Finite Element Simulation of Rear Seat Back Frame Impacted by Wood Blocks for Securing Proper Bracket installation

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Abstract

The rear seat back frame for sports utility vehicles is composed of LH and RH frames with the bracket installed at the lower part of each frame and the bush connected to the brackets used to fold the frames. In this study, the FE simulation is performed to select the proper bracket shape and welding position for the rear seat back frame satisfying the test criteria of the luggage retention test. The modeling methods of bracket welding part and bush part are compared to establish a simplified modeling criterion for the appropriate impact simulation about the bracket installation. When the wood blocks applied by the acceleration condition collides against the rear seat back frame, the head rest and bracket position in the rear seat back frame is the maximum forward displacement from the heap point at the middle and end of the simulation time, such as the luggage retention test respectively. FE simulation is correlated with displacement results of the tested rear seat back frame through SLED test of the luggage retention test due to simplified modeling of multi nodes to nodes method at bracket weld position and free restraint method at bush. The obtained FE analysis modeling criterion allows simulation of bracket shape change of a form addition, flange strengthening, and thickness increase, and weld zone change modeling, thereby ensuring a more suitable displacement aspect compared to the tested rear seat back frame. FE simulation for the luggage retention test is reconfirmed similar to the results of the actual SLED test of the products manufactured with the new bracket shape and welding positions proposed by the FE simulation. It is suggested that luggage retention test of seat back frame can be done by replacing some part test by performing FE analysis based on simple bracket and bush modeling.

Keywords: Bracket, Correlation, Finite element simulation, Luggage retention test, Rear seat back frame, SLED test