

DESIGN AND ANALYSIS OF AN INFLATABLE SHOULDER HARNESS FOR OCCUPANT PROTECTION IN CAR FRONTAL IMPACT CRASHES

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Spring 2002

ABSTARCT

Frontal impact is the number one fatality and injury-causing mode of crash in occupants. Thus occupant safety under frontal impact is big concern for researchers and vehicle developers. Inflatable restraint system such as airbags has shown to be a promising restraint system for occupant protection and have been revisited by researchers from time to time. Although airbags have saved thousands of vehicle occupants during these crashes, they have also caused severe injuries and several deaths when they are inflated during low severity crashes. Thus to provide additional safety of the occupant an Inflatable shoulder belt was designed and tested to meet the injury requirements as specified by FMVSS 208.

The Inflatable shoulder belt was tested with different size of occupant for different triggering time and mass flow rate in and out of the inflatable section. Triggering time, control of mass in and outflow of the inflatable section were found to be most important factors affecting the injury behavior of the occupant. The comparison of the Inflatable seat belt with conventional seat belt have shown great improvement in the injury parameters such as lower torso acceleration, upper torso acceleration, head acceleration, neck forces and moments. The decrease in the neck moments, which is the major injury with airbags, is considerable with inflatable seat belt. It was also seen that proper amount of gas outflow of the inflatable section is necessary to observe any improvement in the results of injury parameters. Substantial increase in shoulder belt forces was observed due to additional pressure of the gases in the inflatable section on the belt.

Thus proper control of the critical parameters such as triggering time, mass flow rate is very important to obtain improved results of injury parameters with Inflatable shoulder belt.