

Investigation of thickness influences on energy absorption for side doors and B pillar in Euro NCAP Pole Side Impact Test

ABSTRACT

To assess a car under the Euro New Car Assessment Program (Euro-NCAP), Adult Occupant Protection is one out of three parameters which need to be calculated with a weight factor of 50% while the other parameters, Child Occupant Protection and Pedestrian Occupant Protection, have a weight factor of 20%. The Pole Side Impact Test, beside two other tests, Side & Front Impact, is also required to calculate the Adult Occupant Protection. It shows how important the Pole Side Impact Test is and what an effective role it has in the car rating assessment. In this paper, the objective is to evaluate the effect of thickness on the energy absorbed by the side doors and the B pillar and its crashworthiness in a Pole Side Impact Test based on the Euro NCAP. In this matter, a vehicle model has been designed and prepared using CATIA and meshed using Hypermesh. Five thicknesses have been chosen including 0.6 mm, 1 mm, 1.2 mm, 1.4 mm and the original thickness of the side doors, 0.75 mm. The simulations have been repeated, using LS DYNA solver, assigning each of five thicknesses to the side doors and the B pillar of the vehicle. Initial conditions defined by the Euro NCAP, including velocity and directions, have been applied to the model. A total of 5 simulations have been conducted. The results showed that changing the thickness of the side doors and the B pillar does not necessarily have a direct influence on energy absorbed. The conclusion is that there are different proper thicknesses for each part which will result in optimized energy absorption.

Keyword: Adult protection; Crashworthiness; LS DYNA; Modeling; NCAP; Pole impact; Simulation; Star rating