

Design of aluminium/polycarbonate structure for vehicle bonnet

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ABSTRACT

According to the World Health Organization statistics, 1.2 million peoples are known to die in road accidents worldwide. Car manufacturers incorporate numerous safety devices and features into their vehicles to reduce injury to the vehicle occupants. Pedestrian protection is also an important issue in traffic safety, as accidents between cars and pedestrians take thousands of lives annually worldwide. The head zone of pedestrian was assessed as the most dangerous injuries that might lead to fatality in account for 60% of all pedestrian fatal injuries. The cause of head and face injuries during the impact was presented in statistic with the high rate of 17.3% by bonnet. That is why bonnet considering becomes important and necessary concern for car manufacturers. This study proposes a bonnet sandwich structure with Aluminium and Polycarbonate material and analyzes its contribution on vehicle model design. Besides, this research also discusses the effect of thickness of sandwich structure on pedestrian head injuries. For designing the pedestrian friendly vehicle model with bonnet sandwich structure, the simulation model of headform impactor to strike bonnet surface is established in LS-DYNA. The assessment processes is performed based on the European Enhance Vehicle – Safety Committee/Working Group 17 (EEVC/WG 17) and European New Car Assessment Program (Euro NCAP) regulations. The bonnet sandwich structure proposed herein has good behavior to protect pedestrian during the impact and ensure the protection of engine inferior to bonnet part simultaneously. Analysis models and results of this study contribute to efforts to design vehicle bonnet structures and pave the way for developing pedestrian protection technologies.

Keywords : Pedestrian、 Headform impactor、 Bonnet、 Sandwich structure、 Aluminium、 Polycarbonate

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