



**EUROPEAN
ENHANCED
VEHICLE-SAFETY
COMMITTEE**

**Status Report for the 21st ESV
Conference**

Dr. Dominique Cesari, Chairman

INTRODUCTION

The EEVC, European Enhanced Vehicle-Safety Committee, exists since June 1974 and has been active in participating in the ESV-programme. We are pleased to present the EEVC Status report containing a summary of the most recent results of our work at the 21st ESV Conference.

WG12 – Anthropomorphic dummies

This working group is the longest active Working Group within EEVC. The scope of the Working Group includes adult as well as child crash dummies and corresponding biomechanical criteria concerning injuries. Important achievements of EEVC WG12 in the period following the 2007 ESV conference include:

Completion of an extensive evaluation of various candidate crash dummies for injury protection in rear-end impacts (whiplash dummies). From this evaluation it was concluded that the Hybrid III dummy is not suitable for evaluation of whiplash injuries mainly due to its lack of biofidelity. The two other dummies that were evaluated, i.e. the BioRID IIg and the RID^{3D} dummy, both offer sufficient biofidelity capabilities for the study of injury protection in rear end impact, with a slightly better biofidelity rating for the BioRID (see Figure 1). It was also concluded that no reliable injury criteria and corresponding injury risk functions exist yet to assess the injury risk in rear impacts. In 2009 the Working Group has started a new study to develop such injury risk functions using real world data.



Figure 1: The BioRID segmented spine

A study concerning a new generation of child dummies (Q dummies) has been completed. It was concluded that this new generation of dummies offers a major step forward compared to the current P dummies used in the ECE 44 regulations. Currently the following 5 dummies are available in the Q family: a new born, a 9 month, a 1.5 year, a 3 year and a 6 year old dummy (see Figure 2). The development of a 10 year old version of the Q dummies has recently started and WG 12 will monitor these developments. WG 12 has also developed a set of injury risk functions for these new dummies. New activities of WG12 in this field concern the application of child dummies for the evaluation of side impacts.



Figure 2: Q series child dummies

Side Impact Protection

The working group in charge of side impact protection has developed a roadmap for the coming years, which was approved by the EEVC Steering Committee. The main research topics for the side impact protection are the following:

- 1) Evidence Review: Review the nature of European side impact accidents and consider the likely effects of advances in vehicle technology on the current accident and casualty profile.
- 2) Barrier based test: On the basis of the Evidence Review, and taking account of the most recently available studies, assess the societal benefit of improving the current regulated barrier based test procedure (ECE Regulation No. 95). Review the updated AE-MDB barrier and test procedure as proposed by the APROSYS project and other

bodies that have evaluated the barrier and procedure.

3) Non-struck side protection: On the basis of the Evidence Review make recommendations regarding necessary research with regard to 'non struck side' occupant protection and the societal benefit of introducing measures to mitigate such injury risk.

4) Pole Test: On the basis of the Evidence Review examine the work that has been undertaken by IHRA members, APROSYS and any other groups into the pole test (perpendicular and oblique).

5) Review the proposed EEVC interior surface test procedure, including any validation testing that has been completed and, if necessary, refine the procedure such that it is fit for regulatory application

A subgroup including experts in accident studies (joint WG 13 and WG 21 subgroup) has been set up to determine the societal benefits of an enhanced side impact test procedure.

The work on the definition of an AE-MDB is in progress; this work includes contributions of Japan in addition to EEVC countries.

Compatibility

The work done by EEVC has progressed over the last two years in conjunction with EC funded VC Compat project. EEVC acknowledges that compatibility is a complicated matter.

The group has developed two candidate test procedures:

1. A full width frontal impact against a deformable element (FWDB) and high resolution force measurement, combined with an offset deformable barrier test.
2. A frontal offset impact against a progressive deformable barrier (PDB), combined with a full width test.

The group has analysed the results of the VC compat project and prepared new terms of reference which will consider the new EC project "FIMCAR"

Pedestrian Safety

Since the last ESV, EEVC did not develop activities in the field of pedestrian safety waiting for phase 2 of the European regulation. However as APROSYS has just made proposals for new additional test methods and as the design of the

JARI flex PLI leg is completed, EEVC is considering to analyse in the near future these two items.

WG 18 – Child Safety

The group dealing with the protection of children in cars, buses and coaches is composed of national government representatives, supported by technical advisers..

This group was created in 2000 with clearly defined terms of reference:

- Review accident statistics with respect to car child occupants and injuries in all type 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 lacks in knowledge, methods and tools

After the publication of the results of the first part of the terms of reference, a report on the comparison of existing legislations and a critical analysis of ECE R44 / 04 is approved by the Steering Committee und public available.

A study concerning a new generation of child dummies (Q dummies) together with working group 12, has been completed.

The Steering Committee of EEVC is considering the continuation of this group with new terms of reference which are under discussion.

Active/Passive Safety Interaction.

This group has started a new activity in which the group will look at 5 to 8 functions of advanced systems aimed at improving safety, and report on evaluation of function assessment methods within two years.

Rear Impact Protection and Whiplash Injuries

Since ESV 2007, EEVC WG20 has worked closely with WG12 on the evaluation of crash test dummies for low-speed rear impact test procedures. WG20 has evaluated static test methods for assessing head restraint geometry, including methods similar to that used by RCAR and methods based on measurements using a co-ordinate measuring machine. Currently, the WG is evaluating methods to assess the *effective* height of head restraints; i.e. the head of the structure of the head restraint that is able to provide adequate support for the centre of gravity of the head of the occupant in a rear impact. A cost-benefit study for head restraint height and backset requirements was also published, which

found that the cost of long-term whiplash injuries was £3 billion pounds per year in the UK alone.

Many seats that have come on to the market in the last few years incorporate an active or, most commonly, reactive head restraint. Both types of head restraint move forward (and sometimes upwards) in a rear impact to support the head and neck, but are typically quite far behind the head in normal use modes. The geometry of reactive head restraints in particular is difficult to assess with static test procedures, as the amount the head restraint moves is dependent on the interaction between the occupant and the seat back. WG20 therefore developed a dynamic test of head restraint geometry – known as dynamic backset – that has been proposed by Japan and the EC as an update to UNECE Regulation 17.

The dynamic backset test procedure uses the BioRID II dummy because it was considered that humanlike interaction between the dummy and the seat back, and humanlike neck kinematics in a low-speed rear impact, were very important.

WG20 continues to collaborate with WG12 on the validation of criteria for dynamic seat assessment test procedures. This work aims to correlate the risk of long-term whiplash injury claims with dummy measurements made with groups of seats and with individual seats. Most recently, EEVC WG20 has met with parties from around the world who are interested in developing a seat assessment test procedure using the BioRID II dummy as part of the proposed Global Technical Regulation 7 Phase 2 work programme.



Figure 3: Static backset measurement according to the draft WG20 test procedure.

Accident studies

1. The Working Group dealing with accident studies is aimed at supporting the research activities of other working groups by the provision of accident data and analysis. It has developed links

with other working groups and has supplied many sets of data analysis.

2. Side impact analysis – a major analysis of side impacts is being conducted on behalf of WG 13 using data from UK, Germany, Sweden, and France. Some of the results of this analysis will be reported during this conference.

Virtual Testing

The aim of this working group was to examine why and how the numerical simulation technology could be introduced in automotive safety regulations.

A first one year mandate allowed to show that numerical simulation is widely used in industry for product development. However, limitations exist in the modelling of some physical phenomena involved in a crash (e.g. material rupture). Many questions still lack appropriate answers such as model validation, dependence of results on code/platform/user, organization and liability.

This working group explored the area of current regulations which may benefit from the introduction of virtual testing and has proposed a plan for 3 years work dealing with four case studies, from the most simple (geometrical analysis) to the most complex (dynamic test).

The objective of the next three year mandate is to initiate the process to address these questions, focusing on the most important aspects, relying on the outcome of recent completed projects, in particular APROSYS, and taking benefit from work performed by other groups such as ISO or within the next IMVITER EC funded project when the objectives of this work are in line with those of EEVC.

Bus and Coach Safety

An ad-hoc has been established to investigate the need of analysing bus safety issues at a European level.

Future of EEVC

EEVC, which has contributed to IHRA activities from the beginning; is considering that there is a need for international cooperation in the field of vehicle safety research. to comply with those thoughts. After having considered to set up the Vehicle Safety Research Forum as an answer to that question, considering that this will take some time, EEVC has decided to open the participations to some of its working groups to other ESV countries.

The following working groups are concerned:

WG 13 – Side impact protection

WG 15 – Compatibility

WG 18 – Child safety

WG 20 – Rear impact

WG 22 – Virtual testing.

An invitation letter has been sent to the GFP of the relevant countries, and we then expect at least for an intermediate period before setting up a more permanent structure, non EEVC countries will be able to contribute to some key scientific issues which are important for future safety regulations.