

Proposal for Changes to the ECE-R 94

Dummy position

Seat position

Injury risk values

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Objective

- Identification of real world issues in frontal accidents with focus on injuries induced by vehicle acceleration
- Establish a proposal for the IWG FI for
 - Dummy position
 - Seat position
 - Injury risk values

Previous Research: TRL - Report on Frontal Impact Regulation

Conclusions

- Car occupant fatalities still account for about half of all road accident fatalities
- Car frontal impacts account for between 59-63% of car fatalities
- There are also a large proportion of fatalities at relatively low severities, the majority of which are elderly occupants

Previous Research: FIMCAR Accident Analyses

- More than 80% of AIS2+ injuries are related to the restraint or contact without intrusion
- Injuries due to vehicle acceleration are increasing with higher overlap
- While intrusion related injuries were addressed in the past years, now the injuries induced by vehicle acceleration are more prominent

Previous Research: Restraint System Safety Diversity in Frontal Impact Accidents

- IRCOBI 2012: Hynd et al. (TRL, Autoliv)
- Investigation of different dummy sizes and their benefit
- The magnitude of the benefit may increase for a fully adaptive smart restraint system compared with a simpler system

Previous Research: USA, FMVSS 208

- In the FMVSS 208 the airbag aggressiveness is included since many years
- Prasad et al 2008; Interactions of out-of-position small-female surrogates with a depowered driver airbag.
 - The objectives of this study were to examine the response, repeatability, and injury predictive ability of the Hybrid III small-female dummy to static out-of-position (OOP) deployments using a depowered driver-side airbag... The results suggested that an **older, osteoporotic, small-female driver would experience AIS > or = 3 thoracic injury if exposed to this type of depowered airbag inflation for the three positions tested**, but would be unlikely to experience any head or neck injury...

Previous Research: BAST Accident Study, 2012

Presented to the Euro NCAP Frontal Impact Group

- Higher injury frequency on passenger seat position compared to driver seat position
 - Higher injury frequency for female on front passenger seat, higher injury risk for male on driver seat
 - Most frequent injury risk on passenger seats in forward and middle position of the seat track
- Positioning of a 5% female dummy on the passenger seat either on most forward position or between middle and most forward position

Conclusion from previous research

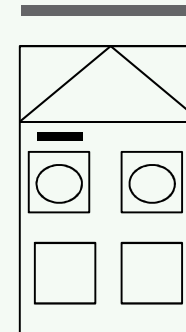
- Car occupant fatalities still account for about half of all road accident fatalities
- Since the compartment stays stable in most crashes the acceleration induced injuries are more prominent
- However, many of the injuries were identified at a AIS2+ level
- Airbag aggressiveness was observed in previous years in US and is addressed within the FMVSS 208

In order to address vehicle acceleration induced injuries the following proposal are made:

BASt Proposal: Dummy Position in Full Width Test

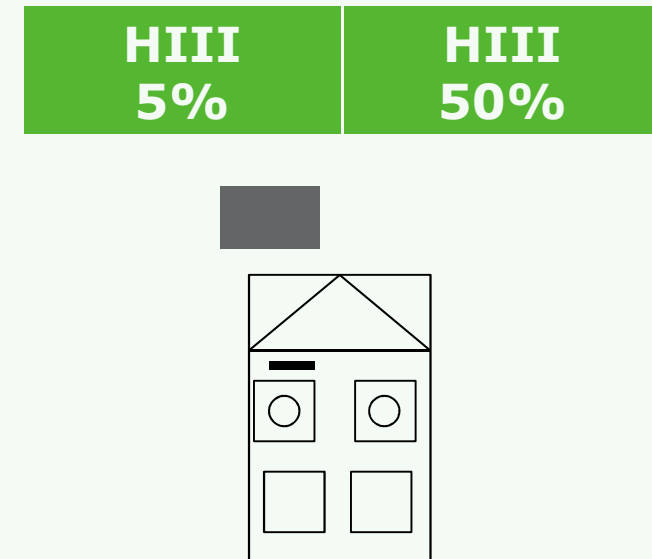
- With the FWRB (a restraint system test) the performance of the restraint system will be tested with the mid size dummy in the driver position
- The test speed is lower compared to the FMVSS (50km/h) to avoid too stiff vehicles and to reflect frequency and severity of real world accidents

HIII 50%	HIII 5%
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BASt Proposal: Dummy Position in the offset Test

- With the ODB test the structural integrity of the compartment will be tested. In addition the 5% dummy ensure that the restraint system is not too aggressive in particular for smaller occupants.
- The combination of the two tests provide a range of demands to improve the restraint system



Proposal for Seat positioning (track adjustment)

- HIII 50% dummy (driver and passenger)
 - Seat position in the middle of the track (no changes)
- HIII 5% driver dummy
 - Most forward position of the longitudinal track because airbag aggressiveness and to reflect ergonomics
- HIII 5% front passenger seat dummy
 - Seat in the 25% position to reflect real world seat data and to avoid very extreme positions

Proposal for Injury Values

- In general:
To address elderly persons the 65 year old injury values shall be used **for both tests**
- Currently biomechanical injury values based on literature are under discussion, amongst others:
 - Eppinger, Sun et al 2000 - Development of Improved Injury Criteria
 - Kent, Bolton et al 2001 - Restrained Hybrid III Dummy-Based Criteria
 - Kent, Patrie 2005 - Chest deflection tolerance to blunt
- Discussions are not yet finalized, limits will be proposed for the next IWG FI meeting

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Thank you for your attention

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