

Characteristics of nearside car crashes – an integrated approach to side impact safety

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Akademisk avhandling

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Abstract

Introduction: Approximately 1.25 million people are killed in traffic accidents yearly. To achieve the Global Goal of a 50% reduction of fatal and serious injuries in 2020 a safer infrastructure, as well as new safety technologies, will be needed. Side crashes represent 20% of all serious and 25 % of fatal injuries. The overall aim of this thesis is to provide guidelines for improved side impact protection.

Methods: NASS/CDS data was used to provide exposure, incidence and risk for fatal injury as well as detailed injury distribution and crash characteristics. The WorldSID dummy was compared to Post Mortem Human Subjects (PMHS) in impactor tests at a high and low severity. Crash tests were performed to evaluate WorldSID dummy assessments of injuries found in the NASS/CDS data. The integrated safety chain was used to demonstrate how to evaluate occupant protection in side crashes in a greater perspective.

Result: Most side crashes occur at intersections. The head, thorax and pelvis are the most frequently injured body regions, and seniors have a higher risk for rib fractures compared to non-seniors. The WorldSID dummy response was similar to the PMHS response at the higher impact speed, but not at the lower. In conjunction with improved airbags, infrastructural change, and the use of Automated Emergency Braking, can effectively reduce the number of fatalities and injured occupants in side impacts.

Conclusion: Future focus for side impacts should be on intersection crashes, improved occupant protection for senior occupants, and protection for and from the farside occupant, reducing injury risk to head thorax and pelvis. The WorldSID dummy has the ability to reproduce humanlike response in lateral and oblique impacts. However, at a low crash severity, chest deflection could be underestimated. Instead of developing structures and airbags for high-speed crashes, it is important to consider alternative countermeasures, and hence the need for an integrated approach to side impacts.

Keywords

Side impact, WorldSID, Side airbag, Integrated safety, Real life data, Injury Distribution, Near-side, Crash test, senior occupant.

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