Extended Abstract

A Crash Testing Evaluation of Motorcyclist Protection Systems for Use on Steel W-Beam Safety Barriers

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Abstract

Safety barriers are a popular and proven countermeasure used to protect vehicle occupants from roadside hazards. However, international and Australian research demonstrates that safety barriers can pose significant safety risks to motorcyclists in the event of a crash. The Centre for Road Safety (CRS) undertook a series of crash tests of currently available Motorcyclist Protection Systems (MPS) to investigate their suitability for use on NSW roads. The objectives were to assess whether the addition of MPS to a standard W-Beam improves the injury outcome for an impacting motorcyclist, without compromising the safety of other road users.

Background, Method, Results and Conclusions (suggested headers only).

Background

Motorcyclists are overrepresented in road trauma compared with other road users, accounting for 19 percent of road fatalities in NSW in 2014, but only 4 percent of motor vehicle registrations (Transport for NSW 2015, Australian Bureau of Statistics 2015). While safety barriers are effective in protecting vehicle occupants from impacts with roadside hazards (Elvik 1995), safety barriers can pose significant injury risks to motorcyclists (Gabler 2007). Research suggests that impacts with a safety barrier are a factor in between 8 and 16 percent of motorcycle fatalities (EuroRAP 2008). This project explores the literature on the risks posed to motorcyclists by safety barriers and evaluates three MPS developed to reduce the injury risk to motorcyclists arising from barrier impacts. It represents the first full-scale crash testing of MPS in Australia.

Method

Twelve crash tests evaluated the injury risks posed to an impacting motorcyclist by each of the MPS and a W-Beam alone, which served as a comparison. Testing was carried out in accordance with the European test specification CEN/TS 1317-8:2012, which is seen as industry best practice. The specification simulates a motorcyclist who is sliding along the ground and impacts the barrier headfirst. Testing is carried out at speeds of 60 km/h and/or 70 km/h, at an angle of 30° to the barrier. This impact configuration represents severe rather than typical impact conditions, and enables test repeatability and use of well-established measurement criteria. MPS are assessed against a range of criteria relating to injury risk to the head and neck, and behaviour of the MPS and the anthropomorphic device (ATD) used in testing.

Four crash tests evaluated the injury risks posed to vehicle occupants by each of the MPS and a W-Beam alone. Vehicle tests were carried out in accordance with the Australian and New Zealand standard for barrier testing AS/NZS 3845:1999. This is based on a car impacting the safety barrier at 100km/h at an angle of 25°.

Results

Two of the MPS demonstrated an acceptable level of injury risk to a sliding motorcyclist, meeting each of the injury, barrier and ATD requirements at 60km/h. The third MPS and the W-beam alone did not demonstrate acceptable injury risks to a sliding motorcyclist, failing to meet all test requirements at 60km/h including exceeding the maximum allowable injury risk measures. The

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post-centred impact with the W-Beam alone at 70km/h resulted in a number of injury measures exceeding the maximum recordable levels, indicating that a motorcyclist who impacted the post would most likely be fatally injured. None of the MPS demonstrated any adverse impact on the injury risk to vehicle occupants, with all vehicle test requirements met.

**Conclusion**

This research highlights that the addition of MPS to standard W-beam can be effective in reducing the risk of fatality and serious injury to sliding motorcyclists, without compromising the safety of other road users. It makes sense to target the installation of MPS initially to locations on NSW roads where motorcyclist impacts with safety barriers are likely to be prevalent.

**References**


