Collision Avoidance Technologies: Their Future Potential for Crash Reduction

Matthew Avery

Thatcham

UK

With the emergence of new primary safety technologies with a range of functionalities, the question is which of these technologies offer benefit in terms of collision damage and casualty reduction? The Research Council for Automobile Repairs (RCAR) has formed a working group, the P-Safe group, to identify beneficial collision avoidance technologies.

The group is working through a research process aimed at developing test procedures that will assess the effectiveness of the systems. Initial research is investigating the occurrence of collision types in the real world to ensure that technologies are addressing the relevant collision types. Estimates of potential benefit and effectiveness have been produced for a range of the technologies on the market now and in the future. The test procedures will be developed to reflect the real world crash types, and publication of test results will encourage vehicle manufacturers to develop systems that will address these collision types.

The different members have used different data sources. In general these include federal/government statistics on casualty collisions, as well as insurance claims cases. The insurance claims can include non-injury cases. The government statistics under report collision types because these crashes have to be police reported. The insurance claims cases are more representative of the scope of crash types occurring in the real world.

Dose-response models from Folksam have revealed that City Safety by Volvo could be effective in reducing crashes by 60%. Thatcham's estimates reveal that City Safety could prevent over 150,000 whiplash injuries, and prevent nearly £2 billion in crash and injury costs. Estimates from IIHS reveal that there are over 2 million crashes in the US from 2002-06 that could have been prevented by Autonomous Emergency Braking (AEB) systems. According to AXA Winterthur's data the most effective systems appear to be Autonomous Emergency Braking (20%), Lane Departure Warning (13%), and Parking Assist (34%). GDV data revealed that significant contributions to improving safety can be achieved even with systems that are already on the market (AEB, LDW and Blind Spot monitoring systems). If all cars were fitted with these systems, the safety potential calculations reveal that 9.3% of all car accidents in their database could have been avoided. A recent study from IIHS on insurance claims reveals that some AEB and Blind Spot monitoring systems are effective in reducing crash numbers and severity.

Different technologies are predicted to have differing levels of effect on reducing crashes and injuries. Although manufacturers offer similar functionality levels for technology types they often operate in many different ways, with haptic, visual or audio warnings being given for the same hazardous situation. These may be misunderstood, especially where drivers use multiple vehicles. For example it is difficult to judge whether a warning noise, or a light, or a vibration through the seat or steering wheel will be most effective in warning drivers that they are deviating from their lane. There is a need for studies to examine these differences in HMI for a particular technology to qualify the differences in effectiveness of the system, so that the best practice can be promoted, or even regulated. There is potential for confusion

between the operation of the current systems on the market that could lead to inappropriate responses by the driver, or even a lack of response, and this could be potentially dangerous, even fatal.

To guide the development of collision avoidance technologies an understanding of the full range of collision types in the real world is needed. The studies of insurance claims have revealed an under-reporting of particular collision types in comparison with government casualty statistics. The P-Safe group has been investigating collision types using insurance claims data, and the estimates of the effectiveness of collision avoidance technologies, and these reveal that these technologies offer some benefit in crash and injury reduction. There is a need for evaluation of the HMI of new technologies in order to fully assess their impact in the real world, particularly with regard to driver adaptation and risk compensation.

Predictions of crash and injury prevention are limited because it is difficult to predict how drivers will adapt to the technology. There is a dearth of research regarding the human machine interface of these systems, and any potential risk compensation. It is not until these technologies are widely fitted to the fleet that detailed assessments can be made of their benefit. However the group uses estimates to try and identify which systems should be encouraged.

The presentation will describe the work of the RCAR P-Safe group in assessing the new range of emerging primary safety technologies.