Information as to potentially suitable measures for control of the risks associated with use of ATVs

Introduction

All Terrain Vehicles (**ATVs**) have found widespread use in various places of work. They are economical and highly adaptable to many uses on farms, in land management, military, search and rescue and many other industries, but they can be hazardous if not used properly and with appropriate caution. Efforts to make ATVs safer have resulted in significant design evolution since 1967, involving more than 30 standardised safety features. Research has indicated that other design modifications (eg, fitment of seatbelts and rollover protection structures) would, even if technically feasible, tend to negate many of the vehicle's attributes and could lead to an increased risk of injury.

Notwithstanding these design changes, as with any other power mobile plant that may be used in workplaces, there can be work health and safety problems encountered in the use of ATVs. In particular, misuse or inappropriate operation of an ATV increases the risk of an incident, which may result in serious injury or death.

The FCAI and its members are committed to the promotion of the safe use of ATVs. The purpose of this document is to provide information for the assistance of those responsible for workplaces when they are considering reasonably practicable risk controls for ATV use, including the availability and suitability of ways to eliminate or reduce any hazards and risks that they may have identified at their workplace. Further information is available:

- in the FCAI publication, *Use of All Terrain Vehicles in the Workplace*, available at http://atvsafety.com.au/information/currentwork
- in Safe Work Australia's "Quad bikes in rural workplaces information sheet", at https://www.safeworkaustralia.gov.au/doc/quad-bikes-rural-workplaces-information-sheet
- at the FCAI's ATV website, http://atvsafety.com.au/
- in WorkSafe Victoria's "Compliance Code – Plant" at https://www.worksafe.vic.gov.au/__data/assets/pdf_file/0007/218086/ISBN-plant-compliance-code-2018-03.pdf

Risk controls for ATVs

Reasonably practicable risk controls for ATV use that may be available to, and suitable for, a workplace include:

- Eliminating or reducing the hazard or risk as far as reasonably practicable:
    - This could include specifying particular areas where workers are not permitted to ride the ATV;
    - Excluding certain workers from riding the ATV (children under 16 years of age and non-active riders);

- Ensuring all workers are aware of, and avoid, particular hazards within the workplace(tall grass, steep terrain, etc)

- Eliminating or restricting ATVs from use in certain tasks for which they are not well suited (eg, carrying passengers and, particularly when on slopes, carrying loads)

- Eliminate potential environmental risks with markers, site maps and staff training (e.g. culverts, ditches, difficult terrain)

- Substitution

- Use another vehicle, particularly where carriage of heavy loads or passengers is involved (see the FCAI Vehicle Selection Matrix available at http://atvsafety.com.au/information/currentwork

- Engineering

  - Ensure that any attachment used with the ATV does not increase the risks (refer to the Manufacturer's Owner's Manual)

- Change the work practice

  - Impose and enforce speed and or load restrictions for certain areas, tasks or riders

- Provide training

  - It is more likely that riders will use the ATV properly and safely once they understand correct techniques and know to recognise and avoid potentially dangerous situations.

    Refer to www.atvsafety.snaplearn.com.au to complete a short on-line ATV Safety Course

    Refer to www.atvsafety.com.au to find a Rider Training Provider near you.

- Provide personal protective equipment

  - Helmets are the most effective safety device for 'ride-on' type vehicles like ATVs.

Unsuitable measures intended to control risks

Although WorkSafe Victoria has said that it now recognises so called "Operator Protective Devices" (**OPD**s) as a safety device for use on ATVs, this position:

- is not supported by any scientific research concerning the safety or efficacy of such devices;
- flies in the face of the most reliable research into such devices, which indicates that they can cause as many new injuries as they might prevent;
- ignores a recent Quad Bike User Survey that found ATVs fitted with an OPD had as many serious injury outcomes as ATVs not fitted with an OPD;
- is not in accord with the findings of recent coronial inquiries into deaths that were associated with ATV rollovers.

The following information is provided to assist ATV users who are seeking to assess the suitability of OPDs as a way to reduce the risk of injury associated with ATV use.

What are OPDs?

OPDs are typically bar or hoop-like devices that are intended to be retrofitted to ATVs. No ATV manufacturer who complies with the mandatory US standard for ATV design (ANSI/SVIA 1-2017) has approved a method for the fitment of such devices to their vehicles.

OPDs (sometimes advertised as “crush protection devices” or CPDs) are very different to ROPS (Roll Over Protection Systems). ROPs are intended in a rollover to retain the operator within a ‘survival’ space by the use of harnesses and other restraints, similar to (most) tractors. Although OPDs do not – and cannot – include the use of restraints, nonetheless, the theory underlying their supposed utility is that ATV riders do not separate from their vehicle if a rollover occurs.

OPD research

The ATV industry’s position is that there is no scientific evidence upon which it can be concluded that OPDs are a suitable means to reduce the risk of injury if there is an ATV rollover.

It is generally accepted that it is extremely difficult to research the causes and potential outcomes of ATV rollovers. It is ethically impossible to perform tests using human riders, and there is no crash test dummy in existence which can ‘operate’ vehicles like ATVs and motorcycles realistically. As a result, computer simulation – calibrated as far as possible by full scale tests using instrumented dummies – is the only viable method of conducting ATV research, including when seeking to test proposed safety devices like OPDs. For motorcycles, international standard ISO13232-5 is the only worldwide standard available for use in evaluating safety devices. Consequently, because ATVs are similarly ‘straddle seat–handle bar–helmet required’ vehicles, with the necessary adaptations that standard provides the most appropriate methodologies and criteria for research involving ATVs.

In order to evaluate the potential suitability of OPDs as a way to reduce the risk of injury in ATV rollovers, the ATV industry engaged a US-based firm, Dynamic Research Inc. (DRI) to undertake research. DRI is a research and development organisation. Its primary area of work is testing and certification for US Federal agencies, including the National Highway Traffic Safety Administration, the Bureau of Land Management, as well as for other organisations including NASA and the United Nations. It has extensive experience in the testing of all types of motor vehicles, including both motorcycles and ATVs, and its expertise and qualifications for this type of research are unmatched by any academic institution, private firm or other person in Australia.

The results of DRI’s research into 3 different OPDs, including the Australian-made “Quadbar”, which has been conducted over a period of some 10 years, and has involved the testing of thousands of scenarios using state of the art computer simulation technology calibrated and verified by full scale instrumented dummy tests, are that each OPD was found to present unacceptably high injury risks in comparison with any injury benefits, having regard to the relevant guidelines in ISO13232-5. Those guidelines are that, for a safety device, a risk/benefit percentage (ie, the aggregate of risks divided by the aggregate of benefits) of 7% or less is acceptable, whilst a risk/benefit percentage of 12% or more is unacceptable.

In particular, with respect to the Quadbar, DRI has found that the injury risk/benefit percentage associated with the fitment of that device to a vehicle operated by a rider wearing a helmet is 108%, whilst the fatality risk/benefit percentage is 121%. In each case, the percentage is grossly in excess of the ISO 13223 guidelines. By comparison, the injury risk/benefit percentage of wearing a helmet was found to be just 9%. Helmets therefore meet the requirements for a safety device according to ISO 13232-5, and studies show they are the most effective safety device for ride-on straddle seat type vehicles like ATVs.

DRI’s research reports are publicly available at http://www.dri-atv-rops-research.com/

Attempts made by others to evaluate OPDs

The ATV industry does not believe that there has been any other research undertaken anywhere in the world in which the potential safety benefits and risks of OPDs have been evaluated in a similarly scientifically rigorous manner, or in accordance with ISO13232-5 protocols. WorkSafe Victoria has been requested to supply any new research that contradicts the current negative findings for OPD as safety devices but, to date, has not made available or published any such data.

Such other 'research' as *has* been conducted, and upon which the manufacturers and other proponents of OPDs seek to rely, has involved:

- Small numbers of tilt table experiments, using only a stationary ATV, with no attempt to replicate actual rollover events and no attempt at all to ascertain the relative position of a rider during or after the rollover event;
- A very small number of scenarios (ie, 10) examined using computer simulation technology that was designed for testing passenger car head-on collisions; and/or
- Static, barrier-type tests, in which a stationary ATV with an instrumented dummy was effectively dropped from a tilt table at an extreme angle onto a horizontal surface, with conclusions being based only upon subjective observations, which were in fact contrary to the objective data recorded by the dummy.

Some research into OPDs was undertaken by a University of New South Wales' Transport and Road Safety (TARS) team as part of its 'Quad Bike Performance Project'. Although the original objective of this team was to conduct full scale rollover testing of OPDs for safety rating purposes, it found that "it was unrealistic to continue with such tests" due to the large range of possible rollover permutations.

In its report, the TARS team agreed that the ATV industry's concerns and resistance to fitting of OPDs "have some potential validity". Although the TARS team expressed a view that, on balance, the addition of an OPD would likely result in a net benefit in terms of reducing harm to workplace ATV riders involved in a rollover. They conceded that this view was based only on assumptions about the speeds at which workplace overturns typically occur; their lack of knowledge of any injuries caused by OPDs and their own (admittedly) limited static tests. Moreover, as the leader of the TARS team later conceded, the conclusion of a "net benefit" was reached without any consideration at all by them of the potential injury risks of OPDs.

Some proponents of OPDs claim that a lack of injuries and deaths known to have been caused by OPDs provides evidence that their risks are not as great as is indicated by DRI's research. However, because only a very small proportion of ATVs have been fitted with OPDs (relative to the number of ATVs currently in use in Australia), it is not to be expected that one of those OPDs would cause a death more often than once every 20 or more years according to DRI's analysis (which has been publicly accepted by the leader of the TARS team). Moreover, this claim ignores all of the unmeasurable incidents in which there is no injury *because an OPD is <u>not</u> fitted* to the ATV when a rollover occurs.

Most recently, in 2016/17, members of the UNSW TARS team undertook a survey of ATV users, in an endeavour to establish whether the use of OPDs could be associated with an improved safety outcome[1]. Although suffering from a number of serious methodological and statistical flaws, the result of this survey was that fitting OPDs resulted in a (not statistically significant) **increase** in serious injuries. This result agrees closely with the DRI simulation study of the Quadbar, which also found a non-statistically significant increase in injury for helmeted riders when an OPD was fitted.

[1]"Quad Bike and OPD Workplace Safety Survey Report: Results and Conclusions", TARS UNSW for SafeWork NSW, May 2017.

Coroners' findings regarding OPDs

Detailed consideration was given to the available research about OPDs during a 2015 inquest into nine ATV-related deaths conducted by the Queensland Deputy State Coroner, Mr John Lock. A specific aim of that inquest was *"… to establish whether crush protection devices may be effective in preventing injury or death in quad bike accidents, or whether CPDs may increase the probability of injury or death in such accidents."*

Having heard evidence from DRI, from the TARS team leader, from both the manufacturer of the Quadbar and various other proponents, and from Associate Professor Robert Anderson, who undertook an independent critique of all of the OPD research, the Deputy State Coroner said that he was unable to reach a conclusion about the efficacy of OPDs. Consequently, he did not recommend the fitment of OPDs on ATVs, but instead recommended only that more research be done.

Similarly, following a 2015 inquest into seven deaths in NSW associated with ATVs, a Deputy State Coroner in that State concluded that "it is not possible to draw any absolute conclusions about the efficacy of OPDs".

One of the deaths associated with ATVs investigated by a Tasmanian coronial inquest (2016) was CPD-related. In that case, the CPD prevented the ATV from rolling away from the rider, and the rider was trapped under the side of the ATV and asphyxiated. Although this rack-like device was wider than a 'Quad Bar', expert evidence during the Tasmanian Inquest outlined how it acted in a similar way to the Quad Bar in that a CPD can prevent the ATV from rolling away from the rider. The Tasmanian Coroner determined;

> *"Those racks would, I am satisfied, offer a measure of protection to the rider in some circumstances, in the event of a roll over. However, in other circumstances, such as those in which [the deceased] died, that large square racks prevent the quad bike from continuing to roll."*

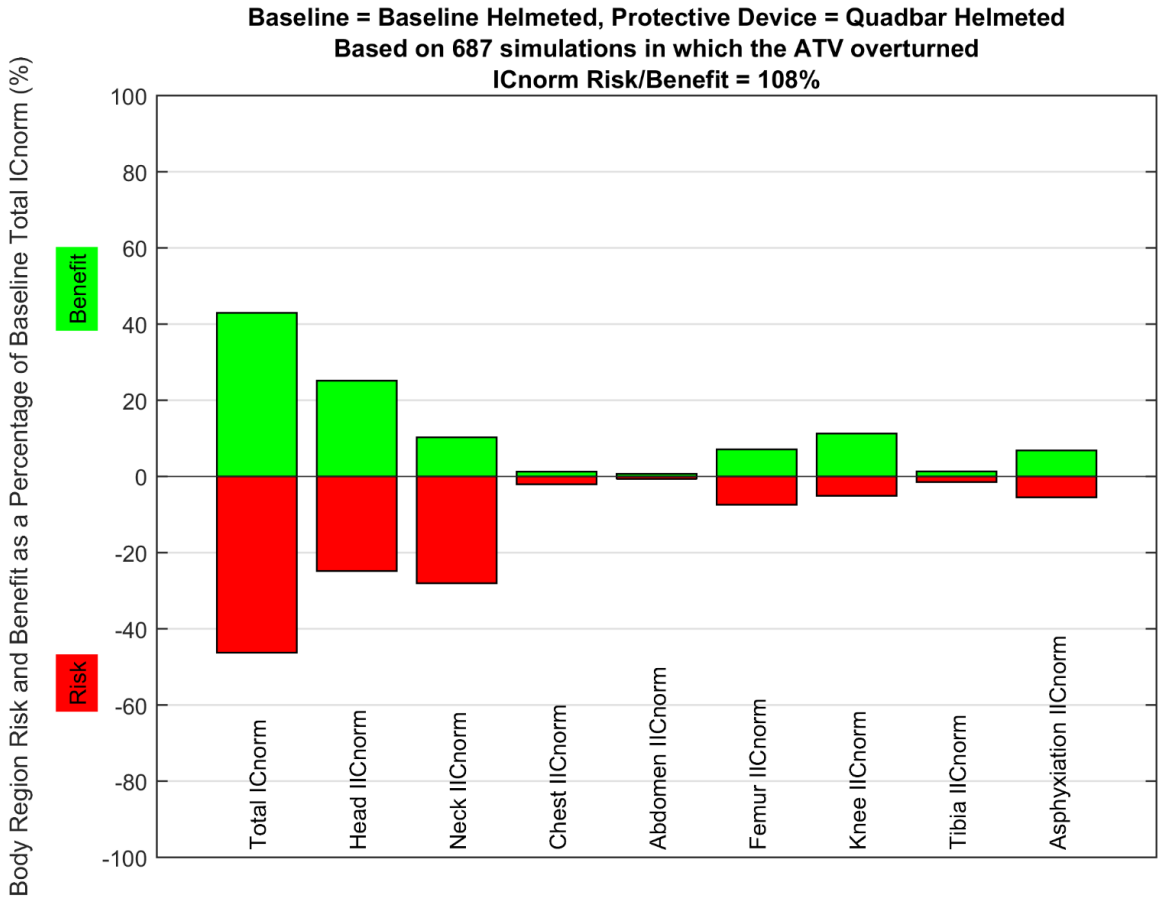
The Coroner went on to say that, in light of the research and the evidence given at the Queensland, NSW and Tasmanian inquests, "it is impossible to conclude that, as contended by the proponents of such systems and devices, fitment [of Operator Protection Systems] to all quad bikes should be recommended."

Dangerous Outcomes from OPDs

The FCAI's opposition to OPDs is based on the research studies showing they can cause as many injuries as they may prevent, but also that they can:

- stop the ATV from rolling away from the rider in a rollover situation
- inhibit separation of the rider from the ATV in a rollover situation
- hit and injure the rider during a rollover
- raise the ATV to a greater height in a rearward rollover, which means the ATV could fall with more force onto the rider
- place greater weight on the rider in a rollover when the ATV rests on the OPD and the rider (such as in the Tasmanian case).

The simulation studies carried out by DRI showed that for 687 rollovers, the quad bar CPD caused as many injuries as it protected for all body regions for the helmeted condition.



The results of Dynamic Research Inc simulation study that shows the risk and benefit for a helmeted rider in 687 roll over simulations.

For more information on the known practices that can improve ATV safety outcomes, visit www.atvsafety.com.au