Latest Developments of VPS Crash Test Dummy Models

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Modelling of the THOR-M dummy is taking place alongside the hardware development and production start-up of the hardware. The model is used within Humanetics to facilitate a full understanding of the THOR dummy. The model represents the latest features in the hardware including the SD3 shoulder and THOR-LX lower leg which are not yet approved by NHTSA but most likely will become adopted for production. A first version of the model will be validated using an initial data set and is planned to be released around the middle of this year.

A VPS model of the Q10 Child is being developed in parallel to the physical product. Its geometry and material cards were built based on the actual SBL-B hardware. Development on a Q10 side-impact kit is ongoing. Euro NCAP is planning on adopting both the Q10 and the Q6 dummy to their protocols forecasted for 2016.

During the past year, Humanetics began delivering harmonized dummies, the first being the Hybrid III 50th percentile. This was undertaken to create a single brand of dummies to standardize dummies manufactured by Humanetics and to reduce variation caused by brand differences. Dummy variation can affect performance in crash testing even though issues do not show up in dummy certification tests. A VPS model of the harmonized Hybrid III 50th percentile is being finalized for release.

Thorax borderline models have been developed to capture variability of the Hybrid III 50th percentile thorax from different brands. These models represent an extreme “soft” and extreme “stiff” thorax and allows users to assess the effect that the dummy certification may have on vehicle test results. It allows to understand and quantify variability coming from the thorax in comparison to variability coming from other variables such as positioning, belt and airbag.

Advanced material modelling techniques are being applied to develop models for challenging dummy materials. Material tests like equi-biaxial and planar tension are incorporated in addition to uniaxial loading to capture material behavior across various deformation modes. Additionally, dynamic tests are carried out at different strain-rates to interpret the viscoelastic nature. Unloading characteristics of foams is being improved and multi-objective parameter extraction methods are being implemented to characterize material response across different tests. Material tests are being simulated using multi-element models, including torsional and cyclic loading cases, to ensure that material is fully representative of the physical hardware.