

## **UNECE GRSP IWG Equitable Occupant Protection (EqOP) Task Force – Virtual Crash Testing**

Draft minutes of the 9<sup>th</sup> meeting.

On-line meeting on the 4<sup>th</sup> of June 2025 with 32 participants.

### **Adoption of the agenda & minutes of last meeting**

Agenda was approved by the participants. Minutes of the 8<sup>th</sup> meeting were approved.

### **Presentations and discussions – are simulation models good enough?**

The chair introduced the point by referring to the chair's definition of the proof of concept which was also explained during the last GRSP session:

*“The proof of concept in this case means that we proof if we can formulate a written concept of a testing procedure and requirements of all involved tools to identify the sticking points and develop a roadmap until when what can be reached.*

*In this draft, we aim to have a procedure which allows to check the injury risk for different body shapes representing the female and male population in frontal crashes neglecting intrusions of the vehicle structure. We also aim to make the procedure in a way so that it will be also open to consider additionally lower speed impacts, the assessment of injuries currently not considered (e.g. brain injuries) and enable to consider thresholds for an aging population. The proof of concepts should also not be a pure theoretical task, we will also generate some side products which we hope are useful for currently only very briefly described validation of simulation models in UN R21. We have heard that the simulations in this regulation with the Hybrid 3 simulation models are already successfully applied, so there is no urgent action needed. However, a clearer guidance for the technical services could be helpful. We will also define body shapes representative for the current population.”*

### **Presentation of ISO scores from virtual testing at China NCAP (CATARC)**

Dr. Bu presented the content of CNCAPs virtual testing protocol and explained the use of ISO scores (see [EqOP-TF3-09-03e - C-NCAP虚拟测评内容与iso scores.pdf](#)). Current VT roadmap is shown, and the details of the different load cases are explained. Dr. Bu showed the resulting ISO scores for the different disciplines coming up in 2027 protocols. Results from CATARC internal and industry simulations are shown: no remarkable difference seen. He closed his presentation with CATARC's stepwise approach on the use of VT: 1<sup>st</sup> supplement physical testing, 2<sup>nd</sup> investigate active/passive scenarios and 3<sup>rd</sup> address diversity with HBMs. CATARC's conclusion on the usability of the simulation models: Dr. Bu stated that in his view frontal impact could be implemented in future protocols as ISO scores from different OEMs (from Japan, China and Germany) can meet the threshold of 0,7.

The group concluded that in the background of regulation these topics need to be discussed, for the use in consumer testing ISO scores are currently seen as sufficient to assess the correlation.

### **Validation of Airbag Models (Autoliv)**

Autoliv presented on the state of the art modelling/validation of airbag models and importance of other vehicle interior parts influencing the kinematics of the occupants (see [EqOP-TF3-09-04e - 20250603 EqOP TF3 AirbagValidation Autoliv.pdf](#)). 20 years ago work has

started with modeling guidelines for airbags, since several years airbag models comply with a German industry standard (CORA rating > 0,9).

Looking at whole system in occupant simulations, the models are not predictive but can be used very effectively for development purposes. Same effort as for requirements on airbag validation (AK-LV36) should be put in the crash behaviour of all components which highly influence dummy kinematics. This could increase the cost and efforts if such requirement would be integrated in component requirements.

In principle the correlation could also be done in a whole system approach covering several working points but the variation of the hardware dummy needs to be taken into account which might require a lower correlation level of the whole model.

### **Validation of HIII Simulation Models (Humanetics, ACEA)**

Firstly, Humanetics presented background information on Euro NCAP VT load cases for frontal impact and the qualification requirements for H3 dummy models defined in CP510.

Latest results of their ATD models Humanetics answered the question: “Are the Dummy simulation models good enough for VT?” as all requirements were fulfilled (see [EqOP-TF3-09-05e - H3 Dummies For VT 20250406 Humanetics EqOP 9th Meeting 4thJune2025.pdf](#)).

Secondly, ACEA gave a more detailed insight in the three stages of the model qualification including background information on possible shortcomings of the used data and procedures for usage in a homologation (see [EqOP-TF3-09-06e - 2025\\_06\\_04-EqOP-TF3 Virtual Testing ATD Certification-ACEA.pdf](#)). ACEA concluded that Stage 1 and 2 might need to be extended to harmonize between dummy percentiles and to include relevant signals. Furthermore Stage 3 only reflects currently 1-D kinematics and simplified interiors.

### **Wrap up and next steps**

The chair summarized the presentations and discussions of the presented topics: CATARC showed promising results in vehicle environment and plans to include these load cases for monitoring in future protocol updates. Based on these first results, an inclusion of VT in regulation on a 10-year time frame seems to be realistic. Looking at ATD models, CP510 was seen a first usable document to be used for MR1 even with the presented need for improvements. Here a framework for regulation might be necessary. Assessment of the correlation of interior models (e.g. airbags, trim parts, seats, ...) on full system level will have to deal with scatter from hardware testing. Component testing-based validation seems to be a suitable addition but is currently not available for all necessary components. This need to be discussed in other working groups.

Following topics/questions need to be work on in the following meetings:

- Validation on component level for interior parts and restraint systems → which WG/forum could address this?
- Status of Human Body Models in terms of validation, qualification and usability.
- Traceability: What and How? (possible update from ANSYS/IIHS?)

Additionally, the group need to discuss how to go forward with the “proof of concept”:

- What do we need?
- What do we already have?

### **Next meeting:**

Online meeting on the 16<sup>th</sup> of October 2025, 12:00 – 14:00 CET.