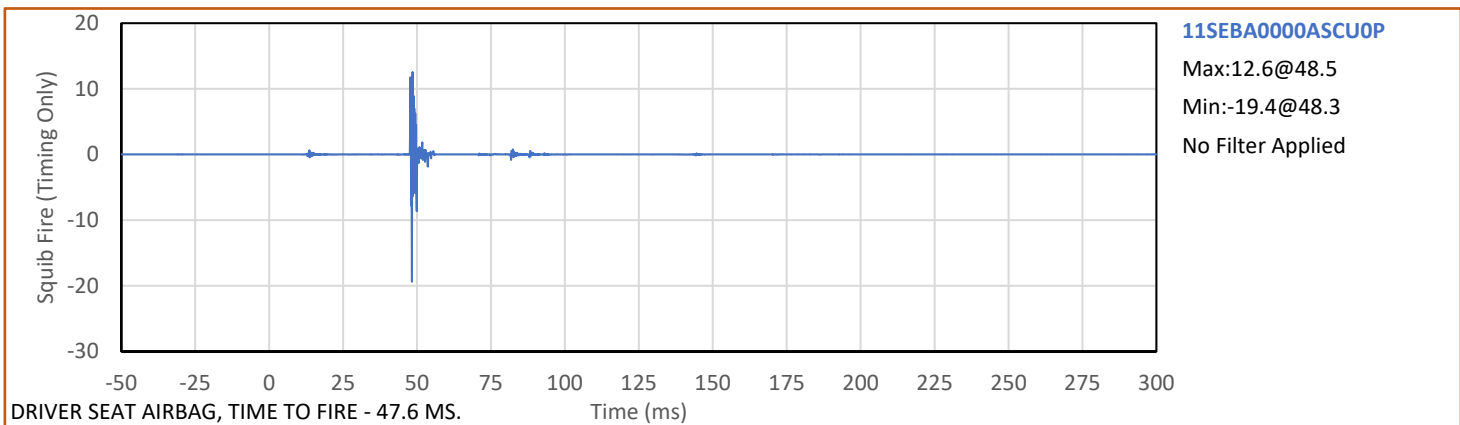
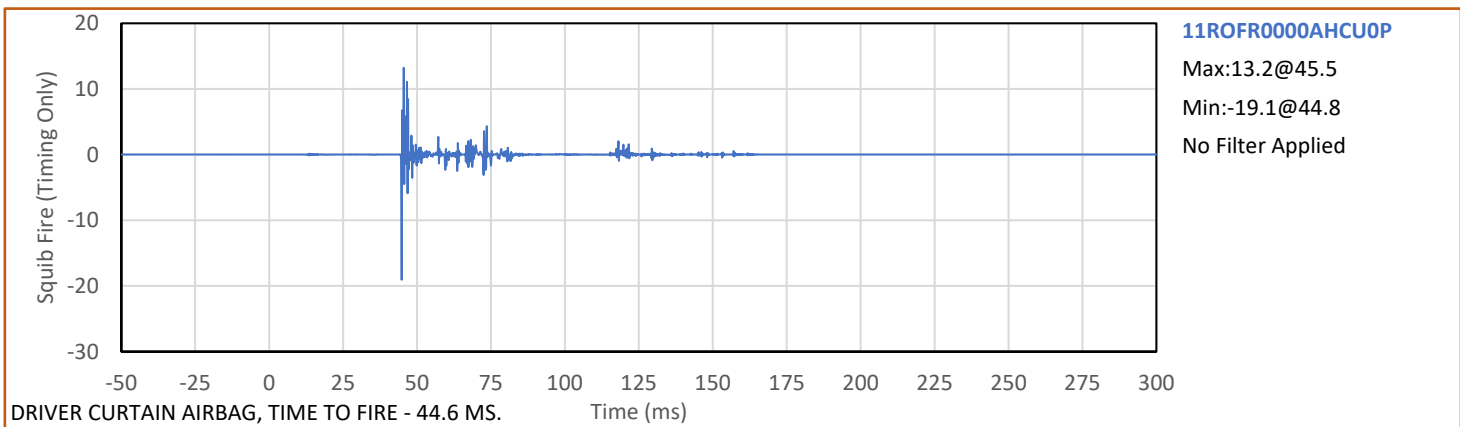
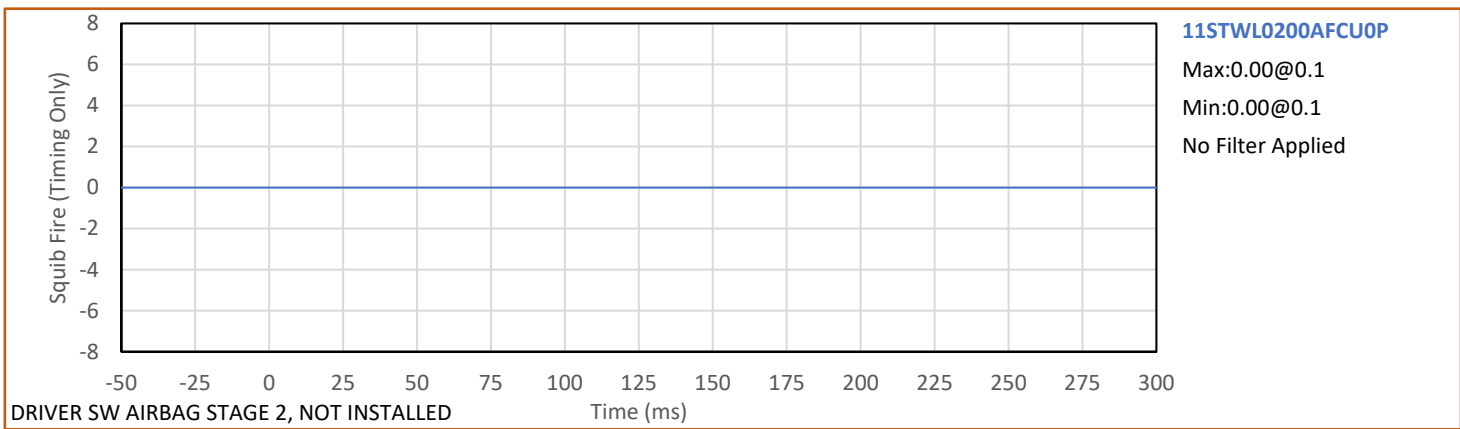
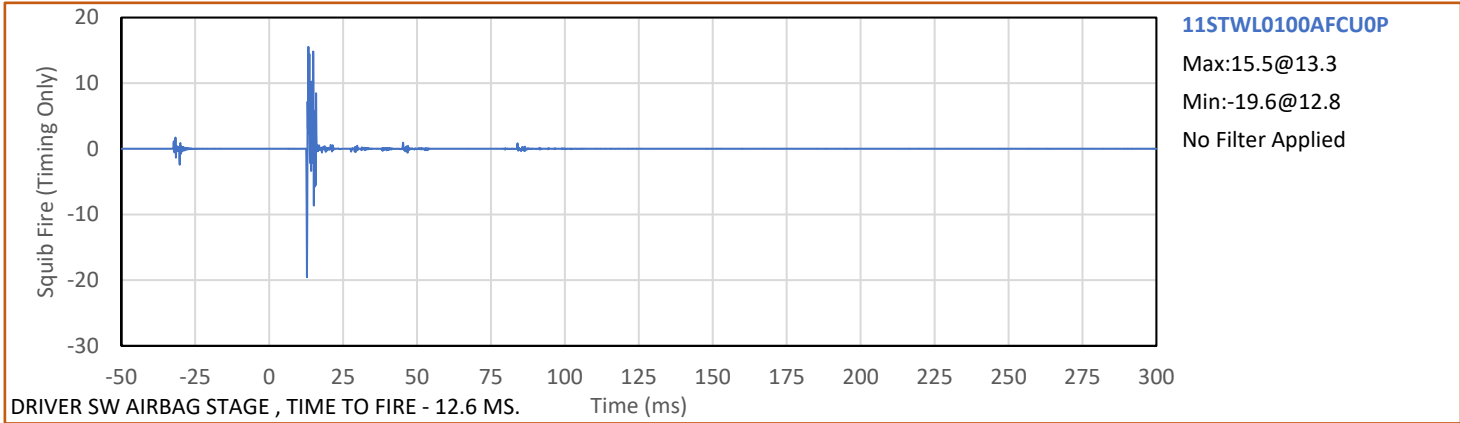


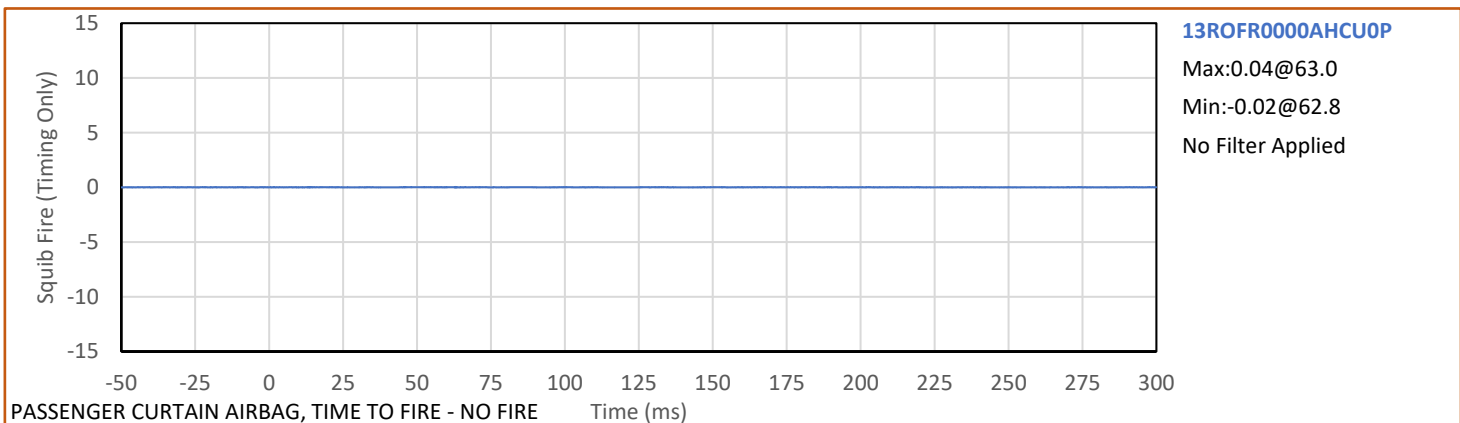
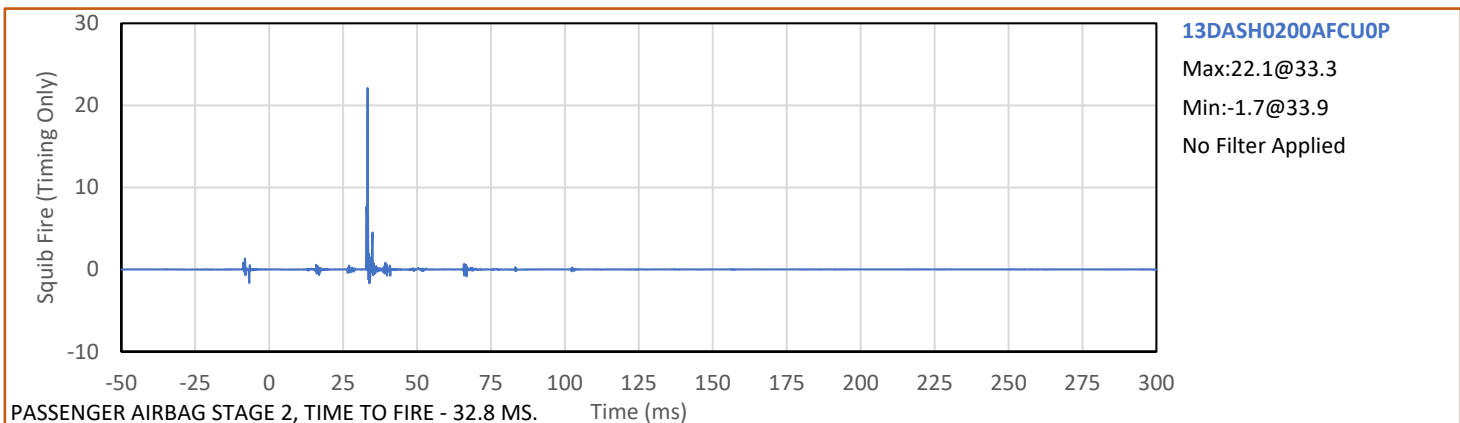
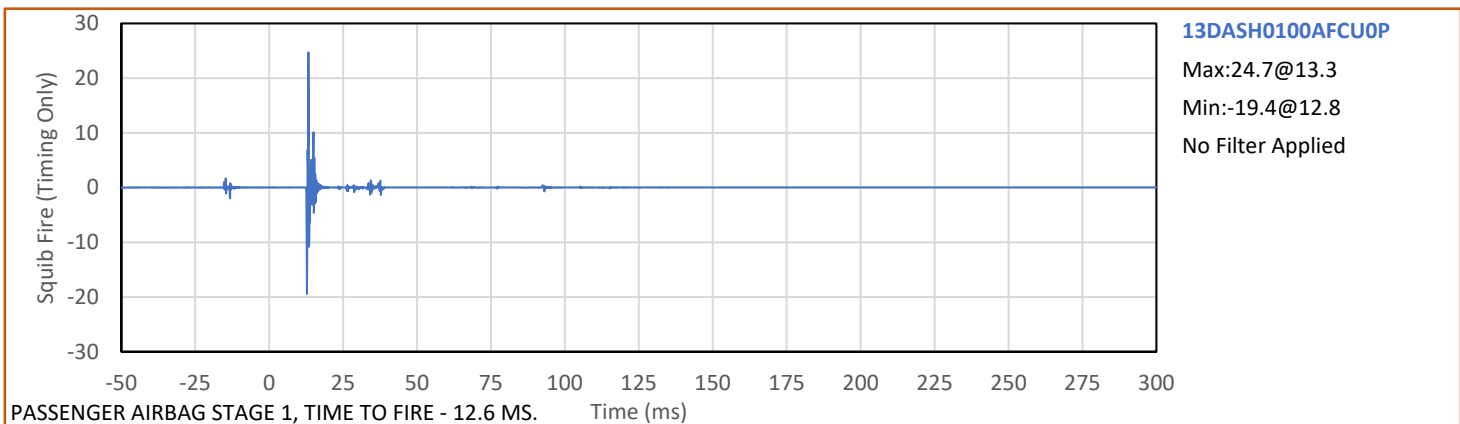
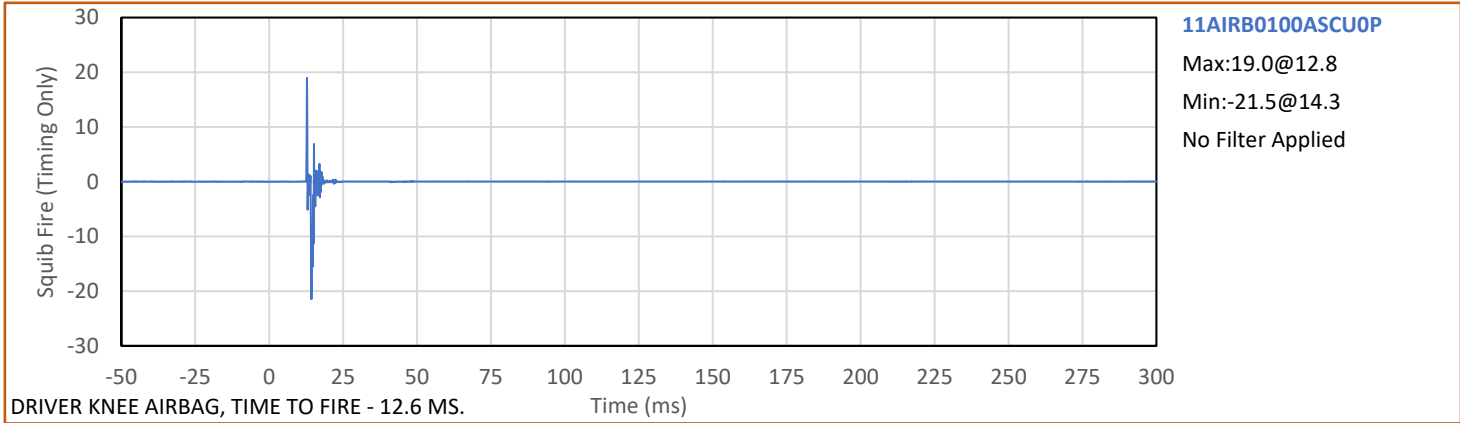






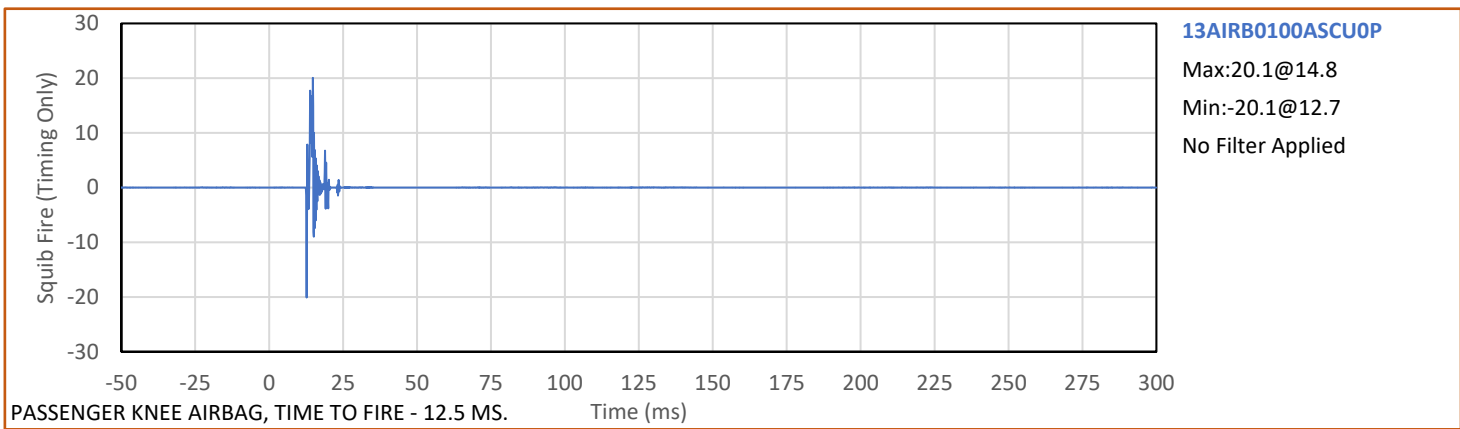
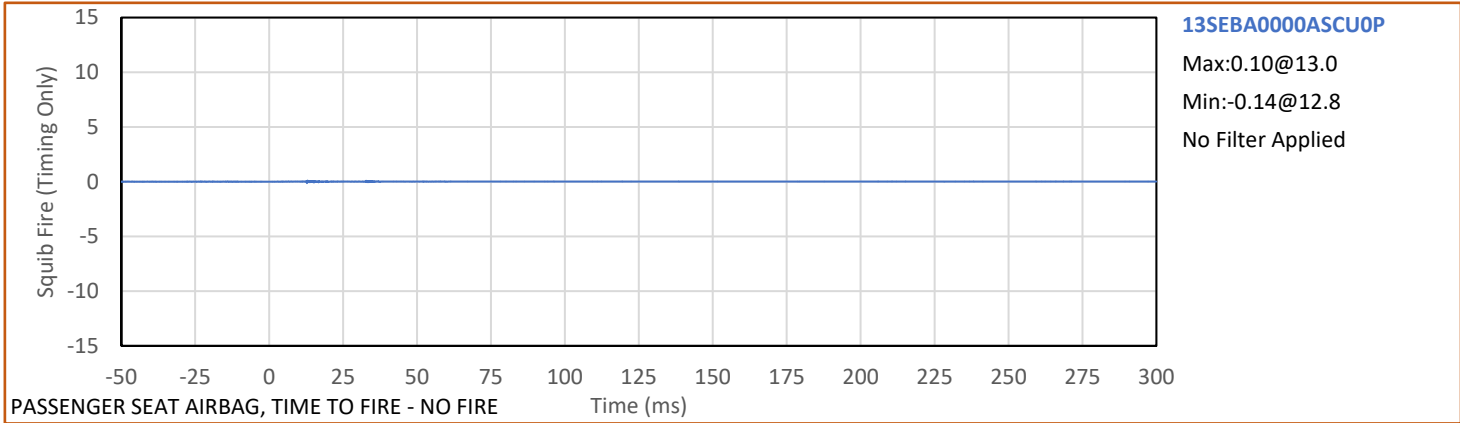


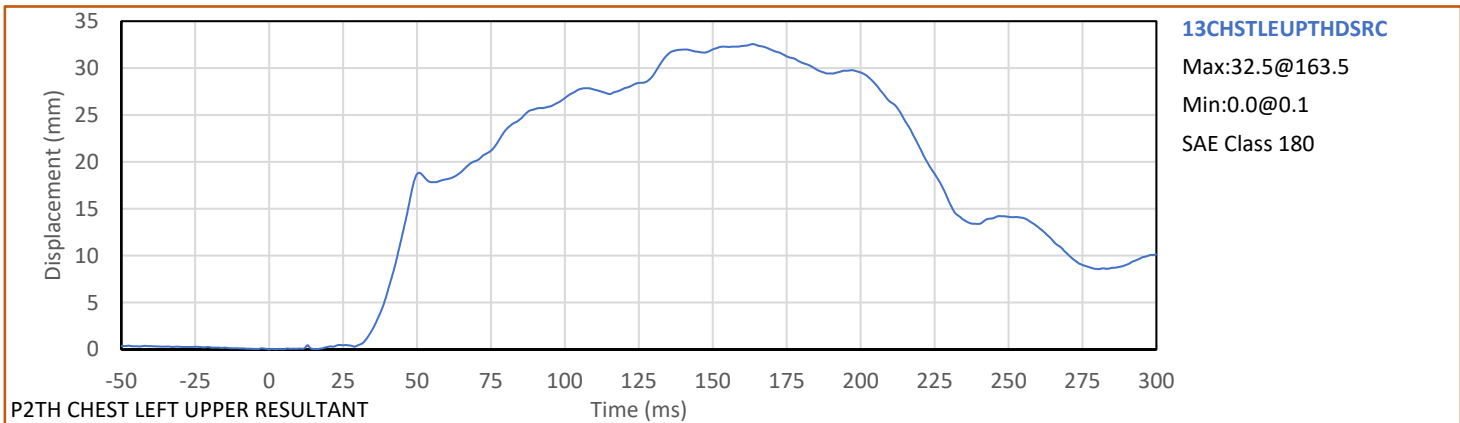
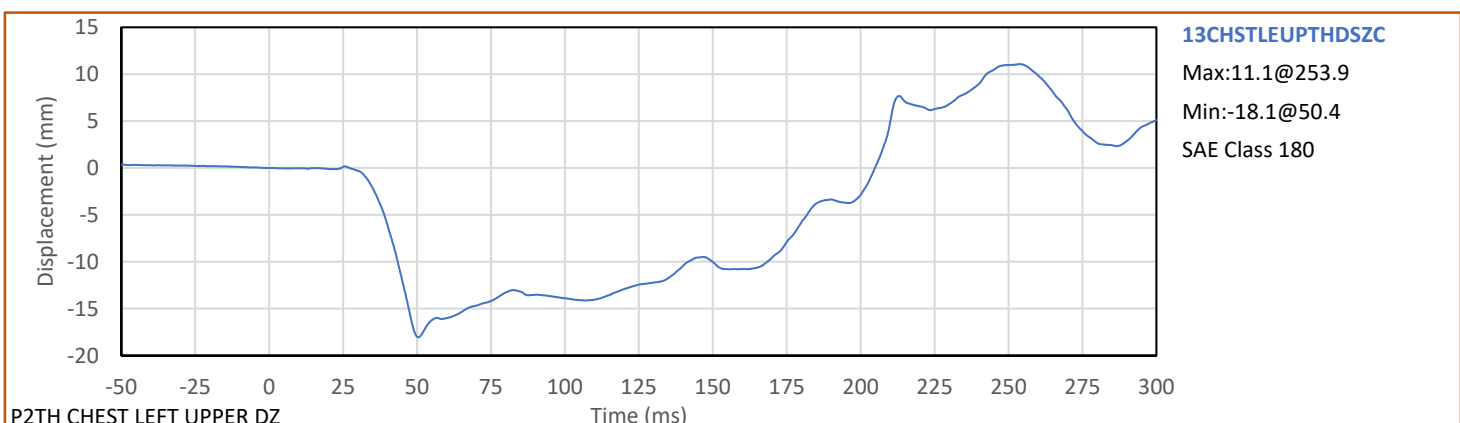
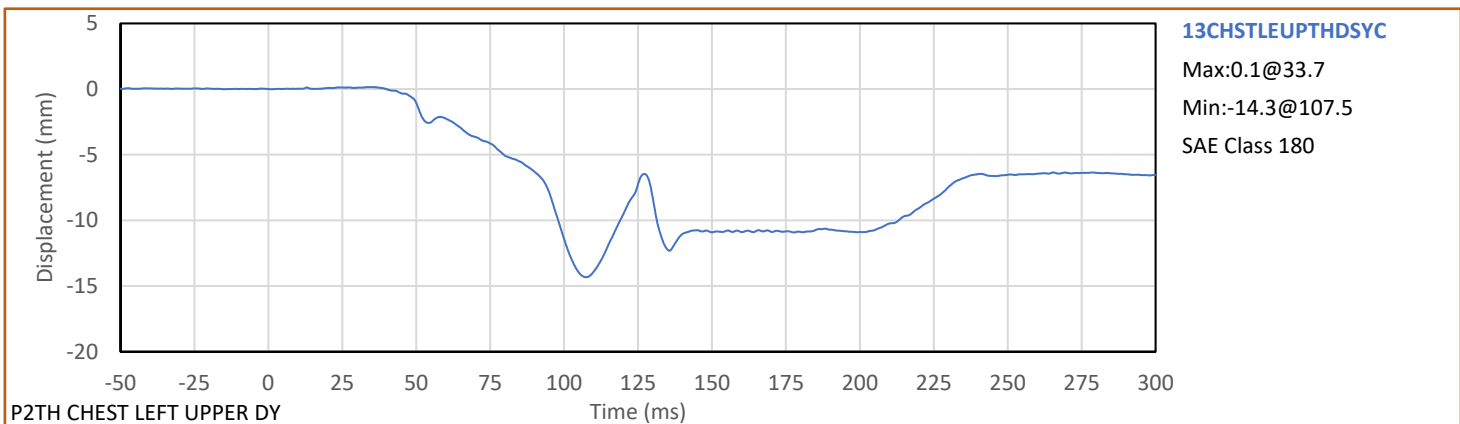
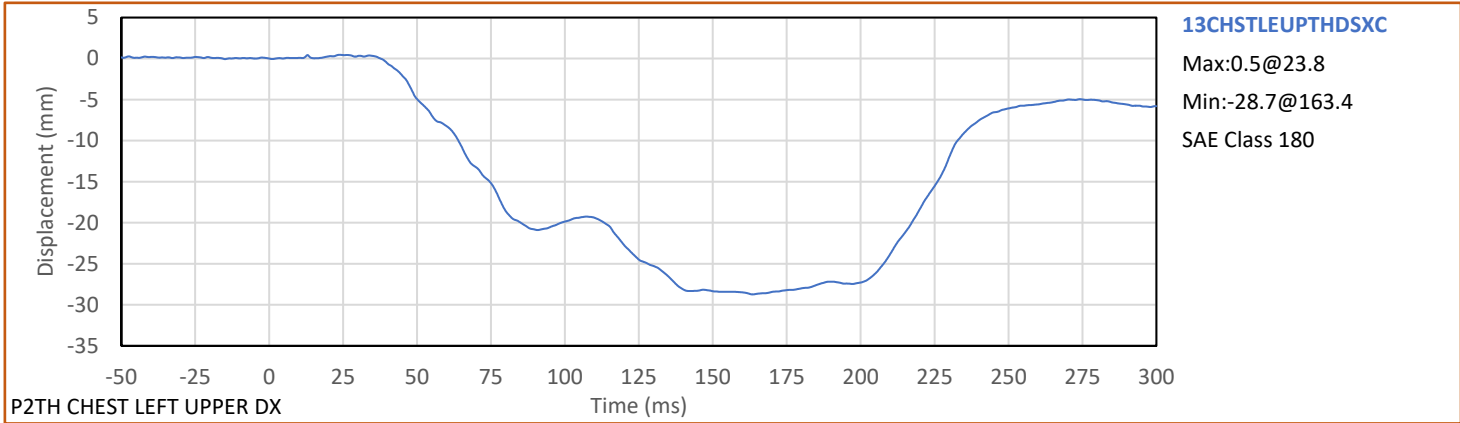


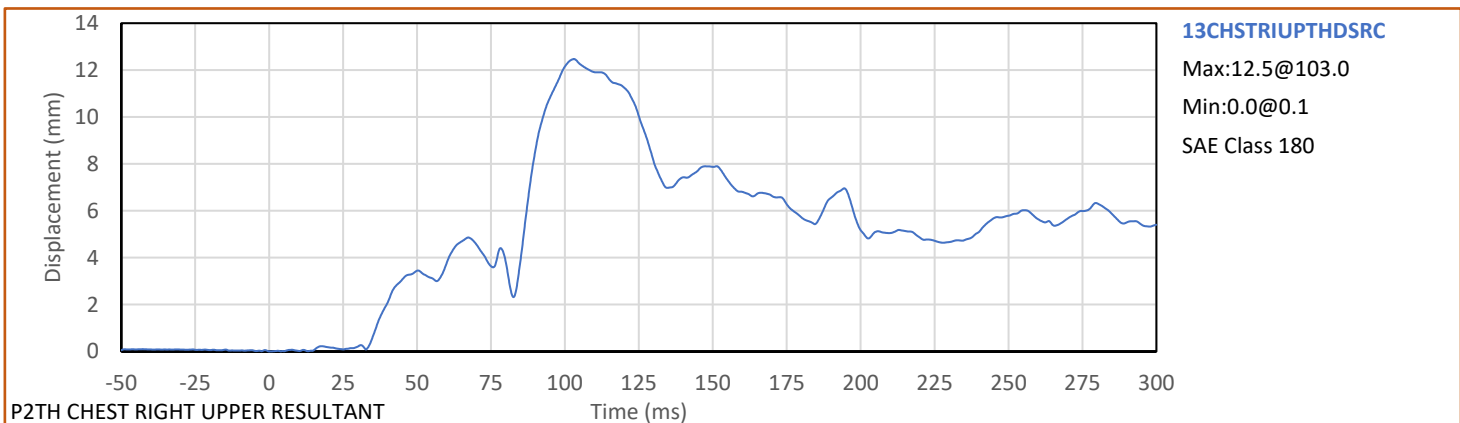
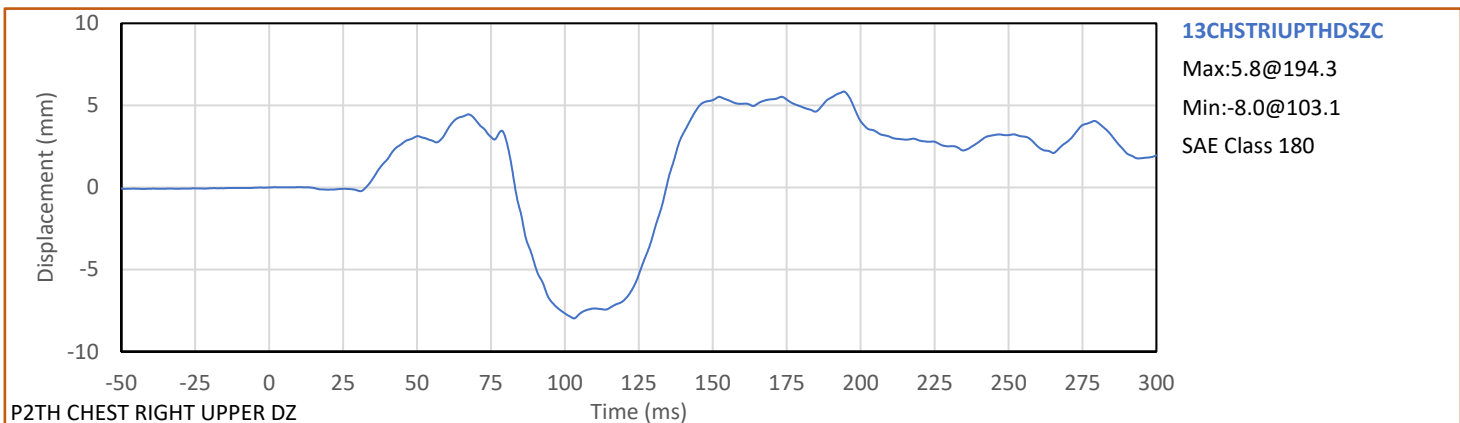
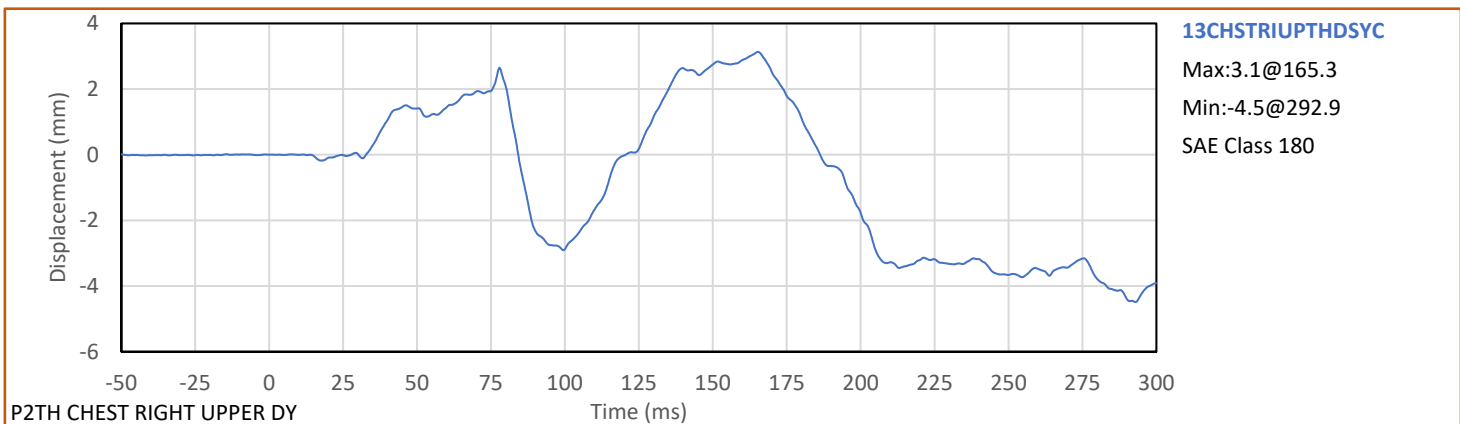
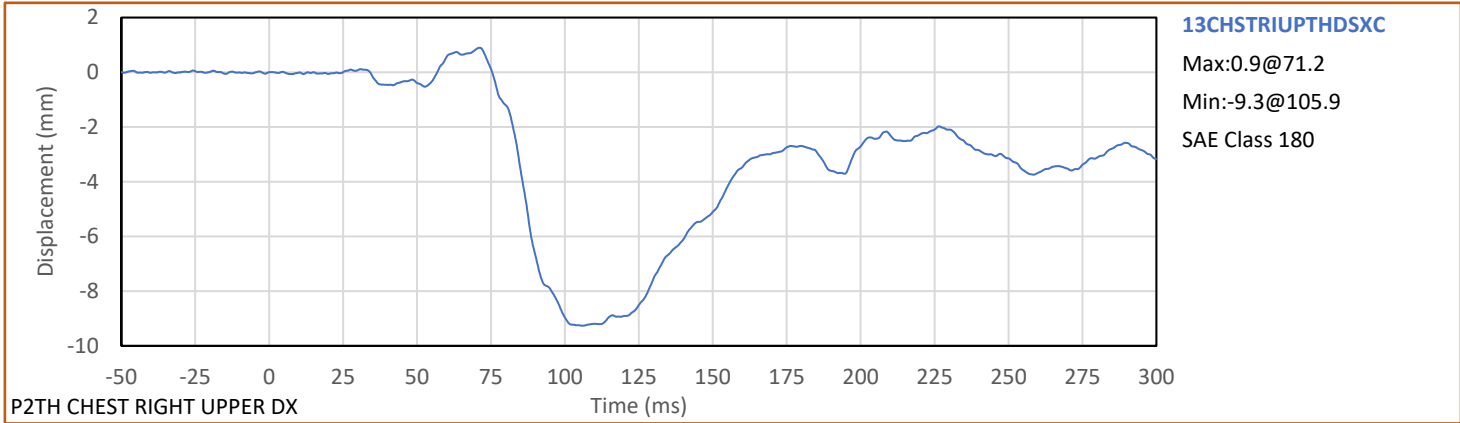


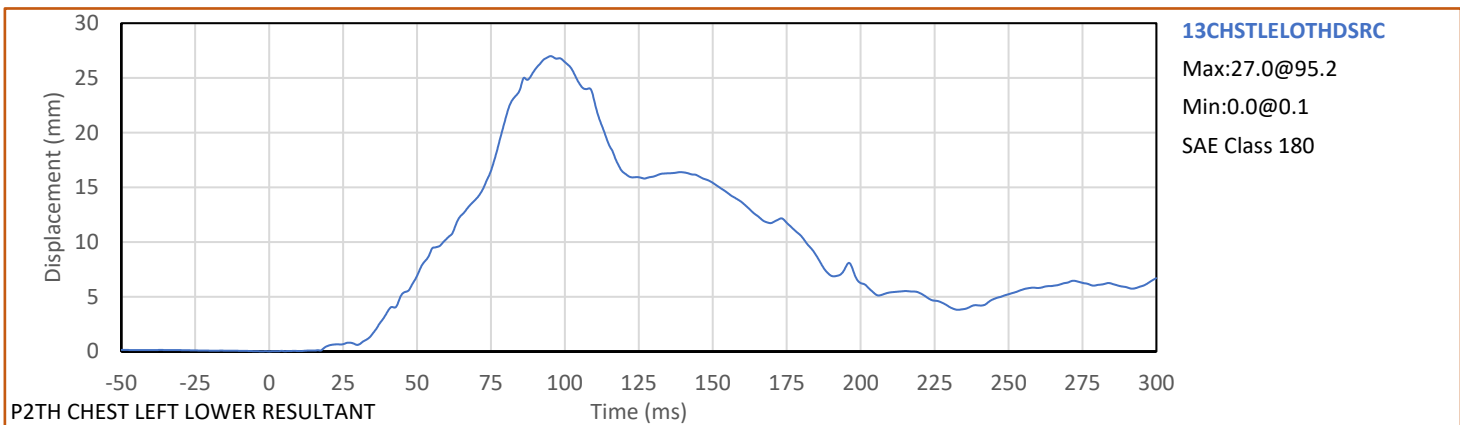
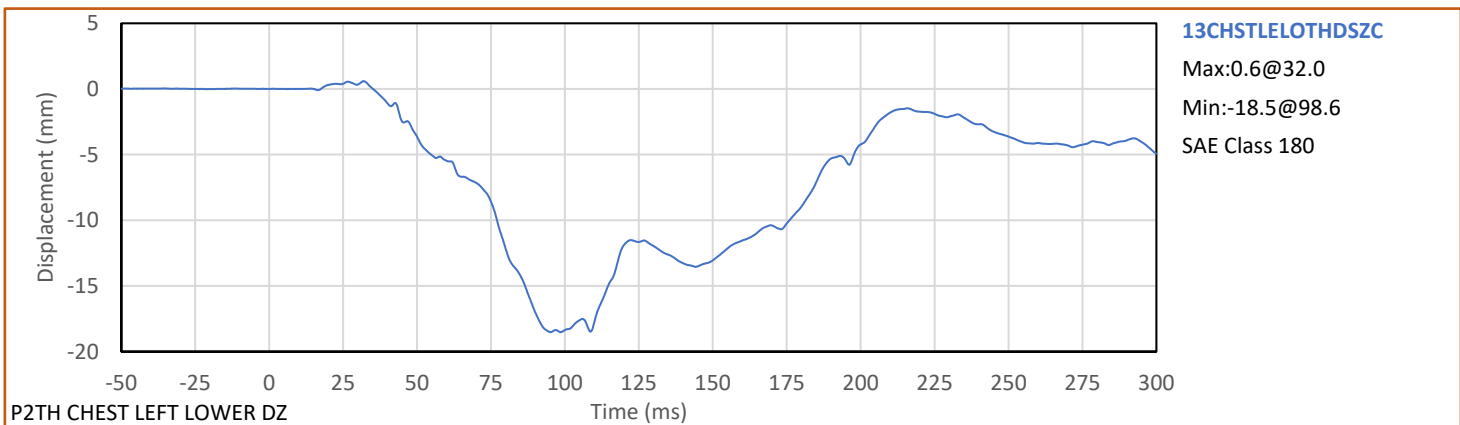
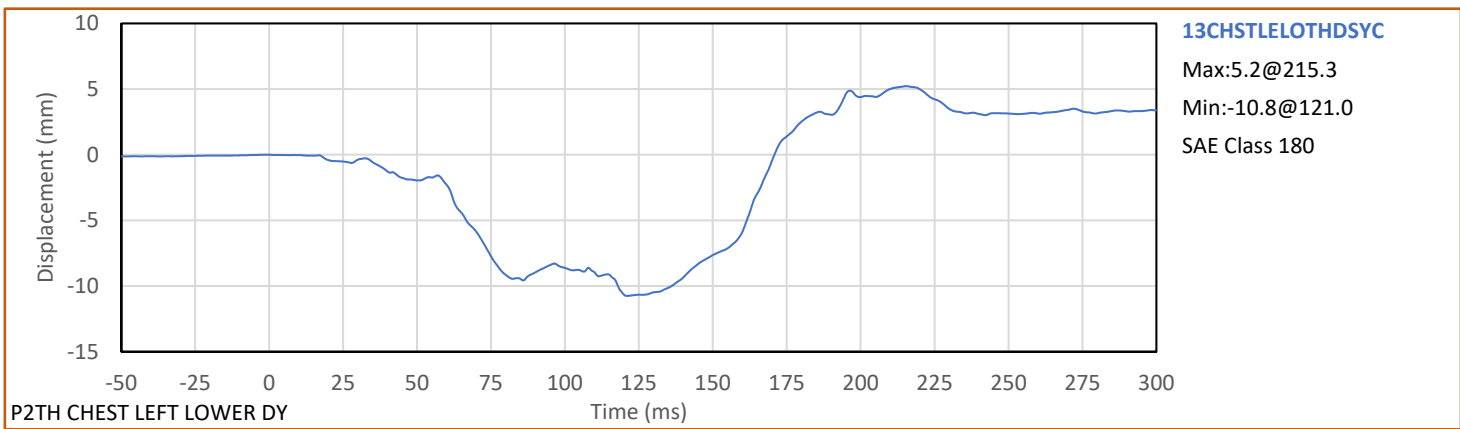
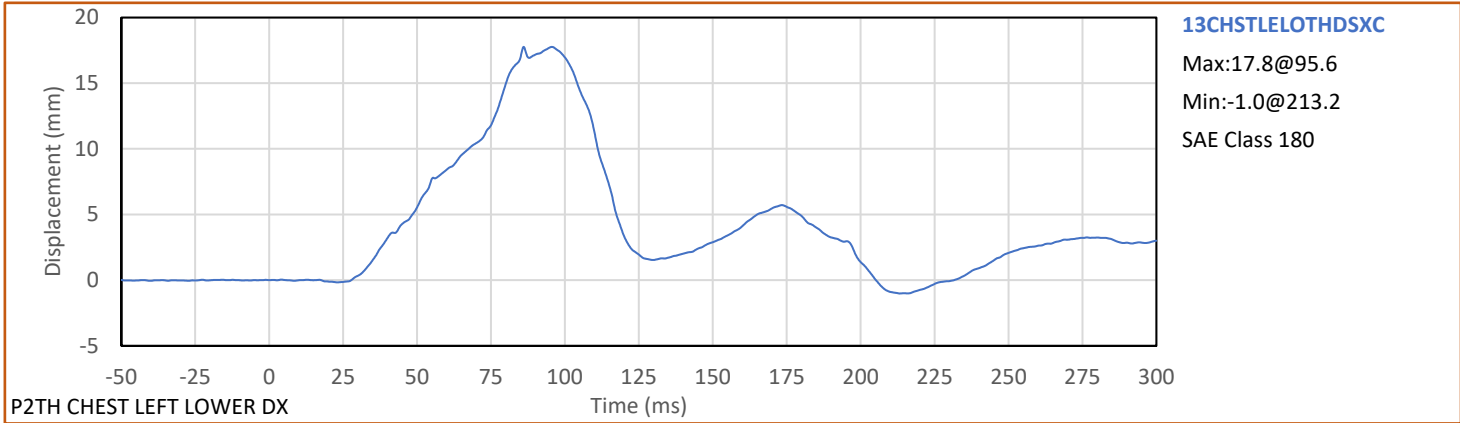
Test Vehicle: 2020 Honda Accord 4-Door Sedan  
Test Program: Left Side 30° Frontal Rigid Barrier Impact

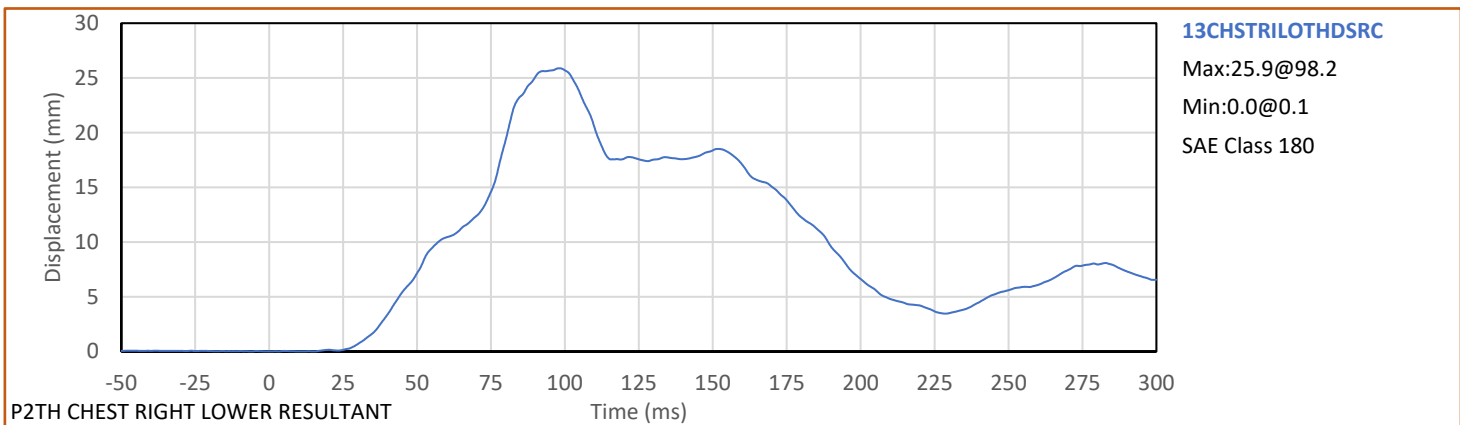
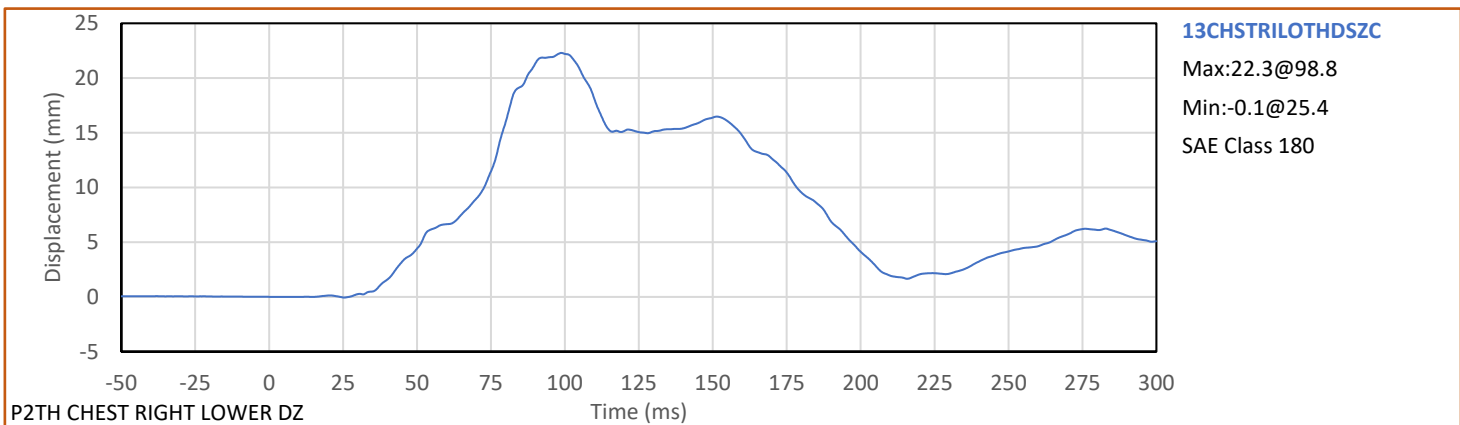
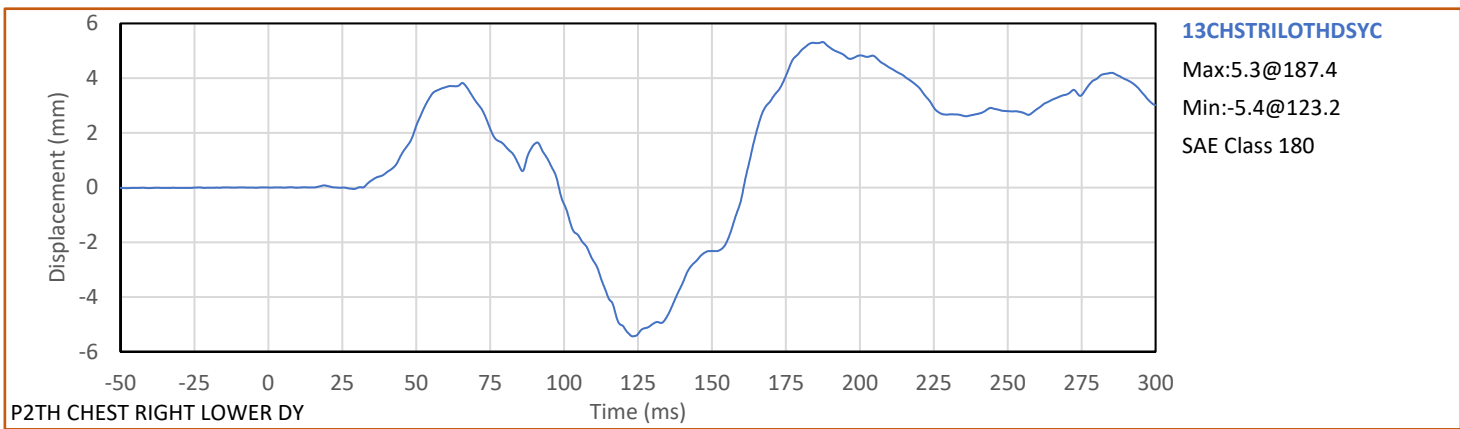
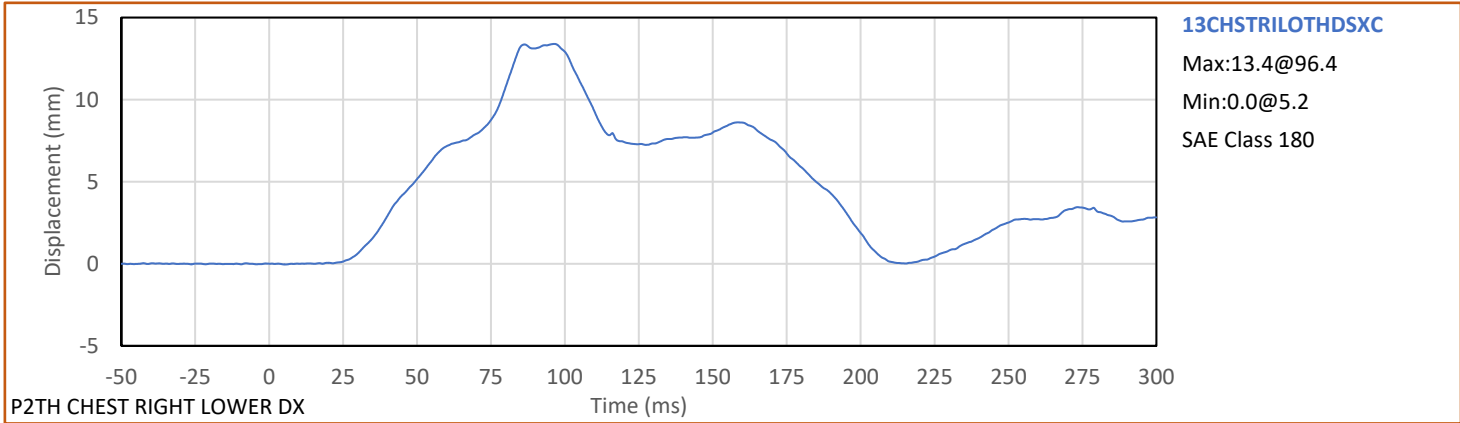
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Test Date: 7/30/2021

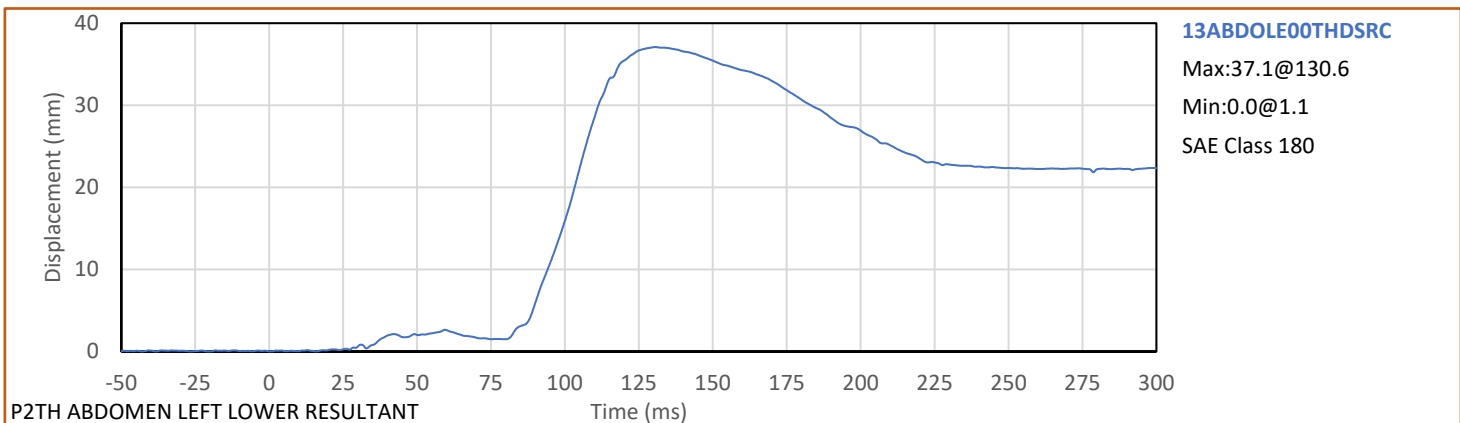
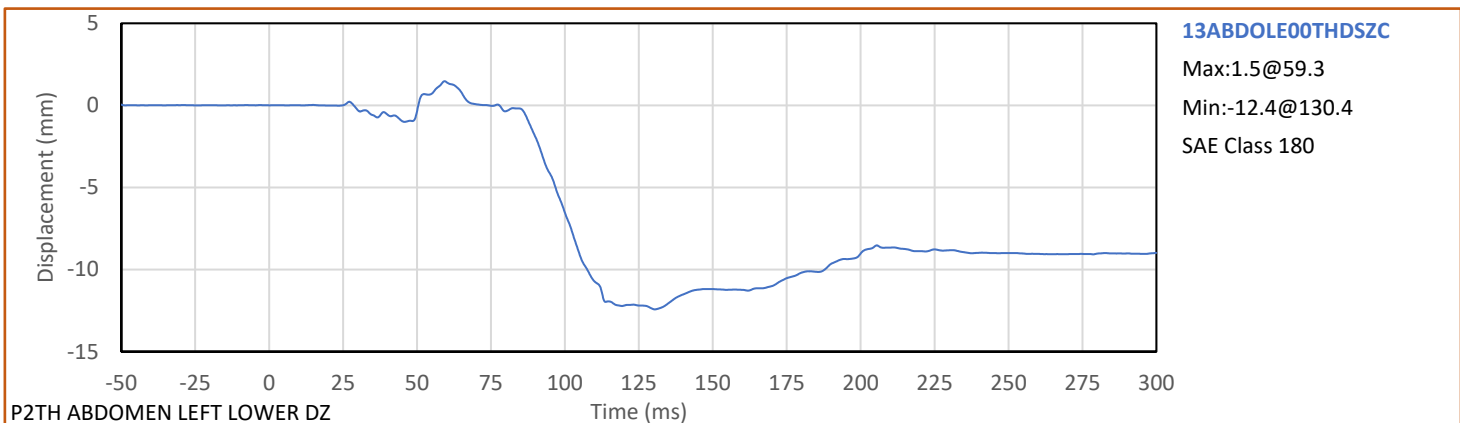
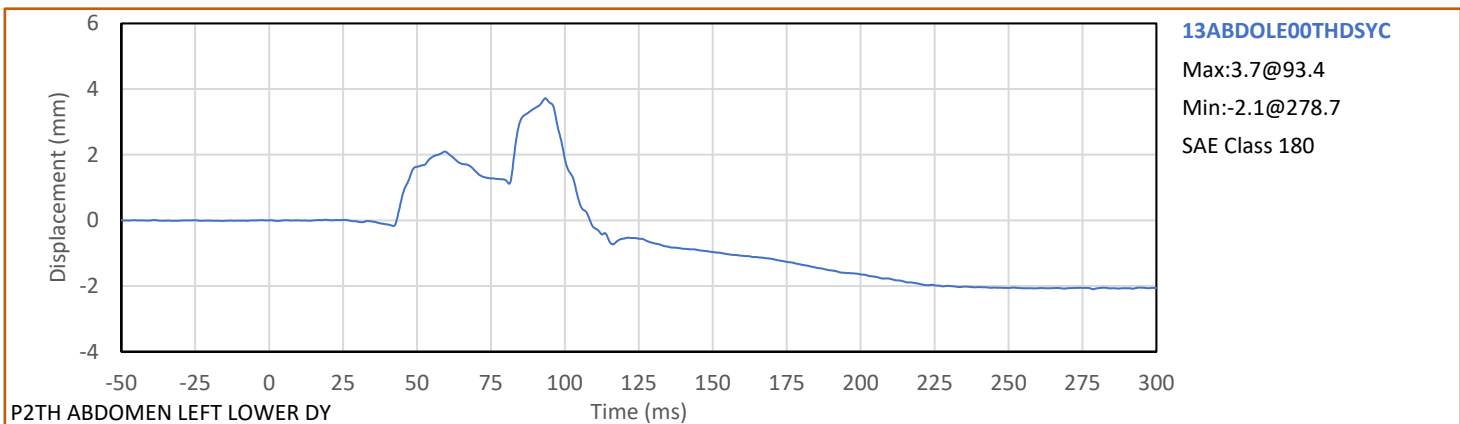
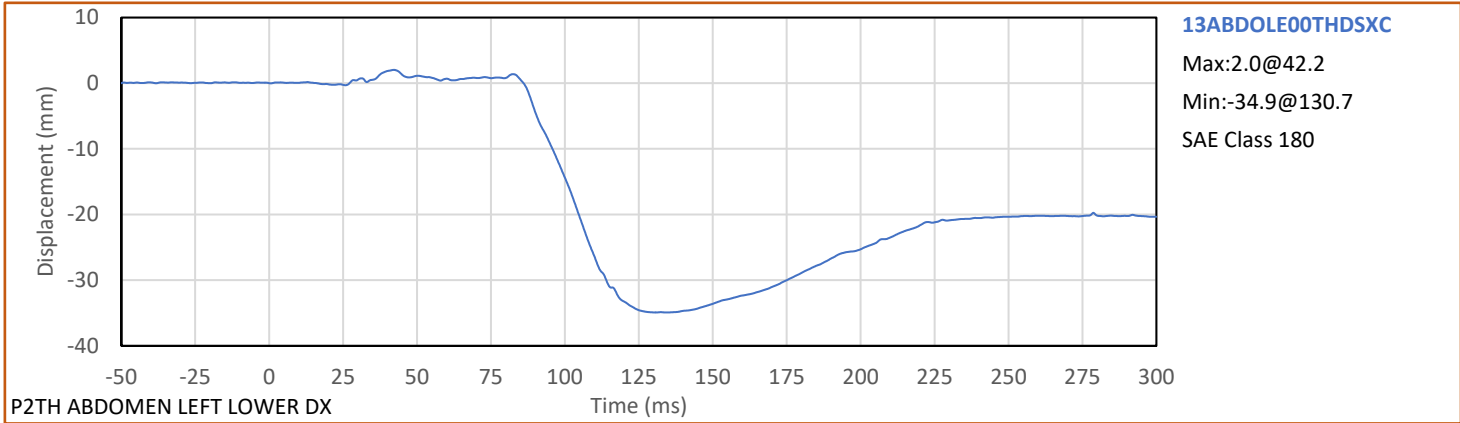


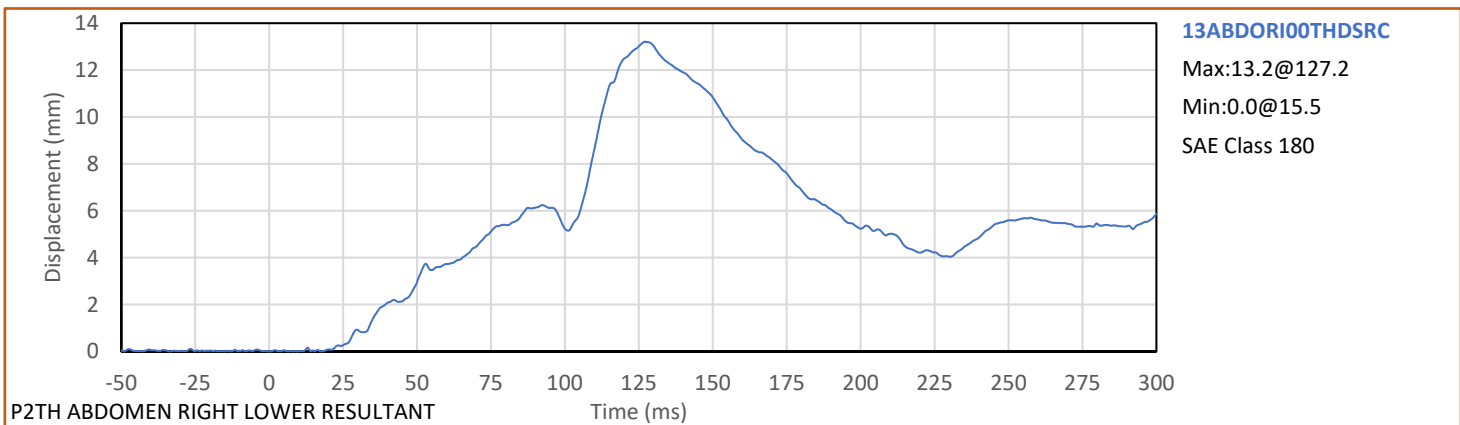
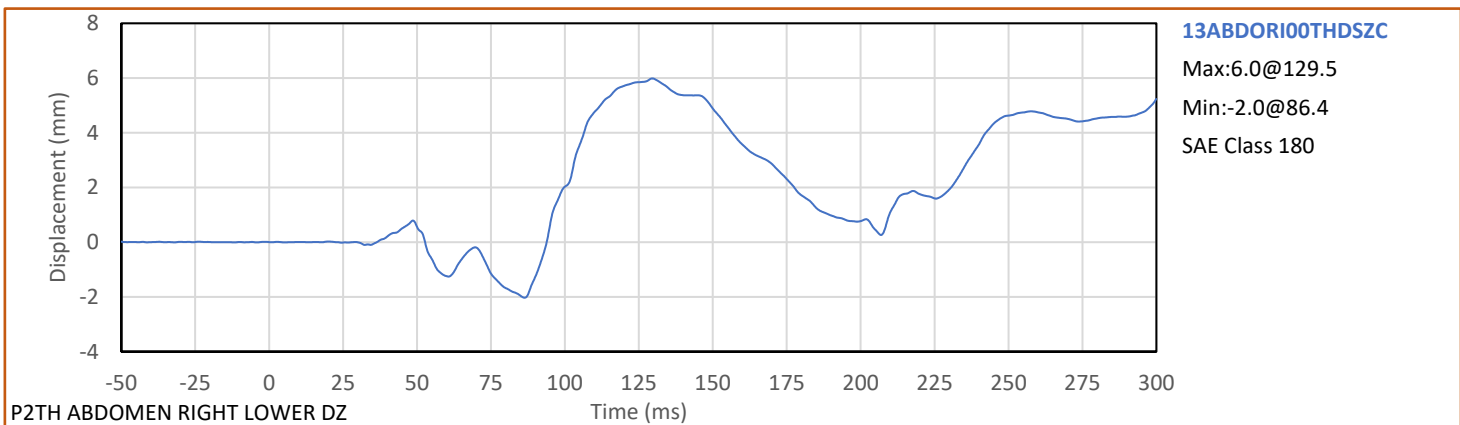
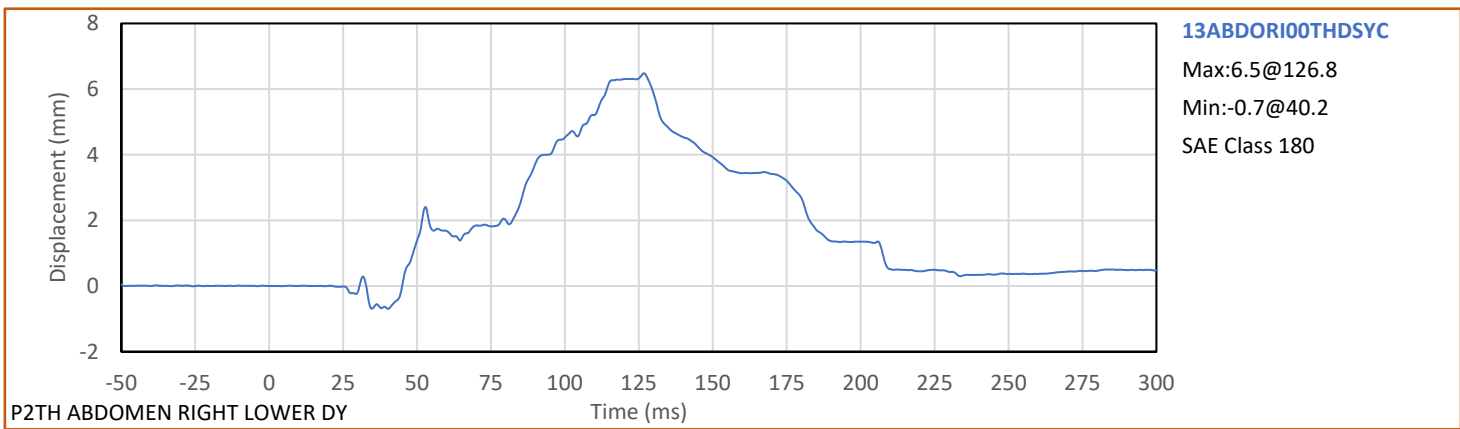
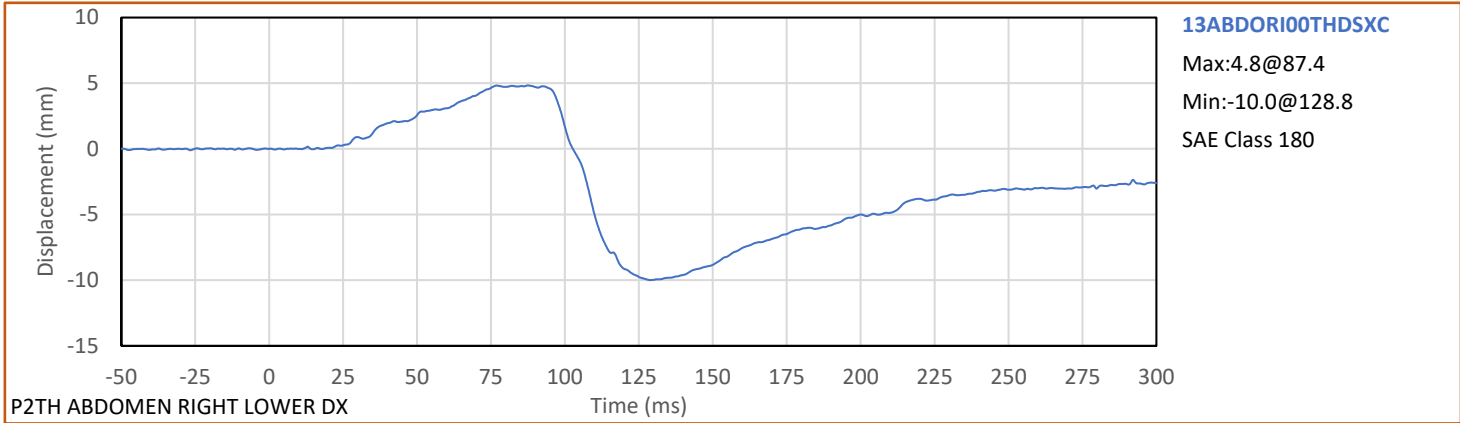








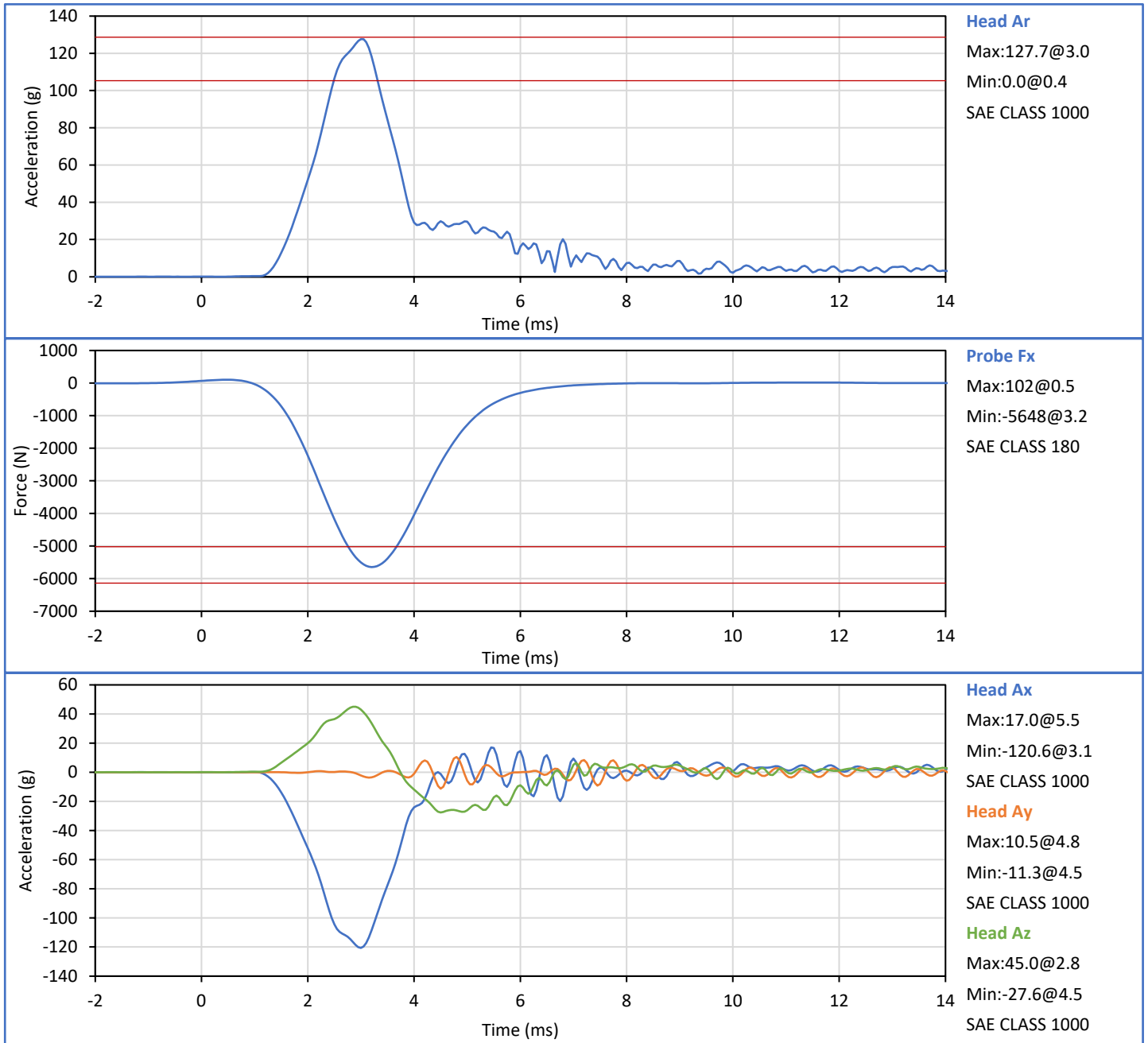




**APPENDIX C**  
**ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA**  
**THOR-50M 50TH PERCENTILE MALE ATD**  
**PRE-TEST QUALIFICATION (PARTIAL)**

**APPENDIX D**  
**ATD Configuration and Performance Verification Data**  
**THOR-50M 50th Percentile Male ATD**  
**Pre-Test Qualification (Full) S/N: EG2595**

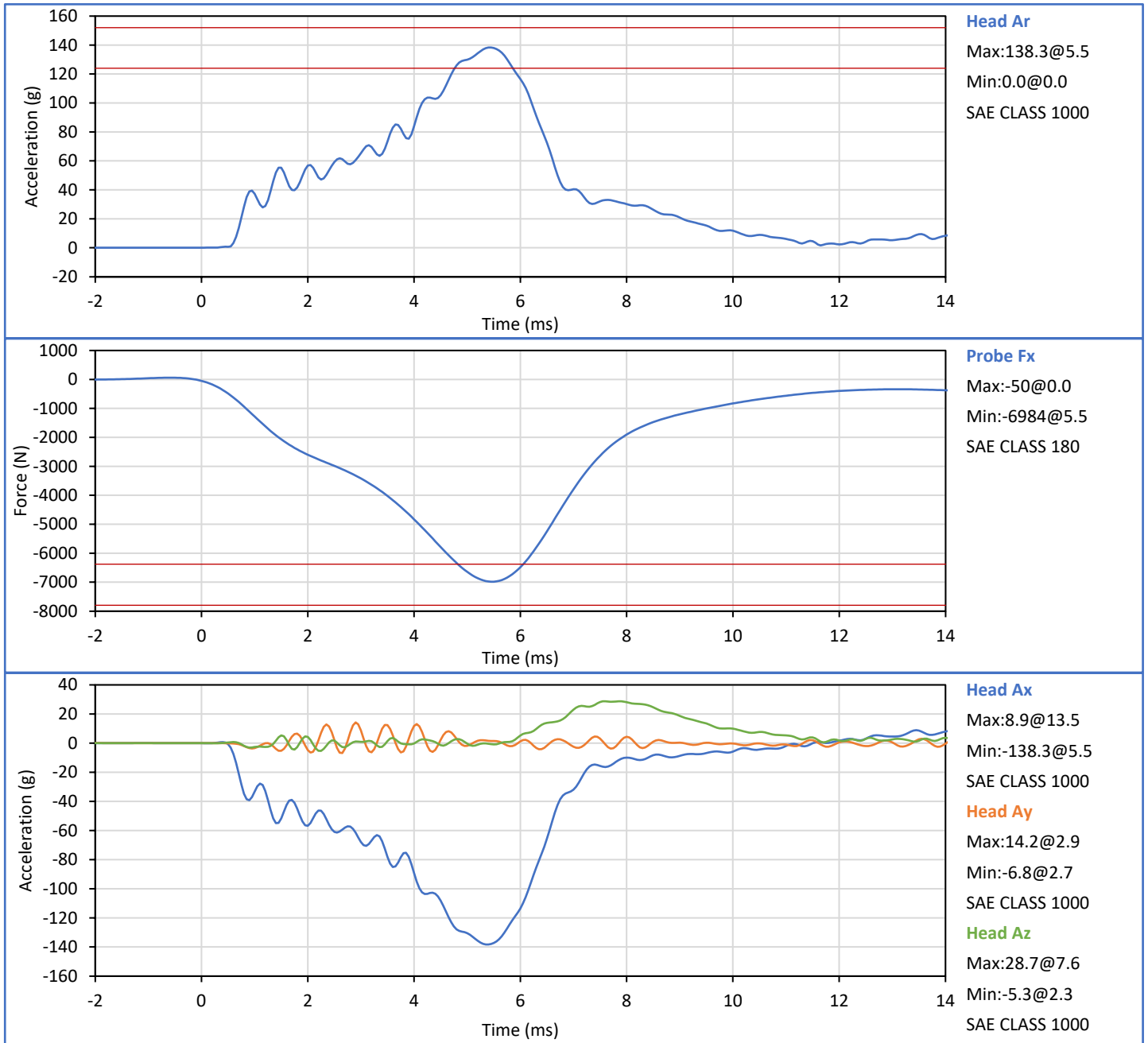
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	23	Pass
Velocity	m/s	1.95	2.05	2.02	Pass
Peak Probe Force	N	-6138	-5022	-5648	Pass
Peak Head Resultant Acceleration	g	105.3	128.7	127.7	Pass
<b>NHTSA Corridor 2019-05</b>				<b>Overall Test Results</b>	<b>Pass</b>



Technician: *J. Hernandez*  
J. Hernandez

Approved By: *P. Puzzuto*  
P. Puzzuto

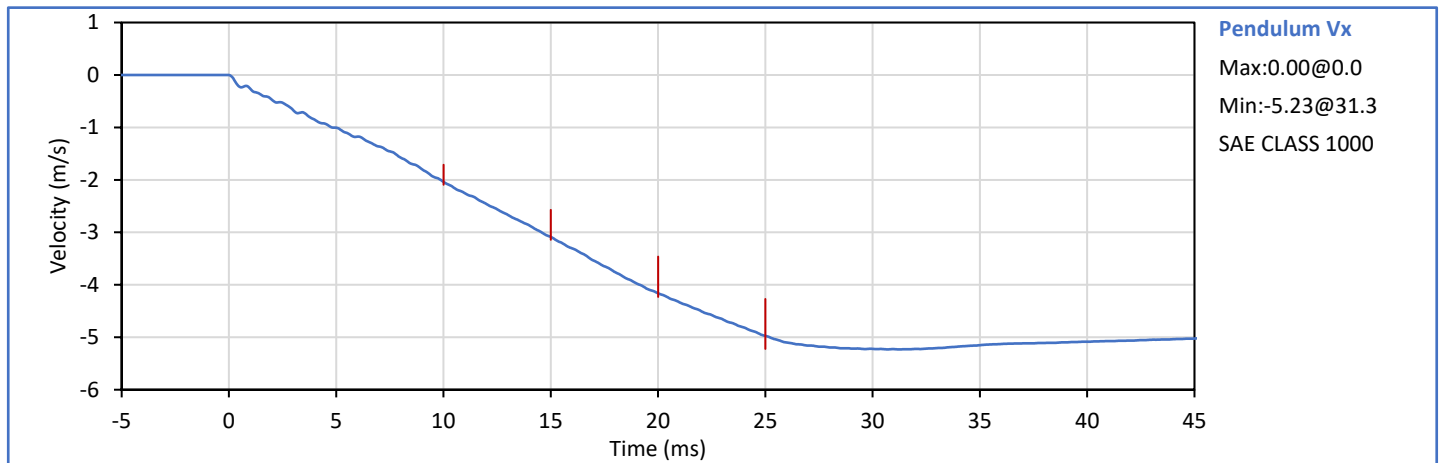
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	48	Pass
Velocity	m/s	6.68	6.78	6.71	Pass
Peak Probe Force	N	-7796	-6378	-6984	Pass
Peak Head Resultant Acceleration	g	124.0	152.0	138.3	Pass
<b>NHTSA Corridor 2019-05</b>				<b>Overall Test Results</b>	<b>Pass</b>

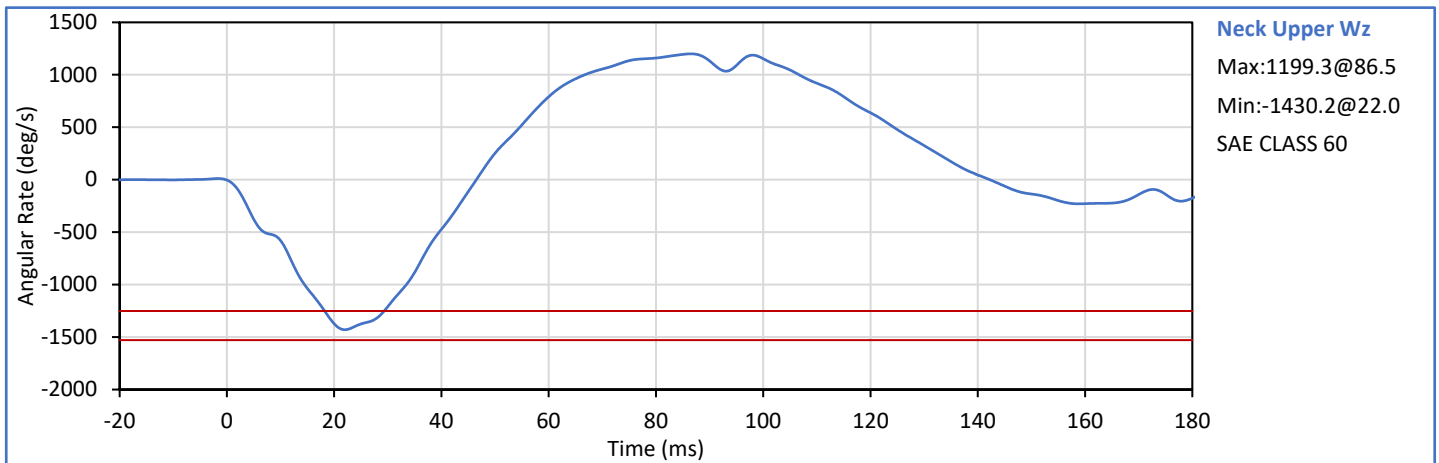
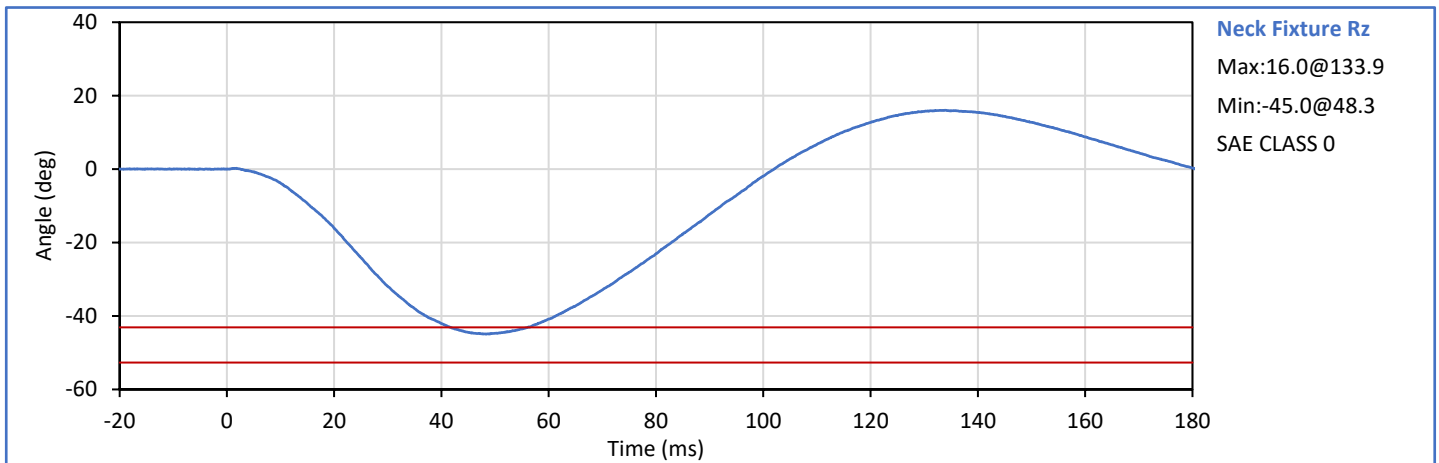
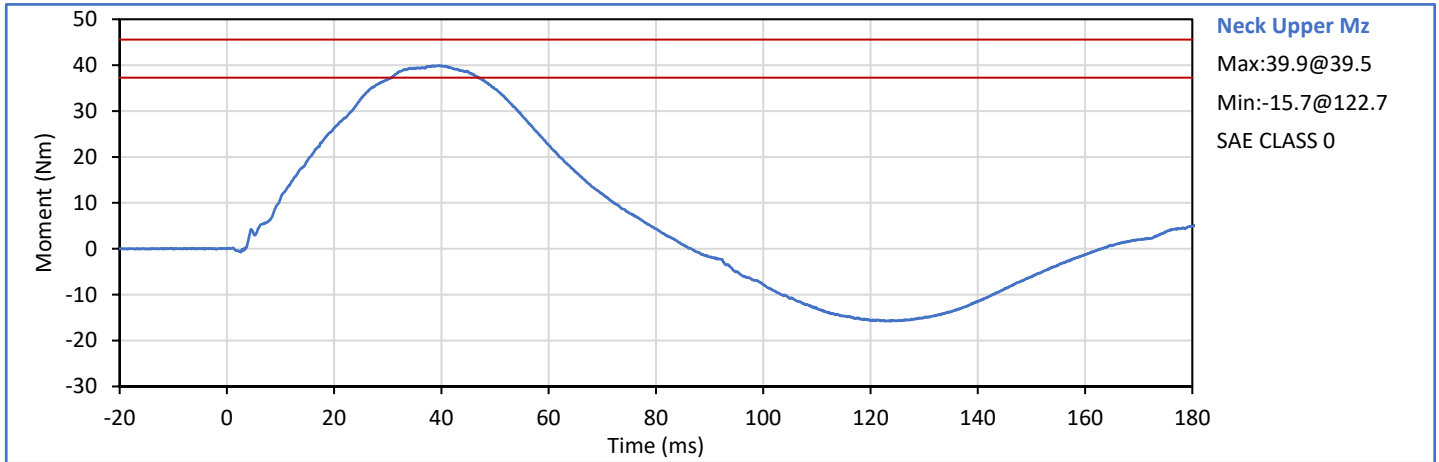


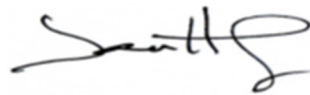
Technician: *J. Hernandez*  
J. Hernandez


Approved By: *P. Puzuto*  
P. Puzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	24	Pass
Pendulum Velocity	m/s	4.95	5.05	4.97	Pass
Pendulum Velocity at 10 ms	m/s	-2.09	-1.71	-2.04	Pass
Pendulum Velocity at 15 ms	m/s	-3.14	-2.57	-3.09	Pass
Pendulum Velocity at 20 ms	m/s	-4.23	-3.46	-4.16	Pass
Pendulum Velocity at 25 ms	m/s	-5.22	-4.27	-4.97	Pass
Peak Upper Neck Mz	Nm	37.3	45.6	39.9	Pass
Peak Head Wz	deg/s	-1529	-1251	-1430	Pass
Peak Neck Fixture Rotation	deg	-52.7	-43.1	-45.0	Pass
<b>NHTSA 2019-05 Corridor</b>				<b>Overall Test Results</b>	<b>Pass</b>

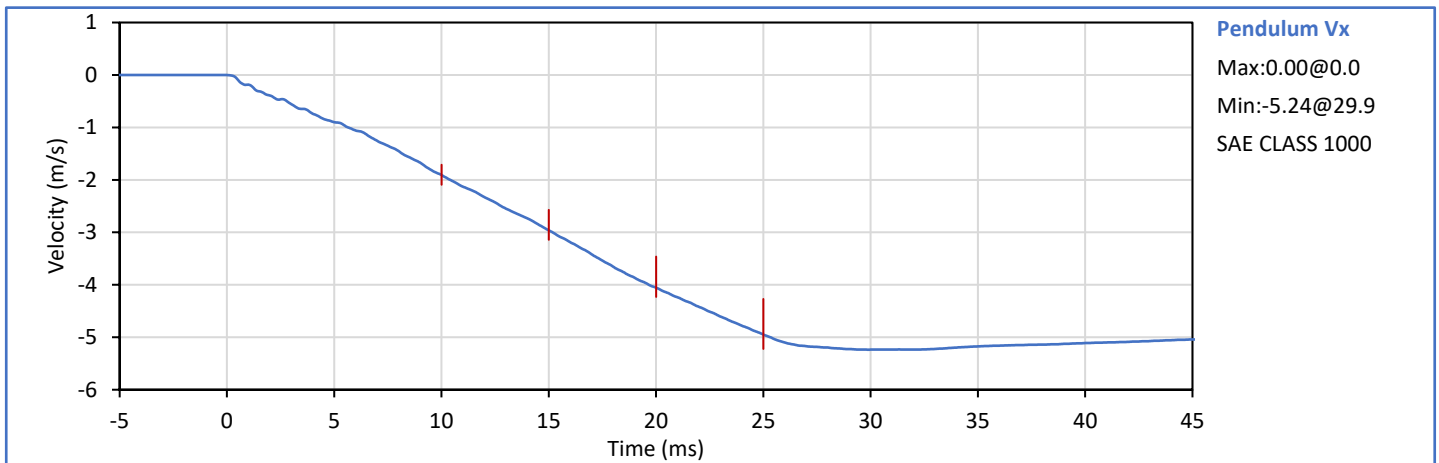


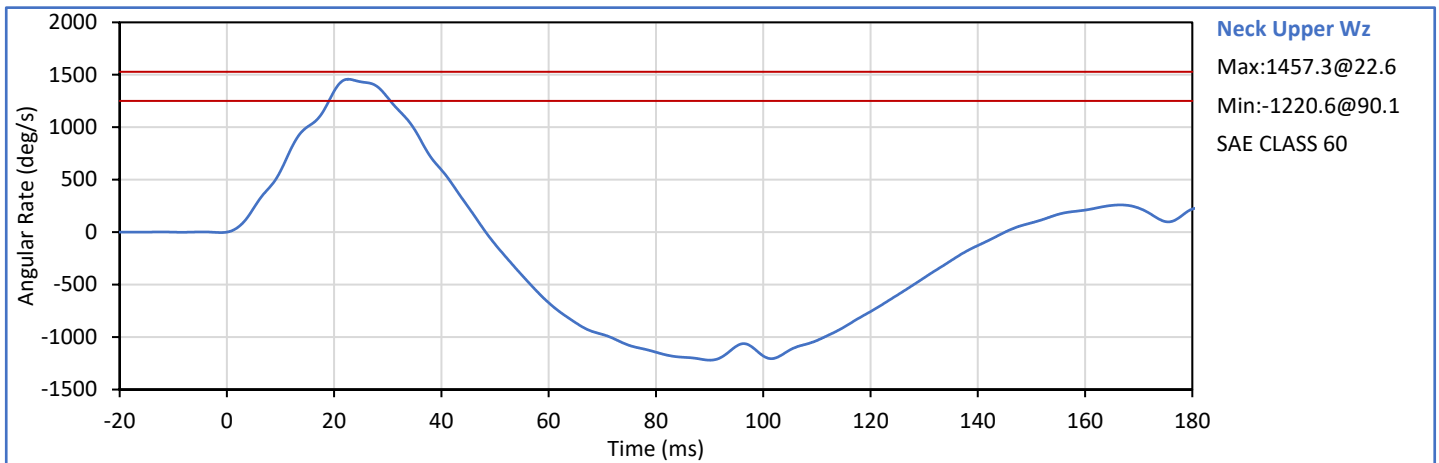
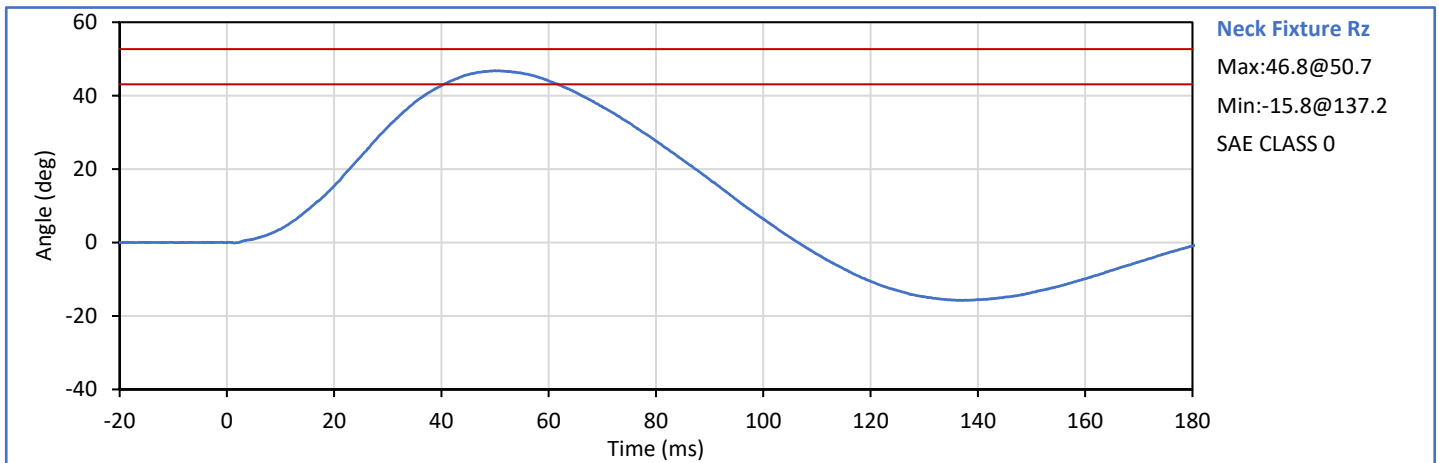
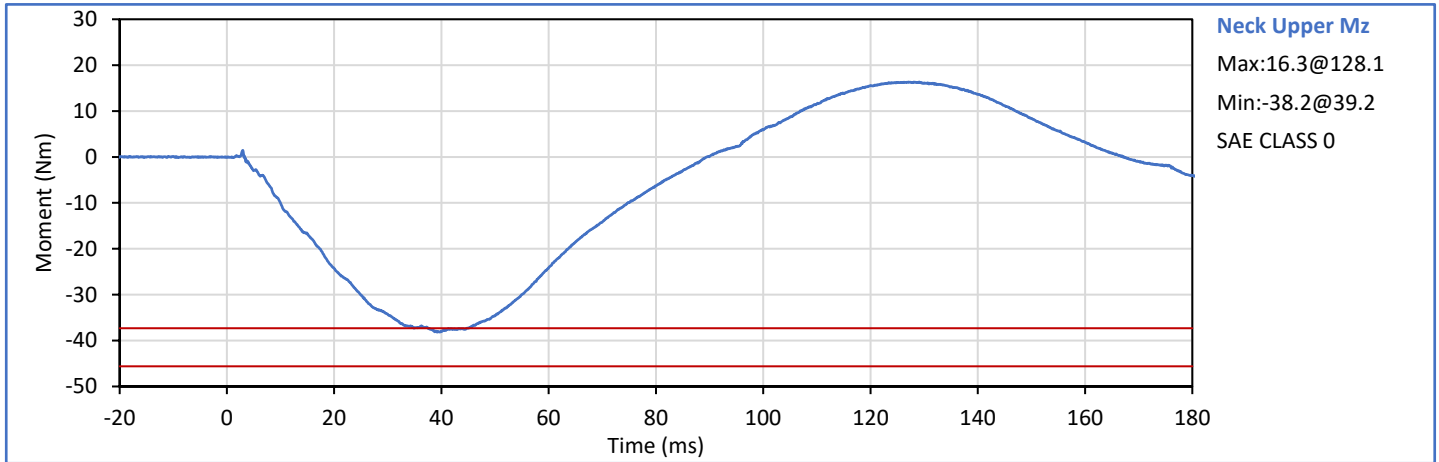



Technician:   
J. Hernandez


Approved By:   
P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	26	Pass
Pendulum Velocity	m/s	4.95	5.05	5.02	Pass
Pendulum Velocity at 10 ms	m/s	-2.09	-1.71	-1.91	Pass
Pendulum Velocity at 15 ms	m/s	-3.14	-2.57	-2.96	Pass
Pendulum Velocity at 20 ms	m/s	-4.23	-3.46	-4.05	Pass
Pendulum Velocity at 25 ms	m/s	-5.22	-4.27	-4.95	Pass
Peak Upper Neck Mz	Nm	-45.6	-37.3	-38.2	Pass
Peak Head Wz	deg/s	1251	1529	1457	Pass
Peak Neck Fixture Rotation	deg	43.1	52.7	46.8	Pass
<b>NHTSA 2019-05 Corridor</b>				<b>Overall Test Results</b>	<b>Pass</b>

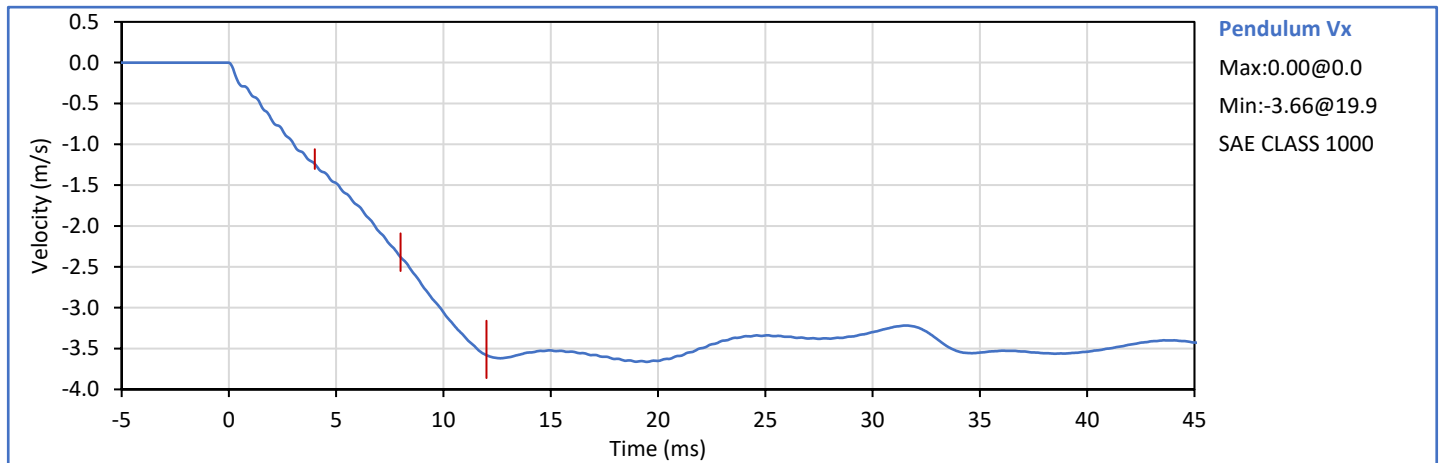


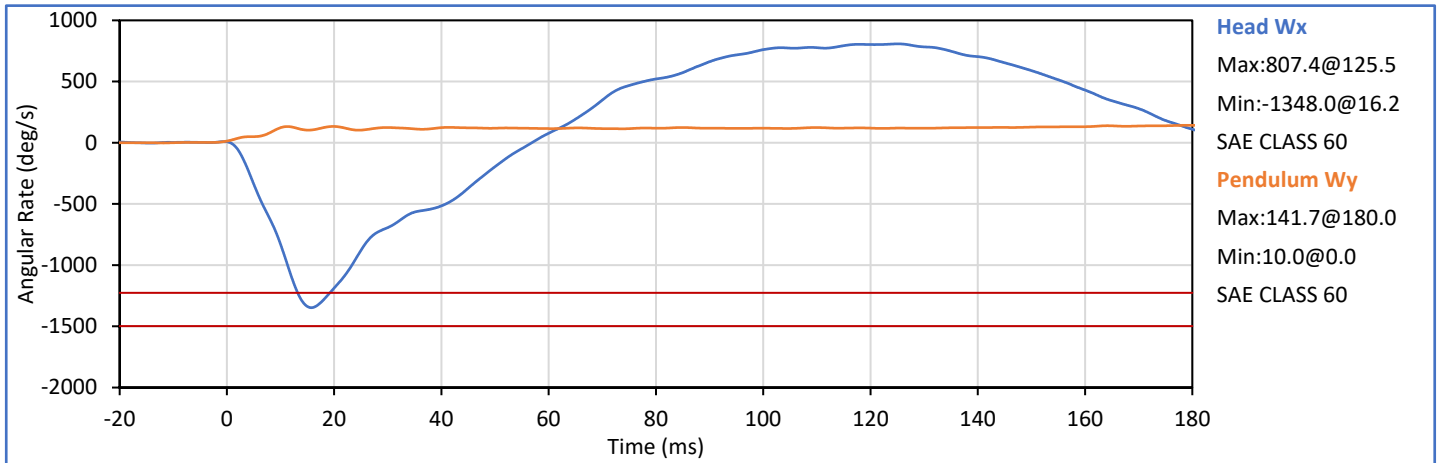
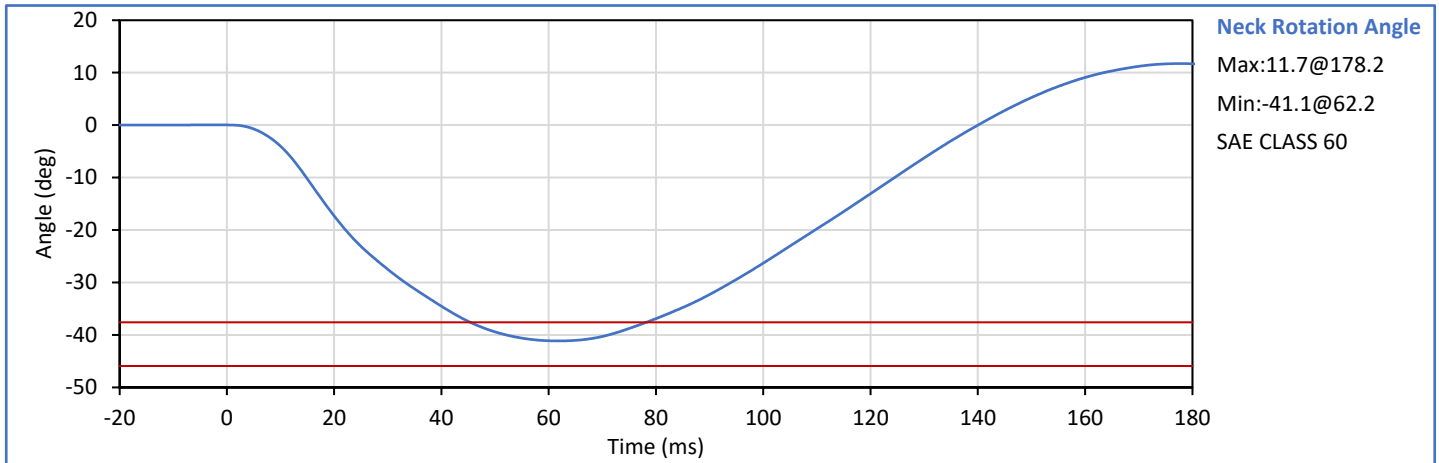
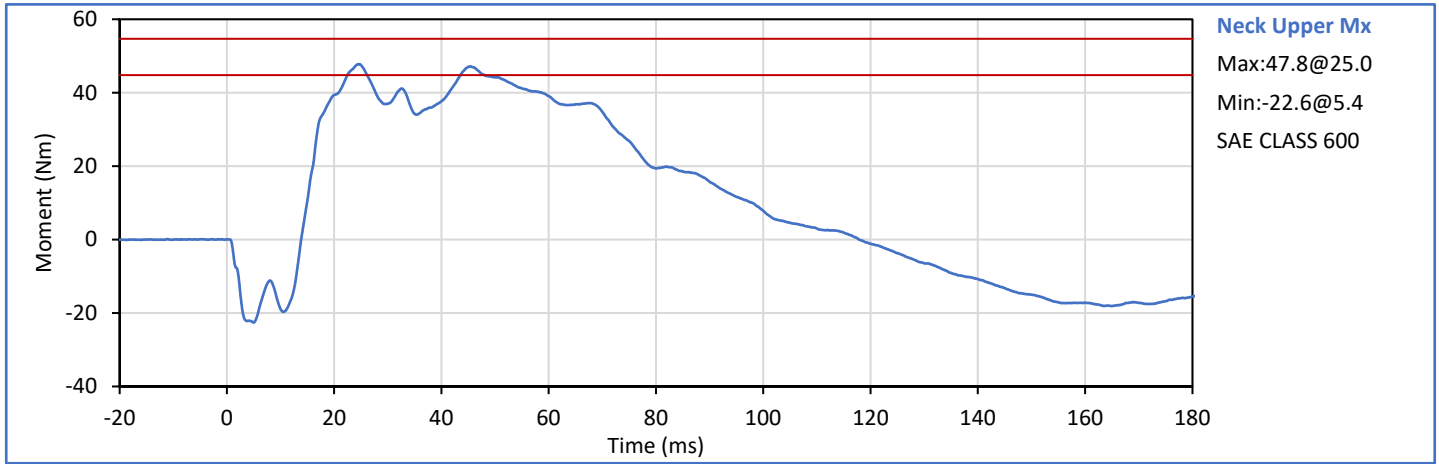



Technician:   
J. Hernandez


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Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Humidity	%	10	70	48	Pass
Pendulum Velocity	m/s	3.35	3.45	3.44	Pass
Pendulum Velocity at 4 ms	m/s	-1.30	-1.06	-1.24	Pass
Pendulum Velocity at 8 ms	m/s	-2.55	-2.09	-2.38	Pass
Pendulum Velocity at 12 ms	m/s	-3.86	-3.16	-3.58	Pass
Peak Upper Neck Mx after 40 ms	Nm	44.8	54.7	47.8	Pass
Peak Head Wx	deg/s	-1498	-1226	-1348	Pass
Peak Head Relative Rotation	deg	-45.9	-37.6	-41.1	Pass
<b>NHTSA 2019-05 Corridor</b>				Overall Test Results	Pass

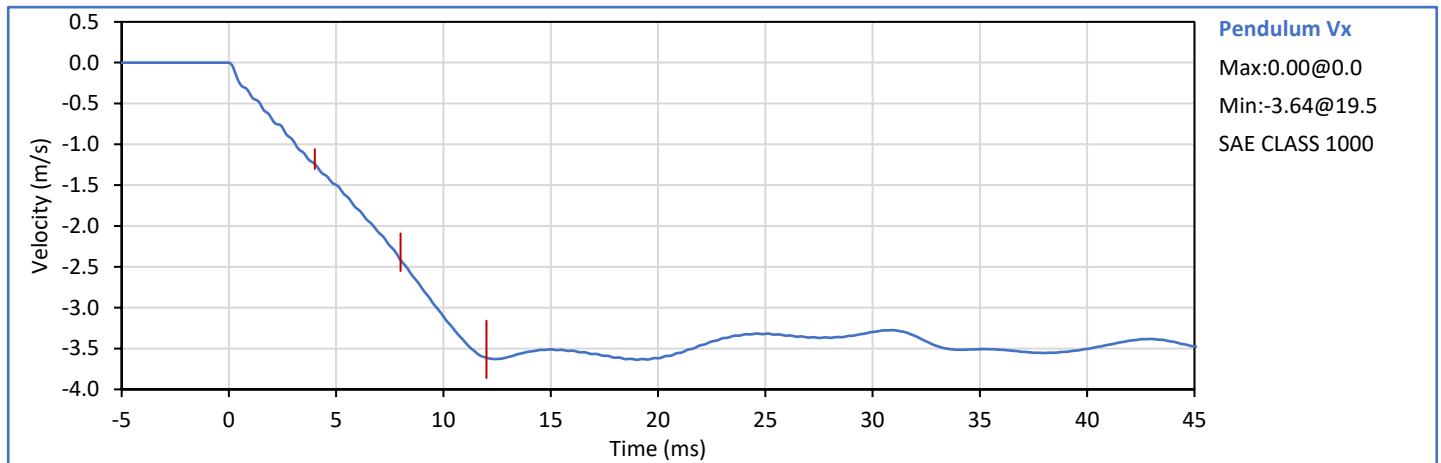


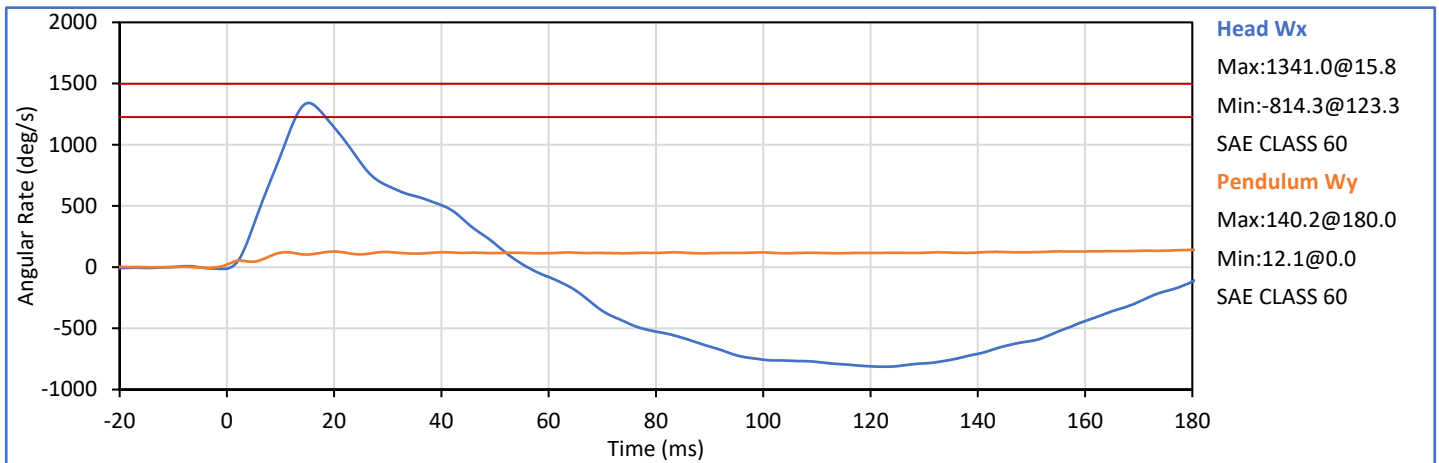
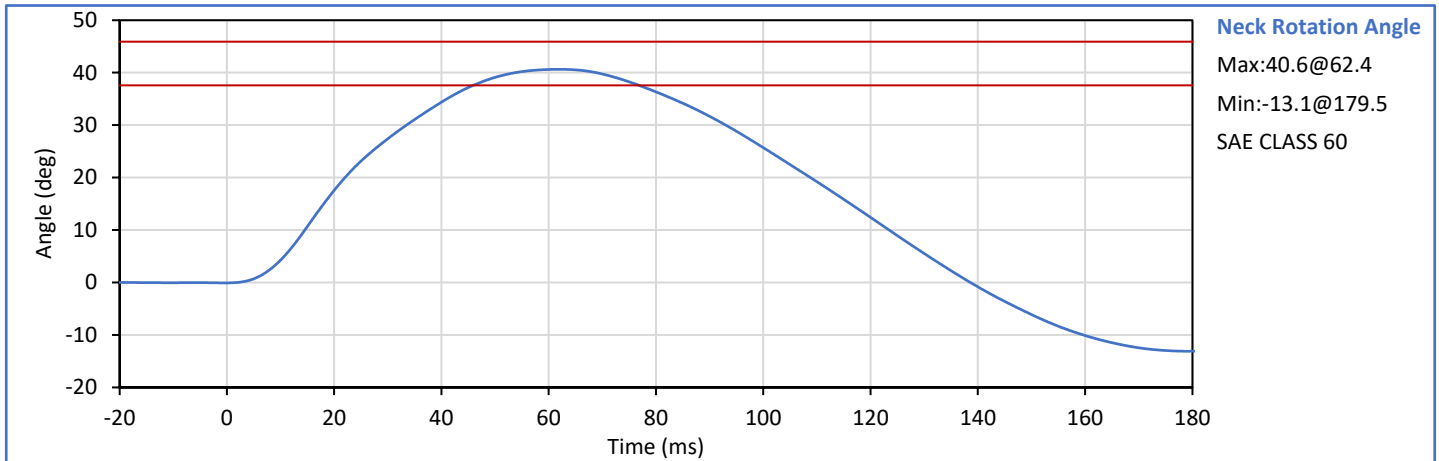
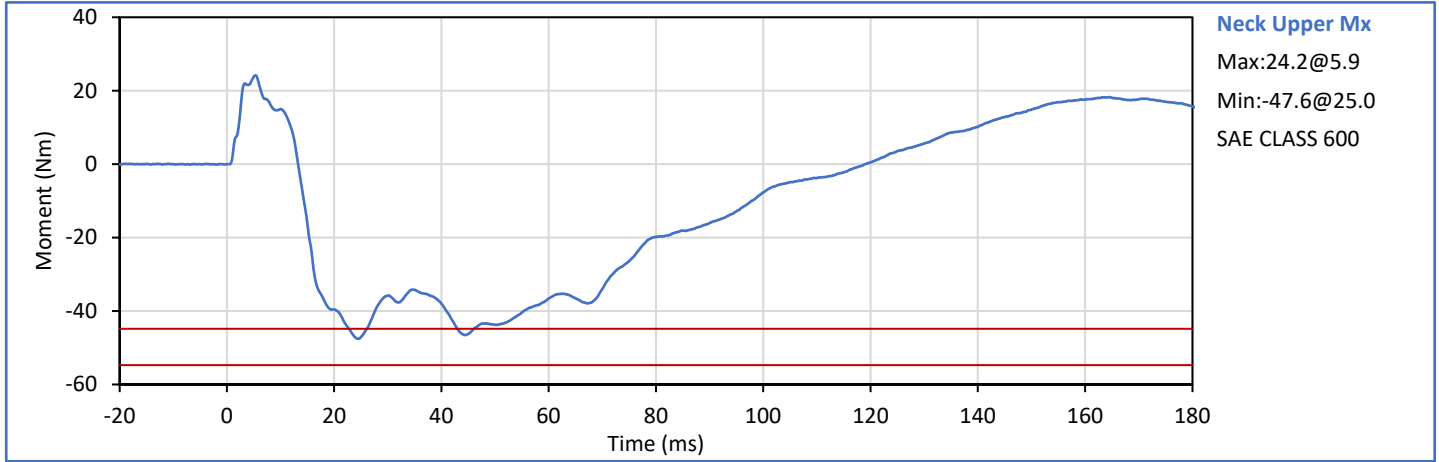


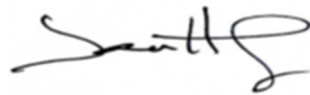
Technician:   
J. Hernandez


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P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Humidity	%	10	70	48	Pass
Pendulum Velocity	m/s	3.35	3.45	3.43	Pass
Pendulum Velocity at 4 ms	m/s	-1.30	-1.06	-1.24	Pass
Pendulum Velocity at 8 ms	m/s	-2.55	-2.09	-2.42	Pass
Pendulum Velocity at 12 ms	m/s	-3.86	-3.16	-3.61	Pass
Peak Upper Neck Mx after 40 ms	Nm	-54.7	-44.8	-47.6	Pass
Peak Head Wx	deg/s	1226	1498	1341	Pass
Peak Head Relative Rotation	deg	37.6	45.9	40.6	Pass
<b>NHTSA 2019-05 Corridor</b>				Overall Test Results	Pass

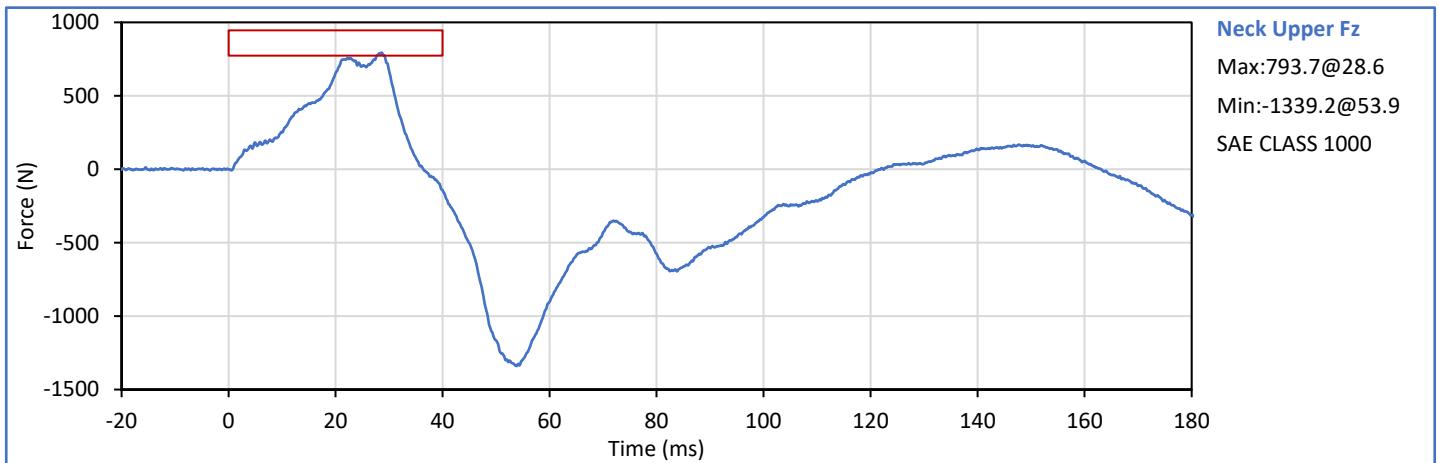
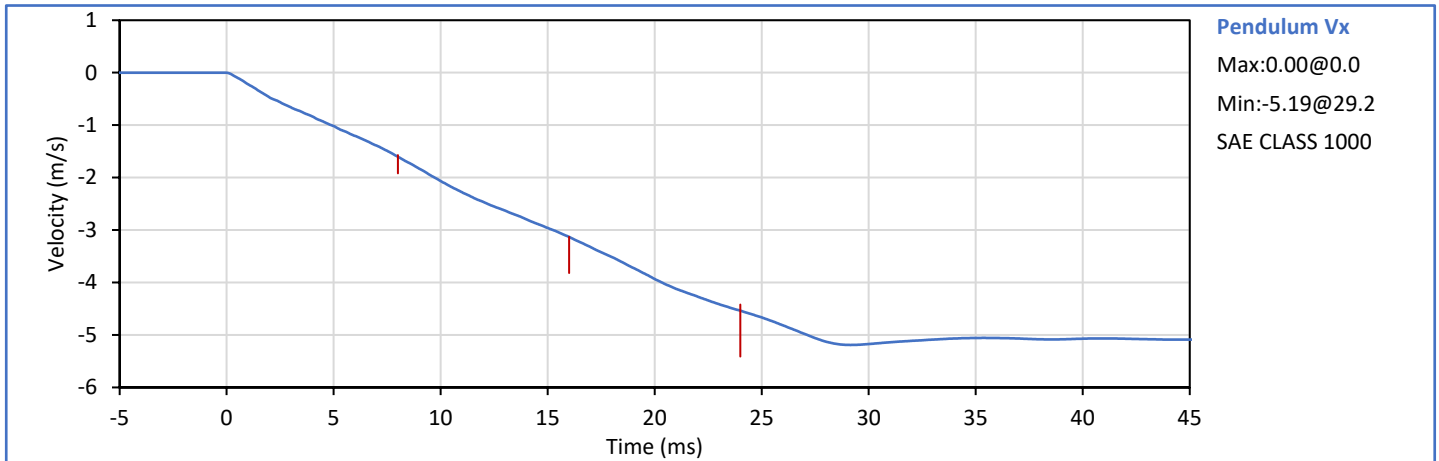


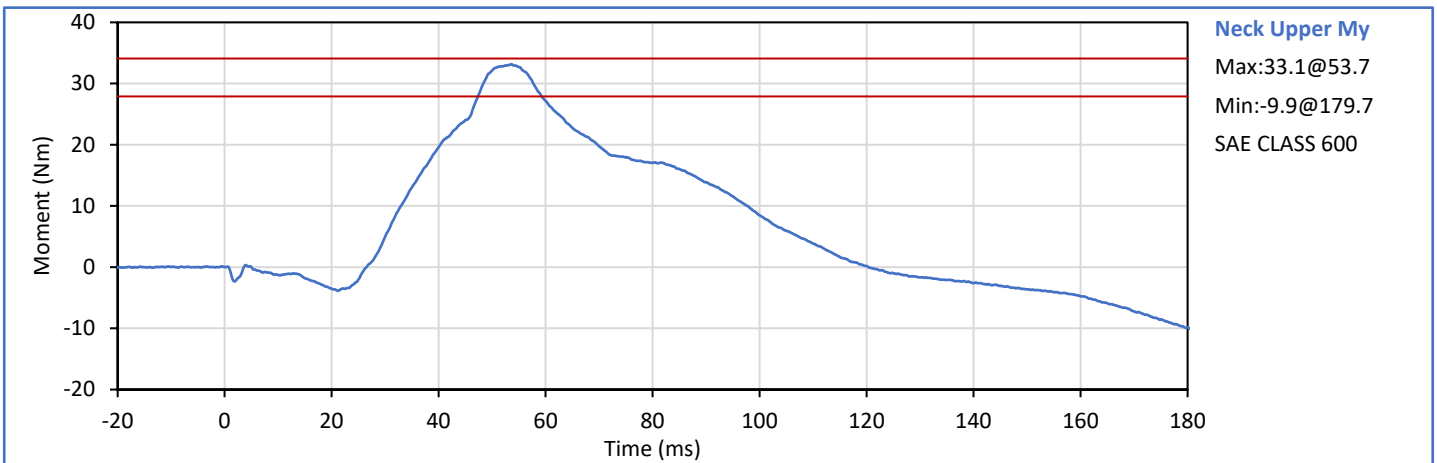
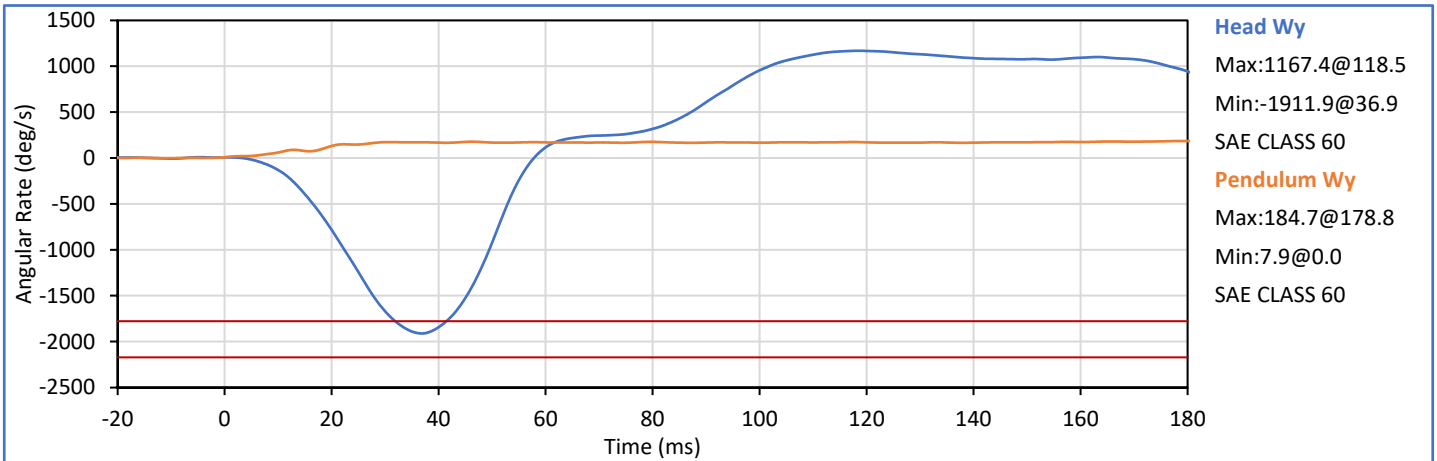
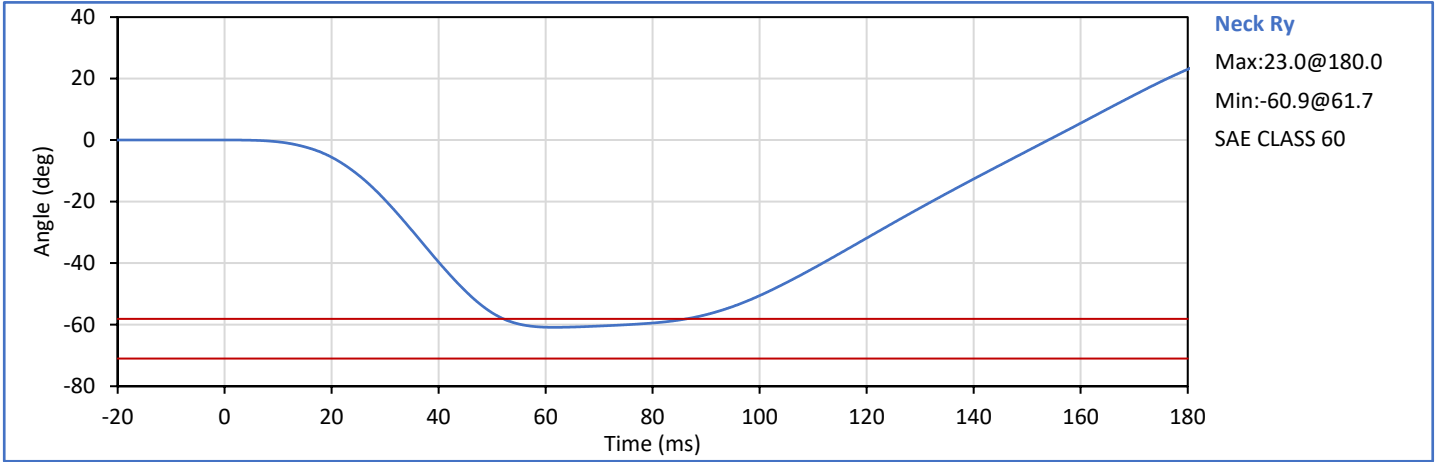


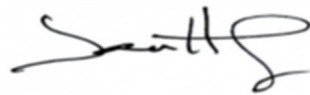
Technician:   
J. Hernandez


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P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.6	Pass
Laboratory Relative Humidity	%	10	70	47	Pass
Pendulum Velocity	m/s	4.95	5.05	5.01	Pass
Pendulum Velocity at 8 ms	m/s	-1.92	-1.57	-1.60	Pass
Pendulum Velocity at 16 ms	m/s	-3.82	-3.13	-3.13	Pass
Pendulum Velocity at 24 ms	m/s	-5.41	-4.42	-4.54	Pass
Peak Upper Neck My	Nm	27.9	34.1	33.1	Pass
Peak Upper Neck Fz (before 40 ms)	N	774	946	794	Pass
Peak Head Wy	deg/s	-2172	-1777	-1912	Pass
Peak Head Relative Rotation	deg	-71.0	-58.1	-60.9	Pass
<b>NHTSA 2019-05 Corridor</b>				<b>Overall Test Results</b>	<b>Pass</b>

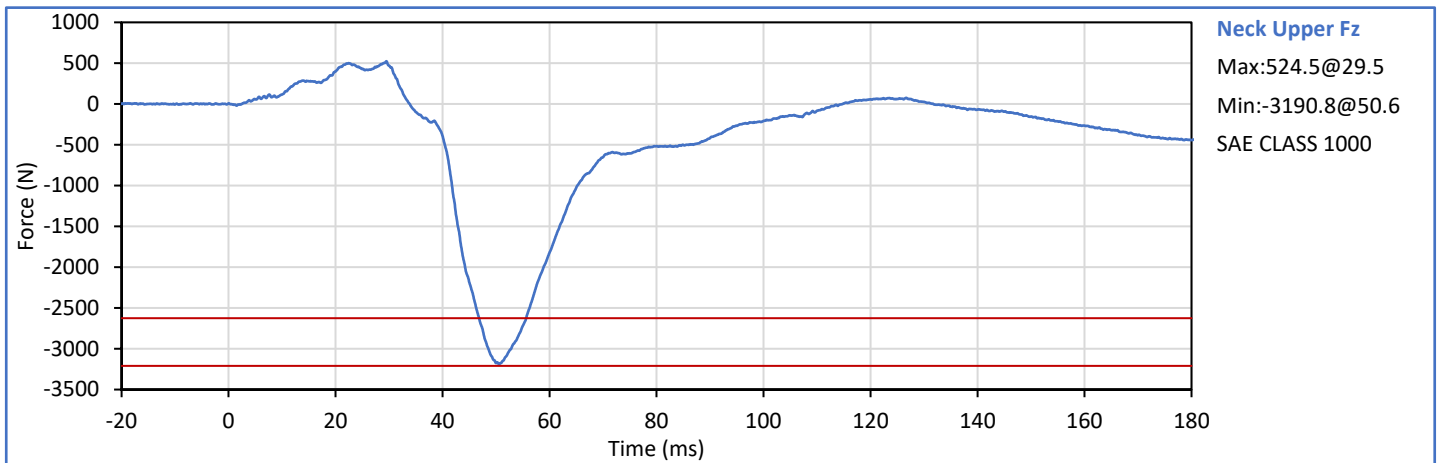
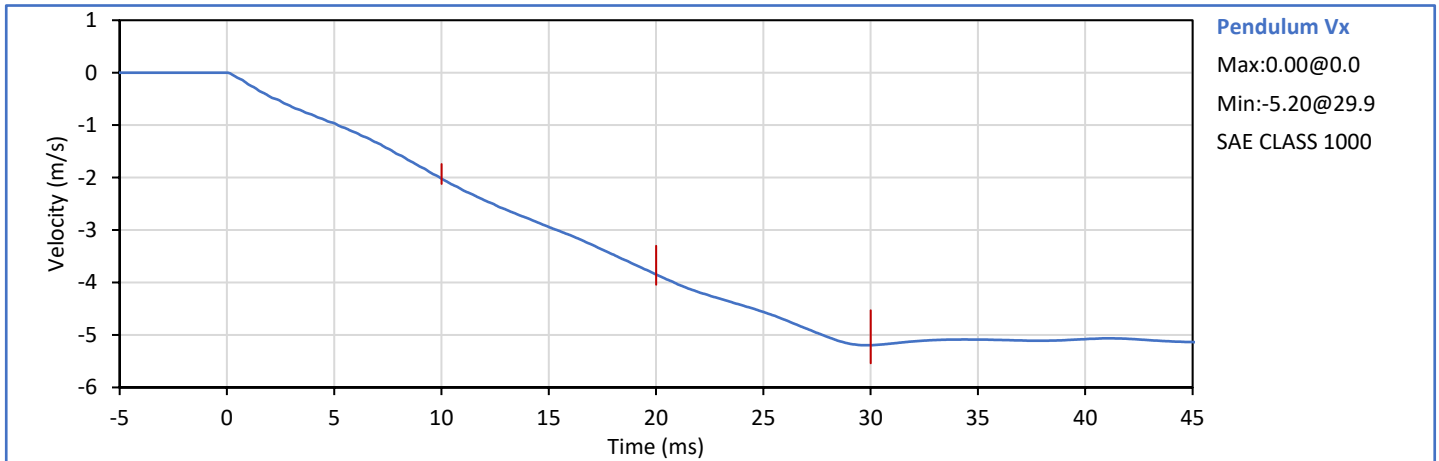


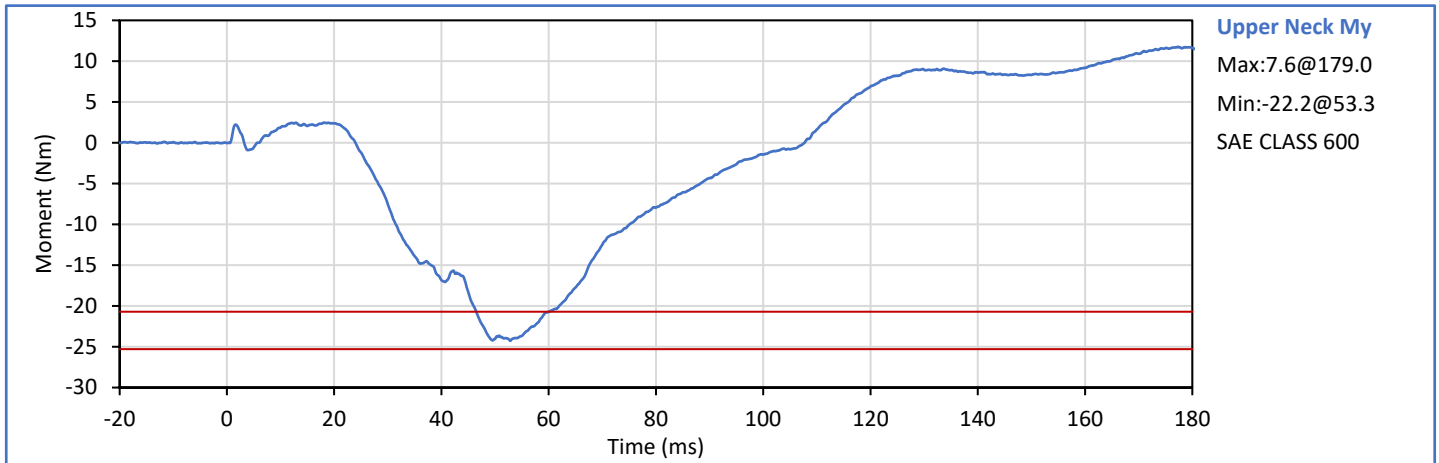
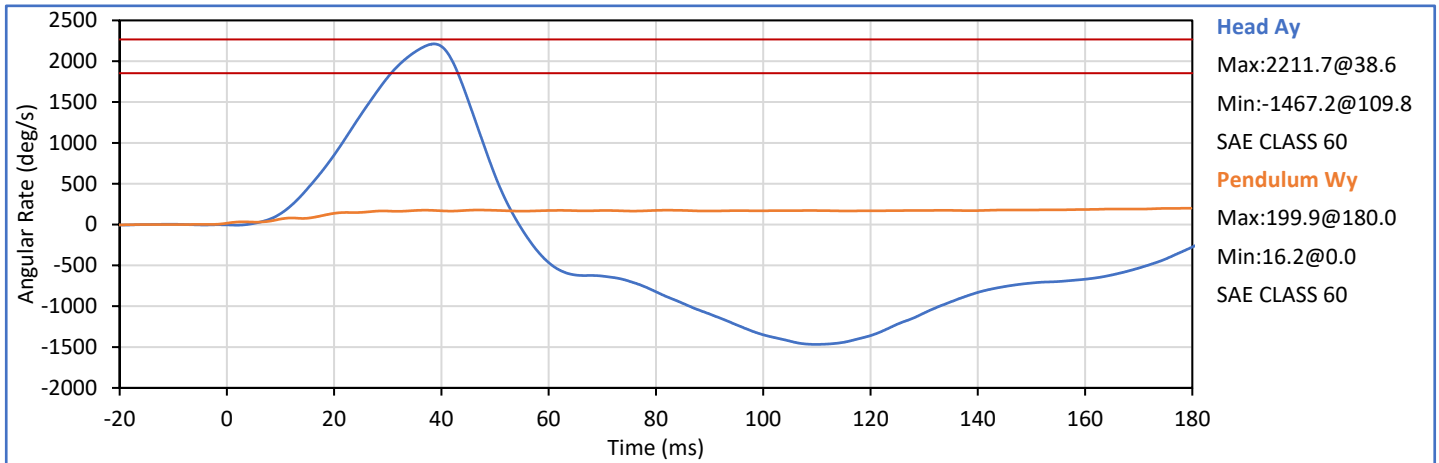
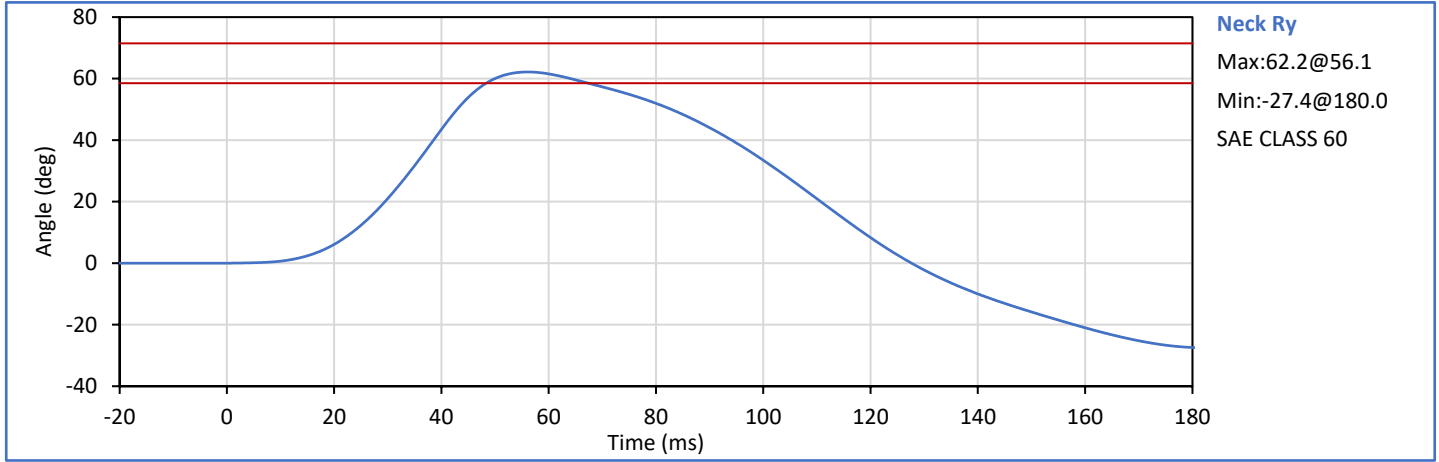



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Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.5	Pass
Laboratory Relative Humidity	%	10	70	48	Pass
Pendulum Velocity	m/s	4.95	5.05	5.03	Pass
Pendulum Velocity at 10 ms	m/s	-2.12	-1.74	-2.03	Pass
Pendulum Velocity at 20 ms	m/s	-4.04	-3.30	-3.86	Pass
Pendulum Velocity at 30 ms	m/s	-5.54	-4.53	-5.20	Pass
Peak Upper Neck My	Nm	-25.3	-20.7	-24.3	Pass
Peak Upper Neck Fz	N	-3210	-2626	-3191	Pass
Peak Head Wy	deg/s	1855	2267	2212	Pass
Peak Head Relative Rotation	deg	58.5	71.5	62.2	Pass
<b>NHTSA 2019-05 Corridor</b>				<b>Overall Test Results</b>	<b>Pass</b>

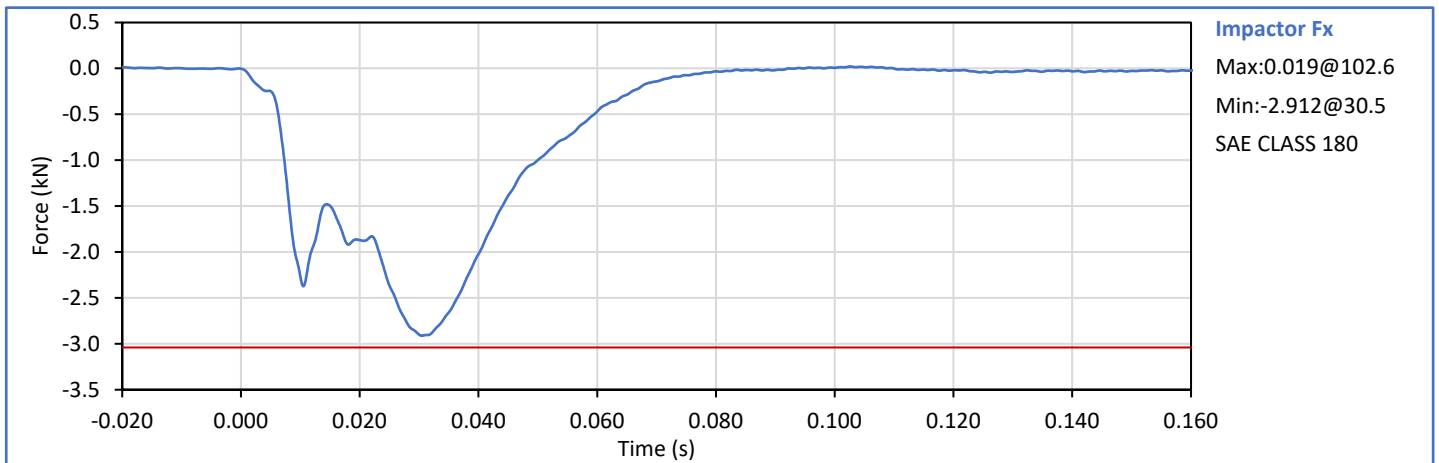
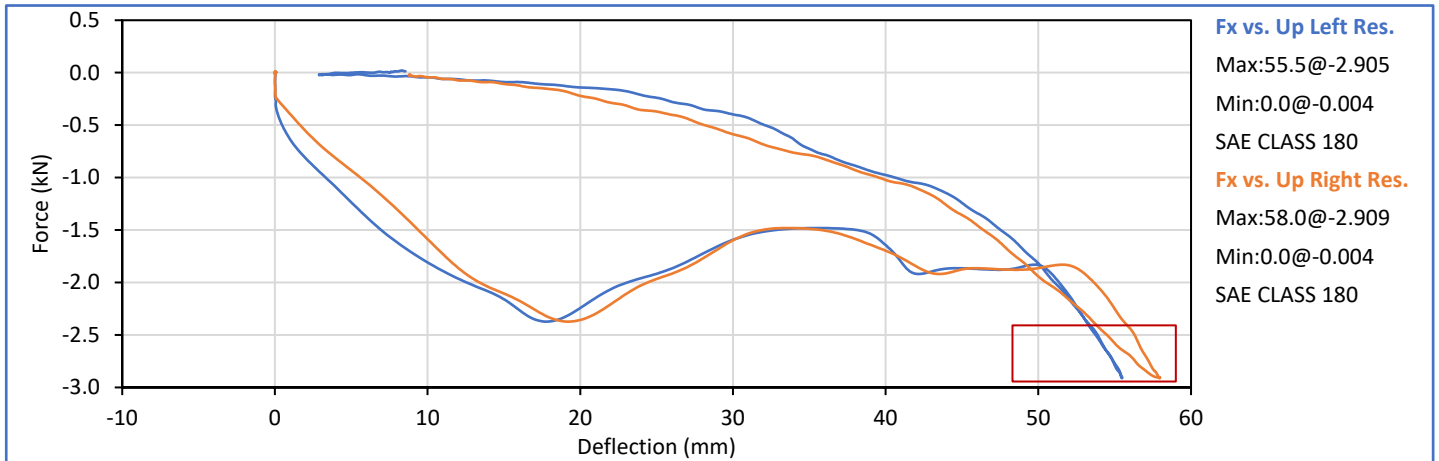





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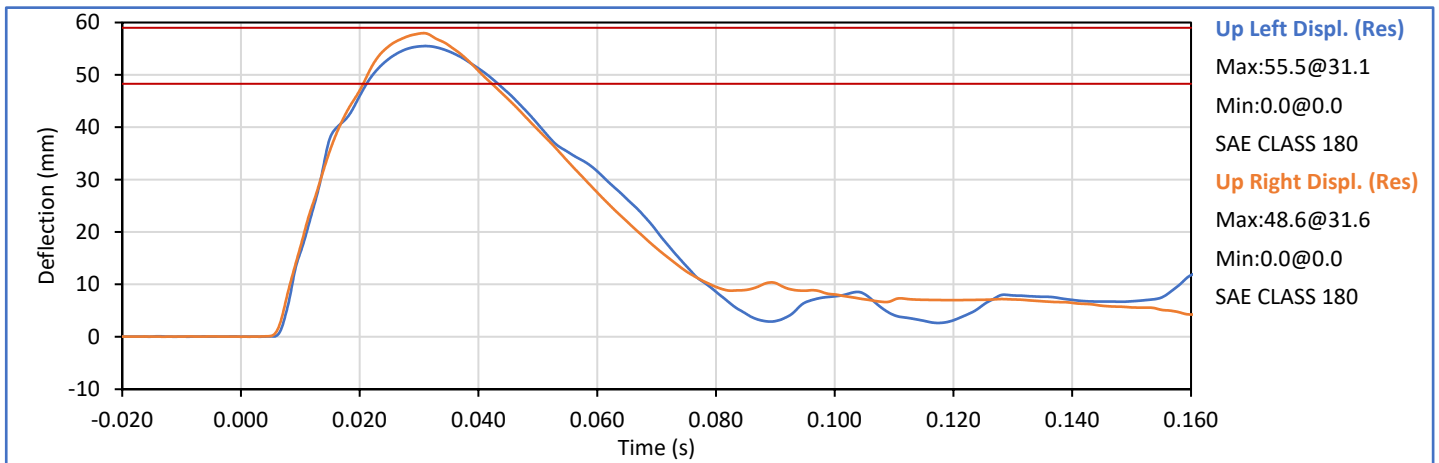
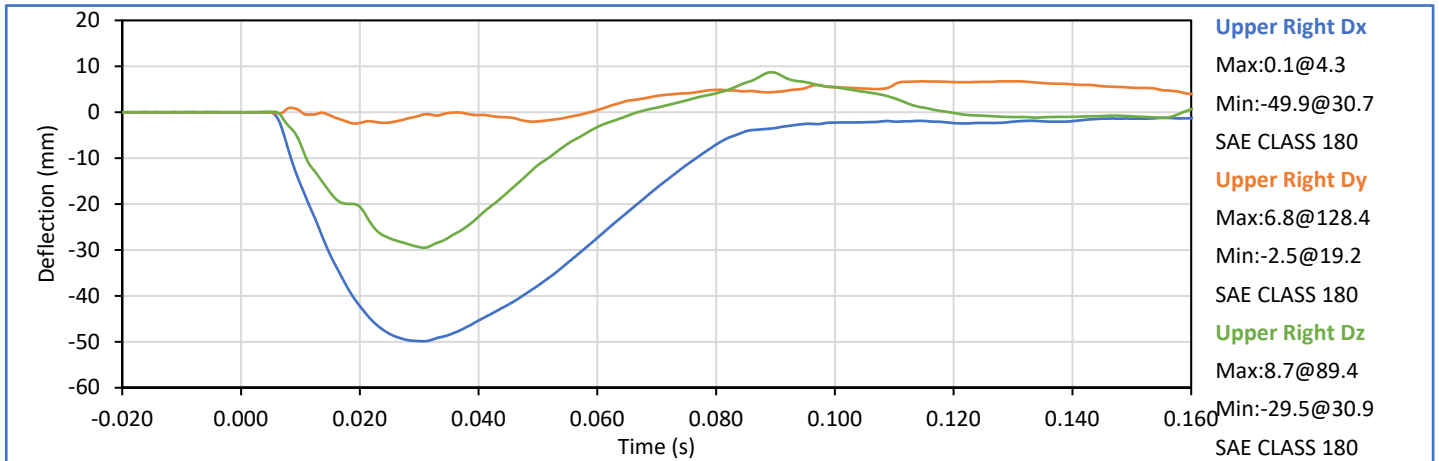
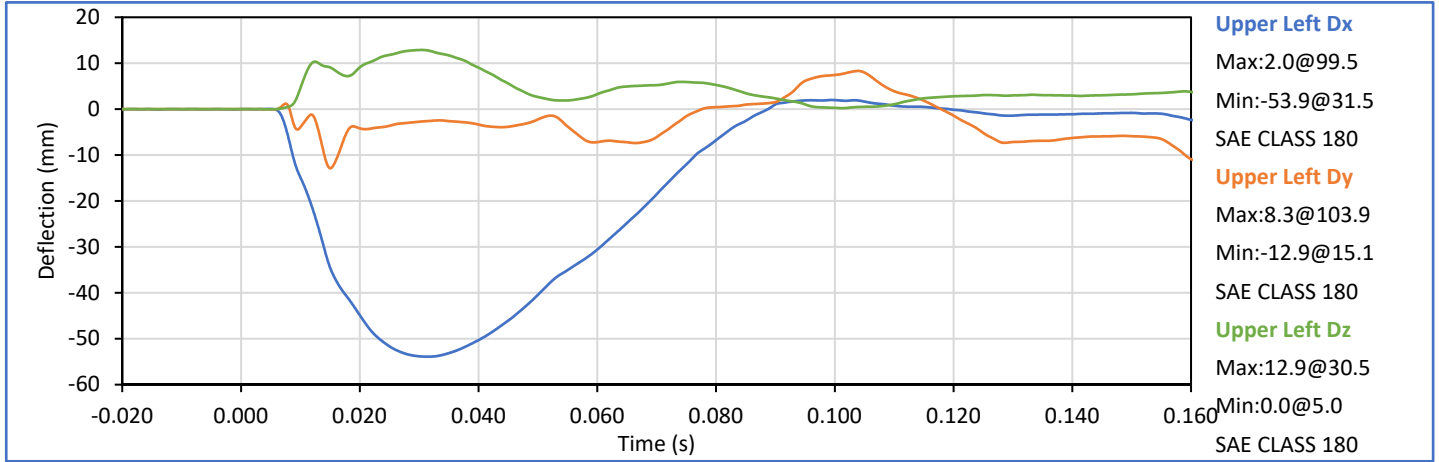
Approved By:   
P. Puzzuto

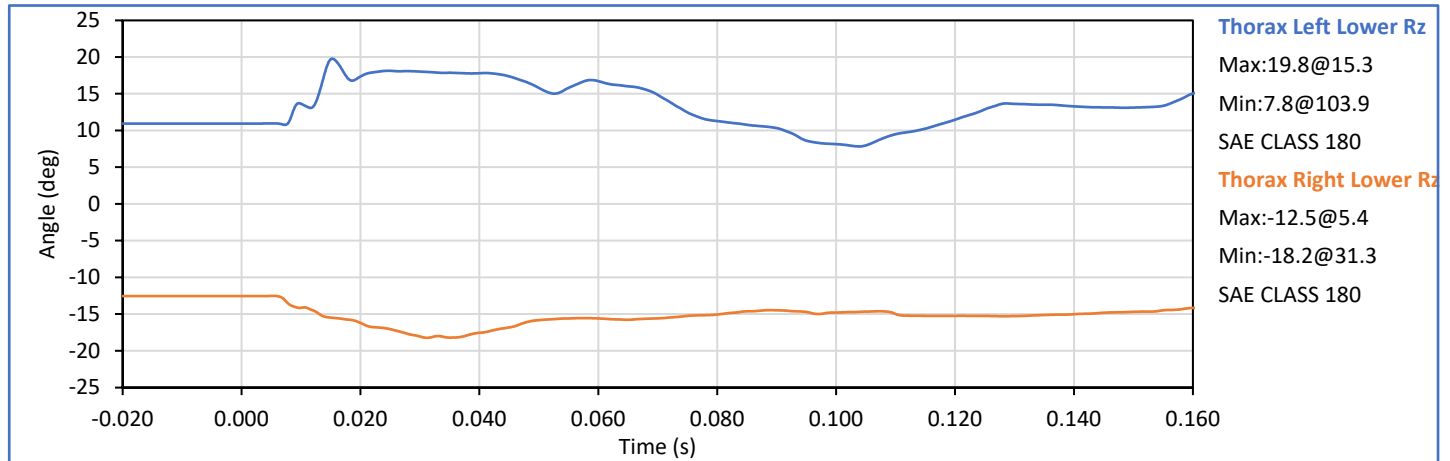
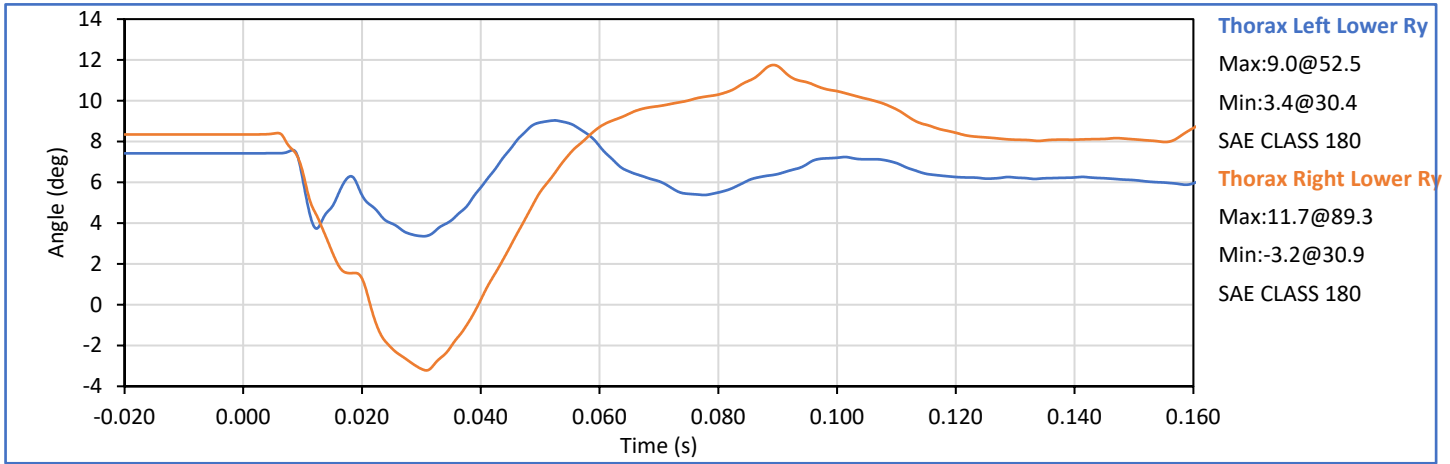
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	46	Pass
Probe Velocity	m/s	4.25	4.35	4.35	Pass
Peak Probe Force	kN	-3.039		-2.912	Pass
Peak Upper Left Deflection Res.	mm	48.3	59.0	55.5	Pass
Peak Upper Right Deflection Res.	mm			58.0	Pass
Absolute Difference L/R Defl. Res.	mm	0.0	5.0	2.5	Pass
Force at Peak Upper Left Res.	mm	-2.944	-2.409	-2.905	Pass
Force at Peak Upper Right Res.	mm			-2.909	Pass
<b>NHTSA Corridor 2019-05</b>				<b>Overall Test Results</b>	<b>Pass</b>



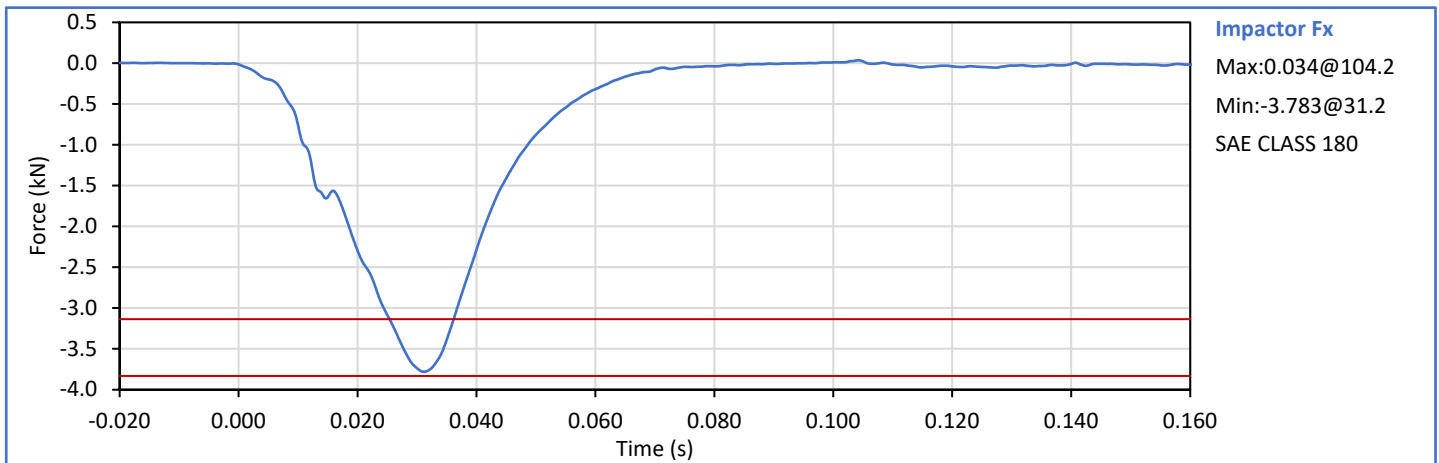
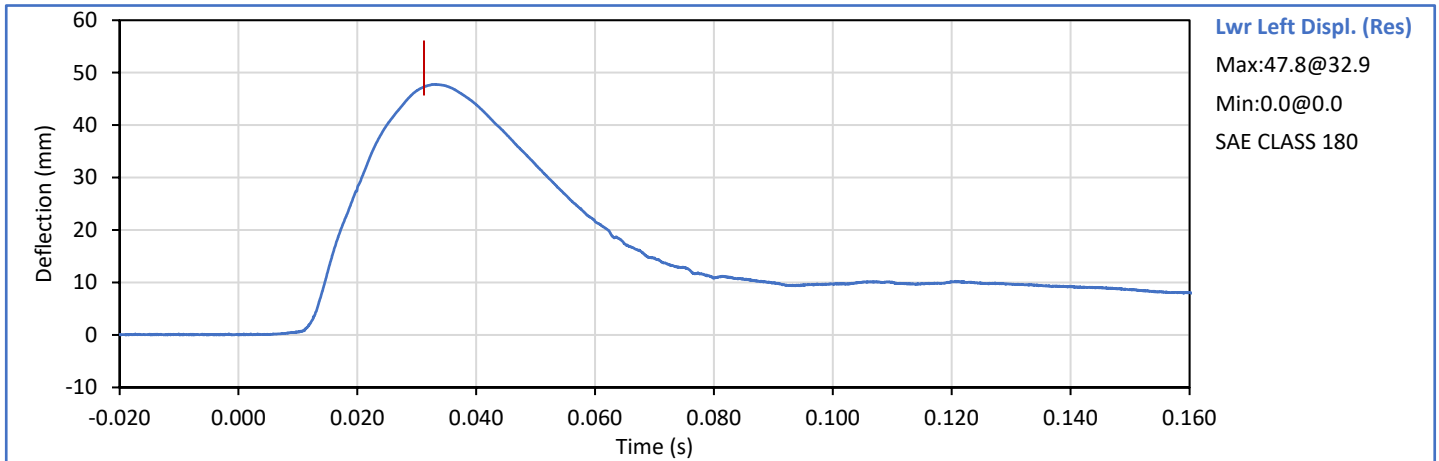
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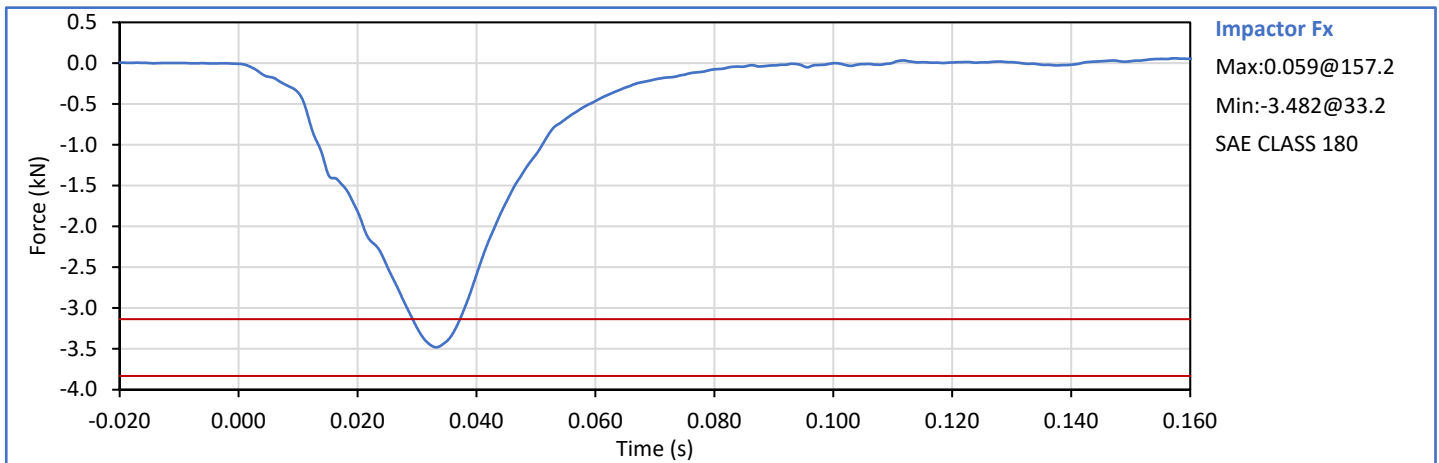
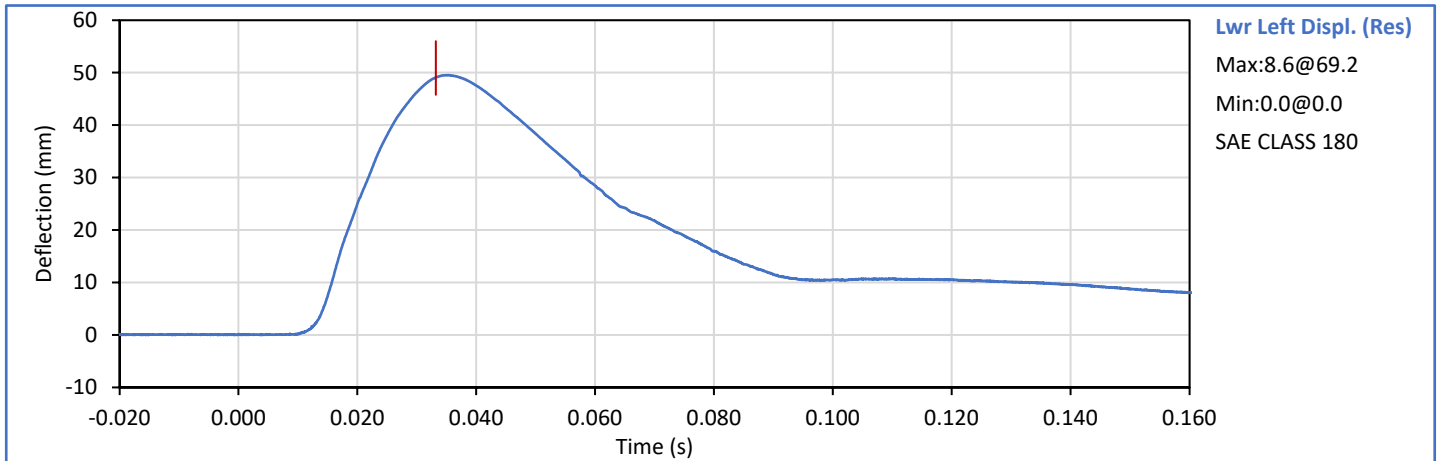
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	44	Pass
Probe Velocity	m/s	4.25	4.35	4.34	Pass
Peak Probe Force	kN	-3.832	-3.136	-3.783	Pass
Lower Left Defl. Res. at Peak Fx	mm	45.8	56.0	47.3	Pass
NHTSA Corridor 2019-05				Overall Test Results	Pass




Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

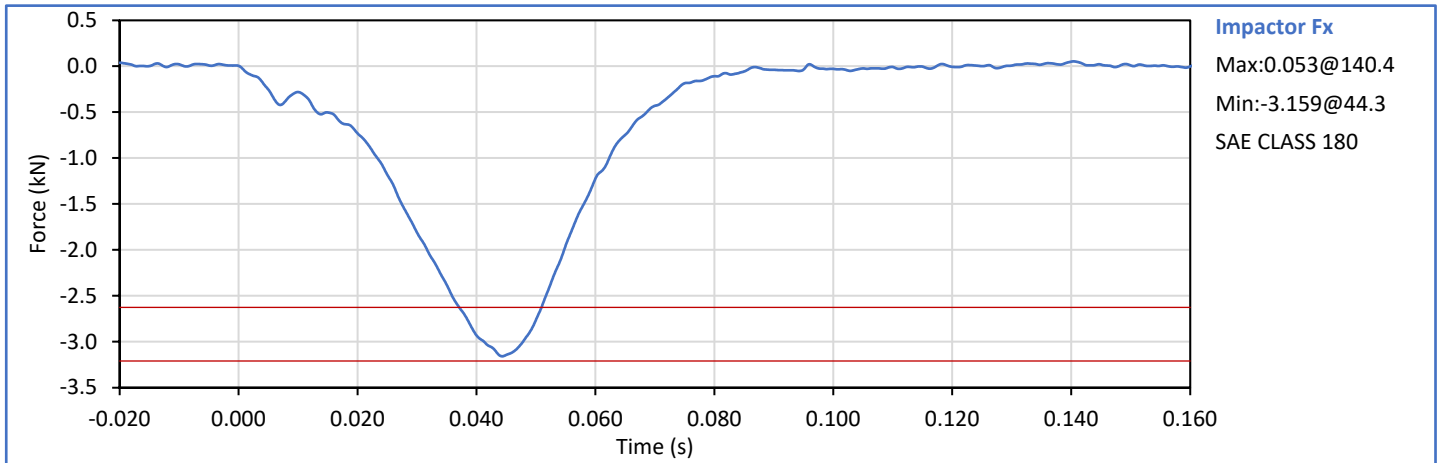
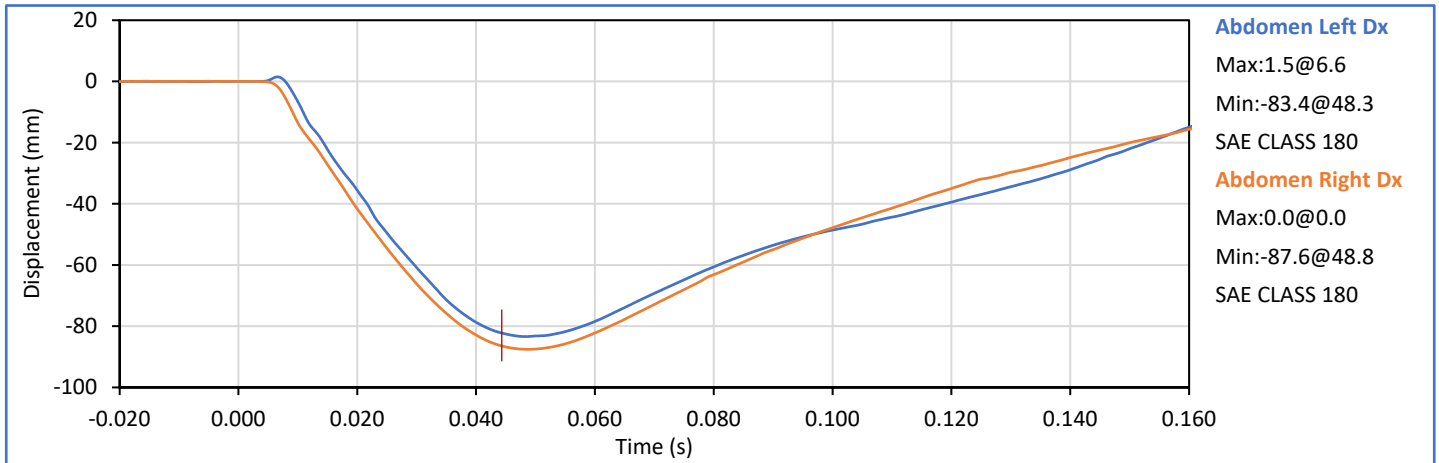
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	44	Pass
Probe Velocity	m/s	4.25	4.35	4.34	Pass
Peak Probe Force	kN	-3.832	-3.136	-3.482	Pass
Lower Left Defl. Res. at Peak Fx	mm	45.8	56.0	49.1	Pass
NHTSA Corridor 2019-05				Overall Test Results	Pass




Technician:   
 J. Hernandez

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 P. Puzzuto

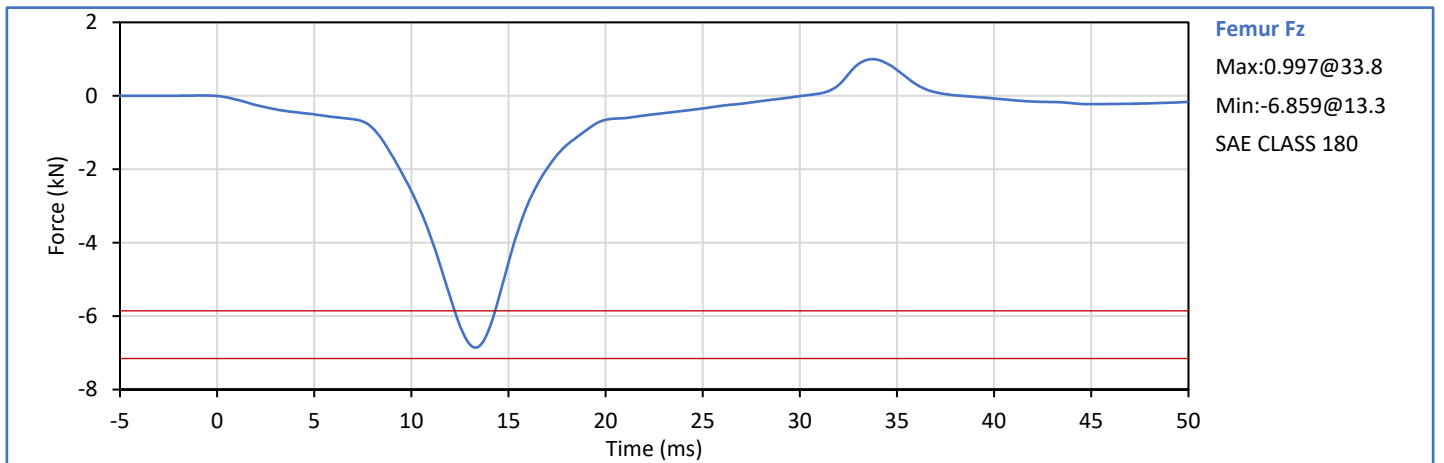
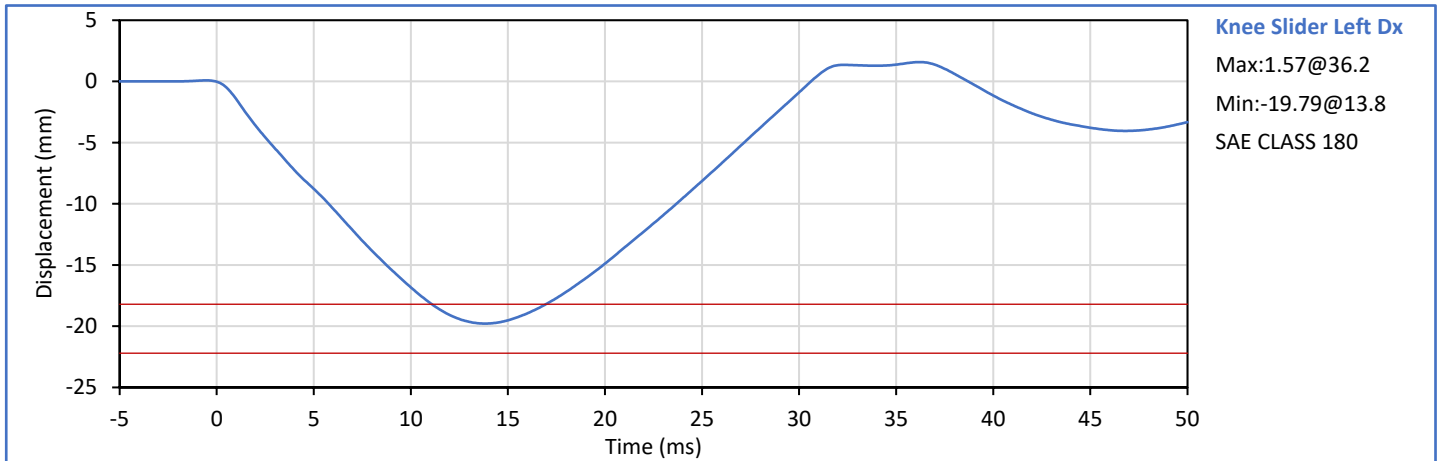
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	48	Pass
Probe Velocity	m/sec	3.25	3.35	3.34	Pass
Peak Probe Force	kN	-3.210	-2.626	-3.159	Pass
Lower Left Dx at Time of Peak Force	mm	-91.3	-74.7	-82.2	Pass
Lower Right Dx at Time of Peak Force	mm			-86.5	Pass
Absolute Difference of Left/Right Dx	mm	0.0	8.0	4.2	Pass
<b>NHTSA Corridor 2019-05</b>				<b>Overall Test Results</b>	<b>Pass</b>

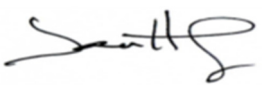


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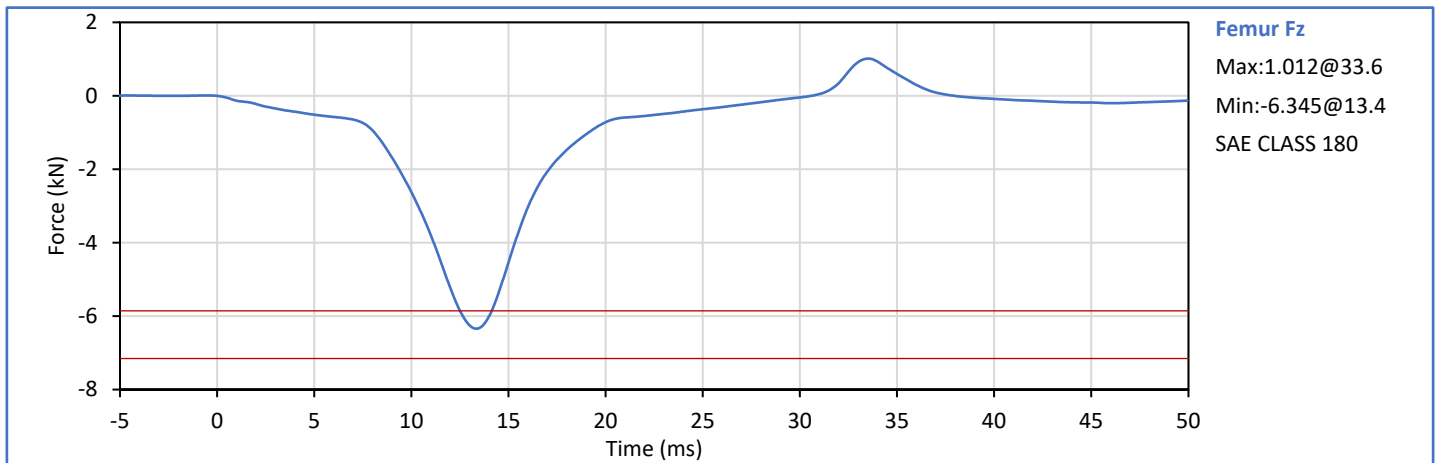
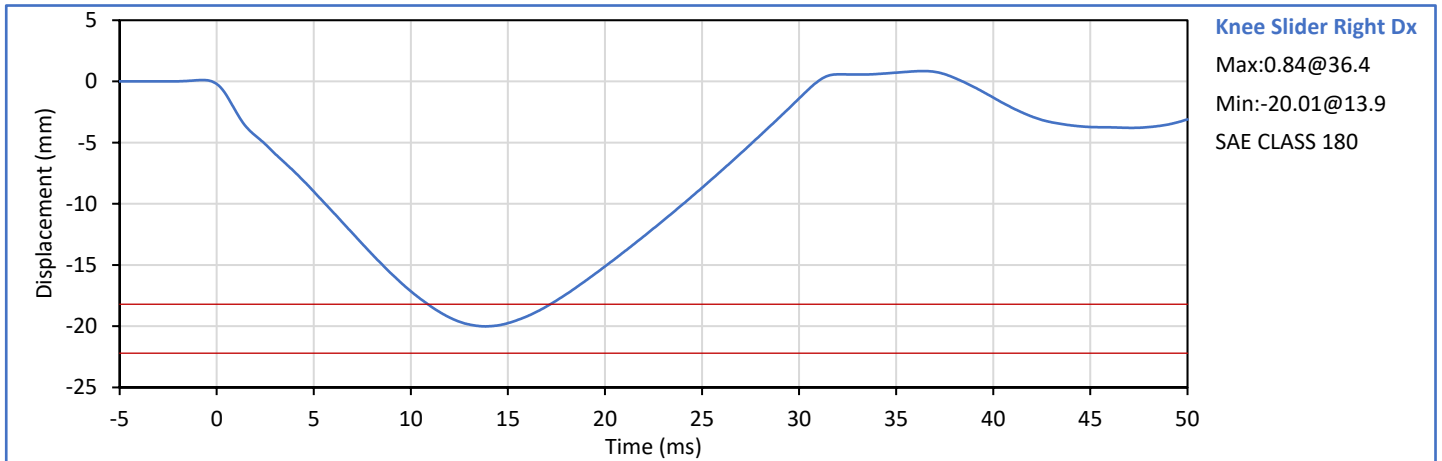
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	47	Pass
Pendulum Velocity	m/s	2.15	2.25	2.22	Pass
Peak Femur Fz	kN	-7.156	-5.855	-6.859	Pass
Knee Dx at Peak Femur Fz	mm	-22.20	-18.20	-19.73	Pass
NHTSA Corridor 2019-05				Overall Test Results	Pass

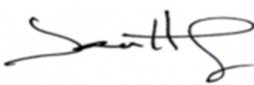



Technician:   
 J. Hernandez

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 P. Puzzuto

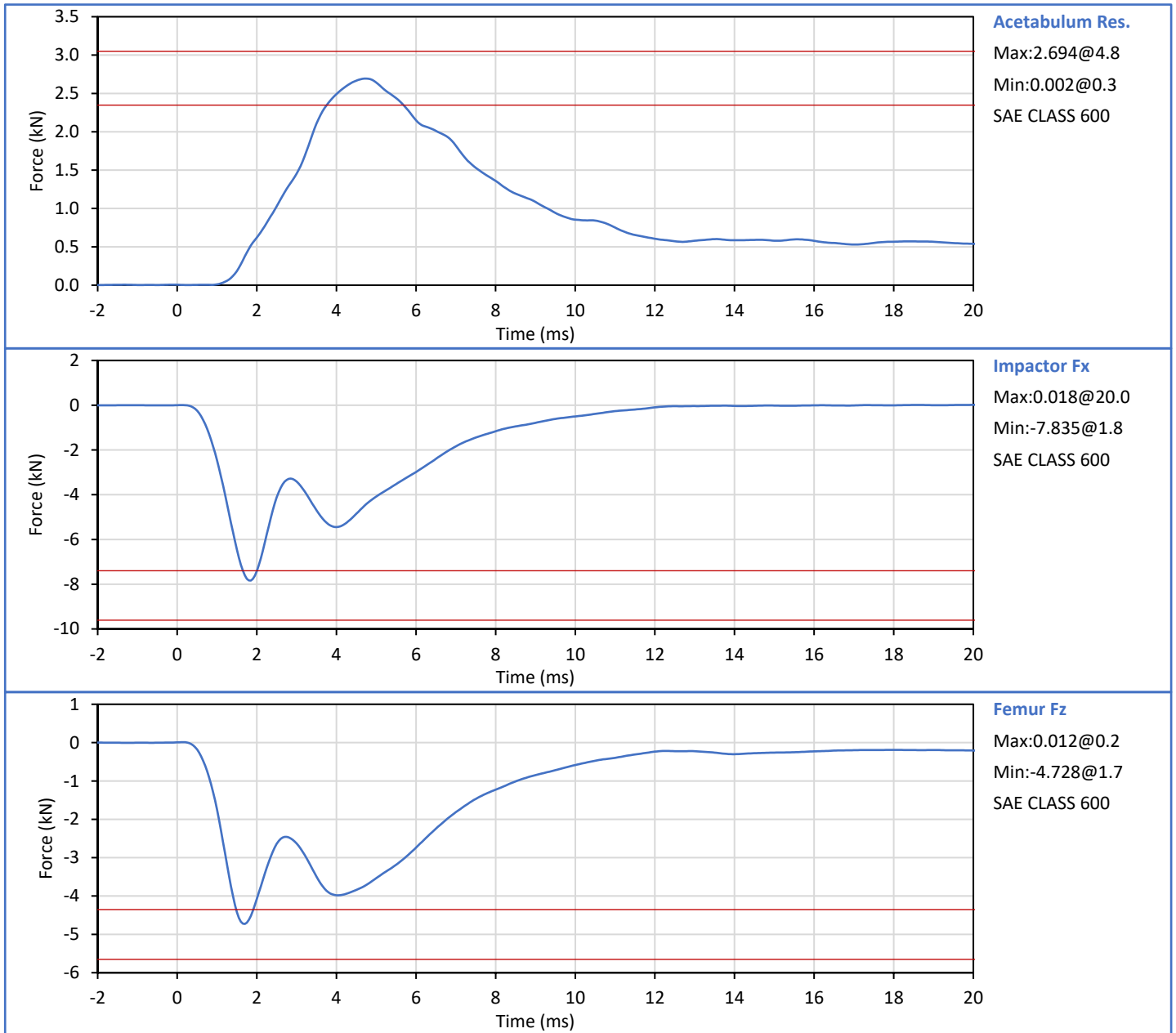
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.6	Pass
Laboratory Relative Humidity	%	10	70	46	Pass
Pendulum Velocity	m/s	2.15	2.25	2.21	Pass
Peak Femur Fz	kN	-7.156	-5.855	-6.345	Pass
Knee Dx at Peak Femur Fz	mm	-22.20	-18.20	-19.96	Pass
NHTSA Corridor 2019-05				Overall Test Results	Pass

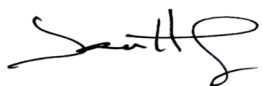



Technician:   
J. Hernandez

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Tested Parameter	Units	Spec. Low <sup>1</sup>	Spec. High <sup>1</sup>	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	43	Pass
Pendulum Velocity	m/s	3.25	3.35	3.29	Pass
Peak Impactor Force	kN	-9.605	-7.395	-7.835	Pass
Peak Femur Fz	kN	-5.650	-4.350	-4.728	Pass
Acetabulum Force Resultant	kN	2.349	3.051	2.694	Pass
<b>NHTSA Corridor 2020-03 (Preliminary Corridor)</b>				<b>Overall Test Results</b>	<b>Pass</b>

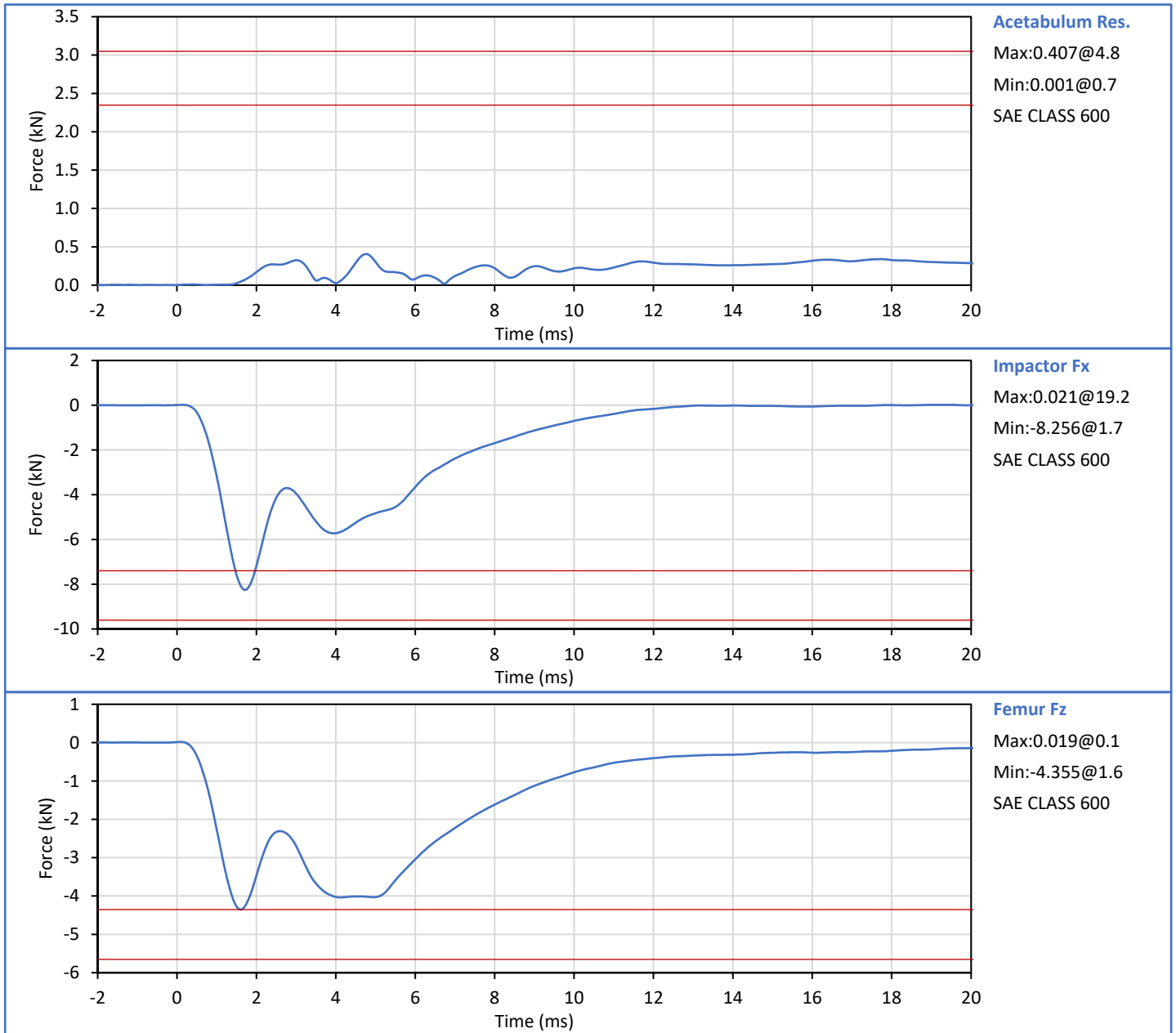


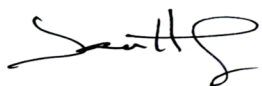
Technician:   
J. Hernandez


Approved By:   
P. Puzzuto

Tested Parameter	Units	Spec. Low <sup>1</sup>	Spec. High <sup>1</sup>	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	37	Pass
Pendulum Velocity	m/s	3.25	3.35	3.33	Pass
Peak Impactor Force	kN	-9.605	-7.395	-8.256	Pass
Peak Femur Fz	kN	-5.650	-4.350	-4.355	Pass
Acetabulum Force Resultant	kN	2.349	3.051	0.407	Fail
<b>NHTSA Corridor 2020-03 (Preliminary Corridor)</b>				<b>Overall Test Results</b>	<b>Fail</b>

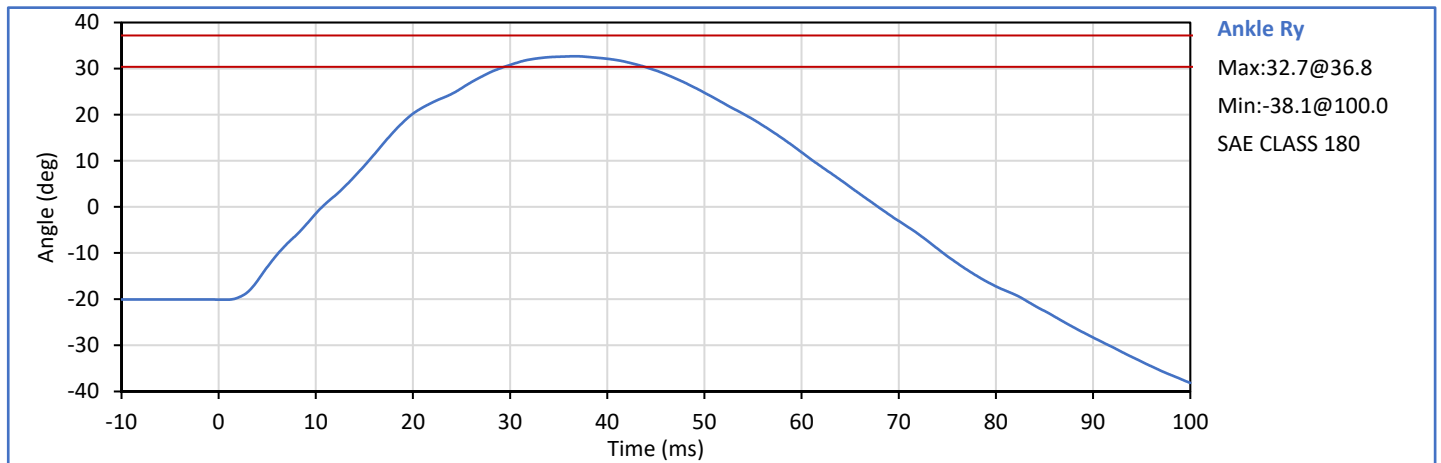
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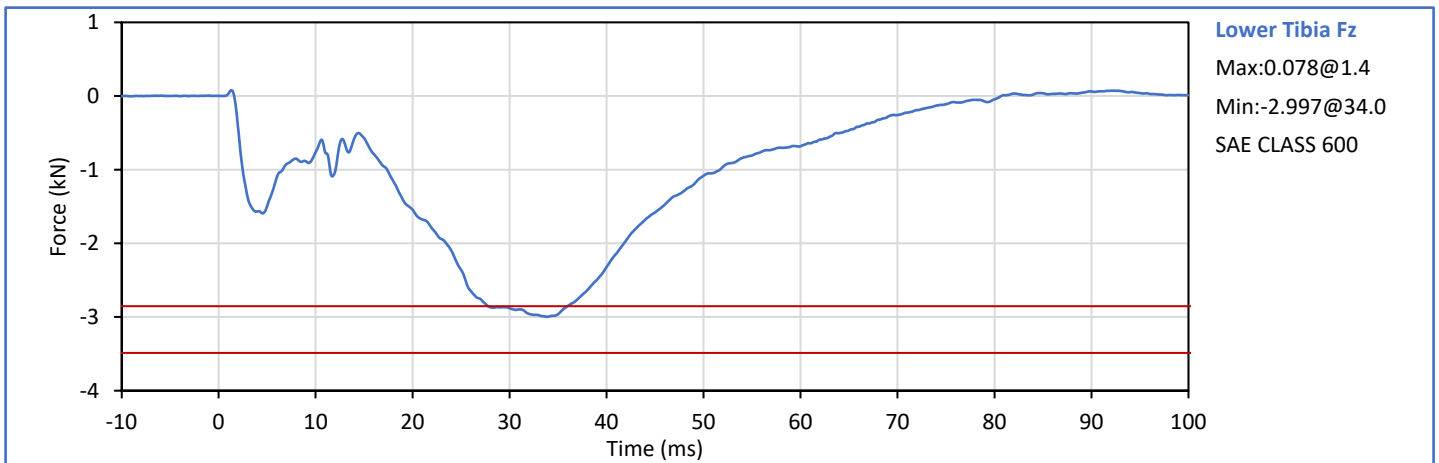
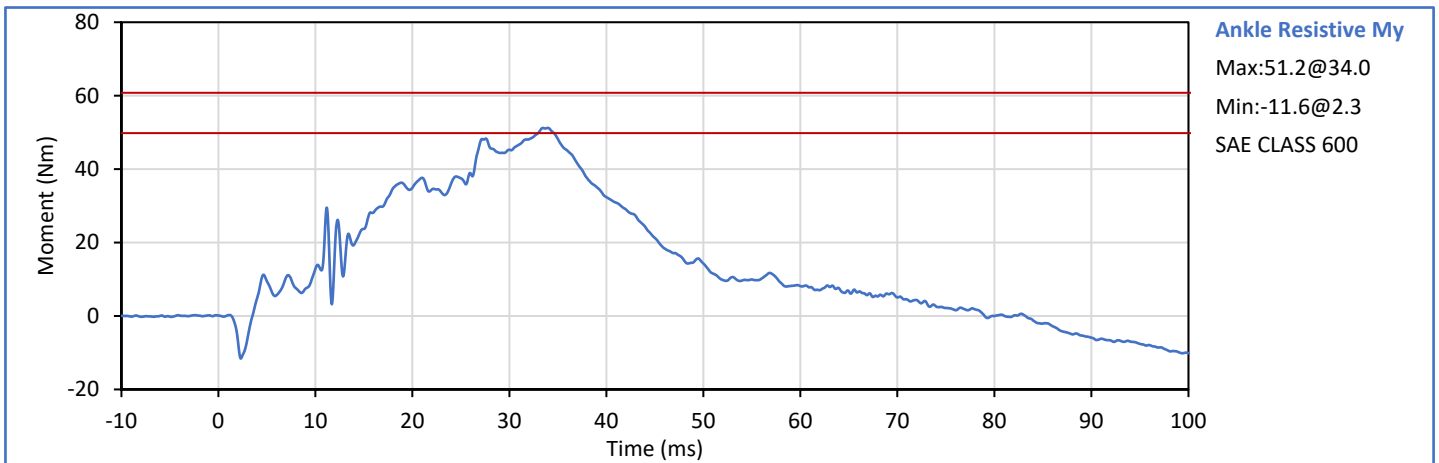
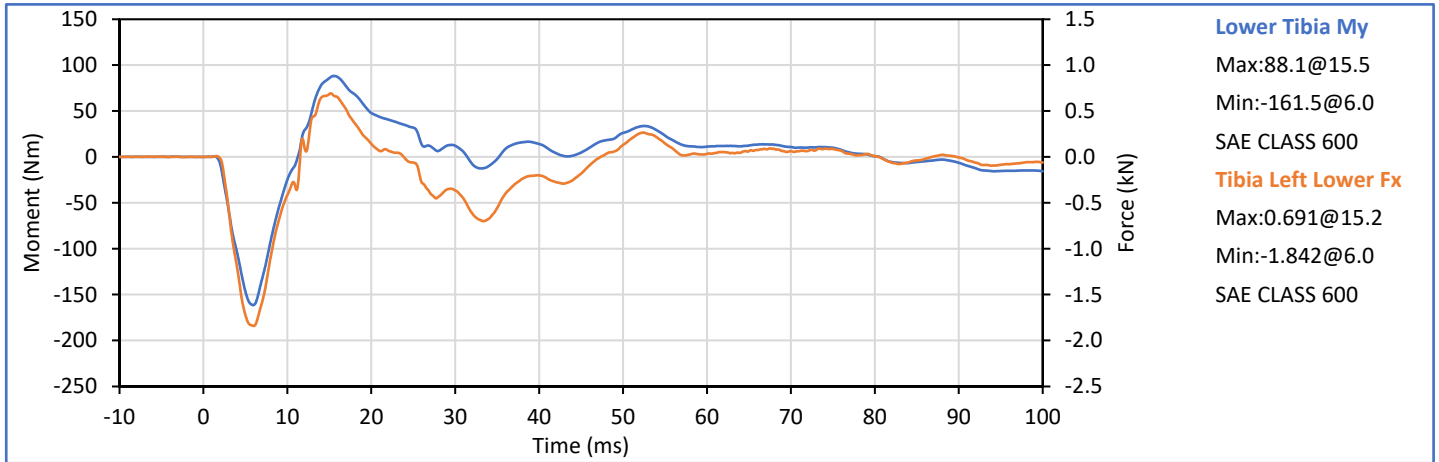


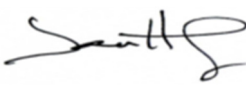
Technician:   
J. Hernandez


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P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	25	Pass
Pendulum Velocity	m/s	4.95	5.05	5.03	Pass
Peak Ankle Ry	deg	30.4	37.2	32.7	Pass
Peak Ankle Resistive Moment	Nm	49.8	60.8	51.2	Pass
Peak Lower Tibia Fz	kN	-3.487	-2.853	-2.997	Pass
NHTSA Corridor 2019-05				Overall Test Results	Pass

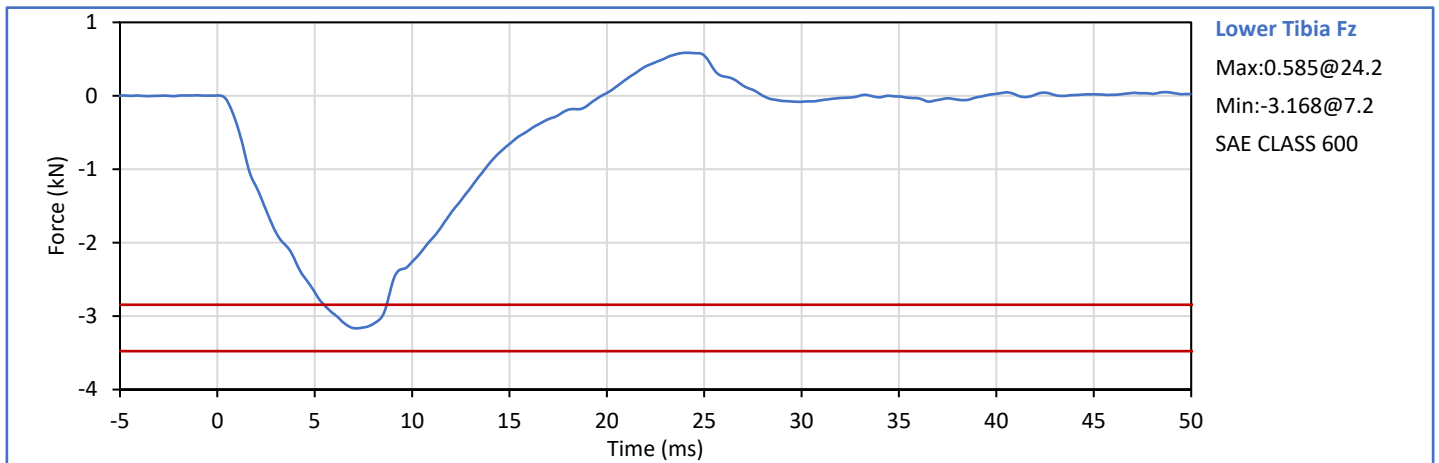




Technician:   
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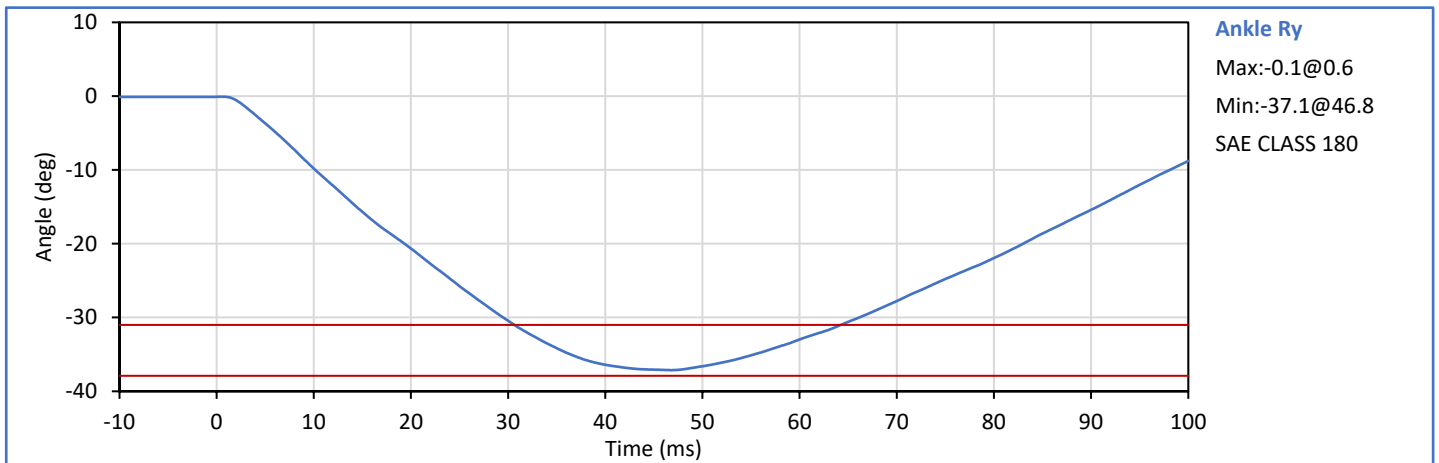
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	46	Pass
Pendulum Velocity	m/s	3.95	4.05	4.01	Pass
Peak Lower Tibia Fz	kN	-3.478	-2.846	-3.168	Pass
<b>NHTSA Corridor 2019-05</b>				Overall Test Results	Pass

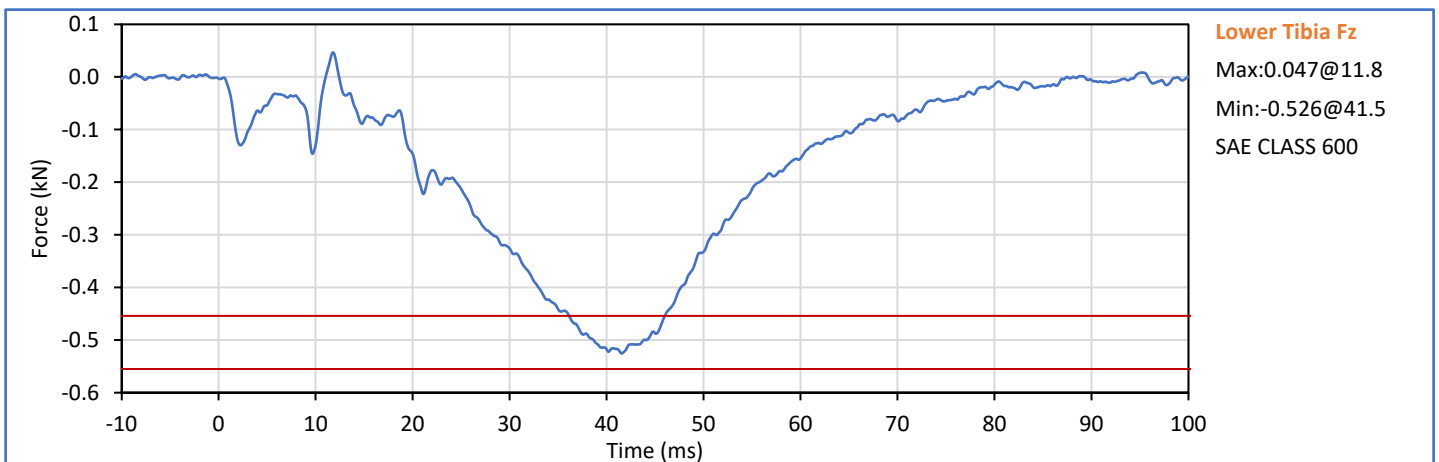
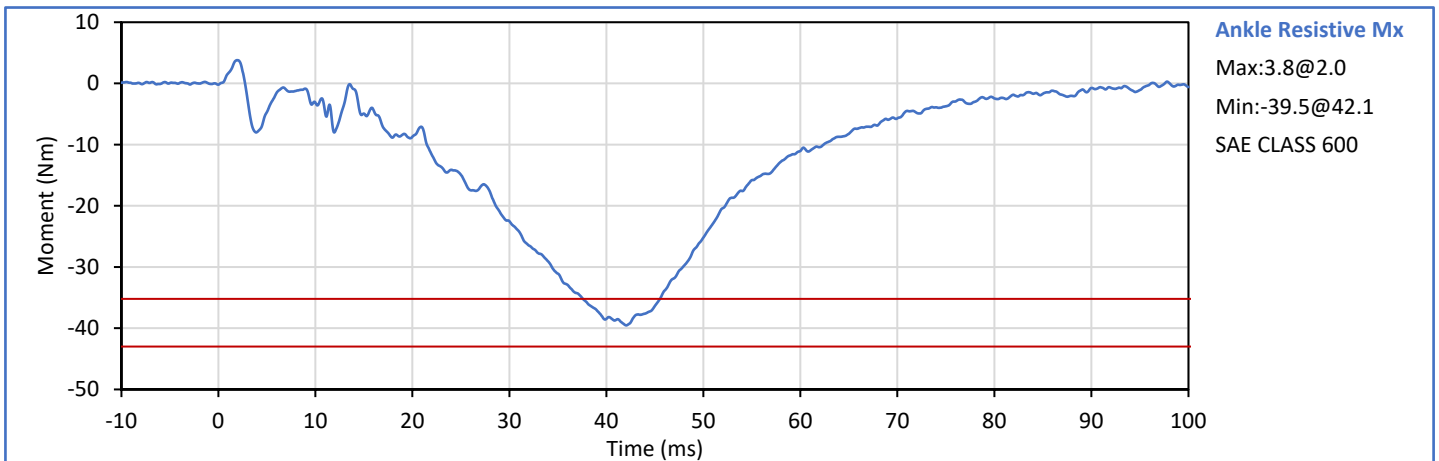
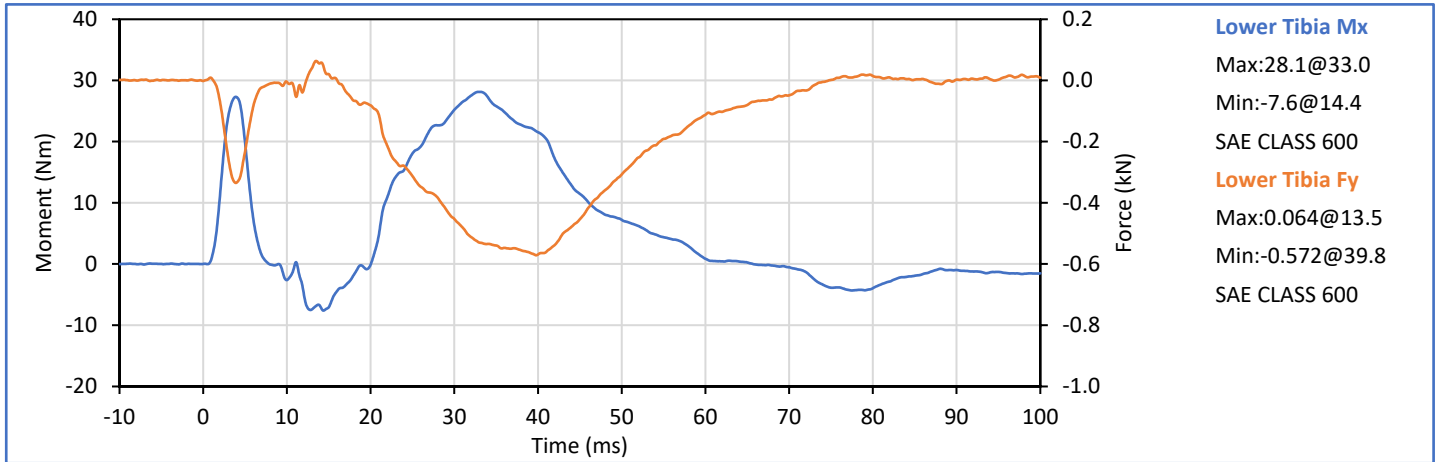


Technician: *J. Hernandez*  
 J. Hernandez


Approved By: *P. Puzzuto*  
 P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.5	Pass
Laboratory Relative Humidity	%	10	70	49	Pass
Pendulum Velocity	m/s	1.95	2.05	2.02	Pass
Peak Ankle Rx	deg	-37.9	-31.0	-37.1	Pass
Peak Ankle Resistive Mx	Nm	-43.0	-35.2	-39.5	Pass
Peak Lower Tibia Fz	kN	-0.555	-0.454	-0.526	Pass
<b>NHTSA Corridor 2019-05</b>				Overall Test Results	Pass

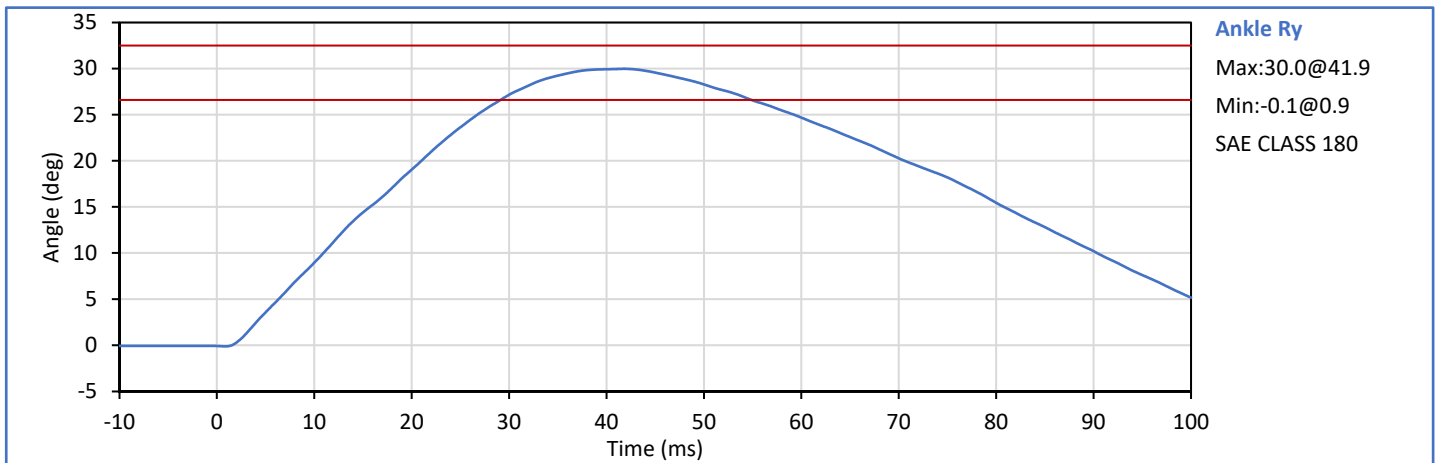


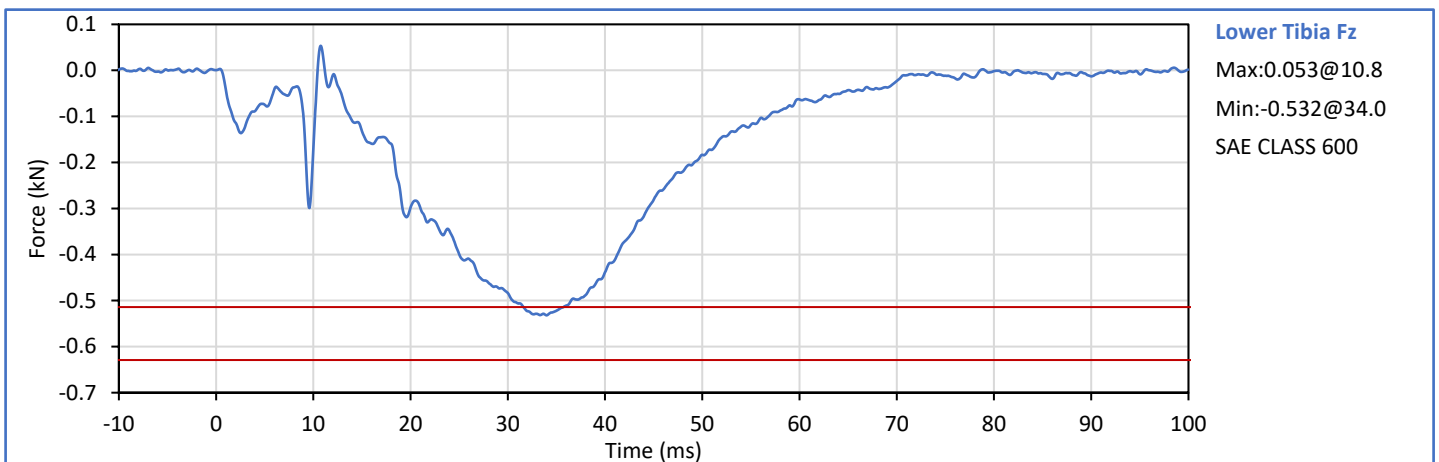
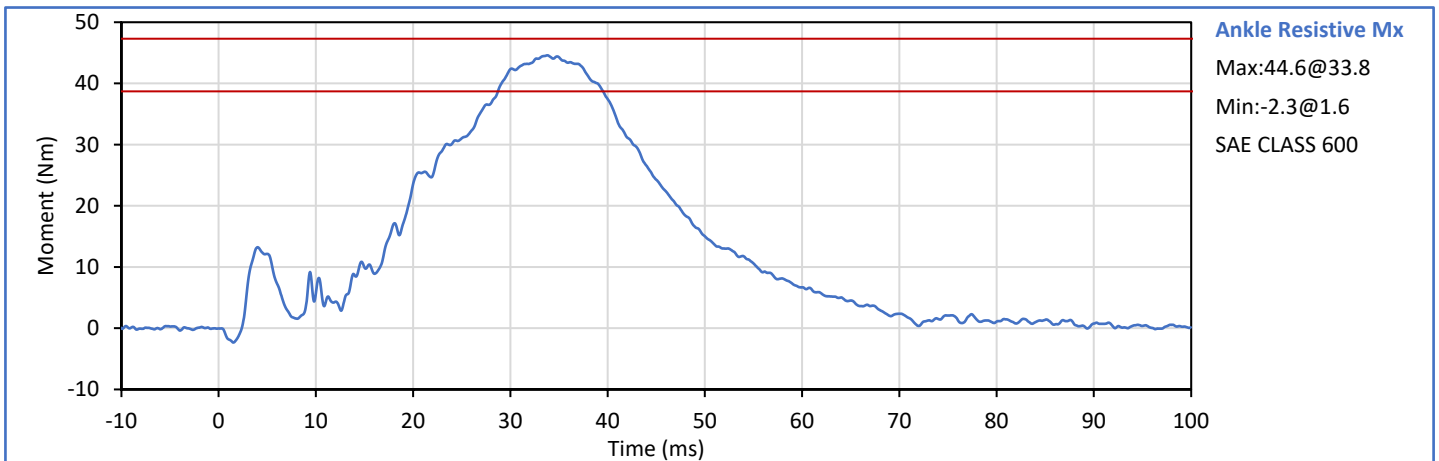
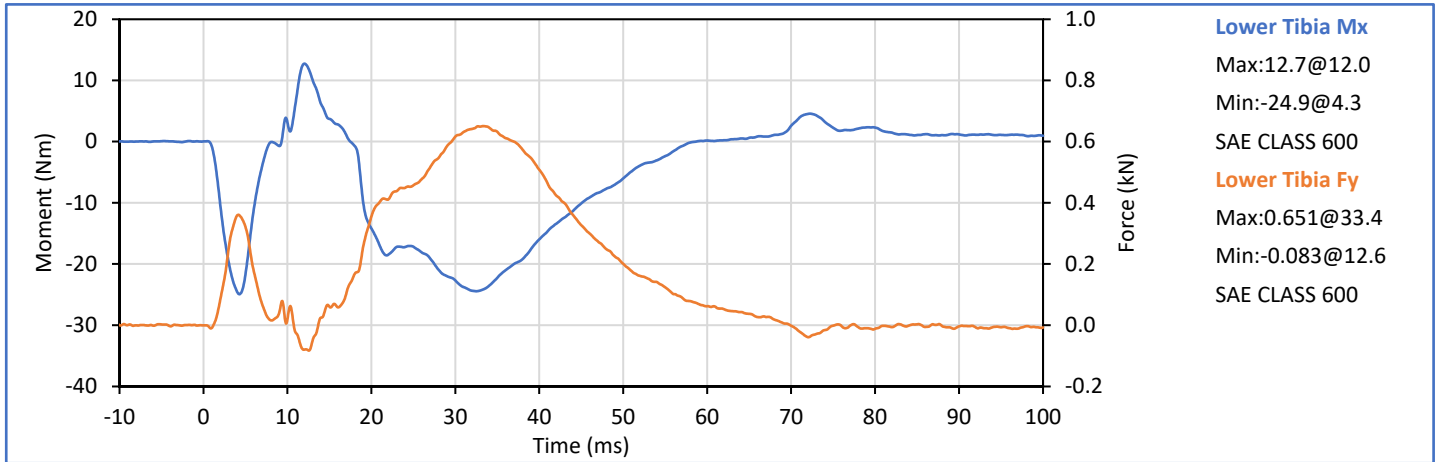


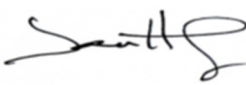
Technician:   
 J. Hernandez


Approved By:   
 P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.5	Pass
Laboratory Relative Humidity	%	10	70	49	Pass
Pendulum Velocity	m/s	1.95	2.05	2.01	Pass
Peak Ankle Rx	deg	26.6	32.5	30.0	Pass
Peak Ankle Resistive Mx	Nm	38.7	47.3	44.6	Pass
Peak Lower Tibia Fz	kN	-0.629	-0.514	-0.532	Pass
NHTSA Corridor 2019-05				Overall Test Results	Pass

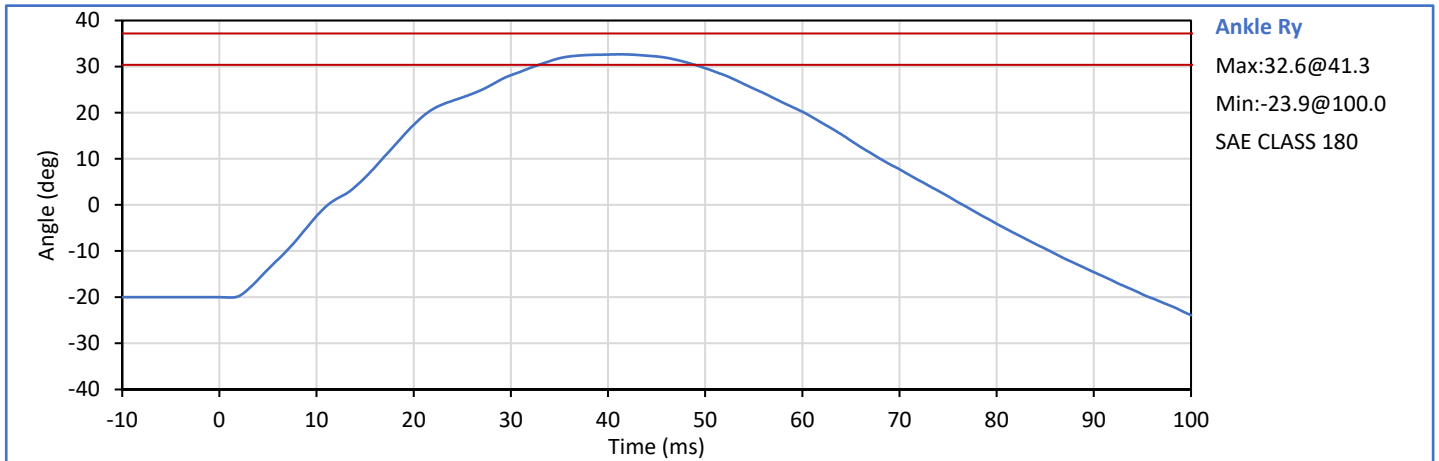


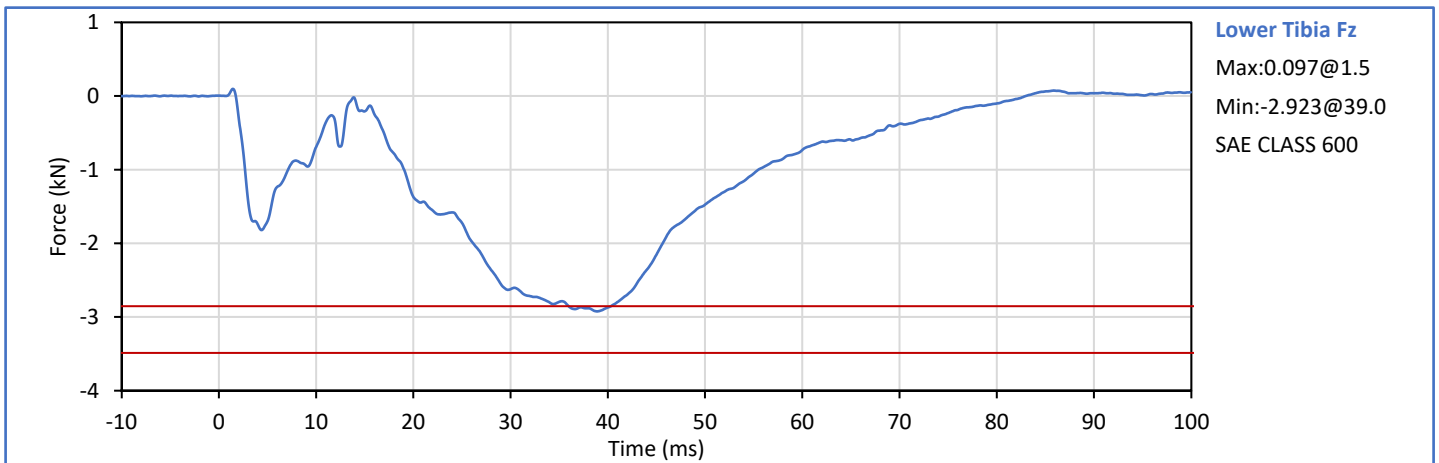
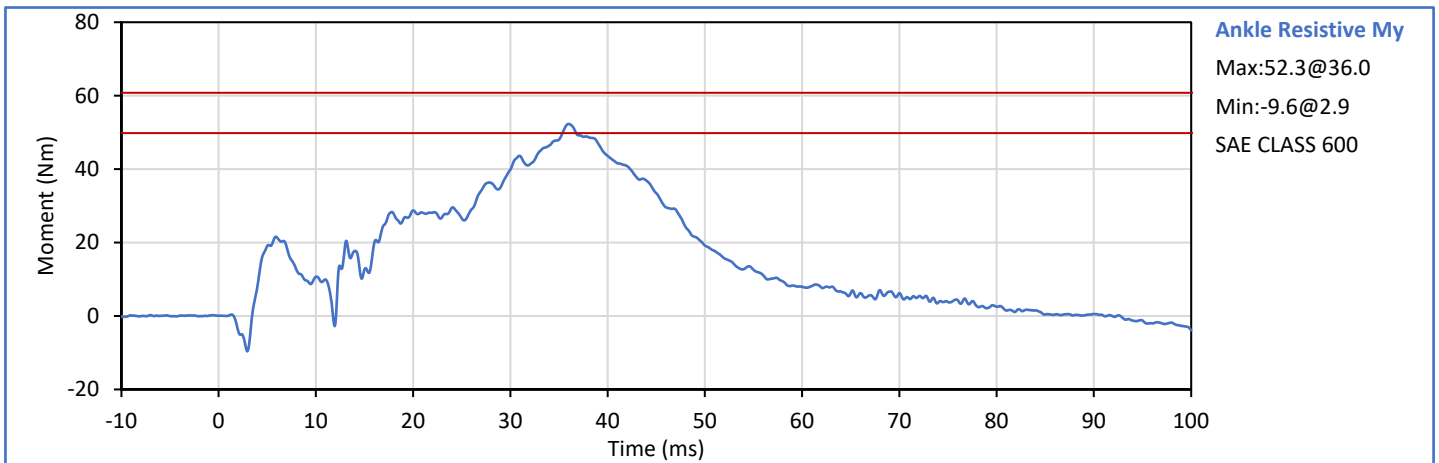
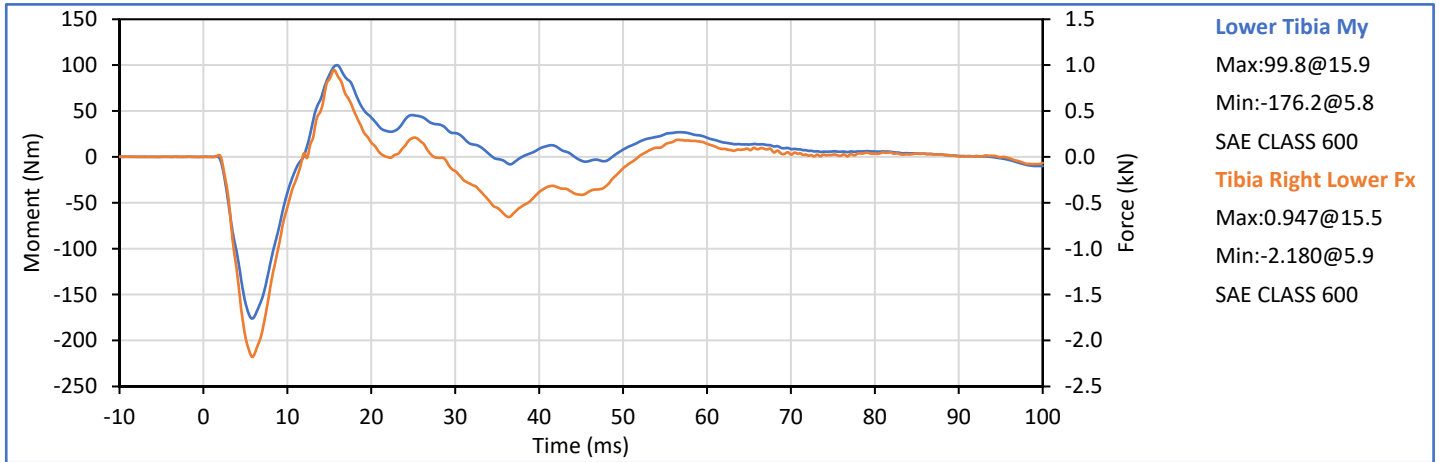


Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	25	Pass
Pendulum Velocity	m/s	4.95	5.05	4.98	Pass
Peak Ankle Ry	deg	30.4	37.2	32.6	Pass
Peak Ankle Resistive Moment	Nm	49.8	60.8	52.3	Pass
Peak Lower Tibia Fz	kN	-3.487	-2.853	-2.923	Pass
NHTSA Corridor 2019-05				Overall Test Results	Pass

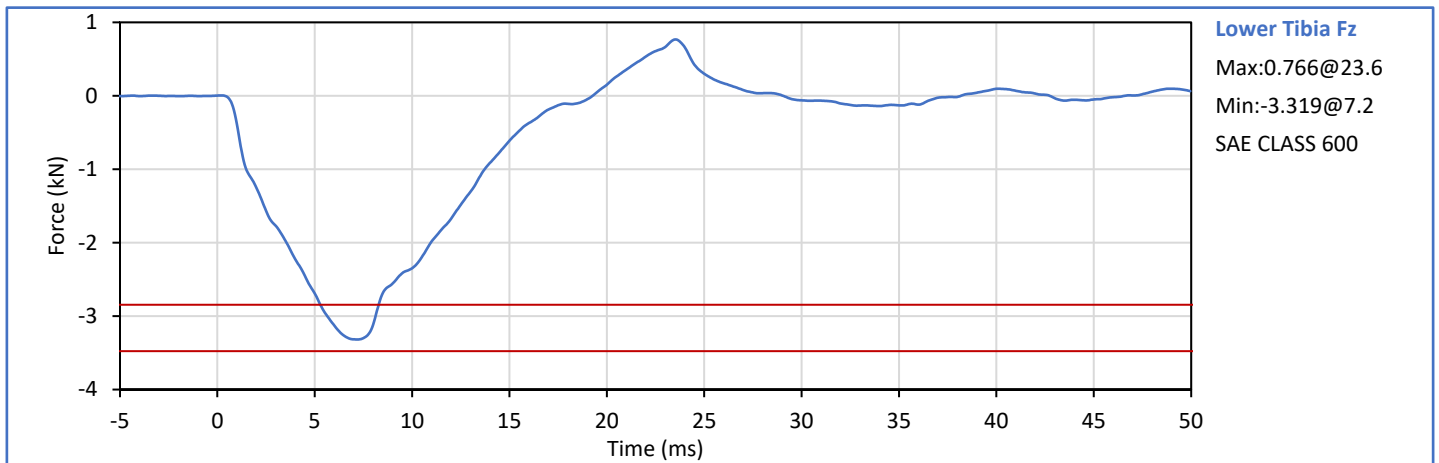


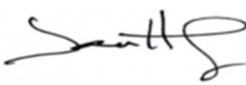


Technician: J. Hernandez

Approved By: P. Puzzuto

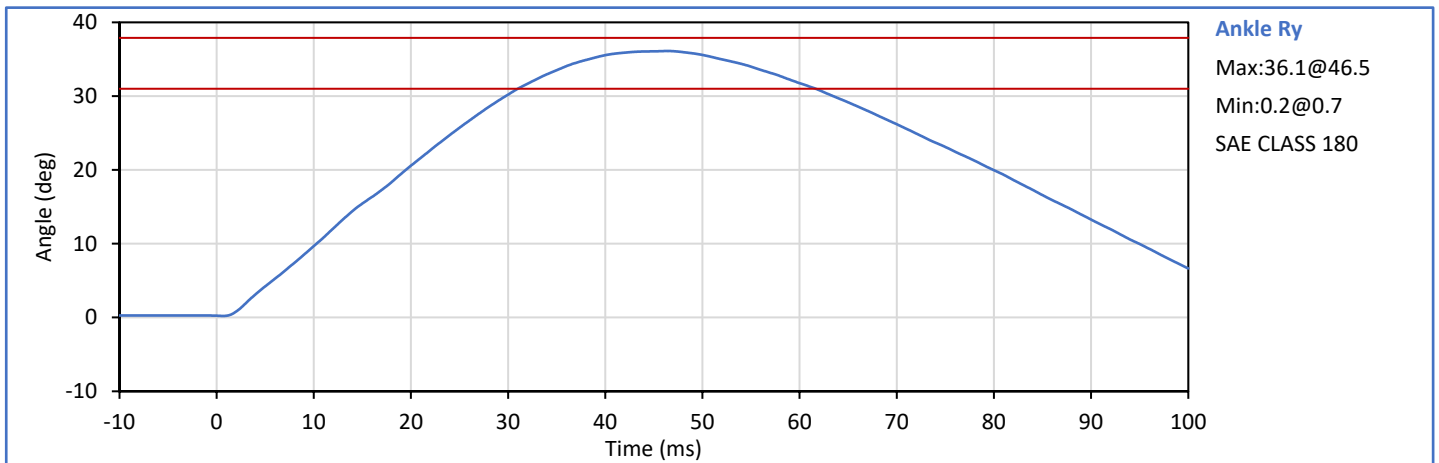
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Laboratory Temperature	°C	20.6	22.2	20.6	Pass
Laboratory Relative Humidity	%	10	70	47	Pass
Pendulum Velocity	m/s	3.95	4.05	3.99	Pass
Peak Lower Tibia Fz	kN	-3.478	-2.846	-3.319	Pass
<b>NHTSA Corridor 2019-05</b>				<b>Overall Test Results</b>	<b>Pass</b>

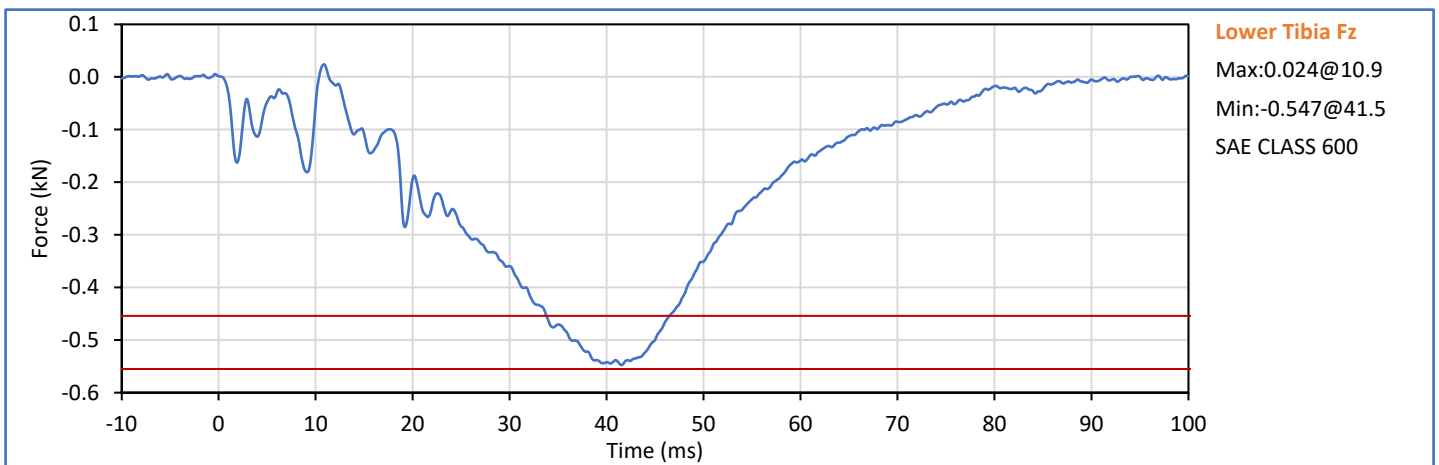
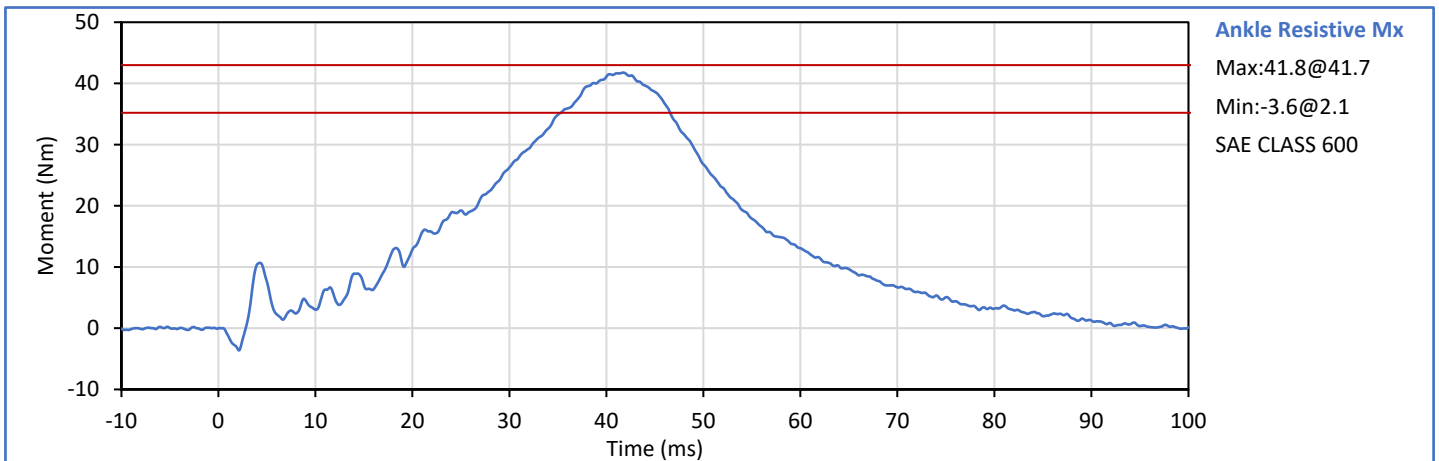
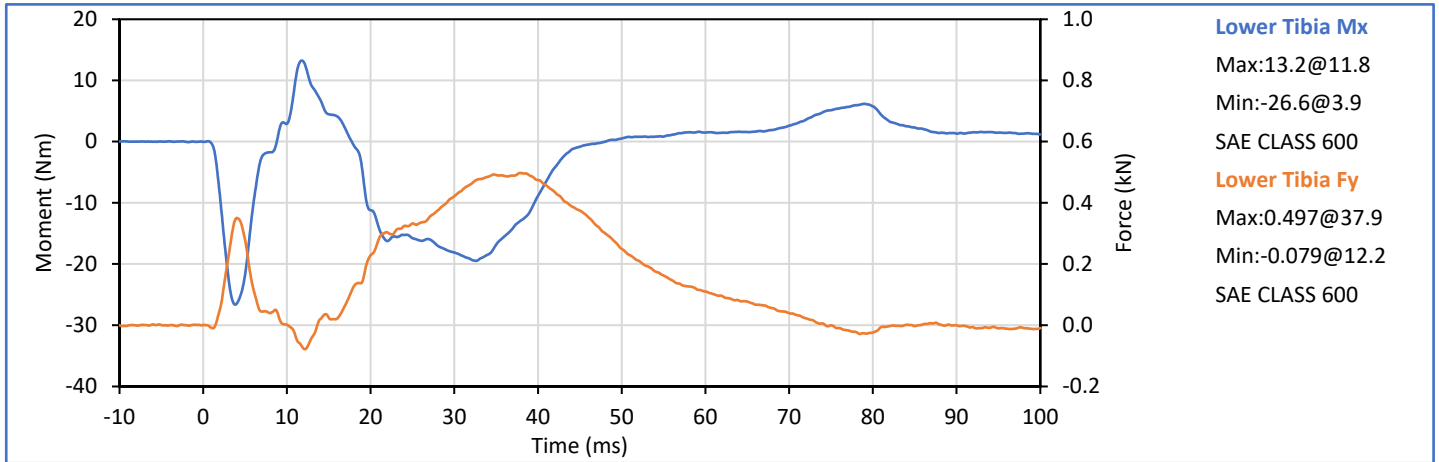


Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	24	Pass
Pendulum Velocity	m/s	1.95	2.05	2.04	Pass
Peak Ankle Rx	deg	31.0	37.9	36.1	Pass
Peak Ankle Resistive Mx	Nm	35.2	43.0	41.8	Pass
Peak Lower Tibia Fz	kN	-0.555	-0.454	-0.547	Pass
NHTSA Corridor 2019-05				Overall Test Results	Pass

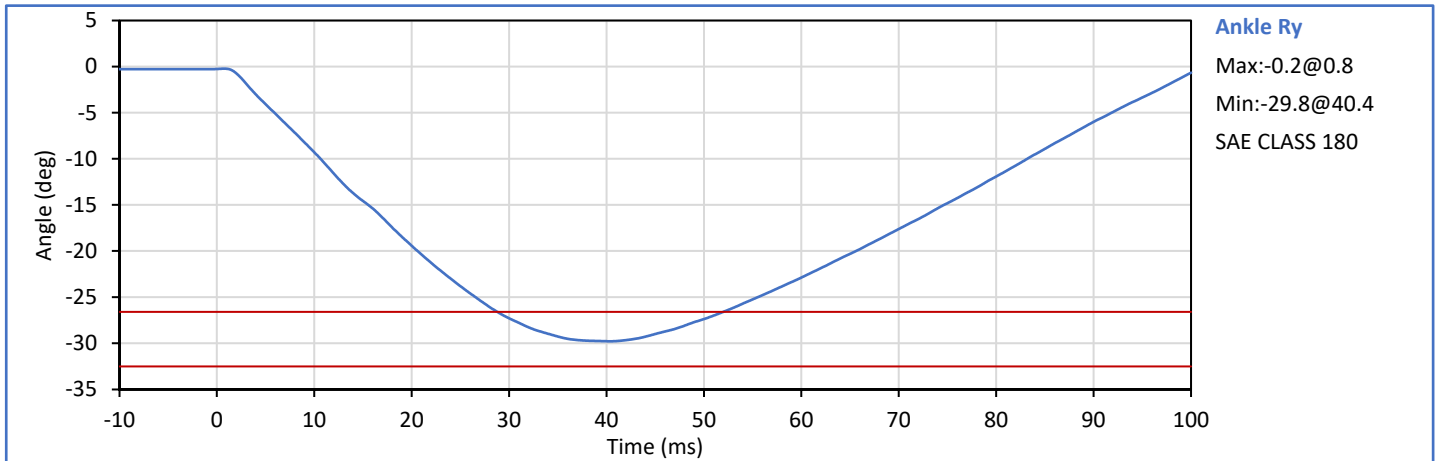


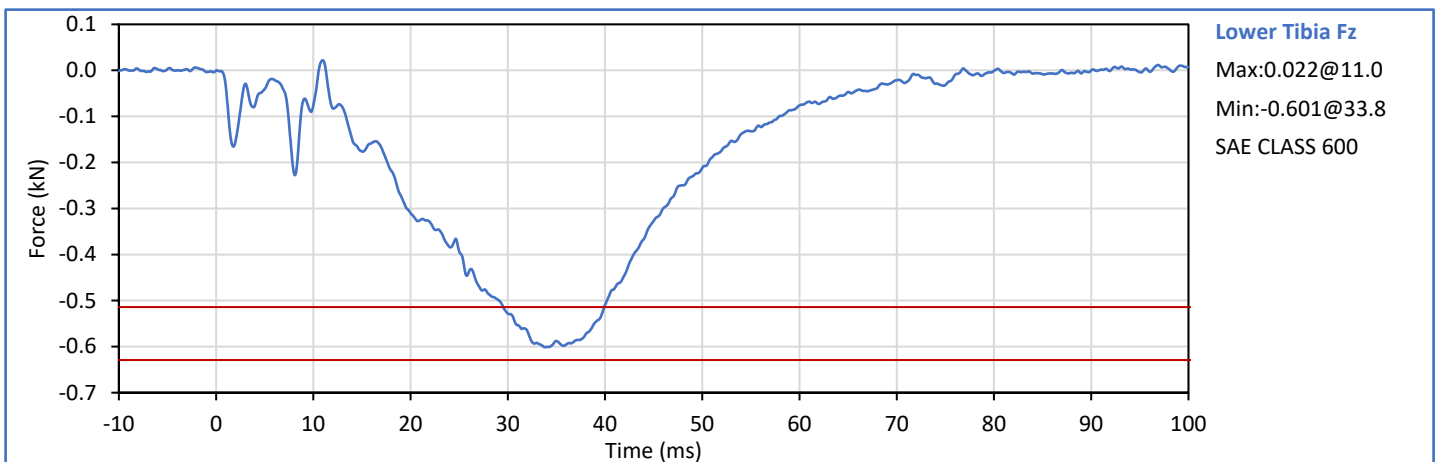
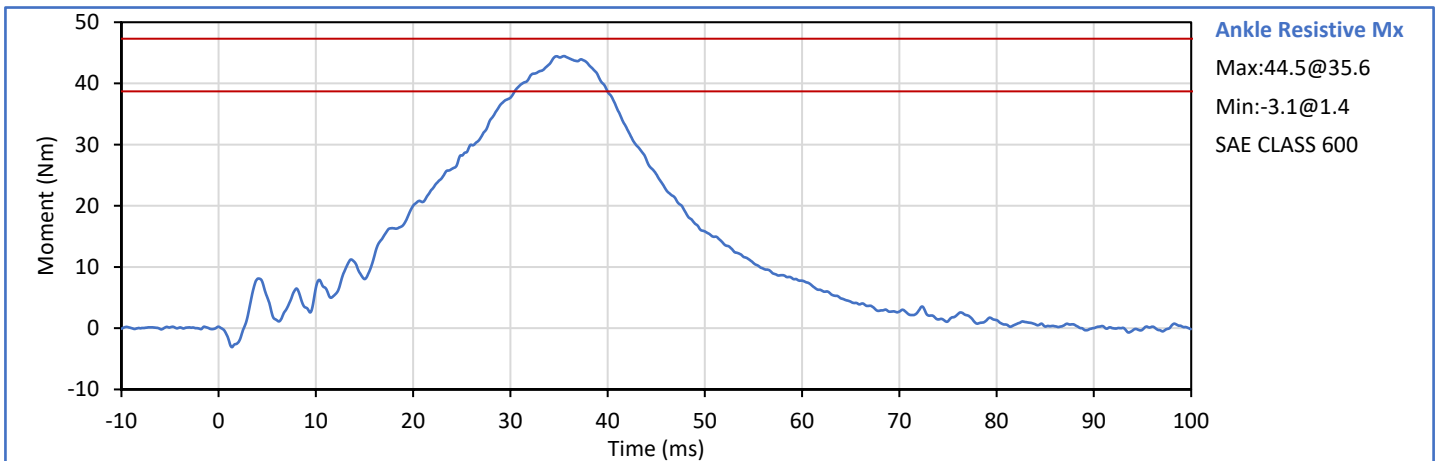
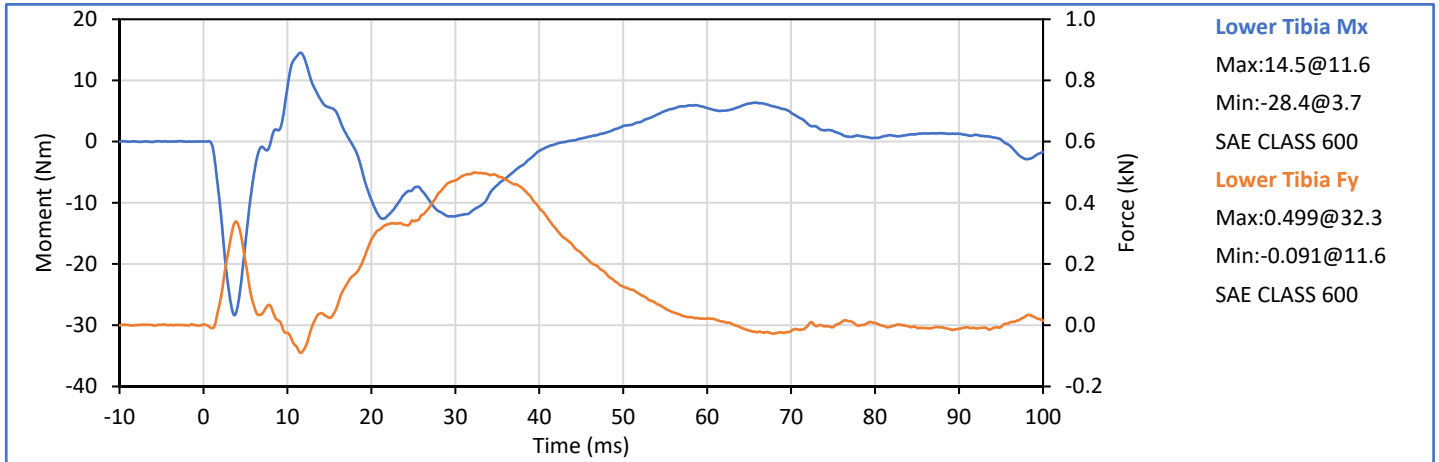


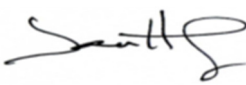
Technician: J. Hernandez

Approved By: P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	51	Pass
Pendulum Velocity	m/s	1.95	2.05	2.02	Pass
Peak Ankle Rx	deg	-32.5	-26.6	-29.8	Pass
Peak Ankle Resistive Mx	Nm	38.7	47.3	44.5	Pass
Peak Lower Tibia Fz	kN	-0.629	-0.514	-0.601	Pass
NHTSA Corridor 2019-05				Overall Test Results	Pass





Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

**APPENDIX D**  
**ATD Qualification and Performance Verification**  
**Hybrid III 50th Percentile Male ATD**  
**Pre-Test Qualification (Full) S/N: 168**

ATD Serial No.: 168

Test Date: 2021-07-27

Dummy Item	Inspect for	Comments	Damage	OK
Entire ATD	Perform general cleaning			✓
Outer Skin	Gashes, rips, cracks			✓
Head	Ballast secure			✓
	General appearance			✓
Neck bracket	Upper neck firmly attached to lower bracket			✓
Neck	Broken or cracked rubber			✓
	Looseness at the condyle joint			✓
Nodding block	Cracked or out of position			✓
Lumbar Spine	Broken or cracked rubber			✓
Ribs	Broken or bent ribs			✓
	Broken or bent rib supports			✓
	Damping material separated or cracked			✓
	Rubber bumpers in place			✓
Chest Displ. Assembly	Bent shaft			✓
	Slider arm riding in track			✓
Sensors	Check cables for cuts, tears			✓
	Check for damaged insulation			✓
Accelerometer Mounting	Head mounting secure			✓
	Chest mounting secure			✓
Knees	Skin condition			✓
	Insert (do not remove)			✓
	Casting			✓
Limbs	Normal movement and adjustment			✓
Knee Sliders	Wires intact			✓
	Rubber returned to "resting" position			✓
Pelvis	Broken			✓
Other	Describe below as needed			✓

Describe any repairs or replacement of parts or other findings:

No Problems Found

Technician: \_\_\_\_\_



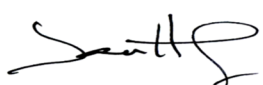
J. Hernandez


Approved By: \_\_\_\_\_



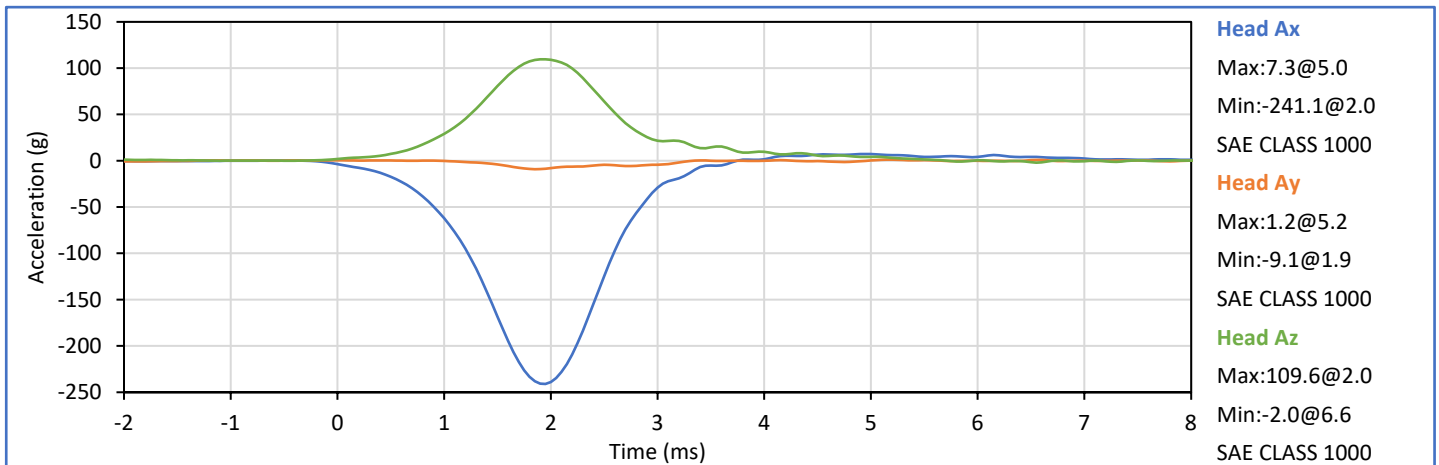
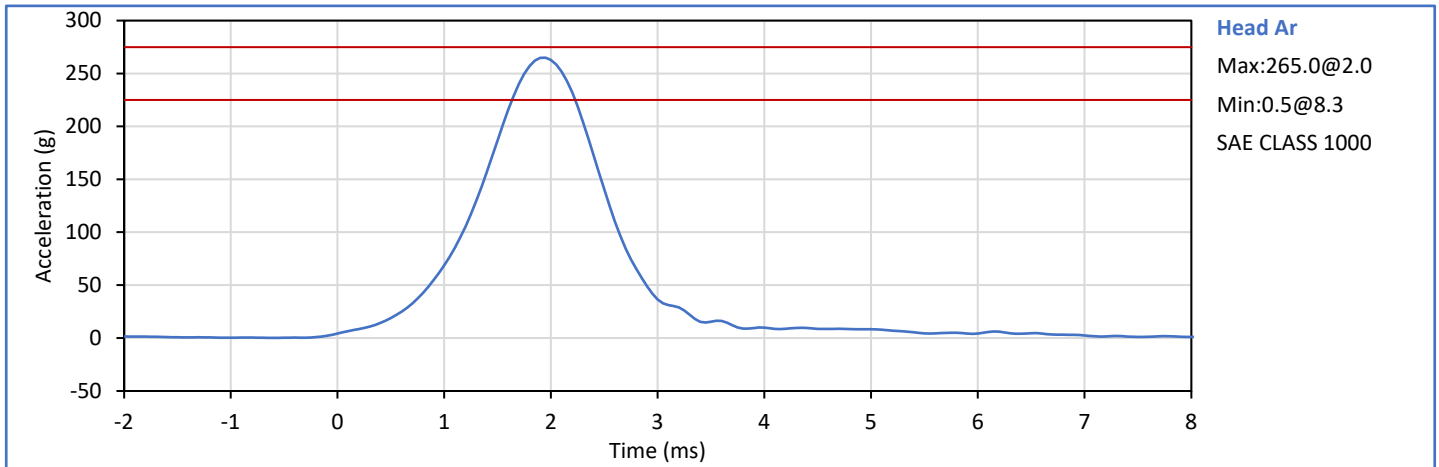
P. Puzzuto


Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Relative Humidity	%	10	70	55	Pass
A - Total sitting height	mm	879	889	883	Pass
B - Shoulder pivot height	mm	505	521	516	Pass
C - 'H' point height	mm	84	89	87	Pass
D - 'H' point location from backline	mm	135	140	138	Pass
E - Shoulder pivot from backline	mm	84	94	88	Pass
F - Thigh clearance	mm	140	155	148	Pass
G - Back of elbow to wrist pivot	mm	290	305	296	Pass
H - Head back to backline	mm	41	46	43	Pass
I - Shoulder to elbow length	mm	330	345	336	Pass
J - Elbow rest height	mm	190	211	202	Pass
K - Buttock to knee length	mm	579	604	587	Pass
L - Popliteal length	mm	429	455	449	Pass
M - Knee pivot height	mm	485	500	492	Pass
N - Buttock popliteal length	mm	452	477	468	Pass
O - Chest depth without jacket	mm	213	229	219	Pass
P - Foot length	mm	251	267	259	Pass
V - Shoulder breadth	mm	422	437	430	Pass
W - Foot breadth	mm	91	107	100	Pass
Y - Chest circum. (w/chest jacket)	mm	970	1001	983	Pass
Z - Waist circum.	mm	836	866	848	Pass
AA - Location for chest circum.	mm	429	434	433	Pass
BB - Location for waist circum.	mm	226	231	229	Pass
				Overall Test Results	Pass


Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

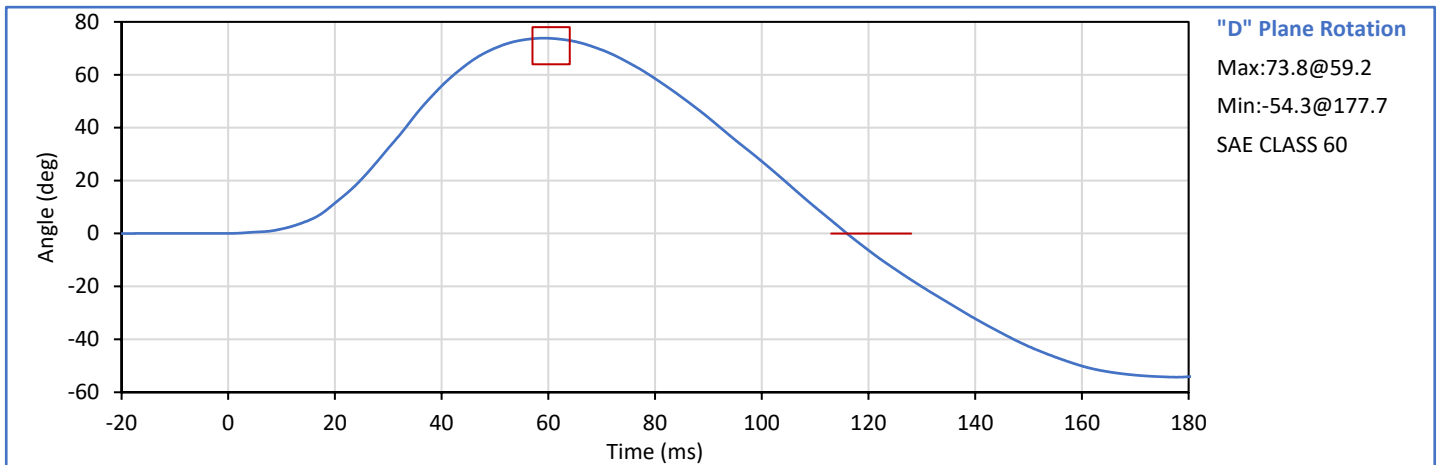
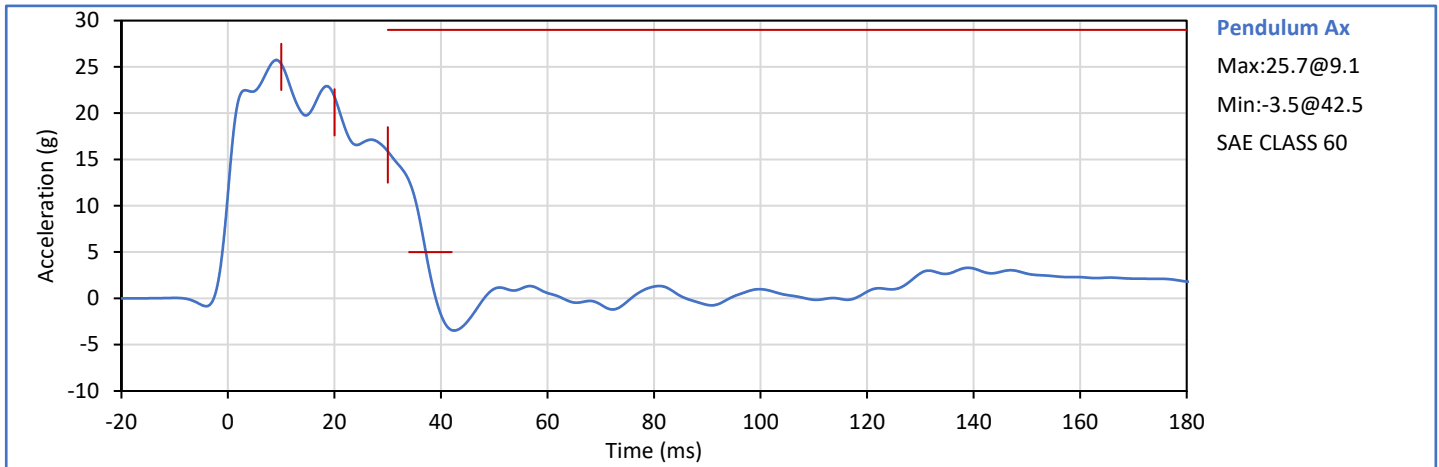
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.7	Pass
Laboratory Relative Humidity	%	10	70	56	Pass
Peak Resultant Acceleration	g	225.0	275.0	265.0	Pass
Peak Lateral Acceleration	g	-15.0	15.0	-9.1	Pass
Oscillations After Main Pulse	%	0.0	10.0	0.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
J. Hernandez

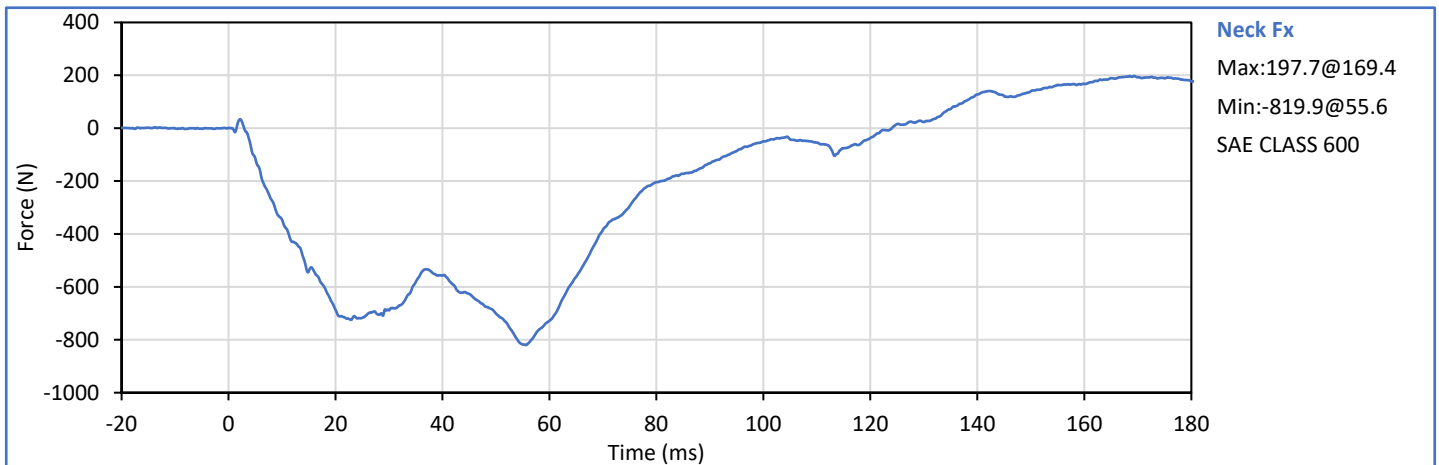
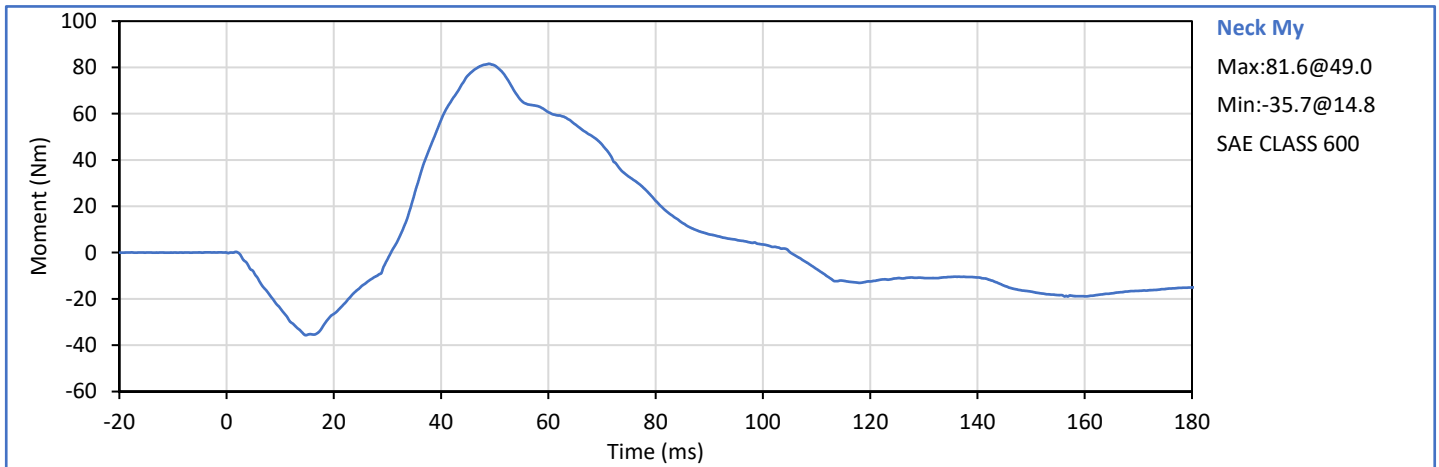
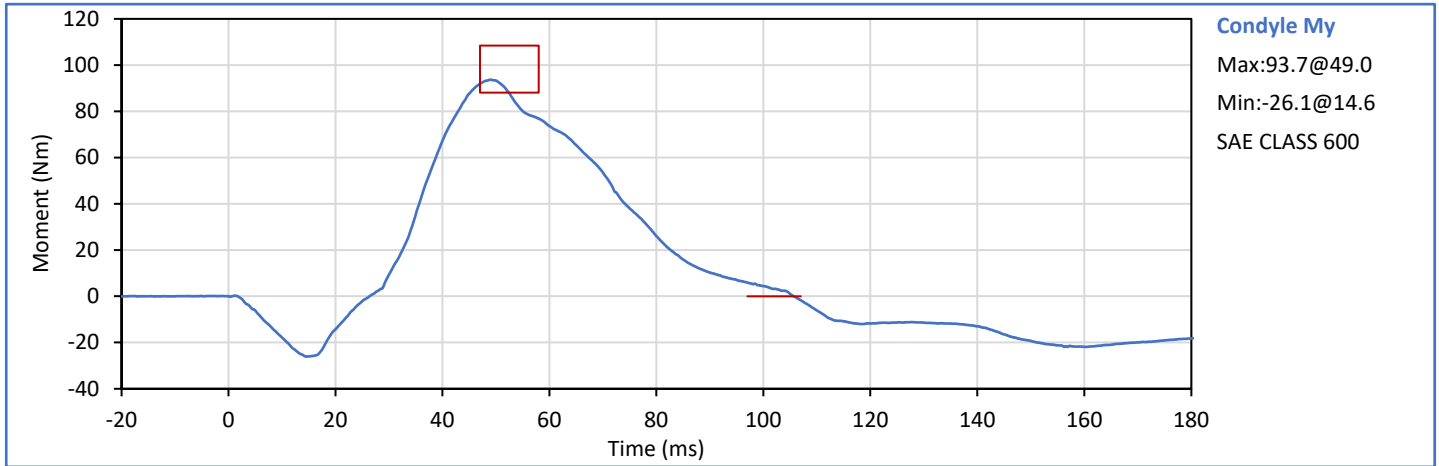
Approved By:   
C-41 P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	6.89	7.13	7.00	Pass
Pendulum Deceleration at 10 ms	g	22.5	27.5	25.3	Pass
Pendulum Deceleration at 20 ms	g	17.6	22.6	21.8	Pass
Pendulum Deceleration at 30 ms	g	12.5	18.5	15.9	Pass
Peak Pendulum Decel After 30 ms	g	0.0	29.0	15.9	Pass
Deceleration Decay to Cross 5g	ms	34.0	42.0	37.1	Pass
"D" Plane Rotation peak	deg	64.0	78.0	73.8	Pass
	ms	57.0	64.0	59.2	Pass
"D" Plane Rotation Decay to Zero	ms	113.0	128.0	116.0	Pass
Moment About Occipital Condyle	Nm	88.1	108.5	93.7	Pass
	ms	47.0	58.0	49.0	Pass
Moment Decay, Peak to Zero	ms	97.0	107.0	105.7	Pass
Overall Test Results				Pass	Pass

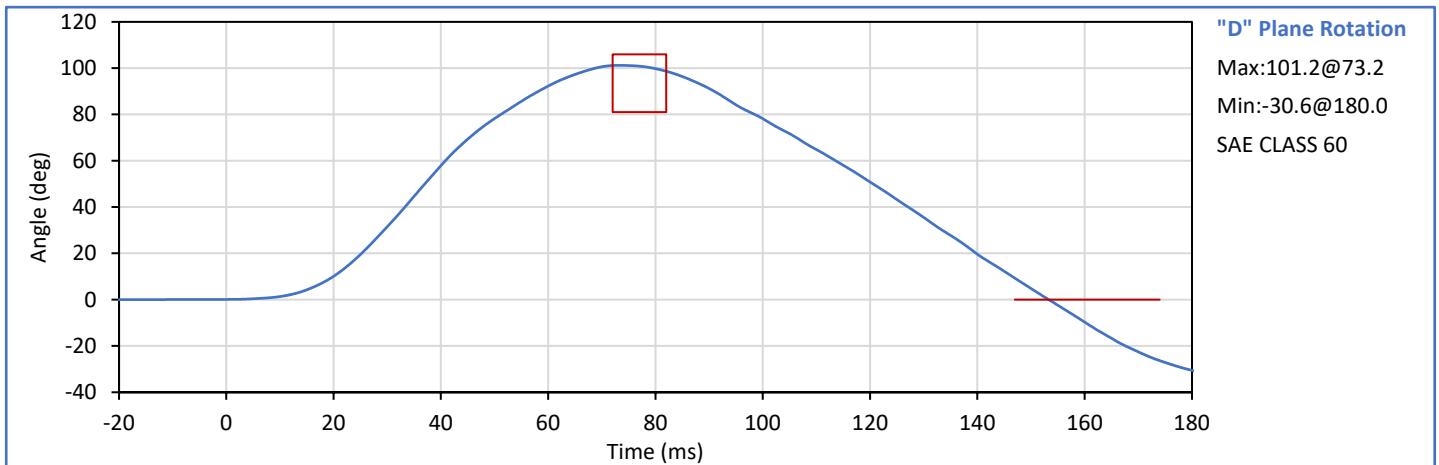
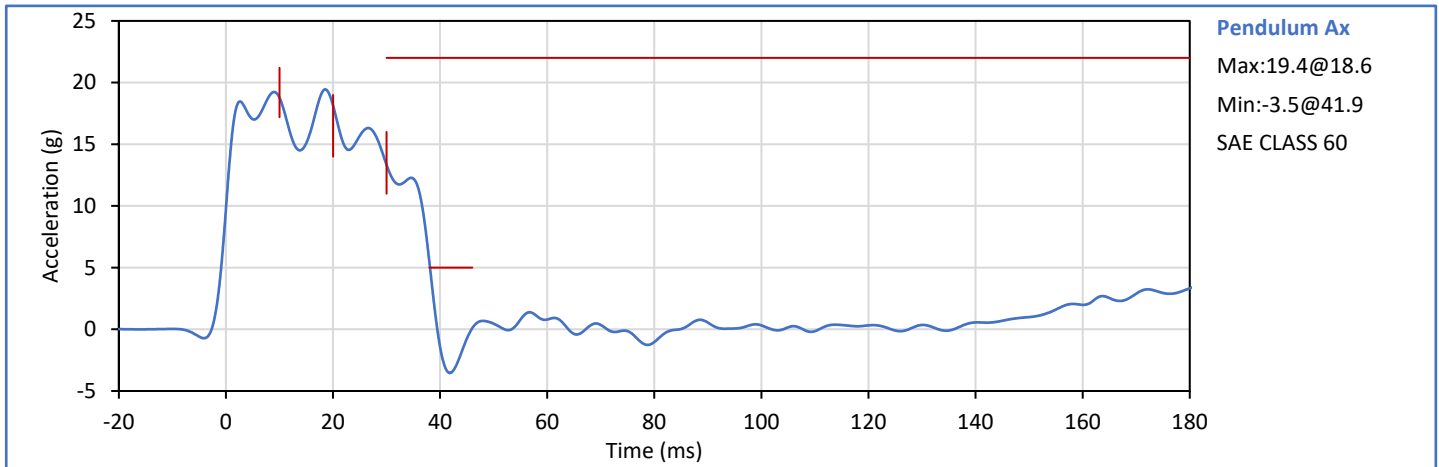


Technician: *J. Hernandez*  
J. Hernandez

Approved By: *P. Puzzuto*  
C-42 P. Puzzuto

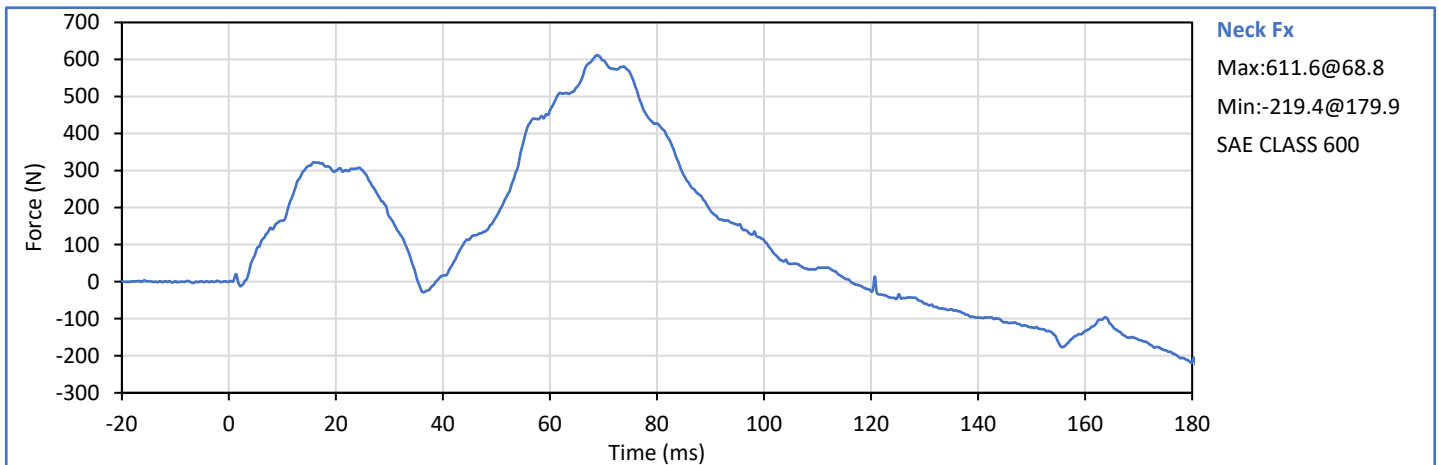
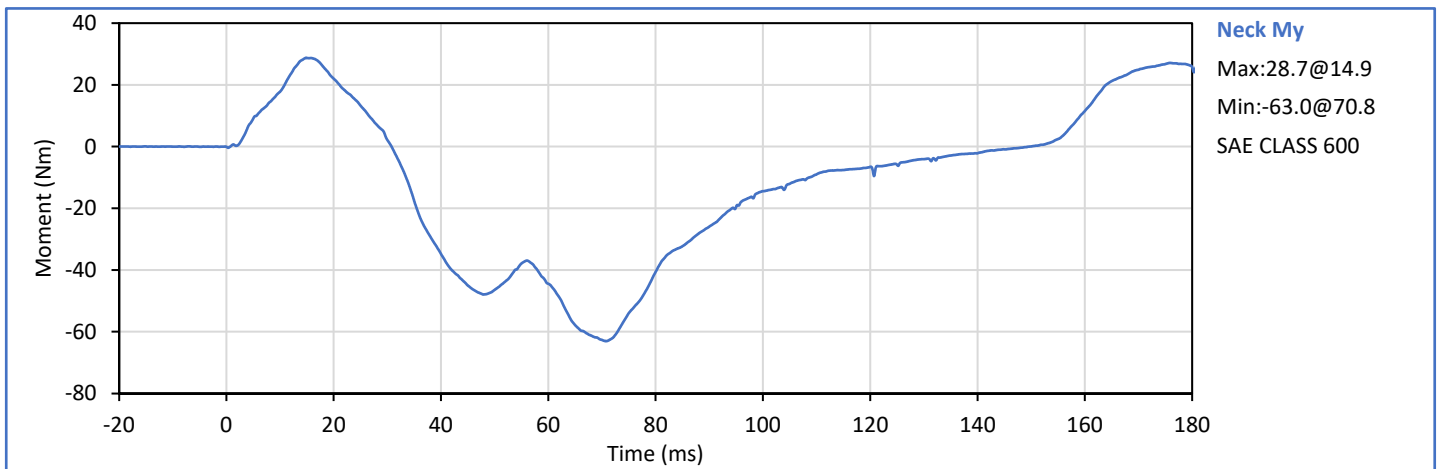
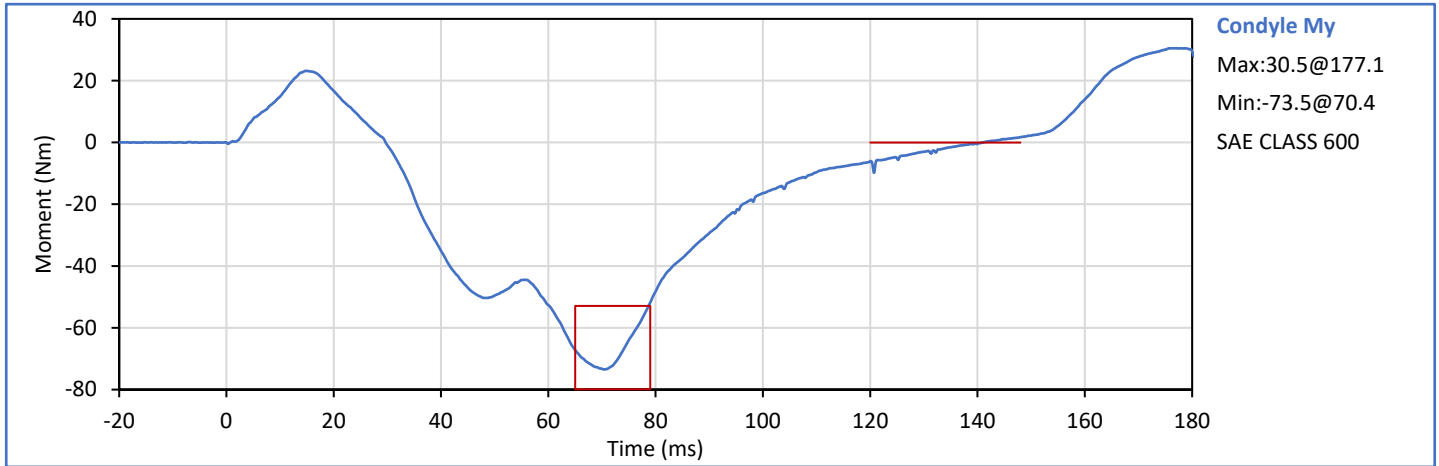


Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	5.94	6.19	6.11	Pass
Pendulum Deceleration at 10 ms	g	17.2	21.2	18.8	Pass
Pendulum Deceleration at 20 ms	g	14.0	19.0	18.2	Pass
Pendulum Deceleration at 30 ms	g	11.0	16.0	13.3	Pass
Peak Pendulum Decel After 30 ms	g	0.0	22.0	13.3	Pass
Deceleration Decay to Cross 5g	ms	38.0	46.0	38.1	Pass
"D" Plane Rotation peak	deg	81.0	106.0	101.2	Pass
	ms	72.0	82.0	73.2	Pass
"D" Plane Rotation Decay to Zero	ms	147.0	174.0	153.4	Pass
Moment About Occipital Condyle	Nm	-79.9	-52.9	-73.5	Pass
	ms	65.0	79.0	70.4	Pass
Moment Decay, Peak to Zero	ms	120.0	148.0	141.1	Pass
Overall Test Results				Pass	Pass

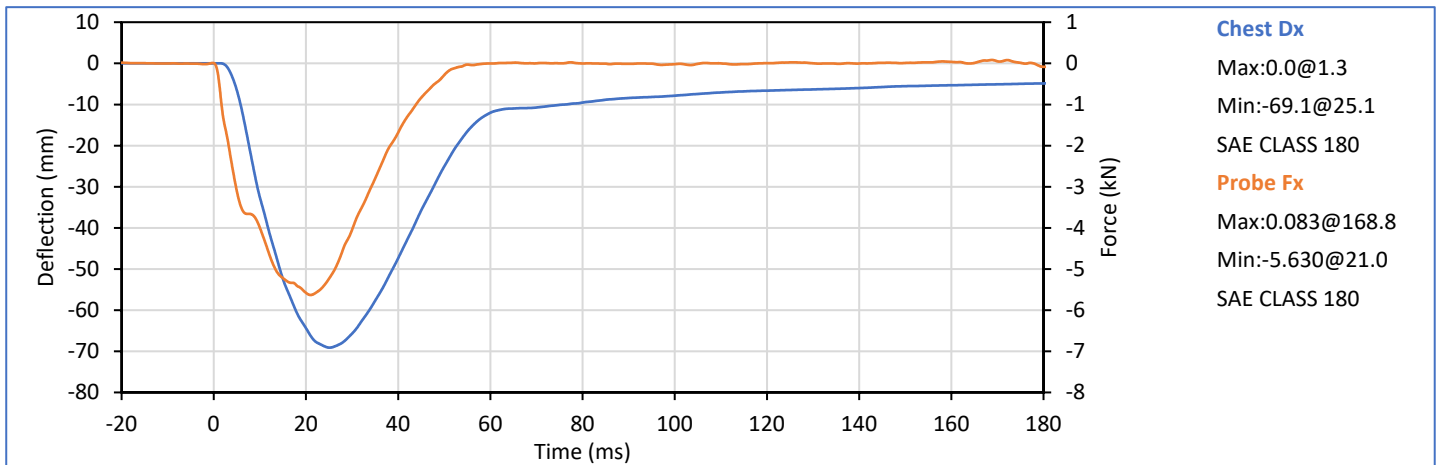
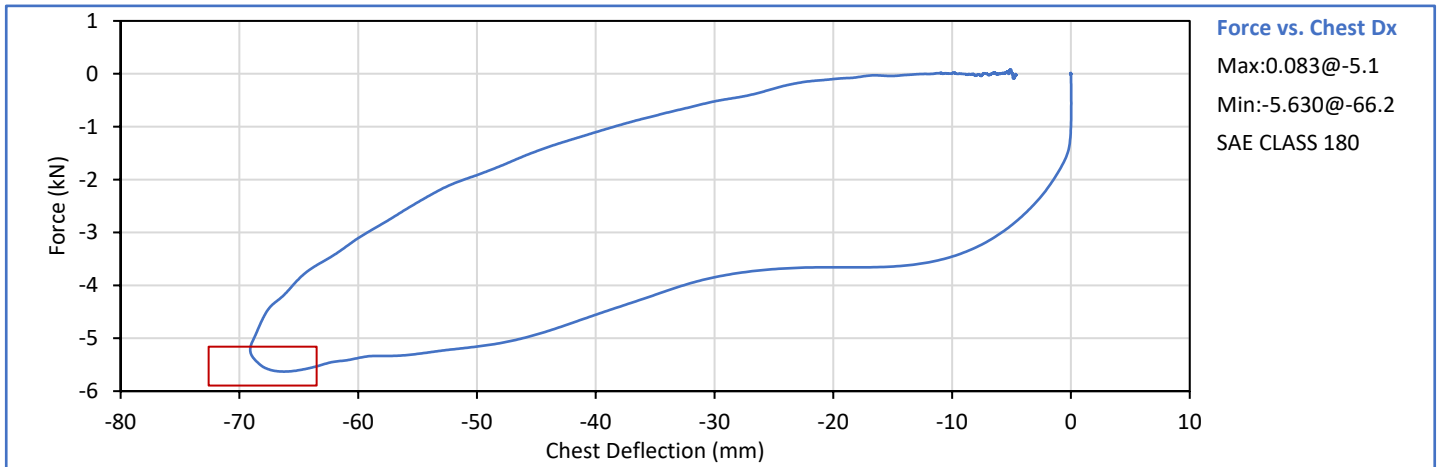


Technician: *J. Hernandez*  
J. Hernandez

Approved By: *P. Puzzuto*  
C-44 P. Puzzuto



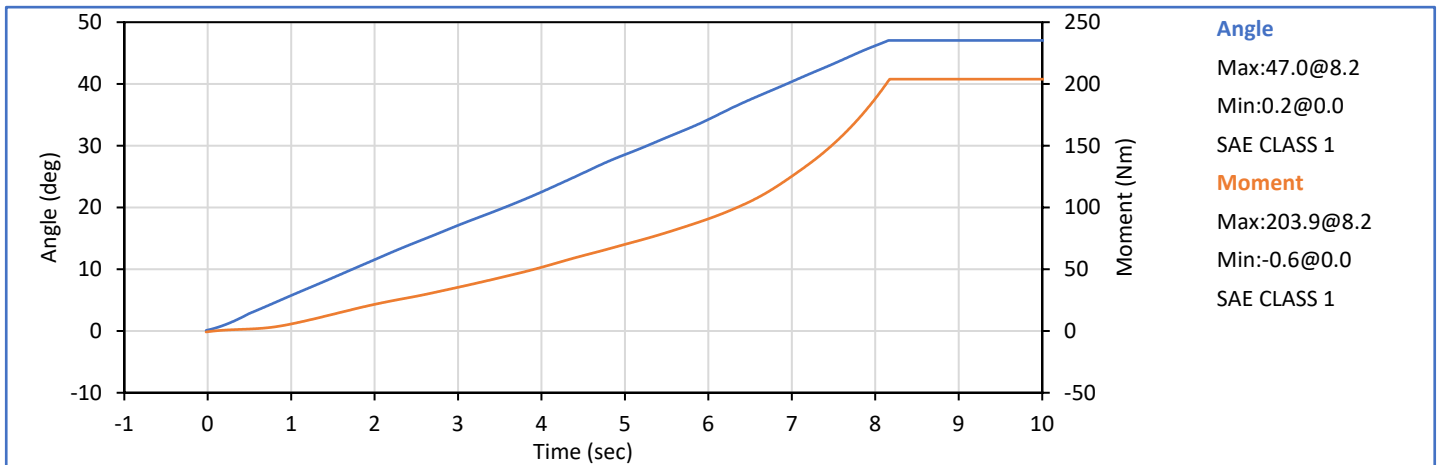
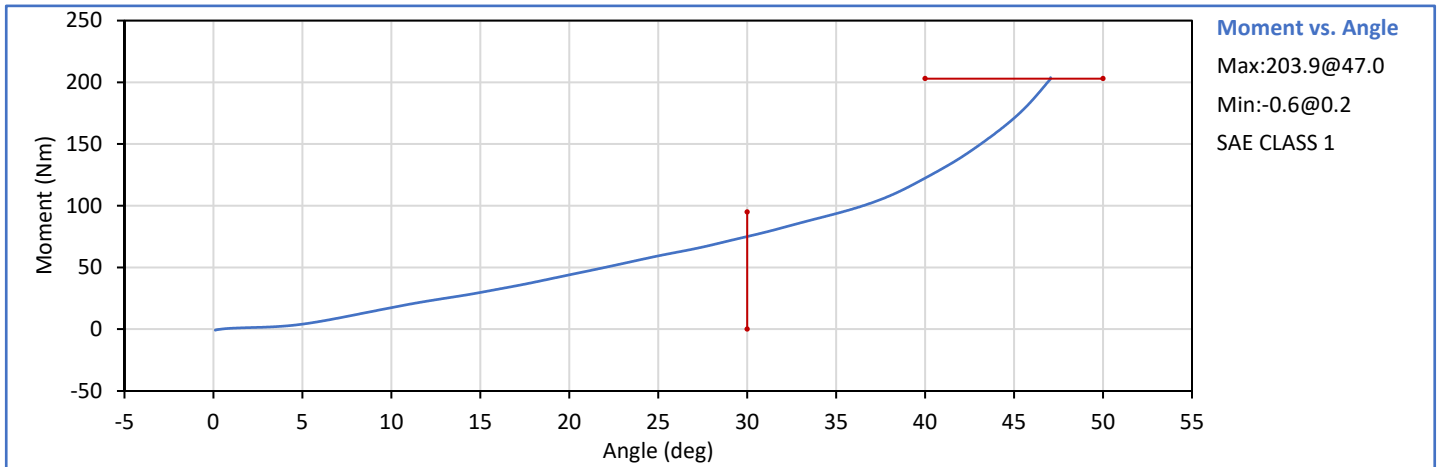
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	40	Pass
Probe Velocity	m/s	6.58	6.82	6.78	Pass
Peak Chest Deflection	mm	-72.6	-63.5	-69.1	Pass
Peak Probe Force	kN	-5.893	-5.159	-5.630	Pass
Internal Hysterisis	%	69.0	85.0	70.7	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

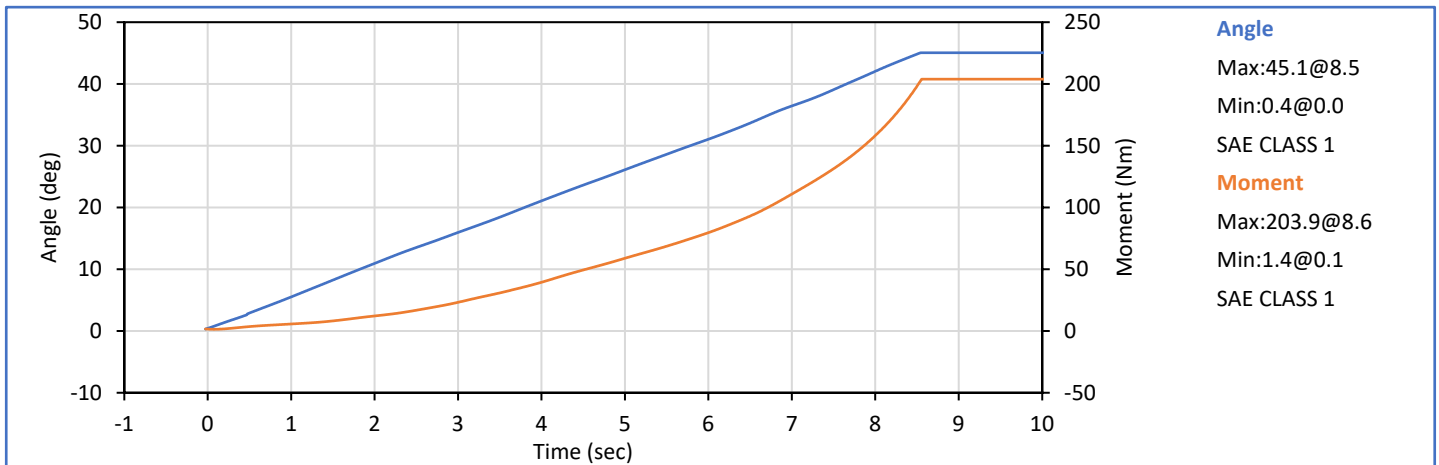
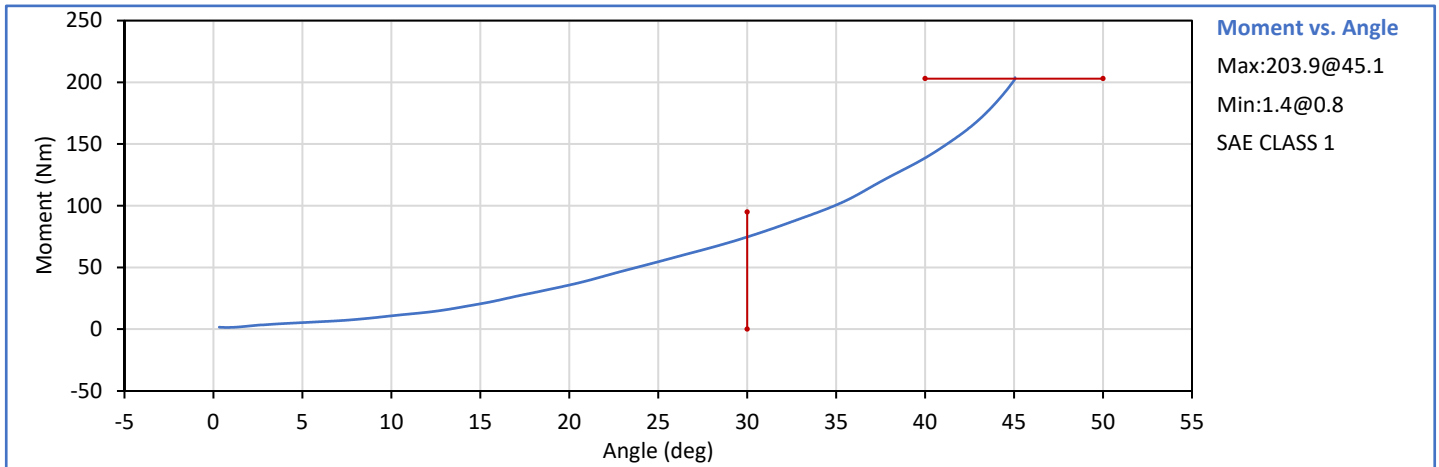
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Relative Humidity	%	10	70	46	Pass
Left Hip Rotation Rate	deg/s	5.0	10.0	5.8	Pass
Left Femur Torque at 30°	Nm	0.0	95.0	75.0	Pass
Left Hip Rotation at 203 Nm	deg	40.0	50.0	47.0	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

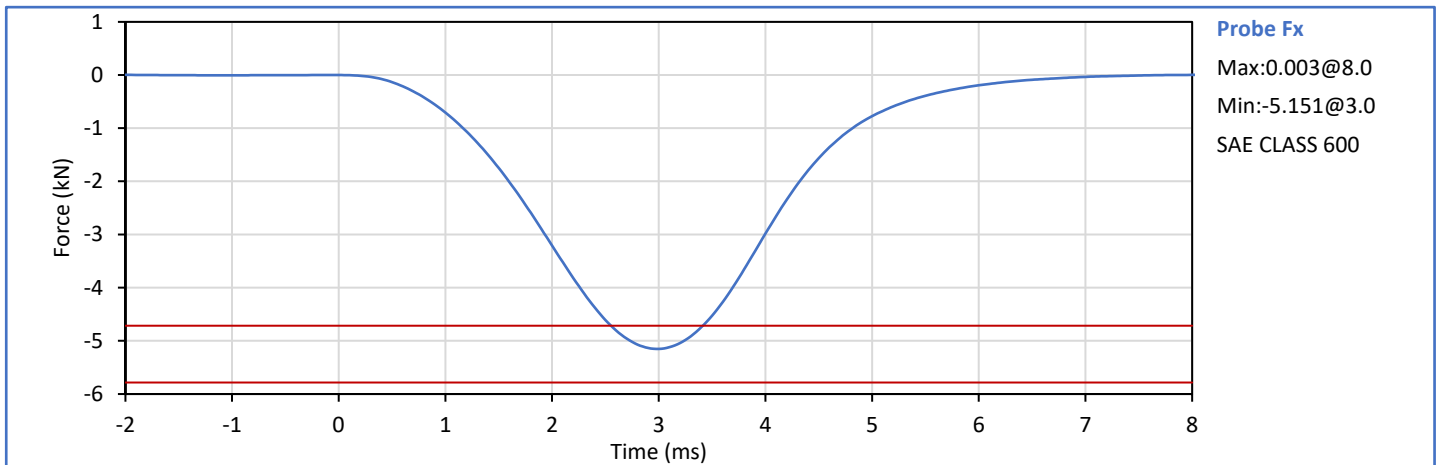
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Relative Humidity	%	10	70	46	Pass
Right Hip Rotation Rate	deg/s	5.0	10.0	5.2	Pass
Right Femur Torque at 30°	Nm	0.0	95.0	74.6	Pass
Right Hip Rotation at 203 Nm	deg	40.0	50.0	45.1	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

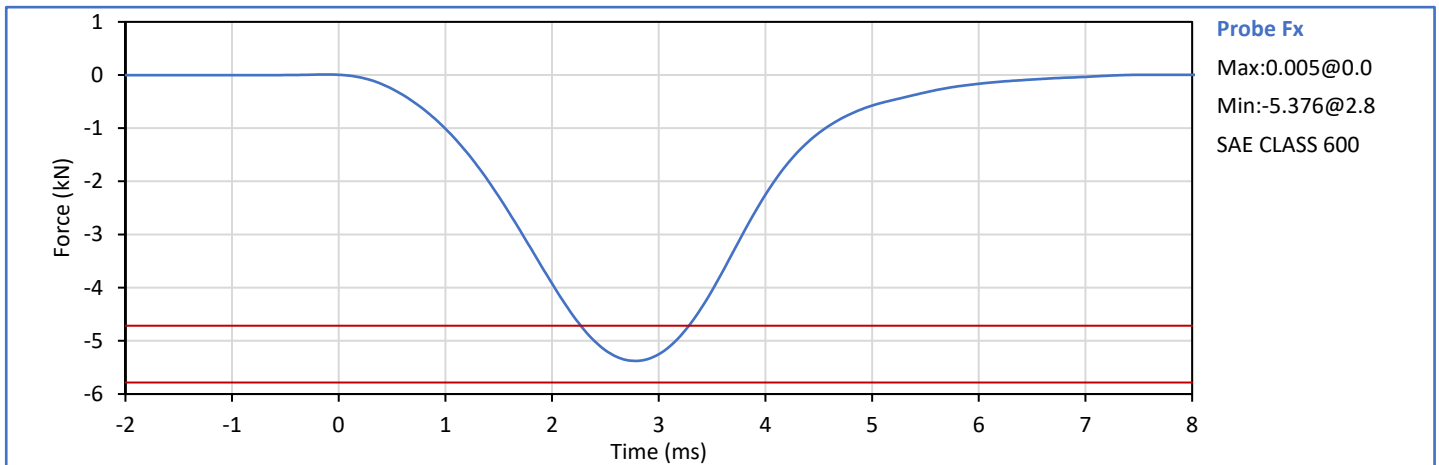
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.2	Pass
Laboratory Relative Humidity	%	10	70	55	Pass
Probe Velocity	m/s	2.070	2.130	2.097	Pass
Peak Resistive Force	kN	-5.782	-4.715	-5.151	Pass
Overall Test Results					Pass



Technician: *J. Hernandez*  
J. Hernandez

Approved By: *P. Puzzuto*  
C-49 P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.3	Pass
Laboratory Relative Humidity	%	10	70	55	Pass
Probe Velocity	m/s	2.070	2.130	2.091	Pass
Peak Resistive Force	kN	-5.782	-4.715	-5.376	Pass
Overall Test Results					Pass



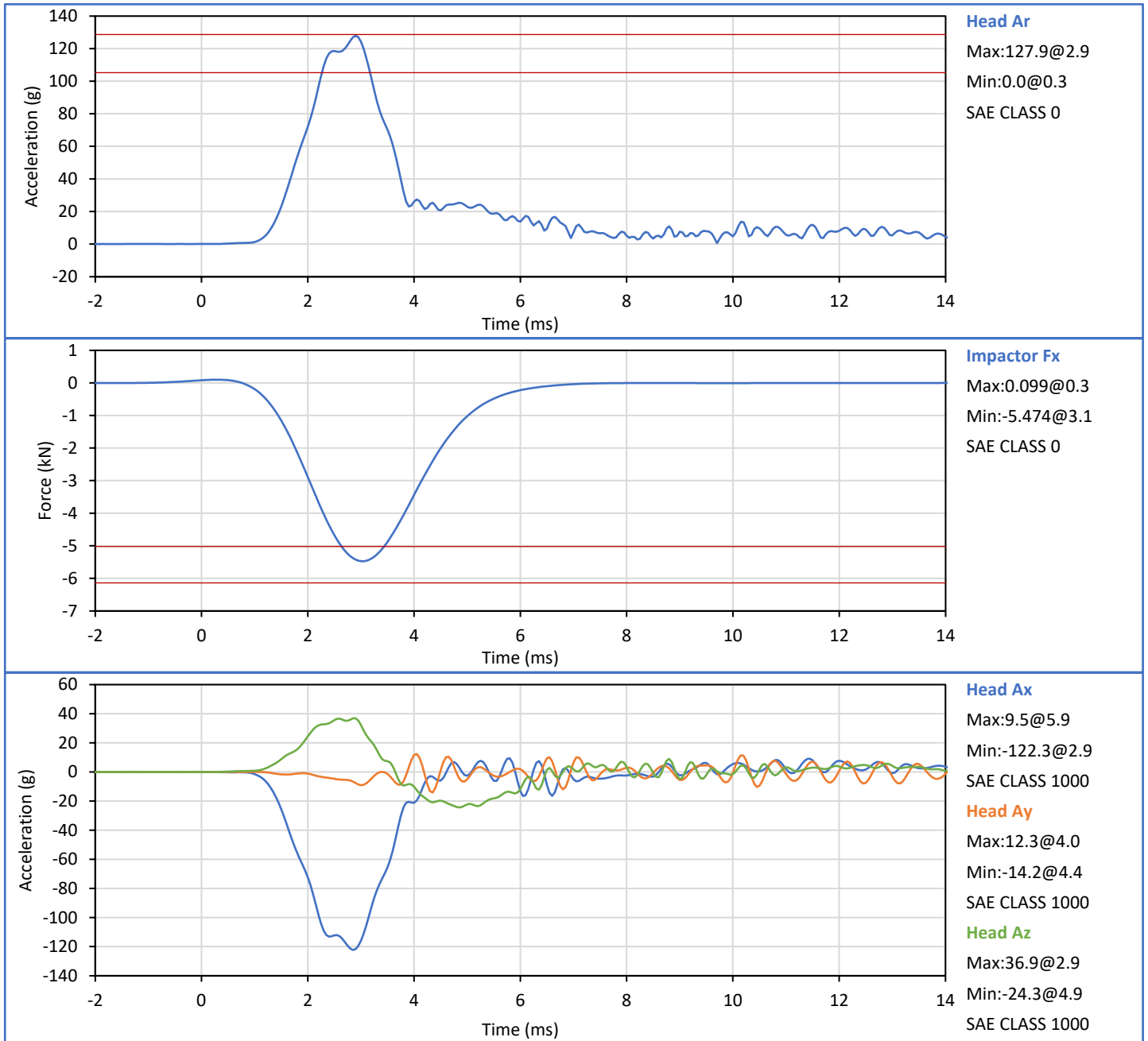
Technician: *J. Hernandez*  
J. Hernandez

Approved By: *P. Puzzuto*  
C-50 P. Puzzuto

**APPENDIX D**  
**ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA**  
**THOR-50M 50TH PERCENTILE MALE ATD**  
**POST-TEST QUALIFICATION (FULL)**

**APPENDIX D**  
**ATD Configuration and Performance Verification Data**  
**THOR-50M 50th Percentile Male ATD**  
**Post-Test Qualification (Partial) S/N: EG2595**

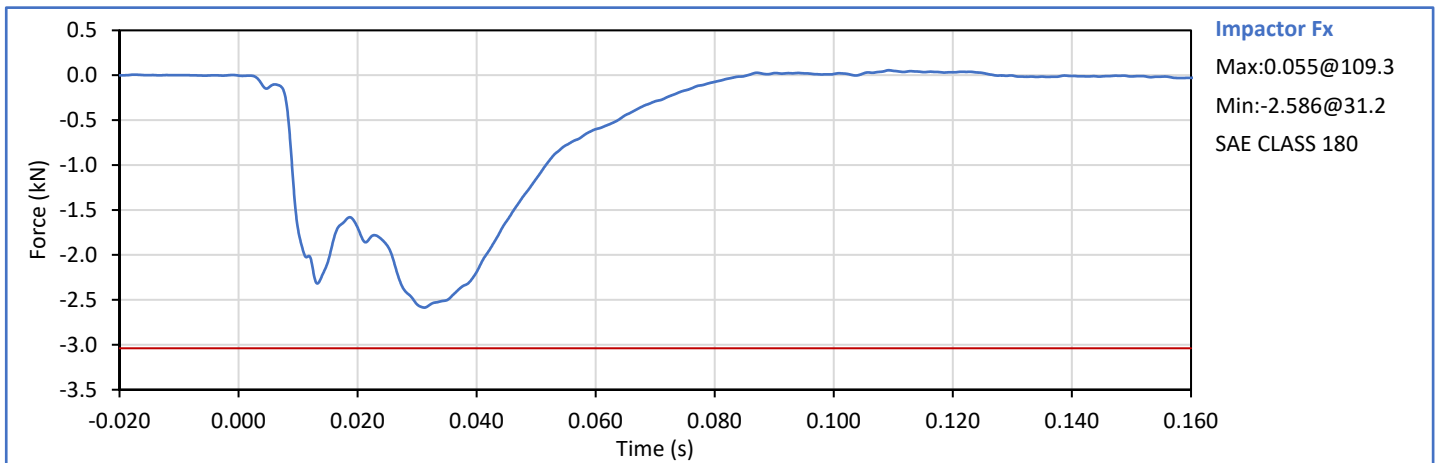
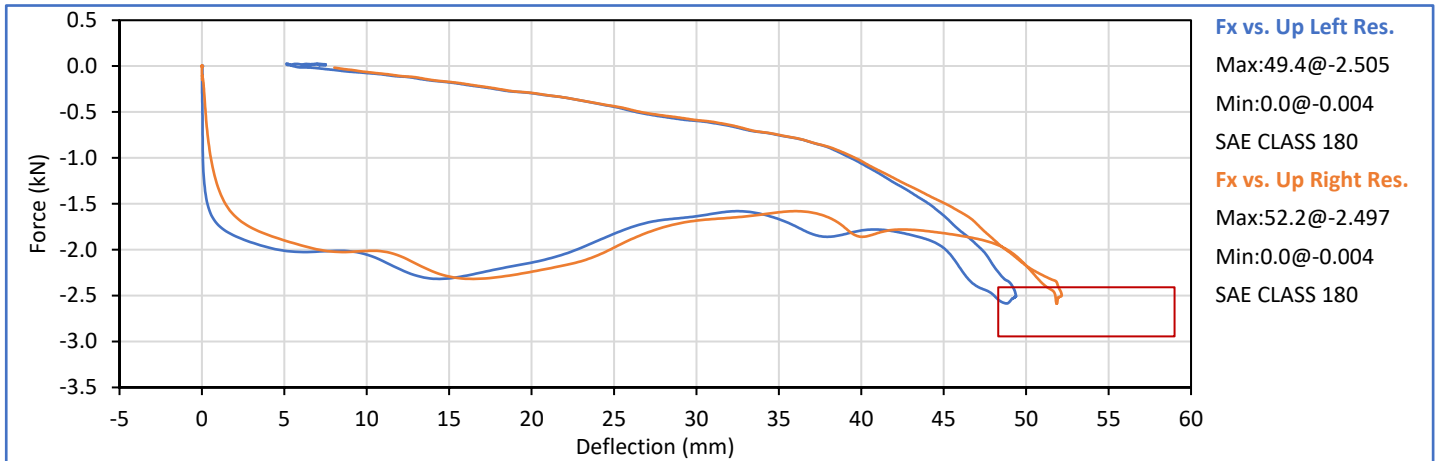
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.0	Pass
Laboratory Relative Humidity	%	10	70	45	Pass
Velocity	m/s	1.95	2.05	1.98	Pass
Peak Impactor Force	kN	-6.138	-5.022	-5.474	Pass
Peak Head Resultant Acceleration	g	105.3	128.7	127.9	Pass
<b>NHTSA Corridor 2019-05</b>				<b>Overall Test Results</b>	<b>Pass</b>




Technician: *J. Hernandez*  
J. Hernandez

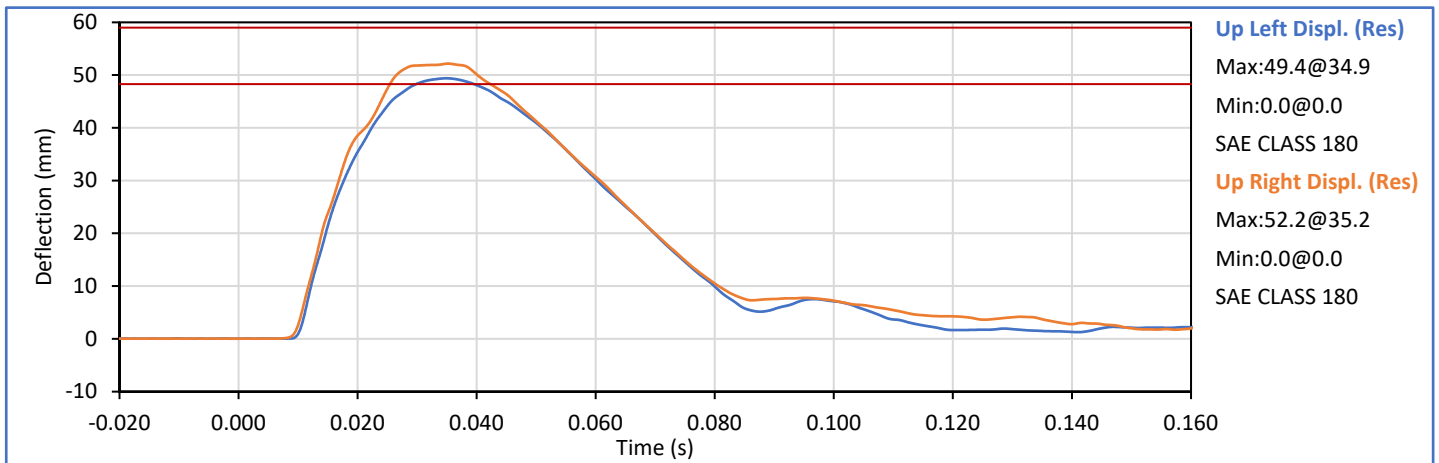
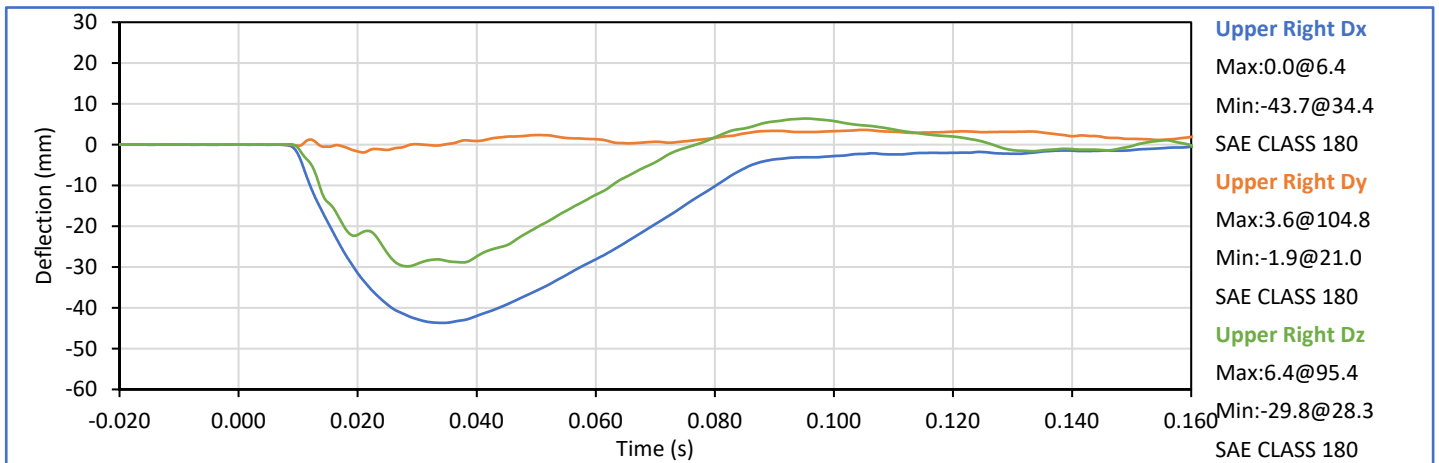
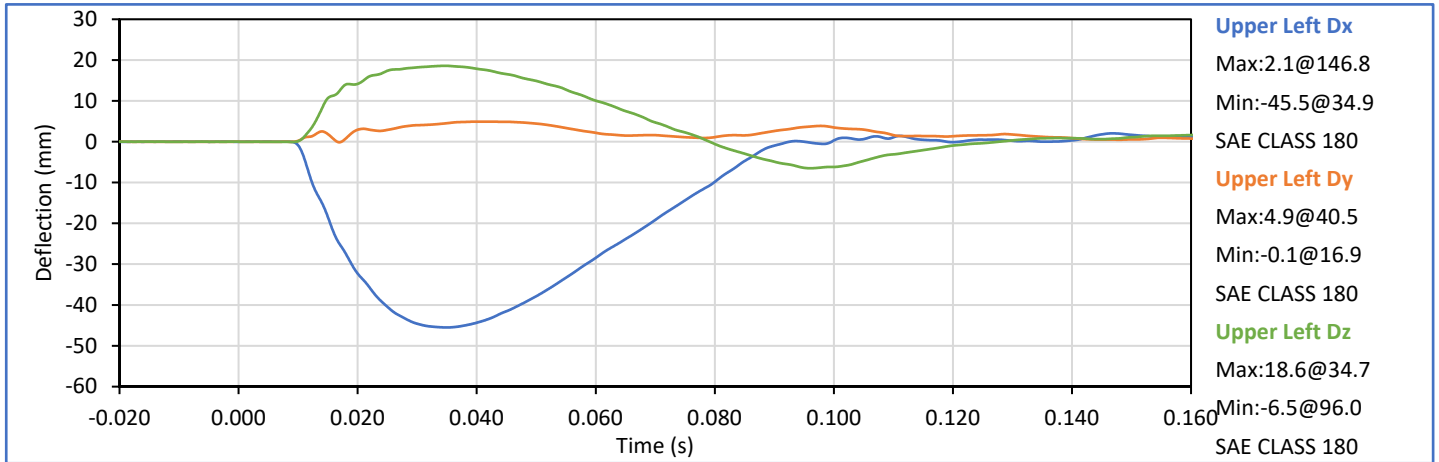
Approved By: *P. Puzuto*  
P. Puzuto

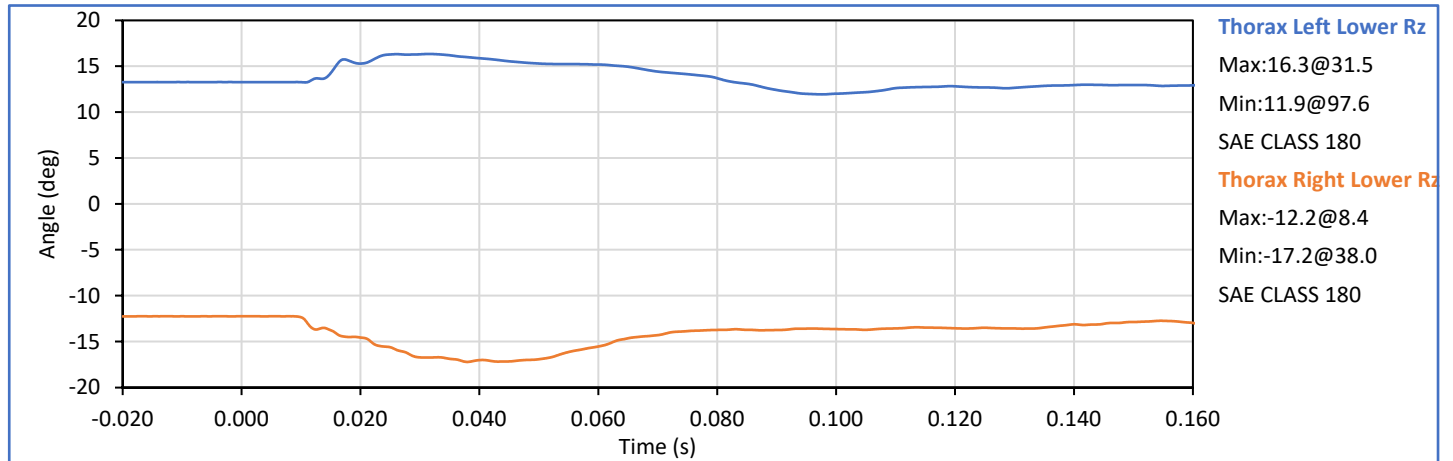
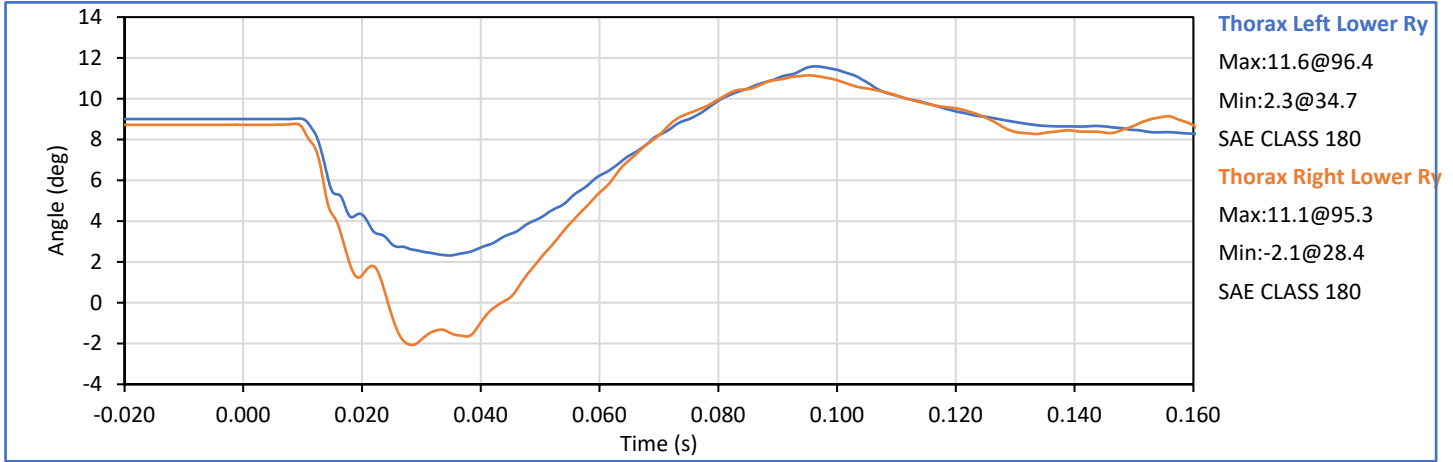
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	46	Pass
Probe Velocity	m/s	4.25	4.35	4.33	Pass
Peak Probe Force	kN	-3.039		-2.586	Pass
Peak Upper Left Deflection Res.	mm	48.3	59.0	49.4	Pass
Peak Upper Right Deflection Res.	mm			52.2	Pass
Absolute Difference L/R Defl. Res.	mm	0.0	5.0	2.8	Pass
Force at Peak Upper Left Res.	mm	-2.944	-2.409	-2.505	Pass
Force at Peak Upper Right Res.	mm			-2.497	Pass
<b>NHTSA Corridor 2019-05</b>				<b>Overall Test Results</b>	<b>Pass</b>



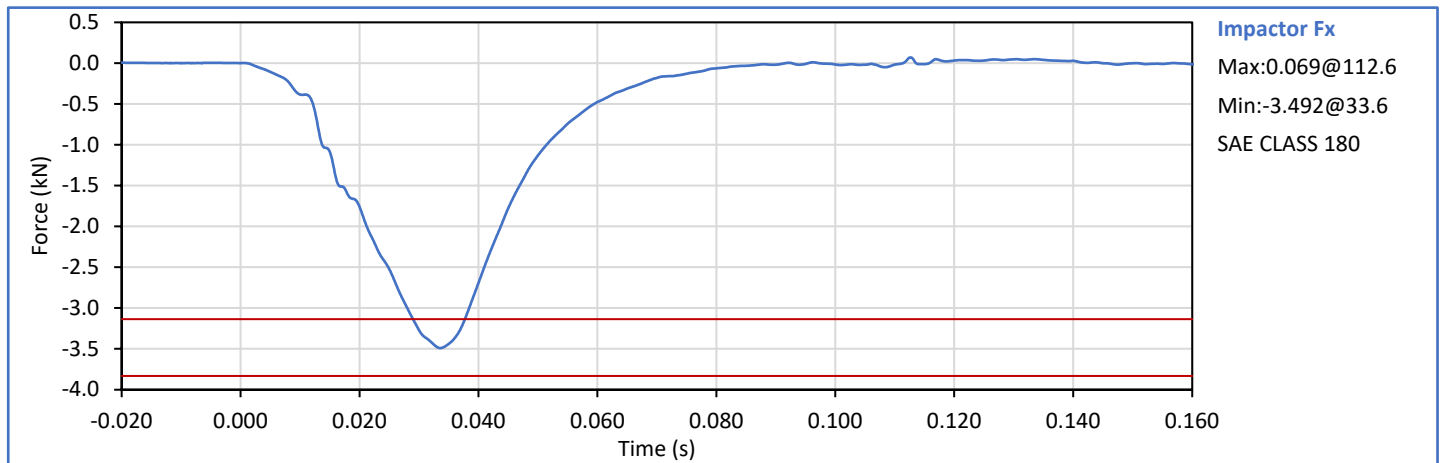
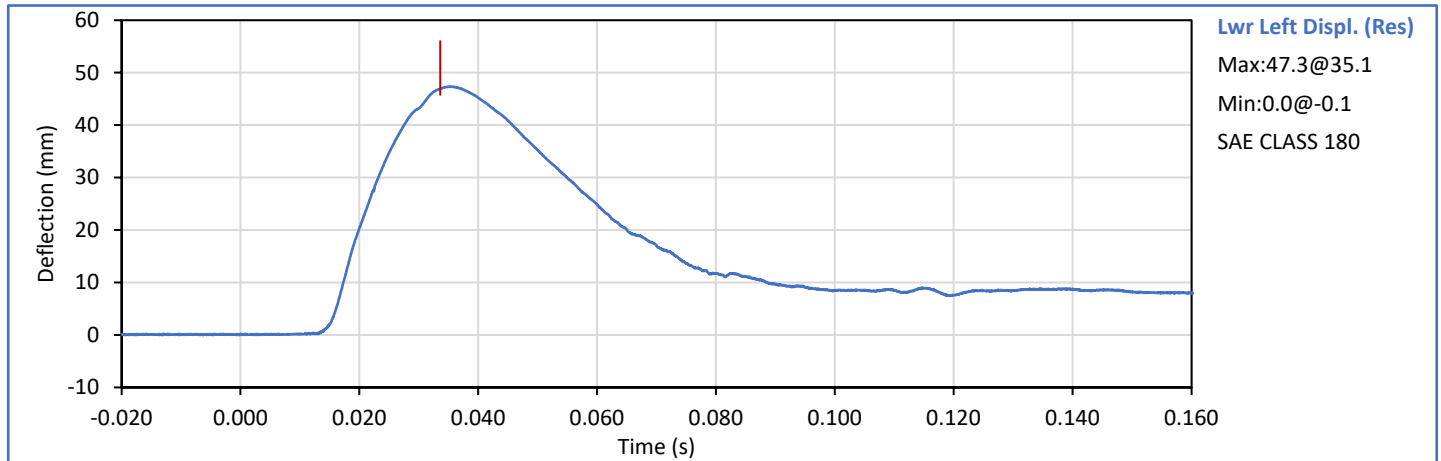
Technician:   
J. Hernandez

Approved By:   
P. Puzzuto






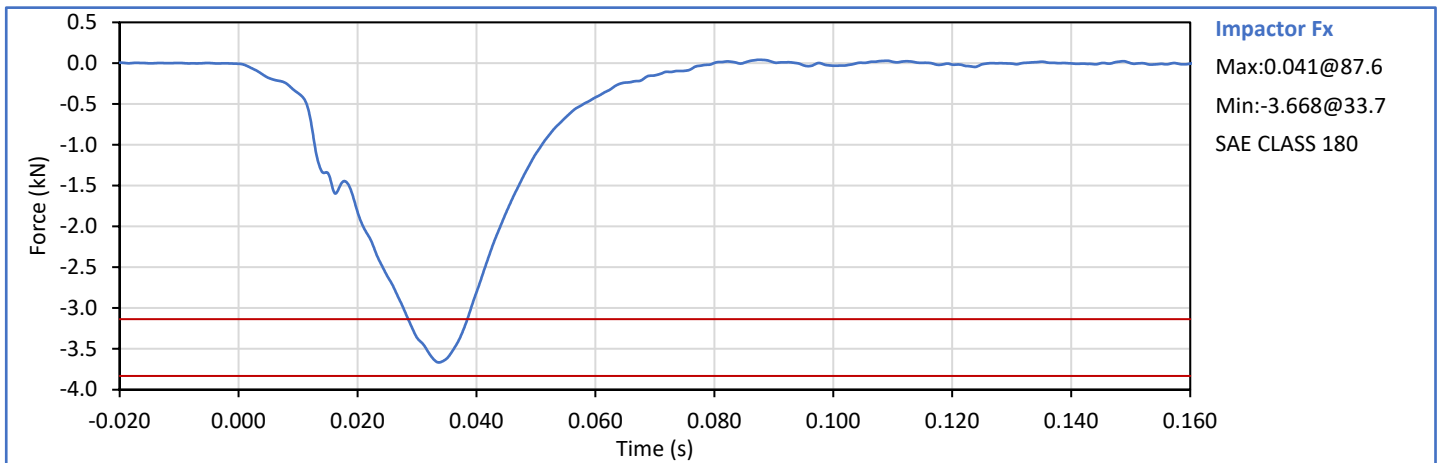
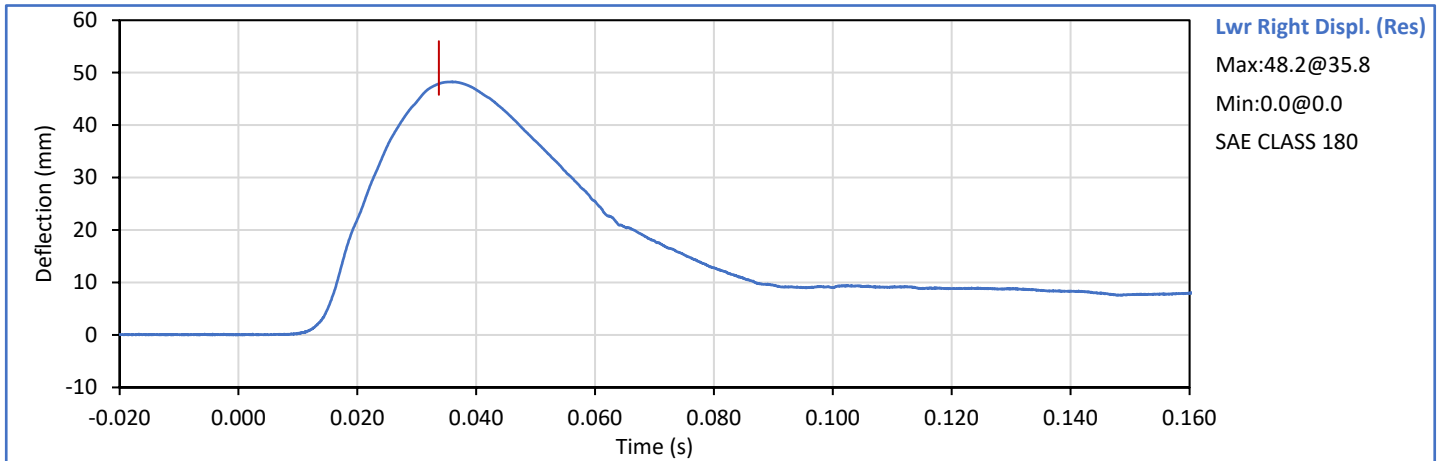
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	45	Pass
Probe Velocity	m/s	4.25	4.35	4.34	Pass
Peak Probe Force	kN	-3.832	-3.136	-3.492	Pass
Lower Left Defl. Res. at Peak Fx	mm	45.8	56.0	46.9	Pass
NHTSA Corridor 2019-05				Overall Test Results	Pass



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

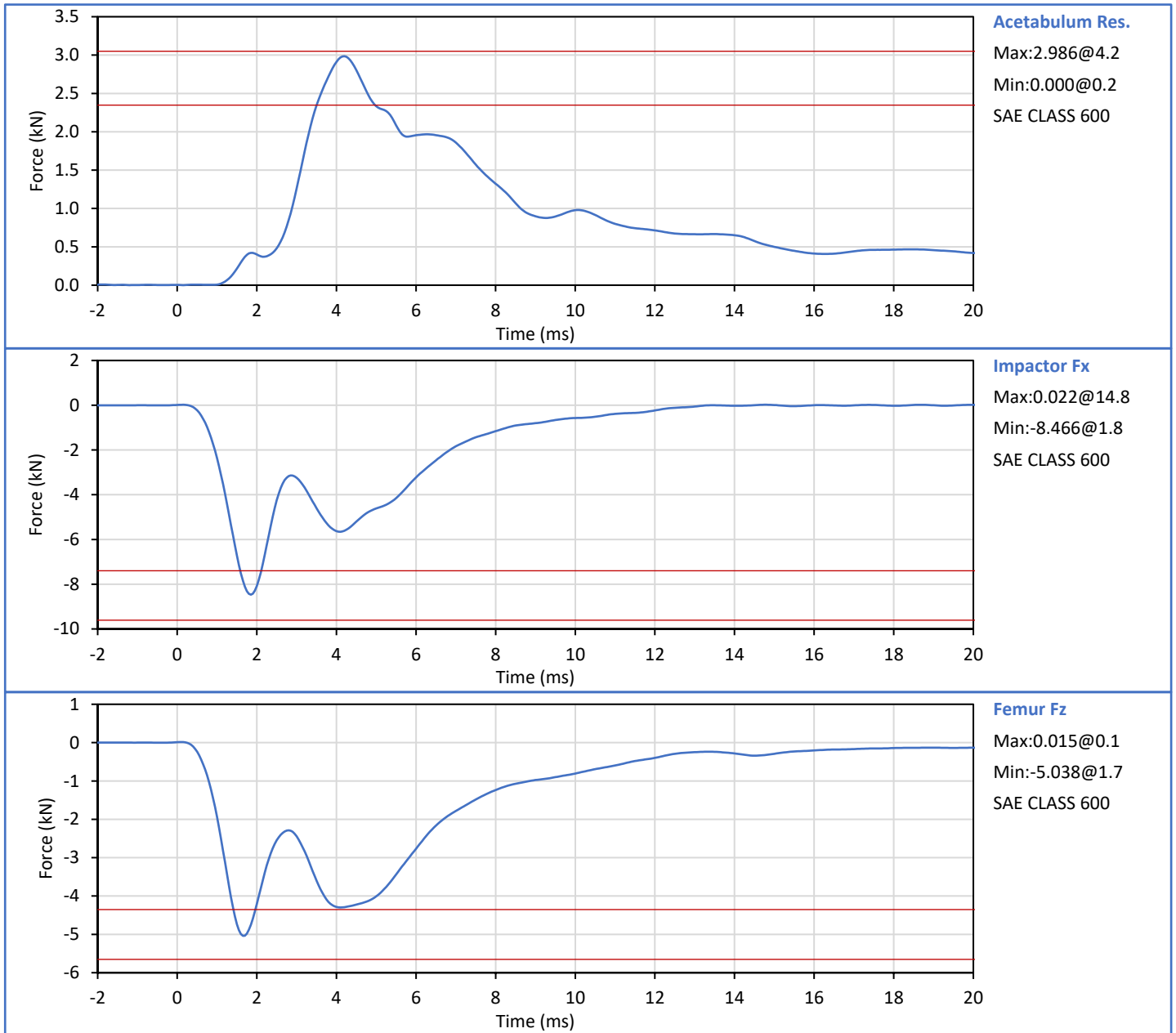
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	22.2	Pass
Laboratory Relative Humidity	%	10	70	42	Pass
Probe Velocity	m/s	4.25	4.35	4.33	Pass
Peak Probe Force	kN	-3.832	-3.136	-3.668	Pass
Lower Left Defl. Res. at Peak Fx	mm	45.8	56.0	47.9	Pass
NHTSA Corridor 2019-05				Overall Test Results	Pass




Technician: *J. Hernandez*  
 J. Hernandez

Approved By: *P. Puzzuto*  
 P. Puzzuto

Tested Parameter	Units	Spec. Low <sup>1</sup>	Spec. High <sup>1</sup>	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	22.2	Pass
Laboratory Humidity	%	10	70	42	Pass
Pendulum Velocity	m/s	3.25	3.35	3.33	Pass
Peak Impactor Force	kN	-9.605	-7.395	-8.466	Pass
Peak Femur Fz	kN	-5.650	-4.350	-5.038	Pass
Acetabulum Force Resultant	kN	2.349	3.051	2.986	Pass
NHTSA Corridor 2020-03 (Preliminary Corridor)				Overall Test Results	Pass

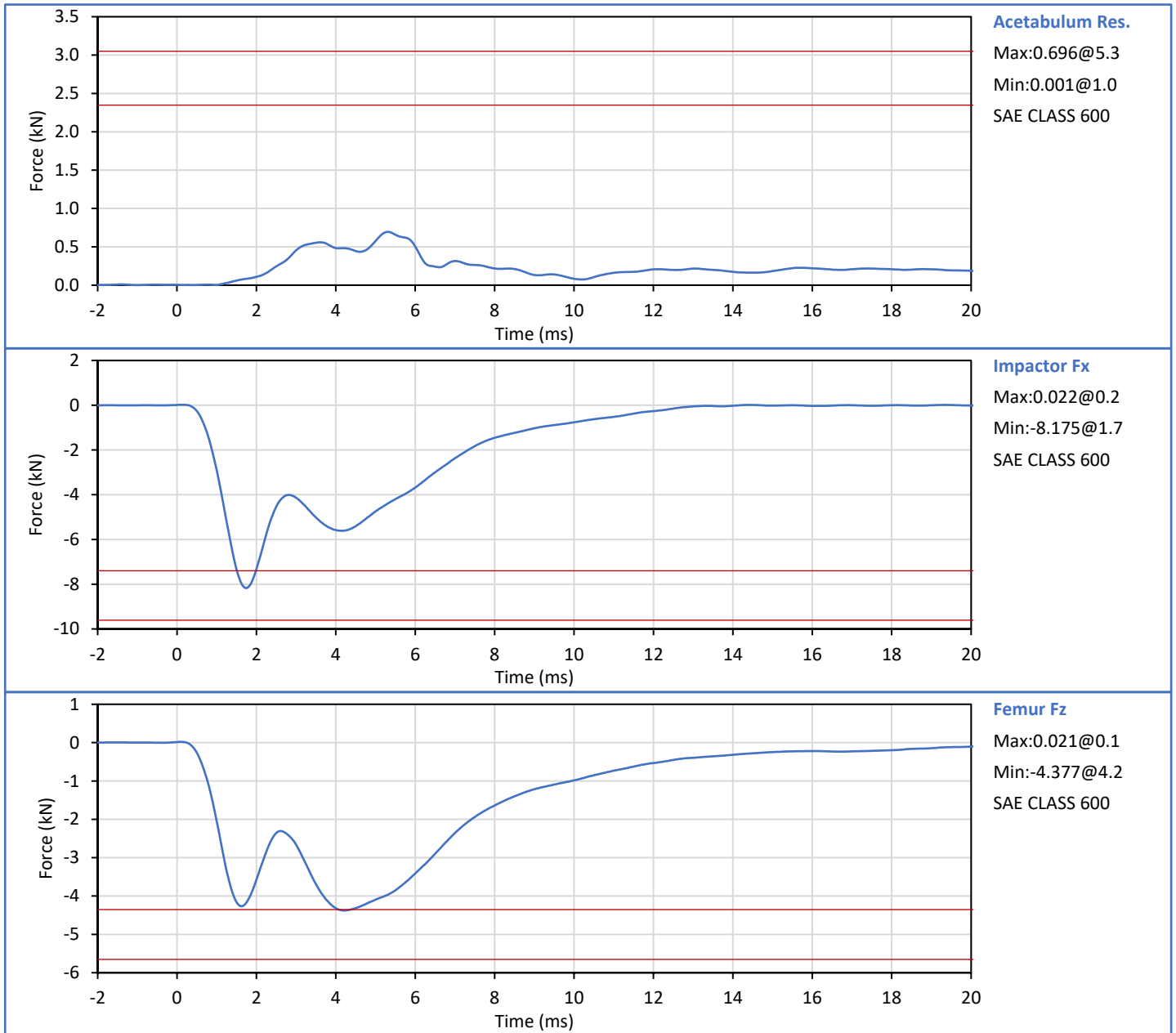


Technician:   
J. Hernandez


Approved By:   
P. Puzzuto

Tested Parameter	Units	Spec. Low <sup>1</sup>	Spec. High <sup>1</sup>	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	22.1	Pass
Laboratory Humidity	%	10	70	32	Pass
Pendulum Velocity	m/s	3.25	3.35	3.35	Pass
Peak Impactor Force	kN	-9.605	-7.395	-8.175	Pass
Peak Femur Fz	kN	-5.650	-4.350	-4.377	Pass
Acetabulum Force Resultant	kN	2.349	3.051	0.696	Fail
<b>NHTSA Corridor 2020-03 (Preliminary Corridor)</b>				<b>Overall Test Results</b>	<b>Fail</b>

\* Acetabulum Load Cell Fx is not functioning



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

**APPENDIX D**  
**ATD Qualification and Performance Verification**  
**Hybrid III 50th Percentile Male ATD**  
**Post-Test Qualification (Partial) S/N: 168**

ATD Serial No.: 168


Test Date: 2021-08-09

Dummy Item	Inspect for	Comments	Damage	OK
Entire ATD	Perform general cleaning			✓
Outer Skin	Gashes, rips, cracks			✓
Head	Ballast secure			✓
	General appearance			✓
Neck bracket	Upper neck firmly attached to lower bracket			✓
Neck	Broken or cracked rubber			✓
	Looseness at the condyle joint			✓
Nodding block	Cracked or out of position			✓
Lumbar Spine	Broken or cracked rubber			✓
Ribs	Broken or bent ribs			✓
	Broken or bent rib supports			✓
	Damping material separated or cracked			✓
	Rubber bumpers in place			✓
Chest Displ. Assembly	Bent shaft			✓
	Slider arm riding in track			✓
Sensors	Check cables for cuts, tears			✓
	Check for damaged insulation			✓
Accelerometer Mounting	Head mounting secure			✓
	Chest mounting secure			✓
Knees	Skin condition			✓
	Insert (do not remove)			✓
	Casting			✓
Limbs	Normal movement and adjustment			✓
Knee Sliders	Wires intact			✓
	Rubber returned to "resting" position			✓
Pelvis	Broken			✓
Other	Describe below as needed		x	

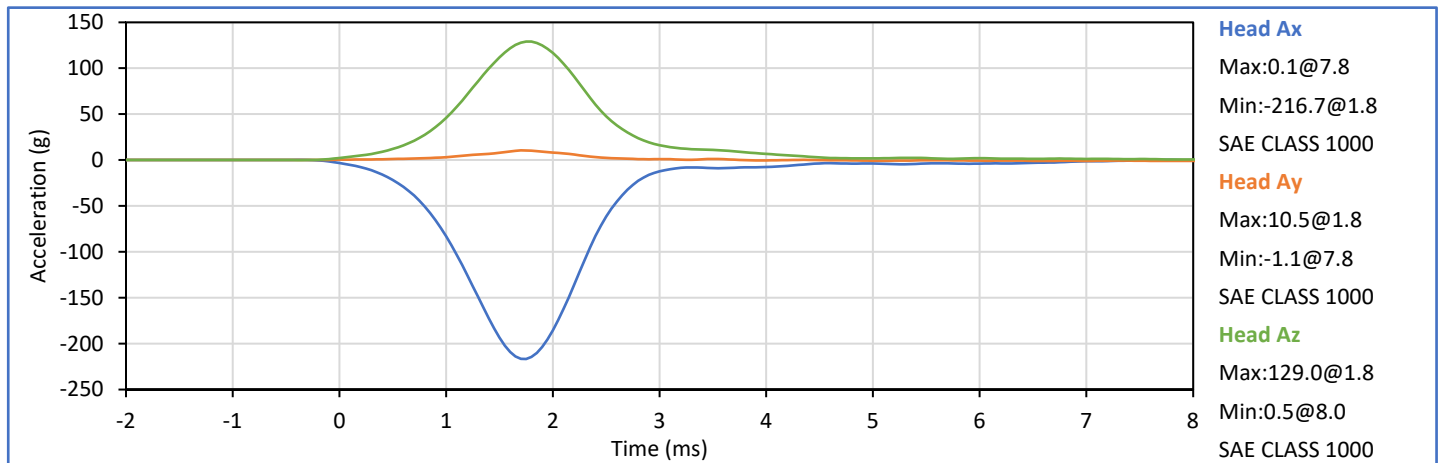
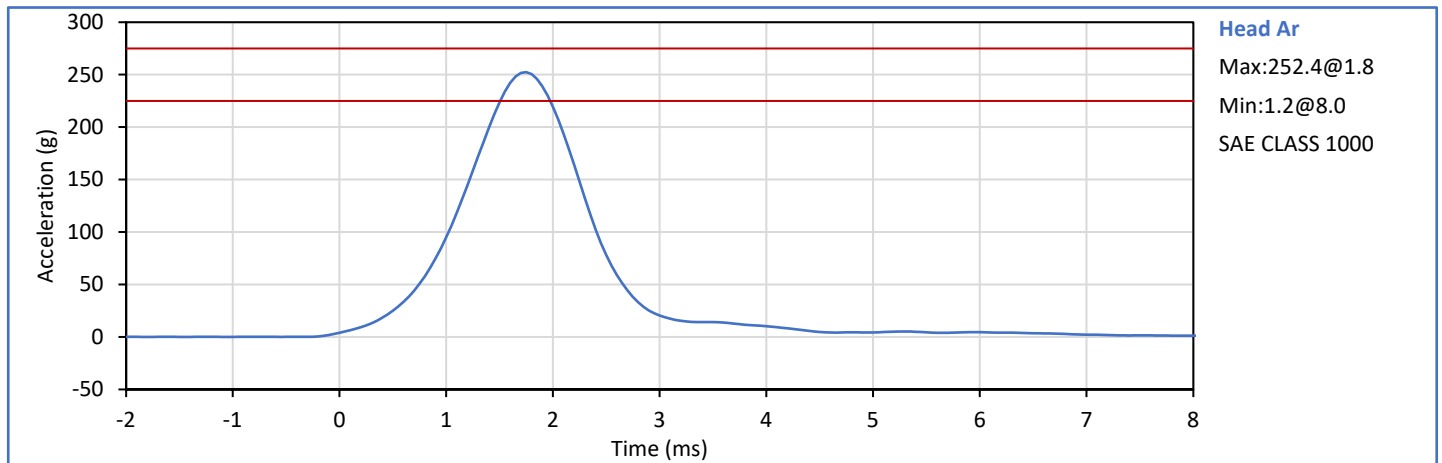
Describe any repairs or replacement of parts or other findings:


No Problems Found  
Head Redundant Ay not functioning. Replaced accelerometer. Cause of failure is not known


Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

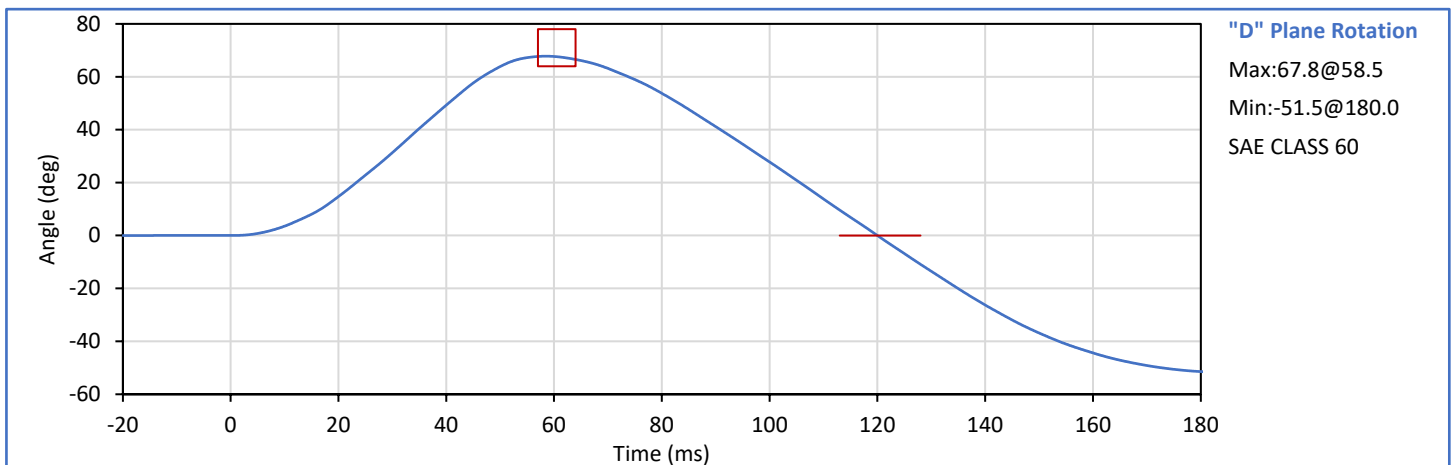
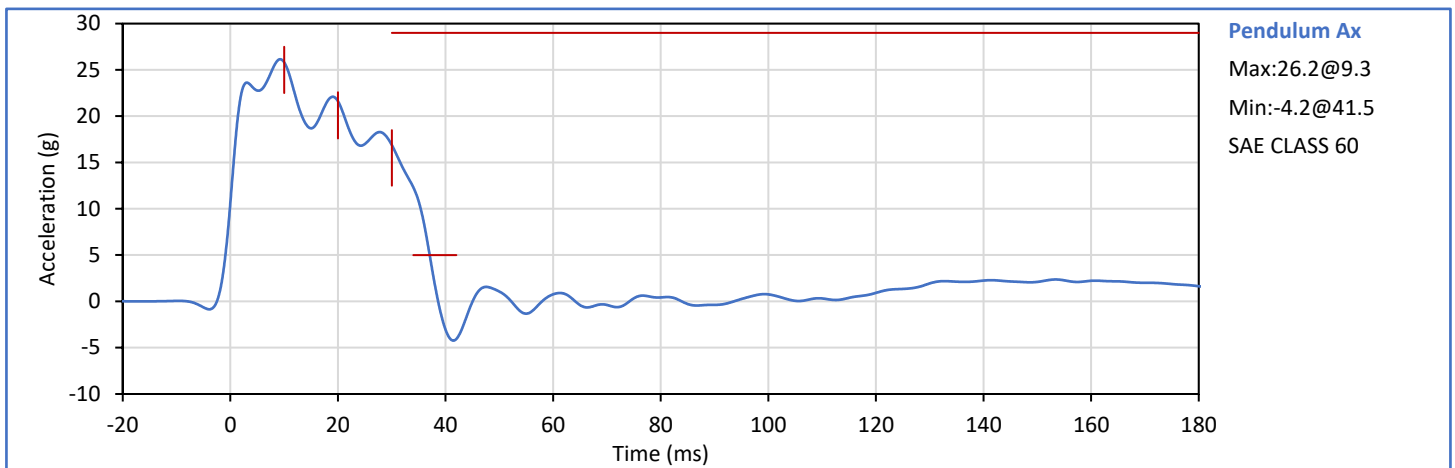
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	22.2	Pass
Laboratory Relative Humidity	%	10	70	48	Pass
Peak Resultant Acceleration	g	225.0	275.0	252.4	Pass
Peak Lateral Acceleration	g	-15.0	15.0	10.5	Pass
Oscillations After Main Pulse	%	0.0	10.0	1.8	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
<b>Overall Test Results</b>					<b>Pass</b>

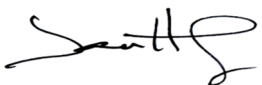



Technician:   
J. Hernandez

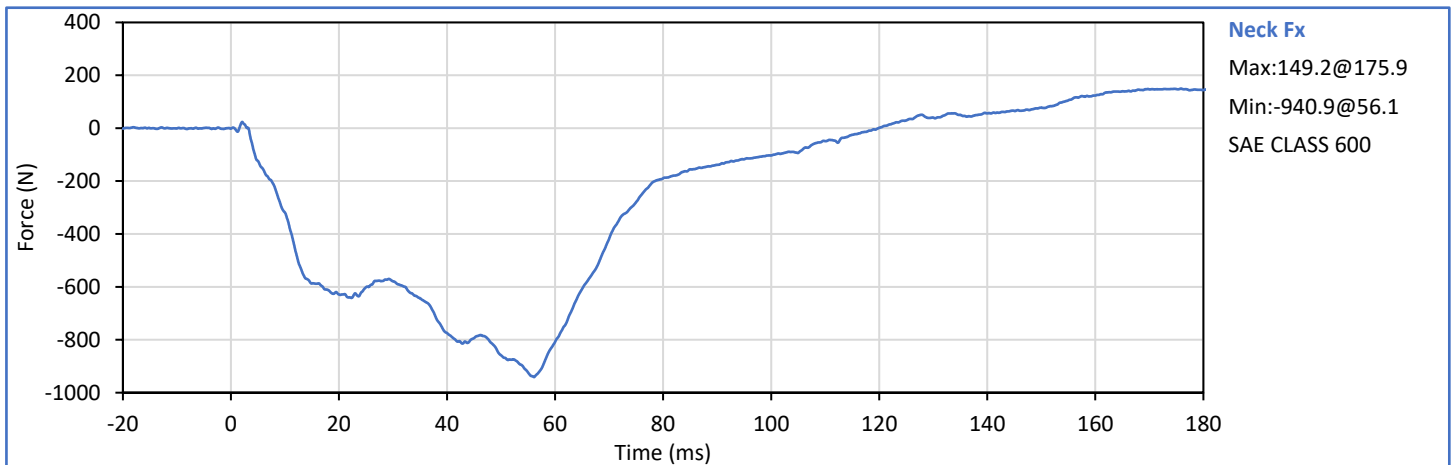
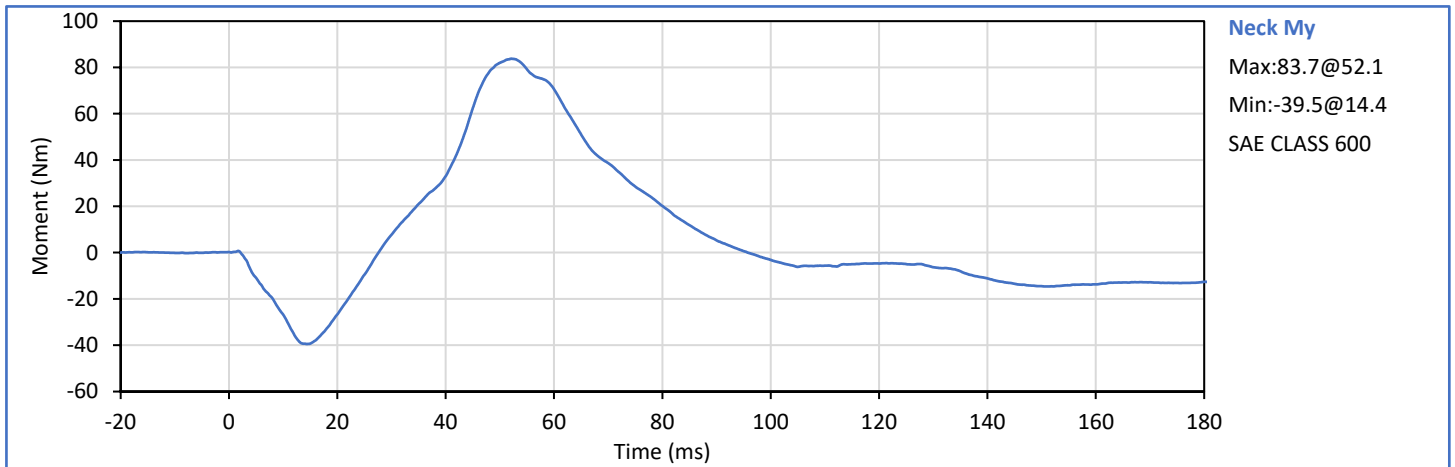
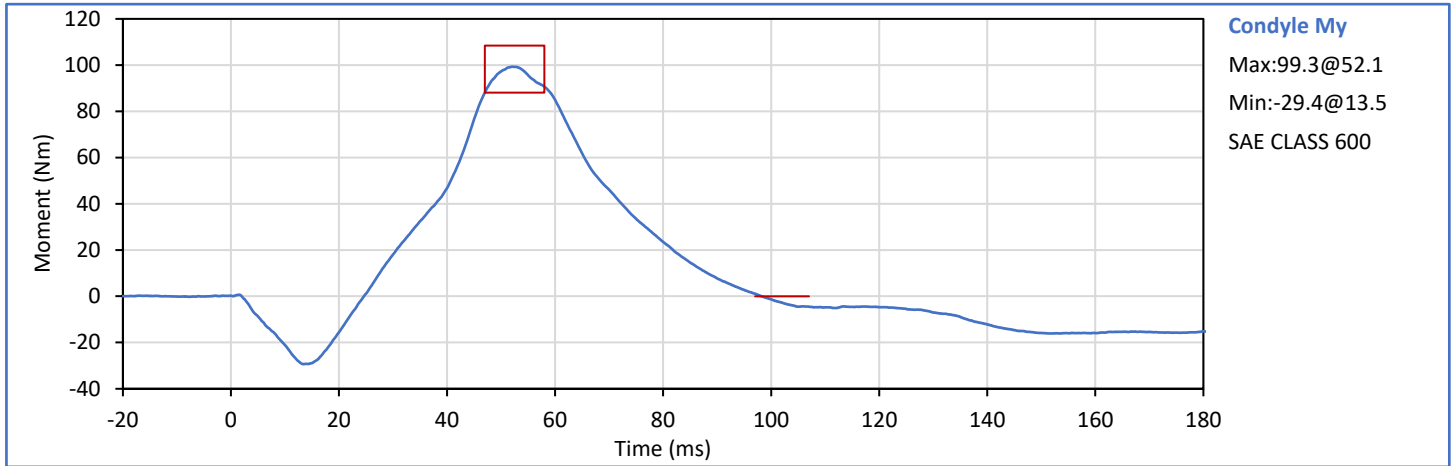
Approved By:   
P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Relative Humidity	%	10	70	46	Pass
Pendulum Velocity	m/s	6.89	7.13	6.99	Pass
Pendulum Deceleration at 10 ms	g	22.5	27.5	25.8	Pass
Pendulum Deceleration at 20 ms	g	17.6	22.6	21.6	Pass
Pendulum Deceleration at 30 ms	g	12.5	18.5	16.9	Pass
Peak Pendulum Decel After 30 ms	g	0.0	29.0	16.9	Pass
Deceleration Decay to Cross 5g	ms	34.0	42.0	37.0	Pass
"D" Plane Rotation peak	deg	64.0	78.0	67.8	Pass
	ms	57.0	64.0	58.5	Pass
"D" Plane Rotation Decay to Zero	ms	113.0	128.0	120.1	Pass
Moment About Occipital Condyle	Nm	88.1	108.5	99.3	Pass
	ms	47.0	58.0	52.1	Pass
Moment Decay, Peak to Zero	ms	97.0	107.0	98.2	Pass
Overall Test Results					Pass

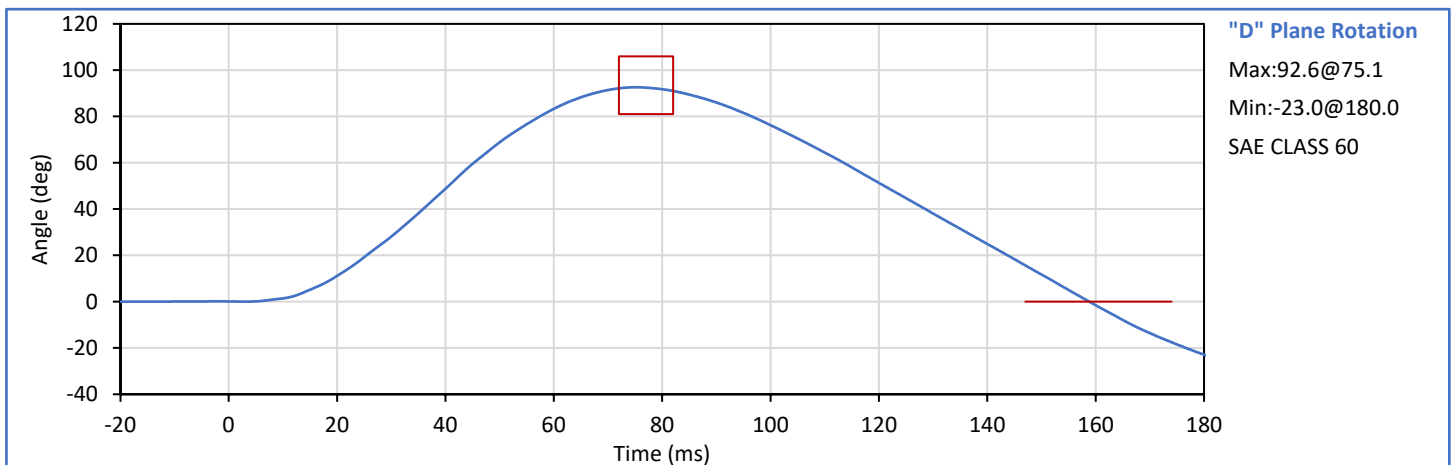
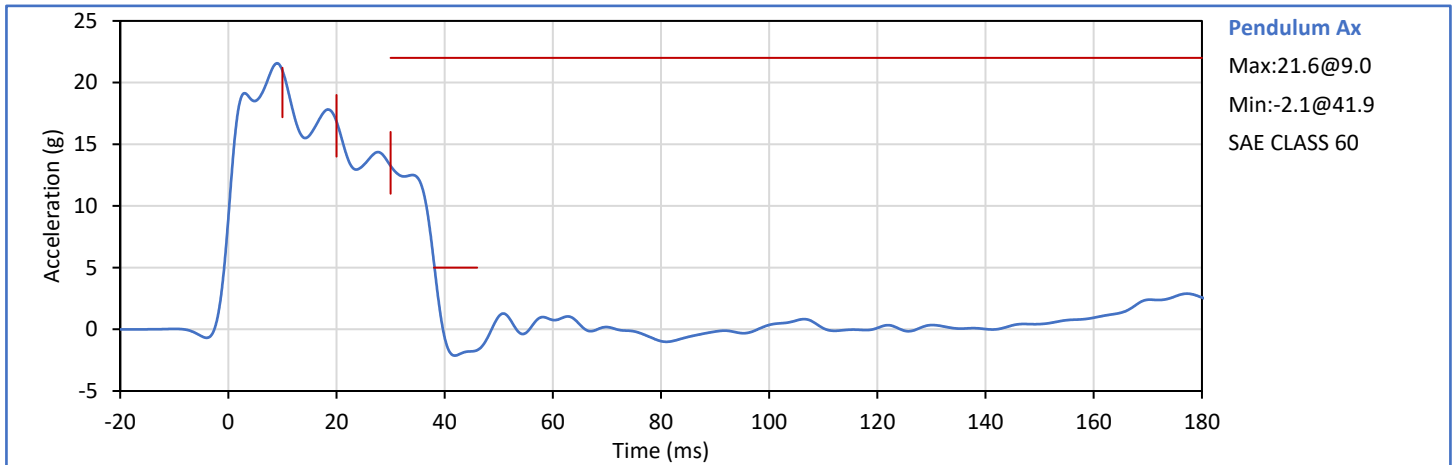


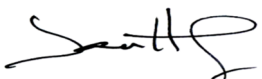
Technician:   
J. Hernandez


Approved By:   
P. Puzzuto

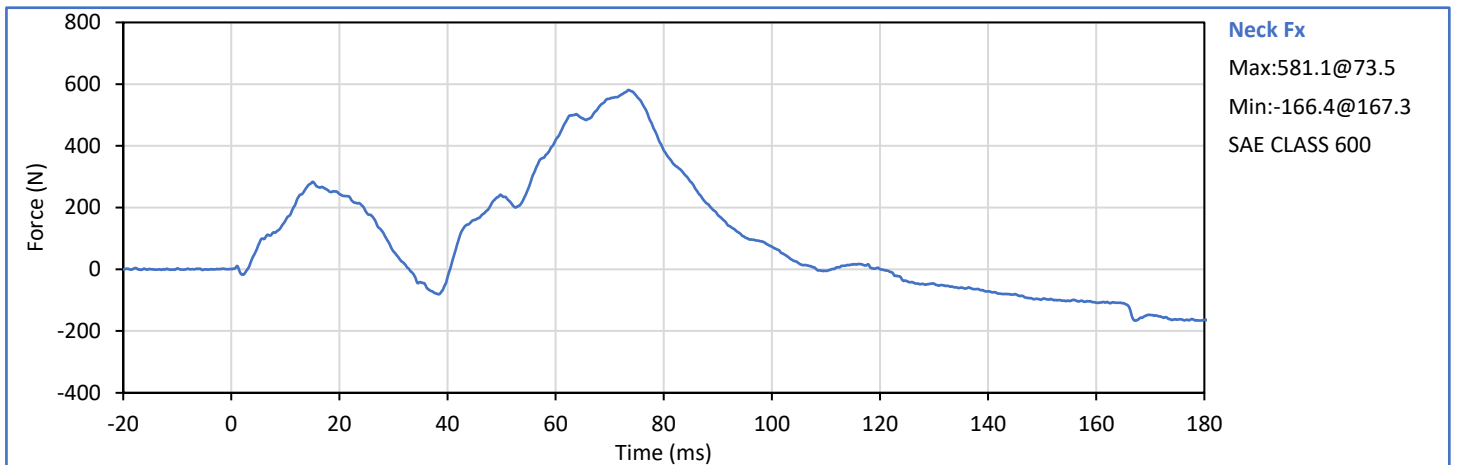
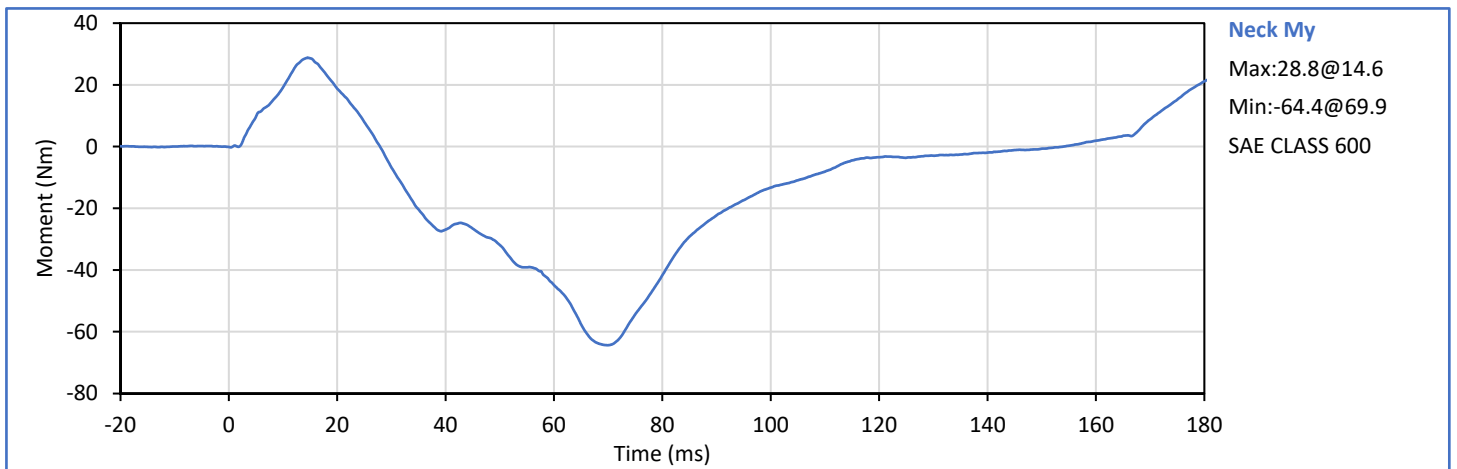
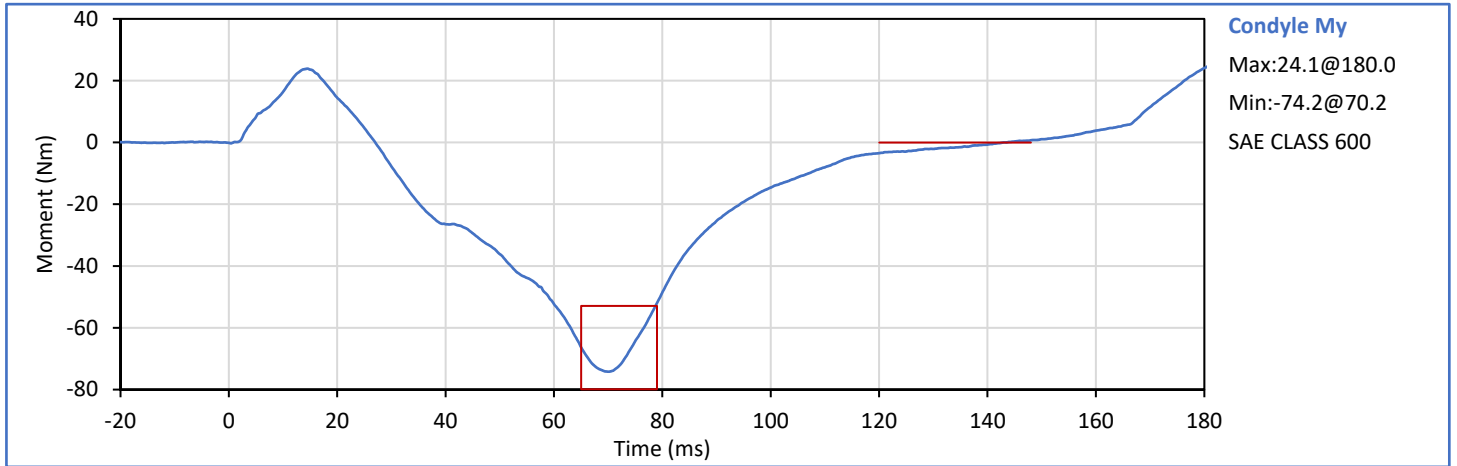


Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Relative Humidity	%	10	70	43	Pass
Pendulum Velocity	m/s	5.94	6.19	6.17	Pass
Pendulum Deceleration at 10 ms	g	17.2	21.2	21.0	Pass
Pendulum Deceleration at 20 ms	g	14.0	19.0	16.9	Pass
Pendulum Deceleration at 30 ms	g	11.0	16.0	13.3	Pass
Peak Pendulum Decel After 30 ms	g	0.0	22.0	13.3	Pass
Deceleration Decay to Cross 5g	ms	38.0	46.0	38.1	Pass
"D" Plane Rotation peak	deg	81.0	106.0	92.6	Pass
	ms	72.0	82.0	75.1	Pass
"D" Plane Rotation Decay to Zero	ms	147.0	174.0	158.9	Pass
Moment About Occipital Condyle	Nm	-79.9	-52.9	-74.2	Pass
	ms	65.0	79.0	70.2	Pass
Moment Decay, Peak to Zero	ms	120.0	148.0	143.4	Pass
Overall Test Results					Pass

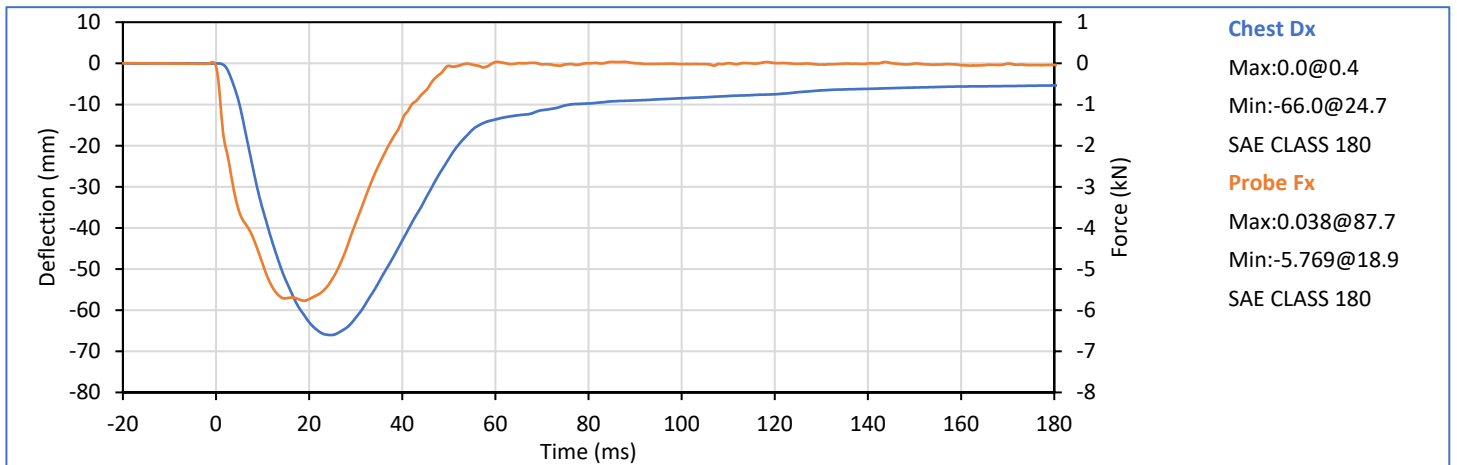
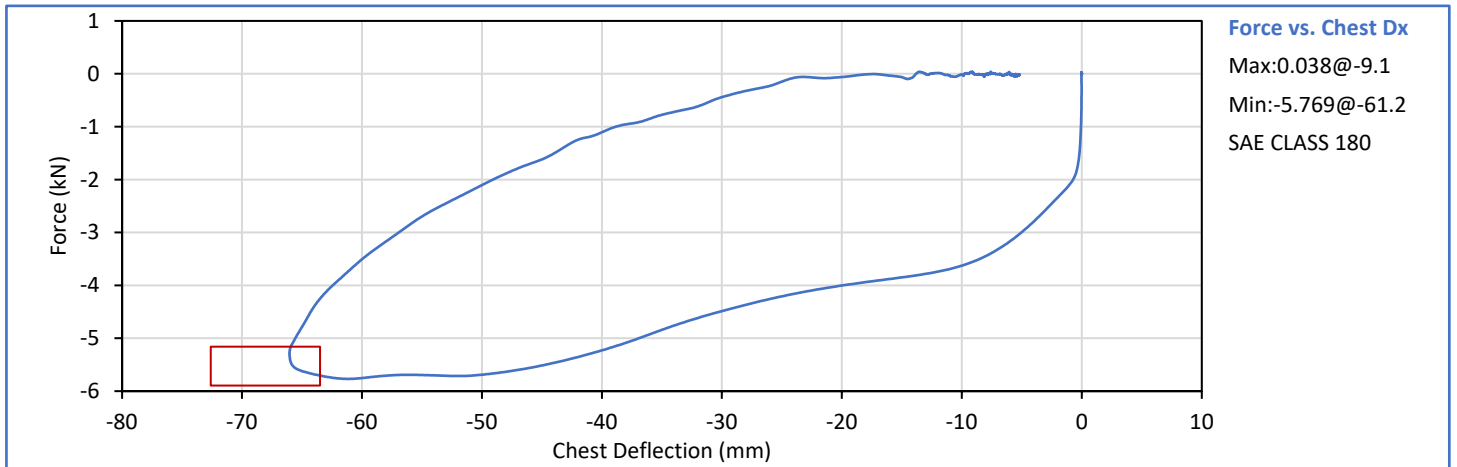


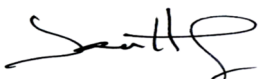
Technician:   
J. Hernandez


Approved By:   
P. Puzzuto



Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	31	Pass
Probe Velocity	m/s	6.58	6.82	6.78	Pass
Peak Chest Deflection	mm	-72.6	-63.5	-66.0	Pass
Peak Probe Force	kN	-5.893	-5.159	-5.769	Pass
Internal Hysteresis	%	69.0	85.0	74.1	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
 J. Hernandez


Approved By:   
 P. Puzzuto


**APPENDIX E**  
**THOR-50M 50<sup>TH</sup> PERCENTILE MALE ATD**  
**PHYSICAL INSPECTION, PRE-TEST**

ATD Serial No.: EG2595

Inspection Date: 2021-07-12

Overall Conditon/Functionality	Note
<p><u>Known errors in data channels (no data, clipping, unexpected drops):</u></p> <p>Serial Number: DL9552-FX Right Acetabulum Force X bad channel.</p> <p>Serial Number: DW9502 Occipital Condyle Potentiometer not wired.</p> <p>Serial Number: DL9552-FX Right Acetabulum Force X bad channel, no data recorded during the test*</p> <p>Serial Number: DW9502 Occipital Condyle Potentiometer, no data recorded during the test**</p>	
<p><u>Physical evidence of damage:</u></p> <p>*Right acetabulum force X was received with bad channel. It was investigated why it was not working and was determined it was not fixable without replacing the loadcell. NHTSA approved running the test without recording this channel.</p> <p>**Occipital Condyle Potentiometer was not wired when received and was required to be recorded. NHTSA approved running the test without recording this channel.</p>	
<p><u>Anecdotal evidence of damage:</u></p>	
<p><u>Equipment delivered to Borrower:</u></p> <p>THOR-50M S/N EG2595 with DTS SLICE6 Internal DAS</p> <p>Laptop</p> <p>DTS MiniDistributor with cables and PSU</p>	

Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

ATD Serial No.: EG2595

Inspection Date: 2021-07-12

HEAD – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Rear head cap mounts securely to head:	
✓	Head skin fits securely over skull	
✓	Head skin shows no sign of tears or damage	
✓	Interior components of skull (ballast, sensor mounts, sensors) securely attached:	
✓	Head securely mounted to OC joint:	
✗	Other:	See Details Page


Neck – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Neck cables slide freely through holes in neck plates:	
✓	Head can rotate about occipital condyle joint freely until the bump stops are engaged:	
✓	Neck cables show no sign of fraying, broken strands, or kinking	
✓	No evidence of de-bonding between neck pucks and plates. If failure, indicate which interface (i.e.: where plate/puck 1 attach to upper neck load cell):	
✓	No evidence of de-bonding or permanent compression in neck soft stop assemblies:	
✓	Neck securely attached to upper neck load cell:	
✓	Neck securely attached to lower neck load cell	
✓	Neck pitch change joint mechanism mating teeth are engaged	
✓	Other:	


JACKET – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Rib stiffeners show no sign of permanent deformation:	
✓	No evidence of tears or holes in jacket fabric, velcro, or zippers:	
✓	Other:	

LEFT SHOULDER/ARM – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Urethane shoulder pads show no evidence of contact:	
✓	Clavicle securely attached to sternum and shoulder:	
✓	No evidence of debonding, tearing, or permanent compression of posterior soft stops	
✓	Other:	

RIGHT SHOULDER/ARM – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Urethane shoulder pads show no evidence of contact:	
✓	Clavicle securely attached to sternum and shoulder:	
✓	No evidence of debonding, tearing, or permanent compression of posterior soft stops	
✓	Other:	

Spine – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	No evidence of de-bonding between thoracic spine flex joint and metal plates:	
✓	No evidence of de-bonding between lumbar spine flex joint and metal plates:	
✓	Lumbar spine pitch change joint mechanism mating teeth are engaged:	
✓	Other:	


Technician:   
J. Hernandez


Approved By:   
P. Puzzuto

THORAX – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	No evidence of contact at top, bottom, or interior faces of rib damping material:	
✓	No evidence of debonding between rib damping material and ribs:	
✓	IR-TRACC tubes securely attached to anterior ribs	
✓	IR-TRACC tubes securely attached to double gimbals, spine:	
✓	Urethane bib is securely attached to ribs with no sign of tearing or washer penetration:	
✓	Ribs securely attached to posterior spine:	
✓	Rib stiffeners show no evidence of bending (no gaps between ribs and stiffeners):	
✓	Other:	

ABDOMEN – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	No evidence of tearing, cuts, or broken stitches in upper abdomen bag and zipper:	
✓	Upper abdomen insert securely attached to spine:	
✓	Upper abdomen insert shows no evidence of permanent set:	
✓	No evidence of tearing, cuts, or broken stitches in lower abdomen bag and zipper:	
✓	Lower abdomen insert securely attached to spine:	
✓	Lower abdomen insert shows no evidence of permanent set:	
✓	Other:	

Pelvis – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Pelvis flesh fits securely over pelvis bones:	
✓	H-point tool fits securely into hole on both sides of pelvis:	
✓	ASIS load cells are secured to the iliac bones and iliac bones are firmly attached to the pelvis	
✓	The iliac bones are free from cracks or fractures	
✓	If welds are present in the iliac bones, the welds are continuous and devoid of cracks	
✓	Other:	

Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

ATD Serial No.: EG2595


Inspection Date: 2021-07-12


LEFT FEMUR – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Acetabular load cells firmly attached:	
✓	Femur load cell firmly attached:	
✓	No evidence of deformation of knee slider bump stop:	
✓	No cuts, tears, or scuffing of knee flesh:	
✓	Other:	

RIGHT FEMUR – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Acetabular load cells firmly attached:	
✓	Femur load cell firmly attached:	
✓	No evidence of deformation of knee slider bump stop:	
✓	No cuts, tears, or scuffing of knee flesh:	
✓	Other:	

LEFT LOWER EXTREMITY (LX) – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Rotational potentiometers in ankle securely attached:	
✓	Achilles tendon provides resistance to dorsiflexion:	
✓	No evidence of debonding, tearing, or permanent compression of ankle soft stops:	
✓	No cuts, tears, or scuffing of leg flesh	
✓	Other:	

RIGHT LOWER EXTREMITY (LX) – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Rotational potentiometers in ankle securely attached:	
✓	Achilles tendon provides resistance to dorsiflexion:	
✓	No evidence of debonding, tearing, or permanent compression of ankle soft stops:	
✓	No cuts, tears, or scuffing of leg flesh	
✓	Other:	

Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

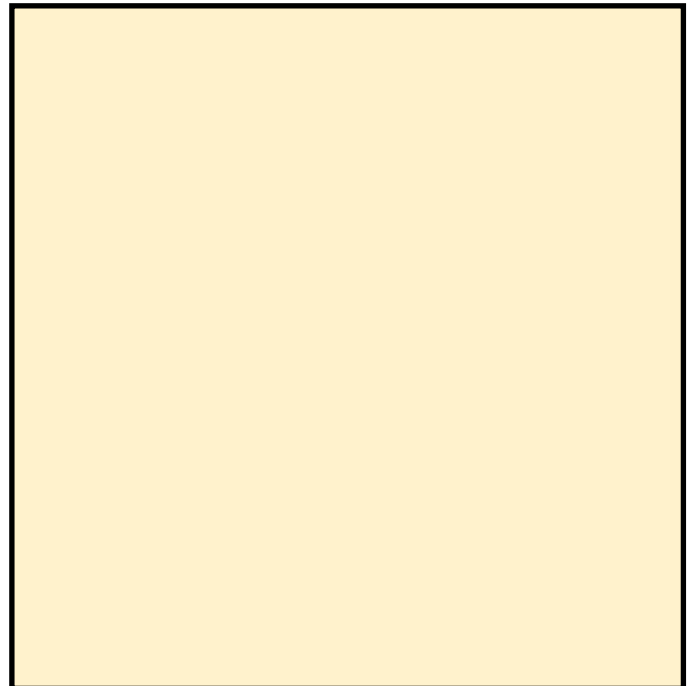
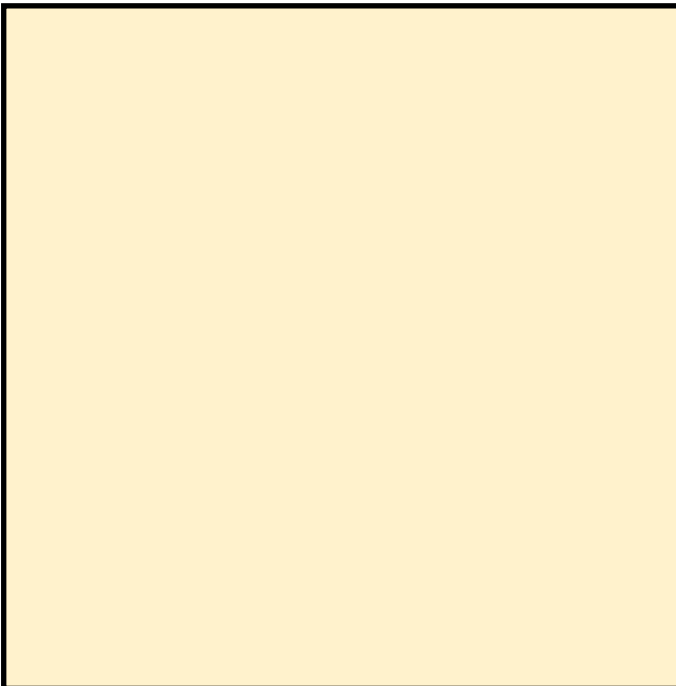
Damage and Discrepancy Details



Cuts in Face Foam





Cut on top of face.



Additional Notes:

None

Technician:   
J. Hernandez


Approved By:   
P. Puzzuto


**APPENDIX F**  
**THOR-50M 50<sup>TH</sup> PERCENTILE MALE ATD**  
**PHYSICAL INSPECTION, POST-TEST**

ATD Serial No.: EG2595

Inspection Date: 2021-08-11

Overall Conditon/Functionality	Note
<p><u>Known errors in data channels (no data, clipping, unexpected drops):</u>            Serial Number: DL9552-FX Right Acetabulum Force X bad channel.            Serial Number: DW9502 Occipital Condyle Potentiometer not wired.            Serial Number: DL9552-FX Right Acetabulum Force X bad channel, no data recorded during the test*            Serial Number: DW9502 Occipital Condyle Potentiometer, no data recorded during the test**</p>	
<p><u>Physical evidence of damage:</u>            *Right acetabulum force X was received with bad channel. It was investigated why it was not working and was determined it was not fixable without replacing the loadcell. NHTSA approved running the test without recording this channel.            **Occipital Condyle Potentiometer was not wired when received and was required to be recorded. NHTSA approved running the test without recording this channel.            Left Upper Thorax ITRACC - SCREW SHCS M2.5 X 0.45X 10 was loose.</p>	
<p><u>Anecdotal evidence of damage:</u></p>	
<p><u>Equipment delivered to Borrower:</u>            THOR-50M S/N EG2595 with DTS SLICE6 Internal DAS            Laptop            DTS MiniDistributor with cables and PSU</p>	

Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

ATD Serial No.: EG2595

Inspection Date: 2021-08-11

HEAD – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Rear head cap mounts securely to head:	
✓	Head skin fits securely over skull	
✓	Head skin shows no sign of tears or damage	
✓	Interior components of skull (ballast, sensor mounts, sensors) securely attached:	
✓	Head securely mounted to OC joint:	
✗	Other:	See Details Page


Neck – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Neck cables slide freely through holes in neck plates:	
✓	Head can rotate about occipital condyle joint freely until the bump stops are engaged:	
✓	Neck cables show no sign of fraying, broken strands, or kinking	
✓	No evidence of de-bonding between neck pucks and plates. If failure, indicate which interface (i.e.: where plate/puck 1 attach to upper neck load cell):	
✓	No evidence of de-bonding or permanent compression in neck soft stop assemblies:	
✓	Neck securely attached to upper neck load cell:	
✓	Neck securely attached to lower neck load cell	
✓	Neck pitch change joint mechanism mating teeth are engaged	
✓	Other:	


JACKET – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Rib stiffeners show no sign of permanent deformation:	
✓	No evidence of tears or holes in jacket fabric, velcro, or zippers:	
✓	Other:	

LEFT SHOULDER/ARM – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Urethane shoulder pads show no evidence of contact:	
✓	Clavicle securely attached to sternum and shoulder:	
✓	No evidence of debonding, tearing, or permanent compression of posterior soft stops	
✓	Other:	

RIGHT SHOULDER/ARM – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Urethane shoulder pads show no evidence of contact:	
✓	Clavicle securely attached to sternum and shoulder:	
✓	No evidence of debonding, tearing, or permanent compression of posterior soft stops	
✓	Other:	

Spine – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	No evidence of de-bonding between thoracic spine flex joint and metal plates:	
✓	No evidence of de-bonding between lumbar spine flex joint and metal plates:	
✓	Lumbar spine pitch change joint mechanism mating teeth are engaged:	
✓	Other:	

Technician:   
J. Hernandez

Approved By:   
P. Puzzuto


ATD Serial No.: EG2595


Inspection Date: 2021-08-11

THORAX – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	No evidence of contact at top, bottom, or interior faces of rib damping material:	
✓	No evidence of debonding between rib damping material and ribs:	
✓	IR-TRACC tubes securely attached to anterior ribs	
✗	IR-TRACC tubes securely attached to double gimbals, spine:	See Comments
✓	Urethane bib is securely attached to ribs with no sign of tearing or washer penetration:	
✓	Ribs securely attached to posterior spine:	
✓	Rib stiffeners show no evidence of bending (no gaps between ribs and stiffeners):	
✓	Other:	

ABDOMEN – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	No evidence of tearing, cuts, or broken stitches in upper abdomen bag and zipper:	
✓	Upper abdomen insert securely attached to spine:	
✓	Upper abdomen insert shows no evidence of permanent set:	
✓	No evidence of tearing, cuts, or broken stitches in lower abdomen bag and zipper:	
✓	Lower abdomen insert securely attached to spine:	
✓	Lower abdomen insert shows no evidence of permanent set:	
✓	Other:	

Pelvis – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Pelvis flesh fits securely over pelvis bones:	
✓	H-point tool fits securely into hole on both sides of pelvis:	
✓	ASIS load cells are secured to the iliac bones and iliac bones are firmly attached to the pelvis	
✓	The iliac bones are free from cracks or fractures	
✓	If welds are present in the iliac bones, the welds are continuous and devoid of cracks	
✓	Other:	

Technician:   
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ATD Serial No.: EG2595


Inspection Date: 2021-08-11


LEFT FEMUR – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Acetabular load cells firmly attached:	
✓	Femur load cell firmly attached:	
✓	No evidence of deformation of knee slider bump stop:	
✓	No cuts, tears, or scuffing of knee flesh:	
✓	Other:	

RIGHT FEMUR – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Acetabular load cells firmly attached:	
✓	Femur load cell firmly attached:	
✓	No evidence of deformation of knee slider bump stop:	
✓	No cuts, tears, or scuffing of knee flesh:	
✓	Other:	

LEFT LOWER EXTREMITY (LX) – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Rotational potentiometers in ankle securely attached:	
✓	Achilles tendon provides resistance to dorsiflexion:	
✓	No evidence of debonding, tearing, or permanent compression of ankle soft stops:	
✓	No cuts, tears, or scuffing of leg flesh	
✓	Other:	

RIGHT LOWER EXTREMITY (LX) – Pass(✓)/Fail(✗). If Fail, explain reason and/or attach picture		Note
✓	Rotational potentiometers in ankle securely attached:	
✓	Achilles tendon provides resistance to dorsiflexion:	
✓	No evidence of debonding, tearing, or permanent compression of ankle soft stops:	
✓	No cuts, tears, or scuffing of leg flesh	
✓	Other:	

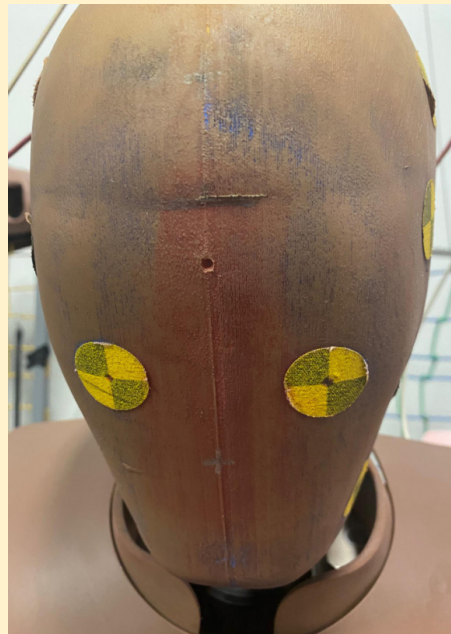
Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

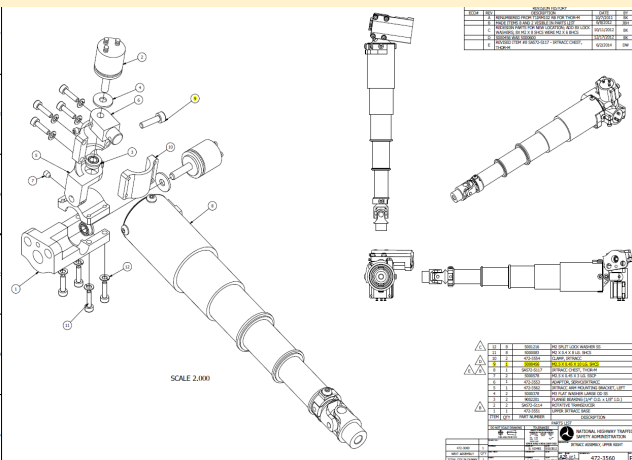
Damage and Discrepancy Details



Cuts in Face Foam



Cut on top of face.



Left Upper Thorax IRTRACC -  
SHCS M2.5 X 0.45X 10 loose

Additional Notes:

Thorax Left Upper gimbal Rz set screw was found to be loose after the test. This was checked due to some less than typical potentiometer data. During the inspection, the set screw was clearly loose. After securing, performed a cursory zero check to  $\pm 1.0$  deg. and the starting angle of the pot after installation is  $\pm 1.0$  degree of the previous cert and test starting angles. The cert test data is accurate

**APPENDIX G**  
**THOR-50M 50<sup>TH</sup> PERCENTILE MALE ATD**  
**SENSOR POLARITIES**

THOR-50M 50th Percentile Male ATD  
Sensor Polarities

ATD S/N: EG2595

Date: 5/10/2021

Note 1: Some polarities may appear counter to the specified wiring. The use of wired adapters may influence polarities

Note 2: Highlighted SAE polarity shows a deviation from SAE standard or an expected negative polarity to the mechanical input

Segment	Instrument	Axis	ISO Code	Motion	J211	Actual	Invert
Head and Neck	Head Accelerometers Primary	Ax	HEAD0000THACXP	Impact back of head	+	-	Yes
		Ay	HEAD0000THACYP	Impact left of head	+	+	No
		Az	HEAD0000THACZP	Impact top of head	+	+	No
	Head Accelerometers Redundant	Ax	HEADRD00THACXP	Impact back of head	+	NA	NA
		Ay	HEADRD00THACYP	Impact left of head	+	NA	NA
		Az	HEADRD00THACZP	Impact top of head	+	NA	NA
	Head ARS	ωx	HEAD0000THAVXP	Rotate right ear toward right shoulder	+	-	Yes
		ωy	HEAD0000THAVYP	Rotate chin away from sternum	+	+	No
		ωz	HEAD0000THAVZP	Rotate chin toward right shoulder	+	-	Yes
	Front Neck Spring	Fz	NECKFR00THFOZP	Rotate head rearward	+	+	No
	Rear Neck Spring	Fz	NECKRE00THFOZP	Rotate chin toward chest	+	+	No
	O.C. Rotary Pot	Ry	NECKUP00THANYP	Rotate chin toward chest	+	NA	NA
	Upper Neck Load	Fx	NECKUP00THFOXP	Move head rear, chest forward	+	+	No
		Fy	NECKUP00THFOYP	Move head left, chest right	+	+	No
		Fz	NECKUP00THFOZP	Move head up, chest down	+	+	No
		Mx	NECKUP00THMOXP	Rotate left ear toward left shoulder	+	+	No
		My	NECKUP00THMOYP	Rotate chin toward sternum	+	+	No
		Mz	NECKUP00THMOZP	Rotate chin toward left shoulder	+	+	No
	Lower Neck Load	Fx	NECKLO00THFOXP	Move head rear, chest forward	+	NA	NA
		Fy	NECKLO00THFOYP	Move head left, chest right	+	NA	NA
		Fz	NECKLO00THFOZP	Move head up, chest down	+	NA	NA
		Mx	NECKLO00THMOXP	Rotate left ear toward left shoulder	+	NA	Yes
		My	NECKLO00THMOYP	Rotate chin toward sternum	+	NA	Yes
Mz		NECKLO00THMOZP	Rotate chin toward left shoulder	+	NA	Yes	
Face Loads	Fx	NA	Hold back of head, push face rearward	-	NA	NA	

THOR-50M 50th Percentile Male ATD  
Sensor Polarities

ATD S/N: EG2595

Date: 5/10/2021

Note 1: Some polarities may appear counter to the specified wiring. The use of wired adapters may influence polarities

Note 2: Highlighted SAE polarity shows a deviation from SAE standard or an expected negative polarity to the mechanical input

Segment	Instrument	Axis	ISO Code	Motion	J211	Actual	Invert
Spine and Thorax	T1 Accelerometer	Ax	THSP0100THACXP	Impact back of T1Spine	+	NA	NA
		Ay	THSP0100THACYP	Impact left of T1Spine	+	NA	NA
		Az	THSP0100THACZP	Impact top of Spine	+	NA	NA
	T1 ARS	$\omega_x$	THSP0100THAVXP	Rotate spine sideways to the right	+	NA	NA
		$\omega_y$	THSP0100THAVYP	Rotate spine rearward	+	NA	NA
		$\omega_z$	THSP0100THAVZP	Left shoulder forward, right shoulder aft	+	NA	NA
	Mid Sternum Accelerometer	Ax	STRN0000THACXP	Rotate dummy back (face up)	+	NA	NA
	T6 Accelerometer (Chest CG)	Ax	THSP0600THACXP	Impact back of T6 Spine	+	-	Yes
		Ay	THSP0600THACYP	Impact left of T6 Spine	+	+	No
		Az	THSP0600THACZP	Impact top of Spine	+	-	Yes
	T6 ARS	$\omega_x$	THSP0600THAVXP	Right shoulder down	+	-	Yes
		$\omega_y$	THSP0600THAVYP	Shoulders back	+	+	No
		$\omega_z$	THSP0600THAVZP	Left shoulder forward, right shoulder back	+	-	Yes
	T12 (Thoracic Spine) Accelerometer	Ax	THSP1200THACXP	Impact back of T12 Spine	+	NA	NA
		Ay	THSP1200THACYP	Impact left of T12 Spine	+	NA	NA
		Az	THSP1200THACZP	Impact top of Spine	+	NA	NA
	T12 (Thoracic Spine) ARS	$\omega_x$	THSP1200THAVXP	Impact back of T12 Spine	+	NA	NA
		$\omega_y$	THSP1200THAVYP	Impact left of T12 Spine	+	NA	NA
		$\omega_z$	THSP1200THAVZP	Impact top of Spine	+	NA	NA
	T12 (Thoracic Spine) Load	Fx	THSP1200THFOXP	Move chest rear, pelvis forward	+	+	No
		Fy	THSP1200THFOYP	Move chest left, pelvis right	+	+	No
		Fz	THSP1200THFOZP	Move chest up, pelvis down	+	+	No
		Mx	THSP1200THMOXP	Rotate left shoulder toward left hip	+	+	No
		My	THSP1200THMOYP	Rotate sternum towards front of legs	+	+	No
	Left Clavicle (Medial) Load	Fx	NA	Pull clavicle forward away from spine	+	NA	NA
		Fz	NA	Push clavicle down towards pelvis	+	NA	NA
	Left Clavicle (Lateral) Load	Fx	NA	Push clavicle forward away from spine	+	NA	NA
Fz		NA	Push clavicle down towards pelvis	+	NA	NA	
Right Clavicle (Medial) Load	Fx	NA	Push clavicle forward away from spine	+	NA	NA	
	Fz	NA	Push clavicle down towards pelvis	+	NA	NA	
Right Clavicle (Lateral) Load	Fx	NA	Push clavicle forward away from spine	+	NA	NA	
	Fz	NA	Push clavicle down towards pelvis	+	NA	NA	
Abdomen	Upper Abdomen Accel,	Ax	NA	Impact back of Spine	+	NA	NA

THOR-50M 50th Percentile Male ATD  
Sensor Polarities

ATD S/N: EG2595

Date: 5/10/2021

Note 1: Some polarities may appear counter to the specified wiring. The use of wired adapters may influence polarities

Note 2: Highlighted SAE polarity shows a deviation from SAE standard or an expected negative polarity to the mechanical input

Segment	Instrument	Axis	ISO Code	Motion	J211	Actual	Invert
Pelvis	Left ASIS Load (Anterior Superior Iliac Spine)	Fx	ILACLE00THFOXP	Push in towards back of pelvis	-	-	No
		My	ILACLE00THMOYP	Push top of ASIS towards back of pelvis	+	+	No
	Right ASIS Load (Anterior Superior Iliac Spine)	Fx	ILACRI00THFOXP	Push in towards back of pelvis	-	-	No
		My	ILACRI00THMOYP	Push top of ASIS towards back of pelvis	+	+	No
	Left Acetabular Load	Fx	ACTBLE00THFOXP	Move femur forward, pelvis rear	+	-	Yes
		Fy	ACTBLE00THFOYP	Move femur right, pelvis left	+	+	No
		Fz	ACTBLE00THFOZP	Move femur down, pelvis up	+	+	No
	Right Acetabular Load	Fx	ACTBRI00THFOXP	Move femur forward, pelvis rear	+	+	No
		Fy	ACTBRI00THFOYP	Move femur right, pelvis left	+	-	Yes
		Fz	ACTBRI00THFOZP	Move femur down, pelvis up	+	-	Yes
	Pelvis CG Accelerometer	Ax	PELV0000THACXP	Impact back of Pelvis	+	-	Yes
		Ay	PELV0000THACYP	Impact left of Pelvis	+	+	No
		Az	PELV0000THACZP	Impact top of Spine	+	+	No
	Pelvis CG ARS	$\omega_x$	PELV0000THAVXP	Right shoulder down	+	-	Yes
		$\omega_y$	PELV0000THAVYP	Shoulders back, legs up	+	+	No
$\omega_z$		PELV0000THAVZP	Twist pelvis, body, and legs right	+	+	No	
Femurs	Left Femur Load	Fx	FEMRLE00THFOXP	Move knee upward, upper femur down	+	+	No
		Fy	FEMRLE00THFOYP	Move knee right, upper femur left	+	+	No
		Fz	FEMRLE00THFOZP	Move knee forward, femur rear	+	+	No
		Mx	FEMRLE00THMOXP	Rotate knee left, hold upper femur	+	+	No
		My	FEMRLE00THMOYP	Rotate knee up, hold upper femur	+	+	No
		Mz	FEMRLE00THMOZP	Rotate tibia left, hold pelvis	+	+	No
	Right Femur Load	Fx	FEMRRI00THFOXP	Move knee upward, upper femur down	+	+	No
		Fy	FEMRRI00THFOYP	Move knee right, upper femur left	+	+	No
		Fz	FEMRRI00THFOZP	Move knee forward, femur rear	+	+	No
		Mx	FEMRRI00THMOXP	Rotate knee left, hold upper femur	+	+	No
		My	FEMRRI00THMOYP	Rotate knee up, hold upper femur	+	+	No
		Mz	FEMRRI00THMOZP	Rotate tibia left, hold pelvis	+	+	No

THOR-50M 50th Percentile Male ATD  
Sensor Polarities

ATD S/N: EG2595

Date: 5/10/2021

Note 1: Some polarities may appear counter to the specified wiring. The use of wired adapters may influence polarities

Note 2: Highlighted SAE polarity shows a deviation from SAE standard or an expected negative polarity to the mechanical input

Segment	Instrument	Axis	ISO Code	Motion	J211	Actual	Invert
Lower Extremity Left	Knee Shear Displacement	Dx	KNSLLE00THDSXP	Hold femur, move tibia forward	+	+	No
	Upper Tibia Load	Fx	TIBILEUPTHFOXP	Move tibia forward, knee rearward	+	+	No
		Fy	TIBILEUPTHFOYP	Move ankle right, knee left	+	+	No
		Fz	TIBILEUPTHFOZP	Move ankle down, knee up	+	+	No
		Mx	TIBILEUPTHMOXP	Impact left of Tibia	+	+	No
		My	TIBILEUPTHMOYP	Impact front of Tibia	+	+	No
	Lower Tibia Load	Fx	TIBILELOTHFOXP	Move ankle forward, knee rearward	+	+	No
		Fy	TIBILELOTHFOYP	Move ankle right, knee left	+	+	No
		Fz	TIBILELOTHFOZP	Move ankle down, knee up	+	+	No
		Mx	TIBILELOTHMOXP	Impact left of Tibia	+	+	No
		My	TIBILELOTHMOYP	Impact front of Tibia	+	+	No
	Tibia Accelerometer	Ax	TIBILE00THACXP	Impact back of Tibia	+	NA	NA
		Ay	TIBILE00THACYP	Impact left of Tibia	+	NA	NA
	Achilles Load	Fz	ANKLLE00THFOOP	Rotate foot forward	+	NA	NA
	Ankle Rotation	Rx	ANKLLE00THANXP	Hold tibia, rotate foot leftward	+	+	No
		Ry	ANKLLE00THANYP	Hold tibia, push toe upward	+	-	Yes
		Rz	ANKLLE00THANZP	From top, hold tibia, rotate foot CCW	+	-	Yes
	Foot Acceleration	Ax	FOOTLE00THACXP	Impact back of Foot	+	NA	NA
Ay		FOOTLE00THACYP	Impact left of Foot	+	NA	NA	
Az		FOOTLE00THACZP	Impact top of Foot	+	NA	NA	

THOR-50M 50th Percentile Male ATD  
Sensor Polarities

ATD S/N: EG2595

Date: 5/10/2021

Note 1: Some polarities may appear counter to the specified wiring. The use of wired adapters may influence polarities

Note 2: Highlighted SAE polarity shows a deviation from SAE standard or an expected negative polarity to the mechanical input

Segment	Instrument	Axis	ISO Code	Motion	J211	Actual	Invert
Lower Extremity Right	Knee Shear Displacement	Dx	KNSLR100THDSXP	Hold femur, move tibia forward	+	+	No
	Upper Tibia Load	Fx	TIBIRIUPTHFOXP	Move tibia forward, knee rearward	+	+	No
		Fy	TIBIRIUPTHFOYP	Move ankle right, knee left	+	+	No
		Fz	TIBIRIUPTHFOZP	Move ankle down, knee up	+	+	No
		Mx	TIBIRIUPTHMOXP	Impact left of Tibia	+	+	No
		My	TIBIRIUPTHMOYP	Impact front of Tibia	+	+	No
	Lower Tibia Load	Fx	TIBIRILOTHFOXP	Move ankle forward, knee rearward	+	+	No
		Fy	TIBIRILOTHFOYP	Move ankle right, knee left	+	+	No
		Fz	TIBIRILOTHFOZP	Move ankle down, knee up	+	+	No
		Mx	TIBIRILOTHMOXP	Impact left of Tibia	+	+	No
		My	TIBIRILOTHMOYP	Impact front of Tibia	+	+	No
	Tibia Accelerometer	Ax	TIBIRI00THACXP	Impact back of Tibia	+	NA	NA
		Ay	TIBIRI00THACYP	Impact left of Tibia	+	NA	NA
	Achilles Load	Fz	ANKLR100THFOOP	Rotate foot forward	+	NA	NA
	Ankle Rotation	Rx	ANKLR100THANXP	Hold tibia, rotate foot leftward	+	+	No
		Ry	ANKLR100THANYP	Hold tibia, push toe upward	+	-	Yes
		Rz	ANKLR100THANZP	From top, hold tibia, rotate foot CCW	+	-	Yes
	Foot Acceleration	Ax	FOOTRI00THACXP	Impact back of Foot	+	NA	NA
Ay		FOOTRI00THACYP	Impact left of Foot	+	NA	NA	
Az		FOOTRI00THACZP	Impact top of Foot	+	NA	NA	

THOR-50M 50th Percentile Male ATD  
Sensor Polarities

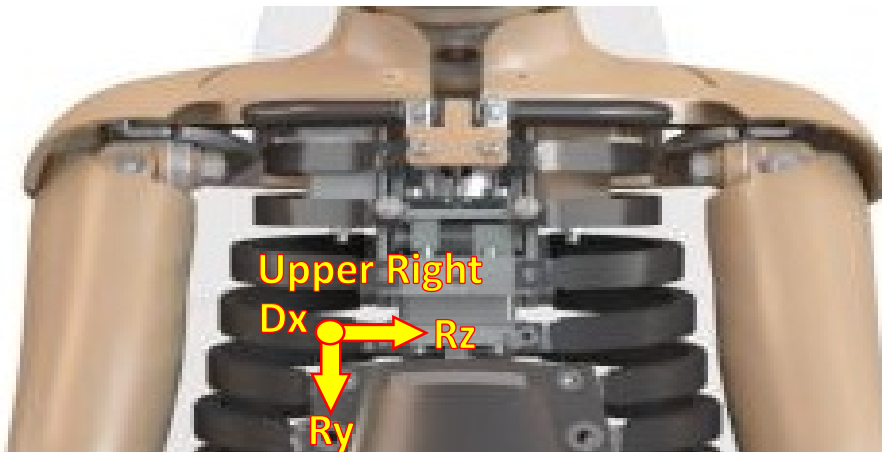
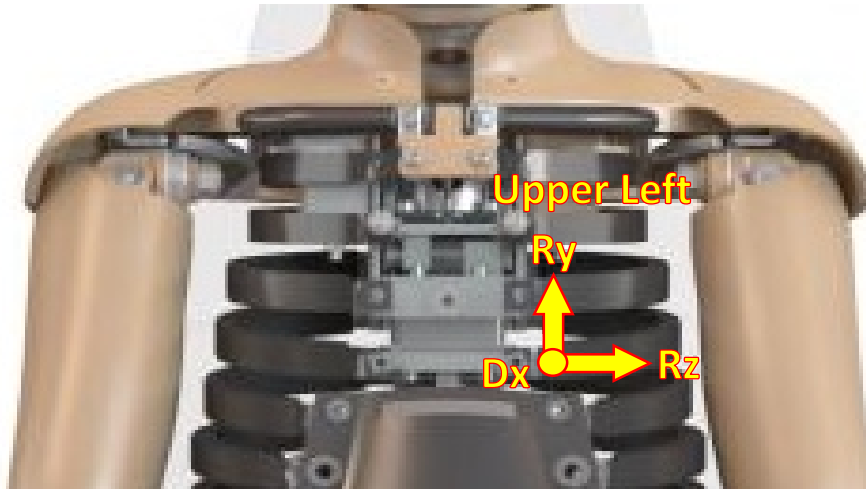
ATD S/N: EG2595

Date: 5/10/2021

Note 1: Some polarities may appear counter to the specified wiring. The use of wired adapters may influence polarities

Note 2: Highlighted SAE polarity shows a deviation from SAE standard or an expected negative polarity to the mechanical input

Segment	Instrument	Axis	ISO Code	Motion	J211	Actual	Invert
Thorax Upper Left	IRTRACC Raw Voltage	Dx (V)	CHSTLEUPTHVOOP	Push Inward	+	+	No
	Rotation Pitch	Ry	CHSTLEUPTHANYP	Push upward	+	+	No
	Rotation Yaw	Rz	CHSTLEUPTHANZP	Push leftward	+	+	No
Thorax Upper Right	IRTRACC Raw Voltage	Dx (V)	CHSTRIUPTHVOOP	Push Inward	+	+	No
	Rotation Pitch	Ry	CHSTRIUPTHANYP	Push downward	+	+	No
	Rotation Yaw	Rz	CHSTRIUPTHANZP	Push leftward	+	+	No



THOR-50M 50th Percentile Male ATD  
Sensor Polarities

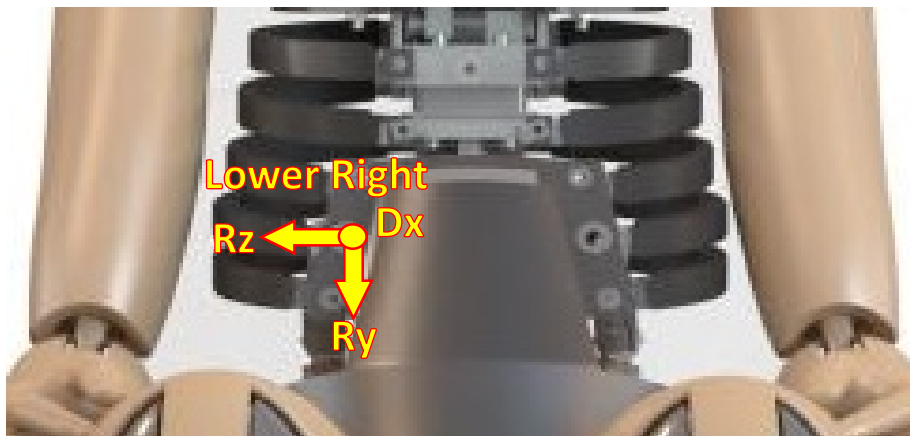
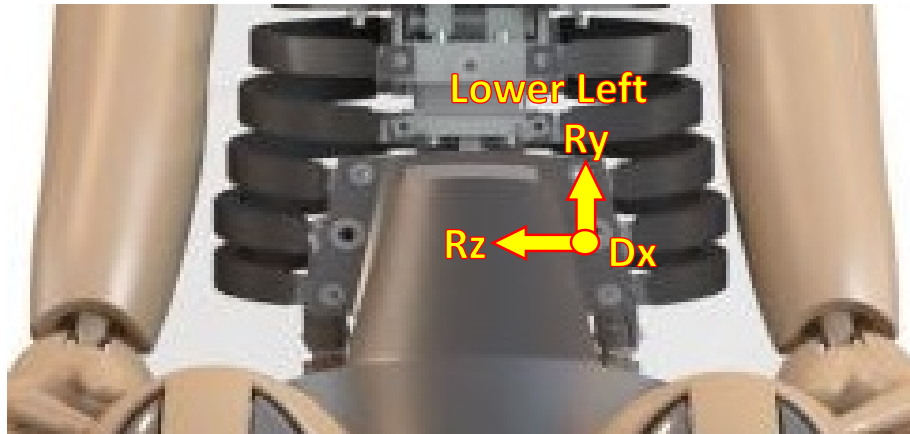
ATD S/N: EG2595

Date: 5/10/2021

Note 1: Some polarities may appear counter to the specified wiring. The use of wired adapters may influence polarities

Note 2: Highlighted SAE polarity shows a deviation from SAE standard or an expected negative polarity to the mechanical input

Segment	Instrument	Axis	ISO Code	Motion	J211	Actual	Invert
Thorax Lower Left	IRTRACC Raw Voltage	Dx (V)	CHSTLELOTHVOOP	Push Inward	+	+	No
	Rotation Pitch	Ry	CHSTLELOTHANYP	Push upward	+	+	No
	Rotation Yaw	Rz	CHSTLELOTHANZP	Push rightward	+	+	No
Thorax Lower Right	IRTRACC Raw Voltage	Dx (V)	CHSTRILOTHVOOP	Push Inward	+	+	No
	Rotation Pitch	Ry	CHSTRILOTHANYP	Push downward	+	+	No
	Rotation Yaw	Rz	CHSTRILOTHANZP	Push rightward	+	+	No



THOR-50M 50th Percentile Male ATD  
Sensor Polarities

ATD S/N: EG2595

Date: 5/10/2021

Note 1: Some polarities may appear counter to the specified wiring. The use of wired adapters may influence polarities

Note 2: Highlighted SAE polarity shows a deviation from SAE standard or an expected negative polarity to the mechanical input

Segment	Instrument	Axis	ISO Code	Motion	J211	Actual	Invert
Abdomen Left	IRTRACC Raw Voltage	Dx (V)	ABDOLE00THVO0P	Push Inward	+	+	No
	Rotation Pitch	Ry	ABDOLE00THANYP	Push upward	+	+	No
	Rotation Yaw	Rz	ABDOLE00THANZP	Push rightward	+	+	No
Abdomen Right	IRTRACC Raw Voltage	Dx (V)	ABDORI00THVO0P	Push Inward	+	+	No
	Rotation Pitch	Ry	ABDORI00THANYP	Push downward	+	+	No
	Rotation Yaw	Rz	ABDORI00THANZP	Push rightward	+	+	No

