Worldsid Update

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March 16, 2012

Agenda

- Small Female Pelvis Clearance
- Overall Dummy Material Changes
- Reasons for Build Level Update Summary
- Hardware updates
  - Pelvis Flesh interaction with abdominal ribs
  - Ankle
  - Jacket
  - MSC tilt sensor investigation
  - IRTRACC ROM and Pot updates
  - Lift Bracket
  - Pubic Load cell Connector
  - Head and Illac wing material change updates
  - External Measurement Procedure

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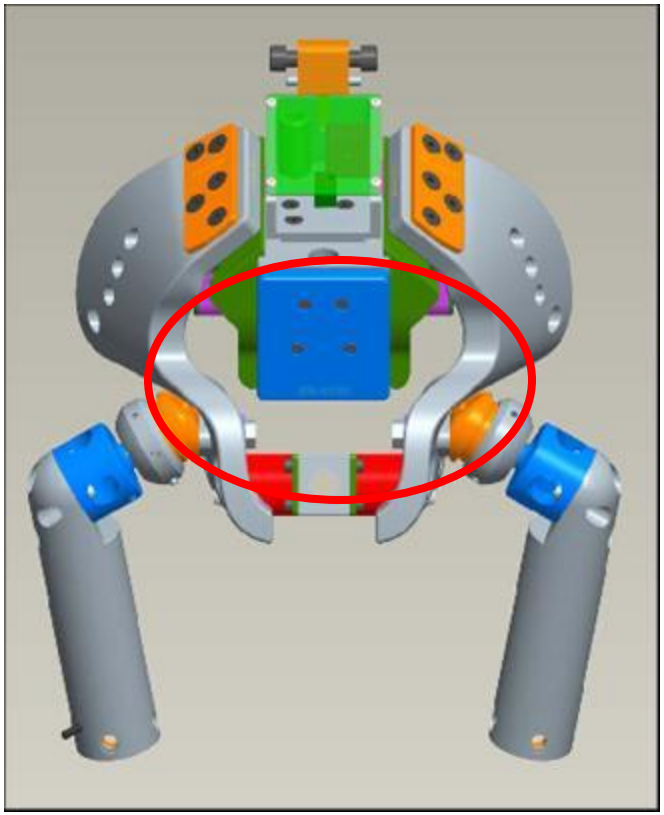
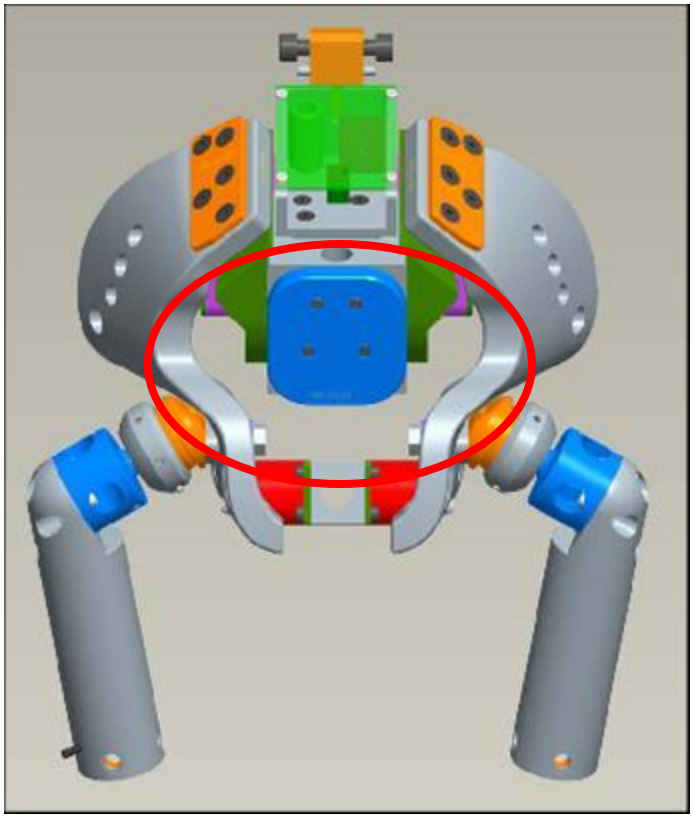
SMALL FEMALE PELVIS CLEARANCE

Increase Clearance in the Front





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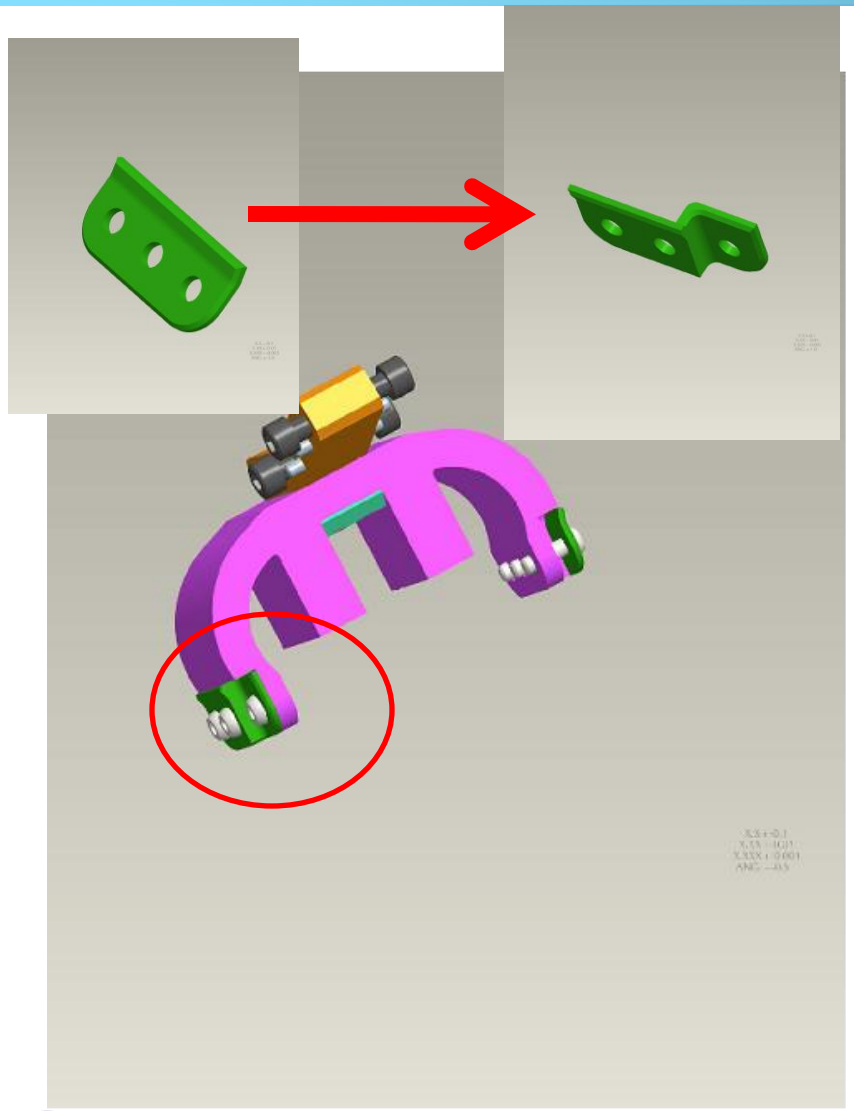
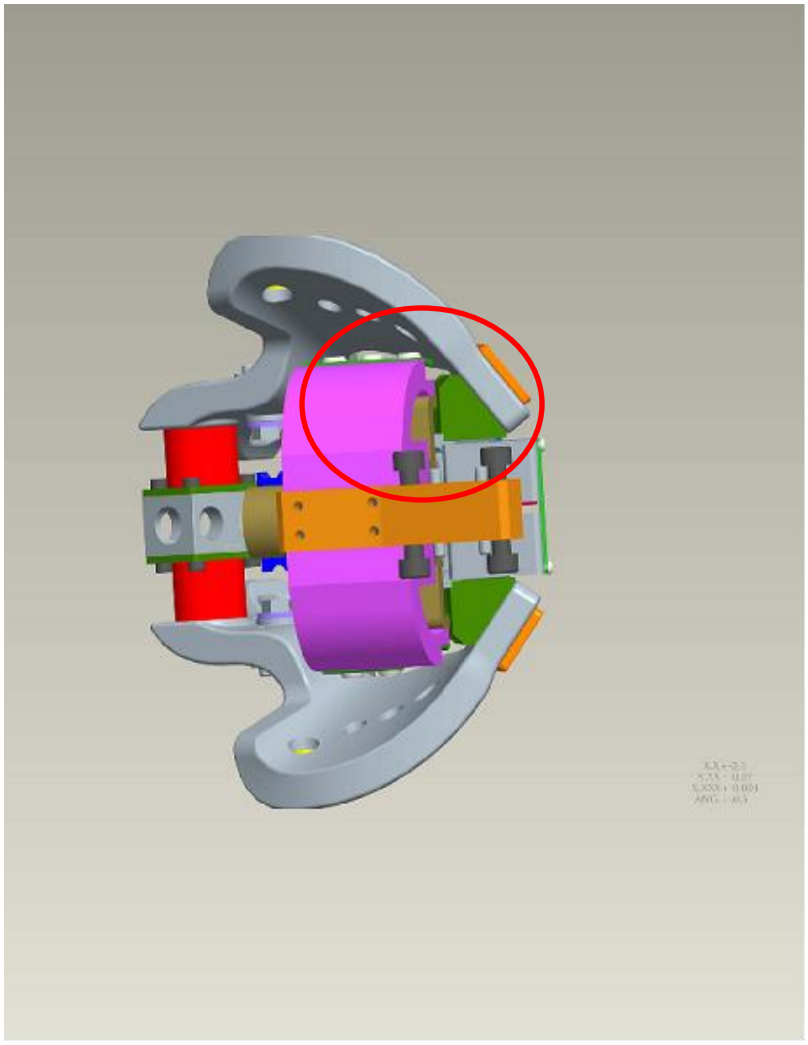
Increase Clearance at Lumbar





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OVERALL ATD MATERIAL CHANGE

Material Update

- Worldwide Government Programs
  - European Reach Program
  - Japan Green Program
  - US-EPA
- Worldsid material review
  - Damping Material (blue ok)
  - UREOL (Urethane replacement, in process)
  - Hyperlast (foam/flesh replacement, in process)
  - Hyperlast Skin material replacement, (does not affect Worldsid)
  - Vinyl Replacement (next year)

Worldsid 50th & 5th

	Part Number	Component	Common Material Name	Material Mixture Found in Current BOM
Head Assembly	W5-1020	Bone	Rencast 6444	8004988 URETHANE RP-6444 RESIN 1.48 LB / 8004989 URETHANE RP-6444 HARDENER 1.52 LB
		Skin	PVC	8007217 BROWN PVC 70 SHORE HARDNESS 3.70 LB
Pelvic Bone - Left (iliac)	W5-4120-1	Bone	Thermoset	8004931 PREPOLYMER CHEMTURA LF650D 0.440 LB / 8007345 ADIPRENE LF750A 1.320 LB / 8004933 CURATIVE CHEMTURA VIBRACURE 134A 0. 0.4750 LB
Pelvic Bone - Right (iliac)	W5-4120-2	Bone	Thermoset	8004931 PREPOLYMER CHEMTURA LF650D 0.440 LB / 8007345 ADIPRENE LF750A 1.320 LB / 8004933 CURATIVE CHEMTURA VIBRACURE 134A 0. 0.4750 LB
Pelvis Flesh - Molded	W5-4140-U	Skin	PVC	8005114 VINYL EURO BROWN PVC DURO 45+/-3 SHORE A 2.21 LB
		Flesh	Hyperlast	8004636 HYPERLAST 2851264 POLY 2700.0 GR / 8006246 CHEM HYPERLAST I 100 (ISO) 300.0 GR
Lower Leg Flesh - Left / Right	W5-5302	Skin	PVC	8005114 VINYL EURO BROWN PVC DURO 45+/-3 SHORE A 2.0 LB
		Flesh	Foam	8004964 FOAM XR-35 COMPONENT A 0.20 LB / 8004965 FOAM XR-35 COMPONENT B 0.80 LB
Vinyl Strips	W5-5308	Skin	PVC	3 8004965 FOAM XR-35 COMPONENT B 0.80000 LB
Upper Leg Flesh - Left	W5-5010-1	Skin	PVC	8005114 VINYL EURO BROWN PVC DURO 45+/-3 SHORE A 0.560 LB
		Flesh	Hyperlast	8004636 HYPERLAST 2851264 POLY 1460.0 GR / 8006246 CHEM HYPERLAST I 100 (ISO) 146.0 GR
Upper Leg Flesh - Right	W5-5010-2	Skin	PVC	8005114 VINYL EURO BROWN PVC DURO 45+/-3 SHORE A 0.560 LB
		Flesh	Hyperlast	8004636 HYPERLAST 2851264 POLY 1460.0 GR / 8006246 CHEM HYPERLAST I 100 (ISO) 146.0 GR
Arm Molded	W5-6107	Skin	PVC	8005114 VINYL EURO BROWN PVC DURO 45+/-3 SHORE A 0.450 LB
		Flesh	Hyperlast	8004636 HYPERLAST 2851264 POLY 830.0 GR / 8006246 CHEM HYPERLAST I 100 (ISO) 83.0 GR
		Flesh	Flexocell	8006250 J-FOAM 162A (FLEXOCELL 6202) 60.0 GR / 8006249 J-FOAM 162B (FLEXOCELL ISO 284) 40.0 GR

Vinyl Replacement over Next Year

- REACH program in Europe
  - Phthalate replacements (plasticizers)
  - Cadmium Stabilizer replacements
  - DOP Replacements
  - Higher stiffness, tear strength, lower elongations

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REASONS FOR BUILD LEVEL CHANGE FOR WORLDSID- 50TH

1st Reason for updates

	FTSS		SBL D: Effective May 15, 2005			
Item	Part Number	Qty	Description	Rev	Replaces	Date
1	W50-20101	1	Upper Neck Bracket	A	W50-20009	15/5/2005
2	W50-20102	1	Lower Neck Bracket	A	W50-20010	15/5/2005
3	W50-20103	2	Spacer Neck	A	New	15/5/2005
4	W50-42040	1	Instrumentation Bracket, Pelvis	A	W50-42030	15/5/2005
5	W50-41042	1	Docking Station, Pelvis	D	N/A	15/5/2005
6	W50-41043	1	Cover, Docking Station, Pelvis	A	New	15/5/2005
7	W50-31020	6	Side Plate Left	F	N/A	15/5/2005
8	W50-31030	1	Side Plate Right	D	N/A	15/5/2005
	The above group of changes were done after initial evaluation of prototype					

2nd Reasons for updates

	FTSS		SBL E: Effective November 1, 2008			
Item	Part Number	Qty	Description	Rev	Replaces	Date
1	W50-37013	1	Mounting Bracket	A	W50-37011	Oct-08
2	W50-37014	2	Standoffs	A	W50-37012	Oct-08
3	W50-37015	1	G5 mounting bracket	A	New	Oct-08
4	W50-43001	1	Battery container	A	W50-33101	Oct-08
5	W50-43002	1	Battery cover	A	W5-3323	Oct-08
6	556-5125-2	1	Structural Replacement G5 cover	A	New	Nov-08
7	Remove	NA			W50-41041	Oct-08
8	Remove	NA			W50-41042	Oct-08
9	Remove	NA			W50-41043	Oct-08
10	W50-31050	6	Ball Joint Assembly IRTRACC	B	Rev A	Oct-08
11	W50-31051	1	Ball Shaft Assembly	B	Rev A	Oct-08
12	W50-31053	1	Ball Shaft IRTRACC	C	Rev B	Oct-08
13	W50-31055	1	Ball Retainer IRTRACC	D	Rev C	Oct-08
14	W50-30000	1	Torso Assembly	L	Rev K	Oct-08
15	W50-40000	1	Pelvis Assembly	J	Rev H	Oct-08

Changes of items 1 to 6 were completed based on VRTC discovery of physical contact occuring betwee pelvis G5 interposer and the iliac wing. The decision with the consent of the WSID task group was to move the G5 to the non-struck side of the spine box and move the battery underneath the sacrum loa

The change to the Blue damping rib set was done with the approval and part of the WSID task group. The change was initiated by several complaints that the original damping material was delaminating from the ribs.

The changes for items 10 to 14 are a result of VRTC testing where IRTRACCs were damaged due to res

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Item	Part Number	Qty	Description	Rev	Replaces	Date
1	W50-51058	1	Upper Leg Flesh, Right	D	Rev B	Jan-08
			Weight Spec changed to 4.1±0.1kg from 3.8kg; changed wire routing shap			
2	W50-51059	1	Upper Leg Flesh, Left	D	Rev B	Jan-08
			Weight Spec changed to 4.1±0.1kg from 3.8kg; changed wire routing shap			
3	W50-55003	2	Sole Plate	F	Rev C	Dec-07
			Rev D - Changed Toe Area Geometry (10/10/2005) **Rev F** - Add Radius Callout, Removed Reference Dim (12/06/2007)			
4	W50-55004	1	Shoe, Left	C	B	Jan-07
			Smoothed surface model (2007)			
5	W50-55005	1	Shoe, Right	C	B	Jan-07
			Smoothed surface model (2007)			
6	W50-61125		Shoulder Clevis	C	New	Oct-07
			Rev B - (4X) Ø4.76 mm & (2X) Ø3.97 mm WAS (6X) Ø2.10 mm; 2.00 mm 0.75 mm X 45° CHAMFER; ADDED R16.0mm, .071mm & R2.0mm **Rev C** - 3.0 mm WAS 0.71mm; REMOVED 2.0mm(SHEET 1); (2X) 3.7mm			
7	W50-61130		Shoulder Clevis Ass'y	C	New	Mar-10
			Rev A - REDRAWN IN INVENTOR; ADDED 9010350 & 9010351			
8	W50-61135		Insert, Clevis	A	New	Mar-10
			Rev A - INCREASE BOSS HEIGHT, HOLE DEPTH			
9	84895A32	2	Ball-spring plunger, Arm			12/1/2009
10	W50-71130S	1	Sacro-Iliac Load Cell		W50-71130	11/1/2007

Changes to items 1 and 2 are a result of a Honda dummy that was fully instrumented and couldn't achieve a good wiring solution without enlarging the G5 and cable clearance in the leg flesh. The chan was clearly communicated to the task group

Changes 3 to 5 are a result of shoe redesign

Changes 6 to 9 were part of the WSID task group agenda and activities. The complaint came from For PMG and VRTC that the arm couldn't be help in position with the original design

Change 10 is a modification of the spec rather than a change to the physical load cell. The change was done in order to meet the cross talk specification.

These changes are on record in the WSID Task Group meeting minutes

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HARDWARE UPDATES

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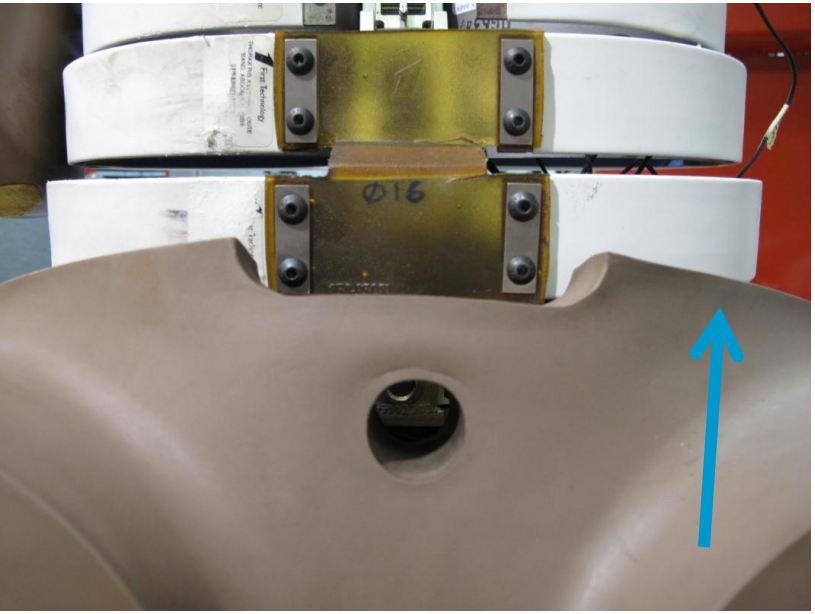
PELVIS FLESH/ABDOMINAL RIB INTERACTION

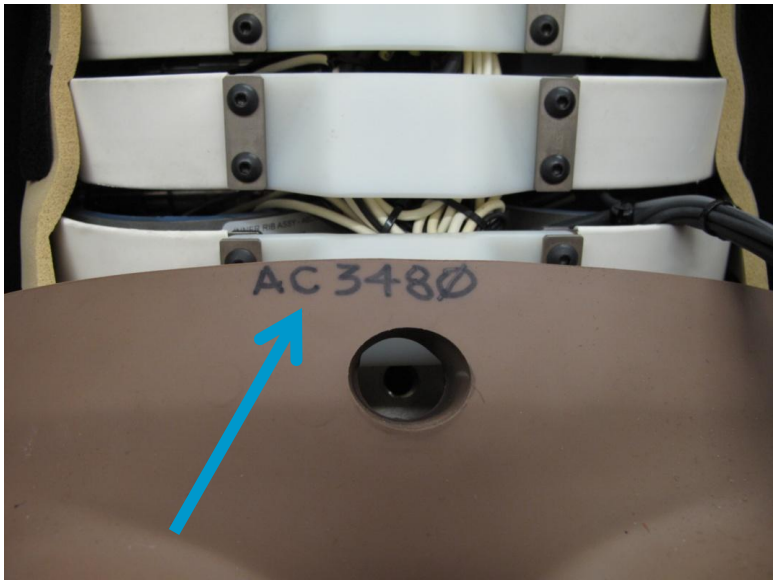
Abdomen Rib/Pelvis Interaction

- 50th



- Need more tests

- 5th



- TRL found that there is some difference between rib deflections depending on rib location prior to test
- TEG has recommended a mold change

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REVISED 50TH ANKLE

WorldSID-50th Ankle Harmonization

- Adapt WorldSID 5th ankle to WorldSID 50th dummy.
- Meet height and weight specifications of original 50th ankle.
- Maximize use of existing parts.

Ankle Comparison

	WorldSID 5th Ankle	WorldSID 50th Ankle-Original	WorldSID 50th Ankle Harmonized
Assembly Number	W5-5700	W50-54054	**W50-57000**
Description	Ankle Assembly	Ankle Assembly	**Ankle Assembly Harmonized**
Overall Height, mm	121.36	160.95	**160.95**
Y-Version axis Height, mm	45.79	73.88	**74.67**
X-Version Axis Height, mm	30.25	58.88	**59.16**
Mass, kg	.558	.909	**.907**

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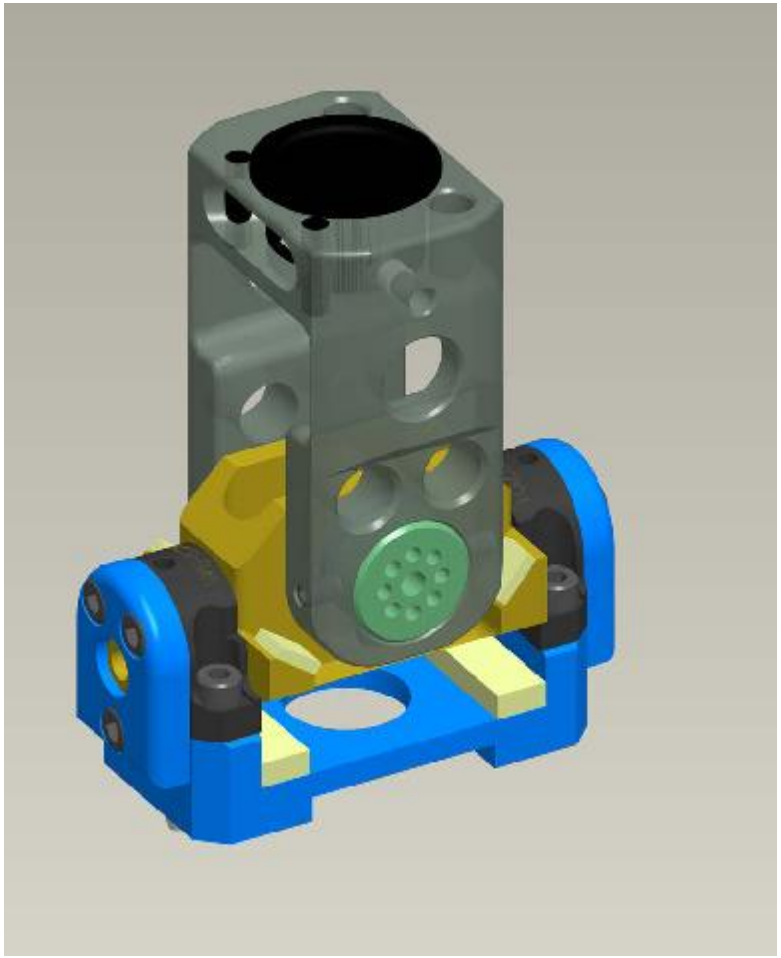
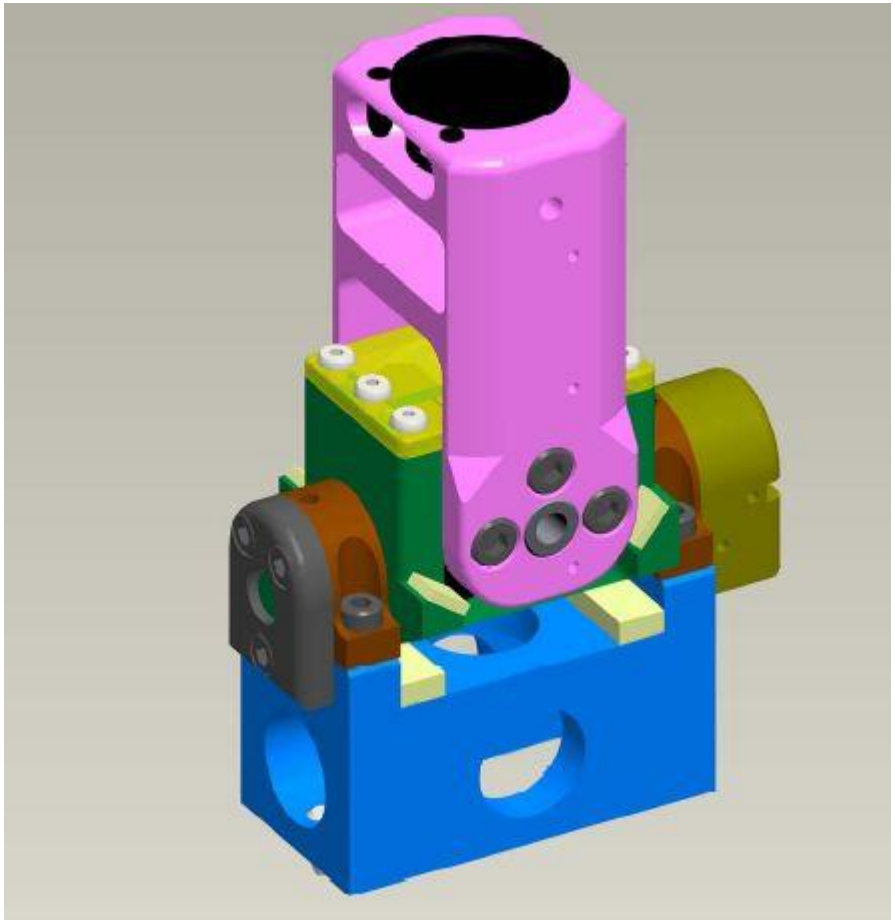
Ankle Comparison

	WorldSID 5th Ankle	WorldSID 50th Ankle-Original	WorldSID 50th Ankle Harmonized
CG-X, mm (+forward)	-.21	-.2	**-.01**
CG-Y, mm (+right)	-.74	-.03	**.38**
CG-Z, mm (+down)	-4.56	-7.03	**-6.41**
Ixx, kg-mm^2	688	1575.	**1795**
Iyy, kg-mm^2	900.	1934.	**2088**
Izz, kg-mm^2	451	781.	**678**
Ixy=Iyx, kg-mm^2	0.3	0.3	**.3**
Iyz=Izx, kg-mm^2	.08	-.2	**-.2**
Izx=Ixz, kg-mm^2	-3.9	8.6	**5.6**

W5-5700 WSID-5TH ANKLE

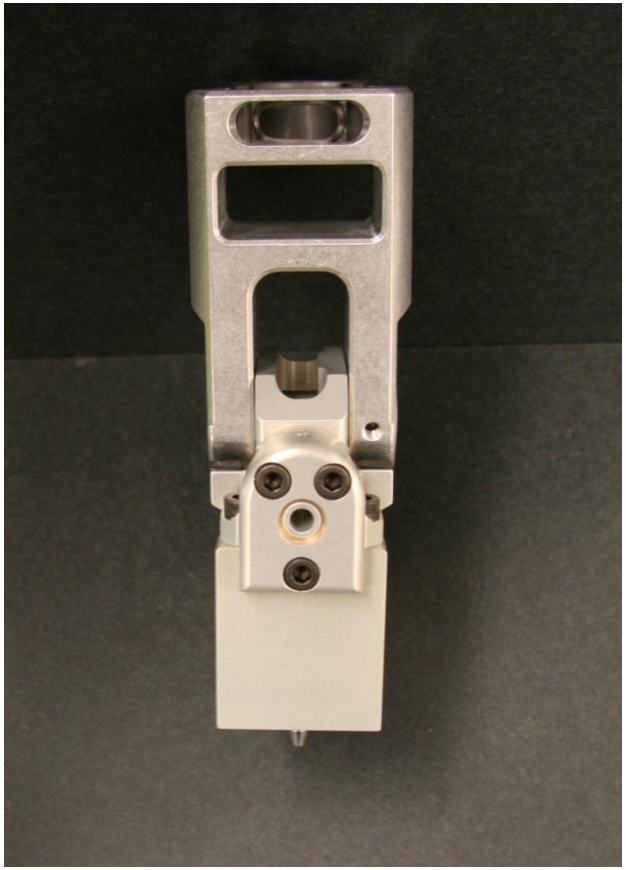


W50-54054 WorldSID 50th Original Ankle



W50-57000 WorldSID 50th Harmonized Ankle

Harmonized WSID-50th Ankle



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CONCLUSION

- Ankle is based on WorldSID 5th ankle design.
- Base block is modified from WorldSID 50th Ankle detail.
- Y-version upper clevis is lengthened and strengthened, based on WorldSID 5th Ankle detail.
- Weight and height match.
- WorldSID 5th ankle functionality is maintained.

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WORLDSID 50TH JACKET IMPROVEMENT

WorldSID-50th Jacket

Jacket Modifications

- H point holes
  - Relocate and finish with sewn border (COMPLETED)
- Shoulder bolt holes
  - Enlarge and finish with sewn border (COMPLETED)
- Arms
  - Remove and finish arm pit holes (TASK DELETED).
  - Removal of the jacket arms was requested after the project was started so first task was stopped. Removal of arm material was not completed due to timing. (TO BE COMPLETED ON NEXT PROTOTYPE BUILD)
- Humanetics logo
  - Move to front of jacket (TO BE COMPLETED ON NEXT PROTOTYPE BUILD)
- Knee holes
  - Re-align holes with center knee rotation (TO BE COMPLETED ON NEXT BUILD)

WorldSID 50th Jacket Improvements

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WorldSID 50th Jacket Improvements

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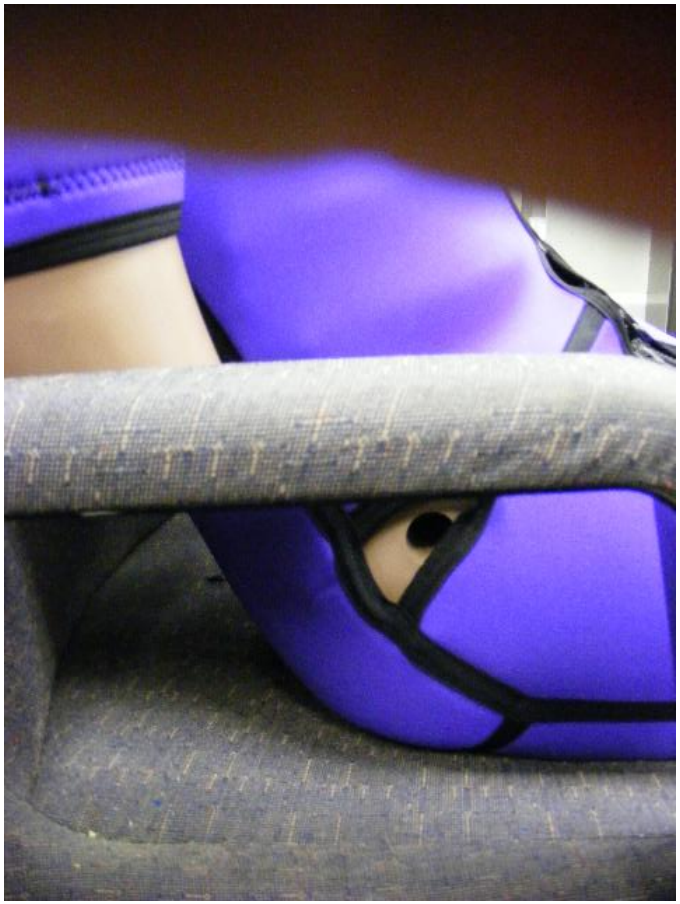
WorldSID 50th Jacket Improvements



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WorldSID 50th Jacket Improvements

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WorldSID 50th Jacket Improvements

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MSC TILT SENSOR INVESTIGATION

Tilt Sensor Investigation

WSID-50 SACRUM BLOCK ANGLE

TILT SENSOR INSTALLED RIGHT SIDE UP ON TOP OF MOUNT

TILT SENSOR	PROTRACTOR	DIFFERENCE
-0.20	-0.30	-0.10
8.30	8.40	0.10
16.90	17.70	0.80
28.00	27.60	-0.40
-0.10	-0.20	-0.10
-8.70	-9.00	-0.30
-20.80	-21.10	-0.30
-26.40	-26.70	-0.30
	Average	-0.08
	Expected Value	0.00
	Difference	-0.08
	Standard deviation	0.39

The readings are acceptable.

TILT SENSOR INSTALLED UPSIDE DOWN IN SPECIFIED MOUNTING POSI'

TILT SENSOR	PROTRACTOR	DIFFERENCE
0.00	0.10	0.10
-20.00	-11.00	9.00
-35.30	-20.30	15.00
15.10	7.80	-7.30
30.40	16.50	-13.90
	Average	0.58
	Expected Value	0.00
	Difference	0.58
	Standard deviation	11.73

The average looks all right but the readings are inconsistent.

After the data was taken I mounted the tilt sensor so as to interchange 1 and 2 so that sensor 1 was X and 2 was Y. Both were mounted @ 90 deg. to horizontal. Neither sensor read anything.
The included spec sheet specifies the reading range at ±80 degrees to horizontal. It does not allow upside down or sideways mounting.

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MSC Data Sheet

Technisches Datenblatt

msc Automotive GmbH

Zweiachsiger, digitaler Neigungssensor

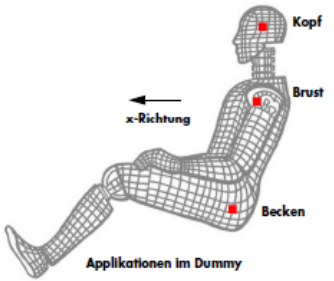
Modell 260D/GP-X

- **Geeignet für Dummy-Positionierung**
- **Messbereich ±60°**
- **Auflösung 0,1°**
- **Digitales Interface**
- **Anzeige mittels Handheld oder APS-Monitor**
- **Selbsttest auf Messeinsatzfähigkeit**
- **TEDS nach IEEE 1451.2**

Anwendung

Der Neigungssensor wird für die Dummy-Sitzpositionierung und bei Out Of Position (OOP) Tests eingesetzt. Auf Grund seiner Spezifikation ist er auch für den Einsatz in der Dummy-Kalibrierung geeignet. Er ermöglicht eine einfache und reproduzierbare Dummy-Positionierung im Fahrzeug während der Versuchsvorbereitung. Das Befestigungs-Gewinde sowie den Passstift gibt es in metrischer und imperial-Ausführung (s. Optionscode). Als weiteres Zubehör sind Montageplatten für die Dummymessstellen erhältlich (s. Applicationnote AN-145). In Verbindung mit dem **D**igital**T**ransducer-**A**dapter 620C/DTA und einem Handheld mit WIN CE (s. „Zubehör optional" auf der Rückseite) erfolgt die Anzeige von bis zu sechs Neigungsaufnehmern mit je zwei Messachsen. Anwendern des portablen Monitors Modell 600A/APS-G3 steht ein DSI-Erweiterungsmodul[1] zur Verfügung[2].

In Verbindung mit dem MDDA-System[3] und Handheld oder Host-PC ist eine Anzeige der Neigungswinkel unmittelbar vor und nach dem Crash auch über die Messanlage via Ethernet möglich.



Applikationen im Dummy

Funktionsprinzip

Der Neigungsaufnehmer basiert auf einem thermodynamischen Messprinzip, bei dem die Lage einer erwärmten Gaswolke in einer Messkammer elektrisch bestimmt wird. Über ein Differenzmessverfahren werden die Neigungswinkel von zwei Achsen gleichzeitig ermittelt. Durch Temperaturkompensation ist der Neigungswinkel unabhängig von der Umgebungstemperatur. Der Aufnehmer besitzt eine synchrone serielle Schnittstelle zur Kommunikation mit der Messanlage oder dem Anzeigegerät. Die komplette Signalaufbereitung und Linearisierung erfolgt im Aufnehmer.

Alle Kalibrierwerte sind im TEDS[4] des Aufnehmers gespeichert. Die Zuordnung beider Messachsen und deren Polarität erfolgt abhängig vom im TEDS enthaltenen „Location Code". Dieser wird abhängig vom Einbauort des Aufnehmers vom Anwender via Handheld oder APS-Monitor in den TEDS geschrieben.

Optionen:
- Kundenspezifische Kabellängen
- Messbereich ±80° (Genauigkeit 60°...80° ±2°)
- Arbeitstemperaturbereich: -10°...+60°C

Zubehör (s. auch AN-145)

Zu Modell 260D/GP-I:	
- Befestigungsschraube imperial *)	Artikel-Nr.: 320162
- Passstift imperial *)	Artikel-Nr.: 320167
Zu Modell 260D/GP-M:	
- Befestigungsschraube metrisch *)	Artikel-Nr.: 320220
- Passstift metrisch *)	Artikel-Nr.: 320015
User Software für PDA	677A/MoST-TI
User Software für PC	677A/LoST-TI

*) Im Lieferumfang enthalten

(1) **D**igital**S**ensor**I**nterface-Karte 600A/G3-DSI
(2) Über die Anwendung mobiler Test- und Anzeigegeräte bei Neigungsaufnehmern siehe Application Note AN-145
(3) **M**iniature**D**igital**D**ata**A**cquisition**S**ystem
(4) **T**ransducer**E**lectronic**D**ata**S**heet

TD-260.Index F.fm 9. März 2007

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Experimental Set Up

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IRTRACC ROM & POT UPDATES

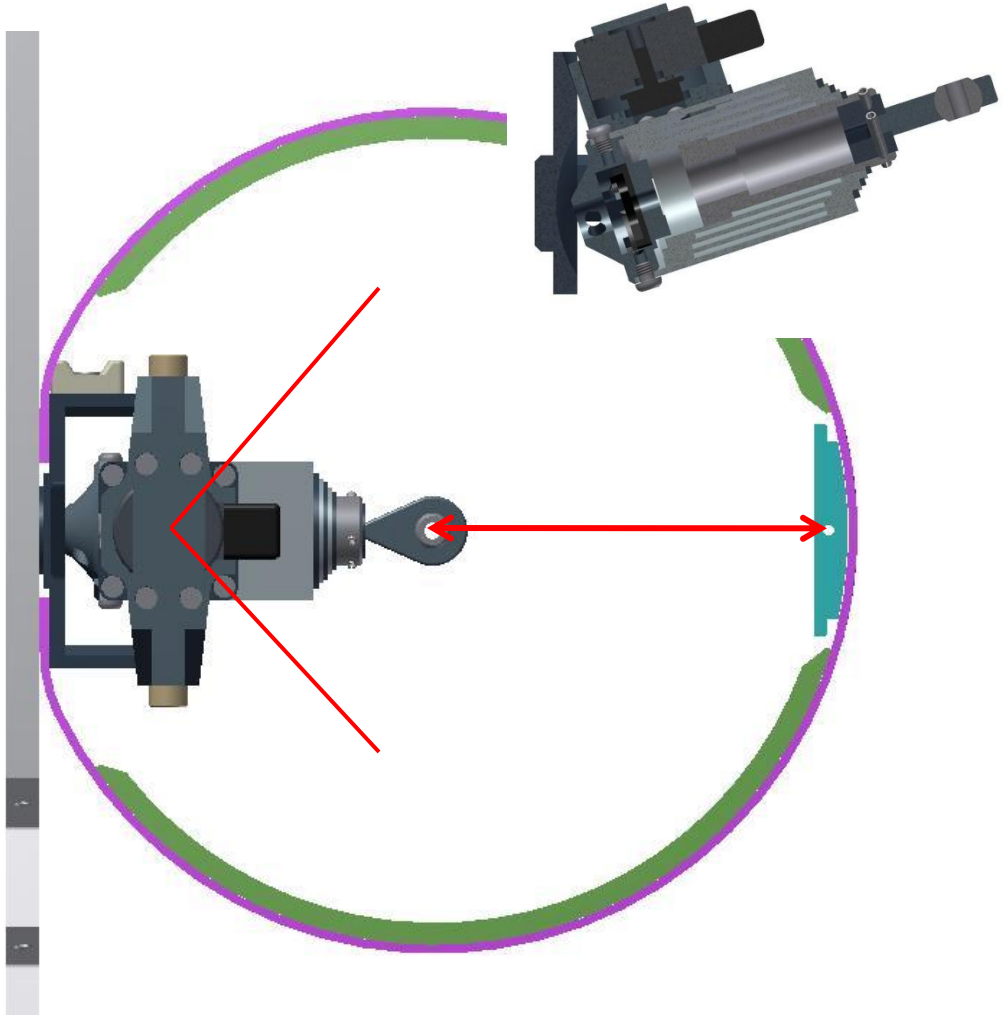
Design Requirements from Task Force

Existing 2D IRTRACC design maintained ~73mm maximum deflection

Need 45° range of motion front to back (x-y plane)

Fix rod end breaking

Spec issue with Rod End: current rod end has spec of 13°, can be changed to 25°



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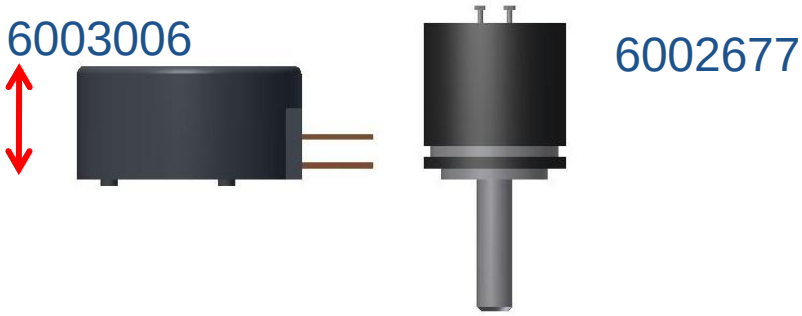
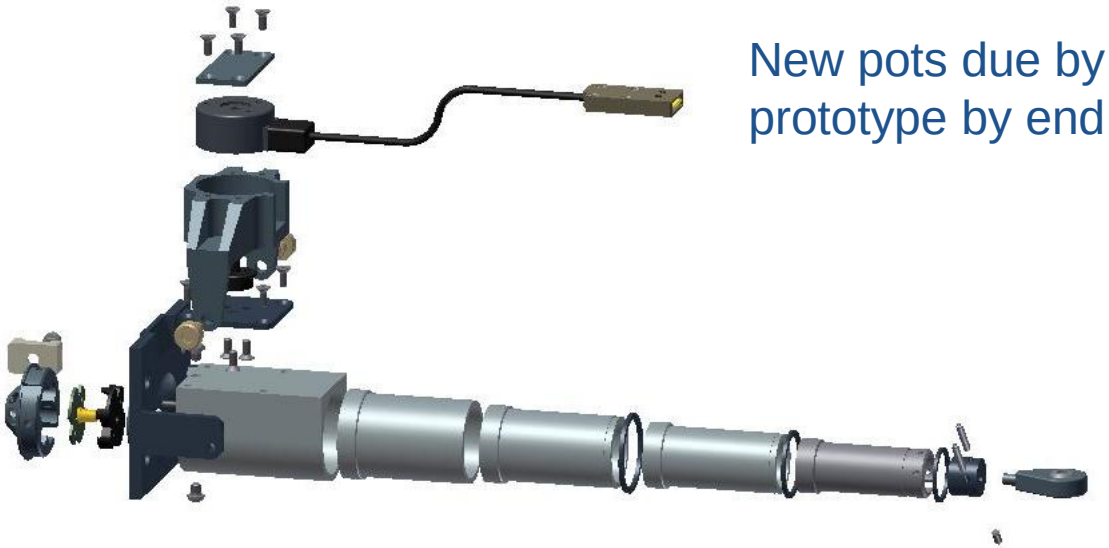
Revise Current 2D pot with a more repeatable pot design





New pots due by end of March, will have prototype by end of April

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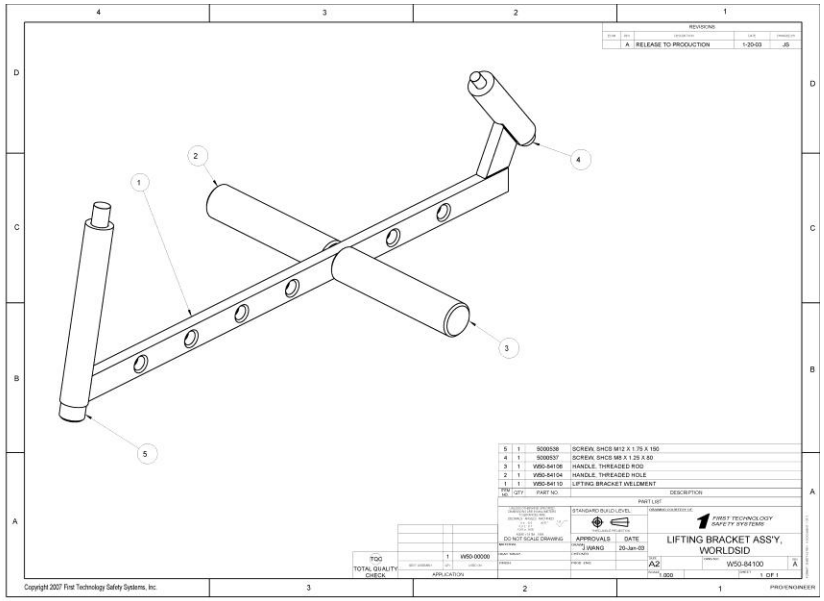
LIFT BRACKET

WSID LIFT

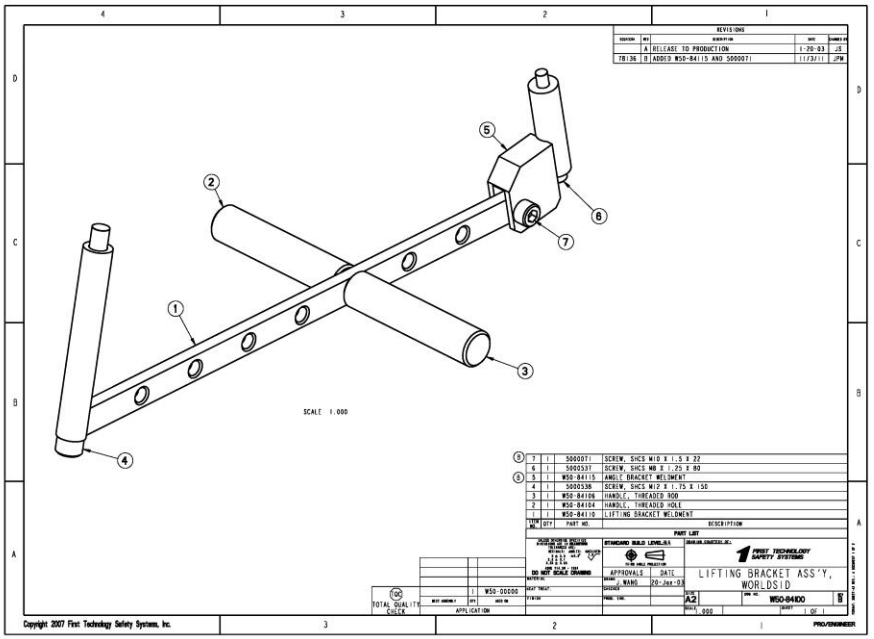
Original WSID lift:

1. Too difficult to align both screws at once



Revised WSID lift:

1. Split design allows for easier installation.



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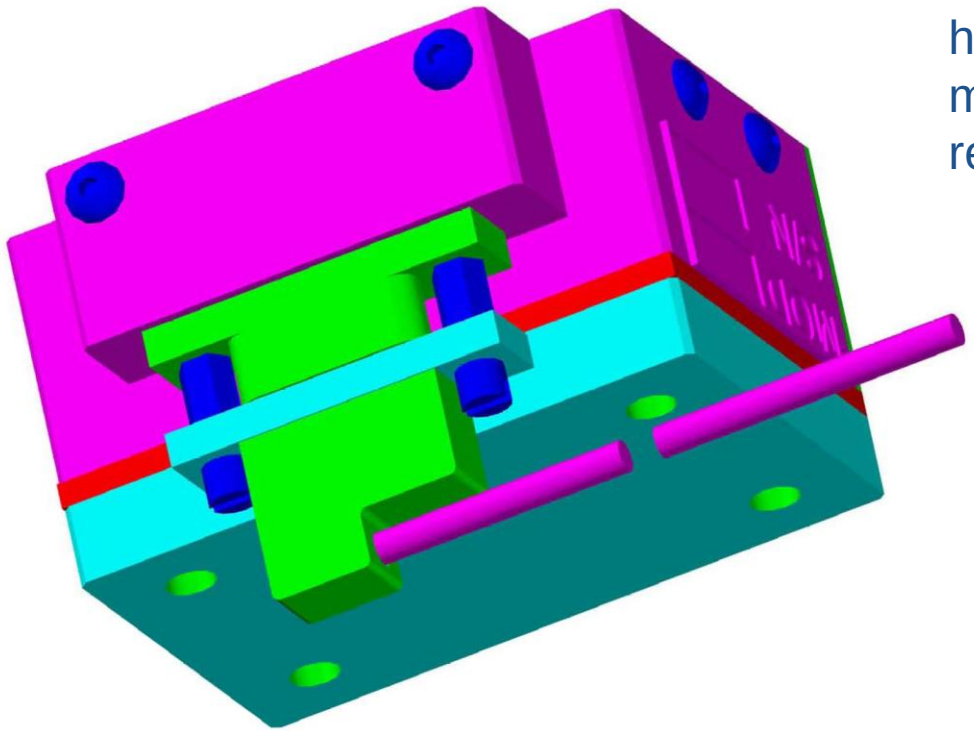
PUBIC LOAD CELL CONNECTOR

WSID PUBIC MOLD



Connector location has been move and mold has been revised

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ILLAC WING AND SKULL MATERIAL CHANGES

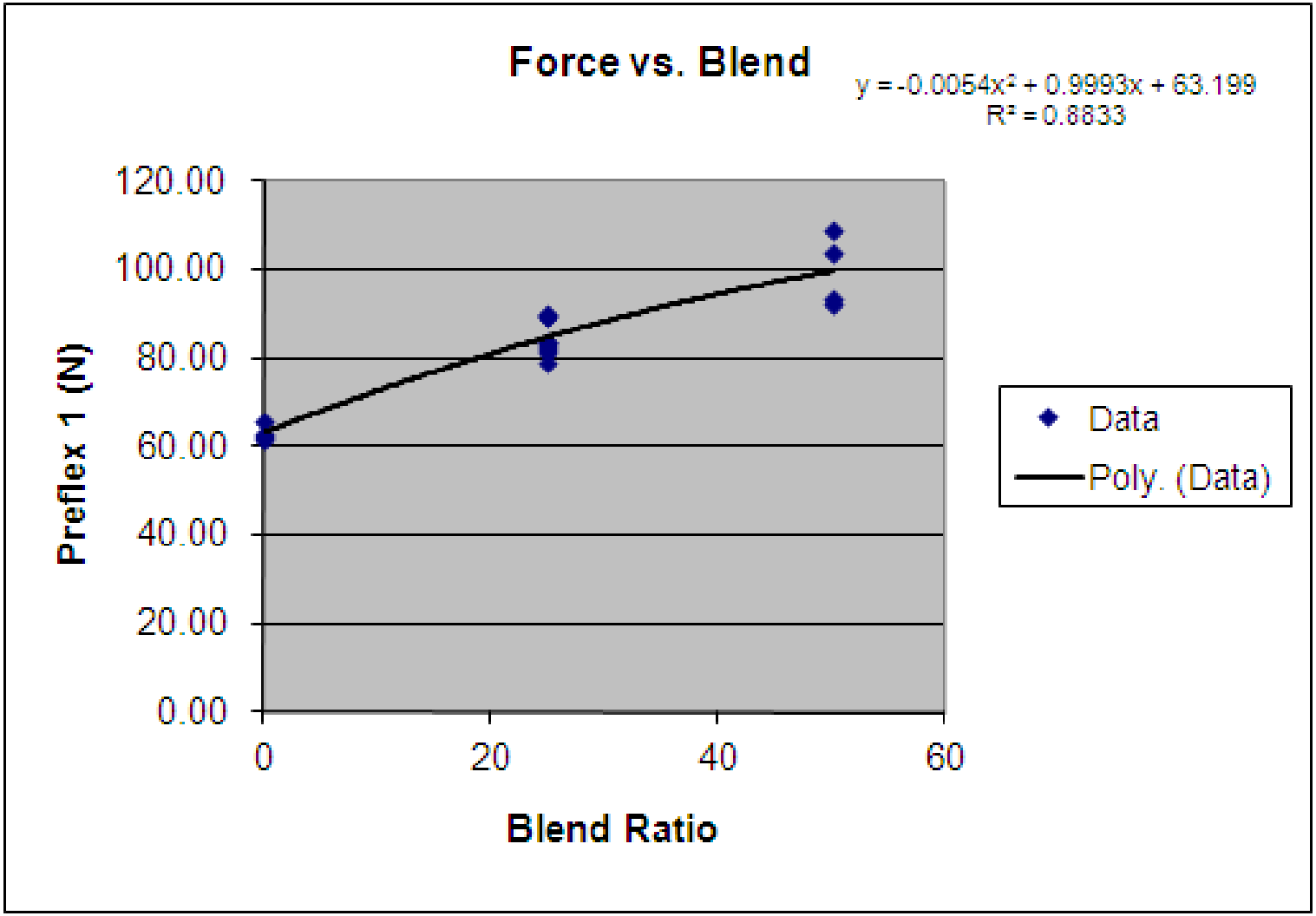
WorldSID 50th Material Change

- Iliac wings
  - Tested three polyurethane blends
    - Quasi-Static
    - Pelvis Impact Certification Tests
- Skull
  - Tested two polyurethane materials
  - One type shows promising results

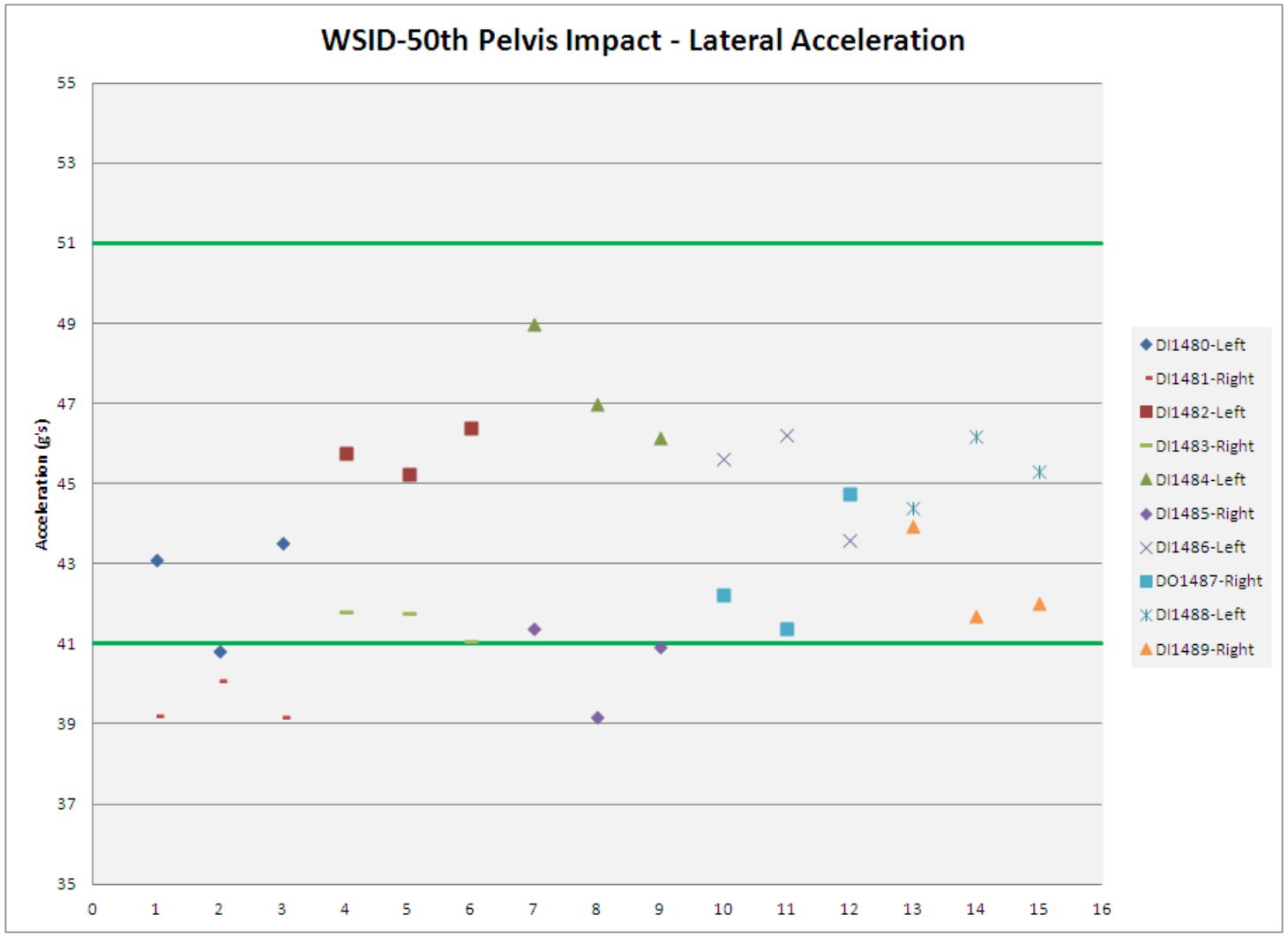
WorldSID Iliac Wing Material Change

- Problem
  - Ureol material no longer available
  - Will run out in coming months
- Action plan
  - Design & build new mold
  - Develop equivalent material
    - Develop process with new material
    - Match Ureol at material sample level
    - Static & Dynamic component level tests
  - Final verifications
    - Dummy certification tests
    - Dummy pendulum biofidelity tests
    - WorldSID task group trials

Quasi-Static Iliac Loading



Pelvis Impact Certification Tests



S/N	Polyurethane
DI1480	Blend "A"
DI1481	Blend "A"
DI1482	Blend "B"
DI1483	Blend "B"
DI1484	Blend "B"
DI1485	Blend "B"
DI1486	Blend "B"
DI1487	Blend "B"
DI1488	Blend "C"
DI1489	Blend "C"

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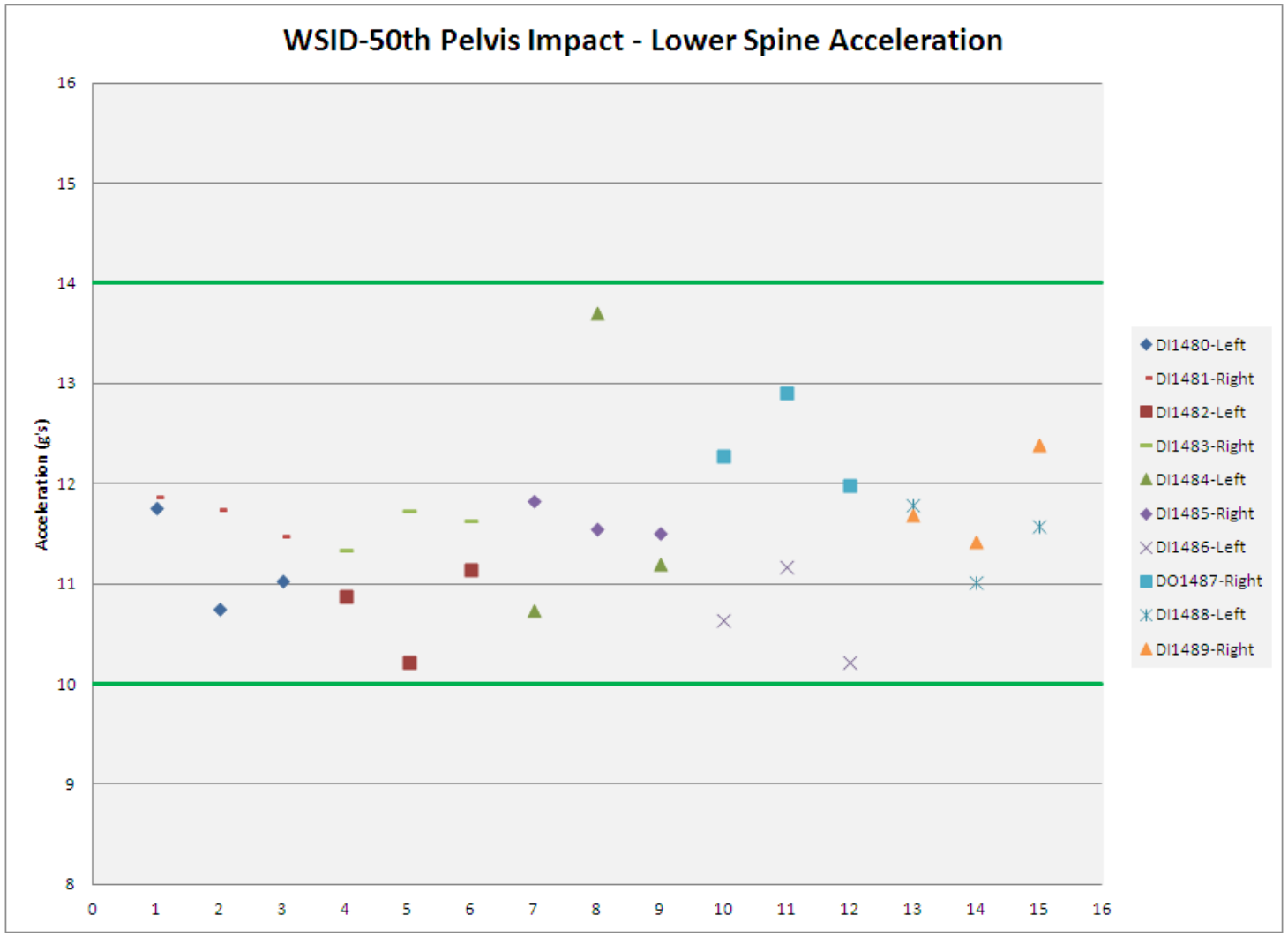
Pelvis Impact Certification Tests



S/N	Polyurethane
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DI1482	Blend "B"
DI1483	Blend "B"
DI1484	Blend "B"
DI1485	Blend "B"
DI1486	Blend "B"
DI1487	Blend "B"
DI1488	Blend "C"
DI1489	Blend "C"

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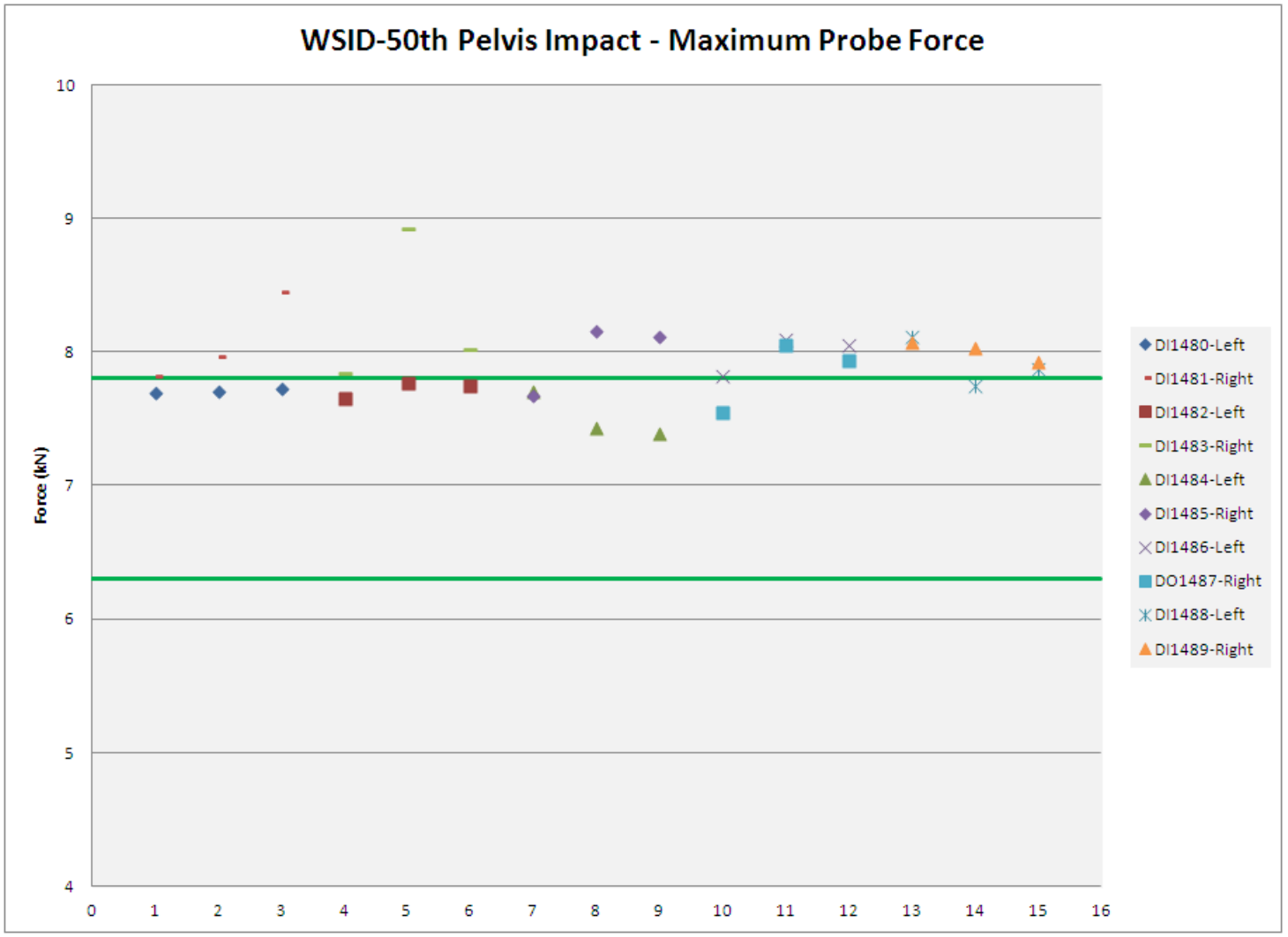
Pelvis Impact Certification Tests



S/N	Polyurethane
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DI1483	Blend "B"
DI1484	Blend "B"
DI1485	Blend "B"
DI1486	Blend "B"
DI1487	Blend "B"
DI1488	Blend "C"
DI1489	Blend "C"

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CONCLUSIONS

- Pelvis Impact certification performance does not differentiate the material blend of the iliac wing.
- Other Key performance factors
  - Hyperlast Pelvis Flesh
  - Lumbar Spine
  - Pubic Buffer
- Hyperlast Flesh needs to be replaced as well
  - Tune Flesh/Iliac components to achieve “System” performance.

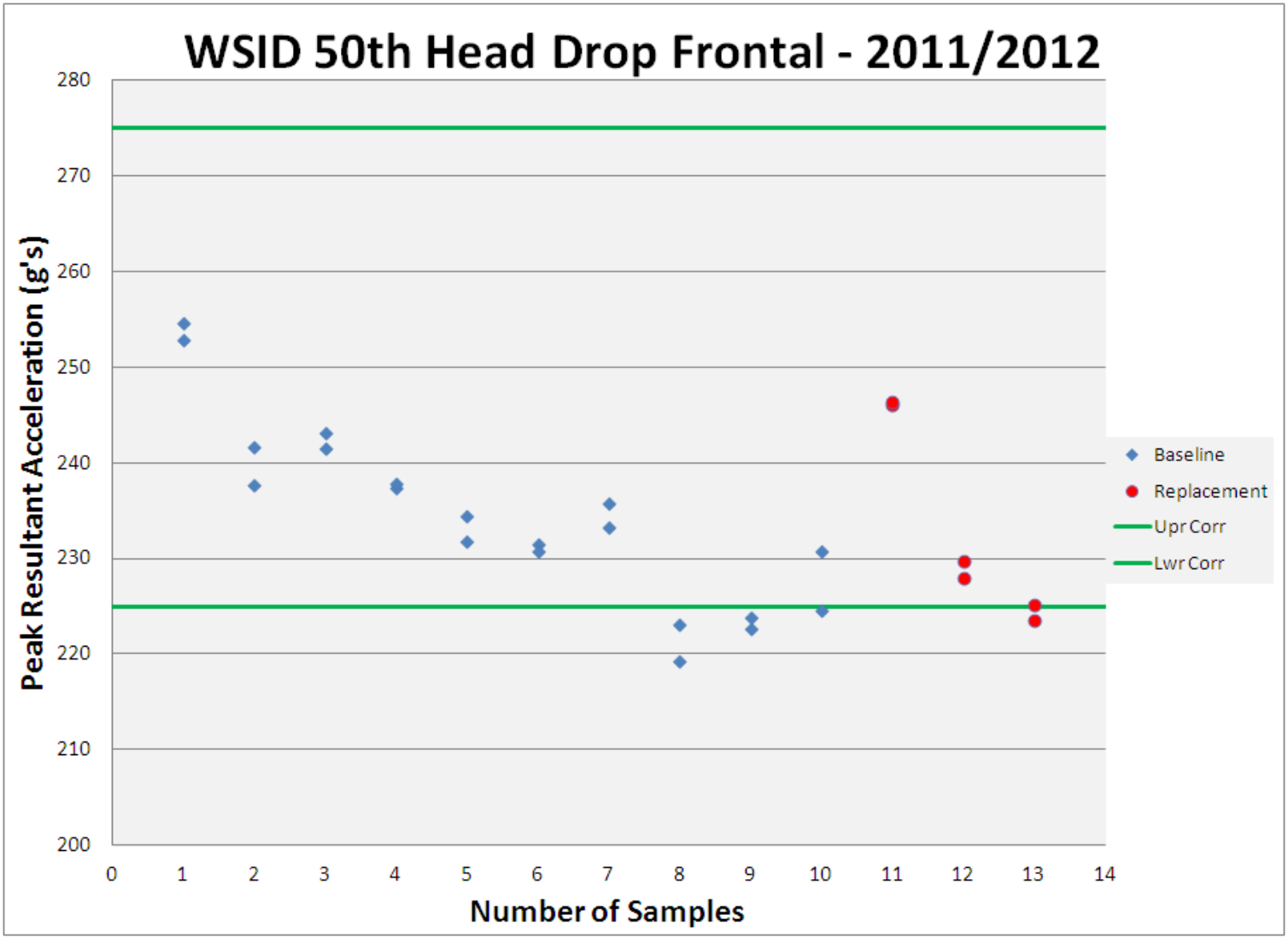
WSID Skull Material Change

- Problem
  - Ureol material no longer available
  - Will run out in coming months
- Action plan
  - Develop equivalent material
    - Develop process with new material
    - Match Ureol at material sample level
    - Static & Dynamic component level tests
  - Final verifications
    - Dummy certification tests
    - Modal frequency tests
    - WorldSID task group trials

WSID Skull Material Status

- Material Testing
  - Evaluate polyurethane samples
    - Pour round pucks and test
  - Make skulls from new material
    - Modal frequency evaluation to determine resonance
  - Pour skull/skin combination and test
    - Head Drop Tests – Lateral and Frontal
- Status
  - Material evaluations continue
  - Review past performance of Ureol heads

WSID 50th Head Drop Testing – Frontal



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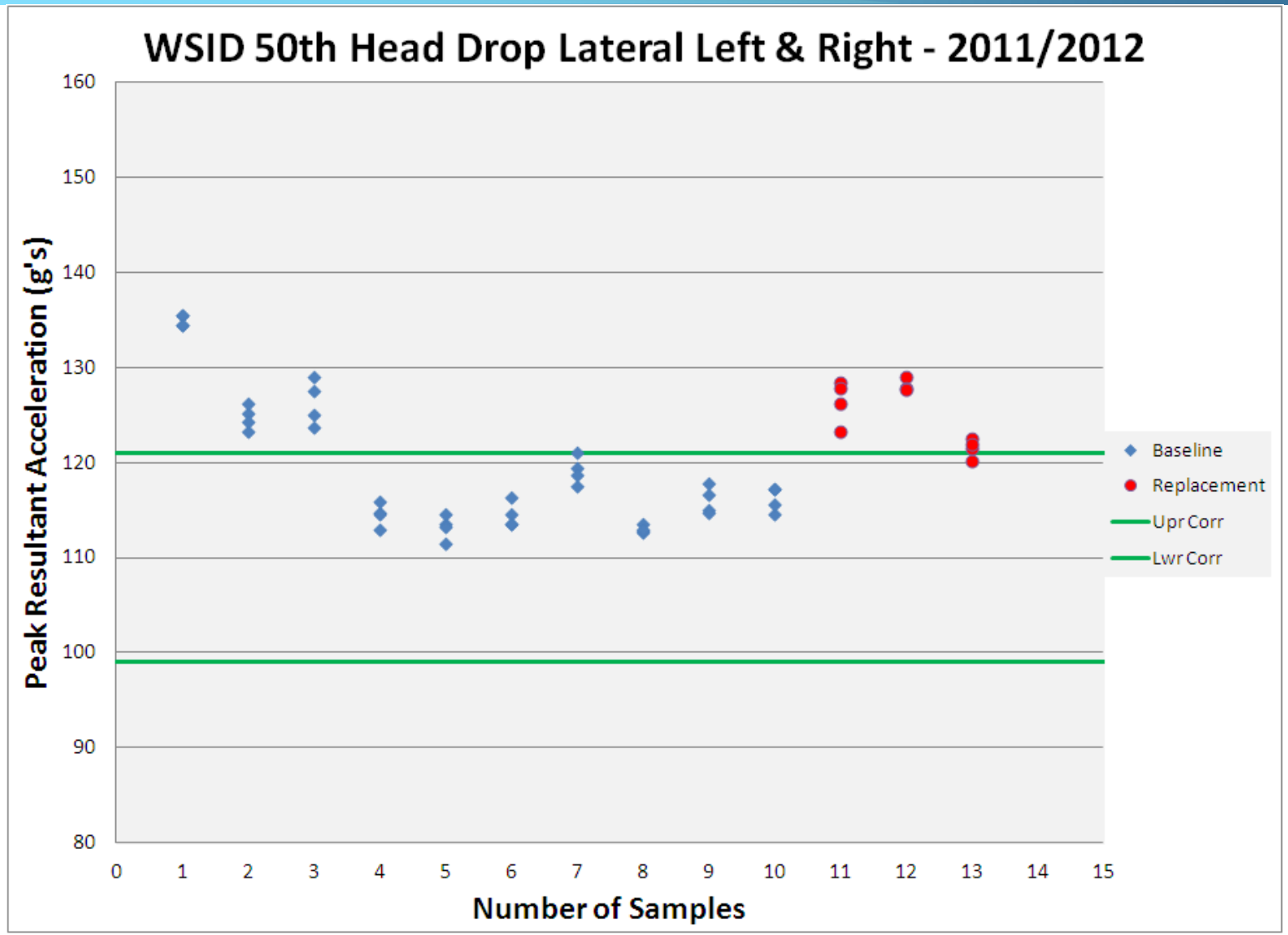
WSID 50th Head Drop Testing - Lateral



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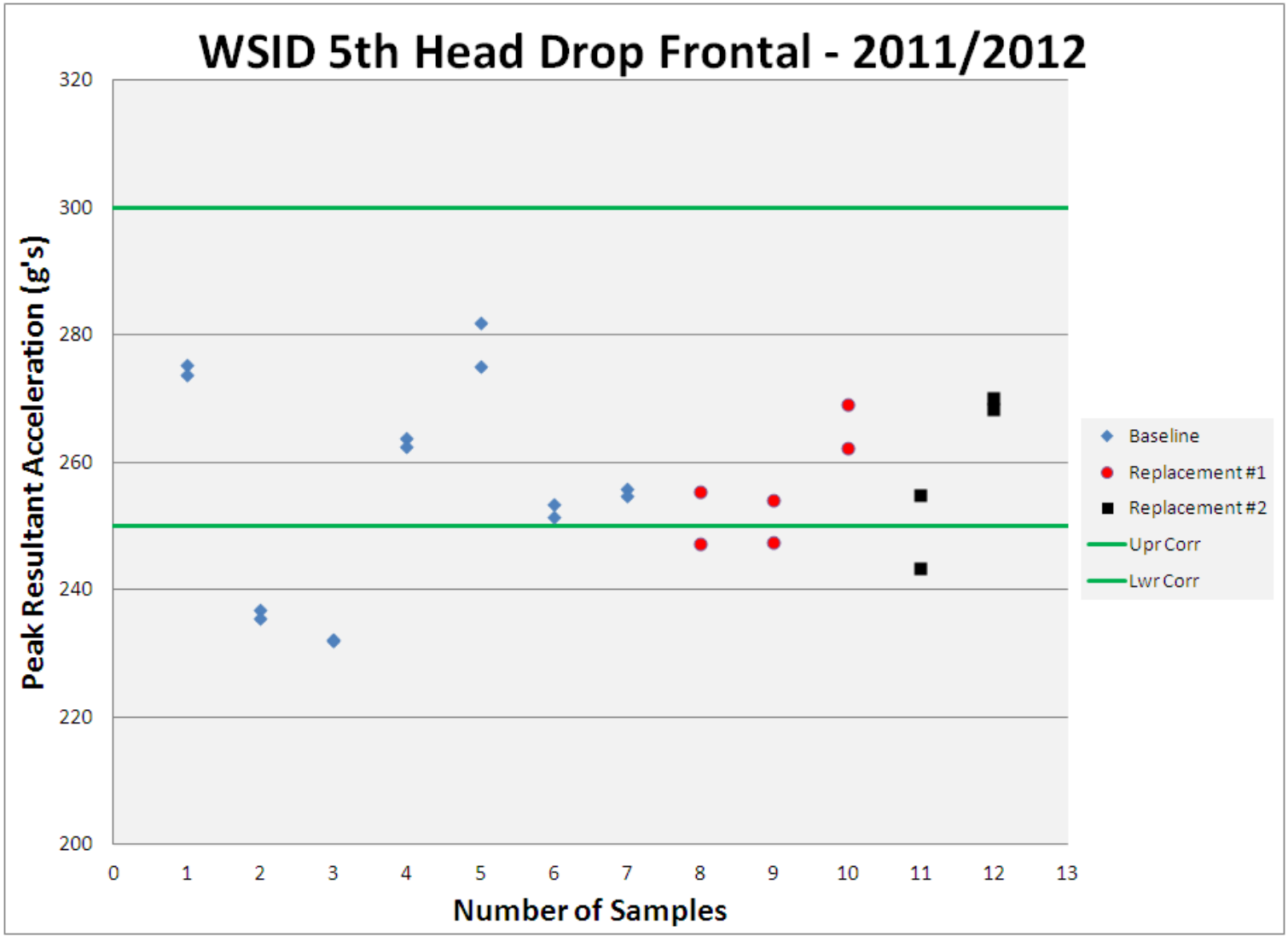
WSID 5th Head Drop Testing – Frontal



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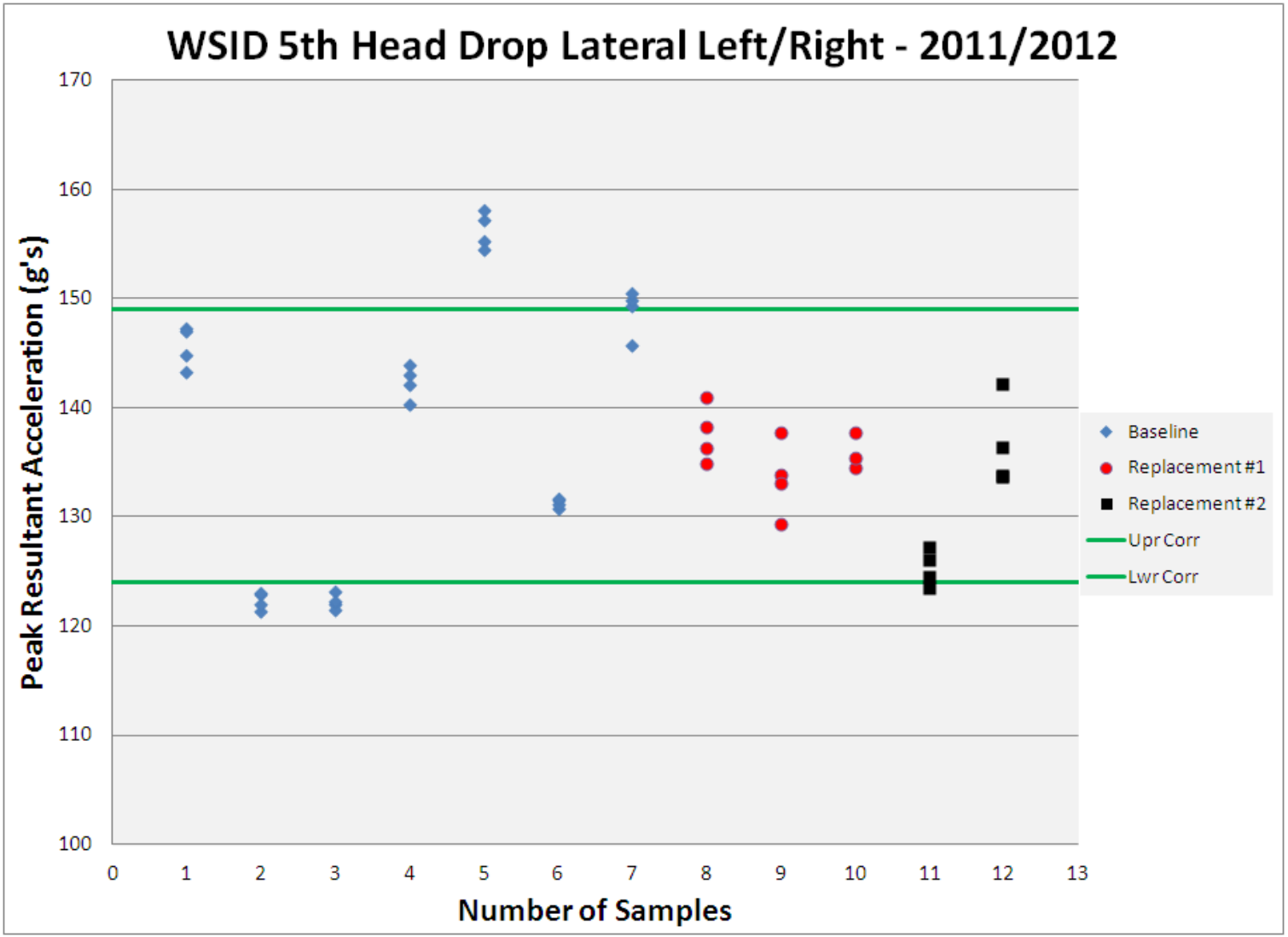
WSID 5th Head Drop Testing - Lateral



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CONCLUSIONS

- A suitable replacement polyurethane has been found for the WSID 50th/5th skulls that closely matches the original Ureol.
- Performance of the WSID 50th/5th Heads have not trended towards the center of the frontal and lateral corridors (historically).
- Additional work is needed to adjust the performance of the WSID 50th/5th Heads to get them nearer the mean of the corridors.
  - Is lateral response a priority over frontal?
- Corridor review will be required.

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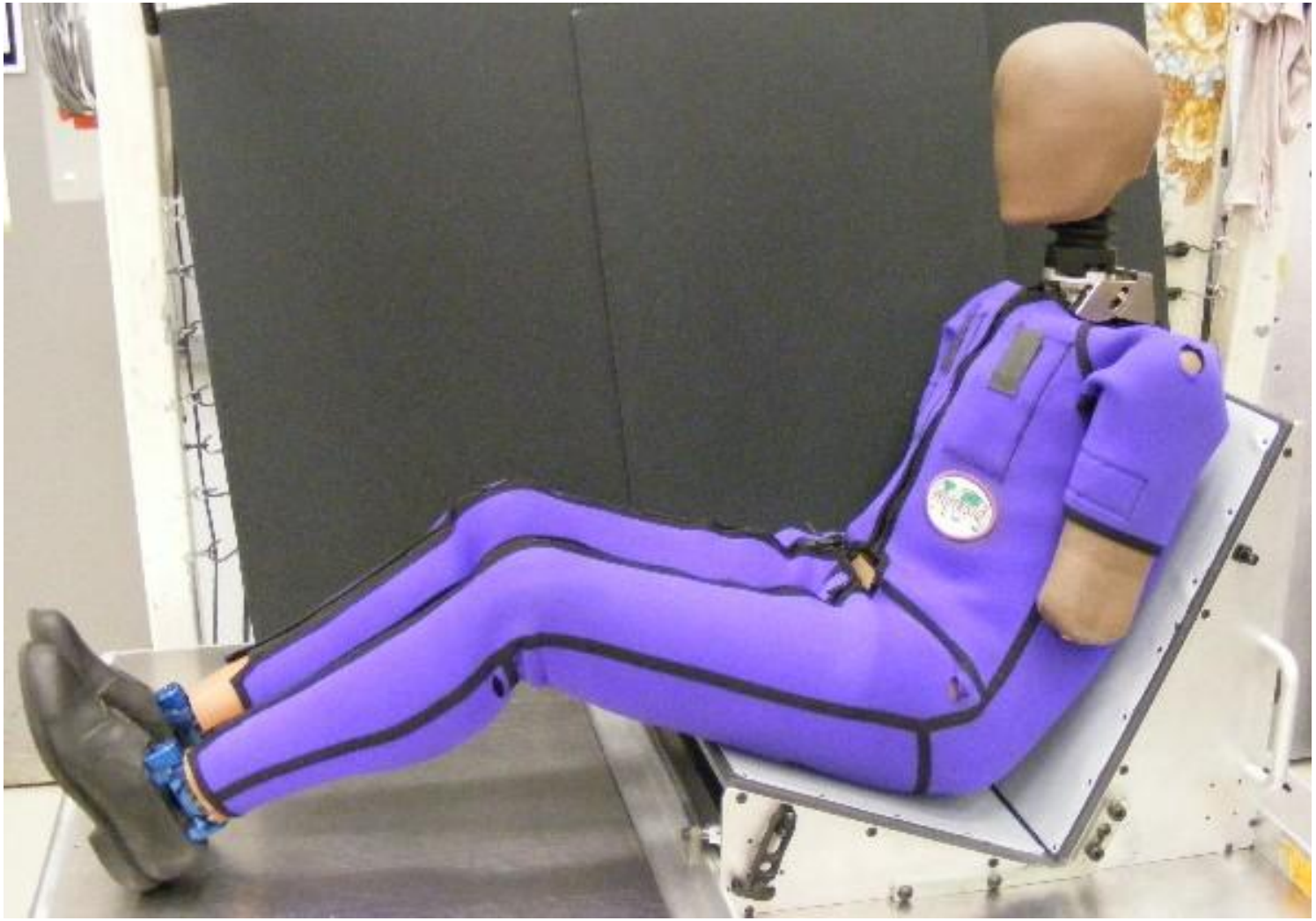
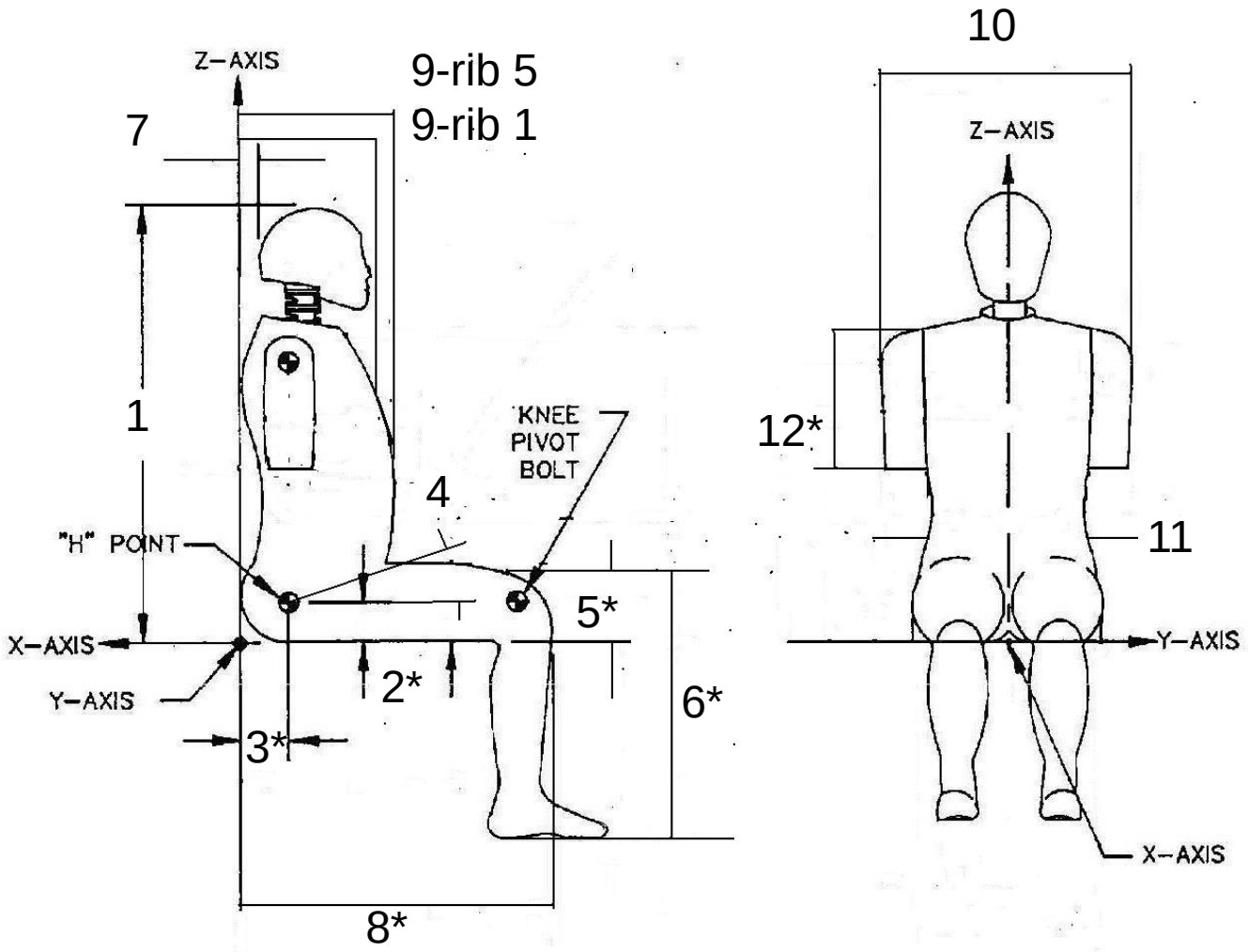
EXTERNAL DIMENSION PROPOSAL

WorldSID-50th on WorldSID test Seat



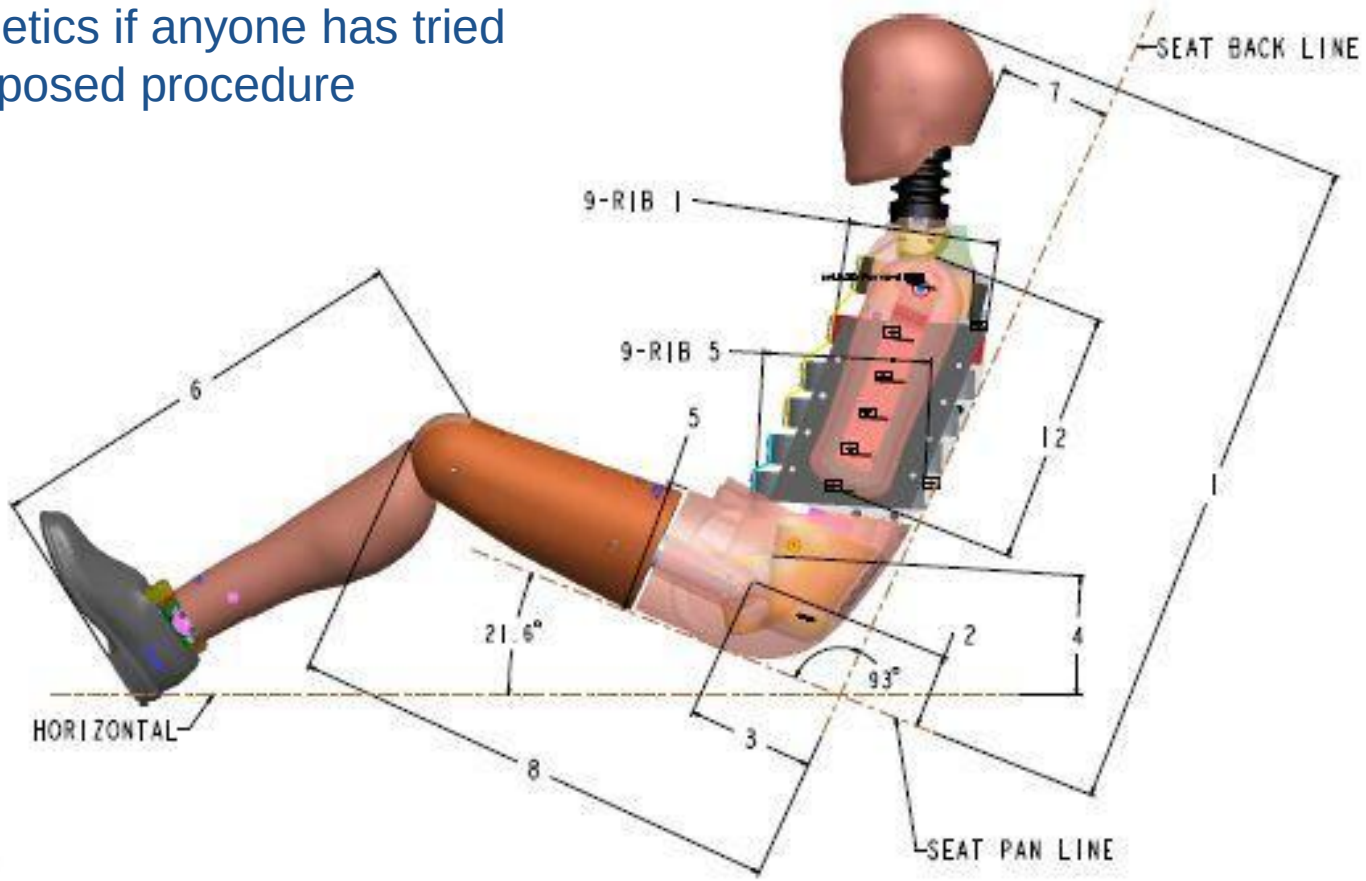
Measurement on Frontal Impact Seat



* Left & Right measurements required

Measurement on WorldSID-50TH

Please provide feedback to Humanetics if anyone has tried the proposed procedure



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THANK YOU

WorldSID ISO Task Force Task List Update

Part	Lead	Description/Action Items	Schedule
Iliac wing material change	Paul D	UREOL 100 is no longer available as of Nov 1, will replace with a Thermoset urethane material. 1. Retested Wings on update dummy, 2. Decide on thermoset formulation with will be used. 3. Make additional sets of wings and perform biofidelity testing in Canada (before end of 2011) 4. Provide a set of wings to PDB & NHTSA for testing	4 - 6 months
Skull material change	Joe B	UREOL 100 is no longer available as of Nov 1, will replace with Rencast 6444 urethane material. 1. Drop testing is complete for both the 50th & 5th heads. 2. Three additional head assemblies will be sent to several task force members to a round robin head drop test series, before final change over to the Rencast material 3. Humanetics will provide modal hammer results at next meeting.	3 - 4 months
Change 50th ankle design to match 5th design	Steve G.	Design complete 1. Task Force gave approval to proceed with new design. 2. Humanetics will build new design and provide to task force for evaluation. 3. Ankle is in process due end Dec 2011	3 – 4 months
Lower rib and pelvis interaction	Mike B	1. Humanetics performed certification testing with the rib in different positions relative to top of pelvis flesh. 2. Need to determine if Task Force will develop a sled test series to understand the issue better. 4. If a change is requested, a new pelvis may be required, along with running Bio testing, cert testing, etc….	3 – 4 months to determine change required 3- 4 months depending on type of changed required
Small Female iliac wing	Joe B	Same as 50th Results	5-7 months

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WorldSID ISO Task Force Task List Update

Part	Lead	Description/Status	Schedule
Shoulder IRTRACC design revision	Kurt B	1. Humanetics has created a proposal	
Grey areas for DAS	Joe B	NHTSA measuring MMI effects on different DAS configuration on 50th dummy. 1. NHTSA will provide final report to PDB for modeling of different MMI to determine effect on performance	In Progress
Jacket update	Joe B	Increasing the hole size is recommended for jackets. 1. Will increase hole in jacket and provide to Task Force for review 2. Current Hpt hole is to low, appears seam is over hole and will need to have a pattern change Humanetics will work with jacket vendor to determine how pattern can be revised. 3. Prototype jacket is on order	1 – 2 months
Lift Device updates	Kurt B	1. Updated designed created, similar to small female	1 – 2 months
External Dimension procedures	Steve G	1. Humanetics to provide procedures for Task Force review	4 weeks
Tilt Sensors	Steve G	Compare tilt sensors to dummy positions 1. Humanetics will position dummy on fixture and compare tilt sensor to hard seat angles	3 weeks
Pubic load cell wires	Kurt B	1. Humanetics has reviewed the improved design used in Q10 and determine how to adapt to worldsid	1 month

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