



WorldSID 50th Update

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on behalf of the WorldSID Task Group

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Transmitted by  expert from ISO

Outline

- ▶ Retrospective
- ▶ NHTSA - WorldSID Evaluation
- ▶ Biofidelity Comparison
- ▶ Ongoing Activities
- ▶ Further Activities
- ▶ Side Impact Dummy Family
- ▶ Summary

Retrospective

- ▶ **Last WorldSID Update at 37th session in May 2005**
- ▶ **Release of WorldSID 50th production version on March 9th, 2004**
 - **Developed by over 45 organizations from around the world**
 - **Governmental agencies, research institutes, automotive manufacturers**
 - **Full vehicle tests covering all side impact test procedures**
 - **Extensive sled-, component- and certification test series**
- ▶ **Fully evaluated in more than 1000 tests worldwide**
 - **WorldSID meets the ISO specifications**
- ▶ **WorldSID International Standard - ISO 15830**
 - **Documentation available since 2005**

NHTSA - WorldSID Evaluation

- ▶ Two instrumented WorldSID 50th provided by OSRP in 2004
- ▶ Tests focused on:
 - Biofidelity
 - Repeatability
 - Reproducibility
 - Durability
 - Handling
- ▶ Finalization of the evaluation test series mid of 2008
- ▶ Tests are being conducted at VRTC laboratory

NHTSA - WorldSID Evaluation

▶ Rib Damping Material:

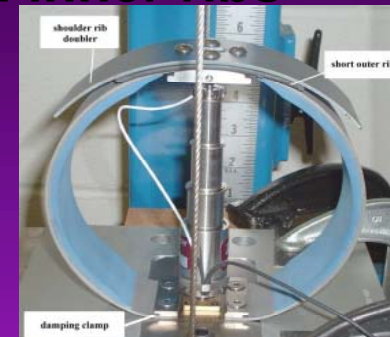
- **May 2005 - Dummy manufacturer was unable to produce ribs due to adhesion problem with new batch of damping material**
- **Problem required switching vendors for new damping material**
- **New damping material adhere to ribs and provided same calibration results**
- **February 06 - Ribs being manufactured**

NHTSA - WorldSID Evaluation

► Durability problems observed during testing

● Cracking of the damping material observed on inner ribs

- Required changing shape of damping material
- Duration: February - September 06



● Observed pelvis bone to DAS box contact in high severe loading conditions

- Exchange the DAS box with the smaller battery box on the non-stuck side of the spine box
- Duration: September 06 - February 07



► Common problem solving by NHTSA/VRTC and WorldSID Task Group

NHTSA - WorldSID Evaluation

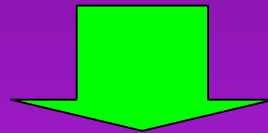
▶ ISO contribution:

- Demonstrate that new damping material and pelvis change have not affected the biofidelity
- Biofidelity pendulum tests and body drop tests were conducted by Transport Canada
- One instrumented WorldSID 50th tested on the sled at Ford in parallel for comparison purposes
- Data also compared to NHTSA to ensure similar dummy performance

NHTSA - WorldSID Evaluation

▶ NHTSA evaluation results:

- Good repeatability
- Good reproducibility
- Good durability
- Good handling
- Good biofidelity rating according ISO TR9790



Biofidelity = 7.2 → "GOOD"

NHTSA - WorldSID Evaluation

► NHTSA results compared with Ford results

NHTSA

Body Test No. & Test Description	Test Weighting, Vi,j	Test Biofidelity
Head Test 1 200 mm Rigid Drop	8	10,0
Head Test 2 1200 mm Padded Drop	4	N. M.
Head Biofidelity, B1		10,0
Neck Test 1 7.2 G Sled Impact	7	7,7
Neck Test 2 6.7 G Sled Impact	6	2,0
Neck Test 3 12.2 G Sled Impact	3	7,8
Neck Biofidelity, B2		5,5
Shoulder Test 1 4.5 m/s Pendulum	6	10,0
Shoulder Test 2 7.2 G Sled Impact	5	10,0
Shoulder Test 3 12.2 G Sled Impact	3	10,0
Shoulder Test 4 8.9 m/s Padded Sled	7	5,0
Shoulder Biofidelity, B3		8,3
Thorax Test 1 4.3 m/s Pendulum	9	6,9
Thorax Test 2 6.7 m/s Pendulum	9	10,0
Thorax Test 3 1.0 m Rigid Drop	6	8,3
Thorax Test 4 2.0 m Padded Drop	5	N. M.
Thorax Test 5 6.8 m/s Rigid Sled	7	6,9
Thorax Test 6 8.9 m/s Padded Sled	7	5,0
Thorax Biofidelity, B4		7,5
Abdomen Test 1 1.0 m Rigid Drop	7	9,0
Abdomen Test 2 2.0 m Rigid Drop	6	N. M.
Abdomen Test 3 6.8 m/s Rigid Sled	3	8,3
Abdomen Test 4 8.9 m/s Rigid Sled	3	0,0
Abdomen Test 5 8.9 m/s Padded Sled	7	5,0
Abdomen Biofidelity, B5		7,3
Pelvis Test 1 6.0 m/s Pendulum Impact	8	10,0
Pelvis Test 2 10.0 m/s Pendulum Impact	9	5,0
Pelvis Test 3 0.5 m Rigid Drop	4	5,0
Pelvis Test 4 1.0 m Rigid Drop	4	0,0
Pelvis Test 5 2.0 m Padded Drop	3	N. M.
Pelvis Test 6 3.0 m Padded Drop	5	N. M.
Pelvis Test 7 6.8 m/s Rigid Sled	8	4,4
Pelvis Test 8 8.9 m/s Rigid Sled	7	0,0
Pelvis Test 9 8.9 m/s Padded Sled	8	N. M.
Pelvis Test 10 6.8 m/s Rigid Sled	3	2,2
Pelvis Test 11 8.9 m/s Rigid Sled	3	0,0
Pelvis Test 12 8.9 m/s 15 psi Padded Sled	3	
Pelvis Test 13 8.9 m/s 23 psi Padded Sled	7	
Pelvis Biofidelity		7.2
N.M. = Not Measured		
WorldSID With Blue Ribs Overall Biofidelity, VRTC Data		

Ford

Body Test No. & Test Description	Test Weighting, Vi,j	Test Biofidelity
Head Test 1 200 mm Rigid Drop	8	10,0
Head Test 2 1200 mm Padded Drop	4	N. M.
Head Biofidelity, B1		10,0
Neck Test 1 7.2 G Sled Impact	7	7,7
Neck Test 2 6.7 G Sled Impact	6	2,0
Neck Test 3 12.2 G Sled Impact	3	7,8
Neck Biofidelity, B2		5,5
Shoulder Test 1 4.5 m/s Pendulum	6	10,0
Shoulder Test 2 7.2 G Sled Impact	5	10,0
Shoulder Test 3 12.2 G Sled Impact	3	10,0
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Pelvis Test 12 8.9 m/s 15 psi Padded Sled	3	
Pelvis Test 13 8.9 m/s 23 psi Padded Sled	7	
Pelvis Biofidelity		7.1
N.M. = Not Measured		
WorldSID With Blue Ribs Overall Biofidelity, Ford Data		



Biofidelity Comparison



Body Region	SID	ES-2	ES-2re	WorldSID Ford	WorldSID NHTSA/VRTC
Head	0	5	5	10	10
Neck	2.5	4.4	4.2	5.5	5.5
Shoulder	0	5.3	4.5	8.3	8.3
Thorax	3.1	5.8	4.0	7.4	7.5
Abdomen	4.4	2.7	4.1	7.5	7.3
Pelvis	2.5	5.2	3.2	4.4	4.8
Overall	2.3	4.7	4.2	7.1	7.2

WorldSID achieves the best biofidelity rating (ISO TR9790) compared with existing mid male side impact dummies

Transmitted by the expert from ISO

Ongoing Activities

- ▶ Full vehicle crash tests at NHTSA
 - **Evaluation of the WorldSID 50th under real world crash conditions**
 - **Completion expected by mid of 2008**

- ▶ APROSYS SP1.1 - EC Research Program
 - **Side Impact / Compatibility - (IHRA Test Procedure)**
 - Use of WorldSID 50th male dummy in AEMDB tests to evaluate proposed test methods
 - **Next steps**
 - Continue test program with WorldSID 5th female (being developed under APROSYS SP5.2)

Further Activities

- ▶ ISO TR12350 “Road vehicles - Injury risk curves to evaluate occupant protection in side impact” will be updated with new NHTSA sled test data
- ▶ Update of ISO 15830 documentation, to reflect change to damping material and pelvis, expected to be available in 2008

Side Impact Dummy Family

- ▶ Used and proposed regulatory side impact dummies

50th Percentile (Male)
ES-2 / ES-2re



5th Percentile (Female)
SID-IIs



- ▶ Marginal to good biofidelity rating
- ▶ Differences in
 - Design
 - Sensor location
 - Kinematics
 - Dummy response

Side Impact Dummy Family

- ▶ Future regulatory side impact dummy family (?)

50th Percentile (Male)
WorldSID



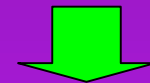
Production version

5th Percentile (Female)
WorldSID



Prototype

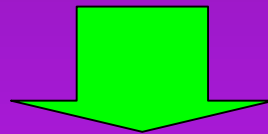
- ▶ Good biofidelity rating
- ▶ Same design
- ▶ Comparability in
 - Sensor location
 - Kinematics
 - Dummy response



**Advantage for occupant
side impact protection
development**

Summary

- ▶ WorldSID 50th side impact dummy development is completed
- ▶ Completion of the NHTSA evaluation expected by mid of 2008
- ▶ APROSYS SP1.1 is using the WorldSID to evaluate new test methods
- ▶ Side impact dummy family consisting of same design would have an advantage for occupant side impact protection development
- ▶ WorldSID 50th biofidelity rating according ISO TR9790 exceeds by far that of existing mid male side impact dummies



WorldSID 50th - best available tool to develop side impact protection for vehicle occupants



Thank you !

www.worldsid.org

