UTILIZATION OF AIRBAGS ON AIRCRAFT CABIN CLASS DIVIDER PANELS

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ABSTRACT

The increasing manufacture of automobiles and aircrafts every year increase the number of accidents every year. This results in an increased study of occupant safety and modification of vehicle interiors as the human safety is a major concern for these industries. National Highway Safety Administration (NHTSA) and the Federal Aviation Administration (FAA) have specified several injury criteria for reducing the complications of manufacturing specifications. Based on these regulations, the occupant safety devices such as the seat, restraint system, the vehicle interiors, and the other parts in an automobile and an aircraft are designed and certified to reduce the injuries during crash.

During crash scenarios, it has been estimated that almost 60 to 70% of the casualties occur due to head and neck injuries. Thus head injuries have been a primary focus of interest recently. FAA have adopted some amendments for the Federal Aviation Regulations (FARs), which requires the demonstration of head injury protection by means of a dynamic impact sled testing using certified crash dummies. This led to the development of Head Injury Criteria (IDC), which set up a threshold limit for the head and neck injuries.

Difficulties have been encountered during the certification of both front-row bulkhead and row-to-row seat installations for transport (part 25) class aircraft. In this study, a rational engineering approach was followed to design an airbag using simulation tools to suite the aircraft applications. Bulkheads that were used in the aircraft industry were tested for HIC. Simulation models were developed for the typical production bulkheads, validated and the airbag was fitted on to the bulkhead and the results are compared. Also an energy-absorbing bu1khead was designed for HIC compliance by conducting several sled tests and simulations. The airbag was tested on the designed HIC compliant bulkhead and also on a rigid wall surface and the results were compared and conclusions were drawn. Various simulation tools like MADYMO, PATRAN and LS-DYNA were used in designing and simulation purposes.