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# Design and simulation of a rear underride protection device (RUPD) for heavy vehicles

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## ABSTRACT

Every year, thousands of deaths are recorded worldwide due to crashes of small cars with heavy trucks. The highest risk during collision of passengers' car with a truck is the intrusion of passengers' compartment under the heavy truck rear underride leading to cause fatal injuries to passengers. Design of robust underride guard of truck is one of the significant factors that should be taken into consideration within design and enhancement of truck chassis. In this study, a new rear underride protection device (RUPD) based on FMVSS 223/224 regulations is developed to enhance the

crashworthiness and reduce passenger compartment intrusion under heavy trucks during accident. Finite element simulation is utilised for performance analysis of the

RUPD in LS-DYNA. The results showed that the new RUPD design enhanced the energy absorption by 68.87% and reduced the occupant's car deceleration by 66.116%. The new guard is able to avoid underride of Toyota Yaris (2010) colliding at 45, 54 and 63 km/h compared with the normal guard that failed under the same test conditions.

KEYWORDS: [Rear underride protection device \(RUPD\)](#), [energy absorption](#), [finite element](#)

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