

INTERNATIONAL HARMONIZED RESEARCH ACTIVITIES (IHRA) STATUS REPORT OF THE BIOMECHANICS WORKING GROUP

Rolf H. Eppinger

National Highway Traffic Safety Administration
United States
Paper Number 05-0459

ABSTRACT

A summary of the continued efforts of the Biomechanics Working Group to complete its original task given to it by the International Harmonized Research Activities Steering Committee, determining specifications for a Universal Side Impact Anthropomorphic Test Devices is presented.

INTRODUCTION

This report summarizes the continued activities of the International Harmonized Research Activities (IHRA) Working Group on Biomechanics Research (BWG) for the period from its last report, given at the May 2003 in Nagoya, Japan on the occasion of the 18th International Technical Conference on the Enhanced Safety of Vehicles, to the present. The Biomechanics Working Group continues to concentrate its efforts to develop a rationale for and specifications of a universal side impact Anthropomorphic Test Device (ATD). This task remains the primary focus of the Biomechanics however; discussions of possible new initiatives have also taken place.

DISCUSSION

Emphasis of the BWG's Current Efforts:

The BWG continues to concentrate the majority of its efforts on the completion of its Side Impact Report. These efforts encompass four major topics:

- Characterization of the Global Side Impact Problem (which seeks to identify the commonalities and differences of the side impact problem throughout the world),
- Anthropometric Characterization of Crash Victims (which investigates the size and mass attributes of the world's side impact population at risk and seeks to determine the necessary and sufficient type and number of test dummies necessary to effect broad safety benefits),

- Biofidelic Impact Response Specifications (which seeks to characterize and generalize human impact responses into dummy design requirements and provide a quantitative evaluation methodology for assessing the ability of various dummy designs to meet them), and
- Injury Criteria and Associated Performance Limits (which seeks, through thorough review and analysis, appropriate injury criteria for the various body areas at risk that can link features of an occupant's impact response with estimations of the extent and severity of expected injuries. Performance limit recommendations that would provide sufficient reduction of the current side impact injury situation will also be proposed).

Steady progress has been achieved in each of the four major research areas with updated versions of the final report having been redrafted. However, developing and reaching consensus in the area of Biofidelic Impact Response Specifications area remains the most difficult technical challenge to the BWG. The difficulties stem from deciding what is the set of *necessary* response requirements and when do they become the set of *sufficient* response requirements. This is further complicated because some response requirements determine how a dummy should interact with its impact environment while others deal with those requirements necessary for good injury prediction. Various, recent technical publications in this area have tried to address this issue and the BWG feels that with these new concepts, it can find a reasonable consensus of opinion to resolve this issue and allow finalizing the needed response requirements.

Efforts to develop Biofidelic Impact Response Specifications for a family of frontal test dummies have also been informally initiated. The BWG has decided to use, as an initial bases, the response specifications derived and used for the design and development of NHTSA's advanced frontal test dummies, the 50th percentile male and the 5th percentile female THOR dummies. Evaluation of the

appropriateness, adequateness, and sufficiency of these and other existing requirements will most certainly become major discussion topics for upcoming meetings of the BWG group.

SUMMARY

To accomplish its task of developing and providing necessary and sufficient specifications to develop a universal side impact anthropomorphic test device(s) with associated injury criteria and performance limits, the BWG continues to review crash data, anthropometrical data, biomechanical response and

injury data. As it stands today, the current consensus among the BWG's participants is that the world side impact problem possesses sufficient significant similarities to allow a definition of a single family of dummy test devices to be made. This single family should be able to appropriately represent the diversity of the world's nationalities as well as be able to monitor and/or control all significant injury and crash modes they experience. The BWG also believes that sufficient information exists to define the dummy's impact response characteristics to assure that it adequately response like a human and those responses can be interrogated to make accurate estimations of injury. The BWG hopes to complete this undertaking in the near future and provide the Steering Committee a draft of the Side Impact report as it has requested.