International Harmonised Research Activities
Vehicle Compatibility Working Group

Minutes of the Sixth Meeting, held in Berlin, on 6 - 7 July 1999

Present:	**IHRA**		**EEVC and Observers**	
	P O'Reilly	Chairman	M de Leo	Italy/Fiat
	A Hobbs	Secretary	H Appel	TUB
	T Hollowell	USA	G Granjus	Renault
	G Neat	USA	B van Kampen	Swov
	E Faerber	EU/EEVC	J Huibers	TNO
	C Adalian	EU/EEVC	H Mooi	TNO
	R Zobel	European Industry	P Lenhoff	Saab
	K Oki	Japan/Industry	J Green	Rover
	K Seyer	IHRA Side Impact	A Lund	IIHS
	A Lie	IHRA Frontal	J Nolan	IIHS

The first day of the meeting was a joint technical exchange, on crash testing and modelling, with EEVC Working Group 15.

CRASH TESTING

TRL

Mr Hobbs explained the rationale behind part of the crash test programme being carried out by EEVC (Doc 29). This was aimed at exploring three tests which might be able to cover both frontal impact compatibility and advanced frontal impact. The first test was aimed at improving structural interaction in impact by encouraging more homogeneous frontal structures. The test consisted of a US style NCAP test against a loadcell wall. In the test a thin deformable face (150 mm) was used to remove the very high accelerations experienced by the very front structures, on impact with the barrier. By controlling the force distribution at the car front it was hoped that this would lead to greater homogeneity and better structural interaction. The second test is based on the Euro NCAP ODB test with the addition of load cells. This test is intended to control the stiffness characteristics of colliding cars so that they would each absorb their own kinetic energy. The third test is an overload test of the passenger compartment. This test is simply designed to provide assurance that the passenger compartment can survive overloading without collapse.

He described some crash tests including a comparison between an ADAC car to car test and Euro NCAP tests on the Peugeot 806 and VW Sharan/Ford Galaxy. This illustrated how incompatibility between to MPVs had led to inefficient energy absorption.

INRETS

Miss Adalian explained the INRETS test programme and gave some preliminary results. These tests are part of the EEVC programme exploring the full width barrier and ODB tests described above and comparing them with car to car tests. The cars being tested are the Peugeot 406 and the Renault Twingo. The results of these tests will be available when they have been analysed.

BASt
Mr Faerber explained that BASt are also carrying out car to car, ODB and full width barrier tests. They are testing both standard and modified Ford Escorts. The cars have been modified to make their front structures more homogeneous. This has been done by weakening the longitudinals and filling the engine compartment with aluminium honeycomb. Tests have shown that these modifications have made the front more homogeneous but high loads have been transferred to the firewall which has intruded into the passenger compartment. Future tests will incorporate a frame, at the front of the car, to link the longitudinals both laterally and vertically.

Fiat
Mr de Leo presented analyses of car to car and barrier tests using Fiat Brava and Renault Megane cars. These cars have a similar mass but different structures and stiffnesses. Fiat used an ADAC barrier face for their offset test.

In the car to car test the Brava was seen to over-ride the Megane. This was thought to be due to its higher structure. Mr de Leo was concerned that the deformation of the Brava was greater using the ADAC barrier. He conclude that this was because the front layer of the ADAC barrier face was thinner than the EEVC barrier face. The second and third layers were very much stiffer and consequently more aggressive to the car. from studying the force/time histories for the upper and lower load paths, he found similar loads with the Megane but the Brava was seen to generate higher loads on the upper load path than on the lower load path. Mr de Leo's reason for choosing the ADAC barrier face was that it could absorb more impact energy. However, this did not happen in this test.

Australia
Mr Seyer described the joint programme FORS are carrying out with Transport Canada to study side impact (Doc 30). In these tests, a Ford Falcon is being used as the target car with a BioSID dummy in the front and SIDIIs in the rear. A parametric study is being performed varying the MDB characteristics. In giving some preliminary analyses, Mr Seyer pointed out that when the AFL design of European barrier face was used with a crabbed barrier it failed in shear. Mr Seyer will supply a CD with the Doc 30 files on it, to distribute with the minutes.

NHTSA
Dr Hollowell explained that his test programme had been held up because of work on airbags. He described the test programme which was being carried out to support the modelling project. Side impacts are being carried out with crabbed bullet vehicles and offset frontal impacts are being carried out with an angled approach. Dr Hollowell expects to have results available for the next meeting.

IIHS
Dr Lund showed that fatality rate decreases with increasing mass but that the rate for cars is lower than that for utility vehicles (Doc 31). This is due to the high incidence of single vehicle accidents. He went on to explain that the aggressivity of utility vehicles cannot be attributed to mass as they are more aggressive than similar mass cars. This difference is greater in side impact.

Because of the high incidence of single vehicle accidents and other configurations where compatibility is not expected to be effective, Dr Lund concluded that less than half of the fatalities occurred in the smaller car in accidents, which compatibility was expected to influence.

Consequently, self protection is thought to be more important. At lower injury severities, two vehicle impacts are more frequent.

He reported on six side impact tests using the Mercury Grand Marquis as target car (2007 kg). Different bullet vehicles were used, varying bumper height, stiffness and mass. In the tests, the bullet vehicle was travelling at 30 mph and the target vehicle at 15 mph. In this configuration, all of the bullet vehicles suffered "front end shift." There was some concern that such shift is not frequently seen in accidents. This may cast doubt on the appropriateness of using a crabbed test configuration.

SIMULATION MODELLING

TNO

Mr Huibers made a presentation on the Madymo modelling of cars derived from the NHTSA FE models of the Taurus and Neon. These have been validated against full width rigid wall impacts and their use has been extended to offset deformable barrier and car to car impacts. The Neon has also been modelled for a side impact test with the FMVSS 214 barrier.

Mr Mooi explained that simple models for fleet modelling had been presented before. This work has now being extended to include more complex Madymo models.

NHTSA

Mr Neat made a presentation on the Fleet modelling work carried out in the US (Doc 32). They are using the INSIA protocol for collecting vehicle structural data but they have extended it. The fleet modelling is based on five US car models. Dr Hollowell explained that NHTSA were doing some FE modelling work on the Neon with the passenger compartment made rigid. They are going to repeat the car to car, offset deformable and full width impacts with this setup to look at the effects on deceleration pulse and frontal forces.

IHRA ONLY MEETING

APPROVAL OF MINUTES AND ACTIONS ARISING

The minutes of the last meeting were agreed.

Page 1 The software to calculate the load cell wall distribution, as given in Doc 23, is available direct from Ken Digges.

Page 2 The action for Mr Faerber to supply barrier crush depth data, at the time that the injury parameters peak, is carried over to the next meeting. **Action Faerber**

Page 3 The action for EEVC to consider what extra data could be added to the NHTSA fleet model is carried over. **Action Faerber**

My Seyer will supply documents on the earlier Australian analysis direct to members. A document number will be allocated at the next meeting. **Action Seyer & Secretary**

Page 4 Mr Oki will discuss the provision of accident data on minicars with Mr Kadotani for the next meeting. **Action Mr Oki**

EUCAR will hold a meeting in September when they expect to agree their test programme. The action is deferred until after that meeting. **Action Zobel**

Dr Zobel will send a copy of the accident seminar report to the secretary who will allocate a document number and circulate to members. **Action Zobel & Secretary**

Dr Hollowell advised the group that confidentiality of data on the web site could not be guaranteed, if there was a change in administration. Any confidential information should not be supplied for inclusion on the web site.

IHRA STEERING COMMITTEE

The chairman explained what he had reported to the Steering committee on the IHRA work. Copies of the report had been circulated previously.

ACCIDENT DATA

Australia

Mr Seyer presented an analysis carried out by Monash University (Doc 33). This was a paired comparison analysis of the relative risk of injury to the driver of the subject vehicle compared with that for the driver of the other vehicle, for vehicle to vehicle collisions. For single vehicle accidents, the risk of severe injury to the driver relative to all injuries for single vehicle accidents was used. A number of questions were raised in discussion which Mr Seyer will take back to Monash for consideration. **Action Seyer**

Japan

Mr Oki presented accident data for Recreational Vehicle accidents in Japan (Doc 34). Conventional cars with bonnets accounted for the largest proportion of accidents (82%). Recreational vehicles account for 5 percent of accidents. Although recreational vehicles accidents are relatively infrequent, RVs are more aggressive to other cars. Following a number of queries by members of the group, Mr Oki agreed to add extra information with explanations for the terms used in the document. He also agreed to add a distribution of vehicles by size for each category in Japan.

Action Oki

STRUCTURAL SURVEY

Australia

Mr Seyer distributed some preliminary information from a structural survey in Australia (Doc 35). This will be developed into a complete document for distribution. **Action Seyer**

EUCAR

Dr Zobel explained that in the EUCAR survey they had been unable to correlate longitudinal height with car size. Mr Hobbs suggested that if this was the case, controlling longitudinal height might not present a problem in the future.

NHTSA

Dr Hollowell presented data from US NCAP and FMVSS 208 giving average vehicle decelerations of about 25g. This is well below the 30g being suggested as the limit for current restraint systems. The peak accelerations were above 30g. The average acceleration was taken from the time of initial contact to the point of zero acceleration.

CURRENT ACTIVITIES AND FUTURE PLANS

EEVC

Mr Faerber gave a verbal presentation for the benefit of IHRA members not present at the EEVC WG15 meeting. It is expected that there will be a follow up EC project within the 5th Framework. WG15 expects to put a bid in for the second call and for work to commence in 2000. Outside the EC project, TRL, BASt and possibly INRETS will continue with compatibility research.

NHTSA

Dr Hollowell expects that NHTSA will continue with their fleet studies, using FARS and NASS data. The structural survey will continue. They intend to continue with the crash test matrix, adding the CK pick up truck. They also expect to carry out low speed loadcell wall tests to compare with the high speed tests.

Japan

Mr Oki said that they saw the priority as being impacts between cars. They have identified compatibility problems between cars of different sizes but have not decided where to direct their research in the future. In 1999-2000, Japan may be able to carry out about three car to car crash tests.

Australia

Mr Seyer expects to extend their structural survey to add additional vehicles. They will aim to get fleet data and a prediction about how the fleet might develop. Their crash test programme will include car to car impacts covering three car types, the Toyota Starlet, Ford Falcon and Rover Freelander. This will compliment the side impact programme. They may also modify car fronts to add lateral and vertical frontal connections. Mr Seyer's current view is that good connections are required on cars but not on SUVs.

EUCAR
Dr Zobel explained that the results of their accident analyses had led to a change in the crash test programme. They would favour maintaining the current tests but if they had to be changed, they would favour harmonisation. EUCAR have already carried out one overload test which proved quite successful. A problem was found with the door, which opened in the test. It was thought that the failure of the door latch could have been caused by opening it after the first test. He suggested welding the door shut. In their test, they had used the deformed face from the original ODB test, mounted on a trolley impacting the stationary car. In their test programme, EUCAR expect to examine the EEVC two step approach.

IIHS
Dr Lund explained that IIHS has no current programme related to compatibility. However, they will consider where they should go in the future. They will also consider adding a loadcell wall to their ODB test and will look at the accident problem, to check for the appropriate accident configurations to address. They have a programme to look at NASS data to see why injuries are still occurring to properly restrained occupants. he invited members to let him have their views about what to look for in this accident study.

SIDE IMPACT COMPATIBILITY

A discussion took place about side impact compatibility. It was agreed that it was less well understood than frontal impact compatibility but that there was no evidence to suggest that what was being considered for frontal impact compatibility would be counter productive for side impacts.

FORM AND CONTENT OF GROUP DOCUMENT

A document is required to report the working group's activities. It was proposed that the framework for the document would be put together by the Chairman. The document could then form the basis of the report of the group's work and the 2001 ESV paper could be drawn from it.

WEB SITE

It was agreed that a document was needed which described the group's work. The web site could also contain copies of the minutes and other documents. Each contributor was asked to consider whether their documents could be put on the web site and possibly become public. In future all contributors are asked to supply their documents in electronic form, as well as hard copy.

NEXT MEETINGS

The next meeting will be held in San Diego, following the Stapp Conference. On 28 October, a joint meeting will be held with the MVSRAC group. On the 29 October there will be a compatibility workshop, to which EEVC WG15 members are invited. This will be open to those who have information to present. One purpose of the meeting is to decide what advice the IHRA Compatibility group should give the IHRA Frontal Group about the use of a mobile trolley test.

The following meeting will be held on 1 - 2 February 2000 at INSIA Madrid.

C A Hobbs
26 July 1999