NAFLIC

National Association For Leisure Industry Certification

Standards & Related Documents Committee

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273. Ferris Wheel Accidents

There have been two more reports, within a time period of a month, of serious accidents involving Ferris Wheel (Big Wheel) rides. These should not be confused with Gondola Wheels, Liberty Wheels, the London Eye, etc., to which this Technical Bulletin is not intended to refer.

One of the recent accidents was in New South Wales, Australia while the other occurred in Kansas, USA. We have previously reported in Technical Bulletins 245 (August 2002) and 112 (February 1995), on similar Ferris Wheel accidents, of which there have been many, sometimes fatal. We repeat and add to the points on the subject of Ferris Wheel passenger restraints that we included in those Technical Bulletins, which are now both withdrawn.

Controllers are required, by Regulation 3(3) of the *Management of Health and Safety at Work Regulations 1999*, to review their risk assessments when there is new evidence (such as accidents) which may be relevant. It is our view that there are several safety issues which ought to be considered when reviewing the adequacy of Ferris Wheel passenger restraint systems :-

1. Consideration should be given as to whether passenger access to the restraint bar release should be made impossible. Methods sometimes used to achieve this include constructing a guard around the release handle, and the use of a release key or tool to do away with an accessible handle.

2. If they are able to do so, it is foreseeable that passengers may attempt to stand or kneel up in the car, since they are not readily able to perceive the risk resulting from destabilisation. This risk is not entirely obvious since it results from the proximity of the unloaded car's centre of mass to the swing pivot axis. Consequently, consideration should be given to limiting passengers' potential movement. Methods which have been used to achieve this include the provision of seat dividers, the addition of seat belts, and the replacement of the conventional single lap bar by a double bar type (either arranged one above the other or angled inwards).

3. It is well known that passengers commonly deliberately rock their Ferris Wheel cars and that serious and fatal accidents have resulted. This is therefore "foreseeable behaviour" for which some passengers are predictably unable to full perceive the ejection risk associated

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with conventional Ferris Wheel restraints. In other words, it is our view that the global accident history shows that containment systems which cannot fully restrain all passengers permitted to ride are unlikely to comply with British law.

The ejection of passengers, following from passenger behaviour as in 2 and 3 above, but also from car pivots jamming so that the car does not swing freely as the ride rotates, is such a common occurrence that the design of passenger containment needs to be able to prevent ejection.

Another known issue is that some types of Ferris Wheel restraint bar mechanisms suffer failed plungers. On these types we suggest that consideration may be given to installing double (redundant) plunger mechanisms, otherwise improved designs, or redundant restraints (such as seat belts or more positive secondary devices). However, if daily inspection includes, as it should, passenger containment and restraint, then failed plungers of the Eli Bridge type are unlikely to occur. Experience shows this type to be both simple and effective if correctly maintained.

Any of the modifications described above are safety-critical and would require to be competently designed and manufactured and submitted to fresh Design Review, etc..

Please note that it is not the reponsibility of inspection bodies carrying out thorough examination, or the appointed inspection body issuing a D.O.C. (Declaration by Registered Inspection Body of Operational Compliance), to review design issues. This also includes design issues arising during controllers' reviews of risk assessments.