

AIRBAGS AND THE RISK OF SERIOUS INJURY TO CHILDREN AND SMALL ADULTS

Why it shouldn't happen in Australia

There have been a number of media reports in recent months of crashes in the USA where unrestrained or incorrectly restrained children have been killed by airbags. A similar number of fatalities involving small adults have also been reported. This monograph looks at the safety issues related to airbag deployment.

How do airbags work?

An airbag system consists of the airbag module which contains an inflator, the airbag itself, and a trim cover. The proper firing of the airbag is controlled by crash sensors which supply electrical signals to a control unit which fires the inflator to inflate the airbag.

The driver-side airbag module is in the hub of the steering wheel. The passenger-side airbag module (if so equipped) is in the dashboard above the glovebox.

This is what happens when an airbag deploys in a crash:

- In the 15 to 20 milliseconds after impact, the crash sensors and control unit determine the severity of the collision and decide whether to deploy the airbag.
- At about 25 milliseconds, the airbag splits its covering pad in predetermined places and begins to inflate rapidly.
- At about 45 milliseconds, the bag is fully inflated while the seatbelted occupant is still moving forward.
- At around 60 milliseconds, the occupant contact the airbag which

immediately begins to deflate via vent holes in the back.

- Up to 100 milliseconds, the occupant continues to sink deeply into the airbag which cushions the head and chest while it is deflating.

In less than a blink of an eye, the crash has occurred, the airbag has deployed, done its job and now lies deflated in front of you.



The U.S. situation

Airbags are mandatory in the USA because it was the one way to ensure that occupants who do not wear seatbelts have some form of protection in crashes. The US seatbelt wearing rate is only now approaching 70%, whereas Australia has been over 95% for many years.

To protect the unbelted, US airbags must fire earlier and with greater force than the systems seen in Australia. This means that small occupants and the elderly in the USA are disadvantaged and low speed crash cases are now emerging where the so called "aggressive" US airbags have caused fatal or serious injuries where these occupants have been sitting close to the airbag when it has deployed.

That is why the Australian Design Rule for crash protection requires the seatbelts to be fastened, allowing the vehicle manufacturers to design their airbag systems to be a supplement to the seatbelt and therefore "softer".

The Australian situation

There are a number of reasons why fatalities to children and small adults should not happen in Australia.

Small Adults

The US airbags fire with much greater force and are designed to stay inflated longer in order to prevent the unbelted occupant from going through the windscreen.

In Australia, airbags are designed as supplementary restraint systems to the lap shoulder seatbelt. As a result, the airbags fire later and inflate with less force and have larger vents which make the airbag "softer".

In 1995, the Federal Office of Road Safety (FORS) commissioned a study with the Monash University Accident Research Centre (MUARC) to investigate crashes involving airbag-equipped cars. The study was aimed at not only examining the benefits of airbags but also

Here is a typical example of the wording used on the warning label:

WARNING! ALWAYS WEAR YOUR SEAT BELT

The wearing of seat belts is required by law, even when an airbag is fitted.

An airbag inflates very quickly and with great force. If you are too close to an inflating airbag, it could seriously injure you. Seat belts help keep you correctly positioned for airbag inflation in a crash.

NEVER install rearward facing infant/child restraints (eg baby capsules) in the front seat, as serious injury may result from the force of the inflating front passenger airbag.

If a forward facing child restraint is suitable for your child and is used in this front passenger seat position, always move the seat to its rearmost position, and buckle and tighten the seat belt.

to alert FORS of any inherent problems with airbag deployments in the real world.

Currently, MUARC has investigated over one hundred cases of airbag deployment and there has not been any case of either adults or children being injured let alone killed because of the airbag deploying.

Children

In the 1970s, Australia led the world in child restraints by mandating their use and adopting an attachment system that incorporates an upper tether strap. Australian child restraints attach to the car via the adult belt at the bottom and to dedicated anchorage points on the vehicle by the upper tether strap. Canada followed our lead in the late 1980s.

In contrast, the USA and Europe only rely on the adult belt which allows the child restraint to move around during a crash thus reducing its effectiveness. Not having an upper tether strap also allows the restraint to be used in the front passenger seat.

This has recently become a concern in the USA particularly with rearward facing child restraints which are literally resting on the passenger airbag. In a crash, the US airbag inflates at over 300 km/h

causing serious or fatal head injuries to the child in the restraint. The same thing happens to children who are unrestrained or incorrectly restrained in the front seat in close proximity to the airbag. These are the two scenarios currently being reported in the US by media.

There have been no reports of similar problems in Australia.

In Australia, the need for an upper tether strap precludes child restraints from being used in the front seat. In addition, some State laws prohibit children of certain ages from riding in the front seat. The only time children are at risk is if they are unbelted in the front seat, which is illegal.

On vehicles fitted with passenger airbags, most vehicle manufacturers are voluntarily putting warning labels alerting to the dangers of having children close to the airbag in an accident. FORS has negotiated with industry to mandate the labelling requirements in the Australian Design Rules.

Following representations from FORS, the latest Australian Standard for child restraints will also have labelling requirements on the child restraint itself to warn of these dangers.

The US problem with airbags should not happen in Australia because:

- *Airbags fitted to Australia cars inflate with less force than in the US.*
- *Australian child restraints are designed for use in the rear seats.*
- *There have not been reports of similar problems in Australia.*
- *Cars and child restraints have warning labels advising of the dangers.*

Nevertheless, it is important to understand that the airbag is not a substitute for a seatbelt.

Unrestrained children are at far greater risk of death or injury than children wearing a suitable seatbelt.

Small drivers, particularly women, are advised to sit as far as is comfortable from the steering wheel. This distance should be at least 30cm (or about 1 foot).