ARTICLES

How to reduce the road toll

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INTRODUCTION

It is acknowledged that significant reductions in the Road Toll have occurred due to speed enforcement, road design improvements, BAC, vehicle design improvements, and publicity and education campaigns, and the benefits that have been achieved should be acknowledged by all. However, there are still a number of significant areas that could be addressed. The current perception is that there are "no more silver bullets" and we have to do more on speeding and drink driving to address the Road Toll. We firmly believe that this view is wrong, and that there are still significant opportunities, as a number of "silver bullets" are yet to be loaded let alone fired. These include setting of appropriate design performance requirements for:

- Vehicle rollover
- Heavy vehicle safety
- Vehicle compatibility
- Road infrastructure design
- Vulnerable road users

There are well known and well identified design deficiencies in each of these areas that contribute to the road toll. Similarly, there are clear countermeasures that work but have not been applied in each of these areas to reduce the number of fatalities and serious injuries in crashes.

We estimate that over 50% of fatalities and injuries have not been addressed by current measures. Any realistic reduction in the road toll will require firm commitment to implement such countermeasures.

The principle we are advocating, is that it is feasible in this day and age to design much of the road system (vehicles, road infrastructure and vulnerable road users) on the basis that if a crash occurs, it will be within the human severe-injury tolerance levels. This is totally consistent with the "Vision Zero" philosophy that is being implemented in Sweden. We are not critical of the current methods but rather would like to highlight that there are major opportunities that are yet to be embraced or adopted. By recognising these opportunities and focussing effort on their implementation we are absolutely confident this will achieve a significant reduction in the road toll.

This article provides an overview of some the key areas that would provide major opportunities for reducing the road toll. Some of these areas overlap.

VEHICLE ROLLOVER (22% FATALITIES)

Rollover crashes are one of the most harmful events that occur on our roads, producing 22% of the road fatalities in Australia and many injuries. There are **no design rules** for rollover protection systems, nor any requirements or guides for a vehicle's rollover propensity in Australia. Given the number of deaths that involve rollover, two performance requirements one covering rollover propensity and the other rollover crashworthiness particularly for Four Wheel Drive's or Sports Utility Vehicle's, would begin to reduce this very large number of fatalities (see articles Richardson et al 2002a & 2002b).

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HEAVY VEHICLE SAFETY (15% FATALITIES)

15% of road fatalities were attributed to truck crashes in 2001. One of the areas where immediate gains can be obtained is in the crashworthiness design of front, side and rear ends of trucks. Again there are no design standards in Australia covering these aspects of commercial vehicles in Australia. International Standards already exist. Similarly we have yet to see the design of public transport vehicles such as buses, trams and trains take adequate steps to improve their crashworthiness as regards collisions involving other road users

Figure 1 Typical fatal rollover crash damage

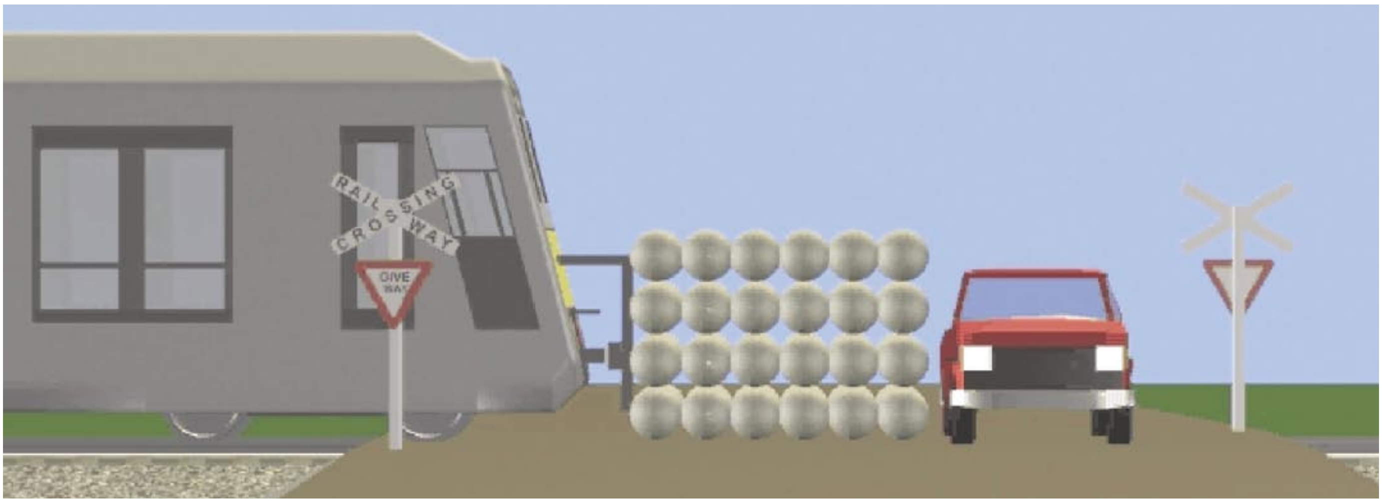

Figure 2 Improving train crashworthiness at level crossings: Concept illustrations of airbag deployment on front of train and impact between vehicle and train [Rechnitzer & Wigglesworth, 2004].

[see Lambert & Rechnitzer, 2002; Rechnitzer & Wigglesworth, 2004]

VEHICLE COMPATIBILITY (20% FATALITIES)

This is a broad area that includes crashes involving pedestrians, cyclists, motorcyclists and crashes between vehicles with significant differences between vehicle geometry, stiffness and mass. Again there are **no standards or performance requirements** in Australia covering these aspects of vehicle design. Some international performance requirements already exist for pedestrian impacts, under-run and override crashes, and side skirts, though much more could be implemented.

ROAD INFRASTRUCTURE DESIGN (10% FATALITIES)

The key aspect is to prevent interaction of vehicles with other vehicles and objects at significant speed differentials. Freeways and divided Highways should have physical barriers to prevent cross over, such as wire rope barriers or other barrier systems. Freeways, Highways and Single carriageways should have barriers protecting loss of control into objects (trees, poles, rocks or rollover tripping mechanisms).

VULNERABLE ROAD USERS

Both vehicle design and road design can play a key role in reducing the risk of serious injury to pedestrians and bicyclists. The design of vehicles can be modified to reduce serious injury risk and in concert speeds can be reduced in pedestrian active-areas.

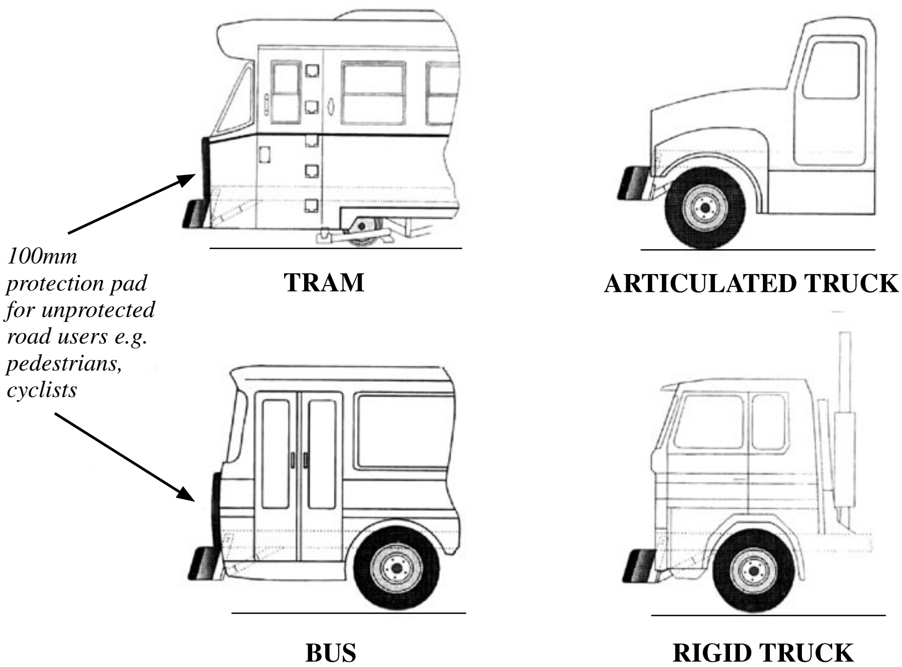

Figure 3 Diagram showing proposed modifications to the front of heavy vehicles, trams and buses incorporating an energy absorbing front under-run barrier (and pedestrian protection pad) [Rechnitzer 1993].

CONCLUSION

To reduce the Road Toll it will be essential to do something more and different from current perceptions. We believe that there should be effort to introduce engineering solutions and engineer the Road Toll down. This fact cannot be over emphasised. In essence the authors are calling for a paradigm shift in road safety thinking strategy [refer Grzebieta and Rechnitzer 2001 and 1999] and the implementation of crashworthy systems [compatibility of infrastructure design, vehicle design, vehicle speed with human injury tolerance].

There should be effort to introduce engineering solutions and engineer the Road Toll down

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Figure 4 The difference in damage sustained by a small car impacting concrete barrier (left) and a wire rope barrier (right). The test involved the vehicle impacting the barriers at a speed of 80km/h at an angle of 45º.

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