

**Informal Working Group Meeting for Side Impact WorldSID Dummies
5th Meeting
Brussels, Belgium, March 2, 2011**

Draft Summary Report

1. Welcome and Introductions

The chairperson, Mrs. Susan Meyerson, opened the meeting and welcomed everyone. Informal group delegates and representatives were introduced. A completed list of attendees is listed in Section 6.

2. Approval of Agenda

The agenda was approved after presentations from ISO and Humanetics were added.

3. Discussion

3.1 NHTSA evaluation of WorldSID 50th male and 5th female (WS-5-2)

WorldSID 50th: The biofidelity, repeatability, reproducibility, and durability analysis is complete. The documentation, including Final Reports, User's Manuals, and Drawing Packages, are being completed. Discussions have started on developing a generic Data Acquisition System (DAS) specifications. Additionally, the seat procedures are being evaluated and fleet testing has begun. The dummy manufacturer is making material changes to the head and pelvis which may then require further testing to validate the properties.

WorldSID 5th: A preliminary inspection has begun of the 2 dummies. Certification tests have been conducted on the head and neck, and show good repeatability and reproducibility. In the examination of the IR-TRACC, repeatability issues have been raised when testing the sensitivity of the devices. A question was raised on whether this was a universal problem with the IR-TRACCs. It was noted that some work has been conducted on the diffuser and NHTSA is evaluating new IR-TRACCs to see if the problem still exists. The drawing packages and research are expected to be completed by the end of 2013.

3.2 WorldSID Material Changes – Humanetics (WS-5-3)

Dummy materials are becoming unavailable due to environmental and economic reasons. With regard to the WorldSID dummies, this is having an impact on the production of the iliac wings and skull. For the iliac wing, a new material has been identified and will undergo static and component level tests before a final verification with certification and biofidelity tests. Once all the testing is completed, several samples will be provided to the WorldSID task group to evaluate. With regard to the skull, a replacement material for the Ureol 100 has been identified and its material properties are being evaluated.

The question was raised on the type of evaluation is planned for the new material. With regard to a similar issue with the rib damping material, drop tests with the new and old ribs are being conducted, by

the SAE group, at rates above and below the rates of crash tests and certification test to see if they give the same performance. Testing shows that the new material seems to provide higher damping. The results from these tests, plus sled tests, pendulum tests and drop tests, will be presented to the group upon completion. Additionally, Humanetics noted that there should not be a period when replacement parts are not available.

3.3 European Commission WorldSID-5th Female Work Programme (WS-5-4)

TRL, funded by the European Commission, is evaluating the WorldSID 5th female in the areas of multi-point chest deflection measurement, biofidelity, and injury risk.

To evaluate multi-point chest deflection measurement in the 5th female, TRL is investigating implementing the RibEye. This may allow better replication of Post Mortem Human Subject (PMHS) tests and improve existing injury risk functions. Overall the group felt this work is important, but there have been difficulties in implementation due to some technical challenges and funding.

With regard to biofidelity TRL will contribute to the ISO WG5 scaling activities by conducting pendulum or sled tests as appropriate. TRL will also work with the ISO WG6 to develop injury risk curves, the ISO group taking the lead on coordination.

3.4 Transport Canada – In Vehicle Crash Testing with 5th Female (WS-5-6)

Transport Canada conducted a series of testing to compare the in-vehicle response of the WorldSID 5th female to the SIDIIIs in various impact configurations. Results showed significant differences in deflection, independent of the crash configuration or struck side location. With the WorldSID, rib deflections did not exceed much more than 11 – 15 mm in the tests, even though there appeared to be clear loading of the thorax at that level. Additionally, the WorldSID injury measurements were much lower than the SIDIIIs. Further testing is needed to isolate the mechanism contributing to the reduced chest deflection response. It was also noted that the introduction of multi-point sensing could aid in tracking fore-aft and vertical displacement.

In the discussion of the results, others observed similar issues and sometimes this can be attributed to the adjustment of the IR-TRACC, but it was pointed out that this may not explain the differences between the dummies. Humanetics stated that the WorldSID 5th female is more sensitive to oblique loading than the SIDIIIs and recommended comparing injury risk using IARV instead. Additionally, it was noted that the effect of kinematic differences between the dummies and the inherent variability in crash testing should not be underestimated.

3.4 Brain Injury Assessment – Development of Rotational Brain Injury Criterion (BRIC) (WS-5-7)

NHTSA is researching whether BRIC can be used as a complementary injury criterion to the HIC. BRICs have been developed for the ES-2 and the Hybrid III dummies. The same development procedure can be used to develop a BRIC for the WorldSID dummies. NHTSA requested that angular rate sensors (example shown in **WS-5-13**) be installed in the WorldSID dummies during testing to increase the data

pool used to develop the WorldSID BRIC. Transport Canada noted that they have rotational data that can be sent to NHTSA.

3.5 WorldSID Injury Risk Curves (WS-5-8)

A subgroup under ISO WG 6 is working to finalize the development of the injury risk curves for the WorldSID 50th male and use the same process to develop injury risk curves for the 5th female. The group achieved consensus to use the survival analysis as a basis to build the injury curves. The curves will be provided with 95% confidence intervals; the process for building these intervals is being evaluated. The 50th injury risk curves were developed as a function of commonly used measurements, further work is needed to define the good injury criteria among the commonly used measurements. Additionally, not all the test configurations were reproduced with the WorldSID 50th; the injury curves would be more robust if more PMHS tests were conducted.

Once the work on the 50th injury curves is completed, the group will begin work on the 5th female injury risk curves. The same methodology used to develop the 50th injury risk curves will be applied. Since there are no PMHS tests for the 5th female, the PMHS samples for the 50th male will be used, but additional work is needed on properly scaling the data. Once there is agreement on test conditions to be reproduced for the 5th female, these will be circulated to groups that are evaluating the dummy.

3.6 Humanetics Update on RibEye (WS-5-9)

Humanetics has upgraded the RibEye for the WorldSID 50th male from Model 8700 to Model 10000. Some of the issues with the original model were insufficient measurement range (one rib could block others in set), damaged sensor connectors, lens errors, and firmware bugs. The new model has increased range, improved durability, and firmware improvements. The maximum range of the RibEye is similar to the ITRACC – 75 mm. BAST has taken receipt of the new RibEye model.

3.7 SAE WorldSID Testing (WS-5-14)

NHTSA presented testing conducted by UMTRI comparing PMHS thorax and pelvic responses to WorldSID 50th male dummy responses. The PMHS and dummies were impacted by a padded wall, first at 3 m/s and then at 8 m/s. It was found that the WorldSID abdomen does not deform as much as the PMHS abdomen under similar conditions and is somewhat less rate sensitive. The WorldSID pelvis forces were higher than the PMHS response corridors at 8 m/s, but the WorldSID pelvis Y-axis was within the response corridors, suggesting that the WorldSID pelvis may be too stiff. Future testing may include a comparison study of the 5th female, depending on the availability of PMHS.

3.8 CIREN – Pelvic Injuries in Near Side Crashes (WS-5-11)

A review of the CIREN crash data shows that, while pelvic injuries are not always the most severe injury sustained in a side impact crash, they generally rank among the top four. It was also noted that 67% of the pelvic injuries are caused by near-side door or the near-side door armrest. Further studies will include merging the injury-rich CIREN database with the crash-rich NASS database and developing a Population Table for pelvic ring fractures.

3.9 WorldSID Seating Procedure (WS-5-12)

The ISO group presented their draft front-seat seating procedure for the WorldSID 50th dummy and requests everyone to evaluate this procedure when they test. There is a difference in the way the ISO group defines the lower seat cushion placement and the way NHTSA defines its placement. This issue will need to be examined further to determine if there is a conflict between the two procedures. The ISO group has not yet looked at seating procedures for the male in the rear seat or for the 5th female in the front and rear seats. Additionally, there was concern expressed that using the WorldSID dummy with the new seating procedure will miss injuries currently being captured by the ES-2 dummy.

3.10 Other Discussions

- OSRP evaluation of the 5th Female: No testing had taken place yet, but the group received their 5th Female dummy.
- Shoulder Interaction: UK has a concern that the 50th shoulder can be loaded artificially thereby reducing loading in the thorax. This phenomenon needs further investigation.
- WorldSID ISO documentation: ISO reported that revision of 15830 documents is completed. (WS-5-5)
- Data Acquisition Specification: NHTSA is in the procurement process for contracting the measurement of mass properties for the WorldSID 50th male dummy. The sub-group working on the generic DAS specification has met several times and, in collaboration with Craig Morgan of Humanetics, has developed gray zones for onboard DAS location. The group is considering a 10% maximum change in response under a flat wall impact condition for a mass and location tolerance of onboard DAS equipment. Some in the group suggested that this may be too large and 5% tolerance may be better.
- Collaborative Data Site: The group discussed setting up a collaborative data site to post the data for certification tests and crash tests. A low effort proposal was suggested to have delegates upload their own data into a folder on a FTP site and allow read rights to the data. Some cautioned that FTP sites are blocked by many firewalls and are difficult to search. Until a data site is formally established, delegates can continue to share data on a one-on-one basis with each other. This discussion will continue.

4.0 Action Items

- a. Review shoulder interactions in tests. Suggested to run sled tests comparing shoulder responses of dummy.
- b. (All) In future testing, request 50ths and 5ths should be outfitted with angular rate sensors (in addition to linear triax) in head to get data for use in rotational brain injury assessment.
- c. NHTSA to develop population tables for pelvic ring fractures
- d. (All) In future testing, validate ISO seating procedure.
- e. NHTSA to develop sub-group to focus on chest deflections and RibEye.

5.0 Next meetings

- June 8, 2011 - Washington, D.C., USA
- October/November 2011 - TBD

6.0 Attendance

Abraham	James	Ford
Akiyama	Akihiko	Honda
Ammerlaan	Hans	RDW
Beebe	Mike	Humanetics
Been	Bernard	Humanetics
Belcher	Thomas	AU Department of Infrastructure
Broertjes	Peter	European Commission
Constant	Myriam	PSA Peugeot Citroen
Dausse	Irina	Renault
Davis	Peter	SMMT
Depinet	Paul	Denton ATD
Donnelly	Bruce	NHTSA
Frost	Bernie	UK Dept for Transport
Hallbauer	Karsten	Takata
Hatano	Keiji	Nissan
Hogan	Robert	AU Dept of Infrastructure
Hynd	David	TRL/EEVC WG20
Ishida	Katsutoshi	JASIC Washington DC
Jensen	Jack	GM
Kim	Dae-Up	Korea/KATRI
Kinsky	Thomas	Opel
Lee	Eun Dok	KATRI
Lee	J.W.	Korea
Lepretre	Jean-Philippe	France - UTAC
Lorenz	Bernd	BASt
Moorhouse	Kevin	NHTSA
Okuda	Yuji	Humanetics
Petit	Philippe	LAB PSA-Renault
Takehisa	Yamakawa	JAMA
Tylko	Suzanne	Transport Canada
Wismans	Jac	Safeteq/EEVC WG 12