



How risk is assessed and controlled

Work Safety Authorities require employers to provide a safe workplace, but this does not mean that it is impossible for an adverse event to occur. What it does mean is that hazards need to be identified and the risks controlled.

A completely different approach is used when risks are to be controlled by regulations. I will illustrate the different approaches by considering the case for mandating safety chains on dog trailers. Dog trailers have always been the trailers of choice for local delivery of dry bulk material, such as sand, soil etc. They can also be used for bulk liquid delivery and pick-up of agricultural produce. There has been significant growth in longer and heavier dog trailer numbers as a direct result of the Performance Based Standards (PBS) scheme, which has 'unlocked' five- and six-axle dog trailer designs.

Dog trailers typically have either a towing eye or a large ball coupling installed at the front of the A-frame drawbar. The towing coupling is a single point of failure unless an additional safety device is installed. Whilst towing couplings that have been correctly specified and certified are highly reliable devices, there remains a non-zero risk of failure, whether due to mechanical defect or human failure (i.e. incorrect coupling procedures).

Risk is assessed by answering the three fundamental questions: What is the likely level of consequences if the hazard

occurred – fatal...minor injury? What is the exposure to the hazard, e.g. continuous or occasional?

What are the countermeasures that prevent the event and how effective are they likely to be, i.e. multiple protections, reliance on a good quality part etc.

The scores for each question are judged and multiplied. The compound score is then interpreted to give risk on a scale from Extreme to Very Low. Employers are obligated to ensure that risk scores are Low. The process must be stopped if the risk is High or Extreme. Over time, using continuous improvement principles, risks should be reduced to Very Low.

An employer who can demonstrate procedures to assess and control risk and work practice policies that should ensure risks are Low or Very Low, will have met the statutory obligations. If an employee fails to follow a written work practice for which training has been provided, then adverse consequences arising should be the responsibility of the employee.

Consider the 'hazard' of trailer separation. There is little doubt in my mind that an OH&S risk assessment of a truck and a heavy dog trailer running around a private road (say, a mine site) would identify truck-trailer separation as a moderate or high risk. Separations are known occasionally to occur, the exposure to separation is continuous and the consequences serious. The mechanical coupling without safety chains has a single level of safety. Risk reduction to Low

would require a counter measure such as safety chains to provide a second level of safety. Based upon risk analysis principles, drawbar trailers should have safety chains. In the public policy domain, the procedure is very different. Imposition of vehicle requirements in federal regulations must be justified in a Regulatory Impact Statement (RIS).

This process requires the estimation of the size of the safety problem, a critical assessment of the options available to tackle the safety problem and the potential net financial benefits of solution options. The RIS approach requires good knowledge about the number of incidents that occur annually. It puts a monetary value on human life and injury and it estimates the cost imposition of the rule change. It tolerates a level of adverse incidents. When the RIS calculations are done, the value for a fatality is \$2.4 million and a serious injury is \$0.21 million (2010). Property damage is not directly costed.

Yet there are many problems with the RIS process. First, the RIS process makes Australian Design Rule revision slow and conservative. It is inherently reactive because it is focused on road trauma that can be quantified. That is, on fatal and serious injury crashes. It is evidence-based and not risk-based but often the evidence is patchy. In most cases, the understanding about the causes of crashes is poor and the RIS writers make judgements about the size of the problem and the improvements

that might occur if a change of the rules were made.

It is sensible to require a detailed study of proposed technical regulations because it is impractical to pick-up all safety enhancements that exist. There must be a systematic way of assessing the next smart idea, but how do these ideas get to the top? Ultimately the community needs leadership from Ministers. Leadership is needed to initiate regulatory change. Australia needs more proactivity in its response to heavy-vehicle road trauma. A policy position similar to that taken by the European Union is needed. This is driven by the principle that road trauma involving trucks is unacceptable. That is, it is initiated by risk-based assessments.

Consequently, the Europeans are leading the world with safety-relevant design rules and resulting technologies.

Back to consideration of dog trailer safety. Three types of couplings are commonly used on drawbar trailers. There are 'automatic pin couplings', pintle hook couplings and ball couplings. Couplings are certifiable items in the Australian Design Rules and so each must have an approval number (which is called a Component Registration Number – CRN). Legally, a manufacturer's plate must be affixed to the coupling or close-by to it. Each coupling must have a maximum ATM rating, a pulling-strength rating called a D-value and a static vertical load rating called an S-value. The D-value must be stated in kiloNewtons (kN). Couplings for pig-trailers should also have a V-value (vertical D-value).

With the exception of some local companies mechanical couplings are predominantly manufactured in Europe, USA and more recently in Asia. The vehicles used in Australia require higher rated couplings than needed in Europe, USA or Asia because Australia uses longer and heavier combinations than elsewhere.

In many cases, European manufactured couplings are retested and uprated for Australia. The rating test involves fatigue tests done at 60 per cent of the D-value. V-value ratings are not obtained in Australia because the test equipment is not locally available. There is no proof test required; and no 'factor of safety' specified in the design rule (ADR 62). This is a shortcoming because couplings can experience extreme forces during crashes (or severe incidents) and may break. It is always better for vehicles in combination to stay together, not least because this protects the driver from the trailer hitting the cabin.

I was present at a presentation that Allan Bartlett of Bartlett Transport Improvements (BTI) made in September 2001, where he made the case to an industry and government reference group, for mandating safety chains on heavy drawbar trailers. There had been a previous RIS investigation that was conducted in 1997 by Ian Pettigrew. The Pettigrew study identified 22 trailer-separation incidents in three states involving dog- and pig-trailers over a two or three-year period. The incidents were serious and five people were killed in the resultant crashes. Dog trailers were involved in about half the cases. Safety chains would have prevented serious consequences in these incidents.

The level of road trauma due to trailer separations is not accurately known and so a fully informed RIS cannot be written. The outcome of the Pettigrew review was that safety chains were mandated in ADR 62/01 on pig-trailers (centre-axle trailer only). However, basic risk mitigation considerations would lead to safety chains on dog trailers as well. The rationale for the decision to mandate safety chains on pig-trailers was apparently that a fixed drawbar is likely to dig into the roadway if the trailer comes free and this constitutes

a greater risk than for a hinged drawbar that probably will not dig-in. The logic is questionable, particularly now that longer and heavier dog trailers are being used. The policy of harmonizing the Australian rules with the international rules (UN ECE) is another major consideration because UN ECE Regulation 55 does not require safety chains on hinged drawbar trailers. The decision to not mandate safety chains on new hinged-drawbar trailers in the design rule ADR 62 was, in my judgement, wrong. ADR 62 compliant safety chain attachments are currently required on all towbars, but compliance with this ADR requirement is very low. In part, compliance is low because towbars on heavy trucks are usually installed as a modification and they are rarely formally approved. Chains and attachments are not mandated on hinged-drawbar dog trailers, so trucks that are used to pull them do not get safety chain attachments. We made a mistake long ago by not mandating safety chains on new hinged-drawbar trailers. We should now correct that mistake. Government, with industry support, should amend ADR 62 to also require chains on new dog trailers. The chain and attachment strength requirements already exist in ADR 62/02, although they could be relaxed for hinged drawbar trailers. State and Territory Ministers should agree to amend the National Heavy-Vehicle Standards Regulation (Part 5, Reg19) to require safety chains on in-service dog- and pig-trailers; and chain attachments on their towing vehicles over, say, a three-year period. The case for safety chain fitment on in-service dolly trailers needs further discussion with road train operators before I could recommend retrofitting chains to dolly converter trailers.

Peter Hart
Chairman, ARTSA