

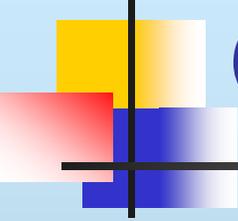
Side Impact Crash Testing with the 50th Percentile Male WorldSID



May 13, 2008

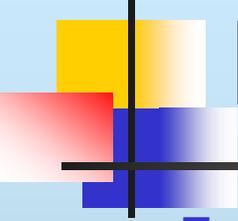
Allison Loudon

NHTSA



Outline

- Background
- WorldSID Information
- Test Details
- Test Results
- Observations
- Future Research



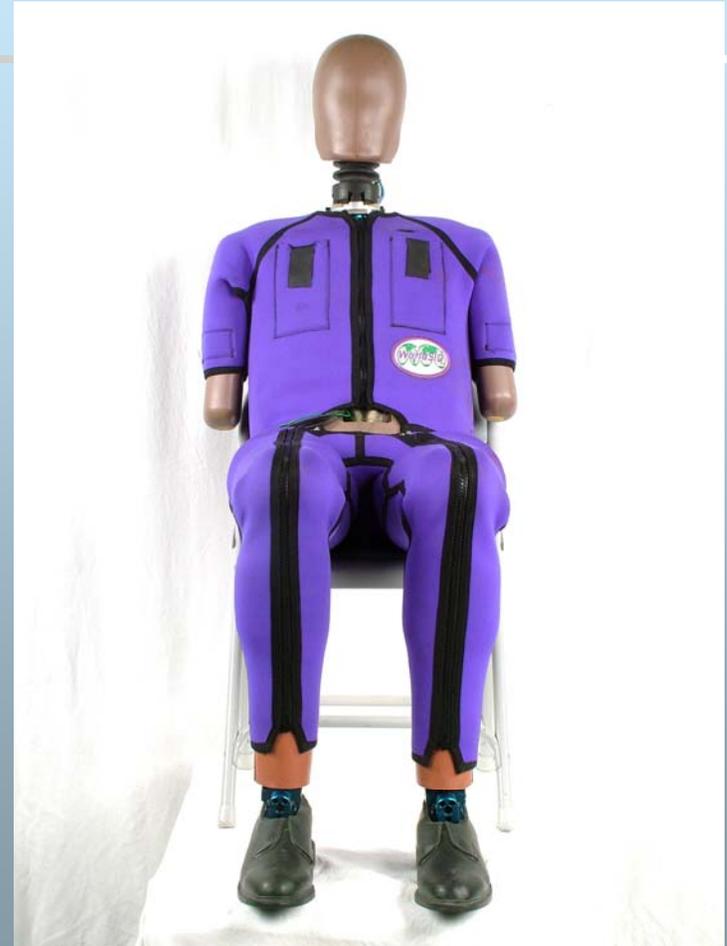
Background

- FMVSS 214 final rule released in September 2007
- Updated the dummies and test configurations
 - Added ES2re (50th male) and SIDIIIs (5th female)
 - 20 mph oblique pole and MDB test configurations
- NHTSA states it will begin evaluations with the WorldSID dummy
- Dynamic pole tests have been conducted in 2007 and 2008 with the same fleet vehicles used to evaluate the ES2re.

50th Percentile Male WorldSID

Dummy

- Development of dummy began in 1997
- Made available in 2004
- Represents a mid-sized adult male occupant
- More measurement capabilities (up to 200 channels)
 - IRTRAC rib (5) and shoulder deflections
 - Rotational head accels
 - Onboard data acq.



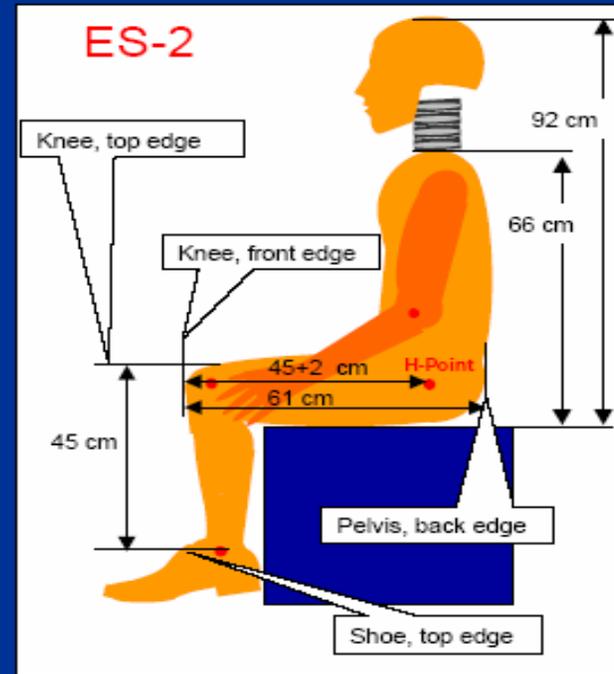
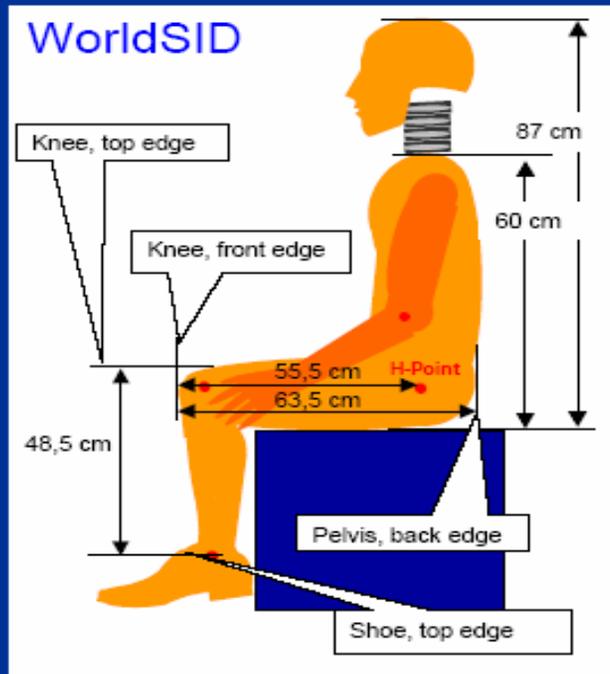
Comparison of ES2, WorldSID, and SID/H3



	WorldSID	ES2	SID/H3
	mm	mm	mm
Shoulder width	480	485	473
Thorax width (nipple)	371	337	NA
Pelvis width	410	355	372
Sitting height (neck/torso interface)	600	660	NA
Sitting height (erect)	870	920	919

Comparison of WorldSID and ES2

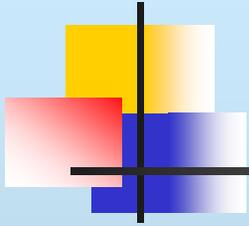
Erect Seating Posture



Hartlieb, Siebert, Reichelt

WorldSID TG Meeting, San Diego, 2003-10-20

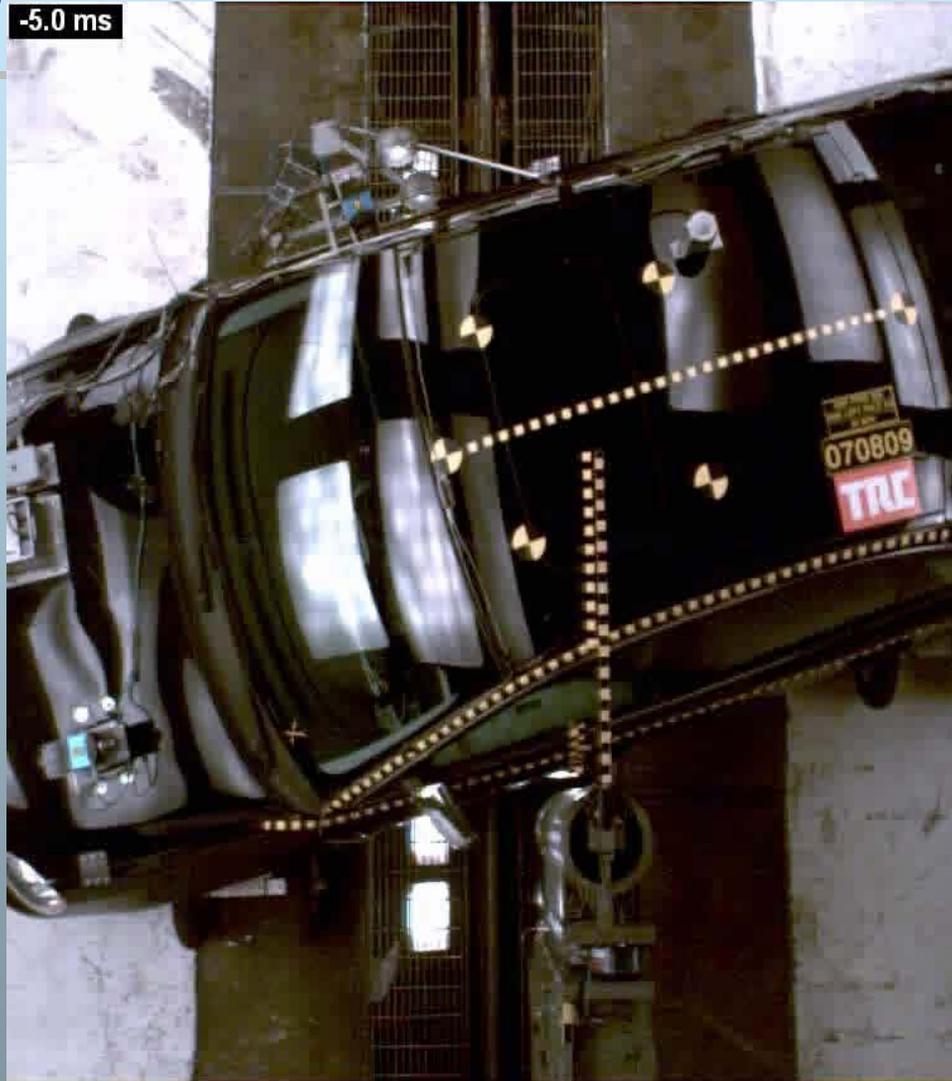
14



Test Setup

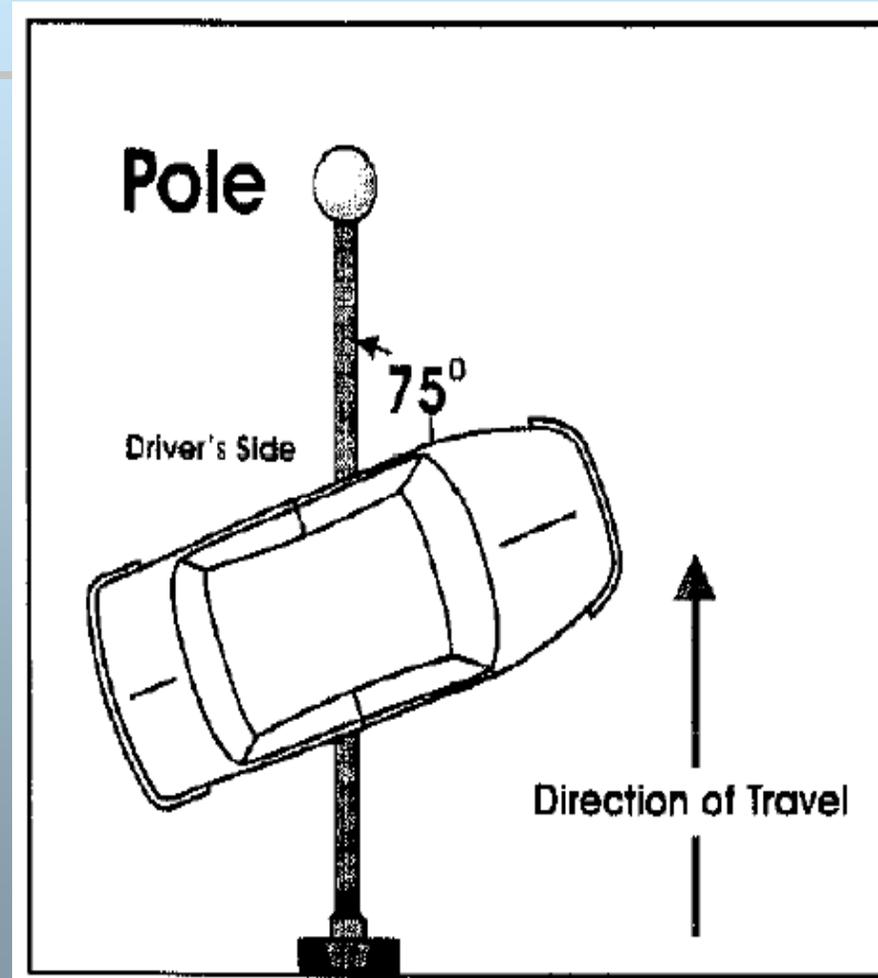
Test Vehicles

- 2004 Honda Accord
- 2005 Subaru Forester
- 2006 Toyota Sienna
- 2005 Ford 500
- 2006 VW Jetta
- 2005 Saturn Ion
- 2005 Ford Expedition
- 2005 VW Beetle Convertible



Test Setup

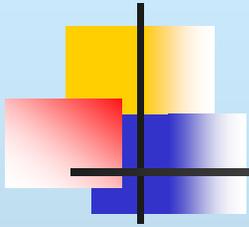
- Used draft WS seating procedure V. 1.0. with minor adjustments
- Aligned vehicle at 75 degrees
- Aligned head CG with the centerline of pole
- Test Speed: 32kph
- Dummy instrumented with 3 G5 units (~90 channels)



Seating Procedure

WorldSID Seating Procedure Draft 1.0

- Placed seat according to current FMVSS 214 procedure for 50th Male (S8.3.1 and S10.3.1)
 - At rearmost position find mid angle of cushion, keeping mid angle, adjust to lowest position, move seat to midtrack
 - Oscar the seat at this position
- Began with step #20 of seating procedure
 - “Draft Test Procedure V.1.0”, 6/6/06 [xyz](#)
- Adjusted dummy using the tilt sensors
 - Head, thorax and pelvis were adjusted to $0\pm 2^\circ$



Test Results

Test Results

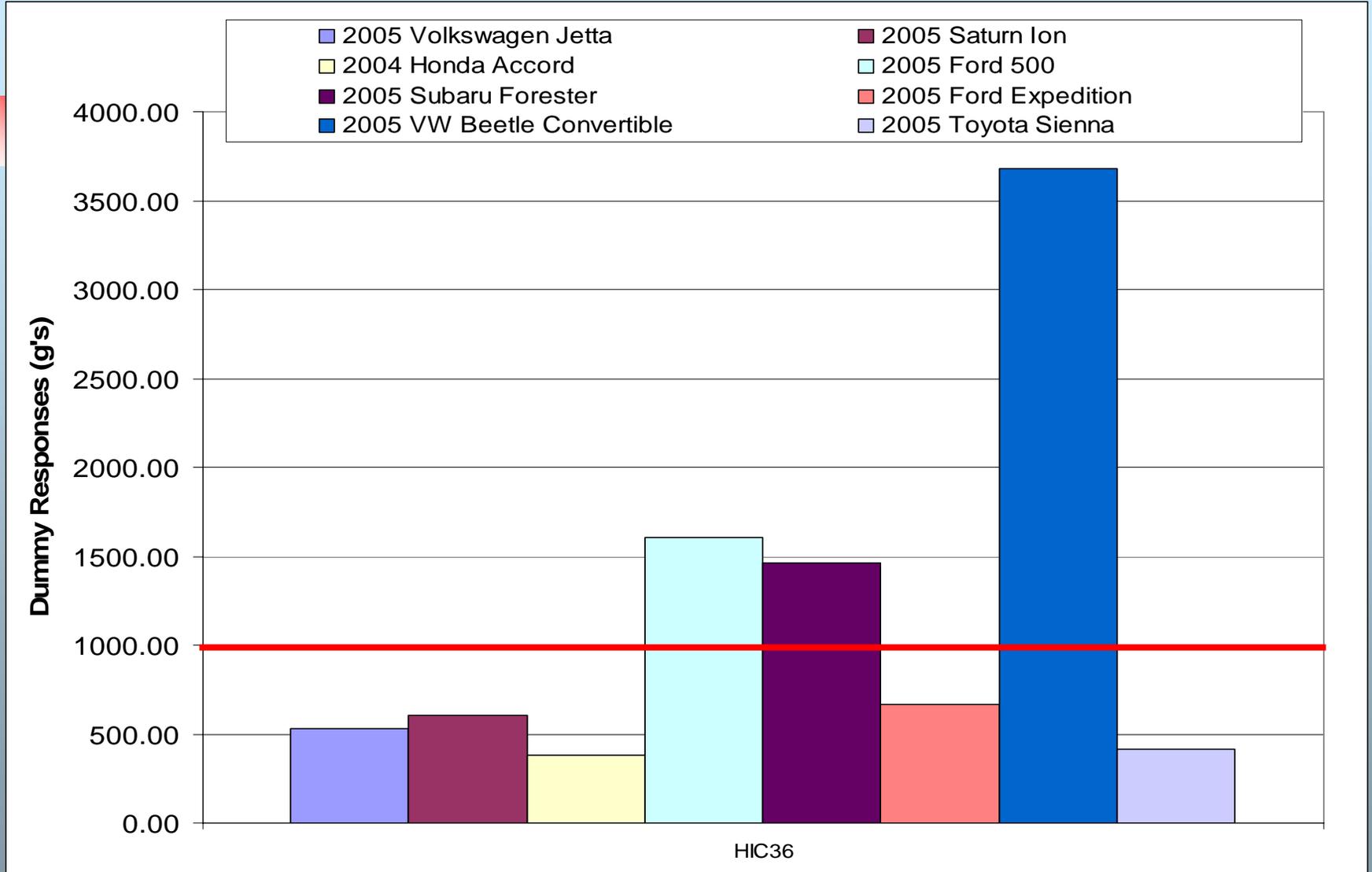
Vehicles	HIC36	Thorax Def	Abdomen Def	Lower Spine (G's)	Pubic Force (N)	Pelvis Result. Accel.
2006 VW Jetta (C+T)	528	48.1	49.9	63.3	1001.9	56.6
2005 Saturn Ion (C)	612	49.0	70.1	79.8	1263.9	68.1
2005 Honda Accord (C+T)	380	26.2	28.8	51.7	1304.5	53.0
2005 Ford 500 (C+T)	1609	62.4	65.7	82.0	1208.6	66.0
2005 Subaru Forester (Combo)	1463	60.8	36.6	79.3	1227.4	77.0
2006 Toyota Sienna (C+T)	418	38.0	52.3	67.9	1085.3	62.3
2005 VW Beetle Convertible (Combo)	3680	44.2	24.7	69.2	1127.3	80.6
2005 Ford Expedition (C)	665	36.3	70.9	76.6	1269.9	85.9

Currently there are not IARV's associated with WorldSID.

Government Industry Meeting – May 2008



HIC36

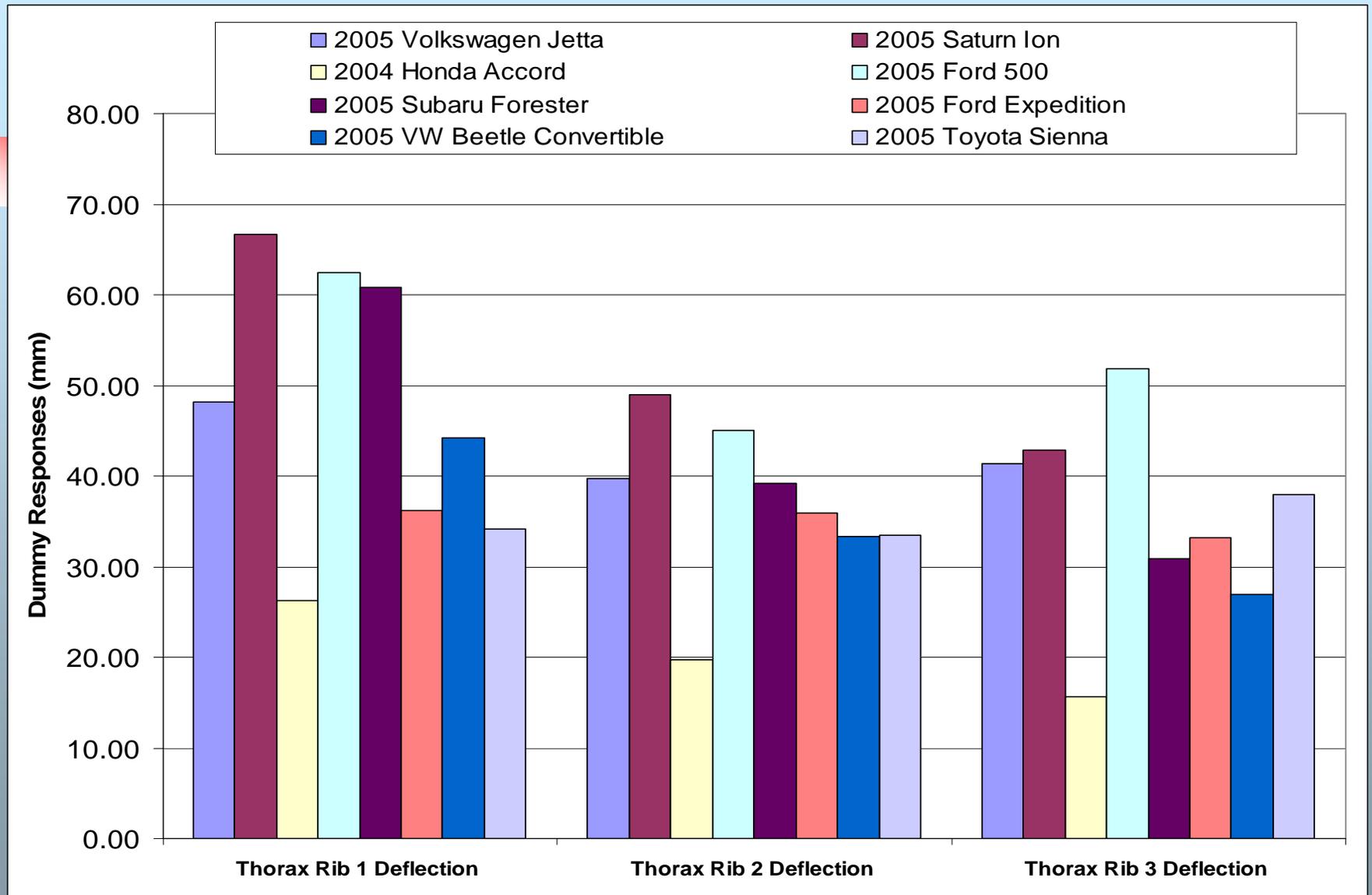


WorldSID

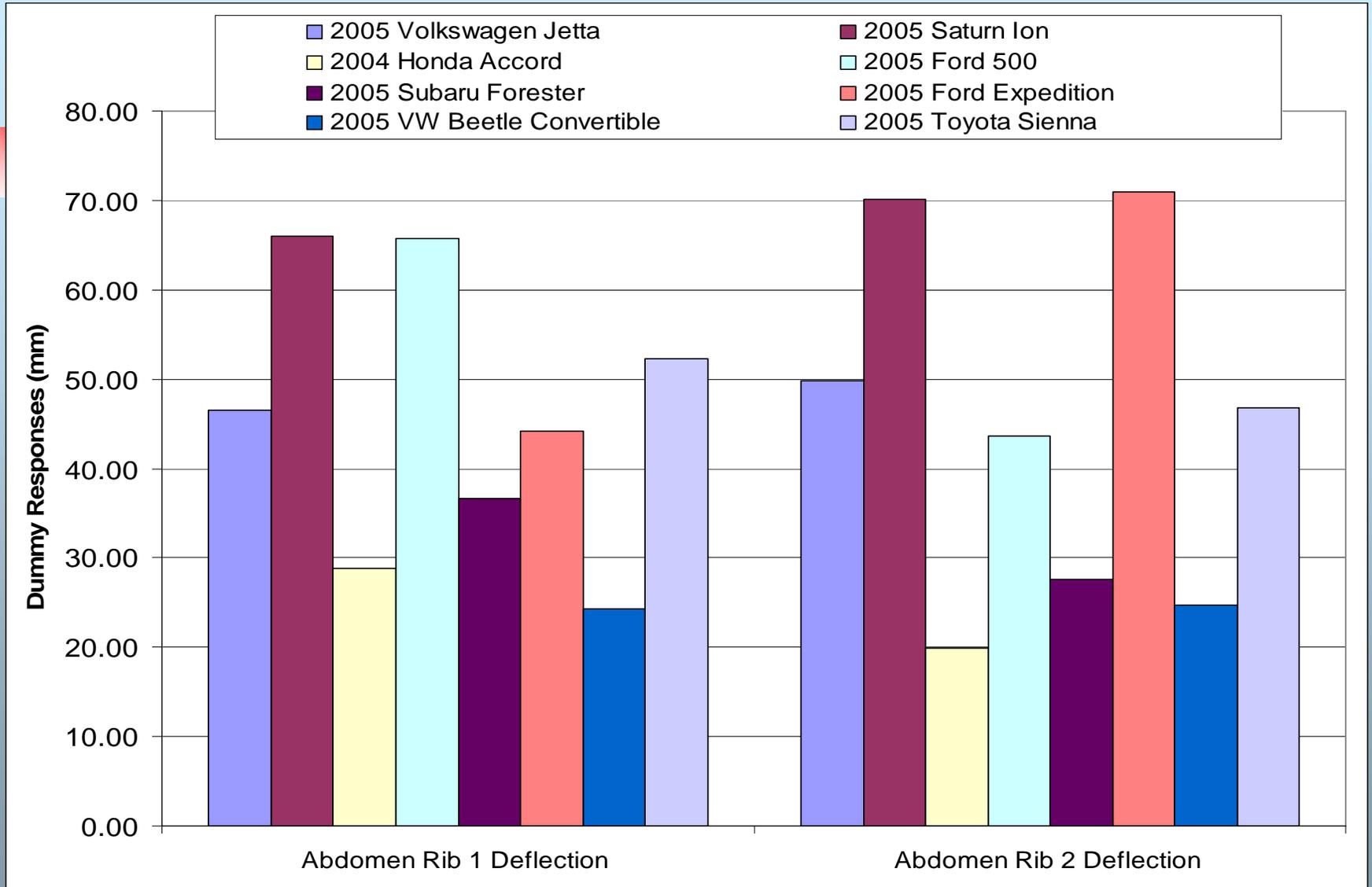
VW Beetle and Toyota Sienna



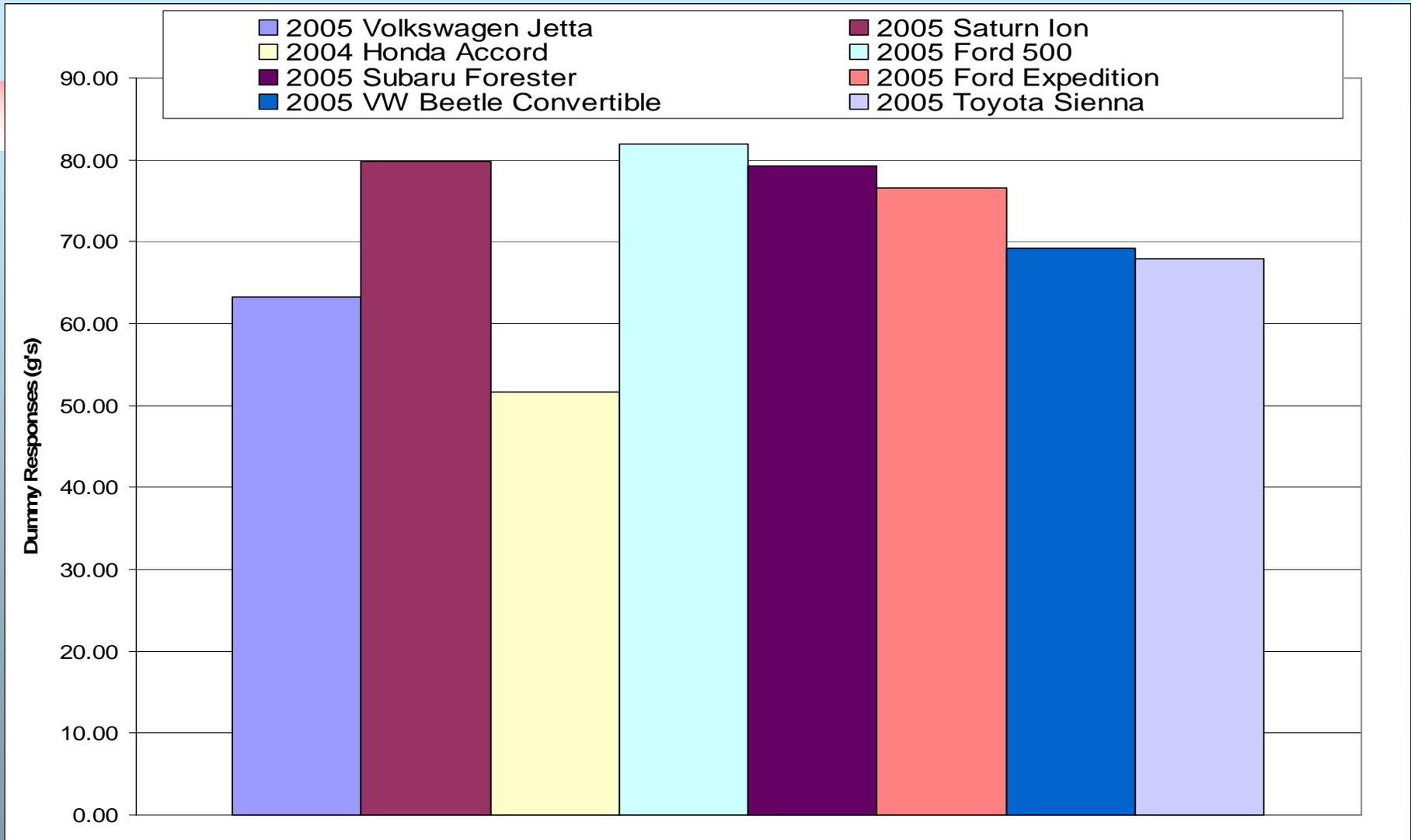
Thorax Deflections



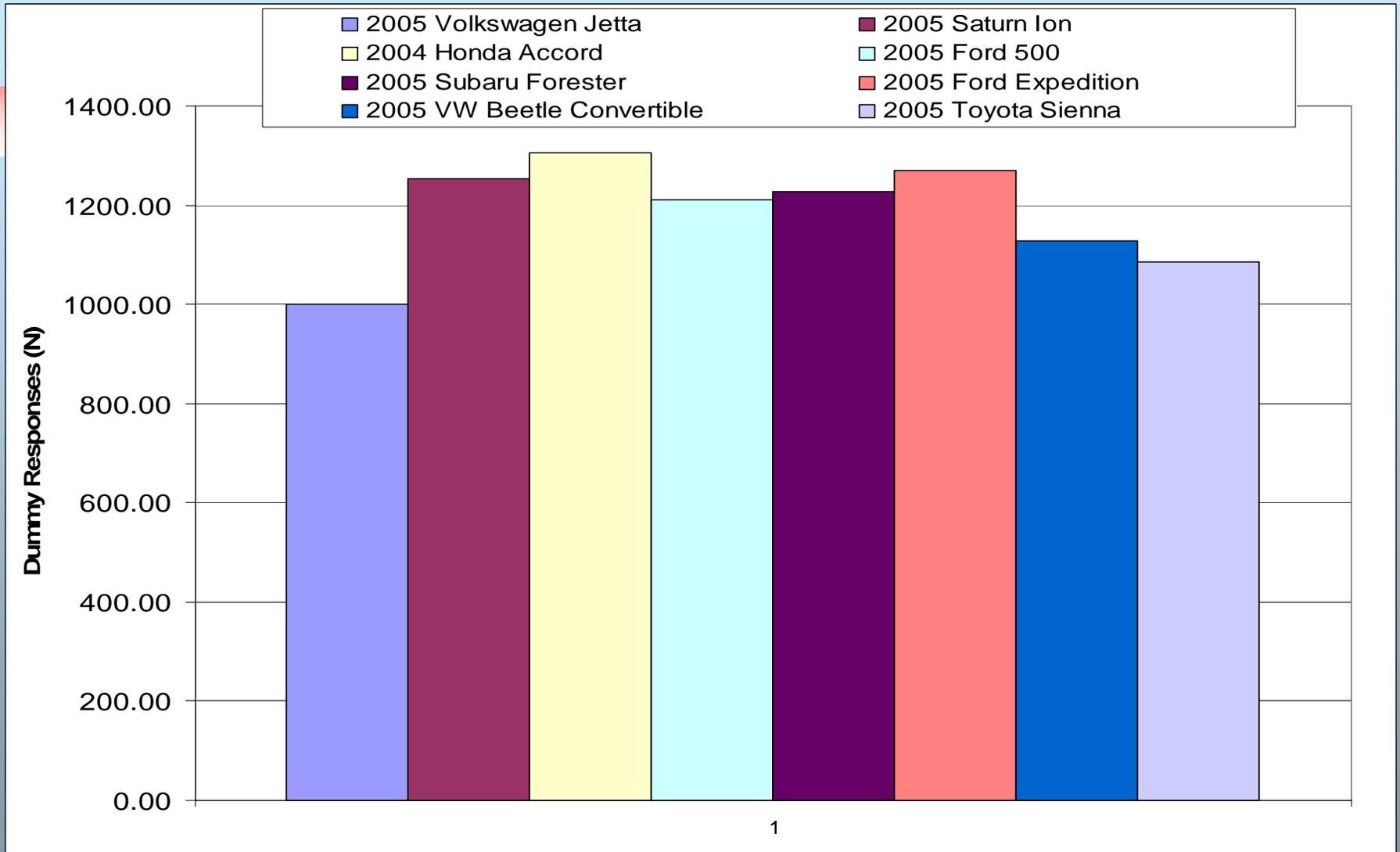
Abdomen Deflections



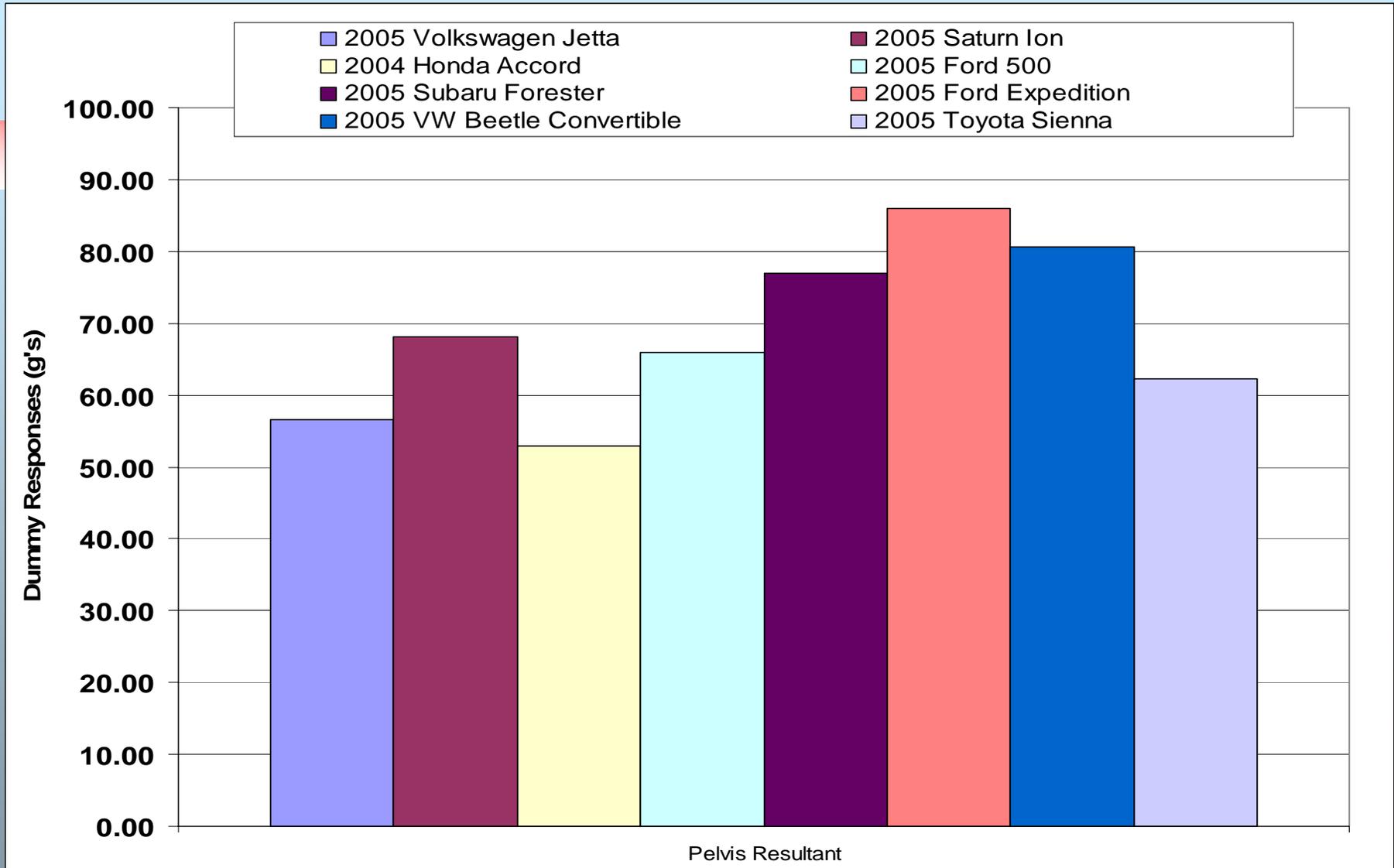
Lower Spine Resultant Accelerations (T12)

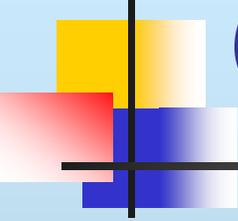


Pubic Symphysis Force



Pelvis Resultant Acceleration

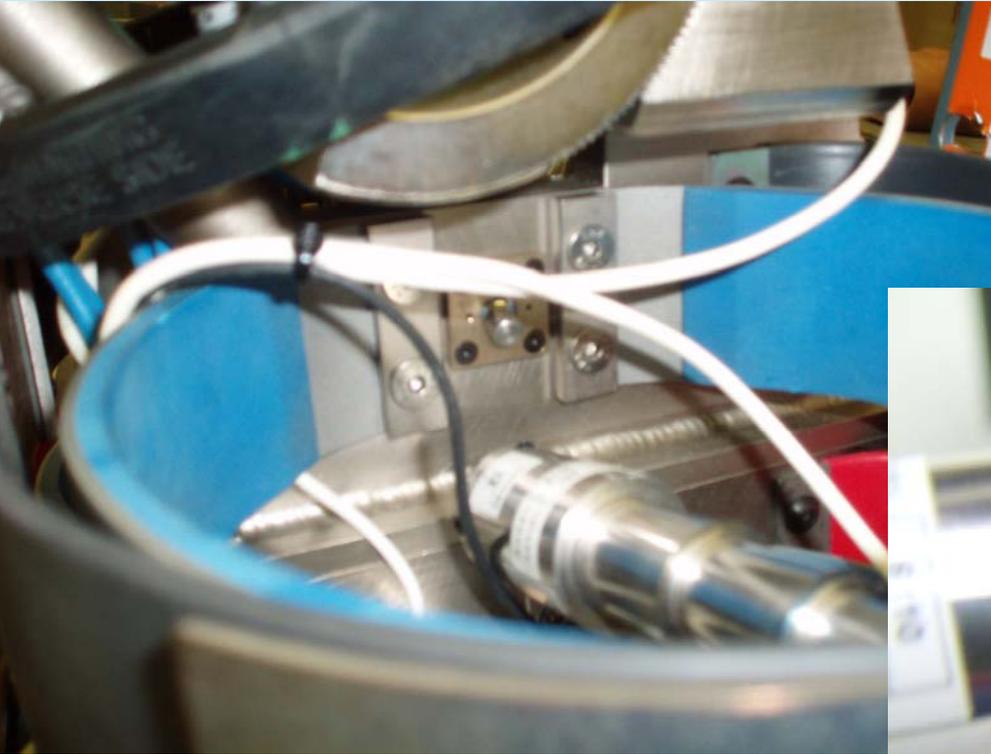




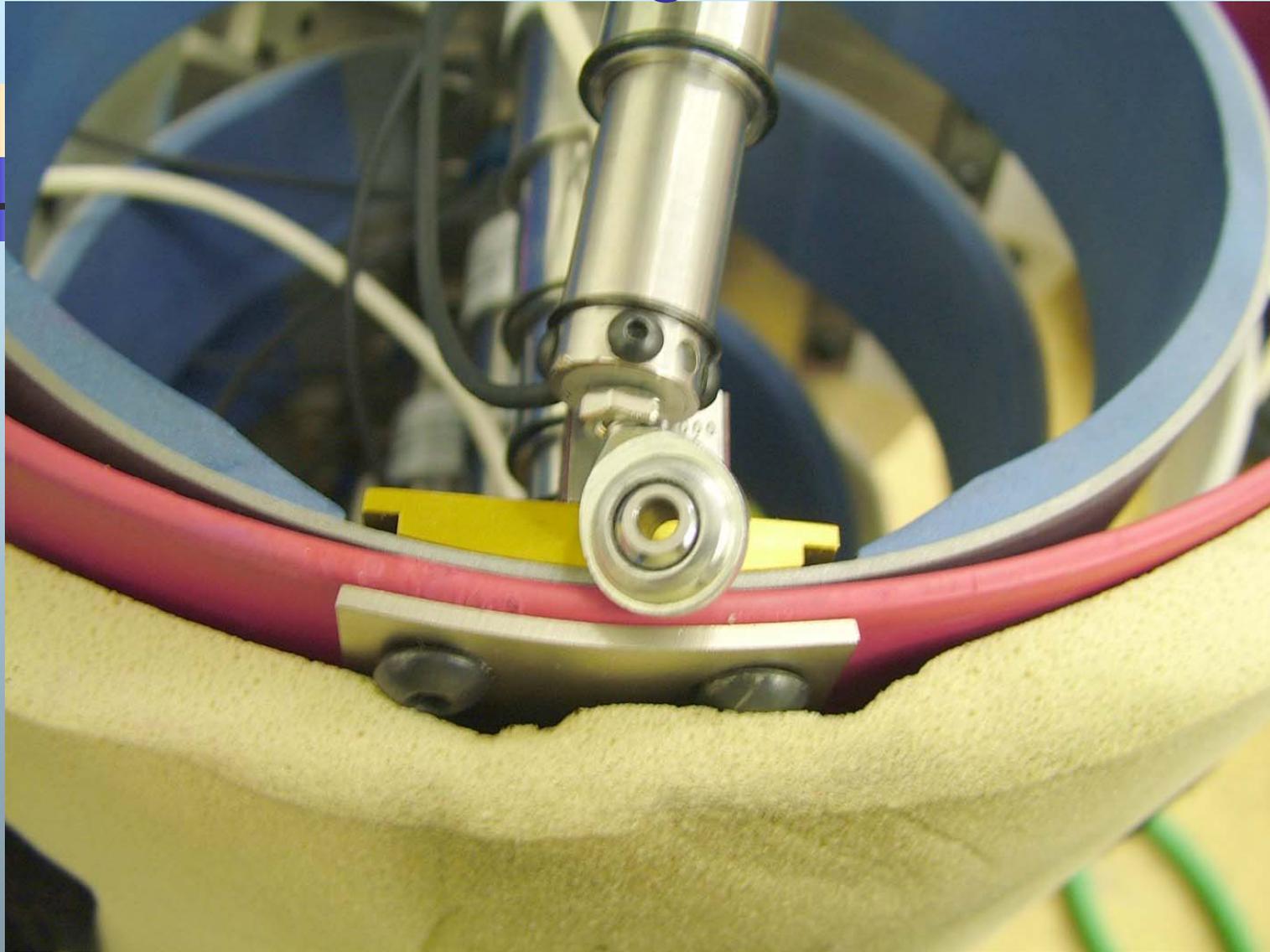
Observations

- Overall dummy durability and dummy responses were good
 - Minor damage
 - IRTRAC
 - Rib delamination
 - Deflection responses
 - Head position

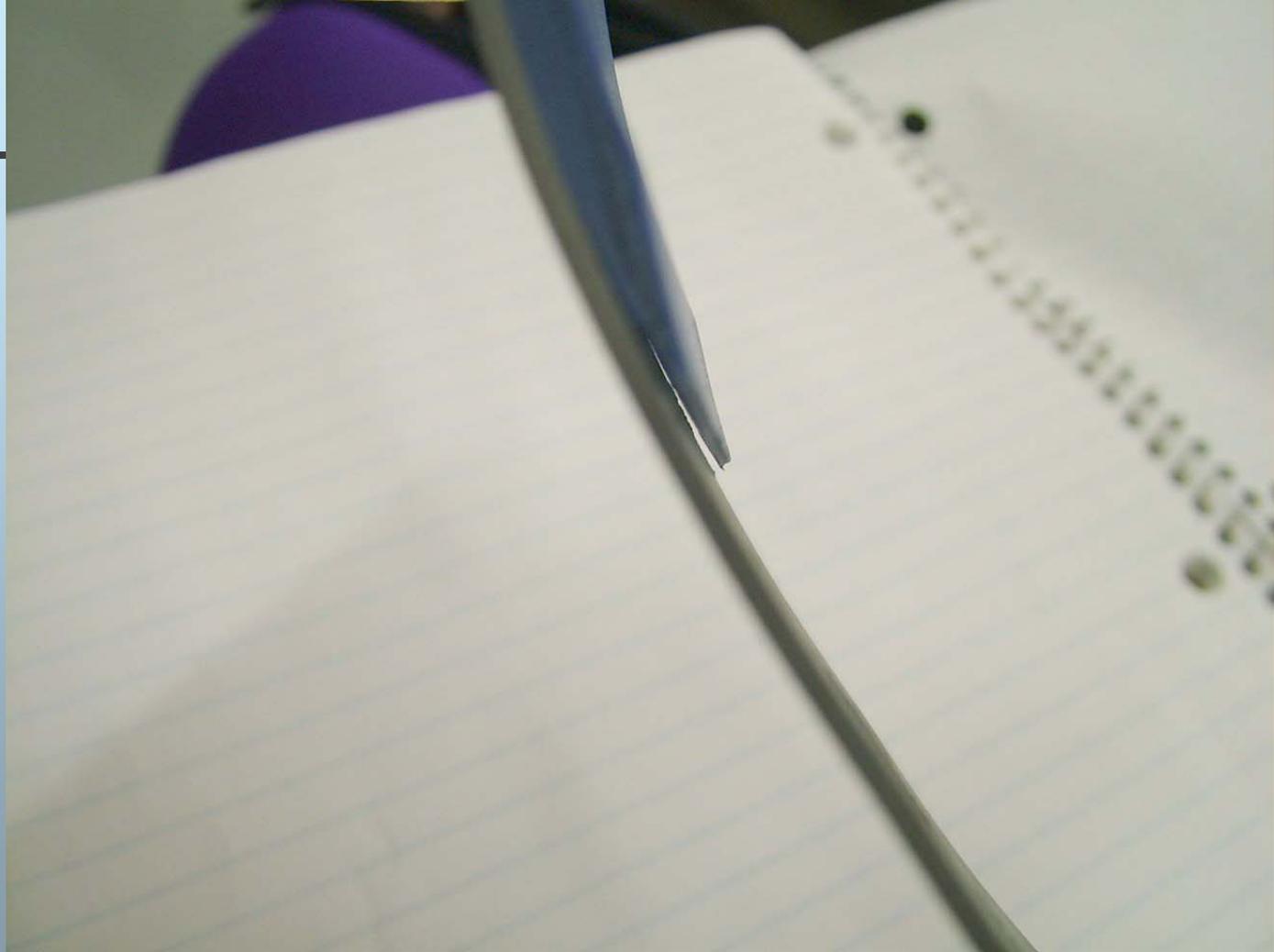
IRTRAC Damage



IRTRAC Damage



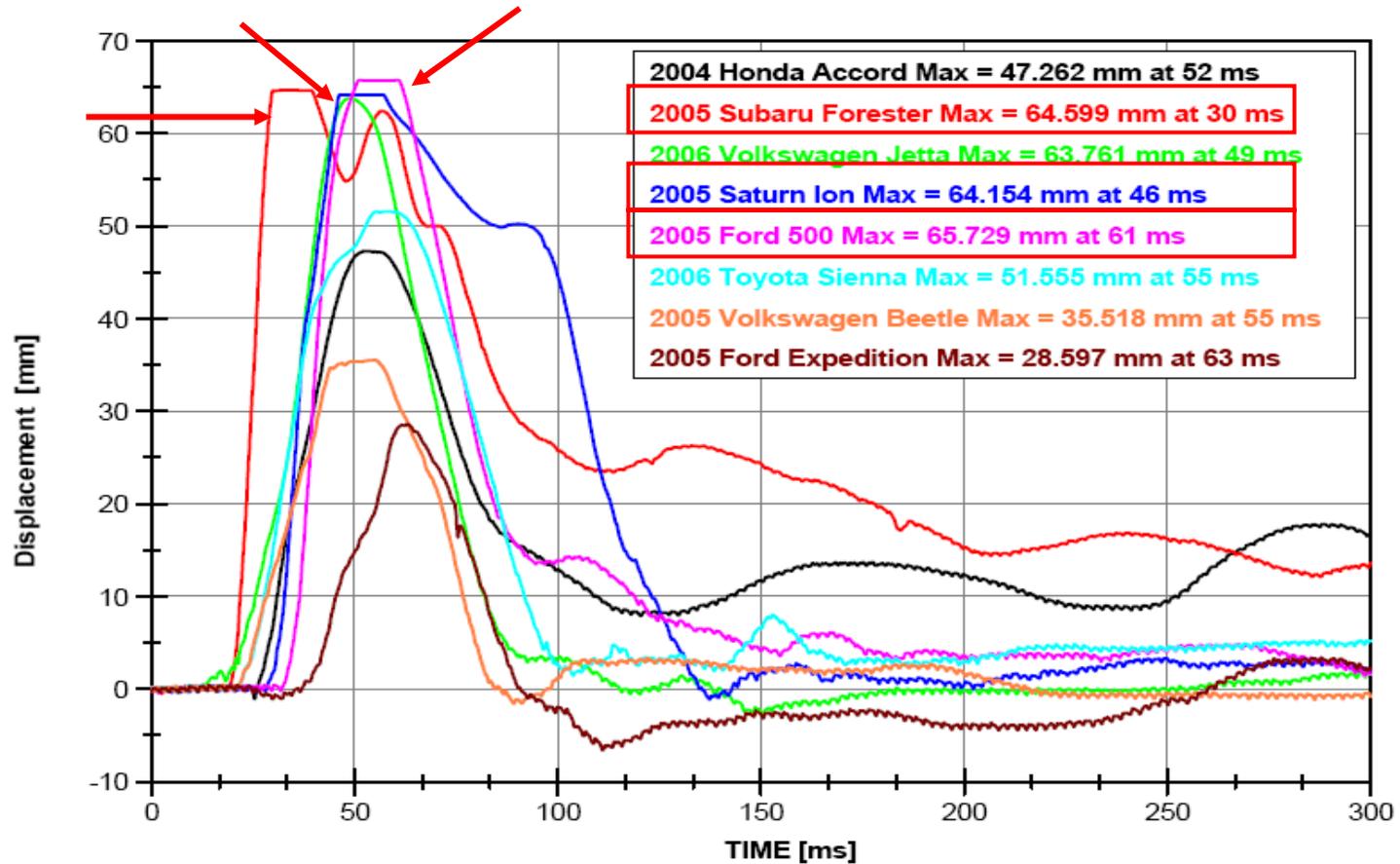
Shoulder rib delaminating



Deflection reached maximum?

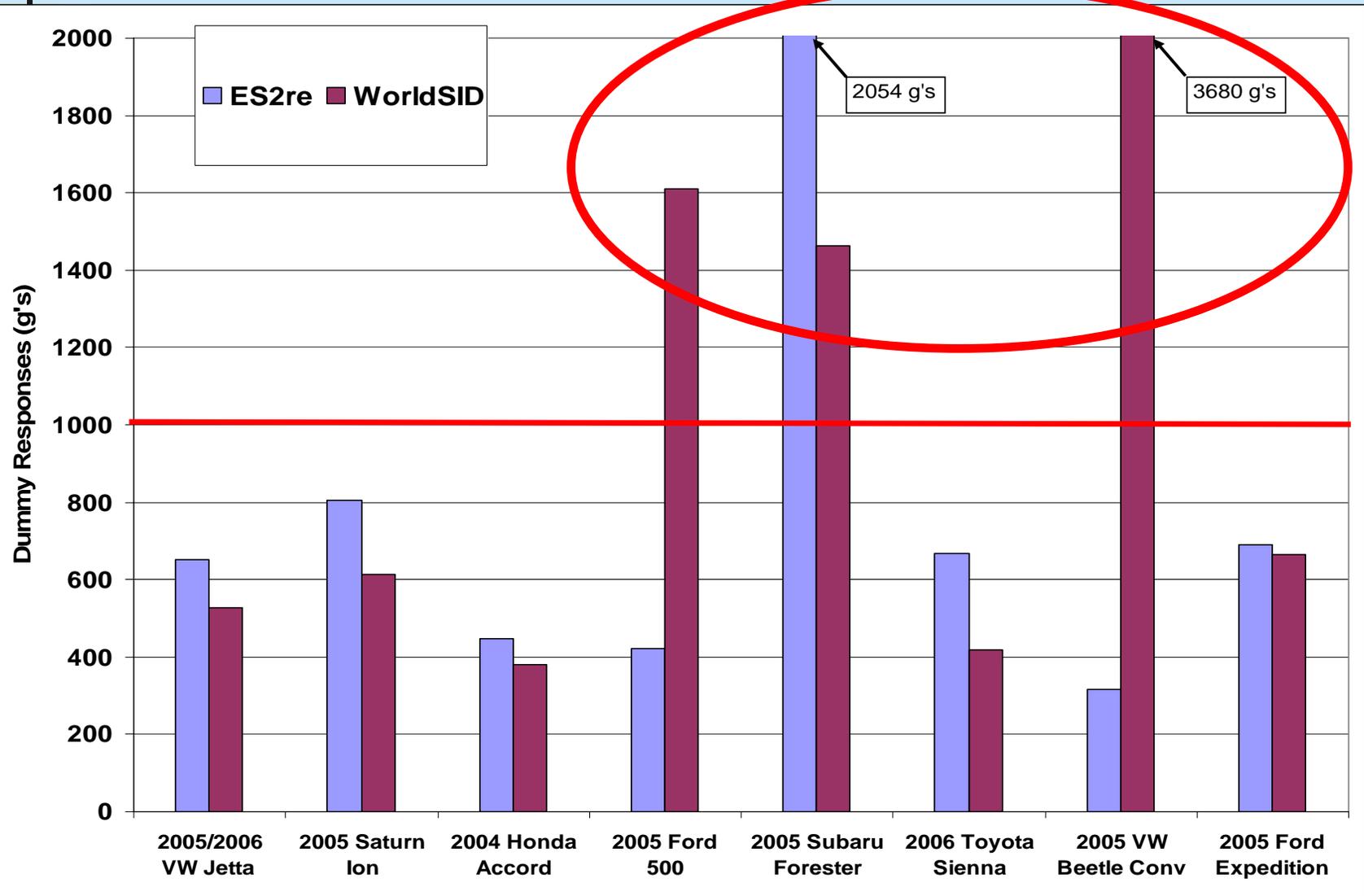


Shoulder Y-Axis Displacement



ES2re vs WorldSID

HIC 36



Why different?

Possible answers

- Ford 500-
 - Possible Sensor issue- airbags deployed at different times
 - WorldSID test- air bag deployed later in the event (22ms vs 37ms)
 - WorldSID sits differently in the seat
- VW Beetle and Subaru Forester-
 - Combination head and thorax bags
 - bags did not get between head and pole

2005 Ford 500

Minor differences in seating



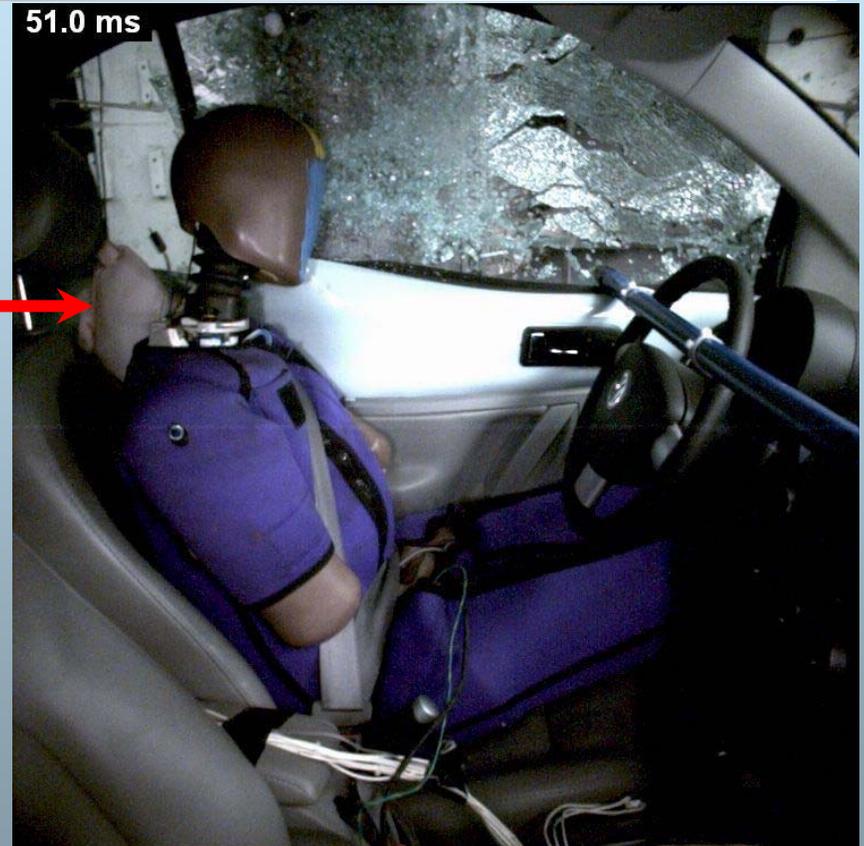
ES2re

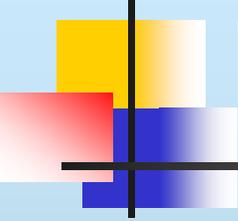


WorldSID

2005 VW Beetle

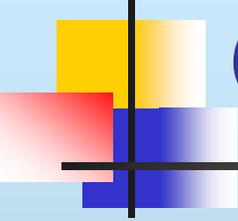
Airbag inflation issue





Future NHTSA Research

- FMVSS 214 MDB tests with 2 WorldSID 50th male dummies
- Analyze data and compare with the ES2re dummy
- Bio-Mechanics Group:
 - R&R testing
 - Biofidelity testing
- Begin evaluation of the 5th female WorldSID dummy



Questions?

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