Date: **30 July 2021**

To: **Deputy Coroner Mr Ian White, South Australian Coroner's Court**

Subject: **AIHS submission on the safety of mobile amusement devices in Australia**

Dear Mr White,

The Australian Institute of Health and Safety (AIHS) wishes to thank the South Australian Coroner's Court (SACC) for inviting us to make a submission to this inquisition into the safety of mobile amusement devices in Australia.

The AIHS acknowledges the family and friends of Adelene Leong, whose death was the catalyst for this exchange. We commend the SACC for performing this inquisition.

The AIHS is the national association for the health and safety profession. With a 70-year history, and previously known as the Safety Institute of Australia, our vision is for safe and healthy people in productive workplaces and communities. One of the ways we realise our vision is by providing a collective voice for the profession, and representing our profession through submissions like this.

We represent the broader community of some 30,000 health and safety practitioners and professionals practicing work health and safety (WHS) across Australia. We have branches in each state and territory. This submission has been led by our Policy Committee, which forms a part of the AIHS College of Fellows (CoF). As a senior network of the Institute, the CoF works to support the Institute's vision, values and strategy.

The SACC has requested that the AIHS provides a submission in relation to mobile amusement devices, in terms of 1) concerns with the current regulatory environment, and 2) recommendations we feel may improve the safety of mobile amusement devices.

Our response covers a brief statement on regulation and Australian Standards, before providing more details across the following four technical areas:

- Design registration
- Annual and major inspections
- Engineers
- Operating staff.

Our recommendations include:

- Ensure regulations are consistent and proportionate to the risks faced by end users and the public.
- Harmonise the standards and approaches by individual regulators to regulate rides, including design registration and verification, annual certification requirements, and auditing of ride management practices.

We look forward to the SACC reviewing our submission.

AIHS Policy Chair

Andrew Heinrichs

AIHS College of Fellows Chair

Nathan Winter

Introduction

There are about 1,000 enterprises in the amusement parks and centres operation industry in Australia, employing more than 7,000 people (*IbisWorld 2020*).

Adelene Leong died at the Royal Adelaide Show in September 2014 after being flung from a mobile amusement device ('ride') called the Airmaxx 360. This occurred in a context of other significant incidents across Australia.

Regulation

Although rides are not manufactured in Australia, there are legislative requirements in each state and territory relating to their manufacture, operation and maintenance. The *AS/NZS 3533 Amusement rides and devices* series was developed as a guide for the requirements for managing rides.

In some states such as South Australia and Western Australia this guide is mandatory, as it is referred to within state legislation. In other jurisdictions a 'best practice model' is adopted, with the Standards being referred to in Codes of Practice. These Codes of Practice are enforceable by law.

Effective compliance and enforcement is an important component of the suite of measures to produce healthier and safer workplaces. Although organisations have the primary responsibility and accountability for meeting legislative health and safety requirements as applied to their own workplaces, proportionate and evidence-based regulation is important.

Regulators play a critical role in providing advice on, confirming, monitoring, and investigating compliance, as well as for incident investigation, determination of causes of incidents, and pursuing processes to establish penalties associated with non-compliance.

Ride incidents are jurisdiction-agnostic. The jurisdictional and legal environments within which they occur makes no material difference to the physical risks and controls on the ground. Therefore our view is that consistency between jurisdictions is essential. Proportionate, consistent regulation is critical to providing clarity to engineers, regulators and operators, and to mitigating risks to end users and the public.

We believe the recommendations provided would not impose materially significant cost burdens onto regulators, in terms of resourcing and training appropriately competent inspectors. Where there are costs imposed on ride owners and operators, we believe the potential to prevent further significant injuries or fatalities far outweigh the financial impacts on this part of industry. We welcome any opportunity to provide input into relevant cost impact assessments.

Recommendation

Develop a model Code of Practice for rides from which all regulators and operators can model their approach.

Australian Standards

This submission includes several references to Australian Standards. We believe that all Australian Standards related to the management of WHS risks should be made more freely available, in order to provide organisations and duty holders with WHS resources and management information. This particularly applies to small to medium sized businesses, not-for-profit and community organisations. We know that these sectors of the economy experience proportionally greater rates of harm compared to larger organisations. Freely available standards would support and encourage better WHS outcomes, compliance and accountability, as well as supporting productivity.

Recommendation

Include a call for the free provision of Australian Standards to Australian businesses in any SACC report.

Design registration

Background

For a ride to be operated in Australia, it must have a design registration number. To obtain a design registration number, the purchaser must have the ride independently verified to ensure that the ride is compliant to the standard to which it was manufactured. In Australia, we can use European, Australian or American standards as the reference documents. To achieve design verification, the owner must engage registered professional engineers from several disciplines to review the various aspects of the ride. In most cases, the following engineering professionals will be required:

- A **safety engineer** to review the overall compliance of the ride against the relevant standard to which is was manufactured. The safety engineer will be a qualified engineer in a discipline such as mechanical engineering, in addition to having an auditing and safety qualification.
- A **structural** engineer will be engaged to determine the appropriate foundations for wind loading and that the structure is suitable for the loads imposed upon it during operation. This is a verification against the designer's specification.
- A **control systems** engineer will be engaged to ensure the ride control systems are compliant with the relevant standard.
- An **electrical** engineer will be engaged to ensure that all electrical wiring and circuits are compliant with local regulations, and with reference to *AS/NZS 3000:2018*, known as the 'Australian/New Zealand Wiring Rules'.

The above process will also require the development of a critical components list with full non-destructive testing (NDT) requirements detailed for the owner. In addition, restraint risk assessments must be completed to ensure the restraint can withstand the acceleration forces experienced by the participant within the ride.

This is a critical assessment, as failure to comply will prevent the ride from being granted design registration and thus legally operating in Australia.

Once this work has been undertaken, each specialist engineer will complete a design verifier's statement which is attached to the application for design registration. This is then scrutinized by the engineering department of the relevant State/Territory regulator to ensure all elements have been completed appropriately before a design registration number will be issued.

The level of scrutiny applied by regulators varies. In states like NSW this action is more administrative in nature, compared to states like Queensland where there is a high degree of involvement and analysis performed by regulators. This creates inconsistencies between jurisdictions.

Once a design registration number has been issued, the owner can apply to the relevant regulator for a registration number which enables the ride to be lawfully operated.

For fixed rides, the regulator overseeing the jurisdiction where the ride is physically located is usually the body who perform this regulatory role. There have been some exceptions, where fixed rides have been registered and verified by another state regulator to which the ride is located, but this is rare.

For mobile rides, operators are able to 'jurisdiction shop', and move the device to the location that best suits their registration needs. This is where inconsistencies between jurisdictions creates gaps.

In some states, registration is required annually such as in Queensland, in other states it is every five years, and in Victoria registration is no longer required.

Observations

Unfortunately, in many cases the design registration of rides process described above is not adhered to, and the design registration is completed by a single engineer who is not a specialist, and may not be competent, in all four technical aspects of the ride. The regulator in many cases will accept the single engineering sign-off on the design registration application form. This results in rides being potentially operated without compliant restraints, and without the appropriate maintenance systems in place.

In Queensland, design verification can only be performed by a Registered Professional Engineers Queensland (RPEQ) registered engineer, whereas in all other state's design verification can be done by a "competent person". The concern here is that we are trusting people to self-assess their skills and knowledge regarding ride designs, and not relying on professional qualified engineers in conjunction with manufacturers to verify ride designs.

Ride owners and operators may therefore choose to have their mobile ride design verifications done in Victoria or New South Wales. It is concerning that once a ride has its design verified it can travel across jurisdictions and operate without restriction.

Recommendations

- Require structural, electrical, mechanical and control systems sign-offs for all rides as part of the application with the following mandatory documentation developed and submitted with the application:
  - *Restraint risk assessment*, to provide evidence the restraint is a suitable classification for the ride.
  - *NDT and critical components list*, to determine annual inspection requirements.
  - *Inspection schedules in the original equipment manufacturer (OEM) manual*, with any variations justified and approved by the relevant engineer.

Annual and major inspections

The regulators require that every operator of a ride have an annual inspection performed by a competent and qualified engineer to ensure that it has been maintained and operated to the requirements of both the manufacturers and *AS/NZS 3533.3-2003 Amusement rides and devices - In-service inspection*.

There are specific criteria which must be assessed by that engineer, including that:

- The operational history since the last annual inspection has been checked.
- The ride logbook is up-to-date.
- Maintenance and inspections have been undertaken and recorded within the logbook.
- Non-destructive testing and other tests have been conducted and records are maintained.
- Electrical inspections in accordance with *AS/NZS 3533.3 clause 11.4.3* have been conducted, and there is an electrical statement provided by a qualified person stating compliance with that requirement.

The annual inspection requirements, although specified in legislation, are completed differently by the various engineers in the industry. This lack of consistency is concerning. It is the regulators' responsibility to audit these reports to determine whether or not the engineer has completed the task appropriately.

'Best practice' inspections and reports

We consider 'best practice' for inspections to include the development of a detailed report, which is 80% based on auditing of records, and 20% on inspecting the ride on site. For indicative timeframes, a

large class type 5 ‘roller-coaster’ may require two days, and a smaller class type 2 ‘merry-go-round’ may require 4-6 hours.

‘Best practice’ reports are considered to include:

- Full review of the logbook including all items recorded for the past 12 months.
- An asbestos register review.
- An audit of instruction and training for operators of the device.
- An audit of training and assessment of maintainers of the device.
- A review of all maintenance records that have been completed and authorised appropriately.
- A review of any repairs and alterations that have been made to ensure that engineering principles have been followed and engineering signoffs completed where required.
- That a critical components list has been developed and reviewed including the development of NDT requirements.
- A review of the NDT records developed by the testing authority.

Once the information has been identified and recorded in the report, the inspection of the ride is conducted during its operation along with the performance of the daily inspection with staff. A ‘best practice’ report will then include the following elements:

- That the ride is operated as per the manufacturer’s requirements.
- That the patron restraints are effective, and the loading plan is followed.
- A critical inspection of key elements of the ride i.e. envelope intrusions, suitable foundations, patron access, controls, interlocks operational, signage is clear etc.
- Emergency plans are current and staff records are available for training in those procedures.
- Noise level assessments have been completed at least one every five years and appropriate control measures taken.
- That all electrical equipment is compliant with standards, with no double-adapters, RCD protection is in place, switchboards are clearly labelled etc.
- Control systems are functioning as designed and a full functional test is conducted.

This report with recommendations for continuous improvement is provided to the owner, and a summary report in a one-page format is provided to the regulator for registration purposes.

The reality

In many cases, the engineer’s providing the service make an entry in the logbook and may provide a certificate to say the inspection has been completed, but no report. Whilst a certificate is implied in the harmonised legislation, there is no set template available for engineers to use, meaning standards vary significantly.

Some engineers in the industry have been reported as inspecting 10 or more mobile amusement devices in a day, which is considered impossible if a thorough process is undertaken. This creates an unequal playing field for inspecting engineers, as the diligent engineer who ensures the ride is being operated and maintained safely cannot compete effectively with an engineer that gives the ride a quick visual inspection.

Regulators, who should be ensuring inspection standards are maintained, generally only look for the logbook entry that an annual inspection has been completed by an engineer, without any consideration of the completeness of the inspection process.

Recommendations

- During their ride inspections, the regulator must review the annual inspection report performed by the engineer for the ride to ensure it has been completed to the standards and with the elements described above, with appropriate electrical sign-offs and supporting evidence. If no report is available to support the annual engineering certificate, then the ride must be prohibited from lawfully operating by the removal of the registration number. The regulator may issue a prohibition notice that the ride cannot be operated without a valid annual engineering report.
- Annual inspections must be performed for each ride, regardless of the jurisdiction it operates in. The annual inspection is to 'follow' the ride and records maintained with the ride.
- Inspecting engineers only inspect aspects of the ride that they are qualified to inspect, e.g. control engineers only inspect control systems.
- Develop and mandate a prescribed template for annual and major inspections, to be used by inspecting engineers.

There is now a legislative requirement in Queensland for major inspections to be conducted every 10 years, or upon recommendation of a consulting engineer. For a mobile ride, a 10 yearly inspection will require the ride to be completely dismantled and all components inspected, repaired or replaced as required. In many cases, this will require the ride to have its basic structure abrasively blasted, full NDT completed on all welds, and repairs made before being reassembled. This process completed thoroughly will ensure any potentially hidden defects which are not detected during annual inspections can be addressed to support continued safe operation.

Recommendation

- Legislate that all mobile amusement devices are required to have 10 yearly major inspections, regardless of where it operates across Australia, and that these inspections should only be conducted by RPEQ engineers that are amusement ride-qualified, as is required in Queensland.

Engineers

The legislation in each state requires the person performing the inspections to be competent, i.e. possess the skills and knowledge to perform the task. But this is self-regulated. There is no requirement for engineers to demonstrate their competency to perform inspections of rides. An engineer in Queensland must simply be registered with the Board of Professional Engineer Queensland (BPEQ), and will be able to conduct inspections and sign off rides with potentially minimal knowledge of a ride's complexity.

To practice in this area, it is a requirement for the engineer to hold valid professional indemnity insurance coverage in the area they practice. This is also often overlooked by the regulator and the BPEQ as the requirement is again self-regulated.

Within the BPEQ there is an area of specialist classification for inspection of rides, but the requirement to hold this area of competence is not yet mandated. Unfortunately, being a recent category of classification, the criteria for the competency assessment is still under development. Submissions were requested on this topic three years ago; we are unaware if any progress has been made since then.

Recommendations

- An appropriate body such as Engineers Australia or BPEQ develop assessment criteria and experience requirements for entry into the professional area of "Inspection of Amusement

Rides and Devices", to determine whether an engineer is competent to perform inspection (e.g. minimum experience under supervision, understanding of relevant standards etc.)
- The BPEQ require the engineer to provide a copy of their professional indemnity insurance as part of their application, and the BPEQ checks the insurance covers the relevant area/s of practice.

Operating workers' training

It would seem that the industry has suffered in the past from inadequate training of ride operating workers.

Some standards (e.g. *AS/NZS 5848:2000 Code of practice for bungy jumping*) address in detail the requirements for training of operating workers and individual log books for each worker.

Because many ride operating workers are transient or casual employees, their training can sometimes be very limited. 'On the job' training often forms a significant component of their development.

Recommendations

- All ride operating workers/attendants be trained in accordance with the ride manufactures' guidelines, and that this training once completed is to be recorded, that training record is to be maintained for each worker, and a copy of this training record be held by the employer and made available for inspection by the regulators.
- Legislate that ride manufacturers' guidelines and training manual/s must be made available to ride operating workers (e.g. may be electronically), so that operating workers can readily access the guidelines and training materials.

Summary

Australian states and territories have legislative requirements for the operation and maintenance of rides to ensure public safety. Regulations apply to both fixed and mobile rides and are enforced by the regulators of each state and territory. Legislation harmonisation has made standards more consistent, however there is still variations and gaps that need to be addressed.

The engineers inspecting the rides are inconsistent with their approaches, and these inconsistencies are not effectively addressed by the regulator. This results in an unequal playing field, and some inspecting engineers will compromise their level of service or diligence in order to meet or achieve commercial gains.

As was stated in our Dreamworld submission, 'neglecting safety because of its perceived costs can result in significant organisational reputational and financial cost, quite apart from the clear human cost where injury or fatality is involved'. The recommendations provided will result in costs being born by stakeholders, particularly ride owners and operators, and by tax-payers through increased regulation resourcing. The AIHS welcomes any opportunity to be involved in assessing the costs of those impacts.

Acknowledgements

The AIHS sincerely thanks David Randall and Gary Wachter for their thoughts and contributions in forming this submission.