

# NAFLIC

*National Association For Leisure Industry Certification*

Standards & Related Documents Committee

TECHNICAL BULLETIN — MAY 2007

## 320. HSE Letter to the industry Re: Tivoli Orbiter

The committee has received the following email from Barry Baker HM Principle Inspector of Health and Safety, Entertainments & Leisure Section. The letter discusses the Tivoli Orbiter devices.

Dear All

### Tivoli Orbiter: Action Required

Unfortunately I find myself in the position of having to send you another -email which will require your members to act on deficiencies in the structural integrity of a fairground ride.

The metallurgical and engineering examination of the failed parts of the Tivoli Orbiter involved in the incident in Bilston in May 2006 are coming to an end. There are likely to be longer term issues which will require action by the industry, but which we are unable to disclose at this time due to the ongoing investigation. However one of the findings of this investigation which has very recently been brought to our attention is of such importance that we need to share it with you now to enable appropriate action to be taken immediately.

### Background

The failure of the car attachment point of the Bilston Orbiter was due to fatigue. The fatigue crack formed through the weld holding the box section car support arm onto the hub at the bottom of one of the drop arms of the ride, and the crack formed from the inside of the section and propagated outwards. Once it broke the surface it was only a matter of time before the crack grew to such a size as to cause a complete failure, resulting in

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the car becoming detached from the ride.

## Issue

I realise that after the event at Bilston, ride controllers were advised to have their rides retested, and this was done with commendable speed. However the expert advice we have received is that due to the manner in which this crack formed and propagated in conjunction with the geometry of the component it would not have been possible to detect the defect with any degree of certainty using non destructive examination techniques until it broke the surface. Once this had happened it was not possible to estimate how long it will take for the crack to grow to a safety critical size and cause a complete failure as there are too many variables and unknown factors to take into account. The upshot of this is that we are faced with a situation where a ride has a component which is known to fail through fatigue, but is not examinable in a meaningful way to determine if fatigue is occurring until it may be too late.

This means that the affected rides will need to have this component redesigned to overcome this problem. Obviously any proposed new design will need to consider possible fatigue modes and suitable examination techniques to determine if fatigue is occurring. As this part of the ride is undoubtedly safety critical any design changes will need to be subject to the relevant pre-use inspections. We do not believe that any short term increased NDT inspection regime is satisfactory to deal with the issue, and legally would not meet the requirements of the Management of Health and Safety Regulations, which require elimination of risk as the first consideration, where reasonably practicable.

## Scope

The information we have suggests that this problem is likely to affect all Tivoli Orbiter rides manufactured prior to 1982 as we are of the belief that they all have car attachment structures of the same design as the ride which failed. As far as we are aware the newer design of car attachment, believed to be from 1982 onwards, which has a gusset plate welded above the three car support arms, is not affected. However ride controllers will need to verify this for themselves.

## Action required:

- 1 All Tivoli Orbiters will need to be assessed to determine whether the car attachment and support structure is of the problematic design.

2 Any which require modification will need to be removed from use immediately until the appropriate remedial action, as detailed above, has been satisfactorily carried out.

At this stage we would hope that this can be done voluntarily with the agreement of the ride controllers. However we will Prohibit any ride, which we find operating where this action has not been taken.

Happy to answer any questions as far as I am able

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