



Workplace Health and Safety
Electrical Safety Office
Workers' Compensation Regulator



Purpose

There are identified risks with rider restraint systems on some amusement rides. This alert outlines information on engineering controls to assist in ensuring the safety of patrons.

Background

Incidents resulting in serious injuries and fatalities have occurred in recent years where rider restraints have failed to work properly. One such restraint system relied on the patrons' ability to hold onto the restraining mechanism (e.g. a lap bar) to avoid being thrown from the carriage during the ride. These incidents have highlighted the need for ride owners to assess the effectiveness of rider restraint systems on their rides in accordance with AS3533.1 and, where necessary, implement engineering control measures to improve the patron's safety.

For most ride owners, an engineer or the ride manufacturer will need to be consulted.

Workplace Health and Safety Queensland (WHSQ) has previously issued a safety alert on rider restraints for **sizzler-type rides**. WHSQ has also conducted statewide campaigns to educate and assist ride owners to address the safety issues. The majority of these ride owners have implemented appropriate engineering controls to address the issues.

In some instances WHSQ has accepted the implementation of interim control measures until a permanent solution can be developed and implemented. Primarily, this relates to secondary locking mechanisms that employ rope and cleat and/or chain and dog clip arrangements.

Audits by WHSQ revealed that with repeated usage, some of these interim control measures have become worn and ineffective. A more robust secondary locking system should be implemented as a permanent solution.

Recent incidents show there are other amusement rides that may have inadequate rider-restraint systems. This safety alert includes these additional rides.

Contributing factors

This safety alert applies to rides which, through their motion, result in an ejecting force on the patron and:

- rely on the patron to hold on to parts of the carriage (e.g. the lap bar) to avoid being moved into a position where they could be ejected from the carriage (e.g. legs can be moved from under the lap bar onto the seat)
- do not have a secondary lock to prevent the rider restraint system from opening during the cycle of the ride (in the event of failure of the primary lock)
- the patron can access and disengage the rider restraint system, while the ride is in motion.

Rides affected

Table 1 includes examples of rides that are likely to be affected by one or more of the above conditions.

Table 1 – Amusement rides that are likely to be covered by this alert

No	Generic name of ride	Names of similar rides
1	Paratrooper	Super Trooper or Skydiver
2	Sizzler, Cha Cha, Whizzer	Scrambler
3	Matterhorn	Rock & Roll, Flash Dance, Tango Train, Love Express, Raupen Bahn or Alpine Express
4	Trabant	Wipeout, Frizbee or UFO (there may be rides known as UFO that are not a Trabant type ride)
5	Breakdance	Spider or Cyber Party
6	Octopus	Spider, Alien 8 Arm or Trippa
7	Hurricane	
8	Music Trip	Gee Whiz, Surf's Up, Disco Show or Avalanche
9	Tilt-a-whirl	

Action required

Owners of these rides should have their rider restraint systems assessed. If design deficiencies are found, implement engineering control measures to improve the effectiveness

of the rider restraint system.

Where permanent actions undertaken following the earlier [Whizzer, Cha Cha and Sizzler-type amusement rides](#) alert comply with the intent of this alert (i.e. not just interim control measures), there is no requirement to repeat the process.

Role of the engineer

1. Conduct a risk assessment of the existing rider restraint system, in accordance with *Australian Standard AS3533.1*, clauses 2.2, 2.8 and appendix G, to determine the following:
 - If the manufacturer has stipulated patron restrictions (e.g. minimum height, age, physical attributes), are these restrictions observed when operating the ride and included in the ride operator's training program?
 - If the manufacturer has not specified any size or seating restrictions for patrons, assess whether any restrictions are necessary. Consideration for rider restraints should include a review of the original design assumptions around the height or size of children who can use the ride safely.
2. If additional patron restrictions are required, then provide this advice to the ride owner to include in the ride's operational procedure and ride operator's training program.
3. If the rider restraint system design is found to be deficient, develop engineering control measures to prevent the following situations from occurring to a patron who is allowed to go onto the ride (i.e. not covered by the physical restrictions such as height restriction imposed on patrons):
 - the patron being able to manoeuvre into a position (e.g. both legs onto the seat) where the patron is more likely to be ejected
 - the patron being able to slip under the rider restraint system and into the foot well of the car, from where the patron may be ejected from the ride.

The objective of the engineering control measure is to improve the ability of the rider restraint system to secure the patron in the intended position and prevent him/her from being ejected from the car. Any improvement to the rider restraint system should remain effective for a patron who is slim and only marginally above the restriction height limit.

4. If there is no secondary locking mechanism to prevent the opening of the rider restraint system, in the event that the primary locking mechanism fails, design a suitable secondary locking mechanism. In the event of a primary locking mechanism failure, the secondary locking mechanism must maintain the effectiveness of the overall rider restraint system (i.e. prevent the rider restraint mechanism from becoming slack enough to become ineffective in holding the patron in the intended position).
5. Assess and, if necessary, design modifications to the primary or secondary locking mechanism (of the rider restraint system) so that at least one of the mechanisms cannot be accessed and unlocked by the patron during the operation cycle of the ride.
6. Check whether the rider restraint system has been properly maintained and in good working order (e.g. fasteners used to secure the restraint bars and locking devices must be prevented from unintended loosening when the restraint system is being engaged or disengaged). Record any defects and report to the owner.
7. Review any rope and cleat, and/or chain and dog clip arrangements (which were previously allowed as a temporary secondary locking mechanism) and redesign a permanent secondary locking system, as required. WHSQ inspectors have observed that the rope and cleat or chain and dog clip arrangements can introduce flailing, an unintended hazard when they become disengaged unintentionally during the ride cycle.\

8. Ensure that the operating procedures mention that all safeguards provided by the manufacturer are to be installed during the operation of the ride (e.g. nose cone on individual cars must not be removed).
9. Prepare a document for the owner to record all new engineering controls designed for the ride (with photographs and/or sketches of the rider restraint system) and include any rider limitations and details of periodic testing, inspection and maintenance requirements.

Additional actions by the owner

1. Work with the engineer to ensure any modifications to the rider restraint system design or procedures are appropriate for the ride's operation.
2. Implement any design and procedure changes needed.
3. When an amusement ride (with an existing design registration) has been modified, the owner is required to submit a copy of the document (with details of the modifications) prepared by the engineer to WHSQ as an update to the [design registration](#) for the particular ride. A copy of this documentation should also be kept with the ride for audit review by WHSQ.
4. Owners are to ensure that all operators of the ride are familiar with any improvements installed on the ride and any revision to the operation procedures, including any minimum patron size and seating requirements.
5. Where patron size limitations are used to ensure patron safety, these must be displayed in a manner easily understood and accessible to operators, patrons and any supervising adult.

Photographs of the completed rider restraint system upgrades that are signed and dated by the engineer may be added to the logbook to minimise the time taken for WHSQ to assess your ride and also provide a reference point for future repairs or maintenance.

The use of removable foam blocks as dummy patrons to enhance the effectiveness of the rider restraint system relies on the diligence of the operator and has been shown to be unreliable. WHSQ discourages this practice. The rider restraint system should be modified so the foam blocks are not required.

Further information

Further information may be obtained from the following:

- › [How to Manage Work Health and Safety Risks Code of Practice 2011](#)
- › [Managing Risks of Plant in the Workplace Code of Practice 2013](#)
- › [Plant design registration – Guide for applicants](#)
- › [WHS Regulators' National Audit Tool for Amusement Devices](#)

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