

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

Draft minutes of the 12<sup>th</sup> meeting.

On-line meeting on the 11<sup>th</sup> of December 2025 with 31 participants.

### **Adoption of the agenda**

A shorter agenda was approved.

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

Minutes of the 11<sup>th</sup> meeting were approved.

### **Continued discussion on the maturity of HBMs to be used in regulations**

The chair opened the Miro Board with the purpose of guiding the continued discussion.

[ [LINK MIRO BOARD](#) ] The discussed diagram of the Miro Board has the purpose of outlining a framework for assessing the readiness and application of HBMs within regulatory testing. It sketches how HBMs can effectively be used to close equity issues and compares it with the possibilities that we have using ATDs.

We added the current limitations and possibilities associated with existing ATDs and contrasted these with the challenges and advantages offered by HBMs, as additional columns. We continued the discussion on the issues of the elderly population, varying body postures, implementation of active muscles, moreover the development of vehicle simulation models.

The current maturity of HBMs for diverse crash scenarios is projected for the medium-term future, with various applications estimated to be ready within the next 5 to 10+ years. A few discussed examples are provided in the following:

- For checking fit criteria for seat belts across different body sizes, readiness is projected at 5+ years.
- For addressing complex kinematics, such as the consideration of pre-crash kinematics, or implementing more robust restraint systems for different body shapes, the readiness is estimated at 10 years or more.
- For scenarios requiring active muscles (e.g., in pre-crash phase evaluations), readiness is projected to be 10 years + if active muscles are required.

We addressed the current gaps and necessary harmonizations required to make HBMs operational in regulations. A few current discussed limitations and gaps of HBMs are provided in the following:

- Missing harmonization of injury criteria for the elderly population. There is also a lack of harmonization for injury criteria and assessment related to different body shapes.
- A general need for harmonization regarding injury assessment.
- Gap exists in the harmonization of PMHS muscle model validations (relevant for low-speed impacts) and active muscle model validations (relevant for pre-crash kinematics).
- Need for harmonization of spine curvature in reclined posture and harmonization regarding how to quantify belt fit.

In summary, HBMs offer advantages, e.g., greater biofidelity for lower speeds and more detailed geometrical and material properties than traditional ATDs, but their implementation in regulations for diverse scenarios is constrained by the need to further standardize methods for assessing injuries.

The other diagram focuses on the possibilities to evaluate risk of specific injury types where equity issues were identified, from the head and neck to the abdomen and lower extremities. The aim is likewise to evaluate what is feasible and in which time frame, differentiating between shorter-term validation goals (3-5 years) and longer-term regulatory application (10 years). The discussed framework can provide a structured plan for research and regulatory efforts intended to improve injury risk assessment.

Ultimately, the discussed assessment shall be feasible regulatory solutions that will involve either setting standards based on relative comparisons among load cases or establishing a comprehensive absolute injury risk assessment.

### **Next steps**

The task force will continue the discussion on the topics.

The chair will seek feedback on the conclusions from today's discussion from relevant stakeholders within the HBM4VT network and report back to our task force.

### **Next meeting**

Next meeting will be an online meeting on the 25<sup>th</sup> of February 2026, 12:00 – 14:00 CET.