

Crashworthiness study of S-Rail behavior

Abstract

In this study, a different design aspect of a simplified front side rail structure of an automobile body (S-Rail) from the point of view of crashworthiness parameters which are crushed energy absorption and force response and also weight efficiency is studied. Various orientations of cross section design and various material replacements have been applied to investigate their effects. The specific energy absorption (i.e. Energy absorption per unit weight) is taken as a measure of the performance of a structure. Effect of different cross section with model cross section horizontally 'hat -type' model (shape 5) given greatest energy absorbed. This model then being analyzed with different material such as mild steel, aluminum, Hastelloy X alloy and Fiberglass Polyamide (PA -66). Hastelloy X alloy result the highest increment in ability to absorbed energy during collision. The consideration of various cross sections and the best material selection of replacement then been discussed and compared for suitability from the aspect of crashworthiness, safety of passengers, weight efficiency and cost to automobile industry.

Keywords: Crashworthiness; Cross section design; Energy absorption; Force responses; Material replacement; Weight efficiency