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Principal Inspector
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Dear Sir

SAFECO CRAZY FROG MACHINES

I am writing to advise you of the findings of recently completed research by the Health and Safety Laboratory (HSL) into the safety of the Safeco Crazy Frog machines fitted at manufacture with a control pedal that allows the operator to control the air pressure in the rams. This letter is being sent to all owners of Safeco Crazy Frog machines and similar machines made by other manufacturers as there may be useful information in it for them. It is also being sent to all fairground ride inspection bodies and registration scheme owners.

The research was carried out because of longstanding concerns about the mechanical integrity of this type of ride and the potential for injury to riders identified in incidents investigated by Health and Safety Executive (HSE). Specifically HSE is aware that:

- passengers have being ejected from this type of machine
- at least two riders have received serious spinal injuries though it is believed this number is higher
- ride arms are cracking and failing due to fatigue.

The published Research Report will be available on HSE's website from Friday 10 January 2014 or can be found on HSE's website using the following link;

http://www.hse.gov.uk/entertainment/fairgrounds/resources/crazy-frog.pdf

Given the seriousness of the concerns highlighted by the research and the extent of the action required, HSE met with representatives of the SGGB, NAFLIC, individual Inspection Bodies, ADIPS and a ride owner on 10 October 2013. At this meeting, HSE set out what will need to be done to ensure that these machines can be safely used during the 2014 season and beyond. This letter confirms those matters.

HSL Study

The HSL Research looked at 12 arm Frog rides fitted with a pedal that lets the operator override the control system and change the air pressure in the rams. However, controllers and ride examiners of similar machines should also look closely at the Research Report, as its findings may also affect these machines.

The key findings of the Research indicate that:

1. The foot pedal over- rides the machine's control system and is able to create forces that can potentially damage the machine and injure riders.
2. The fatigue life of the arms is lower than was calculated in any previous Design Review or Schedule.
3. The lighting conduits tack welded on the arms prevent effective visual inspection of the arms and create weak points in high stress areas from which cracks can and are starting.
4. Weld repairs in the arms allow cracks to pass faster.
5. Cracks can start inside the arms, which are invisible to daily visual checks.
6. The ram and its control system design are able to let the arm free fall to a hard stop in circumstances the operator has no control over.
7. The valve in the bottom of the ram will not stop a free falling arm before it comes to a hard stop.
8. The passenger restraint system does not conform to the British Standard for fairground rides (BS EN 13814)
9. The ride requires passengers to brace to remain safe but the position of the footrest and the passenger bars are not in the correct position to permit this.
10. The pressure control system allows operators to operate the machine in ways that can injure riders.

Actions Required

Irrespective of the Report's findings, under the Health and Safety at Work etc. Act 1974 ride controllers have a duty to ensure, so far as is reasonably practicable, that riders are not exposed to risks to their health and safety.

Controllers are required to take the following actions to ensure that the risks to riders and others from operation of the ride are effectively controlled.

Foot pedal

The force that can be generated by operation of the foot pedal is the most serious concern highlighted by the study. The pedal allows the operator to create forces on the machine and the riders, which are far outside the safe limits for either. Operation of the pedal can create forces of over 9 times gravity (G) on passengers. This is 50% higher than that recommended in the British Standard BS EN 13814 and presents a number of risks:

- Riders can receive serious back injuries
- Repeated use can cause high stresses in the machine's arms leading to a much reduced fatigue life of around 900 bounces between NDT tests
- Mistakes by the operator can allow the arm to fall to a hard stop, which carries a significant risk of personal injury
- Use of the pedal can generate ejection forces that move the ride into the full restraint category. Normally this means that interlocked over shoulder restraints are required.

Further work is required by the industry to find out whether changes to the pedal and rams can be made to reduce the level of force generated on riders. In the meantime, given the potential risk of serious injury to the public presented by operation of the pedal, HSE requires the foot pedal to be disabled. Any

machine found with a working pedal after 1 April 2014 will be served with a prohibition notice and costs incurred by HSE for this will be recovered from the controller at the rate of £124 per hour.

Given the risk to the health and safety of riders presented by machines with this pedal enabled, HSE will take enforcement action as necessary against any inspection body issuing a DOC or equivalent to a machine with a working pedal.

Non-destructive testing (NDT)

The results of the tests done by HSL show that current NDT regimes are inadequate. Attached to the HSL Study is an NDT Schedule which HSE believes will help with early detection of fatigue problems in the machine arms. Machines with the pedal disconnected will require NDT twice annually from the start of 2014. One test will be required before the season starts with a second carried out half way through the season. The second test is to be based upon usage rather than time and controllers must be able to demonstrate how they assessed this. As can be seen from the schedule the tests will require a greater use of ultrasound. Controllers choosing not to use the NDT Schedule attached to the HSL Study should discuss this decision with their ride inspector to ensure they have in place a system that will provide at least the same level of integrity.

Welding

Cracks in the side plates of the machine's arms can propagate at great speed. Consequently no new welding is to take place on these side plates. Any existing welds should be visually inspected as part of controller's daily checks. Tack welds used for securing conduits and the lighting bars must also be inspected daily with the lighting bars removed. Another machine was recently found with a fast moving crack starting at the site of a tack weld.

Operation

Passengers tend to lean forward when the machine runs backwards and the risk of back injury caused by vertical forces is increased. Controllers should not allow reverse operation of the machine; HSE will take enforcement action as necessary to prohibit this as and when it is seen.

Restraints/ seating/rams

Most machines will need work in these areas outlined in this letter but if the pedal is disconnected, the need for this work is not as urgent. Consequently, other changes may not be required until the start of the 2015 season. Details of what is required will be researched in the next few months and released to controllers in good time for the work to be done.

The information in this letter should give controllers a chance to get the most urgent work needed on their machines completed during the off-season. We strongly recommend that controllers and inspection bodies read the Research Report as it gives more details about why the work is needed.

If you require any further information, do not hesitate to contact me on 07527002689

Yours faithfully

M Sandell
HM Inspector of Health and Safety
Entertainments

cc: David Wallis – SGGB

John Culine – SGGB

Joey Noyce – SGGB

Craig Kirkman – NAFLIC

Charles Bowers – NAFLIC

David Geary – DGS Technical Services

Paul Geary – Geary Power Systems

Luke Ditchburn – ADIPS

Safeco

Worlds Fair

All Safeco Crazy Frog Owners/Controllers

All inspection bodies