Update, Educate and Check

The Bus Safety Initiatives Paper

Bus Industry Confederation
moving people

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Bus Australia Network

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1. Introduction

The Bus Industry Confederation (BIC) is the national peak body for the Australian Bus and Coach Industry. We represent bus and coach operators, body and chassis manufacturers and suppliers, associated service providers and state bus associations on issues of national importance. The BIC advocates on behalf of our members to Federal, State and Territory Governments and bodies to ensure the safe and efficient carriage of passengers safe and sustainable operations and supply chains that support this industry.

The BIC and its members consider safety of the highest of importance which is reflected in road trauma statistics Bus and coach travel has been and continues to be the safest mode of road transport in Australia largely due to the operations of buses by certified drivers, the size and weight of buses (whereby each passenger experiences less crash force) and lower average speeds, particularly in urban route environments.

Road trauma data[1] as of January 2023 reveals that on average a total of 15 people a year were killed in accidents involving a bus between 2012-2021. The trend over the last three years showed a reduction of 13.4 per cent per year. Of the people killed in these bus-involved fatal accidents, approximately 11 per cent were occupants of the bus, 33 per cent were occupants of a light vehicle and 57 per cent were other road users. Approximately 254 bus occupants are hospitalised from accidents each year.

[1] BITRE (18 Jan 2023) Road Trauma Involving Heavy Vehicles – Annual Summaries. https://www.bitre.gov.au/publications/ongoing/road-trauma-involving-heavy-vehicles

2. Executive Summary

BIC has provided support to the industry and governments through the development and publishing of a range of operator guidelines and industry advisories related to Fire Safety, Passenger Door safety, and Transition to Zero Emissions Technologies for example, as well as submitted numerous safety related papers to key Government stakeholders and reviews.

This latest Safety Initiatives Paper details eight key topics to further enhances bus safety and a series of recommendations with the rationale behind them.

Each of these key topics carries their own reasons for importance, and cover three general themes, **update** to new technologies, **educate** the community about bus safety through national campaigns and enhance the ability to background **check** drivers.

Recommendations summary

1. Adoption of **Event Data Loggers** (for event investigations purposes) into new vehicles in alignment with European regulations and a set of standard data metrics for existing buses.

2. Adoption of **Intelligent Speed Assist Systems** into new vehicles in alignment with European regulations.

3. **Fast-tracking** vehicle replacement programs that incorporate **new technology systems** such as Electronic Stability Control (ESC), Lane Departure Warning (LDW), Autonomous Emergency Braking (AEB) and other appropriate systems such as those mentioned throughout this paper.

4. Implementing a national **harmonised** approach to **bus safety awareness**. This is aimed at both:
    a. Education in schools and
    b. Education of general public.

5. A full **review of Australian Design Rule 68** to:
    a. Clearly state seat belt requirements in the ADRs thereby **removing anomalies** .
    b. **Remove standees** on buses equipped with seat belts (except in Emergency*).
    c. **Increased warning devices and labelling** in vehicles to increase usage of seatbelts.

6. Investigate **feasibility** of introducing **seat belts** on new **Route Service** buses (typically low floor city buses and these vehicles undertaking specific Service type applications.

7. **Review** the level of obtainable **information** for **driver employment checks**.

8. **Continue** Driver **Fatigue reforms** through the **National Heavy Vehicle Law Review** and investigate feasibility of introducing **of driver fatigue monitoring systems**.

We recognise that there are operational and cost implications associated with some of these recommendations. They will take time and require a partnership between industry and governments. However, their adoption will further enhance the safety of bus and coach fleets and operations and protect the lives of everyone that travels on the bus network.

The Bus Industry have shown that we are early adopters of new and improved safety systems, innovation, and technology. Many of these new technologies can be implemented by accelerating older bus replacement. This could be through modifications to State and Territory government replacement programs or for the private sector, through incentive programs such as tax concessions/credits or financial incentives.

The BIC advocate that these recommendations framed under '*Update, Educate and Check*' are duly considered and enacted upon by the Federal *and state and territory* governments as part of a new Bus Safety Initiatives Roadmap for the most far-reaching public transport sector in Australia – buses.

3. Data Loggers or Event Data Recorders

Overview

In Australia - Currently there are no federal legislative requirements on event data loggers. Some states like NSW do mandate vehicle monitors in certain Heavy Vehicle applications[2]. These devices often referred to as Tachographs are a simple recording device measuring road speed, time, and driver breaks.

Telematics (more detailed dataloggers) are fitted to many Route Service buses (ie: public transport buses) as a specific state requirement and do record various vehicle metrics but are also for daily operational usage. Data is not always stored on a vehicle, being upload to remote servers. Different states have different requirements and systems. Systems are normally common to operators.

In Europe - For the purpose of accident investigations, Event Data Recorders (EDRs) are becoming mandatory across all vehicles over a time period starting in 2024 for cars and light vehicles. For buses this requirement (EU ECE Regulation R160[3]) commences in 2026-2029.

Event data recorders record

- General data: vehicle speed, accelerator pedal position, brake status, engine speed, ABS and stability control activity, and steering wheel angle.
- Ignition cycle.
- Vehicle dynamics: change in speed over time (delta V) in the longitudinal and lateral axes, and the resulting acceleration vector.
- Restraint system: the occupant seat belt status, the operating status of the airbag warning light, and the deployment times of the various airbags and seat belt pretensioners, each separately for driver and passengers.

In addition, for buses its proposed to have (still being finalised by the decision makers)

- Air pressure of the braking system, door status, ramp position, regenerative braking system, ISA status, and GPS status.

In the USA - Technical Requirement 49 CFR Part 563 specifies the technical requirements that EDR systems which are voluntarily fitted to passenger cars, multipurpose passenger vehicles, and trucks and buses with a maximum laden mass not exceeding 3,855kg (8,500lbs). Uptake is 99.6%[4].

Recommendations

As a priority, BIC recommend the government investigate the implementation of Event Data Recorders in two main stages.

1. **For New Buses**
   BIC recommend the government investigate the adoption EU ECE R160 standard for Australian buses and equivalent standards for vehicles from other markets. This would not be immediate but will align with Government initiatives to harmonise Australian legislations with European legislations and provide a standard method for investigators to assess accident-related data

[2] https://www.nsw.gov.au/driving-boating-and-transport/roads-safety-and-rules/heavy-vehicles/vehicle-monitors#toc-which-vehicles-must-have-monitors-in-nsw
[3] https://unece.org/transport/documents/2021/10/standards/un-regulation-no-160-event-data-recorder-edr
[4] <https://www.interregs.com/articles/spotlight/eu-and-un-ece-develop-new-regulations-on-event-data-recorders-000235>

regardless of vehicle type.

2. **For Existing Buses**
   Implement a standard set of metrics (in alignment with R160) that would be recorded / logged by an event data recorder, which are then obtainable in the event of an accident.
   This could be an expanded existing telematics system, or similar device. Emphasis would be placed on the standard set of metrics rather than the recording device itself.

   This approach could also be used as an intermediate standard for new buses until R160 is legislated, given the timing of R160 could be some years away.

4. Future Design - Intelligent Speed Assist Systems (ISA)

Overview

History - Driving at excessive or inappropriate speed is a major threat to safety on the road. In Europe it is estimated that 10 to 15% of all crashes and 30% of all fatal crashes are the direct result of speeding or driving at an inappropriate speed[5]. In 1991, Road Speed Limiters (RSL) were introduced Under Australian Design Rule 65[6] that disable the accelerator pedal above 100kph thus effectively limiting the vehicle to 100kph.

Now - In recent years technology has advanced to further assist with reducing the risks associated with speeding. Available on the market today and soon to be gradually legislated in Europe[7] are systems known as Intelligent Speed Assist Systems (ISA) which act as a driver aid to remind them of the speed they are driving at and warn of exceeding that speed.

An ISA system consists of two key features:

1. A Speed Limit Information Function (SLIF), which determines the applicable road speed limit and displays this information to the driver. Speed signs on the dash.
2. In addition to the SLIF, the ISA system must also include either:
    a. Speed Limit Warning Function (SLWF), which alerts the driver when the actual vehicle speed exceeds the speed limit, or
    b. Speed Control Function (SCF), which attempts to limit the vehicle speed to a speed at or below the applicable speed limit.

Opportunities exist to expand this technology into the Australian market.

Recommendations

BIC recommend the investigation of mandating Intelligent Speed Assist Systems in buses. This would need to occur in two stages:

1. **For New Buses**
   The BIC recommend that the government investigate mandating the ISA technology on all new buses in alignment with forthcoming European requirements.

2. **For Existing Buses**
    a. Fast-track bus replacement programs to allow for increased uptake of new technologies.
    b. Investigate the feasibility of introducing ISA system to existing buses, prioritising School Buses.
    This may also serve as an intermediate measure for new buses also until the European ISA technology comes into force.

[5] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=PI_COM:Ares(2021)2243084&rid=1
[6] https://www.legislation.gov.au/Series/F2006L02297
[7] https://road-safety-charter.ec.europa.eu/resources-knowledge/media-and-press/intelligent-speed-assistance-isa-set-become-mandatory-across#:~:text=From%20July%202022%2C%20Intelligent%20speed,in%20circulation%20before%20that%20date).

5. Vehicle Roll Over Systems, Stability Control Systems

Overview

Application - In the wake of several recent bus and coach accidents. There has been many discussions regarding what can be done to reduce vehicle rollovers, and what systems can be put into place to reduce these risks. These systems are already in place for "new" buses which are required to have a system called Electronic Stability Control / Program (ESC or ESP as its often referred to) to reduce the likelihood of single vehicle loss of control accidents including rollovers. This mandatory requirement was introduced under ADR 35/06 for:

- All new vehicle models since November 2020; and
- All new vehicles since January 2022 must have the technology.

The introduction of ESC into the vehicle was led by industry with suppliers and customers specifying inclusions of this feature in many vehicles as far back as 2015 ahead of any legislative requirements.

Benefits - A key function of stability control is rollover prevention. An impact statement for ADR 35/06 update mandating ESC[8], indicted that ESC for heavy vehicles is 40-56 per cent effective in reducing rollover crashes and 14 per cent effective in reducing loss of control crashes.

Retrofitting - Whilst anything is possible noting cost and time, retrofitting ESC to existing vehicles depends on many variables such as the vehicle model, system design, and age. Retrofitting though in most cases where it is possible would involve a comprehensive upgrade of the vehicle braking system, wiring harnesses, braking computers, main vehicle software, and other linked computer systems. ADR re-certification is also required.

Publicly - There are safety messages in the media regarding ESC and its effectiveness in improving safety in cars, but little for Heavy Vehicles.

Recommendations

Whilst the BIC would support retrofitting where possible, the sheer complexities and cost implications that would need to be investigated for the hundreds of model type currently in service make this impractical. A far more practical approach would be to take a two-tiered approach:

Fast-track Technology Uptake

1. Support the fast-tracking of replacing older non-ESC vehicles with vehicles that have this and other safety features as Autonomous Emergency Braking (AEB) and Lane Departure Warning (LDW). This would include exempting LDW safety cameras from vehicle width.
   The Federal, State and Territory governments should consider endorsing and funding fast-tracking safer vehicle initiatives.

Note:

- AEB is mandated by ADR 97[9] from November 2024.
- LDW which will most likely come in under ADR 99 is still in development.

2. **Education**
   Endorse and conduct a national awareness campaign regarding the effectiveness of such safety systems in heavy vehicles.

[8] https://oia.pmc.gov.au/published-impact-analyses-and-reports/national-heavy-vehicle-braking-strategy-australian-design
[9] https://www.legislation.gov.au/Details/F2022L00211

6. Increasing Usage of Seat Belts - Safety Campaigns

Overview

Education and awareness campaigns to encourage or reinforce seatbelts have traditionally focussed on cars with little or no reference to the use on buses (where fitted). Whilst it is generally accepted that seats belts should be worn if present on the vehicle an individual is travelling in/on, the lack of focus on buses means that it is not an automatic response to put a seat belt on in a bus as it is in a car.

In terms of school buses there are various state-based approaches to seat belt safety in buses showing videos and/or graphics, such as NSW Child Safety Hub bus safety program[10], Victorian School Bus Program [11] and Western Australian Get on Board Program[12]. Whilst individual initiatives like this are informative, they are not harmonised and can vary in how they are promoted in the classroom.

To the general public there is very little promotion of seat belt usage. In fact, seat belt education and awareness at the community level is primarily focused on cars.

The lack of regulated safety announcements regarding seat belts on buses, has meant that where a seat belt is fitted on a bus they are not necessarily used in comparison to aircraft where all passengers are orally briefed (and visually checked) before each take-off due to regulatory requirements.

Gaps

Overall, there is no national harmonised approach to education and public awareness for wearing seatbelts on buses and coaches. There is an opportunity to improve this.

Recommendations

BIC believe that there is a priority need to raise public awareness on seat belts and bus safety in general at a national level. Therefore, the BIC propose that a national public safety campaign be initiated to focus on two keys areas to increase awareness and educate all bus users.

1. **School Children Safety Education**
   An ongoing national education program designed for children but include teaching/support staff on bus safety including wearing seat belts. This could be a harmonisation of the various state based programs. This would be easily understood and be taught on a yearly basis at schools. It would harmonise what all children and staff are taught in this regard. For example, this could be a full national rollout of the new BusSAFE program by BusSA[13].

2. **General Public Safety Awareness Campaign**
   Support and fund a national public awareness campaign on various media fronts to increase the awareness and importance of wearing seat belts in buses and general bus safety (proposed by BIC as part of the National Road Safety Action Grant Program).

Both recommendations would be aligned to the safety recommendations initiatives outlined by BIC for ADR68. Specifically, increased signage and seat belt reminders messages.

[10] https://nsw.childsafetyhub.com.au/street-smart-road-safety-school-bus-safety/
[11] https://www2.education.vic.gov.au/pal/school-bus-program/policy
[12] https://getonboard.transperth.wa.gov.au/
[13] https://www.bussa.asn.au/

7. Seat Belts and Australian Design Rule 68

Overview

Seatbelts have been required in certain heavy buses since July 1992 and there are various regulations enforcing them. First it was ADR 66, and then ADR 68[14] from 2006. ADR 05 also covers requirements and means referencing three ADRs for one element of the bus. ADR 68/00 introduced in 2006 mandates seat belts on buses where the seat reference height (seat back) is greater than 1metre. Section 2 of this ADR sates the ADR does not apply to:

- # 'Route Service Omnibuses', or
- Vehicles in which all passenger 'Seats' have a 'Reference Height' of less than 1.0 metre.

Note

 # ROUTE SERVICE OMNIBUS - an omnibus specially designed with spaces for standing passengers. This is typically a normal city bus but could also apply to a high floor vehicle where the manufacturer or state has permitted standees[15].

Anomalies / Gaps

In the regulations despite their best intent there are several anomalies which have the opportunity to be addressed.

1. A high floor bus is fitted with seats under 1mt high then seat belts are not necessarily required if the bus model type approval was granted before 2015. Although it is uncommon to have 'non-route buses' (eg: charter buses) built without passenger seat belts, this is also due to state-based initiatives mandating fitment for applications such as school buses.

2. It is currently possible to design a bus to have seat belts and carry standees. This means two levels of protection for the occupants depending on whether they are standing (not restrained) and seated (restrained). Industry has previously raised concerns as acknowledged in TfNSW Rural and Regional Seatbelt Program Taskforce Report, 2019[16].

3. Warning/reminders systems for seat belt engagement largely don't exist on buses beyond the driver and even then, its not mandatory.

Recommendations

Noting the last regulation update was in 2006 (17 years ago), the BIC have already approached the Federal Government to set up a small expert working group to undertake a review of ADR68 for several of reasons. These include the adoption or investigation of the recommendations below. This review may also encompass the need to update ADR 05 also relative to seatbelts.

1. **For high floor buses**
    a. Remove the 1metre reference height exemption, thus, removing anomalies and risk of misinterpretation .
    b. Seat belts would be required for all occupants on buses that are equipped with seat belts. Thereby removing standing passengers and consequential two levels of safety protection. *Except of course in an emergency and in exceptional circumstance to respect*

[14] https://www.legislation.gov.au/Details/F2006L01454
[15] https://www.legislation.gov.au/Details/F2022C01069
[16] https://www.transport.nsw.gov.au/system/files/media/documents/2020/Rural-and-Regional-Seatbelt-Program-Taskforce-Report.pdf

the various state based 'no child shall be left behind principles e.g., QLD[17].

2. **Route Service Omnibus** (Typically City/Urban Buses)
   Investigate the feasibility of introducing seat belts to this model type taking into account specific service type applications as well as model type for example where low floor vehicles operate in high speed environments or dedicated school bus applications. Note the complexity of this recommendation includes challenges such an estimated capacity reduction of 46%. This is why detailed analysis is required. Other flow on effects include:

   - Requirements to increase the size of the bus fleet with a replacement bus ratio of 1.81. For every 10 buses seat-belted you would need to add another 8 buses to the fleet.
   - Yearly bus replacement cost increase of 87%. $660M to $1.2B. Estimate based on Q1 2023 pricing.
   - Infrastructure requirements such as bus stops, lay over spaces, depots, and electric bus charging requirements, all nearly doubling in size.
   - Increased electricity/hydrogen requirement supply constraints.
   - Driver shortages and enforcement challenges
   - Increased run time on routes

3. **Initiatives to remind users to fasten seat belts**
   Investigate and validate and then define requirements for reminder and warning systems to increase usage of seat belts where fitted. Such as but not limited to those mentioned below:
   a. Vehicle signage (e.g.: on back of each seat similar to an aircraft)
   b. Audible reminder upon closing bus door to fasten seatbelt. Plus, a visual lamp for hearing impaired.
   c. Seat Belt warning systems for the driver and possibly each occupant.
   d. 'No child left on board' safety systems.
   e. Other initiatives as defined by the working group.

[17] https://translink.widen.net/s/vrfgglqspv/safe-travel-of-school-students-guiding-principles-and-stakeholder-actions

8. Driver Employment Checks

Overview

According to statistics from the *Bureau of Infrastructure and Transport Research Economics*, in 2021-22[18] there were 12.03 billion passenger km travelled on buses primarily carried by a workforce of 41,000 bus drivers[19].

These 41,000 drivers carry our family, friends, and everyone using public transport in Australia to and from work, school, shops, sports and other events every day. On average each driver can carry up to 80 people at a time on large buses driving in busy traffic conditions and varying climates. High-capacity buses can be up to 100 people.

Skilled and experienced drivers are a major contributor to the safety of people not only on the bus but also around them. Bus Drivers are the pilots of land transport. Hiring competent drivers is major factor in bus safety.

The BIC are consequently concerned that a gap exists in the level of obtainable information available to prospective employers to provide a comprehensive understanding of an applicants professional driving history (for example. dangerous driving, negligent duty, customer complaints, at fault accidents, workers compensation history). This information would assist in assessing the prospective new employees for suitability. Respecting privacy legislation, it should be acknowledged this is sensitive topic.

Drawing a parallel to the USA aviation industry, prospective employers are required to adequately 'investigate a pilot's background before allowing that pilot to conduct commercial air carrier flights[20]'. This is kept and controlled through a Pilots Records Database[21].

Recommendation

Whilst an individual's privacy is paramount so is the safety of the people a bus driver would carry each and every day.

The BIC recommend that the governments investigate the level of and type of information obtainable by prospective employees to ensure that there is a transparent level of professional validated information to assess a drivers competency prior to employment.

This could include feasibility of establishing a national heavy vehicle licencing authority similar to the AHPRA potentially aligned to the National Heavy Vehicle Driver Competency framework

[18] https://www.bitre.gov.au/sites/default/files/documents/bitre-yearbook-2022.pdf
[19] https://bic.asn.au/industry-stats/
[20] https://www.govinfo.gov/content/pkg/GOVPUB-TD4-PURL-LPS109131/pdf/GOVPUB-TD4-PURL-LPS109131.pdf
[21] https://www.faa.gov/regulations_policies/pilot_records_database

9. Driver Fatigue

Overview

Law Reform

In most states of Australia driving hours are regulated under the Heavy Vehicle National Law. This law and associated regulations have been subject to a reform process for a several years. Two key areas of the reform, which BIC has engaged strongly with are fatigue management and drivers duties and drivers' health.

In terms of fatigue management, the reforms are aimed at simplified fatigue management and record-keeping without compromising on safety. This involves a risk based regulatory approach that provides industry with clarity of their obligations and fairness in enforcement.

In terms of duties and driver health the aim is clarifying the primary duty and parties covered by the chain of responsibility and strengthening laws to prevent drivers not fit for work from getting behind the wheel.

Technology

From a technology perspective, there are now available driver fatigue systems (referred to as Driver Drowsiness and Attention Warning -DDAW). These systems varying in how they technically determine drowsiness but typically monitor the drivers directly via various inputs such as steering wheel movement and eye movement cameras to track the alertness of the driver. It is understood that the National Transport Commission are investigating fatigue detection technology under the review of the Heavy Vehicle National Law.

Recommendation

Law Reforms: BIC recommends that the governments continue to progress the reforms related to driver fatigues, duties and driver health through the National Heavy Vehicle Law Review. In future, consideration could be given to mental health.

Technology: Additionally, BIC recommend investigating the feasibility of introducing of driver fatigue monitoring systems.

10. Conclusion

The reoccurring message throughout this paper is to Update, Educate and Check, which should form the basis of a new Bus Safety Initiatives Roadmap.

Update - Bus technology and Safety is moving at a fast pace globally. Other countries support this technology change with shorter bus life expectancies for example in Europe where the average lifespan is 12-15 years.

The Australian bus Industry have shown that we are early adopters of new and improved safety systems, innovation, and technology ahead of legislative requirements. However, the current common practice of contracting buses to have a life span of up to 25 years, means there are a large portion of older buses without these new technologies in active operation today. This is counterintuitive to increasing safety.

Many of these new technologies can be implemented faster by accelerating older bus replacement. This could be through modifications to State and Territory government replacement programs or for the private sector, through incentive programs such as tax concessions/credits, financial incentives, or ideas. This also has environmental benefits as older higher polluting buses are replaced by either zero/ or low Euro emission technologies.

Educate – The current state based approaches to education could be harmonised into an ongoing national program. This will ultimately save money and increase a common message. Instead of designing the similar packages several times over, do it once and invest the savings in its implementation.

Check – Preventative rather than re-active. Very simply, better ability to check backgrounds of drivers will act as a significant preventative step in addressing issues after the event.

The BIC advocate that these recommendations are duly considered and enacted upon by Federal Government as part of a new Bus Safety Initiatives Roadmap for the most far-reaching public transport sector in Australia – buses.