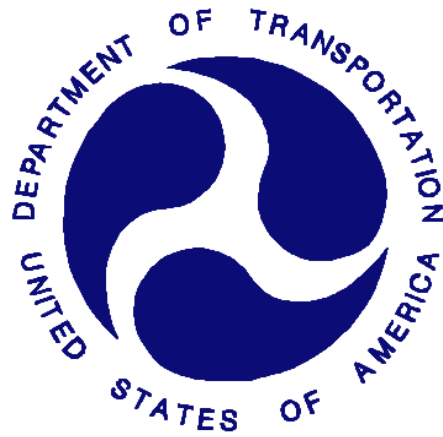


**Vehicle Research and Test Center
FMVSS 213 Testing
Hybrid III 10 Year Old**

**Prepared By:
Transportation Research Center Inc.
10820 State Route 347
P. O. Box B-67
East Liberty, OH 43319**



Summary Report

January 2021

**Prepared For
Vehicle Research and Test Center
P. O. Box 37
East Liberty, OH 43319**

SECTION 1
PURPOSE AND SUMMARY FOR HYBRID III 10 YEAR OLD

The purpose of the testing is: 1) to determine whether test data from the revised FMVSS No. 213 bench is repeatable and reproducible when compared to other test facility results; and 2) to refine additional test procedure measures to improve R&R.

SUMMARY

A Hybrid III 10 year old dummy (serial number F001) was secured in the left rear occupant position (position 4 or P4). The Hybrid III 10 year old was instrumented with head, chest, and pelvis triaxial accelerometers, upper neck, lower neck, and lumbar force and moment load cells, a displacement potentiometer in the chest. During this test series the dummy was restrained with a 3 point seat belt (SB3PT).

The neck was re-qualified on 1/27/2021.

Section 2 contains the testing performed using a forward facing CRS in the left rear seating position. Section 3 contains the dummy certification information. Section 3A contains the re-qualified neck certification information.

SECTION 2
FORWARD FACING CRS LEFT REAR TEST SUMMARY

TEST DUMMY INFORMATION

Description	Position # 4 CRS
ATD Type/Serial No.	Hybrid III 10 Year Old/F001
Restraint System	SB3PT
CRS Direction	Forward Facing
Foam Cushion	WB13, WB24, WB7

CAMERA POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Origin	mm	0.00	0.00	0.00
Driver Front	mm	444.19	-880.48	-376.24
N1 Driver Excursion	mm	814.19	-905.23	-447.56
N4 Driver Side	mm	1843.92	313.63	-505.41

DUMMY POSITIONING

CRS: Harmony Youth NB – Belt Positioning Booster – SB3PT

TRC Test Number: S210112-1

VRTC Test Number: FR_RR_PE_01



DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Z-Point	mm	-0.16	-0.16	0.18
Center of Seat Back Frame	mm	-118.23	350.72	-683.04
Top of Head	mm	92.62	351.40	-890.87
Bridge of Nose	mm	185.91	350.02	-798.04
Head CG Outboard	mm	99.29	281.88	-790.97
Neck Center	mm	108.64	350.97	-670.04
Shoulder Belt Up	mm	176.52	350.35	-599.33
Shoulder Belt Down	mm	218.86	350.31	-519.24
Lap Belt Up	mm	279.91	350.70	-405.02
Lap Belt Down	mm	317.70	350.31	-377.09
Base Center	mm	460.81	351.32	-239.55
Center of Seat Frame Bottom	mm	619.08	351.10	-103.32
Outboard Knee	mm	539.48	207.78	-363.12
Outboard Ankle	mm	685.99	246.28	-115.76
Target 2 - Seat Base H-Point	mm	176.55	138.35	-260.65
Target 3 - Seat Base Side	mm	419.02	171.59	-262.59

HIC (36 ms)*	527
Chest Clip (3 ms)	42.76 g
Head Excursion (mm)	497
Knee Excursion (mm)	688

*Truncated to exclude rebound

DUMMY POSITIONING

CRS: Harmony Youth NB – Belt Positioning Booster – SB3PT

TRC Test Number: S210113-1

VRTC Test Number: FR_RR_PE_03



DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Z-Point	mm	-0.07	0.21	0.51
Center of Seat Back Frame	mm	-118.68	352.03	-682.66
Top of Head	mm	91.67	350.40	-891.51
Bridge of Nose	mm	186.15	350.49	-799.03
Head CG Outboard	mm	101.19	281.04	-791.56
Neck Center	mm	109.55	349.39	-670.62
Shoulder Belt Up	mm	178.08	350.72	-599.59
Shoulder Belt Down	mm	217.66	350.10	-525.47
Lap Belt Up	mm	277.48	350.52	-403.02
Lap Belt Down	mm	315.95	350.41	-374.44
Base Center	mm	456.80	348.46	-245.93
Center of Seat Frame Bottom	mm	618.11	350.88	-105.47
Outboard Knee	mm	533.57	212.60	-370.47
Outboard Ankle	mm	677.22	247.96	-116.38
Target 2 - Seat Base H-Point	mm	180.83	138.04	-257.72
Target 3 - Seat Base Side	mm	417.73	176.49	-262.18

HIC (36 ms)	519*
Chest Clip (3 ms)	43.54 g
Head Excursion (mm)	483
Knee Excursion (mm)	675

*Truncated to exclude rebound

DUMMY POSITIONING

CRS: Harmony Youth NB – Belt Positioning Booster – SB3PT

TRC Test Number: S210113-2

VRTC Test Number: FR_RR_PE_05



DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Z-Point	mm	-0.16	-0.30	0.48
Center of Seat Back Frame	mm	-118.67	350.76	-682.87
Top of Head	mm	88.04	350.32	-889.11
Bridge of Nose	mm	181.57	352.27	-795.84
Head CG Outboard	mm	96.79	281.50	-789.06
Neck Center	mm	103.78	349.19	-668.46
Shoulder Belt Up	mm	171.16	349.97	-601.14
Shoulder Belt Down	mm	212.28	350.50	-522.09
Lap Belt Up	mm	274.79	350.75	-401.83
Lap Belt Down	mm	310.61	350.74	-375.46
Base Center	mm	459.23	348.94	-245.52
Center of Seat Frame Bottom	mm	618.43	350.69	-105.07
Outboard Knee	mm	531.68	212.72	-368.33
Outboard Ankle	mm	679.94	245.96	-116.46
Target 2 - Seat Base H-Point	mm	174.32	136.52	-254.14
Target 3 - Seat Base Side	mm	419.91	171.07	-264.41

HIC (36 ms)	541*
Chest Clip (3 ms)	43.18 g
Head Excursion (mm)	481
Knee Excursion (mm)	676

*Truncated to exclude rebound

SECTION 3
DUMMY CALIBRATION DATA

SECTION 3A
RE-QUALIFIED NECK CALIBRATION DATA

Transportation Research Center Inc. ATD Certification Report

Customer:

Vehicle Research and Test Center
10820 State Route 347
East Liberty, Ohio 43319

Anthropomorphic Device:

Hybrid III (10) Year Old
Serial No. F001
Certification No. 33



**Transportation Research Center Inc.
P.O. Box B-67
10820 St. Rt. 347
East Liberty, OH 43319-0367**

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Introduction

Customer Name: VRTC
Customer Contact: Bryan Crabtree
Email: Bryan.Crabtree.CTR@dot.gov
Phone: (937) 666-2011
Date Received: December 17, 2020
Date Completed: December 21, 2020

Special Instruction: N/A

This Certification Report meets the requirements set forth by the ANSI National Accreditation Board ISO/IEC 17025:2017 accreditation under the scope of Mechanical Testing for Crash Test Dummy Certification Testing (ANAB Certificate #L2187). **This testing certification shall not be reproduced, except in full, without written approval of TRC Inc.**

The evidence measurements of this Certification Report are traceable by the Serial Number and Certification Number located at the top of the first section for each certification.

Each certification test was conducted by an authorized Transportation Research Center Inc. (TRC Inc.) employee within the requirements of the ISO/IEC 17025:2017 standards and adheres to CFR Part 572 Subparts B, E, N, O, P, R, T, U, V, SAE J2860, J2856, J2862; depending on ATD type. Any statements of conformity in this report are made using the shared risk method.

Each component of the ATD to be tested was contained in a temperature controlled environment for a period of at least 4 hours before the test. The temperature in the ATD Certification Laboratory was between 20.6°C and 22.2°C (69.08°F – 71.96°F). The relative humidity in the ATD Certification Laboratory was between 10% and 70%.

Date Testing Requested: 12/17/2020

Testing Conducted by: Bryce Williams
Bryce Williams, Engineering Technician I

Date: 12/21/2020

Testing Approved by: Sal LoPresti
Sal LoPresti, Supervisor - Calibration Services

Date: 12/22/2020



Appendix A – Incoming Inspection



TRC ATD Laboratory As Received Inspection Report

Name: Bryce Williams

Date: 12/17/2020

Customer: VRTC

ATD S/N: F001

HEAD / NECK		
No.	Comments	Photo No.
1	None to report.	
2		
3		

THORAX / ABDOMEN		
No.	Comments	Photo No.
4	Small cuts on back and on left side of abdomen.	1,2
5		
6		

SHOULDERS / ARMS		
No.	Comments	Photo No.
7	None to report.	
8		
9		

PELVIS / LUMBAR		
No.	Comments	Photo No.
10	Cut on left top side of pelvis.	3
11		
12		

FEMUR / KNEES		
No.	Comments	Photo No.
13	None to report.	
14		
15		

LOWER LEGS / FEET		
No.	Comments	Photo No.
16	None to report.	
17		
18		





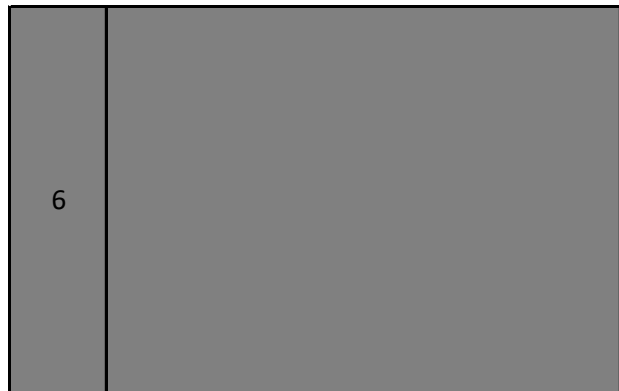
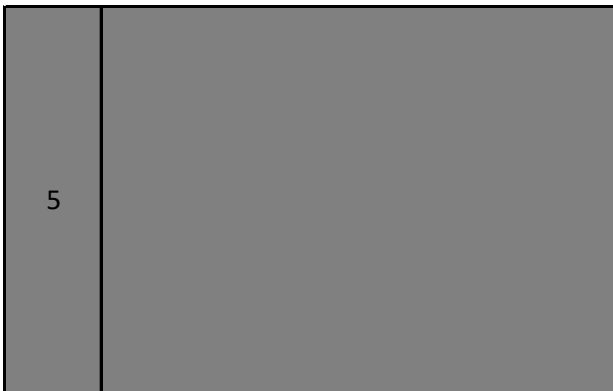
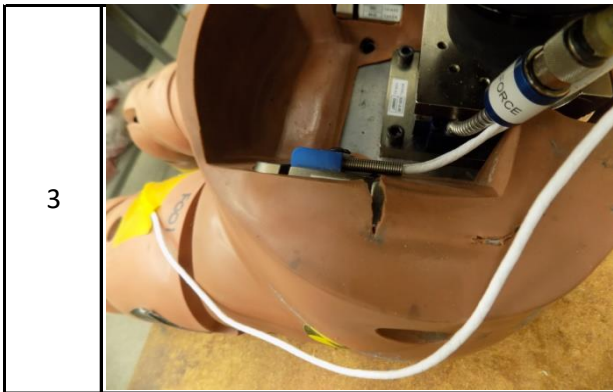
TRC ATD Laboratory As Received Inspection Photos

Name: Bryce Williams

Date: 12/17/2020

Customer: VRTC

ATD S/N: F001





TRC ATD Laboratory Inspection Report Action Items

Name: Bryce Williams

Date: 12/21/2020

Customer: VRTC

ATD S/N: F001

Action #1	None to report.
Resolution #1	
Action #2	
Resolution #2	
Action #3	
Resolution #3	
Comments	



Appendix B – Test Results

Transportation Research Center Inc.

Front Head Drop

HIII 10YO Serial No. F001 Certification No. 33-1

Test Date: 12/18/2020

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	293.6 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	2.7 g	Yes
Is Acceleration Curve Unimodal	< 10 %	1.59 %	Yes

Test meets specifications.

Condition: Used

Comments:

Head Skin S/N: 1352

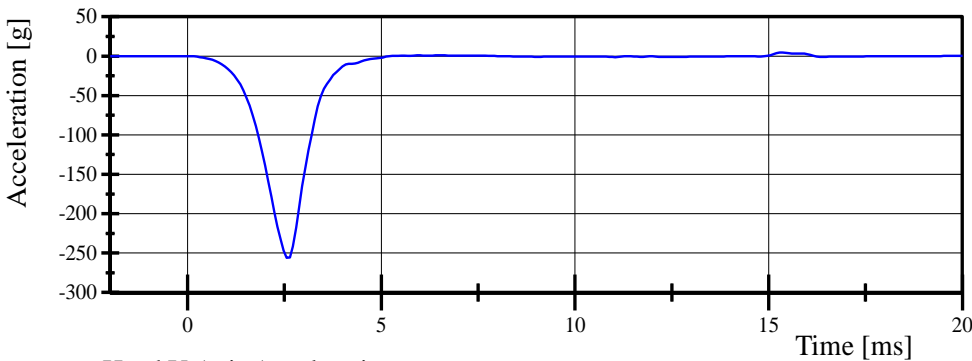
Transportation Research Center Inc.

Front Head Drop

HIII 10YO Serial No. F001 Certification No. 33-1

Test Date: 12/18/2020

Head X-Axis Acceleration

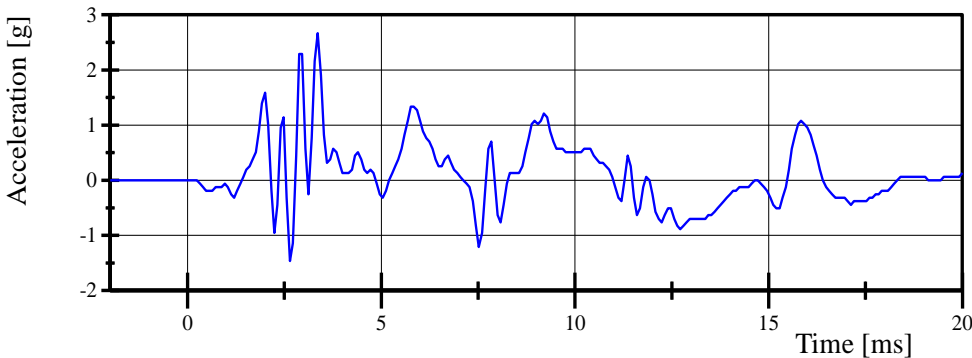


Filter Class: CFC_1000

Max: 4.6 g at 15.3 ms

Min: -256.1 g at 2.6 ms

Head Y-Axis Acceleration

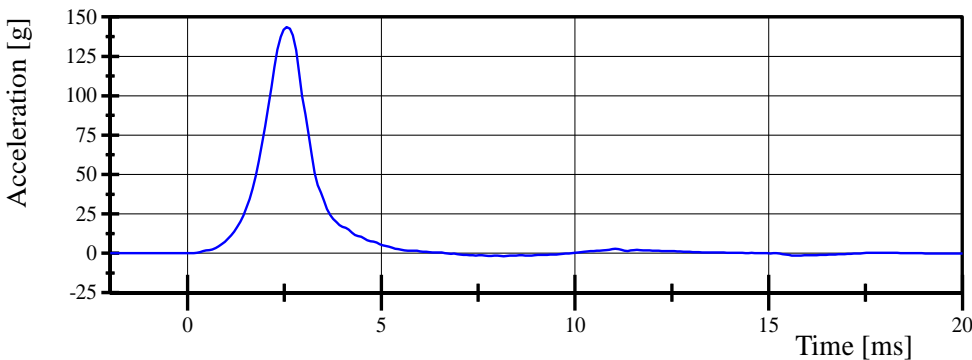


Filter Class: CFC_1000

Max: 2.7 g at 3.4 ms

Min: -1.5 g at 2.6 ms

Head Z-Axis Acceleration

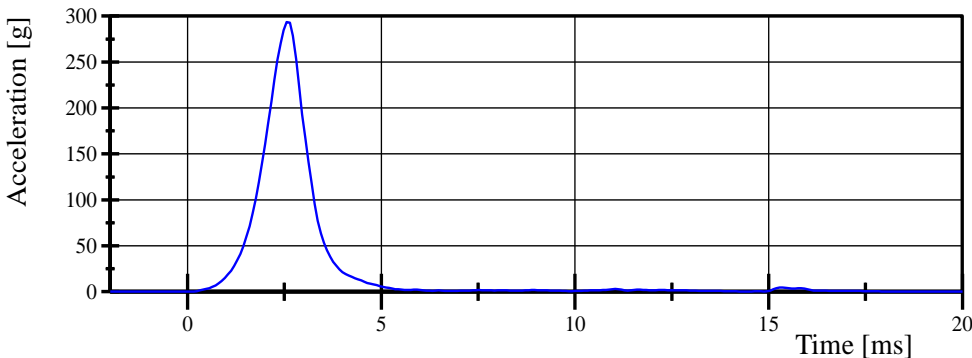


Filter Class: CFC_1000

Max: 143.6 g at 2.6 ms

Min: -1.8 g at 8.2 ms

Head Resultant Acceleration



Filter Class: CFC_1000

Max: 293.6 g at 2.6 ms

Min: 0.0 g at -2.0 ms

Transportation Research Center Inc.

Neck Flexion

HIII 10YO Serial No. F001 Certification No. 33-1

Test Date: 12/21/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Pendulum Impact Velocity	5.98 - 6.22 m/s	6.142 m/s	Yes
Pendulum Integrated Velocity at 10ms	(-1.64) - (-2.04) m/s	-1.810 m/s	Yes
Pendulum Integrated Velocity at 20ms	(-3.04) - (-4.04) m/s	-3.558 m/s	Yes
Pendulum Integrated Velocity at 30ms	(-4.45) - (-5.65) m/s	-5.175 m/s	Yes
Total Head D-Plane Rotation	(-76.0) - (-90.0) °	-79.08 °	Yes
Total Neck Occipital Condyles Moment Between -76° and -90° Rotation	50.0 - 62.0 Nm	56.28 Nm	Yes
Neck Occipital Condyles Moment Decay to 10 Nm	86.0 - 105.0 ms	94.25 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Neck S/N: 22020053A

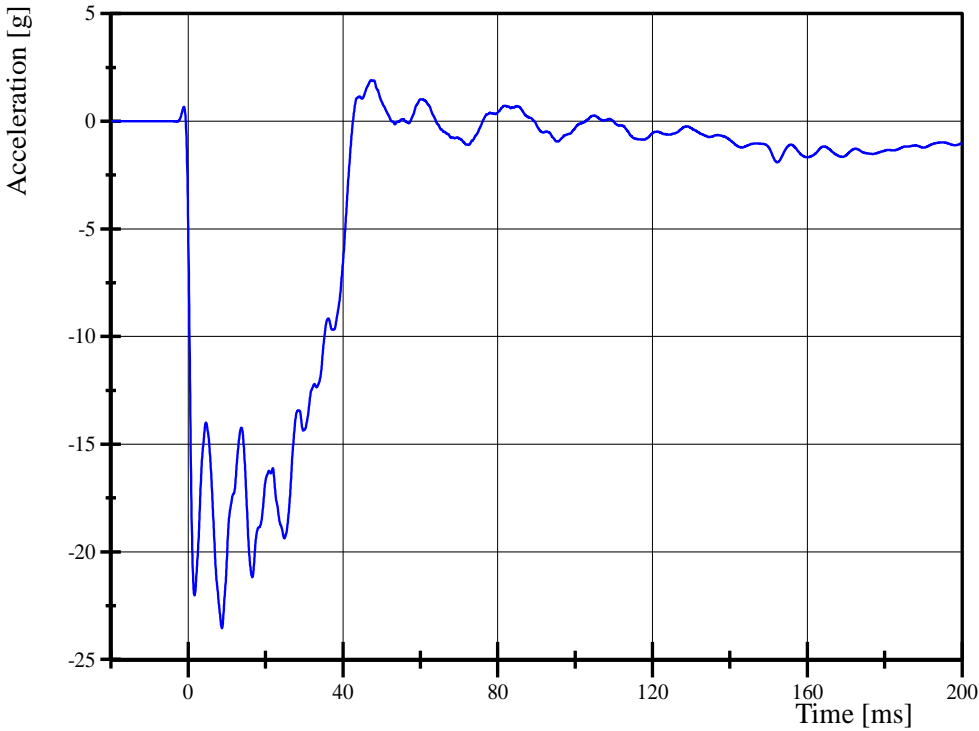
Transportation Research Center Inc.

Neck Flexion

HIII 10YO Serial No. F001 Certification No. 33-1

Test Date: 12/21/2020

Pendulum Acceleration

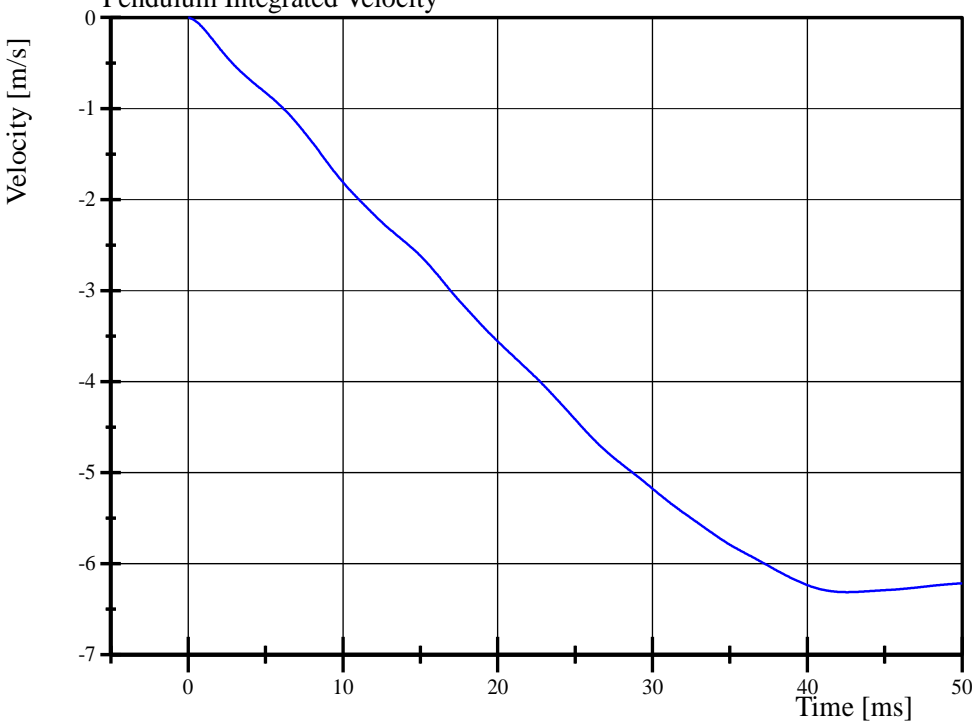


Filter Class: CFC_180

Max: 1.9 g at 47.3 ms

Min: -23.5 g at 8.8 ms

Pendulum Integrated Velocity



Filter Class: CFC_180

Max: 0.0 m/s at 0.0 ms

Min: -6.3 m/s at 42.6 ms

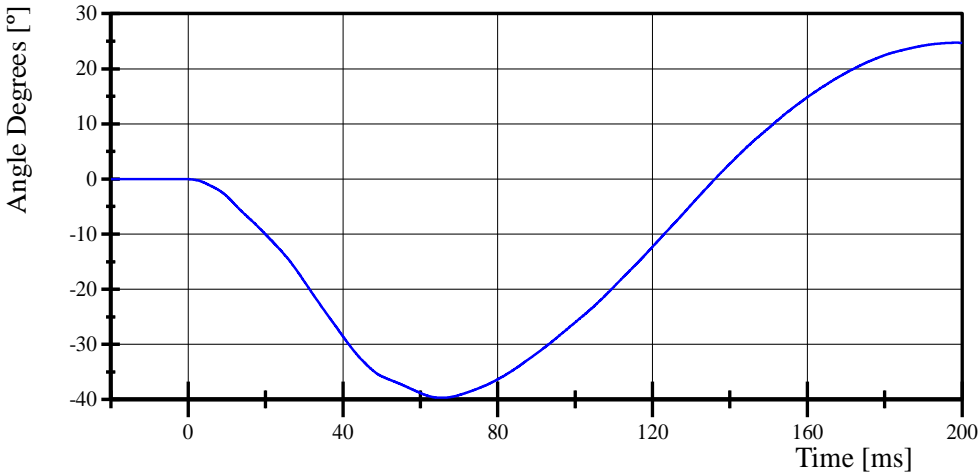
Transportation Research Center Inc.

Neck Flexion

HIII 10YO Serial No. F001 Certification No. 33-1

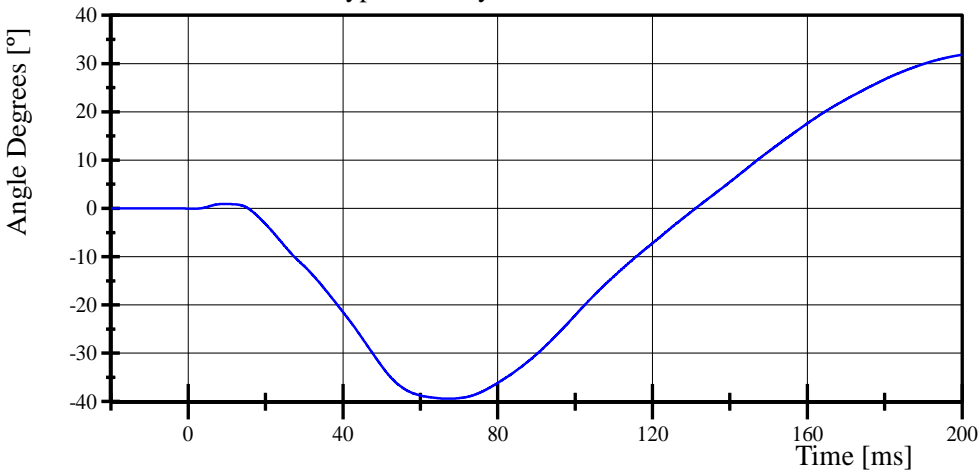
Test Date: 12/21/2020

Pot Rotation at the Base of Neck



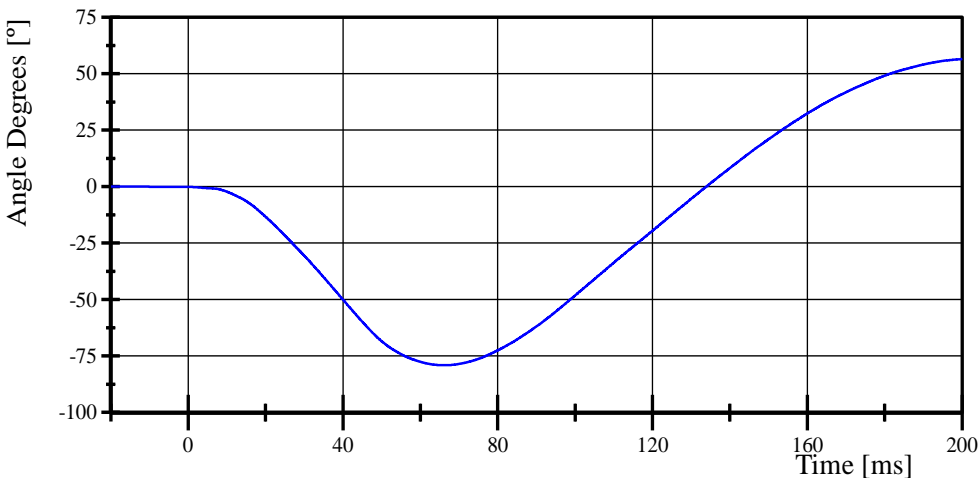
Filter Class: CFC_60
Max: 24.7 ° at 198.3 ms
Min: -39.7 ° at 65.4 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 31.8 ° at 200.0 ms
Min: -39.4 ° at 67.2 ms

Total Head D-Plane Rotation



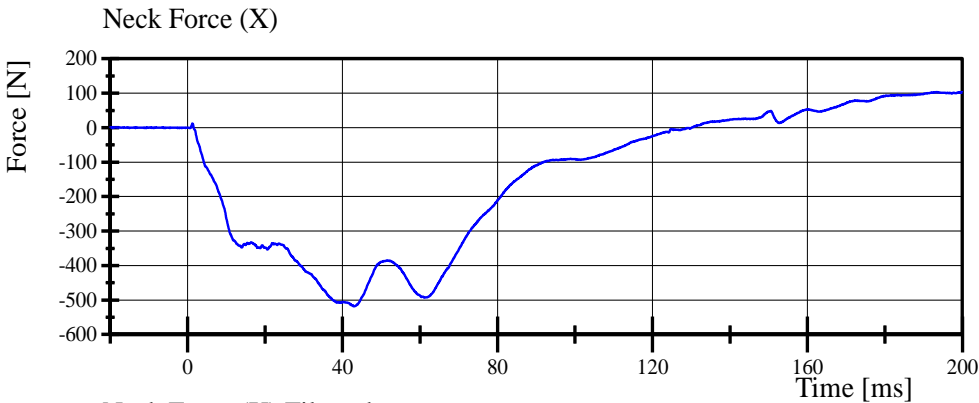
Filter Class: CFC_60
Max: 56.5 ° at 200.0 ms
Min: -79.1 ° at 66.2 ms

Transportation Research Center Inc.

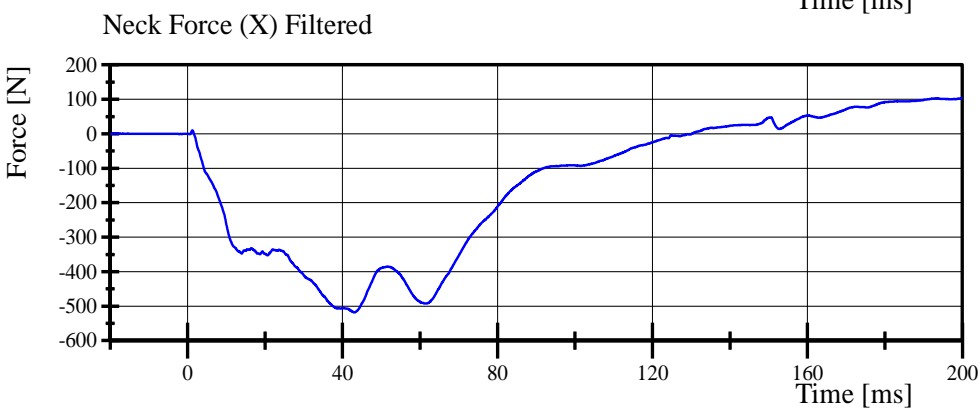
Neck Flexion

HIII 10YO Serial No. F001 Certification No. 33-1

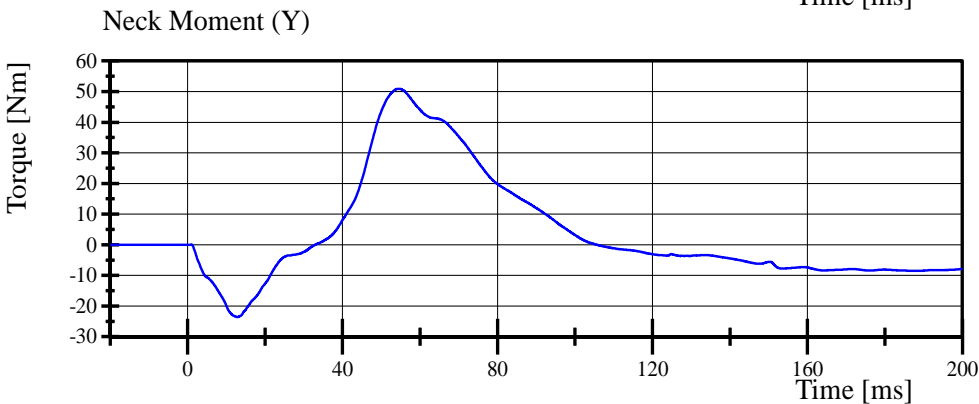
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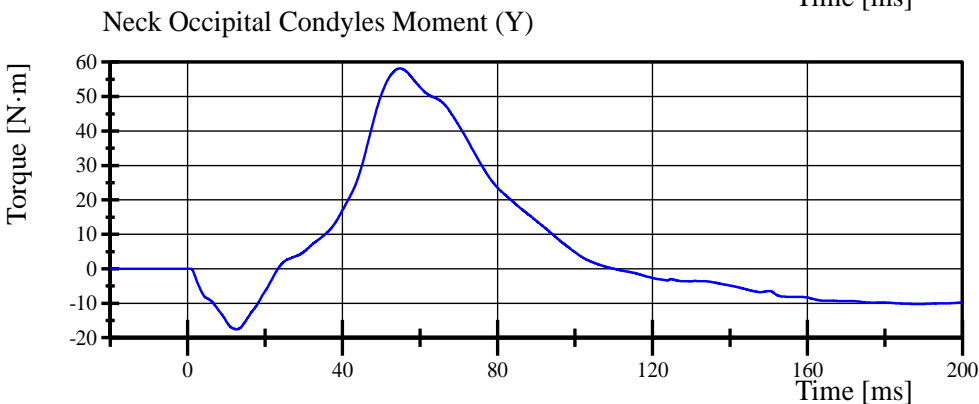
Filter Class: CFC_1000
Max: 103.2 N at 193.2 ms
Min: -518.2 N at 42.9 ms



Filter Class: CFC_600
Max: 103.1 N at 193.3 ms
Min: -518.0 N at 43.0 ms



Filter Class: CFC_600
Max: 50.9 Nm at 54.6 ms
Min: -23.6 Nm at 12.8 ms



Filter Class: Without_(Constar
Max: 58.2 N·m at 54.8 ms
Min: -17.6 N·m at 12.7 ms

Transportation Research Center Inc.

Neck Extension

HIII 10YO Serial No. F001 Certification No. 33-1

Test Date: 12/21/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Pendulum Impact Velocity	4.91 - 5.15 m/s	4.988 m/s	Yes
Pendulum Integrated Velocity at 10ms	1.49 - 1.89 m/s	1.680 m/s	Yes
Pendulum Integrated Velocity at 20ms	2.88 - 3.68 m/s	3.354 m/s	Yes
Pendulum Integrated Velocity at 30ms	4.20 - 5.20 m/s	4.879 m/s	Yes
Total Head D-Plane Rotation	96.0 - 115.0 °	102.19 °	Yes
Total Neck Occipital Condyles Moment Between 96° and 115° Rotation	(-37.0) - (-46.0) Nm	-40.01 Nm	Yes
Neck Occipital Condyles Moment Decay to -10 Nm	100.0 - 116.0 ms	106.80 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Neck S/N: 22020053A

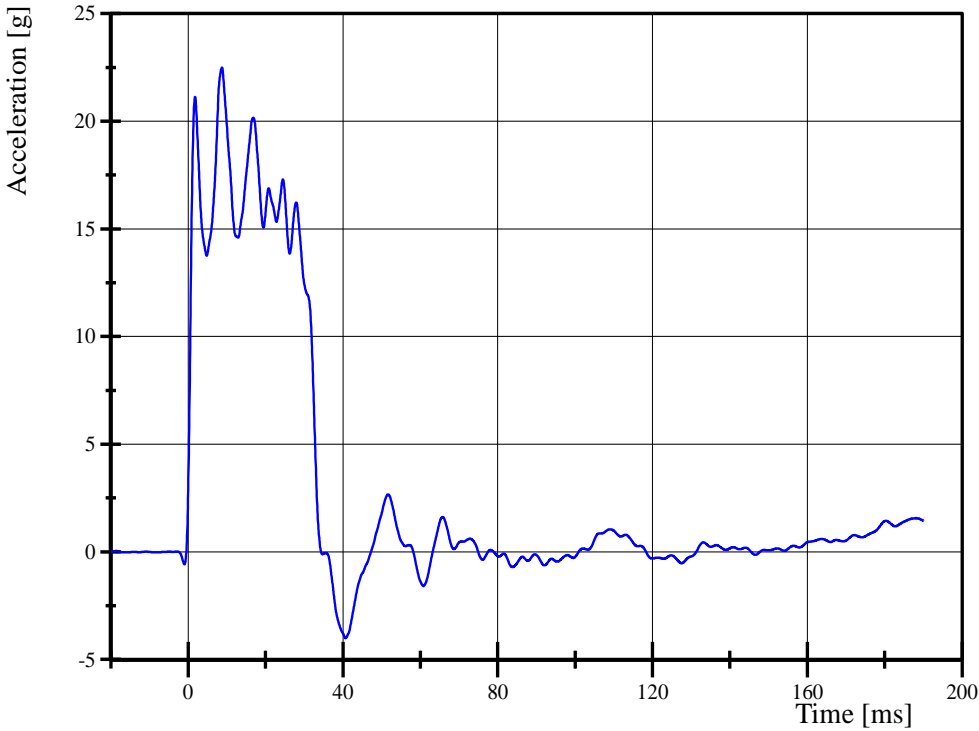
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Neck Extension

HIII 10YO Serial No. F001 Certification No. 33-1

Test Date: 12/21/2020

Pendulum Acceleration

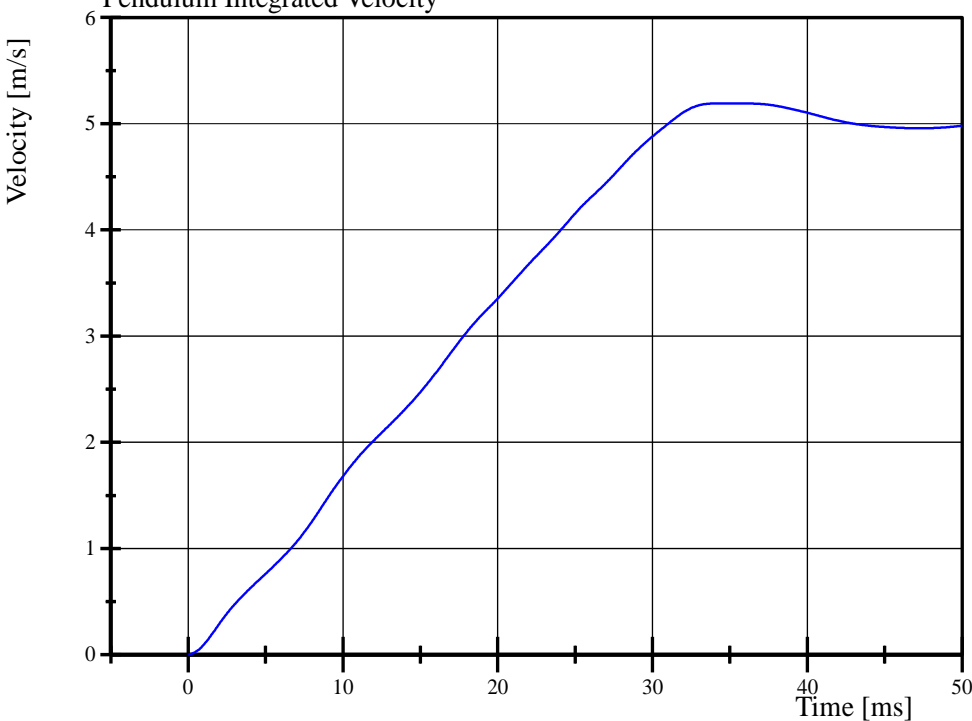


Filter Class: CFC_180

Max: 22.5 g at 8.8 ms

Min: -4.0 g at 40.7 ms

Pendulum Integrated Velocity



Filter Class: CFC_180

Max: 5.2 m/s at 34.4 ms

Min: 0.0 m/s at 0.0 ms

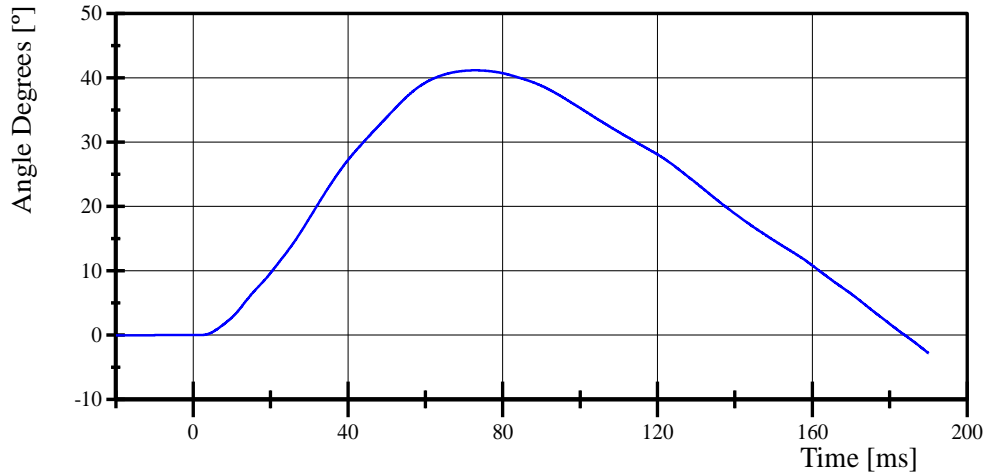
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Neck Extension

HIII 10YO Serial No. F001 Certification No. 33-1

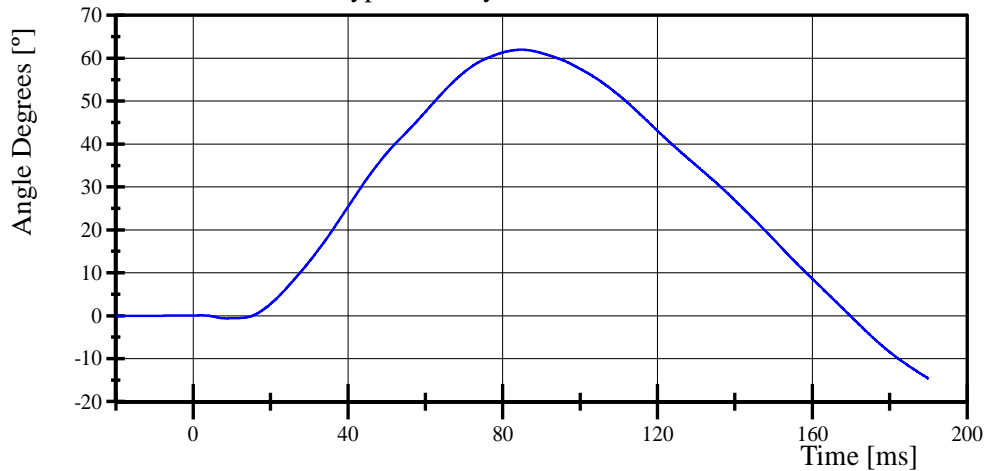
Test Date: 12/21/2020

Pot Rotation at the Base of Neck



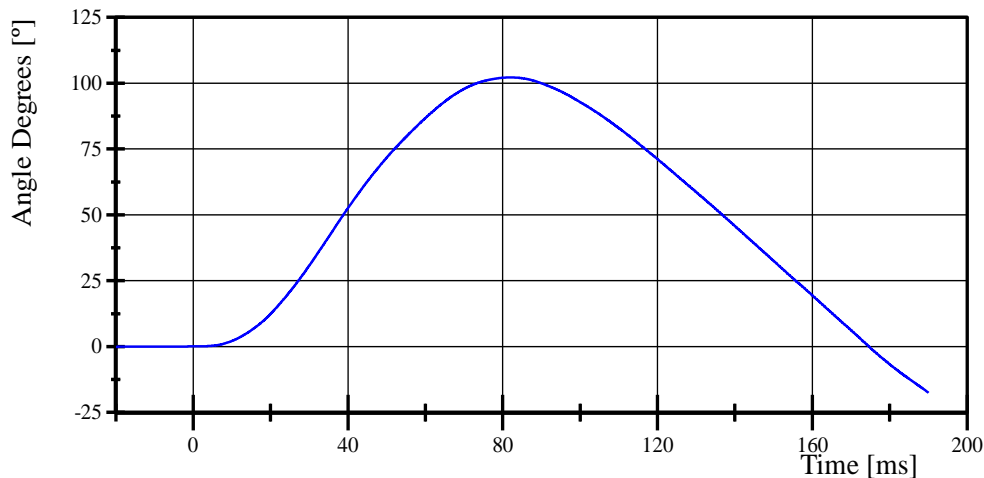
Filter Class: CFC_60
Max: 41.2 ° at 72.9 ms
Min: -2.8 ° at 190.1 ms

Head Rotation at Occipital Condyles



Filter Class: CFC_60
Max: 62.0 ° at 84.8 ms
Min: -14.7 ° at 190.1 ms

Total Head D-Plane Rotation



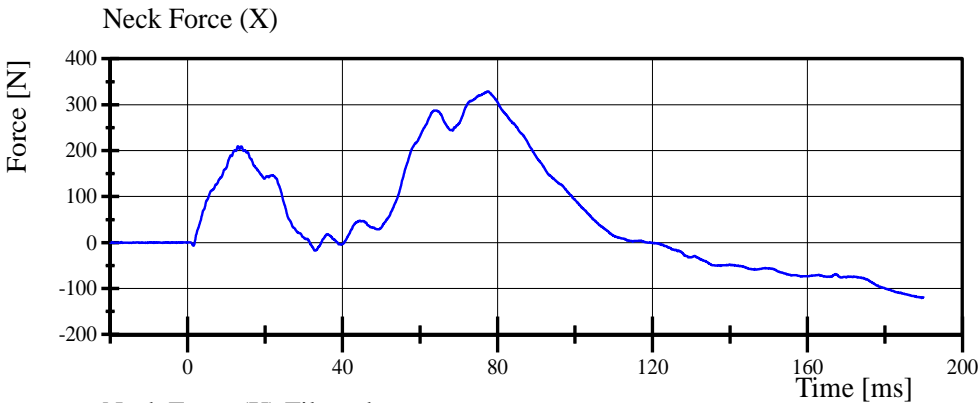
Filter Class: CFC_60
Max: 102.2 ° at 81.9 ms
Min: -17.5 ° at 190.1 ms

Transportation Research Center Inc.

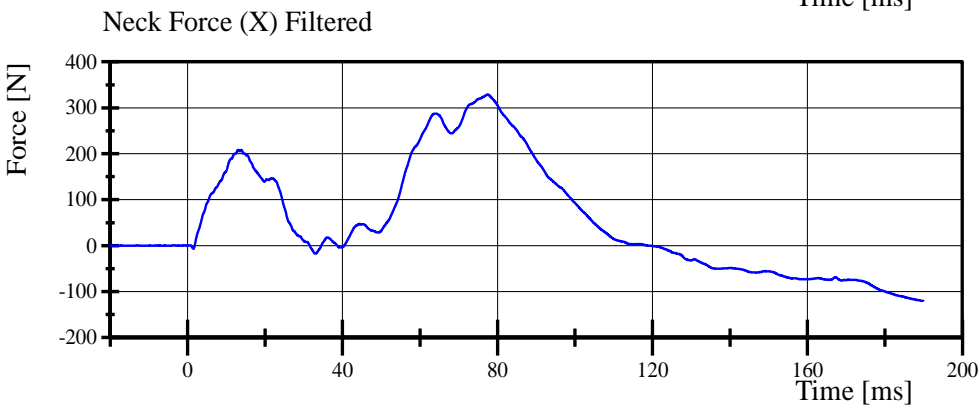
Neck Extension

HIII 10YO Serial No. F001 Certification No. 33-1

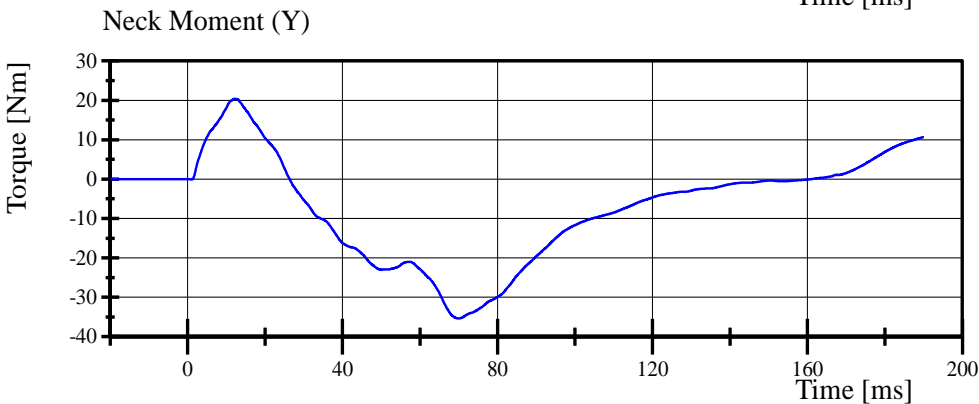
Test Date: 12/21/2020



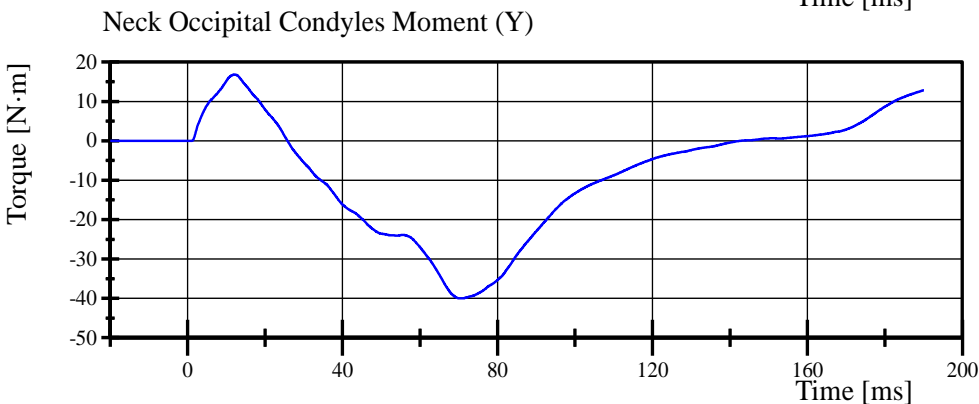
Filter Class: CFC_1000
Max: 329.2 N at 77.5 ms
Min: -120.4 N at 189.5 ms



Filter Class: CFC_600
Max: 328.9 N at 77.5 ms
Min: -120.4 N at 190.1 ms



Filter Class: CFC_600
Max: 20.4 Nm at 12.1 ms
Min: -35.4 Nm at 70.0 ms



Filter Class: Without_(Constar
Max: 16.8 N·m at 12.1 ms
Min: -40.0 N·m at 70.8 ms

Transportation Research Center Inc.

Front Thorax

HIII 10YO Serial No. F001 Certification No. 33-1

Test Date: 12/21/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Probe Velocity	5.88 - 6.12 m/s	6.021 m/s	Yes
Probe Force Peak Between 37 mm and 46 mm Chest Deflection	(-2,000) - (-2,450) N	-2,318.1 N	Yes
Probe Force Peak Between 20.0 mm and 37 mm Chest Deflection	>= (-2,520) N	-2,312.4 N	Yes
Maximum Chest Compression	(-37) - (-46) mm	-40.2 mm	Yes
Internal Hysteresis	69 - 85 %	80.5 %	Yes

Test meets specifications.

Condition: Used

Comments:

Jacket S/N: 08948

Rib Set S/N: 22031804A

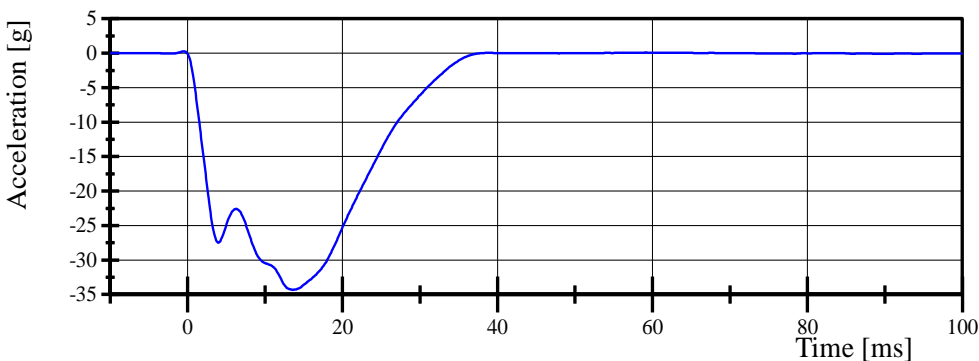
Transportation Research Center Inc.

Front Thorax

HIII 10YO Serial No. F001 Certification No. 33-1

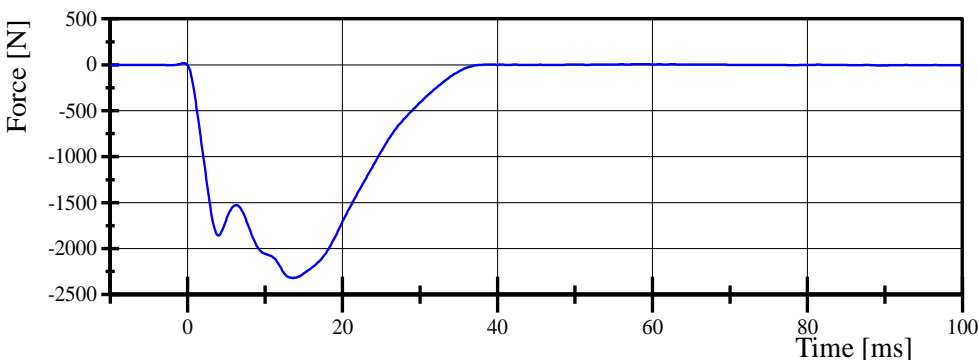
Test Date: 12/21/2020

Pendulum Acceleration



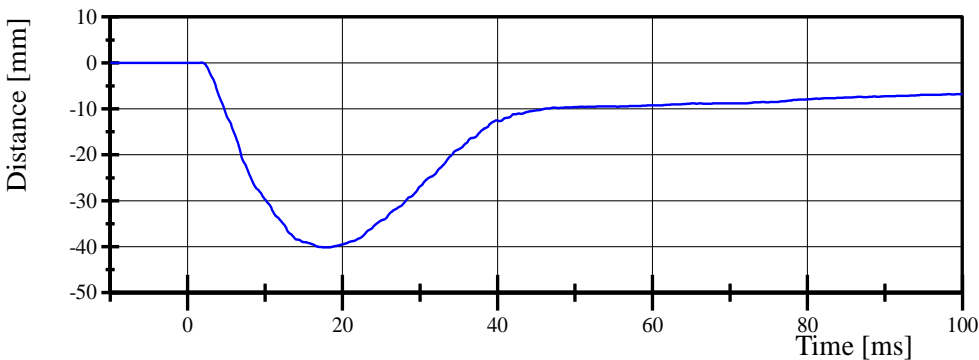
Filter Class: CFC_180
Max: 0.3 g at -0.5 ms
Min: -34.3 g at 13.6 ms

Pendulum Force



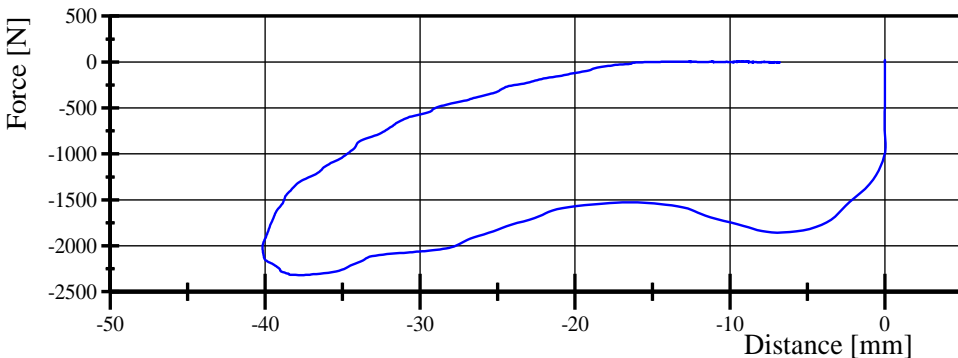
Filter Class: CFC_180
Max: 18.1 N at -0.5 ms
Min: -2,318.1 N at 13.6 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at 1.8 ms
Min: -40.2 mm at 18.2 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 18.1 N at -0.0 mm
Min: -2,318.1 N at -37.7 mm

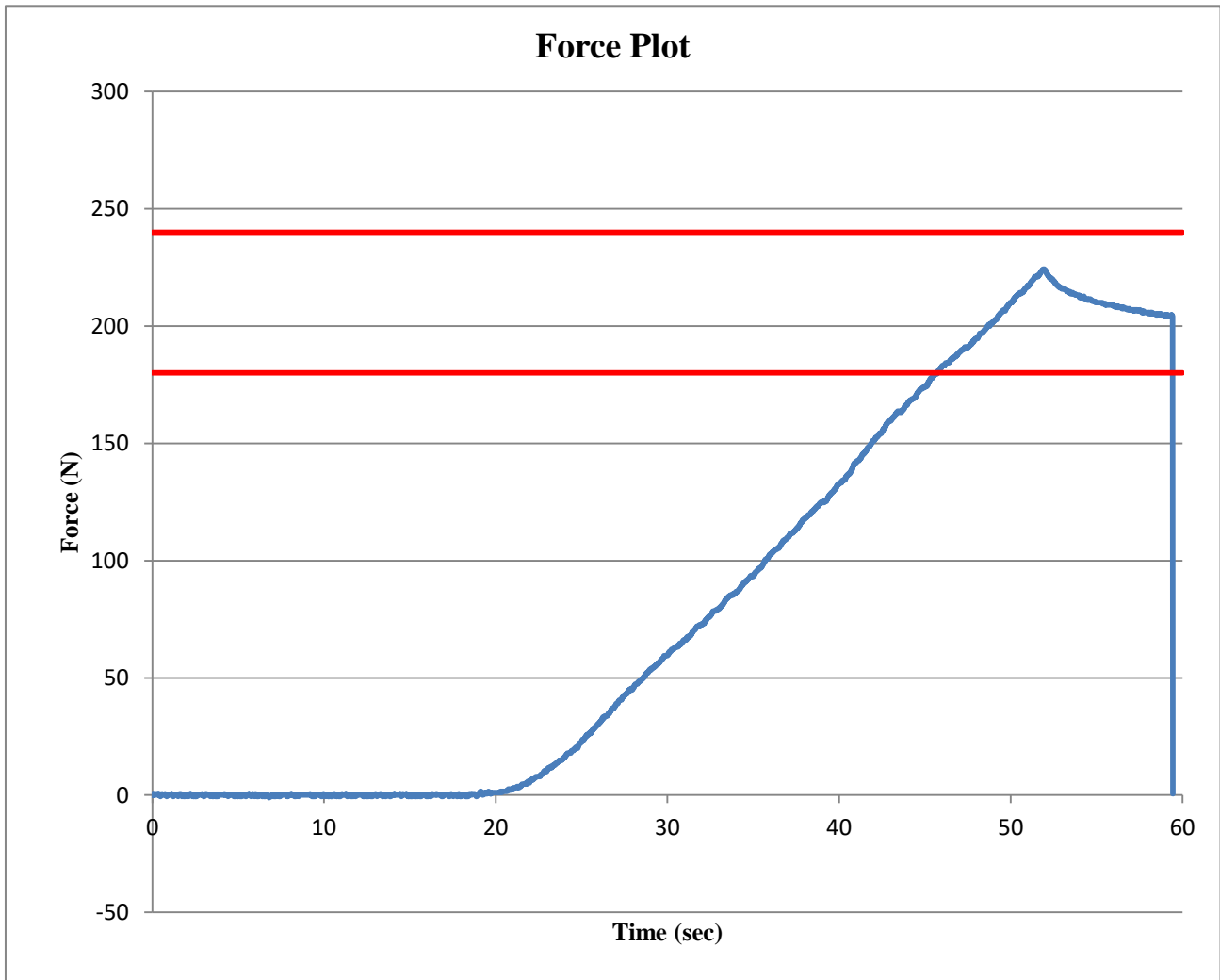
Transportation Research Center Inc.

Hybrid III 10-Year Old Torso Flexion



Customer: VRTC
Serial Number: F001 Date: 12/18/2020
Test Number: 1 Time: 10:15

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 - 25.6	21.3 °C Pass
Humidity	10 - 70	41 % Pass
Average Angular Velocity	0.5 - 1.5	0.96 deg/sec Pass
Initial Angle	0 - 20	4.71 deg Pass
Peak Force at 35.28°	180 - 240	224.23 N Pass
Final Angle	0 - 8	2.28 deg Pass



Comments:
Lumbar S/N: 0053
Abdomen S/N: N/A

Transportation Research Center Inc.

Left Knee Femur Response Test

HIII 10YO Serial No. F001 Certification No. 33-1

Test Date: 12/18/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.105 m/s	Yes
Peak Femur Force	(-2,600) - (-3,200) N	-2,719.6 N	Yes

Test meets specifications.

Condition: Used

Comments:

Knee Skin S/N: 527

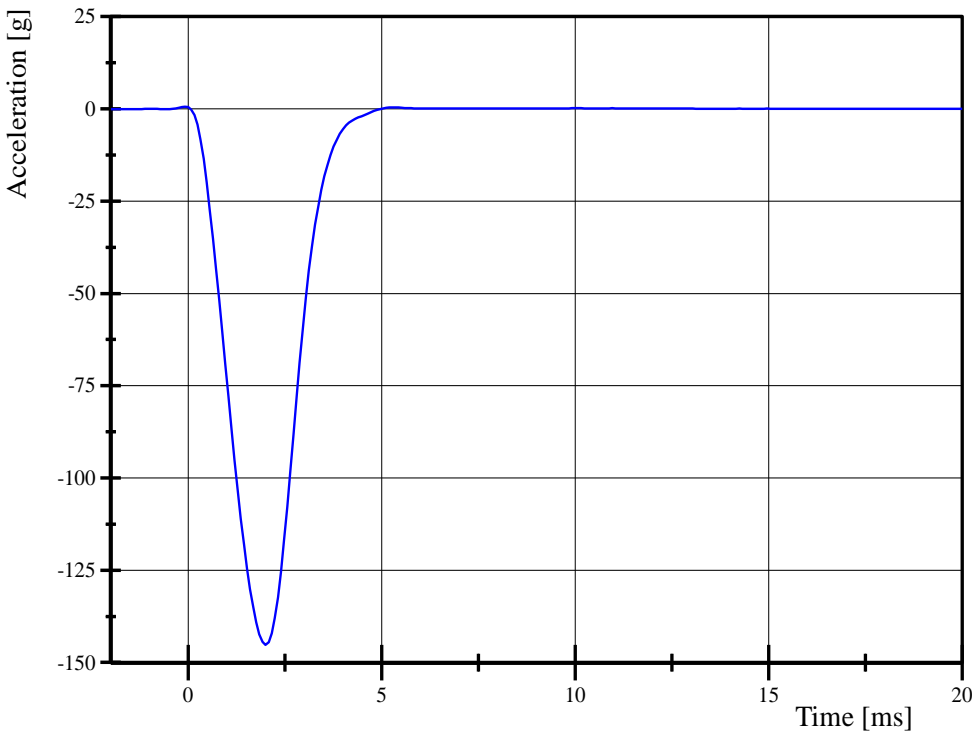
Transportation Research Center Inc.

Left Knee Femur Response Test

HIII 10YO Serial No. F001 Certification No. 33-1

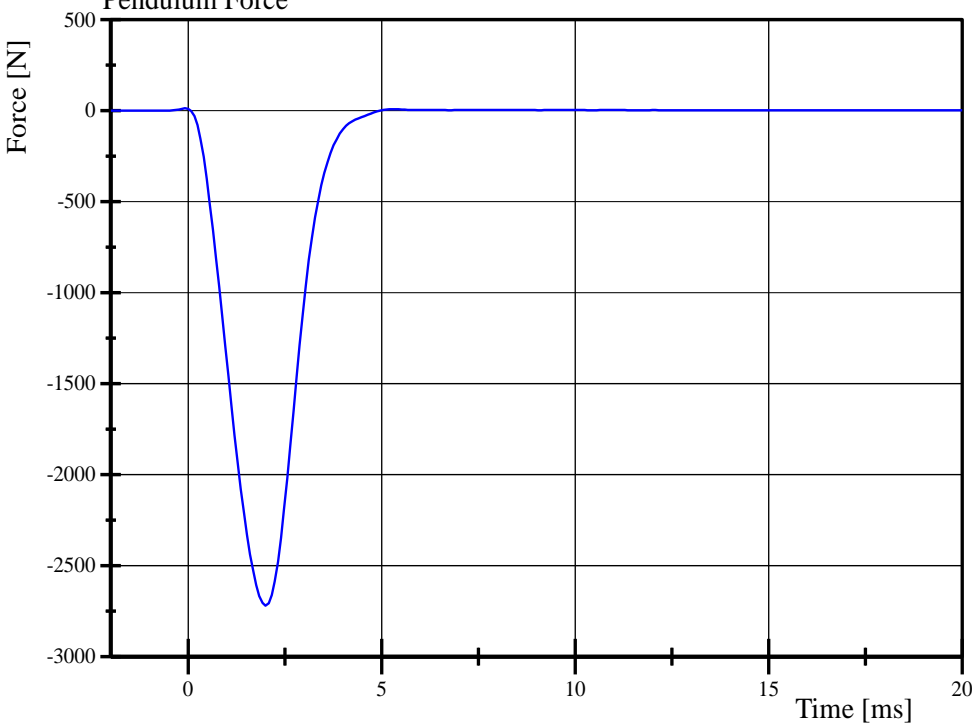
Test Date: 12/18/2020

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.6 g at -0.1 ms
Min: -145.2 g at 2.0 ms

Pendulum Force



Filter Class: CFC_600
Max: 11.6 N at -0.1 ms
Min: -2,719.6 N at 2.0 ms

Transportation Research Center Inc.

Right Knee Femur Response Test

HIII 10YO Serial No. F001 Certification No. 33-1

Test Date: 12/18/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.110 m/s	Yes
Peak Femur Force	(-2,600) - (-3,200) N	-2,874.1 N	Yes

Test meets specifications.

Condition: Used

Comments:

Knee Skin S/N: 526

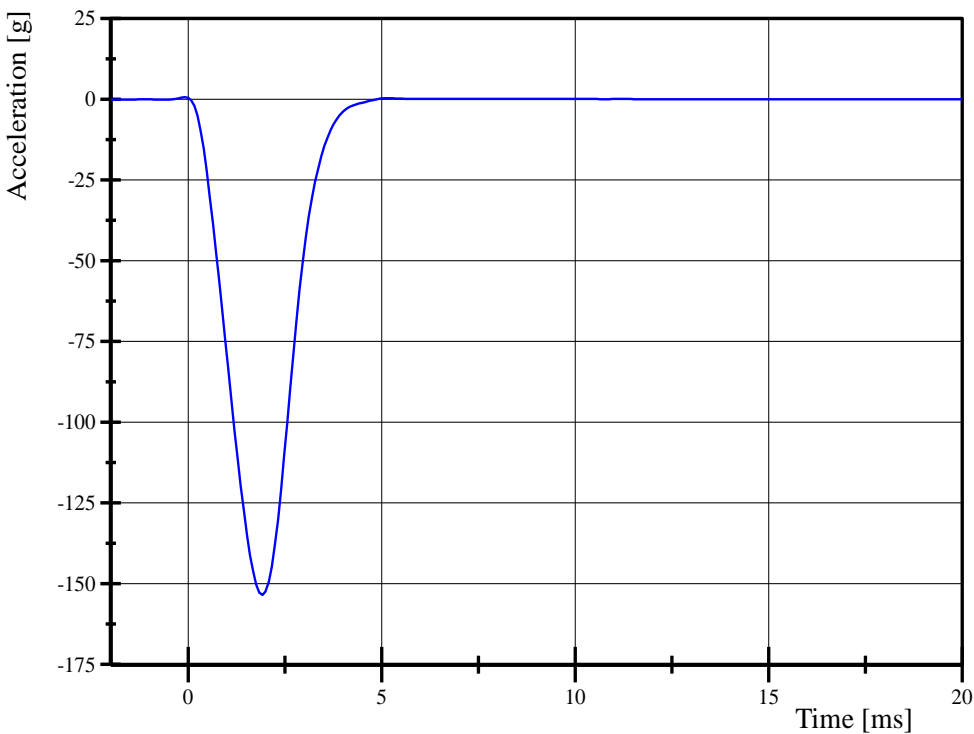
Transportation Research Center Inc.

Right Knee Femur Response Test

HIII 10YO Serial No. F001 Certification No. 33-1

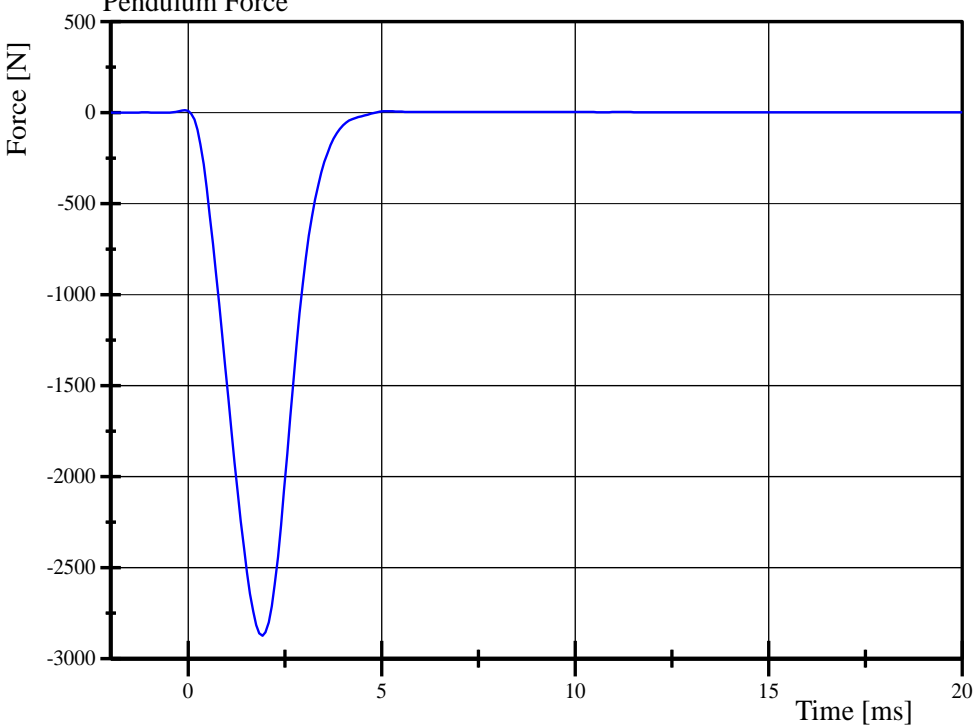
Test Date: 12/18/2020

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.7 g at -0.1 ms
Min: -153.4 g at 1.9 ms

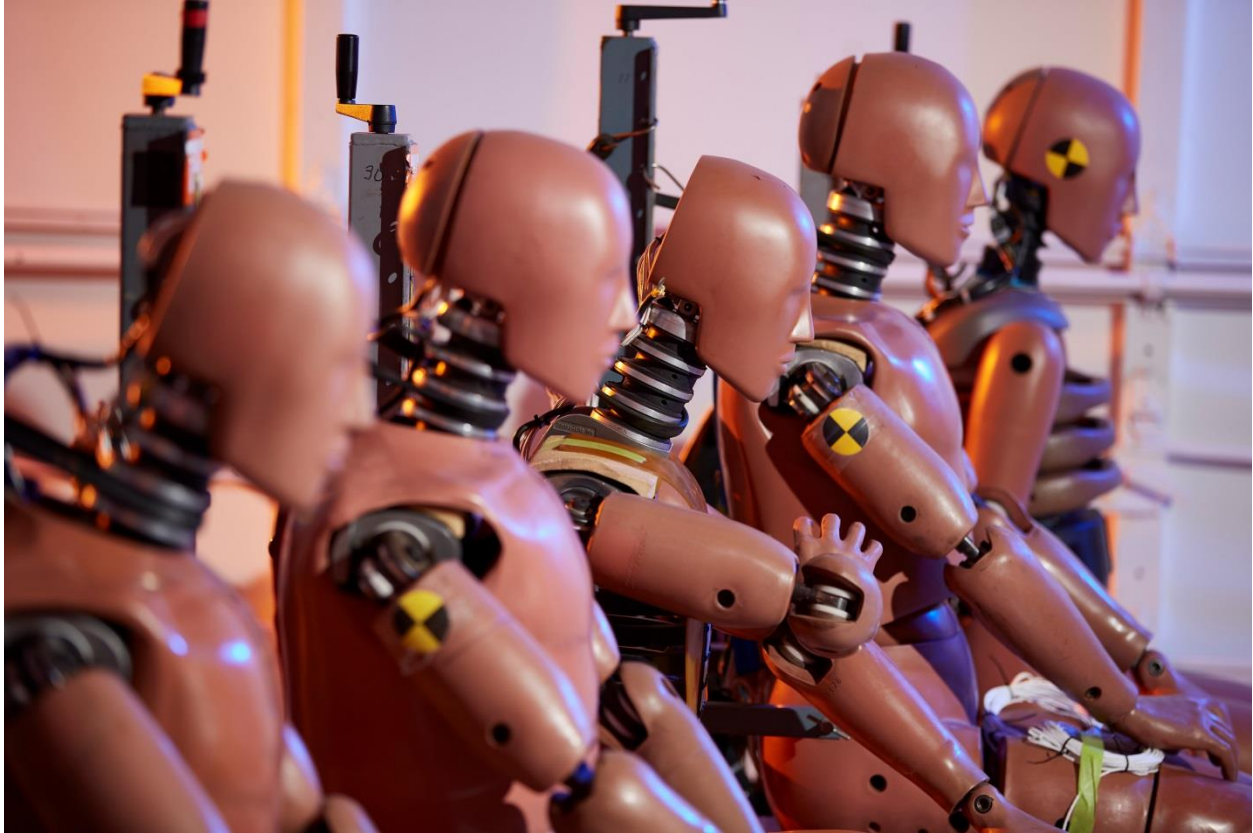
Pendulum Force



Filter Class: CFC_600
Max: 12.5 N at -0.1 ms
Min: -2,874.1 N at 1.9 ms

Appendix C – Quality Assurance

Quality Assurance



ATD Assembly & Final Inspection

ATD Type: Hybrid III (10) Year Old

ATD Serial Number: F001

Assembled by: Ben Lin

Inspected by: Rat Benda

Date Inspected: 12/21/2020

Transportation Research Center Inc.

Neck Extension

HIII 10YO Serial No. F001 Certification No. 33-2

Test Date: 1/27/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	23 %	Yes
Pendulum Impact Velocity	4.91 - 5.15 m/s	4.992 m/s	Yes
Pendulum Integrated Velocity at 10ms	1.49 - 1.89 m/s	1.775 m/s	Yes
Pendulum Integrated Velocity at 20ms	2.88 - 3.68 m/s	3.461 m/s	Yes
Pendulum Integrated Velocity at 30ms	4.20 - 5.20 m/s	4.945 m/s	Yes
Total Head D-Plane Rotation	96.0 - 115.0 °	101.64 °	Yes
Total Neck Occipital Condyles Moment Between 96° and 115° Rotation	(-37.0) - (-46.0) Nm	-40.83 Nm	Yes
Neck Occipital Condyles Moment Decay to -10 Nm	100.0 - 116.0 ms	105.60 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Neck S/N: 22020053A

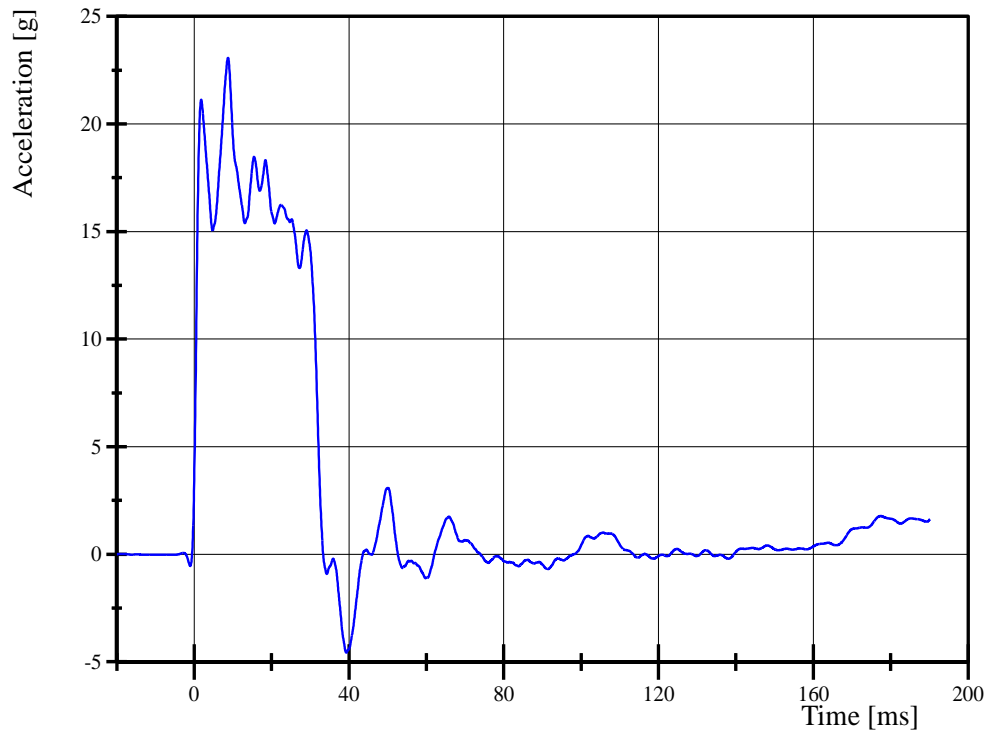
Transportation Research Center Inc.

Neck Extension

HIII 10YO Serial No. F001 Certification No. 33-2

Test Date: 1/27/2021

Pendulum Acceleration

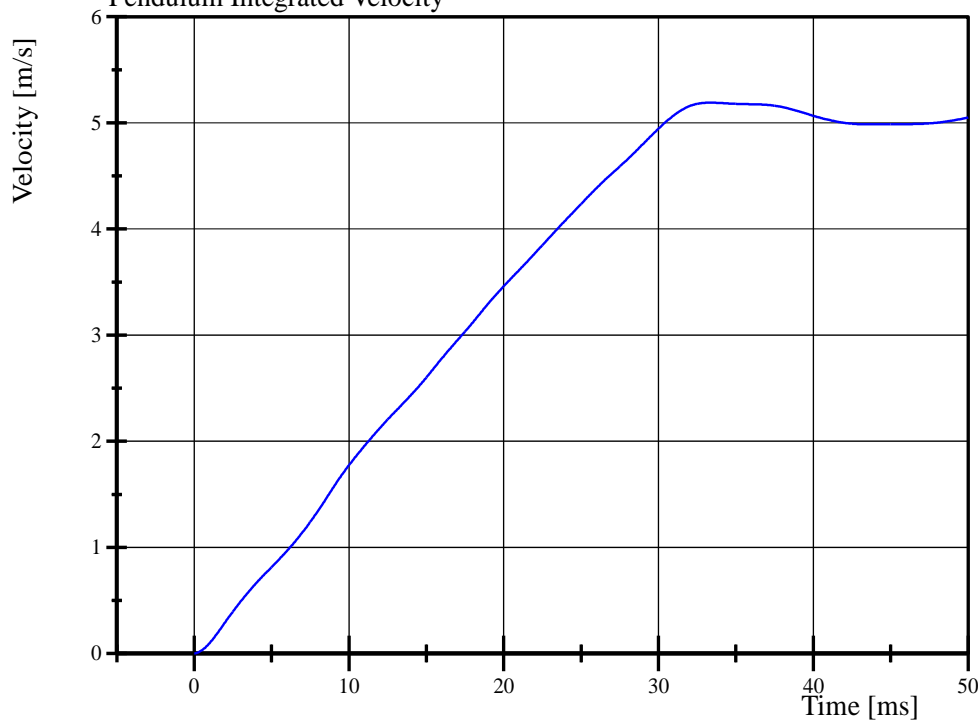


Filter Class: CFC_180

Max: 23.1 g at 8.8 ms

Min: -4.6 g at 39.4 ms

Pendulum Integrated Velocity



Filter Class: CFC_180

Max: 5.2 m/s at 33.4 ms

Min: 0.0 m/s at 0.0 ms

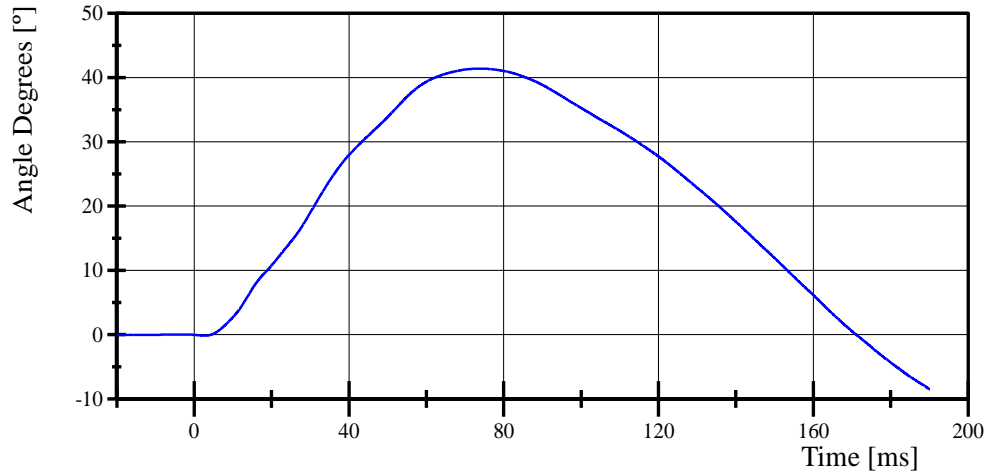
Transportation Research Center Inc.

Neck Extension

HIII 10YO Serial No. F001 Certification No. 33-2

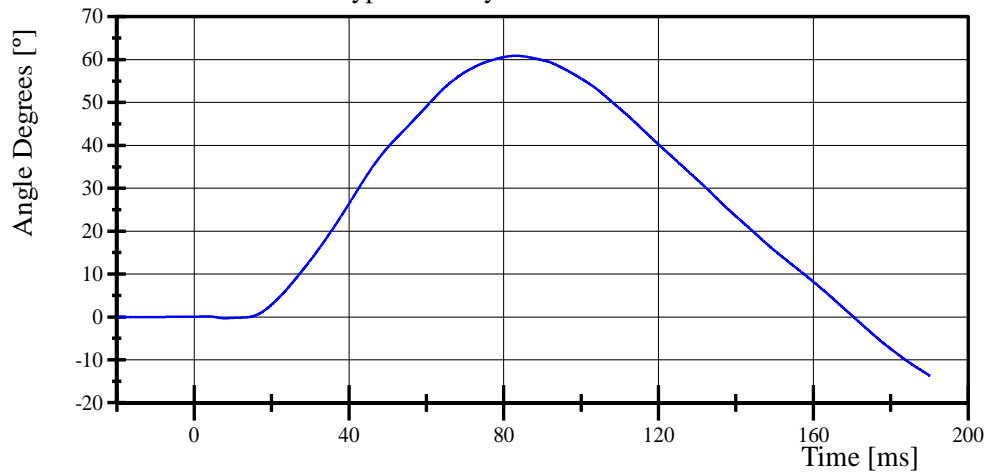
Test Date: 1/27/2021

Pot Rotation at the Base of Neck



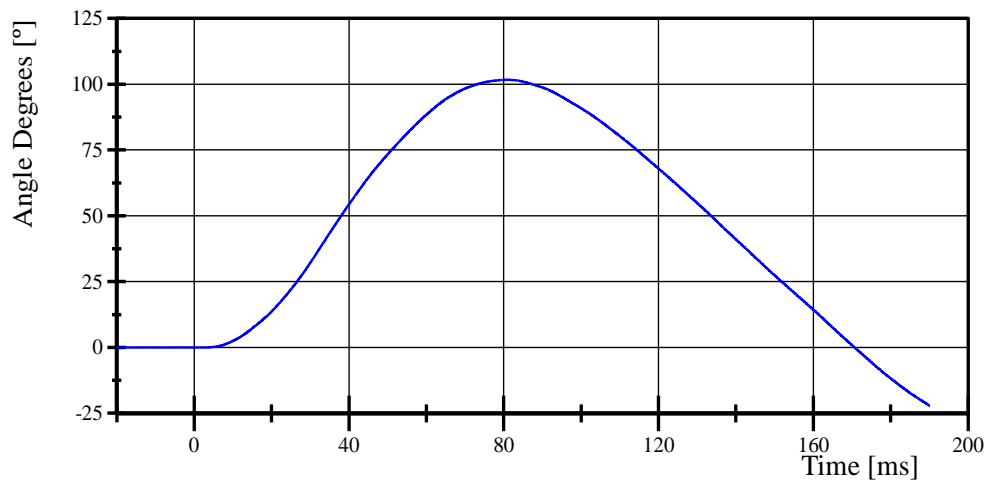
Filter Class: CFC_60
Max: 41.4 ° at 74.0 ms
Min: -8.5 ° at 190.2 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 60.9 ° at 83.2 ms
Min: -13.7 ° at 190.2 ms

Total Head D-Plane Rotation



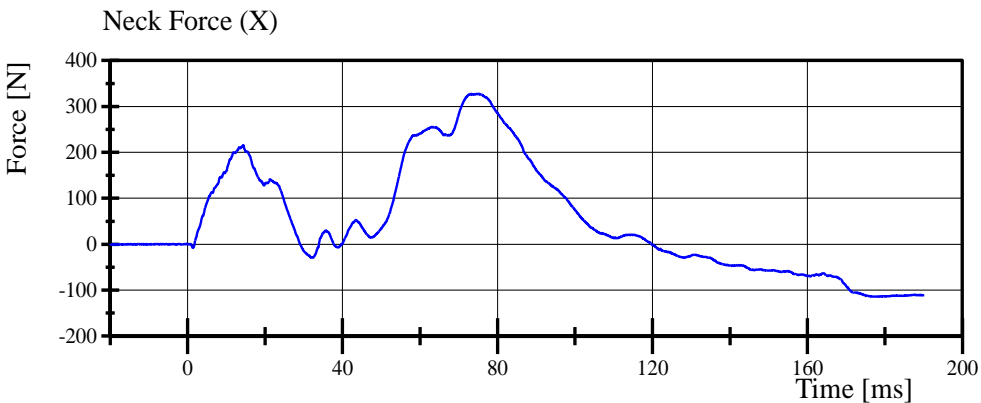
Filter Class: CFC_60
Max: 101.6 ° at 81.0 ms
Min: -22.2 ° at 190.2 ms

Transportation Research Center Inc.

Neck Extension

HIII 10YO Serial No. F001 Certification No. 33-2

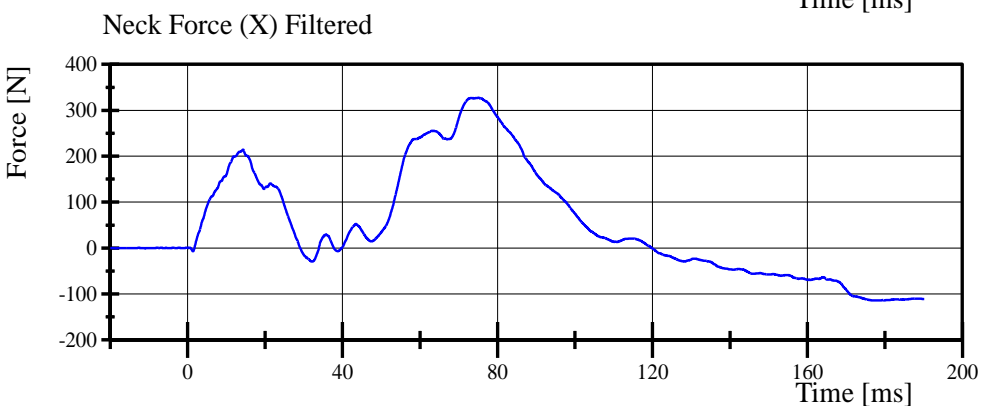
Test Date: 1/27/2021



Filter Class: CFC_1000

Max: 327.3 N at 75.1 ms

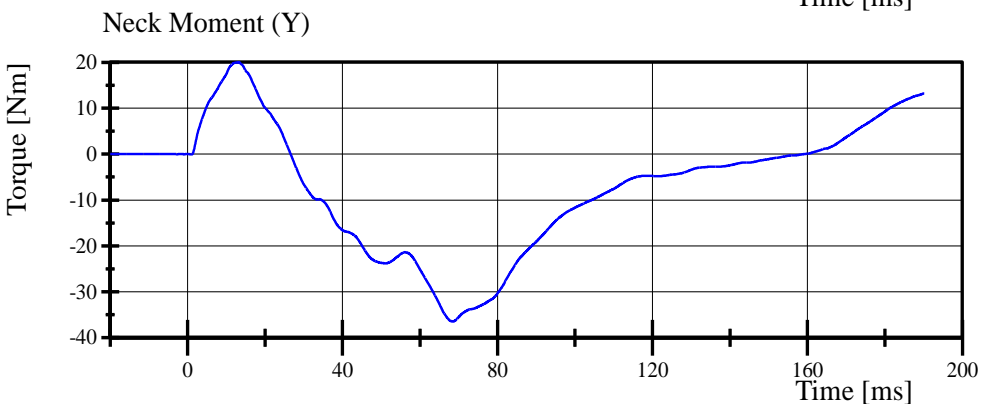
Min: -114.1 N at 176.9 ms



Filter Class: CFC_600

Max: 327.2 N at 75.1 ms

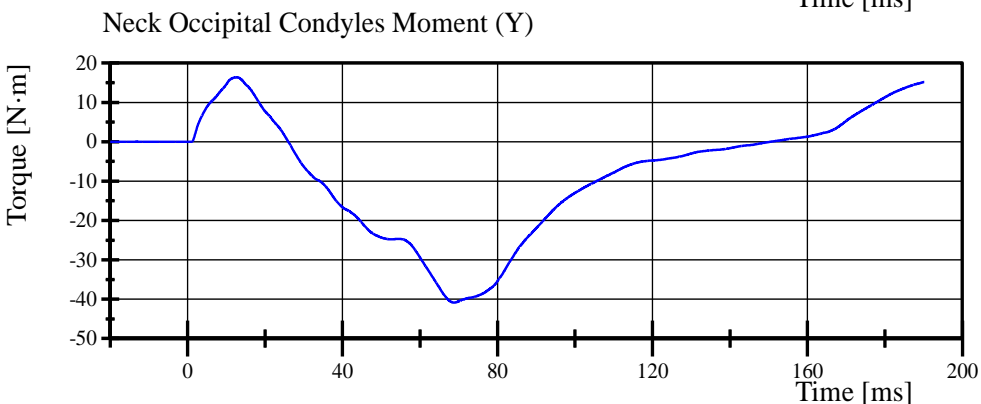
Min: -114.1 N at 178.9 ms



Filter Class: CFC_600

Max: 20.0 Nm at 13.1 ms

Min: -36.5 Nm at 68.4 ms



Filter Class: Without_(Constar

Max: 16.4 N·m at 12.6 ms

Min: -40.8 N·m at 68.8 ms

Transportation Research Center Inc.

Neck Flexion

HIII 10YO Serial No. F001 Certification No. 33-2

Test Date: 1/27/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.8 °C	Yes
Relative Humidity	10 - 70 %	30 %	Yes
Pendulum Impact Velocity	5.98 - 6.22 m/s	6.137 m/s	Yes
Pendulum Integrated Velocity at 10ms	(-1.64) - (-2.04) m/s	-1.965 m/s	Yes
Pendulum Integrated Velocity at 20ms	(-3.04) - (-4.04) m/s	-3.850 m/s	Yes
Pendulum Integrated Velocity at 30ms	(-4.45) - (-5.65) m/s	-5.527 m/s	Yes
Total Head D-Plane Rotation	(-76.0) - (-90.0) °	-80.15 °	Yes
Total Neck Occipital Condyles Moment Between -76° and -90° Rotation	50.0 - 62.0 Nm	56.42 Nm	Yes
Neck Occipital Condyles Moment Decay to 10 Nm	86.0 - 105.0 ms	92.65 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Neck S/N: 22020053A

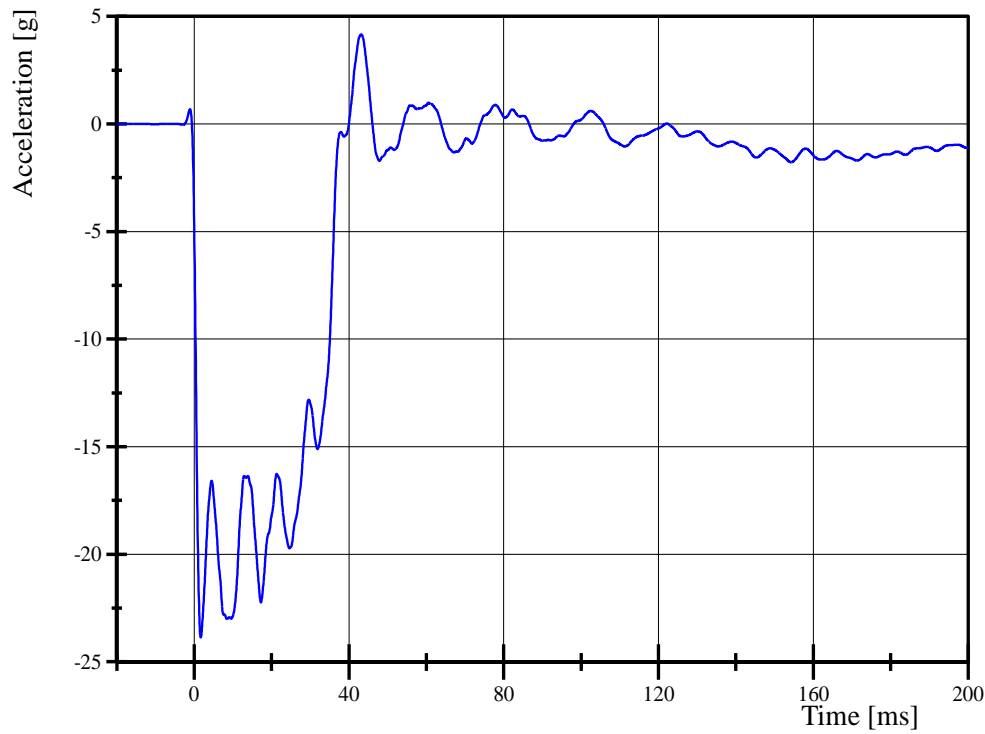
Transportation Research Center Inc.

Neck Flexion

HIII 10YO Serial No. F001 Certification No. 33-2

Test Date: 1/27/2021

Pendulum Acceleration

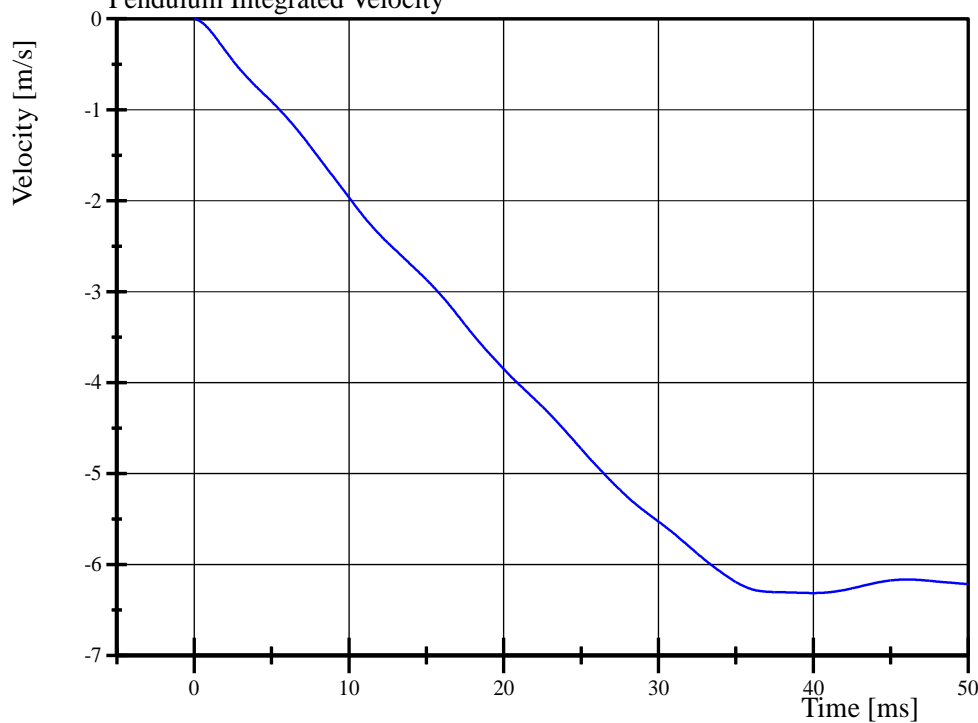


Filter Class: CFC_180

Max: 4.2 g at 43.2 ms

Min: -23.9 g at 1.7 ms

Pendulum Integrated Velocity



Filter Class: CFC_180

Max: 0.0 m/s at 0.0 ms

Min: -6.3 m/s at 40.0 ms

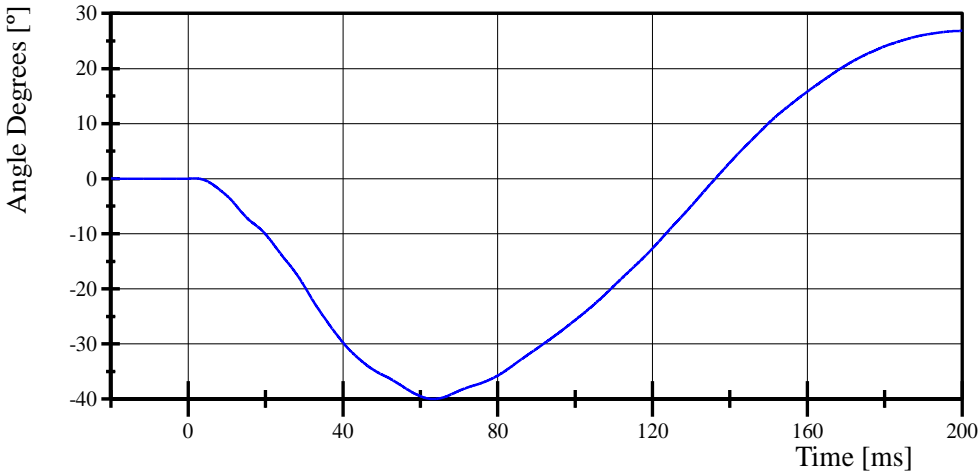
Transportation Research Center Inc.

Neck Flexion

HIII 10YO Serial No. F001 Certification No. 33-2

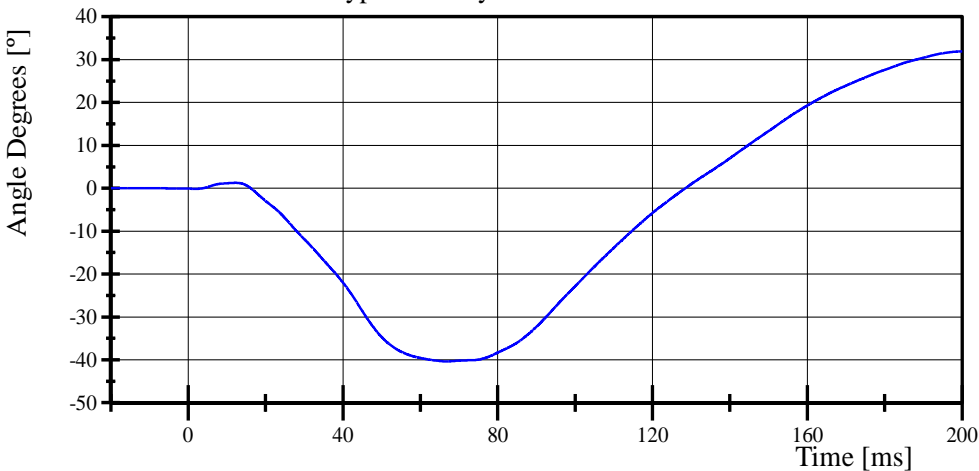
Test Date: 1/27/2021

Pot Rotation at the Base of Neck



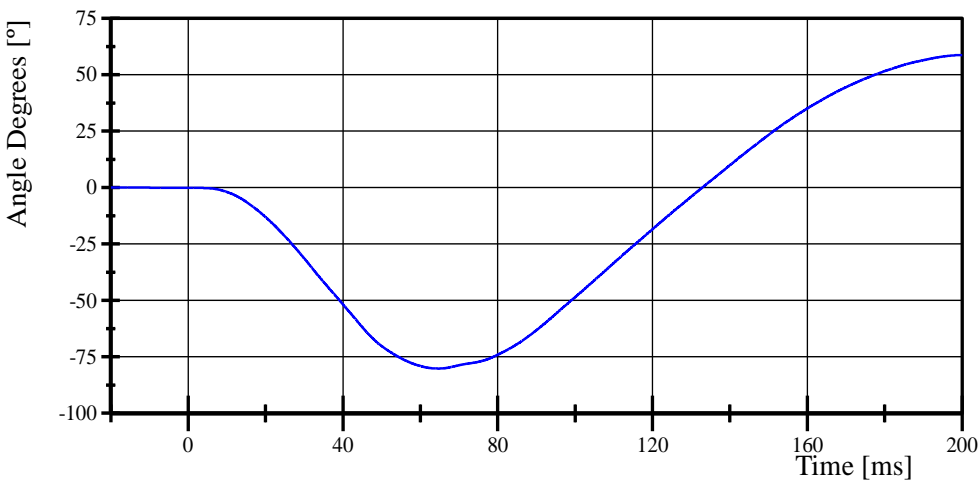
Filter Class: CFC_60
Max: 26.8 ° at 200.0 ms
Min: -40.0 ° at 63.3 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 31.9 ° at 200.0 ms
Min: -40.4 ° at 66.8 ms

Total Head D-Plane Rotation



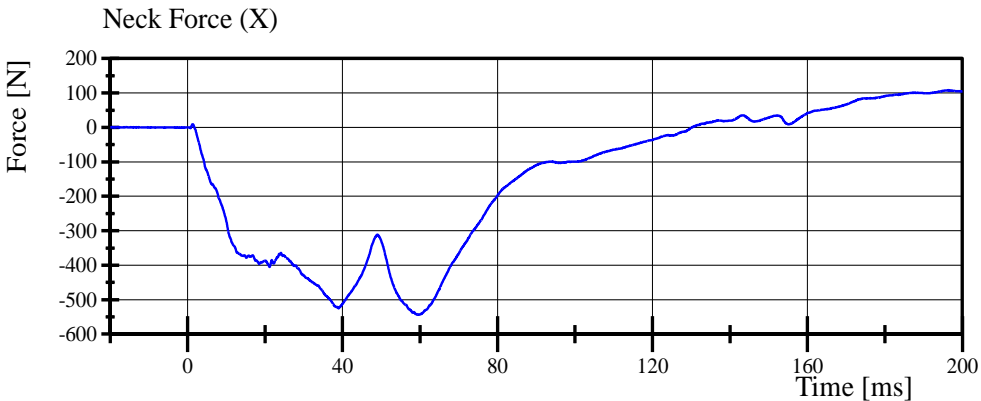
Filter Class: CFC_60
Max: 58.8 ° at 200.0 ms
Min: -80.2 ° at 64.7 ms

Transportation Research Center Inc.

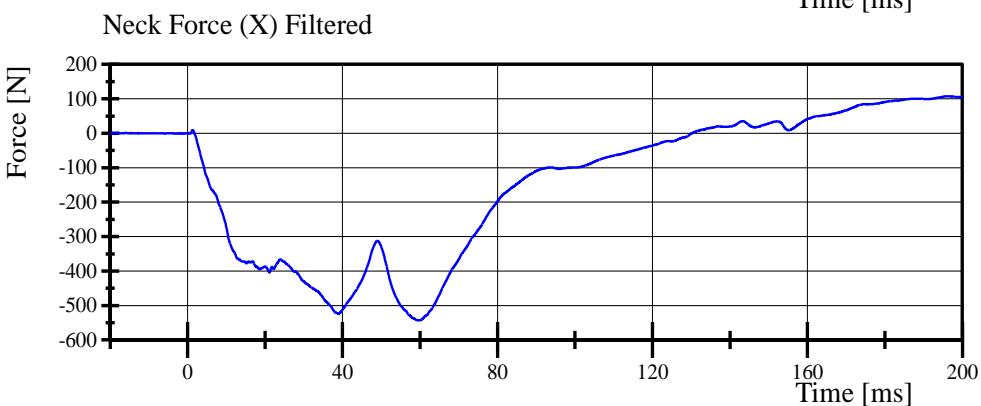
Neck Flexion

HIII 10YO Serial No. F001 Certification No. 33-2

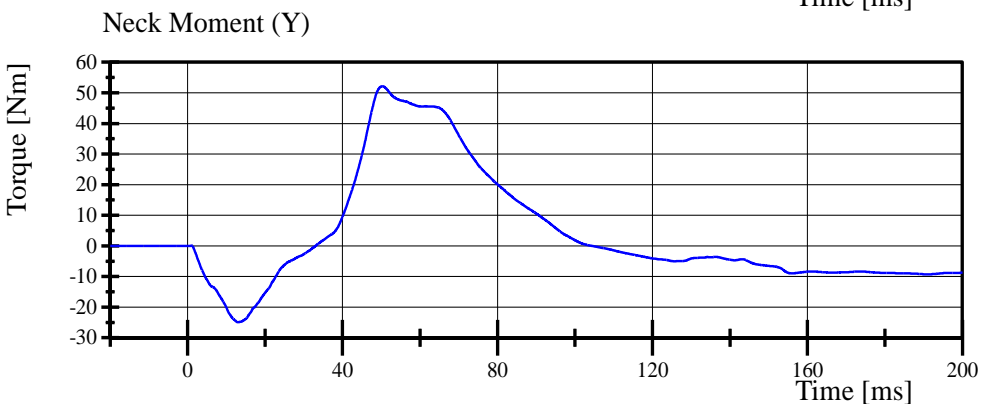
Test Date: 1/27/2021



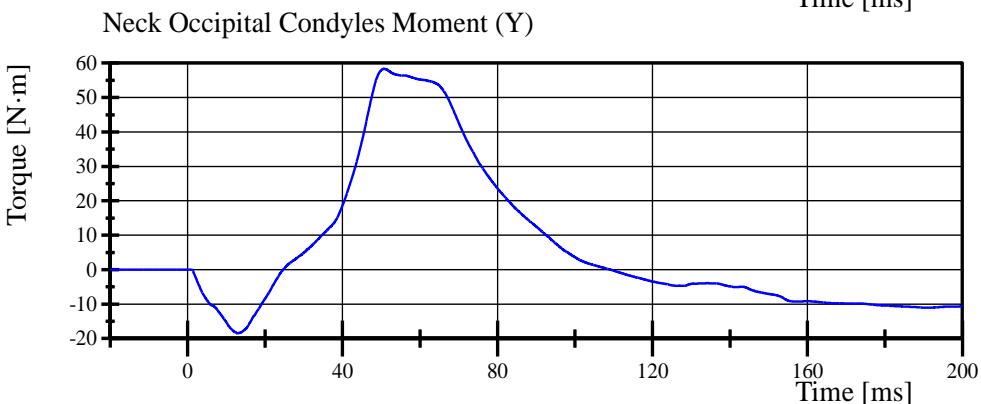
Filter Class: CFC_1000
Max: 108.2 N at 196.4 ms
Min: -543.7 N at 59.5 ms



Filter Class: CFC_600
Max: 107.6 N at 196.4 ms
Min: -543.3 N at 59.5 ms



Filter Class: CFC_600
Max: 52.2 Nm at 50.3 ms
Min: -24.9 Nm at 13.0 ms



Filter Class: Without_(Constar
Max: 58.3 N·m at 50.7 ms
Min: -18.4 N·m at 12.9 ms