SAFETY ALERT/ACTION NOTE
CRAZY FROG TYPE RIDES

Background.

This alert results from the now closed investigation into the Crazy Frog accident on Blackpool Central Pier on 29 July 2009. The investigation involved HSE Specialist Mechanical Inspectors and Specialists from the Health and Safety Laboratory (HSL).

The accident occurred when a radial arm collapsed whilst the ride was running. Two riders were in the car at the time but there were no serious injuries. A photo of the ride with the broken arm in situ is at Fig 1.

Fig 1.

Investigation Report

The Report into the accident concluded that the failure of the arm was the result of fatigue cracking. The arm fractured through 3 sides of the fabricated box section. This cracking is highly likely to have started at the site of a series of welds that had probably been made to repair a previous instance of fatigue cracking It is believed that this was done sometime after manufacture. Another of the arms had received similar welds. Some of these welds were of poor quality incorporating weld laps, slag entrapment, gas pores, lack of fusion and cracks.

The repair welds were both along the arm (longitudinal) and across the arm (transverse) and the failure appears to have started at the point where two transverse welds met at the upper right hand corner of the arm box section at a point close to that shown in Fig 2.

Fig 2.

Non Destructive Testing (NDT).

Two NDT Schedules were examined during the investigation, and the best case fatigue life of the arm has been calculated in a design review as being 6.04 years based on 2 passengers (160kg) and with 3 passengers (225kg) as 5.19. The 3 passenger scenario should be seen as the more likely in practice over the term of the ride as it is possible to run the ride with 3 passengers in the car.

Ride Controllers- Action Required.

The variation in use of these machines will have a bearing on the amount of stress the arms are subject to and therefore the level of accumulated fatigue within them. The machine involved in this accident is probably not typical of the majority of travelling machines in that it will probably have worked harder during its life. The fact that its radial arms have developed fatigue cracking demonstrates though that this cracking is not only possible but probable over time. The majority of the machines in UK will now have exceeded (or will soon exceed) the fatigue lives for the radial arms in either of the scenarios in the design reviews examined.

The legal duty to ensure that a fairground ride is safe to operate lies with the Controller. The controllers of all Safeco Crazy Frog rides should now:

1 Have the areas identified in this Alert examined if they have not already done so for any evidence of poor quality weld repair or fatigue cracking and have any defects repaired by a competent person.

2 Consult with ADIPS inspection bodies registered to carry out design reviews and NDT testing to review the current NDT schedule and ensure that all areas where fatigue cracking could reasonable be expected to occur have been identified, and suitable intervals of NDT, using an appropriate technique have been identified.

3 Ensure that where the design life of the radial arms has been exceeded, e.g. are more than 5 years old the NDT schedule is reviewed by an ADIPS registered inspection body competent to carry out design review and the NDT schedule is adequate to ensure that the increased possibility of fatigue cracking and propagation is addressed by the frequency and type of NDT examination.

4 It would be good practice for controllers to conduct regular visual checks of the areas identified in this Alert for surface breaking cracks. If any are found, the machine should immediately be taken out of use and the advice of their ride examiner sought.

Ride Inspection Bodies - Action Required.

I am making the HSE Specialist Report (Svc 4163940 – 'Failure of a Crazy Frog Radial Arm – Central Pier Blackpool') into this incident available to all the trade associations on FJAC and to the ADSC for further distribution to their members.

Given the problems that have now been identified with this ride the design life for the majority of the radial arms should be clearly identified in the design review along with the date of review of the NDT schedule. Many of the rides currently operating in GB will now have radial arms that have exceeded the initial fatigue life identified in the original design review.

Before issuing a DOC, ride examiners should confirm that the NDT Schedule to which the NDT test is conducted takes account of the detail in this Alert and in the Specialist Report (Svc 4163940). Special attention should be paid to the methods used to test various welds to ensure they are the most appropriate. It should also have been updated by a competent person to confirm that any additional testing required by the age of the machine has been taken into account.

During their in service annual inspection they should visually check all of the stress bearing longitudinal and transverse welds on the radial arms to ensure that any welding subsequent to manufacture has been done competently. The quality of the welds should be confirmed by NDT.

HSE action: This note is being passed to HSE NFIT Inspectors for information. Checking that these Schedules have been reviewed and that NDT is being properly conducted on these machines will form part of the NFIT Inspectors work in the coming year.

Further information if required from M Sandell (HSE) on 07527002689.

M Sandell

HM Inspector of Health and Safety

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