

INNOVATIVE RESTRAINT SYSTEMS – VIRTUAL VERIFICATION RESPECTING THE VARIETY OF HUMAN POPULATION VIA VIRTUMAN MODEL

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It is evident, that today trends in mobility toward autonomous driving systems bring new challenges for both active and passive safety elements. The situation will be even more challenging in the coming years due to co-existence of automated and non-automated conventional traffic for a relatively long transition period. There are HPC computing used as a standard tool in the development cycle of modern vehicles, but the current certification process involves mainly tests with mechanical dummies, which are usually limited to a single purpose impact assessment. Virtual human body models bridge the gap enabling assessment in multi-directional impact scenarios at least in the development phase. The main aim of this work is to show the potential of application of the virtual human body model Virthuman in crash scenarios, where respecting real variety of the human population is essential.

The scalable virtual human body model Virthuman is formed by a virtual skeleton formed as a multi-body structure coupled via a system of springs and dampers modelling soft tissues to outer segments representing skin. The model can be simply adapted to any initial position and it enables fast calculation of injury risk prediction. The Virthuman model is scalable, so it is simply able to represent any human being just based on few parameters identifying proper representative in the anthropometric database.

This contribution describes the methodology of human body scaling and its application to different type of safety applications, where the variety of human population can play a role and it should be considered during safety protective systems design. There will be explained and summarized methodologies, where scalable human model was used for analysis of dangerous scenarios (like accidents in transportation from perspective of a pedestrian, driver or passenger) or verification of functionality and design improvement of innovative protection systems.