



**EUROPEAN
ENHANCED
VEHICLE-SAFETY
COMMITTEE**

Status Report for the 18. ESV Conference

**Dr. Bernd Friedel, Past Chairman
Dr. Dominique Cesari, Chairman**

We have been active participants in the ESV-programme since June 1974 – nearly 30 years – and we welcome this opportunity again to present the EEVC Status report and to report on recent developments of the European Enhanced Vehicle-safety Committee.

Mr. Cesari has been elected at the last EEVC Steering Committee meeting in February 2003 in Rome as the new chairman of EEVC.

Advanced Anthropometric Adult Crash Dummies

The research work for the development of EuroSID-2 (ES-2) has been completed. The ES-2 is an improved EUROSID-1 dummy with increased injury assessment and measurement capabilities that addresses the main concerns expressed with the EUROSID-1. EEVC has proposed to EC and ECE to replace the EUROSID-1 by the ES-2 anticipating a substantial improvement in side impact protection.

The new chairman for this work is Mr. van Ratingen (TNO). Within the ECE-GRSP group EEVC is discussing the use of ES-2 with OICA. The evaluation of the ES-2 by NHTSA in the USA is almost completed and the results are positive in general. A pending issue is still the backplate loading. Several solutions have been proposed and are under review by NHTSA.

An EEVC ad hoc group has finalised a report on whiplash injuries dealing with accident data and insurance statistics, biomechanics and dummy development, car and seat design, test procedures and research programs with regard to the protection of injuries in low speed rear impacts. Based on this overview EEVC has created a new working group: Protection in rear impacts. The aim of this group is the development of a test procedure including the use of appropriate dummies to assess neck injuries in rear end collisions within two years. Mr. Svensson (Chalmers University) has been appointed as the chairman of this group.

EEVC is collaborating with NHTSA on the next generation frontal impact dummy. The work focuses on defining the biofidelity response requirements for relevant body regions injured in frontal impacts. The potential of the THOR dummy has been assessed in various test conditions.

Contributions have been made to the IHRA Biomechanics working group, dealing with anthropometry, biofidelity and injury criteria for side impact and the development of a biofidelity

rating system. Recently, IHRA has been coordinating the work related to frontal impact dummy biomechanics and evaluation of THOR in the different regions.

A paper about “Biofidelity impact response requirements for an advanced mid-size male crash dummy” will be published at this conference.

Side Impact

The EEVC activities to improve side impact protection are on-going under the chairmanship of Mr. Lowne (UK).

Phase III of the detailed programme, leading to the proposal for the EEVC interior headform test procedure, is now complete. A draft proposal for the EEVC Interior Head Impact Test Procedure has been produced and the definition of the impact points is being evaluated by WG members.

Phase IV comprises the validation of the proposed test procedure and this research programme is currently being undertaken. TRL has completed a test programme evaluating three vehicles using the current proposal and the draft proposal takes into account some observations made in these tests. Other test institutes, including BAST and TNO, are now undertaking test within Phase IV.

A new aspect of this task is that EEVC has been asked to draft the interior headform test for the harmonised IHRA side impact test procedure. Therefore this work will have wider implications than previously considered. Accident data collected for IHRA have shown that injuries to non-struck side occupants constitute a significant proportion of the “Harm” in side impacts accidents. EEVC has been asked to consider how this would change the interior headform test procedure.

The EEVC Report on the recommendations for a revised specification for the current EEVC mobile deformable barrier face was presented to GRSP in December (2001) in an Informal Document and then discussed in more detail in the May 2002 meeting on the basis of a Formal Working Document. The EEVC report was well supported at the meeting by the delegates of EEVC countries. GRSP approved the EEVC proposal and forwarded it to ECE-WP29 where, in November 2002, it was approved for use in ECE Regulation 95.

The activities, related specifically to IHRA, have concentrated on the work to understand the potential for a harmonised MDB test (one of the

four components of the proposed IHRA Side Impact Test Procedure). A new prototype MDB has been built to represent modern European vehicle more closely than the existing EEVC MDB. This is now known as the 'Advanced European MDB' or 'AE-MDB'. Full scale tests have been performed at TRL with this first prototype MDB and the US Insurance Institute for Highway Safety (IIHS) MDB. All of these tests so far have been performed by TRL with funding from the UK DfT. Other EEVC laboratories are expected to undertake additional tests in 2003. From the results of these tests, it was concluded that the IIHS MDB is far too severe a test for European conditions. The advice from the industry advisors is that, if this were to be the only possibility of a fully harmonised test procedure, the disbenefits would outweigh the possible benefits of a harmonised test procedure. The EEVC current view is that there will need to be two MDB designs for the next generation of side impact test procedures. Following this, the IHRA SIWG chairman has proposed that there should be two MDB designs, one corresponding to car and small SUV impacts and the other corresponding to larger SUV and light truck impacts. Regulators could adopt one or both as appropriate for their vehicle fleet. This proposal has been agreed by the IHRA Steering Committee.

The next level of possible harmonisation would be for the more onerous test to be so designed that compliance with this test would guarantee compliance with the less onerous "European" (and probably Australian/Asian) test. This approach was also proposed at the IHRA Steering Committee meeting.

- The IHRA SIWG will propose a draft international harmonised side impact test procedure at this conference. EEVC will participate in the validation of this proposed test procedure during 2003 - 2005.

At this conference two reports of EEVC concerning protection in side impacts will be presented (Advanced European MDB and headform test procedure).

Truck underrun

Based on the earlier work of WG14 the EC 5th Research framework project VC-COMPAT has started in 2003 and will go on for 3 years. Most former members of WG14 and additionally some truck manufacturers are members of the VC-COMPAT consortium. The main project outputs for the car to truck part of the project are:

- Test procedures and associated performance criteria to assess and control truck frontal structures for frontal impact compatibility with cars
- Suggestions for improving front and rear underrun safety
- Indication of the benefits and cost of improved compatibility

WG14 has established a close cooperation with VC-COMPAT and will work in parallel concentrating on establishing practical test procedures that may be used in type approvals for underrun devices on trucks. If possible these procedures and performance criteria should be the same - except for impact speed - for frontal and rear protection devices on trucks.

The work will be chaired by Mr. Turbell (Sweden)

Crash compatibility

Following the introduction of the European Frontal and Side Impact Directives in October 1998, compatibility offers the next greatest potential benefit for improving car occupant safety and reducing road casualties. There are currently four candidate test procedures discussed in EEVC WG 15, which are expected to form the basis of future legislation and / or consumer testing to improve compatibility. These are a full width deformable barrier test to assess structural interaction, an ODB test to control stiffness, a high speed ODB test to control the compartment strength and a Progressive Deformable Barrier (PDB) test to assess both structural interaction and control stiffness.

In 2001 and 2002 an interim study to improve the crash compatibility between cars in frontal impact was carried out by TRL, BAST, UTAC and FIAT. The objectives of this study, sponsored by the European Commission, were

- To further develop the crash test procedures detailed above.
- To perform an analysis to estimate the benefits of implementing compatibility measures for frontal impact.
- To perform accident analysis to further aid the understanding of compatibility and to support the cost benefit analysis.

The work was divided in three packages: Accident Analysis, benefit analysis and crash testing. In the accident analysis it was confirmed for United Kingdom and Germany that the compatibility problems for car to car frontal impacts are structural interaction, stiffness matching and compartment strength. In the benefit analysis the first approach, to determine the problem scope,

indicated that a significant proportion of current road accident casualties would benefit from improved compatibility. In GB, for car frontal crash victims, it was predicted that approximately half (45 to 61%) of the fatalities and 2/3 (66-85%) of serious injuries would experience some reduction in injury risk as a result of improved compatibility. In Germany about half (33-67%) of current frontal crash victims would experience a reduction in injury risk.

Full scale crash testing including car to car tests was performed to further develop the candidates for a test procedure.

A report will be given during this conference by Mr. Faerber (Germany) about this study. EEVC has developed a list of parameters for assessing compatibility in a test procedure using different barriers such as a full width deformable barrier test to assess structural interaction, an ODB test to control stiffness, a high speed ODB test to control the compartment strength and a Progressive Deformable Barrier (PDB) test to assess both structural interaction and control stiffness.

These parameters are in particular structural interaction, frontal unit force, compartment strength and other items like simplicity, repeatability and reproducibility of the test procedure. EEVC is in favour for further development of the existing offset deformable barrier test used in Directive 96/79 EC to assess compatibility.

The activities with regard to advanced frontal protection are merged with the compatibility activities since the end of 2002. This was considered logical since the majority of questions dealt with contain aspects of both self-protection and partner protection. This arrangement is also in line with the organisation of the IHRA work.

The advanced frontal protection group has finalised its two outstanding tasks, a footwell intrusion measurement method and a report on seat belt reminders. The EEVC footwell intrusion measurement method uses the normal position of the foot as reference for measurements. This is considered more relevant than references to the undeformed foot well. The report was sent to the European Commission in December 2002.

The working group has also worked with seat belt reminders. A large proportion of the people injured in severe crashes are unbelted. The most important safety system in the cars still has a large protection potential if everyone used the seat belt. EEVC has developed a series of recommendations around seat belt reminder systems. The seat belt reminder system should target the "part time users", should

use progressive multiple step audible and visual signals but not affect the driveability of the car. EuroNCAP has used a large proportion of the recommendations in their work to promote seat belt reminders. In 2002 a substantial number of car models have been introduced on the European market equipped with seat belt reminders following the EEVC recommendations.

Pedestrian Protection

In December 1998, the EEVC issued the report "Improved test methods to evaluate pedestrian protection afforded by passenger cars", which is the first complete test method proposed for pedestrian protection evaluation. Taking into account the experience of using this methodology, modifications to this report, especially the part concerning the certification of the impactors were finalised. New certification response values for head forms and leg impactors were defined. Variations in verification test results required to take wider response corridors than expected. The terms of the reference of our EEVC activities for further improvement of pedestrian protections concentrate on:

1. Development of test methods, tools and requirements for (adult) pedestrian head to windscreen, windscreen frame and A-pillar impacts, based on accident statistics and biomechanics, as well as on technical feasibility.
2. Integration of new technologies, methods and tools in the field of physical and virtual testing into EEVC pedestrian protection test methods.
3. Prepare the EEVC contribution to the IHRA working group on pedestrian safety.
4. Cooperation with the UN/ECE informal group on pedestrian safety (ECE/WP29/GRSP).

The ECE/GRSP has created an informal group on pedestrian safety. The informal group will have the responsibility of preparing and bringing forward a proposal for a global technical regulation (gtr), based upon the research and development work done so far by different institutions and the industry and take account of any additional work that is being undertaken.

The preparation of the proposal shall consist of two phases:

An analysis of the feasibility and desirability for a gtr on pedestrian safety and the development of complete and detailed recommendations. EEVC was invited to join this group.

The EEVC contributes to IHRA Pedestrian Safety working group with two representatives.

The IHRA-Pedestrian Safety working group started its work by collecting available accident data. The analysis of these data allowed to draw a priority list of body area/vehicle contact tests to be developed:

1. Adult/child head tests (head versus bonnet/windscreen).
2. Adult leg test (leg versus bumper/car front).
3. Adult chest / abdomen / pelvis and femur test, and child chest / abdomen and pelvis test.

The group has decided to use the sub-system approach. It has already developed the test procedure for child and adult head protection and it is working now on adult leg test.

The work of EEVC with regard to pedestrian protection is now chaired by Mr. Cesari (France).

Child Safety

The activities of EEVC with regard to child safety are concentrated on

- Review accident statistics with respect to car child occupants and injuries in all types of car accidents.
- review research with respect to car child occupant safety.
- Describe the state-of-the-art taking into account all existing regulations.
- Identify gaps in knowledge, methods and tools
- Safety of children in buses.

The working group of EEVC is chaired by Mr. Le Coz (France).

The working mode was organised around two axes:

- personal work, then collective analysis of the members of the group according to subjects distributed during the plenary sessions
- collective hearing of the experts or the representatives of organisations having an enlightened opinion on the protection of the children during road travel.

At this stage of the work, a synthesis report was prepared with 7 appendices presented below:

- Accidentology in cars.
- Accidentology in coaches and buses.

- Background and development of dummies.
- Sizing a C.R.S.: centimetric
- Legislation review.
- Hearing and research programs summary.
- Questions for ECE Regulation 44.

Outlook

A new activity of EEVC will start on the interaction between active and passive safety.

The aim is to describe within one year the State of the art with regard

- overview of existing and future techniques
- effect of these techniques on priorities for injury prevention
- effect of these techniques on existing regulations

This work will be chaired by Mr. Aparicio (Spain). The international cooperation in Europe as well as with the IHRA activities will continue.

EEVC has a new member: the government of Poland; we are very happy to welcome our new colleagues.

We are also pleased to provide you with a new EEVC brochure which will be available during this conference.

Based on our long lasting input to this important conference we are convinced that we are able to make genuine progress on all relevant issues to enhance safety of vehicle in the future based on the success in occupant protection.