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Investigation of Diversified Cae Modeling Techniques and Dynamic Loads on The Advanced Design Luggage Bar

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Abstract

In the automotive industry, studies on improved safety attributes have received increasing attention in recent years. In case of a design change in the field of safety, compliance with the regulations is essential and studies are carried out in this direction without compromising on mechanical properties. In the present study, after the design change of the luggage bar part of the rear row triple seats in commercial vehicles, passenger security-based analyzes were characterized and the effect of different computer-aided engineering (CAE) models was examined. Based on this, the ECE R17 Luggage retention test was performed using the Rigid Coupling model and the Hexa element model. The test models were compared and the physical test was performed for correlation purposes. After the analysis, it was determined that the Hexa element model was appropriate in terms of correlation and surface-surface contact between the seat and the luggage bar, beam-to-surface contact for the edge surfaces between the seat leg and surface-surface contact parameters for the contact surfaces were used in the relevant modeling. After finite element analysis (FEA) analysis, tearing was detected in the pin of the structure, and a correlation was achieved in the physical test. Design changes were made in the relevant area, but after repeated analysis, various design changes were made in the structure when it was transmitted to different regions such as high-stress wire and slot parts. After the analysis, the renewed design has successfully passed the ECE R17 regulation by providing without increasing weight. No deformation or breakage was observed in the physical test performed after the prototype production.

Keywords: automotive, design, finite element analysis, luggage retention test, modeling