

RECENT ENHANCEMENTS OF THE THOR-5F FEMALE DUMMY MODEL

Nordic LS-DYNA Users' Conference 2022



Humanetics CAE Department

E-mail: fe.support@humaneticsatd.com

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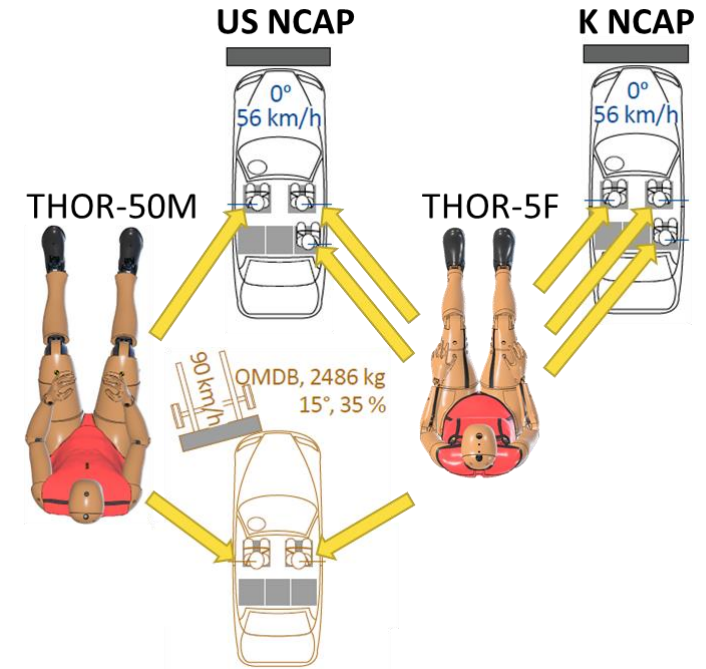
THOR-5F - Background



Current Dummy Landscape 2022 2023 2024 1) planned (no date specified)

	Frontal Impact Dummies				Side Impact Dummies					Rear Impact Dummies		Child Dummies					
	HIII 50 %	HIII 5 %	HIII 95 %	THOR 50 %	ES-1	ES-2	ES-2re	SID-lls	World SID	HIII 50 %	BioRID II	CRABI	CAMI	HIII	P Series	Q Series	
UN R94	•																
UN R95						•											
UN R135									•								
UN R137	•	•													•		
UN R44																•	
UN R129																	•
Euro NCAP	•	•	(•)	•							•						•
FMVSS 208	•	•										•		•			
FMVSS 214							•	•	1)								
FMVSS 213												•	•	•	•	1)	
FMVSS 202a																	
U.S. NCAP	•	•		1)			•	•	1)								
IIHS	•	•						•			•						
Latin NCAP	•					•											•
Japan Regulations	•	•				•			•						•		
JNCAP	•	•		•					•								
China Standards	•	•				•	•		•								
C-NCAP	•	•		•		•		•	•		•						•
KMVSS 102	•	•				•			•								
KNCAP	•	•		•					•								•
India AIS (Frontal, Side)	•	•				•	•										
Bharat NCAP	1)					1)									1)	1)	
ASEAN NCAP	•																•
ADR (Frontal, Side)	•					•			•								
ANCAP	•	•	(•)	•					•								•
GTR 7 Head Restraints											•						
GTR 14 Pole Side Impact									•								

Possible Future THOR-5F applications - Examples



Female dummy comes, also, on the rear seat in frontal crash scenarios!

THOR 5th will step by step replace H3 5th

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THOR-5F - Background

USA SPENDING.gov | Data Lab | Fiscal Data | An official website of the U.S. government

USA SPENDING.gov | Spending Explorer | Award Search | Profiles | Download | Resources

AWARD PROFILE | Contract Summary | Share | Download

Delivery Order (DO) | PIID: 693JJ922F00158N | In Progress (1 year, 4 months remain)

Unlinked Award

Awarding Agency: Department of Transportation (DOT)

Recipient: HUMANETICS INNOVATIVE SOLUTIONS, INC.
23300 HAGGERTY RD
FARMINGTON HILLS, MI 48335-2603
Congressional District: MI-14
UNITED STATES

Related Awards: Parent Award Unique Key: CONT_IDV_693JJ920D000002_6940

Dates:
Today
Start Date: Sep 30, 2022
Current End Date: Feb 28, 2024
Potential End Date: Feb 28, 2024

\$ Award Amounts: \$3.2 Million Obligated Amount, \$3.2 Million Current Award Amount

Description: ISSUE A NEW TASK ORDER ADVANCED 5TH FEMALE REVISIONS SOLE SOURCE: HUMANETICS 693JJ920D000002

North American Industry Classification System (NAICS) Code: 33: Manufacturing
3345: Navigational, Measuring, Electromedical, and Control Instruments Manufacturing
334515: Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals

Product or Service Code (PSC): PRODUCTS
66: INSTRUMENTS AND LABORATORY EQPT
6695: COMBINATION AND MISCELLANEOUS INSTRUMENTS

- Current official level is SBL-B
- NHTSA already owns 8 x THOR-5F SBL-B dummies
- Work on next level updates is ongoing



NHTSA new order for the WSID-5F and THOR-5F Revisions, start date Sep 30, 2022 ([link](#))

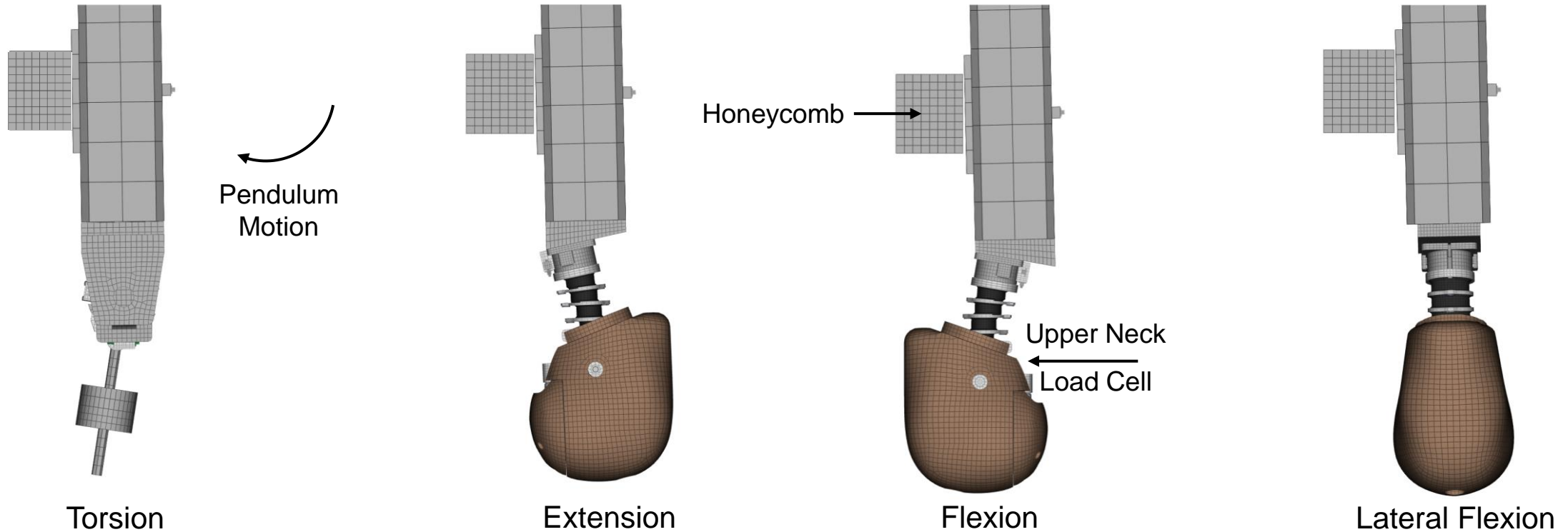
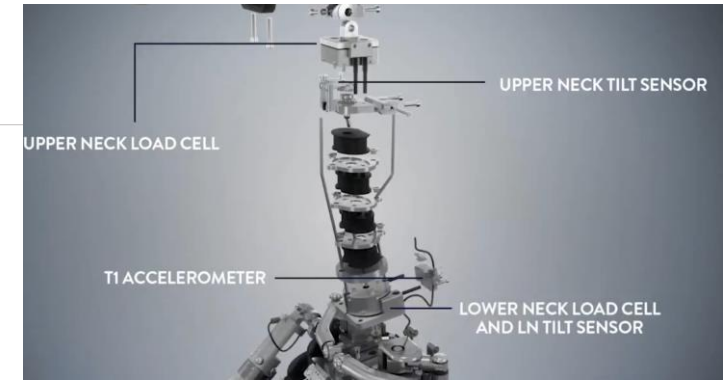
Major Geometrical Updates in V1.2

- Geometry and mesh update to represent latest SBL-B hardware geometry
- Few material updated to represent the latest hardware materials

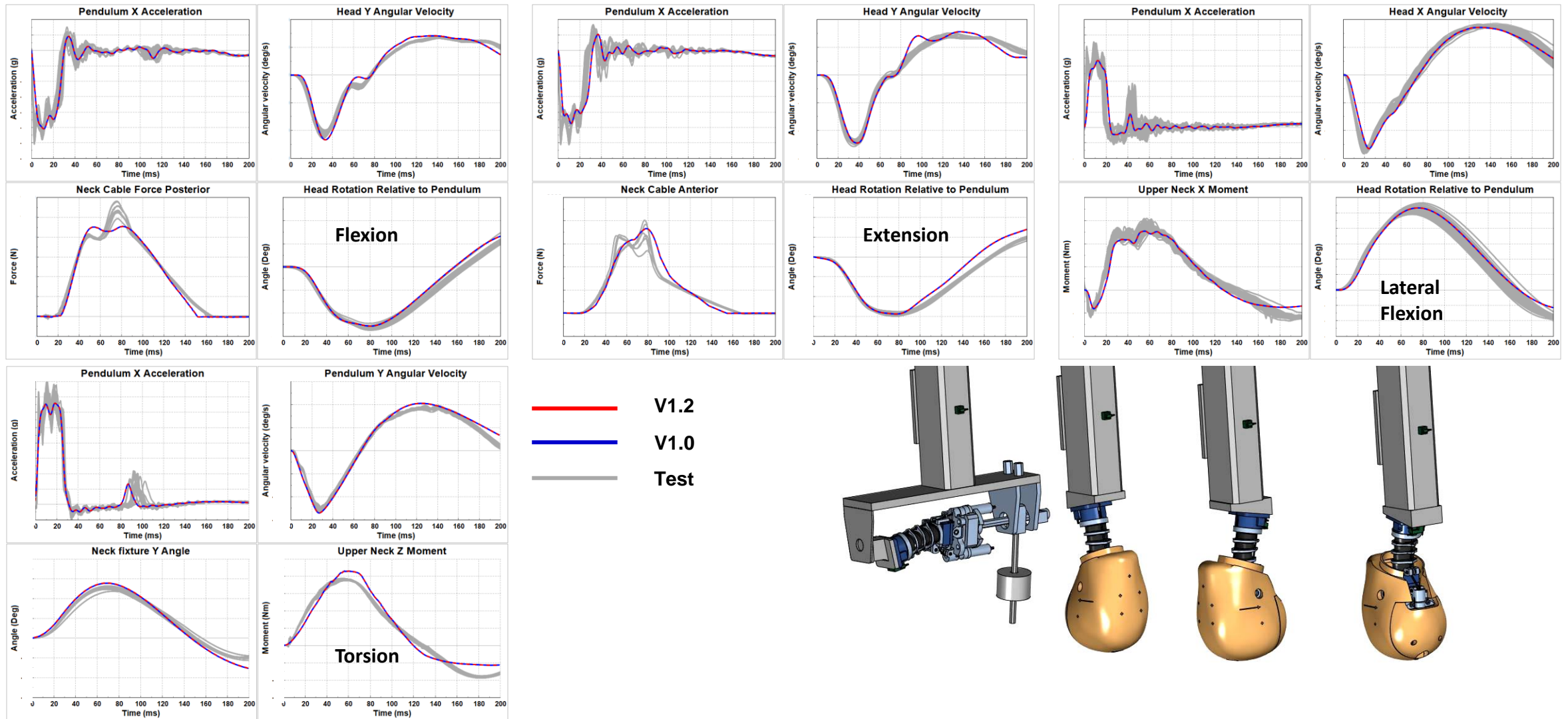


Components – Neck Pendulum Tests – V1.2

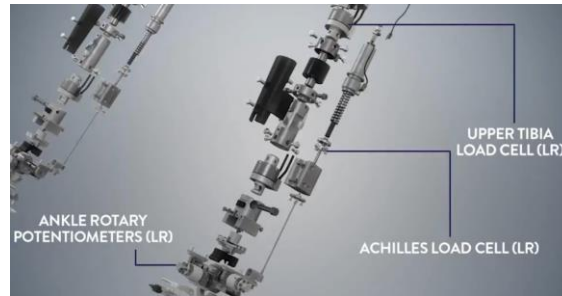
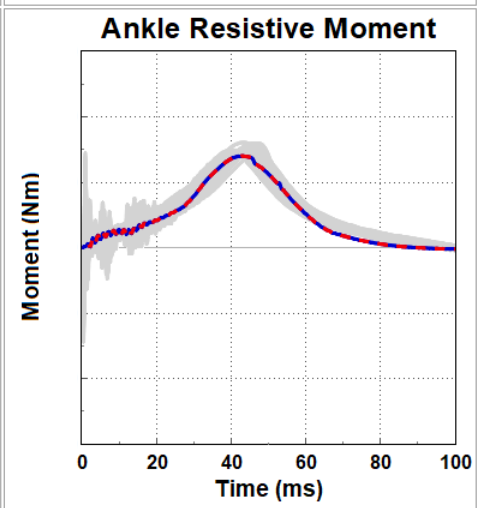
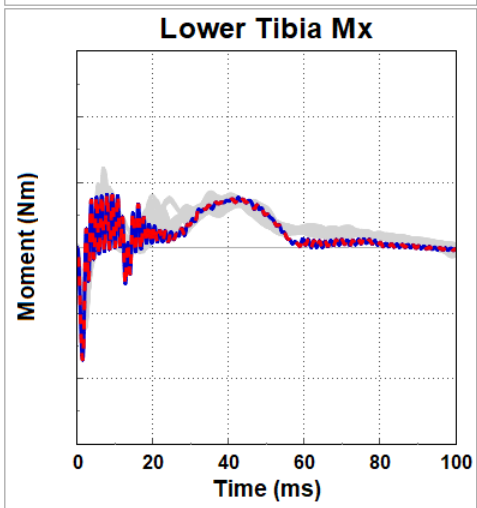
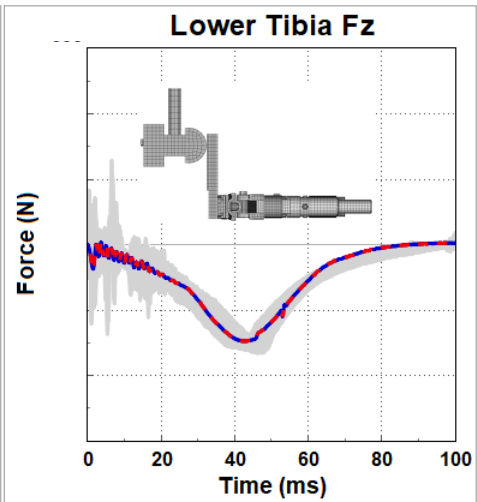
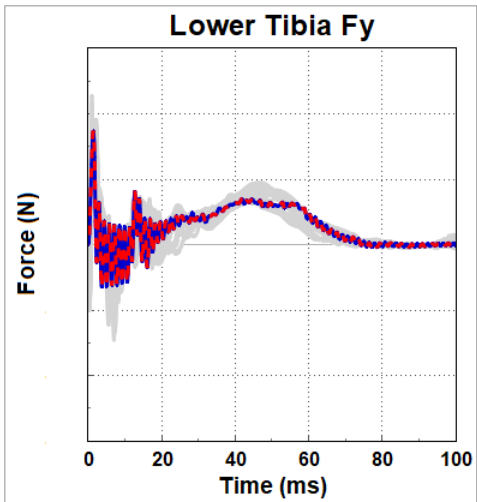
Test Type	Test
Qualification	Flexion Test W/ Cable
Qualification	Extension Test W/ Cable
Qualification	Lateral Flexion Test W/ Cable
Qualification	Torsion Test W/ Cable



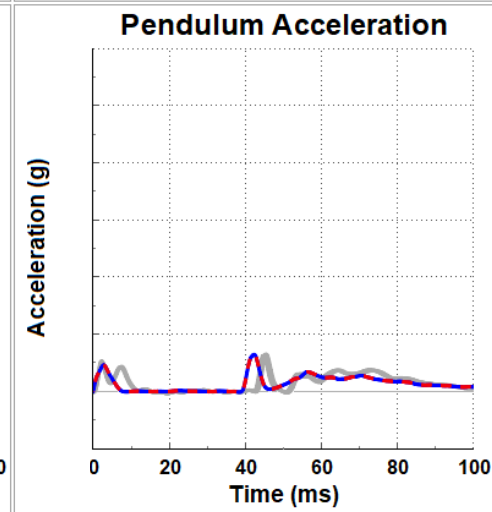
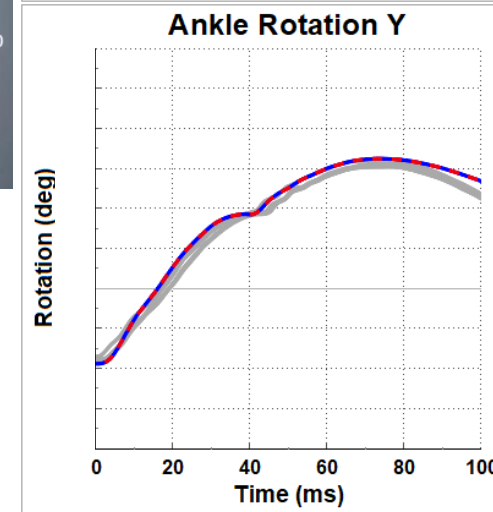
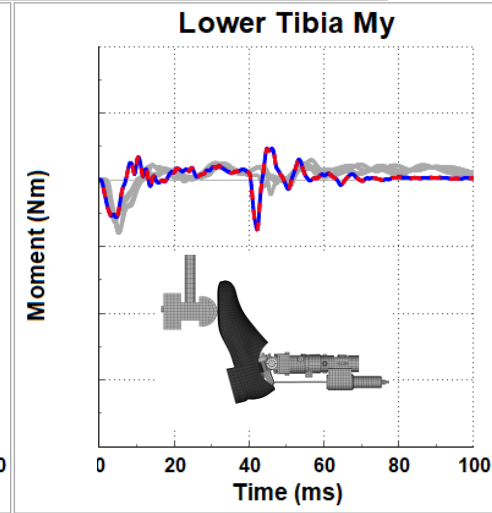
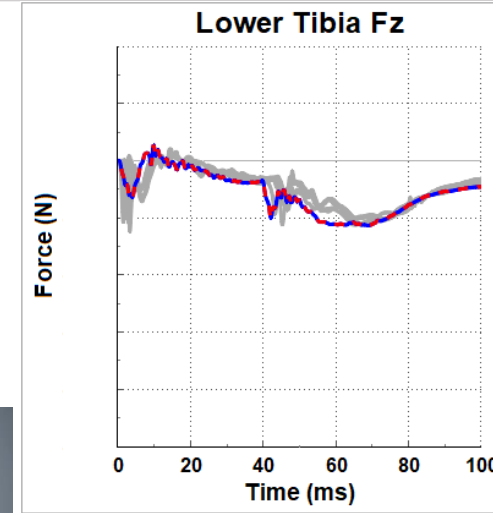
Components – Neck Pendulum Tests – V1.2



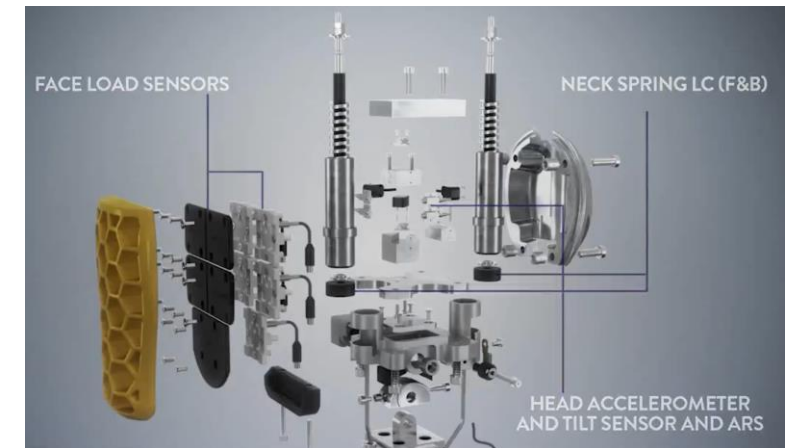
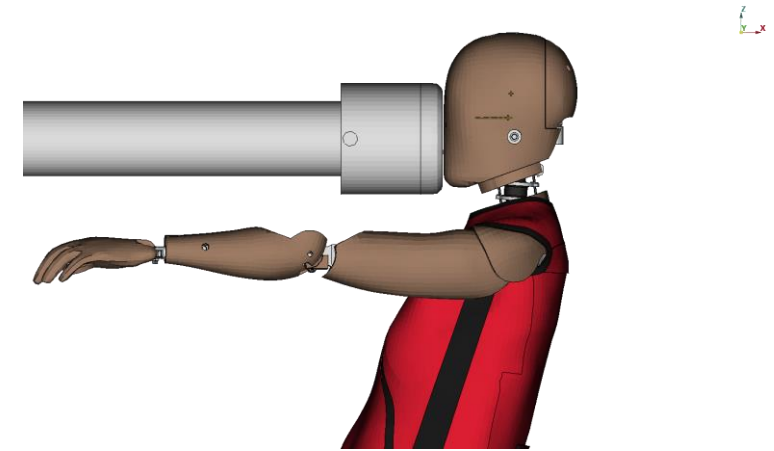
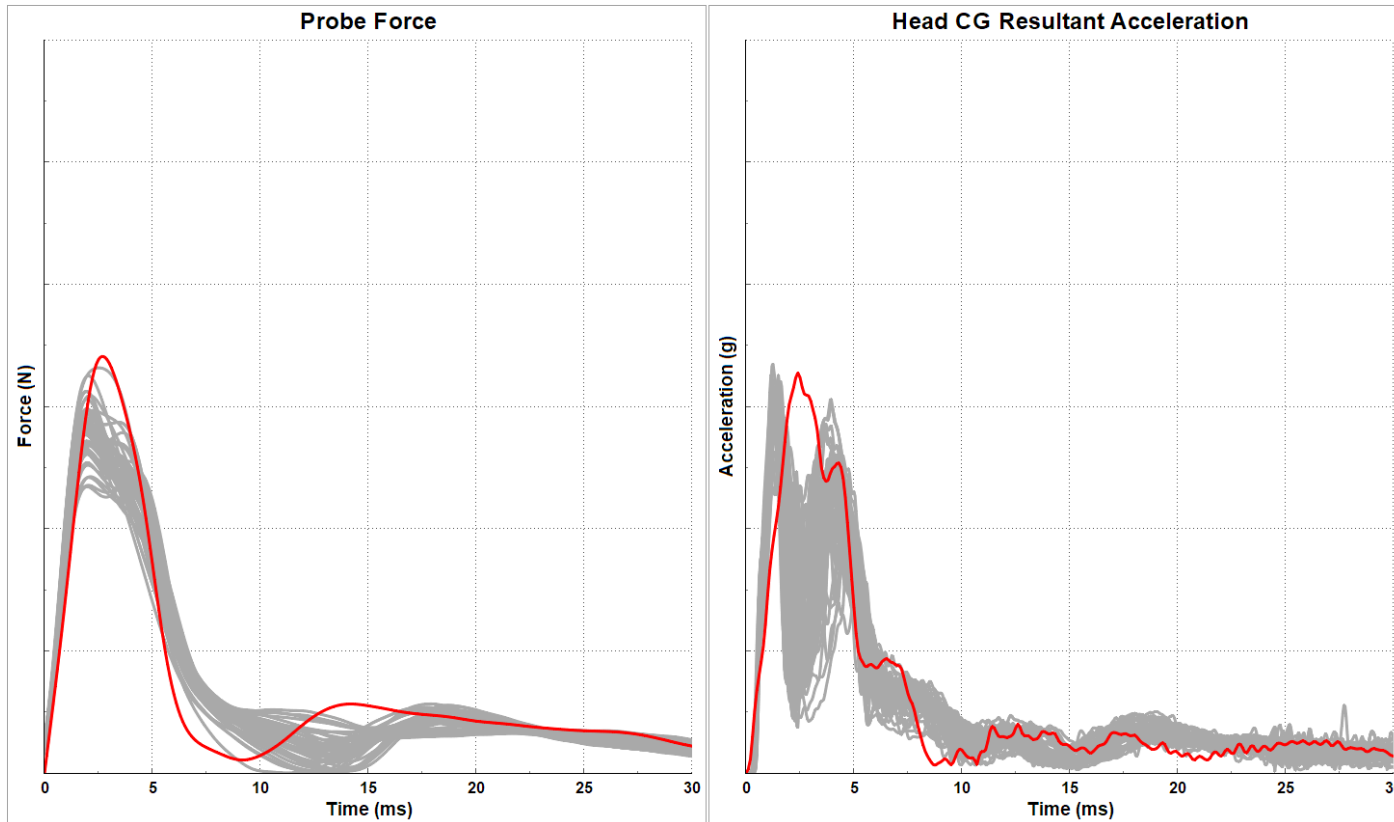
Components – LX Tests – V1.2



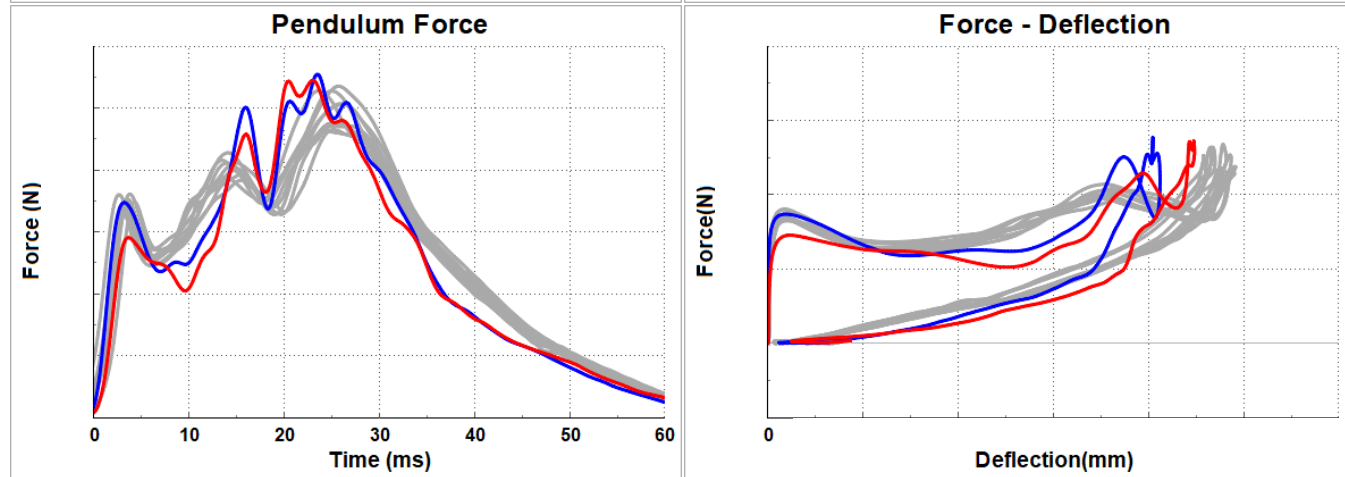
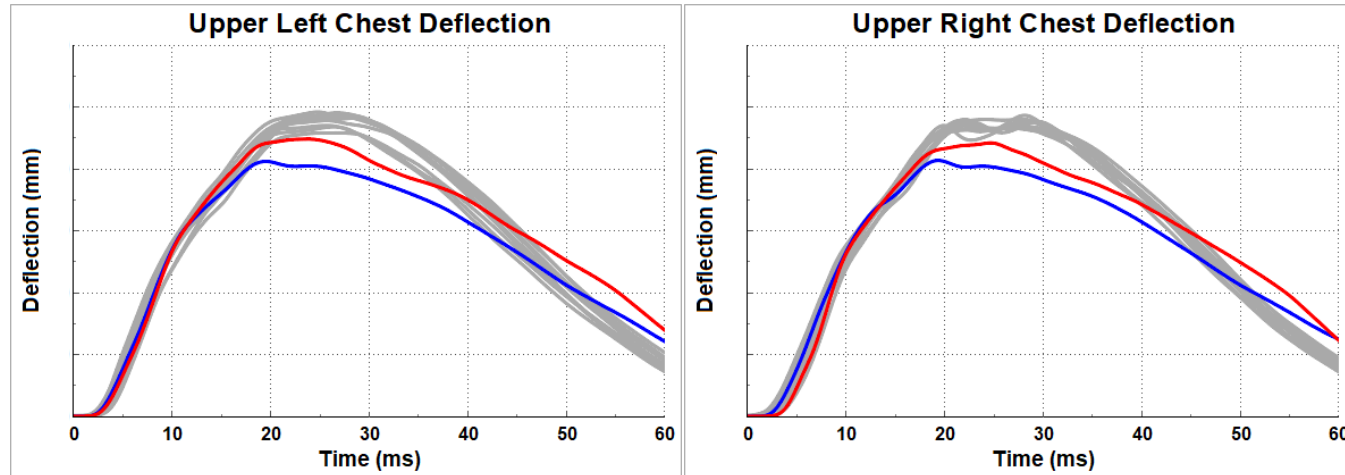
— V1.2
— V1.0
— Test



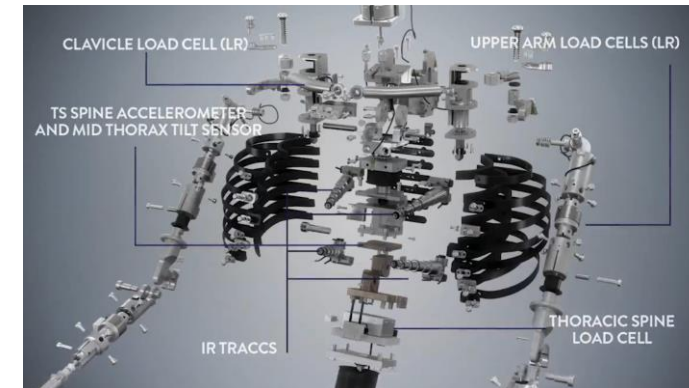
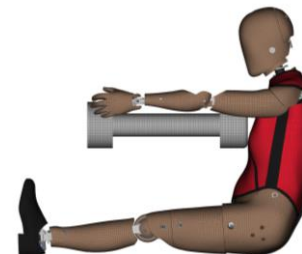
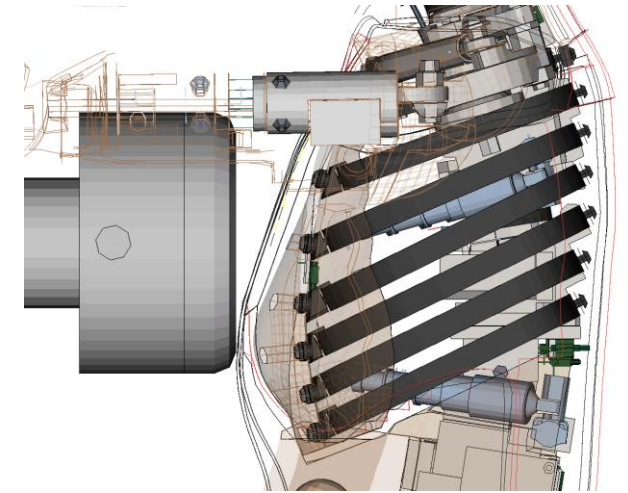
Full Dummy – Face Impact – V1.2



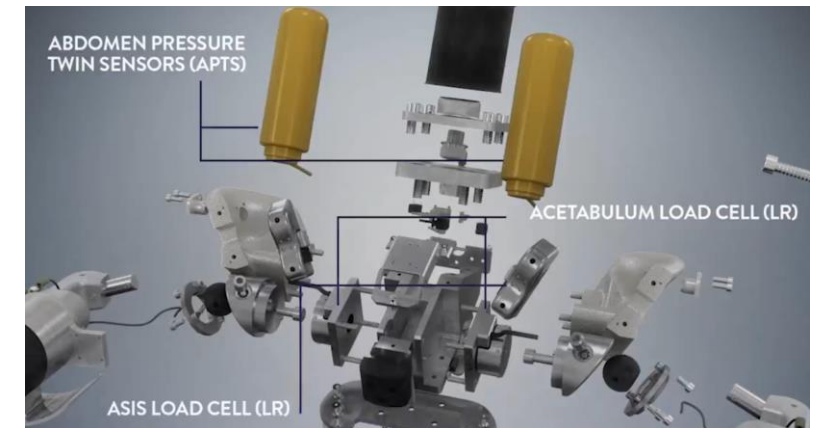
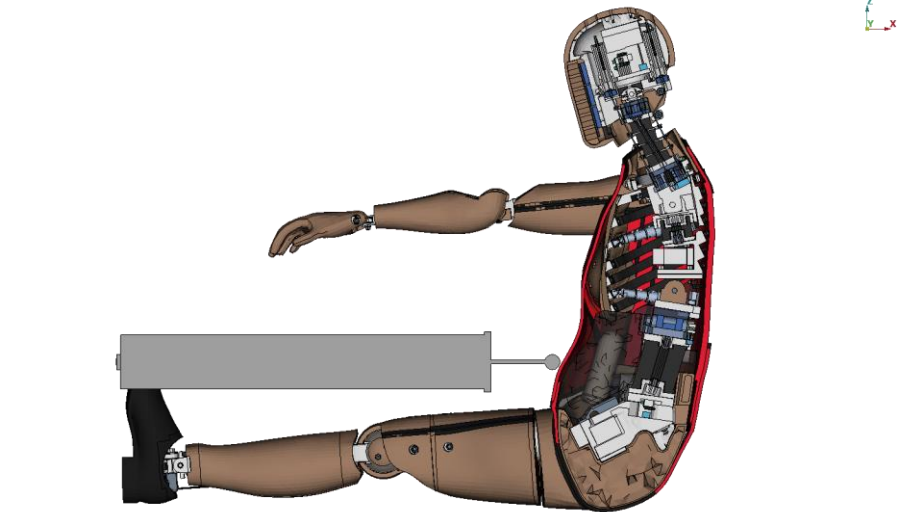
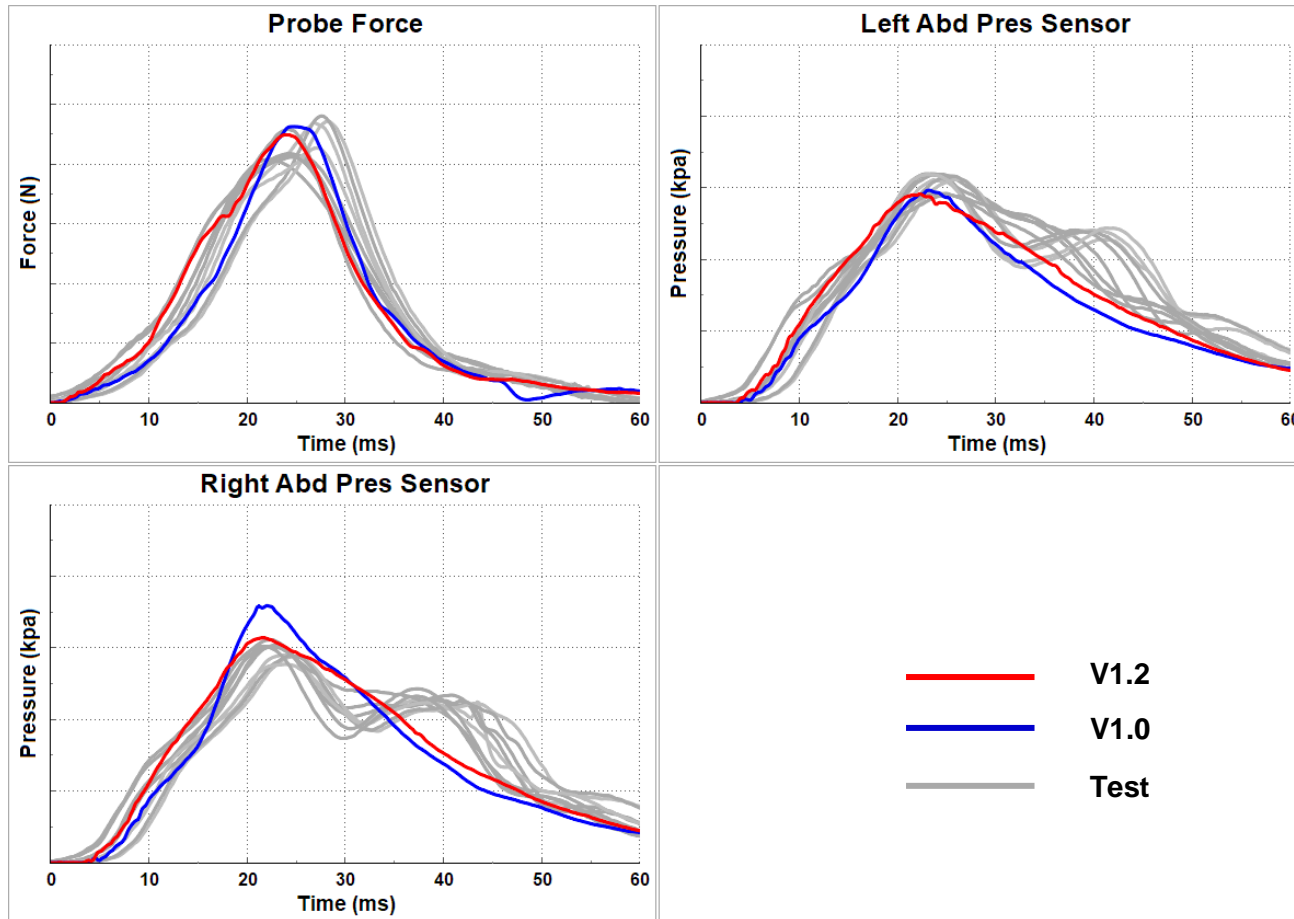
Full Dummy – Upper Thorax – V1.2



— V1.2
 — V1.0
 — Test

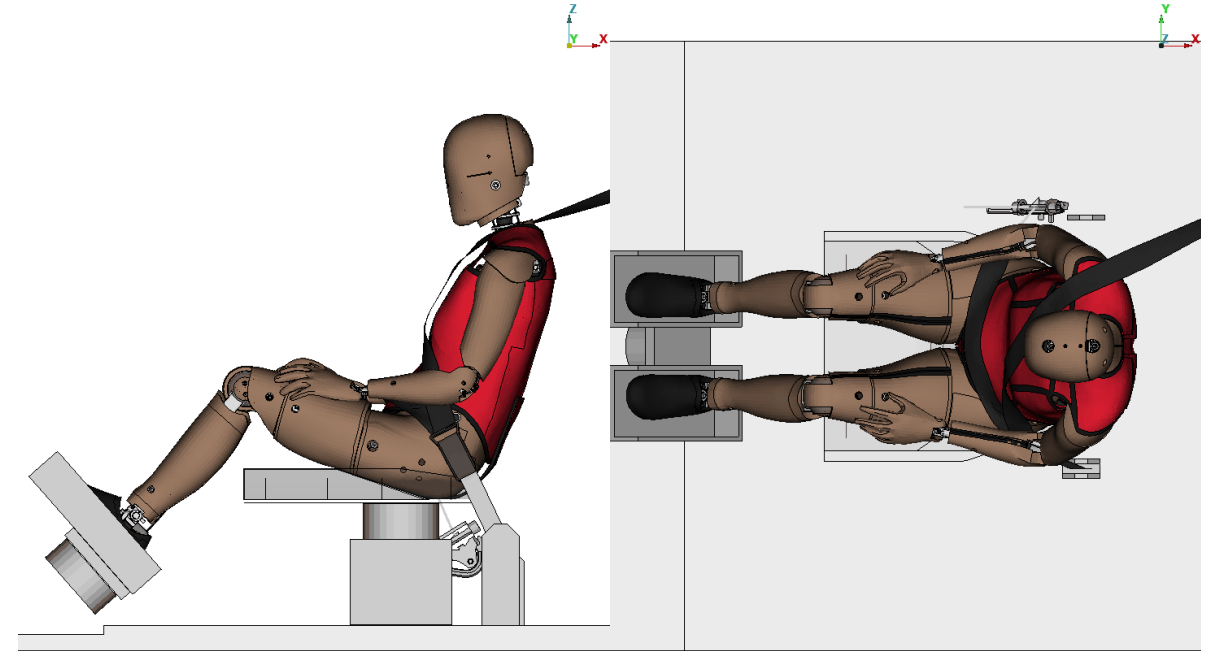


Full Dummy – Abdomen – V1.2

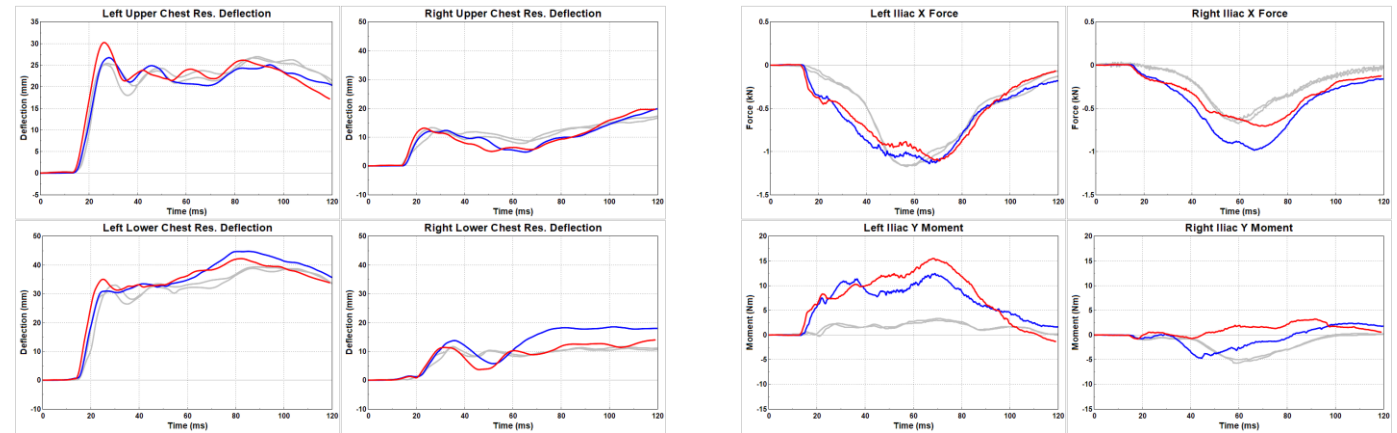


Full Dummy – Sled – V1.2

- SBL-B experienced significant pelvis updates and should in general show better performance regarding submarining
- SBL-B physical dummy was not tested in the Autoliv sled
- Sled simulation to check robustness, and to ensure that SBL-B perform well (submarining etc.)

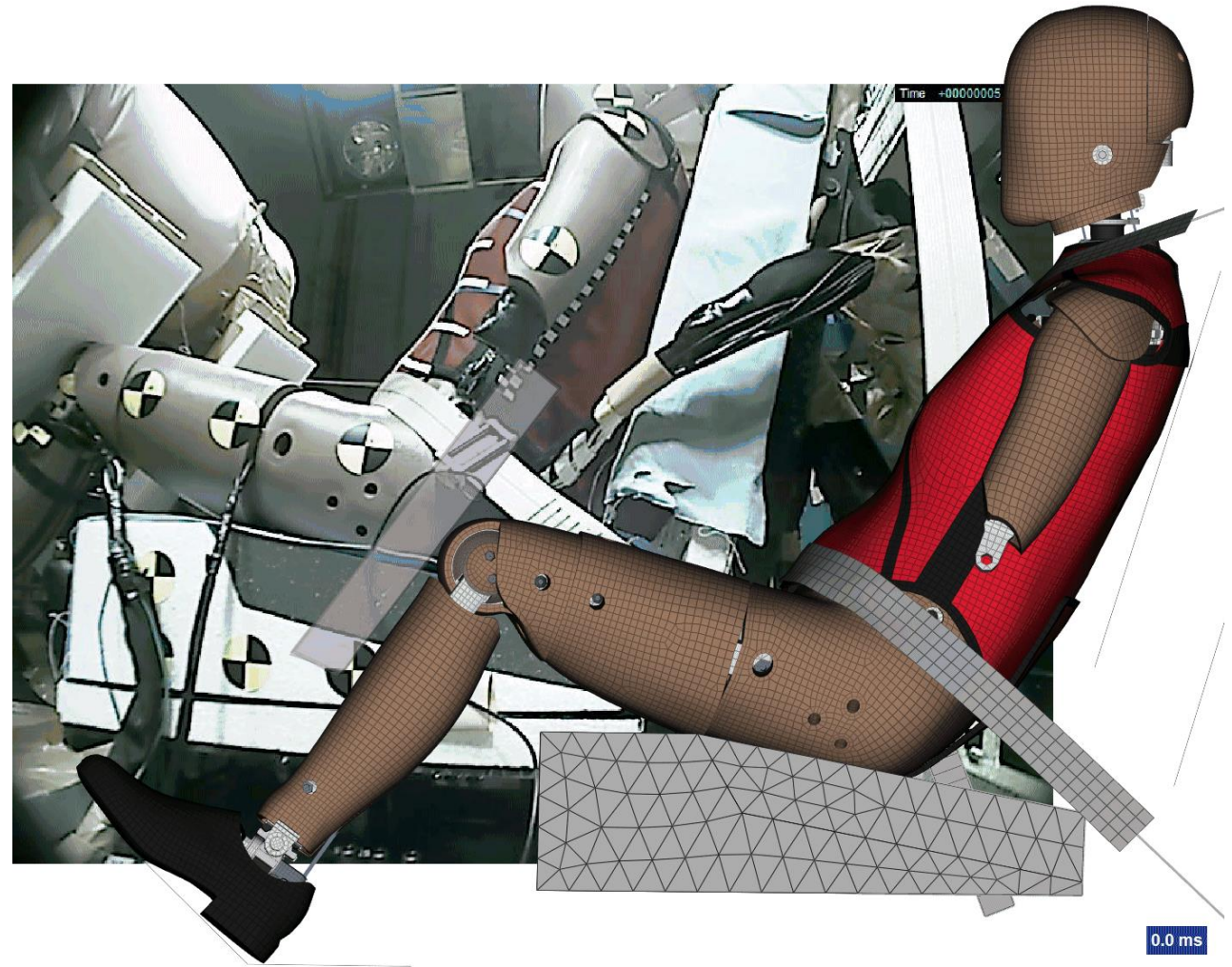


— V1.2
— V1.0
— Test



Full Dummy – Sled – V1.2

- New sled with SBL-B
- Good pelvis performance in new sled (no submarining)
- Model shows good kinematics in comparison to the test

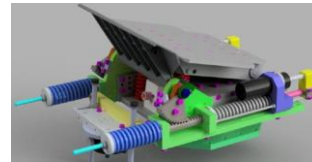


THOR-AV-5F

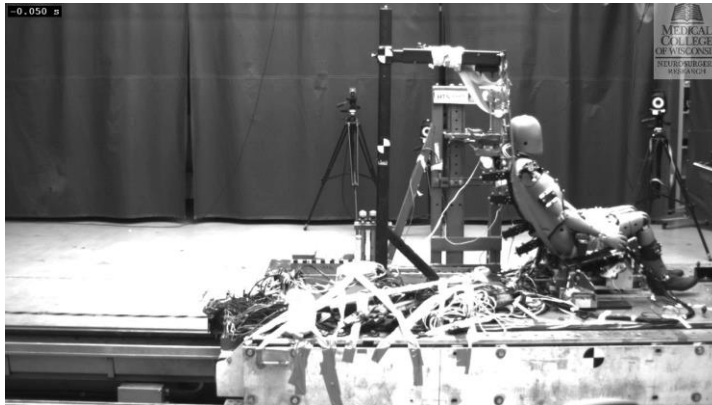
- NHTSA tested THOR-5F (funded the tests) at MCW in 25° and 45° reclined position. NHTSA did not publish the data/results yet.
- Humanetics tested THOR-AV-5F at MCW in 25° and 45° reclined position, same as NHTSA’s setup above. NHTSA is aware about our tests and approved using MCW sled buck (built by NHTSA funding).
- The sled buck/seat used for the tests above is a Uriot semi-rigid seat.

Table 2.5-1: Test matrix.

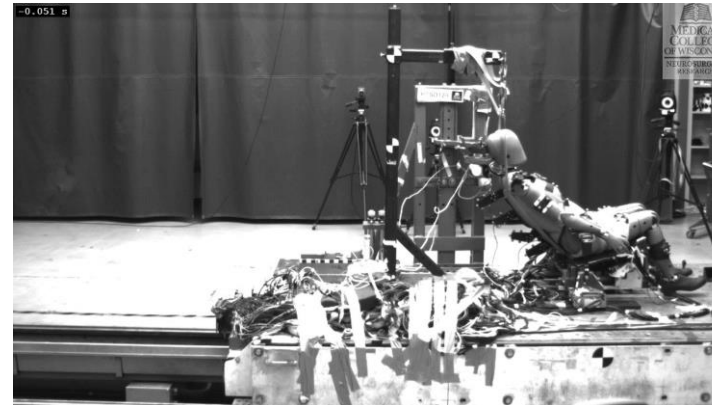
Test ID	TestNumber	Recline Angle	Delta V	Restraint System
HTSD107	1	25	15 km/h	loadlimiter 2 kN
HTSD108	2	25	15 km/h	loadlimiter 2 kN
HTSD109	3	25	15 km/h	loadlimiter 2 kN
HTSD105	1	25	32 km/h	retractor 4.5 kN
HTSD112	2	25	32 km/h	retractor 4.5 kN
HTSD113	3	25	32 km/h	retractor 4.5 kN
HTSD114	1	45	15 km/h	loadlimiter 2 kN
HTSD115	2	45	15 km/h	loadlimiter 2 kN
HTSD116	3	45	15 km/h	loadlimiter 2 kN
HTSD118	1	45	32 km/h	retractor 4.5 kN
HTSD119	2	45	32 km/h	retractor 4.5 kN
HTSD120	3	45	32 km/h	retractor 4.5 kN



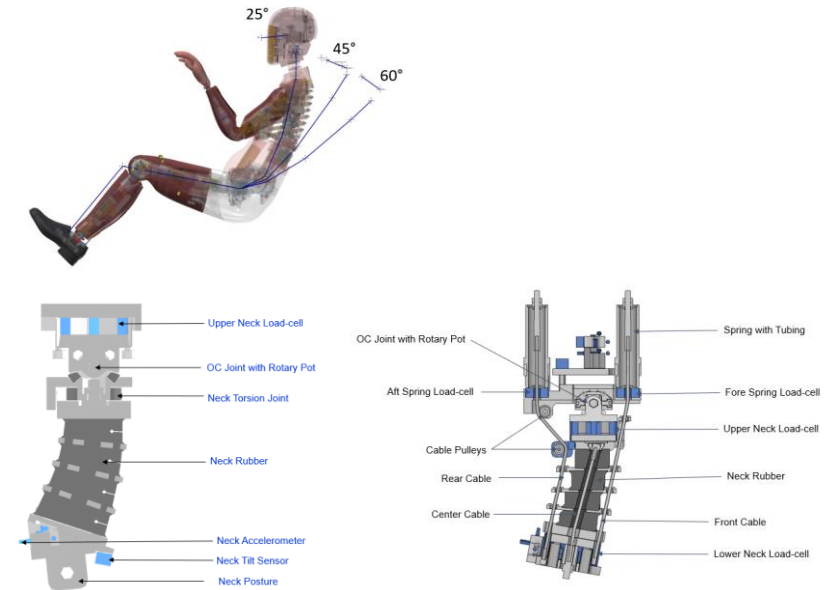
HSTD113



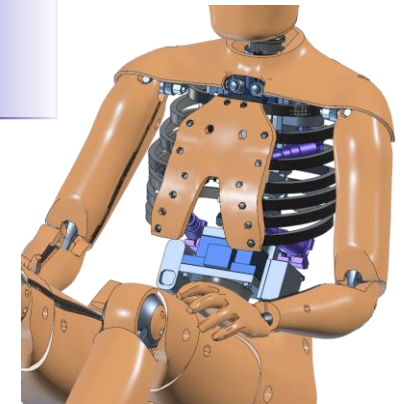
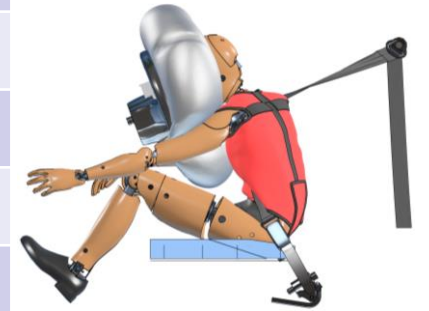
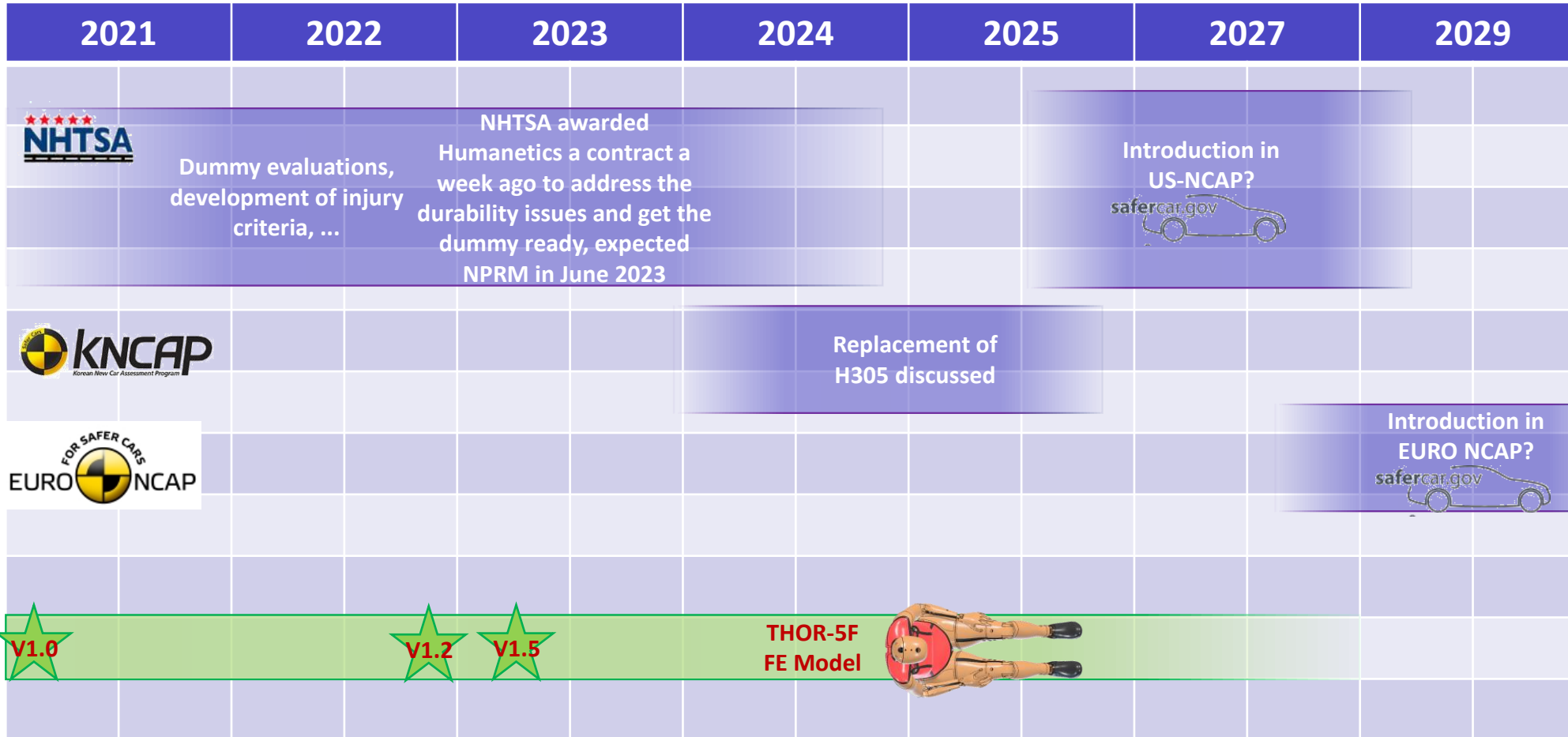
HSTD120



NHTSA has not published the data/results yet!



THOR-5F Roadmap



Summary

- 💡 V1.2 will include SBL-B geometrical updates and performance
- 💡 Many updated certifications setup, leading to some change in the performance
- 💡 Dyna version V1.2 new release date is middle of October
- 💡 THOR-AV-5F will follow soon after THOR-5F release



THANK YOU!
