

WorldSID, AN ENHANCED, HARMONISED MID MALE SIDE IMPACT DUMMY
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In the automotive safety testing field, the ISO World Side Impact Dummy (WorldSID) Task Group has completed the design and development of the WorldSID. Developed under direction of ISO/TC 22, Road vehicles, subcommittee SC12, Passive safety crash protection systems, working group WG 5, Anthropomorphic test devices, beginning in 1997, and funded by a worldwide consortium at a cost of about 14 million USD, the dummy production design was completed on schedule in March 2004. The WorldSID made its official debut at a United Nations World Forum for Harmonization of Vehicle Regulations (Working Party WP.29) reception on 22 June in Geneva.

The WorldSID heralds a significant improvement in the ability of crash dummies to duplicate human motions and responses in side impact tests, which should lead to improved vehicle designs and occupant protection. In addition, WorldSID, which was developed by hundreds of engineers and scientists from over 45 organizations in Europe, Asia-Pacific and the Americas, represents a major breakthrough in worldwide harmonization of crash test dummies.

Effective vehicle occupant protection design is very dependent upon the ability of vehicle engineers to use crash dummies to predict possible human injuries. The WorldSID's biofidelity, a measure of how well the dummy simulates the forces and motions of a human, is the best of any side impact crash dummy to date and far exceeds that of the others. ISO/TR 9790, Lateral impact response requirements to assess the biofidelity of the dummy, specifies procedures for evaluating side impact dummy biofidelity performance using a series of 33 laboratory tests. Based on using the ISO/TR 9790 rating scale, the WorldSID rating is 7,6 ("Good" on a 10 point rating scale). In comparison, other currently used side impact dummies, US-SID, EuroSID-2RE, EuroSID-1, and EuroSID-2 have rating of 2,3, 4,2, 4,4, and 4,7 respectively. The ability of vehicle safety engineers to utilize the enhanced biofidelity of the WorldSID should lead to safer vehicle designs, enhanced side impact protection, and reduce human injuries in side impacts.

In addition, as a major benefit of harmonization, introduction of a single universal dummy into regulations and consumer testing in all regions would enable manufacturers to focus and coordinate resources to improve worldwide occupant safety, rather than engineering different safety designs for different dummies.

As an international group, the WorldSID Task Group operated under the leadership of a Tri-Chair, consisting of one individual from the Americas, Asia-Pacific, and European regions of the world. Each of the Tri-Chairs served as chair of their respective regional Advisory Group and shared the chairmanship of the Task Group, which is made up of worldwide representatives of research facilities, manufacturers, government agencies, and dummy equipment manufacturers. One of the goals of this worldwide group was to achieve harmonization via the use of the same dummy in all worldwide markets. Humans are physically similar worldwide, so it is logical to have a single crash dummy to test vehicle safety. There are presently at least three different adult male sized side impact dummy designs in use and at least four more have been developed. One, used by the US Department of Transportation, has served as the crash dummy to be used in the existing US side impact crash regulation (FMVSS 214). Others were developed in Europe and are being used or are being considered for use in crash tests under European Regulations. The WorldSID was developed to allow a single test device to be used for side impact testing in any regulation around the world. Such a worldwide-harmonized dummy could not have been developed without the international cooperation exhibited within the Task Group.

To ensure that the WorldSID is available to the worldwide vehicle research community the design details have been documented in ISO/WD 15830, Design and performance specifications for a 50th percentile male side impact dummy (WorldSID) – Part 1: Definitions, symbols and rationale, Part 2: Mechanical subsystems, Part 3: Electronical subsystems and Part 4: User's manual which was recently approved by ISO/TC 22/SC 12/WG 5, and is currently being reviewed and balloted at the Committee Draft level by ISO/TC 22/SC 12. This documentation, which consists of nearly 500 pages plus 400 fabrication drawings and CAD files, includes all of the design details, material specifications, and performance standards required for the fabrication of the WorldSID.

The excellent biofidelity of the WorldSID design is due in part to the use of new technologies and materials some of which were not available for use in older dummy designs. The WorldSID ribs achieve human-like deflection performance through the use of a super-elastic nickel-titanium alloy. The WorldSID anthropometry is based on an extensive, diverse 50th percentile male drive data set, which resulted in a more human-like seating position. In addition the WorldSID can utilize an optional in-dummy data acquisition system capable of recording up to 224 data channels, which can lead to a better understanding of the loads applied to car occupants during side impacts.

The technical performance of the WorldSID design has been thoroughly tested and verified by extensive testing under a variety of conditions. The original prototype dummy underwent nearly two years of biofidelity, vehicle, and component testing. Based on the prototype test results, a pre-production design was developed which resulted in the modification of nearly every part of the dummy in order to improve biofidelity, durability, usability, or other aspects of the dummy. Beginning in early 2003 11 pre-production dummies were fabricated and delivered to each of the three world regions. The subsequent worldwide testing of the pre-production dummies resulted in a few final modifications, which were incorporated into the final production design. The production design is complete and the production dummy is currently available for purchase and use.

In total, testing has included more than 1 000 whole dummy biofidelity, vehicle, and component tests. This testing was conducted in 16 different test labs and agencies in at least 10 different countries including testing by governmental agencies in Canada, Japan, Australia, the USA, and various organizations as part of a framework research programme of the European Commission.

The future use of WorldSID in worldwide regulation is now being reviewed. During its November 2003 meeting, United Nations Working Party WP.29 agreed that development of the WorldSID should be encouraged, and further agreed that EU member states will make proposals to incorporate the WorldSID in ECE Regulation 95 once the WorldSID is shown to be ready for use, in the expectation that this could be done before the end of the 36-month transitional period specified for ES-2 in the proposed amendment. This action ensures that the door remains open for the WorldSID to be considered for adoption as a replacement in UN-ECE Regulations for EuroSID-1, which is scheduled to be phased out in 2007 in keeping with earlier GRSP (Global Road Safety Partnership) decisions. Another and separate discussion involves continued reporting to WP.29/GSRP, as related to future potential use of WorldSID in any potential future Global Technical Regulation for side impact protection.

Reference:

ISO Focus, July-August 2004