

Effect of Material and Thickness of Side Doors And B Pillar on Crashworthiness in Euro NCAP Side Impact Crash Test.

ABSTRACT

In side impact test which is one out of three tests of Euro NCAP standard, front and rear doors and B pillar are most absorbance parts among vehicle body parts. Passengers are highly in danger while side crash, because of the distance between passenger's head and vehicle body. In this paper effect of material and thickness of doors and B-pillar and their absorbed energy during crash and improvement of its crashworthiness with respect to light weight design are studied using LS DYNA solver. The objective of this paper is to propose a material for doors and B-pillar with a specified thickness to achieve maximum absorbed energy and minimum weight. The shape of the doors and B-pillar remains unchanged and its effect on crashworthiness was not investigated. Parameters which could be changed were material and thickness. Material which studied were steel AISI 1006, aluminum alloy 5182, magnesium AZ31B and high strength steel 204M. For each selected material, five thicknesses were considered and the same initial and boundary conditions according to NCAP were applied. Results show that decreasing in thickness of these parts do not always increase the absorbed energy. In order to reduce the weight and increase the total absorbed energy the best way is to use thinner parts with light material and use a reinforcement bar or foam inside the doors.

Keyword: Crashworthiness; Side impact; Crash simulation; NCAP; Material selection; Crash optimization