

Quantifying Safety Benefits



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It wasn't until the Safety Drive Days at Melbourne's Sandown Raceway in early March that I realised just how much effort this industry is putting into promoting the benefits of advanced truck and trailer safety technologies. At first I couldn't understand why the delivery of such a simple message was such hard work, but then it dawned on me: the focus has been too much on the 'potential benefits' and not enough on the 'realised benefits'. By 'realised benefits' I mean measured reductions in real-life crashes, serious injuries and fatalities involving trucks, where those reductions are directly attributable to the introduction of particular advanced safety technologies. I know what you're thinking – it's too early to tell, there aren't enough equipped vehicles in the market to make a difference. You may be right, but there is some published research that sheds some light on the matter, and some of it makes compelling reading.

The United States' National Highway Traffic Safety Administration, with funding from the Department of Transportation's Intelligent Vehicle Initiative, conducted a remarkable test of the effectiveness of a major prime mover manufacturer's advanced safety package during real-world use. The test involved 100 new prime movers operating throughout the US for three years, fitted with various combinations of forward collision warning, adaptive cruise control (without braking), and disc brake EBS. Together these technologies

have the purpose of reducing the risk and severity of rear-end collisions, which accounted for 13% of all multi-vehicle crashes involving heavy vehicles in the US in 2003. By varying the combinations of technology installed in each vehicle researchers could isolate the benefits of different technologies. But the results were somewhat surprising. Fifty vehicles had the complete safety package, while the other fifty (the control group) had only the forward collision warning system. For part of the test period, twenty of the control group vehicles were operated without any of the technologies, and were called the baseline group. Using various data channels on each vehicle, such as deceleration rate and ABS intervention, the experiment could determine whether a 'conflict event' had occurred, and the percentage reductions in rear-end collisions attributable to technology intervention. The results?

The key finding was that vehicles fitted with the complete safety package enjoyed a 28% reduction in medium severity conflict events. Surprisingly, there was a 21% reduction attributable to the forward collision warning system alone.

Driver acceptance was good for the collision warning system and the disc brake EBS, but mixed for adaptive cruise control. Drivers reported feeling safer with the systems installed, and the data indicated that they maintained greater following distances even if only the collision warning system was installed. There were no major technology failures over the three years. Maintenance costs were slightly higher than for standard vehicles but these costs were expected to reduce over time as the technologies become more common, and the expected benefit-cost ratios were as high as 3.6. Another US study, this time conducted by the American Transportation Research Institute on behalf of the Federal Motor Carrier Safety Administration, developed robust benefit-cost ratios to encourage take-up of trailer rollover stability control. The 'benefit' side of the analysis

was established from heavy vehicle insurance company data relating to the cost of crashes to the industry, and the proportion that involved rollover due to excessive speed in a curve, where rollover may have been prevented by a rollover stability control system. The 'cost' side included purchase, installation and operational costs of the systems. Using simulation data and industry feedback, the study determined that 37-53% of rollover crashes could be prevented by rollover stability control systems, where the cost to the operator of a rollover crash was estimated to be around US\$197k for a property damage only incident, around US\$462k for an injury incident, and around US\$1.14M for a fatality incident. Depending on the assumed effectiveness of the system, the cost of purchase, installation and maintenance of the system, and the distance travelled, estimates of return on investment ranged from six to 30 months. The study found that economic viability will be greater for larger fleets where vehicles are either self-insured or are insured through an insurance provider with high excess. It seems that while there probably isn't yet an enormous amount of hard proof of the realised real-life benefits of new advanced truck and trailer safety technologies, there is enough information out there to make the decision a fairly easy one, even if only on financial grounds. But reflecting again on the recent Sandown experience, for me the best way to be convinced of the effectiveness of advanced technologies is to try them out yourself.

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