Response to ACCC Quad Bike Issues Paper
Prof. Raphael Grzebieta and Associate Prof. George Rechnitzer from TARS UNSW

Questions for response

1) Can you provide additional data or information on costings of injuries and fatalities caused by quad bikes?

Have no further information to contribute beyond references already provided.

However the proposal does not include ‘Willingness to Pay’ costs. An alternate basis which may be relevant for Quad Bikes and Side by Side vehicles is to cost a fatality and injury used in transport. This is based on ‘Willingness To Pay’ methods from Bureau of Infrastructure, Transport and Regional Economics (BITRE) (2014) indicated in their Table 8. The social willingness-to-pay to avoid road trauma is $7.7 million for preventing a fatality and average of $259,000 for preventing a hospitalised (serious) injury (2014 dollars).

![Table 8 Willingness-to-pay based estimates of the value of preventing serious casualties (2014 dollars, thousands)](image)

2) Would design changes to quad bikes be likely to reduce the number of injuries and fatalities caused by quad bikes in Australia?

In our opinion, yes.

We note that the results from the TARS survey of 1,546 workplace riders revealed that at least 1 in every 2 riders will experience a crash, and of those riders who do crash 70% will involve a rollover. If the quad rolls over the rider the odds of the rider being seriously injured is 6.6. Any changes to the design of the vehicle in regards to its rollover propensity will most likely reduce this risk.

The authors note an inherent deficiency in quad bike design is the lack of crashworthiness protection for the rider in a rollover crash.

3) If you answered ‘yes’ to question 2, what design changes do you consider would have this effect?

The following changes need to be made:

1. The track width of quad bikes need to be widened to increase the vehicle’s static stability factor (SSF);

2. The rear differential needs to be designed and manufactured so that the rear wheels can move independently of each other. The rider needs to have the capability of locking the differential in situations where a locked differential is needed, i.e. in slippery muddy conditions or where there is excessive gravel next to rocks. The default setting should be unlocked when starting the quad bike.

3. The suspension should be designed so that when one side of the quad bike’s wheels are traversing (asymmetrically) a reasonable size bump (around 100-150 cm) (right or left side), the vehicle does not displace the rider off the seat.
4. The dynamic handling of quad bikes would need to be improved so as to reduce the vehicle’s oversteer characteristics.\(^1\)

Which design features, if any, should a safety standard mandate or prohibit?

A standard for quad bikes used in the workplace could:

1. mandate a minimum SSF;
2. prohibit locked only rear differential;
3. mandate a child lockout proof ignition system;
4. prohibit installation of long seats that allow a passenger to ride on the vehicle for those vehicles that are not intended to carry a passenger.
5. The thumb throttle should be replaced with a more ergonomic design that prevents inadvertent sudden acceleration of the quad bike, as currently can occur with most quad bikes.
6. Require the quad bike to have predominately neutral to moderate understeer characteristics

In particular the ACCC is interested in understanding design changes that are likely to reduce:

a) injuries and fatalities caused as a result of quad bike rollover

Typical farming and workplace conditions are now well established in the evidence based literature.

Several studies of quad bike usage have found that in an agricultural workplace environment these vehicles are commonly used at relatively low speeds on slopes in rough bumpy grassy terrain where rollover incidents have occurred and where riders have been seriously injured or killed (Carman et al., 2010; Grzebieta et al., 2017; Lower et al., 2012; McIntosh et al., 2015; Milosavljevic et al., 2011; Moore, 2008; Schalk and Fragar, 1999; Wundersitz et al., 2016).\(^2\)\(^3\)\(^4\)\(^5\)\(^6\)\(^7\)\(^8\)\(^9\)

Based on a New Zealand research using GPS data and an inclinometer sensor, the maximum peak slope angles traversed by farmers were around 21.0 degrees (Carman et al., 2010).\(^2\)

Similarly, the fatalities and injuries investigated in previous research noted that the majority of


riders travelled at speeds of around 25 km/h or less (Grzebieta et al., 2017; Lower et al., 2012; Milosavljevic et al., 2011; Wundersitz et al., 2016)\textsuperscript{3,4,6,9}.

Increasing stability and asymmetric bump tolerance to reduce the risk of rollover in typical farming and workplace terrains will reduce the number of rollover events and hence the number of injuries and fatalities.

b) injuries and fatalities caused to children

Ignition systems that require a code or child proof locking mechanism designed to prevent use of the vehicle by children.

c) injuries and fatalities caused to riders being carried on quad bikes not designed to carry passengers.

By designing the seat length to only allow one rider to travel on the vehicle will dissuade adult riders to carry a passenger.

4) If your view is that design features should be mandated or prohibited to increase quad bike safety, could the regulation be designed to encourage innovation rather than prescribing particular products or technical solutions (for example by ensuring fitting points or attachment mechanisms to allow the development of improved CPDs or ROPSs or by prescribing performance-based outcomes rather than technical designs)?

Any specification should be performance based in order to promote innovation from Manufacturers.

History has taught us that the most efficient way to initiate change in vehicle design is to have a consumer safety rating program that encourages manufacturers to compete with each other. The Australian New Car Assessment Program (ANCAP) as well as other country’s consumer testing programs for car safety, has been spectacularly successful.

5) If any or all of these design changes were implemented in Australia, are you able to estimate the additional cost that would be imposed on Australian suppliers?

No. It is not possible to answer this question presently by us. The Federal Chamber of Automotive Industries (FCAI) may be able to answer this question.

6) To what extent does the US Standard satisfactorily address design features that ensure quad bikes are safe for use? Do you consider that Australia should adopt a mandatory safety standard similar to the US Standard? To what extent would this option impose additional costs on Australian suppliers or create barriers to trade?

The US Standard is generally acceptable except for a number of recommendation that have been made in the TARS reports relating in particular to stability and dynamic handling.\textsuperscript{1,10}

7) Are consumers currently getting adequate information at the purchase point about quad bike use and limitations or safety information and equipment? Should there be additional warnings or instructions displayed at the point of purchase or provided with the sale of quad bikes?

No. A rating system is required. Additional labels as recommended including those in our summary report\textsuperscript{11} as follows:


\textsuperscript{11} Grzebieta, R., Rechnitzer, G., Simmons, K. and McIntosh, A.S., 2015a. Final Summary Project Report: Test Results, Conclusions, and Recommendations, Quad Bike Performance Project TARS Research Report No 4, submitted to the WorkCover Authority of New South Wales, University of New South Wales, Sydney, Australia. \url{http://www.tars.unsw.edu.au/research/Current/Quad-Bike_Safety/Reports/Final_Summary_Report4-QBPP_Test_Results_Concl_Recom_Jan-2015.pdf}
• “Quad bikes have low stability and other more fit for purpose vehicles should be considered instead.”

• Recognise that the current configuration Quad bikes are promoted by Industry as Active Riding machines and that riders should not use them if they are not trained, or the task does not allow active riding, etc. The Authors therefore recommend a new safety warning label on Quad bikes with a continuous specific communication campaign to support this:

WARNING for QUAD Bike Riders
THIS VEHICLE IS DESIGNED AND REQUIRES THE RIDER TO USE ACTIVE RIDING - IF YOU HAVE NOT BEEN TRAINED IN ACTIVE RIDING, DO NOT HAVE THE PHYSICAL CAPACITY OR CAN NOT APPLY ACTIVE RIDING WHEN YOU ARE RIDING, THEN DO NOT USE THIS VEHICLE. IT IS UNSAFE FOR YOU.

• “Use a locator beacon if using this vehicle”

Considering that farmers often work alone in the field, development of a suitable Personal Locator Beacon (PLB), which ideally would activate automatically should a Quad bike roll over, should be developed or resourced from existing technology (e.g. from other industries such as mining) such that this would facilitate assistance as early as possible to a rider in distress.

a) What form should the warnings or instructions take?
See above

b) What costs would be imposed by the requirement for further warnings or instructions?
Extremely minimal cost

c) What benefits might the warnings or instructions have in reducing quad bike related deaths and injuries?
These could be significant as riders may choose better ‘fit-for-purpose’ vehicles rather than quad bikes which have no rollover protection and have a high propensity to rollover.

8) In relation to the option of a consumer safety rating system:

a) what testing criteria should be specified?
Refer to our ATVAP reports (ref)

b) how should test results be displayed?
Can use a tag affixed to any new quad bike being displayed at point of sale. The tag would include the quad bike safety rating and a brief explanation of the tag. The tag should state the minimum star rating potential buyers should consider in relation to their particular workplace terrain and use of the quad bike. The tag should inform consumers that in some cases this would mean the quad bike is unsuitable (e.g. a 5 star rating is required and no quad bike would have a 5 star rating) and a more suitable vehicle should be considered such as a side by side vehicle.

c) what costs might be imposed by requiring the testing of vehicles and displaying the test results?
Obviously the amortisation of the test costs would be over the fleet of quad bikes sold in any year. As a rough estimate this could be about $50 per vehicle.

d) what benefits might a consumer safety rating system have in reducing quad bike related deaths and injuries?
It would enable consumers to make informed decisions on vehicle selection understanding the vehicle’s relative safety which they cannot currently do. Furthermore, history has taught us that the
most efficient way to initiate change in vehicle design is to have a consumer safety rating program that encourages manufacturers to compete with each other. The Australian New Car Assessment Program (ANCAP) as well as other country’s consumer testing programs for car safety, has been spectacularly successful.

Such a rating system would also highlight the significant difference between quad bikes and other comparable vehicle types, in particular side by side vehicles which would have a higher safety rating. Without such comparison ratings, consumers would not realise that alternate vehicles to quad bikes may be their best choice in terms of reduced injury/fatality risk in a crash event.

9) If your view is that regulation is needed to reduce the number of injuries and fatalities caused by quad bikes in Australia, how should these be implemented? One proposed option is to prohibit or mandate particular design features; another is to increase consumer information, including through a consumer safety rating system; a third option is a combination of both:

a) What are the comparative benefits and costs of these approaches?

The Authors consider that the best approach is a consumer rating system as has been demonstrated by ANCAP. This is both a cost effective, practical and extremely successful approach.

10) If the ACCC recommends a mandatory safety standard for quad bikes:

a) should the standard apply differently to quad bikes used for different purposes, for example agriculture, sports, recreation, tourism and commercial hire?

Yes. However these bikes are used differently. In the case of OPDs the Authors survey report presents a case study of a recreational facility where the fitment of OPDs was reported to have been very effective in almost eliminating all serious injuries.

b) should the standard apply differently to quad bikes designed for use by children?

Clearly children should not be using adult quad bikes. We proposed to the ACCC about two years ago, a study regarding child specific quad bikes to review the safety of these and what actions should be taken in regard to their design and sale.

c) should the standard apply to SSVs as well as quad bikes, and if so how should the vehicles be defined?

Yes. Simply as Side by Side vehicles. However this will require reference to the US standards for the different vehicle types and a more considered and detailed analysis.

d) when should the standard commence?

As soon as practicable.

e) should the standard include a transitional provision?

Yes.

f) should the standard have an expiry date?

It should be a Review data – not Expiry date. If it was a Review date then ‘Yes’

g) should the standard apply to both new and second hand vehicles, or be limited to new quad bikes sold after the transitional date?

New Bikes only
11) What is the life cycle of quad bikes in Australia? For example, on average how long do consumers use quad bikes before the vehicle is retired? How long might it take before the current stock of 380,000 quad bikes is replaced by new stock that satisfies requirements of a safety standard, if imposed?

Best to ask the FCAI this question.

12) Please provide any other information you consider may be relevant to the ACCC’s consideration of these issues.

Refer to all of our reports and we bring to your attention the latest report surveying 1546 workplace riders dated May 2017. Refer to the following web links.