

ACTION NOTE

TIVOLI ORBITER EXTREME

Following the passenger ejection from a Tivoli Orbiter Extreme in Scotland in May 2009 an investigation has been conducted by HSE. A concurrent examination of the ride and the possible causes of the ejection was conducted by the Health and Safety Laboratory (HSL) in Buxton. This report has now been received by HSE and action is required by the operators to prevent a recurrence of the ejection incident.

Problem:

The rides affected are all Tivoli manufactured Orbiter Extreme rides with seat and rail configurations as shown below:

Fig 1:



Experiments on the ride involved with this seat configuration have shown that it is possible, given the movement characteristics of the ride and the rail positioning, for ejection to occur through the gaps in the containment. The gap in the containment marked A in Fig 1 (165mm) corresponds to the chest depth of 14-year-old boy, whose equivalent stature (with shoes) is estimated at 1750mm. The gap marked B in Fig 1 (239mm) is large enough for all children 16 years of age and under, and 17% of all adults to fit through and so possibly be ejected from the ride through this route, especially during the start up phase. In order to eliminate the risk of ejection through this gap, an estimated height restriction closer to 1950mm would be more appropriate (i.e. to eliminate all but large adults).

Action required:

Action required is in 2 stages:

1. Until physical changes are made to the seat restraint bars and those changes have been reviewed and approved in accordance with the design review procedures in HSG 175, with immediate effect, no person under the height of 1.8m (one point eight metres) is to be permitted to ride this machine. The design review should be carried out by an appropriately qualified person and can be limited to the seat restraint bar system if that is the only part altered. It should be noted that there remains a slight possibility that persons of certain builds over 1.8m may still be ejected from the ride so a high level of operator vigilance is required.
2. By 21 August 2009 the seat rails must be adjusted so that the gap between the overhead restraint and the new rail is not greater than 50mm and should fill the gap from top to bottom as shown in Fig 2. The 50mm measurement is to be taken with the overhead restraint at the 'first click' only and not utilising the pneumatic system. Tivoli have completed this work on at least one ride so far, an example of this work is below:

Fig 2:



It can be seen that the original side restraint bars are retained and the new piece welded to it. This addition should be capable of withstanding the weight of the upper torso of a large male rider, an approximate sideways force of 150 kg during all phases of the ride.

Operators are to notify HSE, (M Sandell – 07527002689) when this work has been completed. Operators who have not notified HSE by 21 August 2009 will be visited by their local HSE NFIT Inspector to discuss future use of the ride.

Once this work is done the ride can once again be operated allowing riders of at least 1.3m to ride.

HSE Action:

HSE NFIT inspectors will be briefed to pay particular attention to the use of these rides, in particular the height restraint procedures used by operators, and enforce as necessary.