



15th January 2021

Information Note: Crazy Frog Type Rides

Introduction

This information note supersedes the information note issued by HSE in August 2018 (copy attached) and NAFLIC TB 472, which were issued following an incident involving a Jump and Smile (Crazy Frog or Grasshopper type) ride.

The investigation into the failure mode has now been completed and HSE requires that the measures set out in this information note are implemented.

This information note is aimed at owners and operators of these and similar rides and details the actions that they should undertake prior to further use.

Background

In a recent incident a pneumatic cylinder failed at the connection (clevis) between the cylinder and the central hub, causing the car and its occupant to drop to the ground whilst in motion. The threadform at the threaded end of the rod had worn to the point where it no longer positively engaged in the clevis. Examination of the ride revealed another ram where although wear was not as advanced, the threaded rod was not secure in the clevis, was free to rotate, and could be unwound by hand. The ride's cylinders did not have any practical means of tightening the threaded connection to the recommended tightening torque, nor any secondary means of restraint of the threaded connection such as a lock nut.

The worn condition of the failed component meant that the underlying cause of the failure could not be ascertained with any certainty, but it appeared that either:

- Play in components, as a consequence of inadequate tightening, subsequent loosening or both, lead to fretting wear and failure; or
- The threadform deteriorated through an end of life process such as fatigue.

Metallurgical analysis did not identify one clear underlying cause and could not rule out that a possible cause of the defect could be related to an end of life condition.

Immediate Action

In the original information note HSE required that a system of inspection of the rod/clevis connections to ensure that there is no movement or play in the connection.

As a result of the conclusion of the investigation, HSE requires the following action to be taken with; owners and inspection bodies should immediately survey their rides and ensure that:

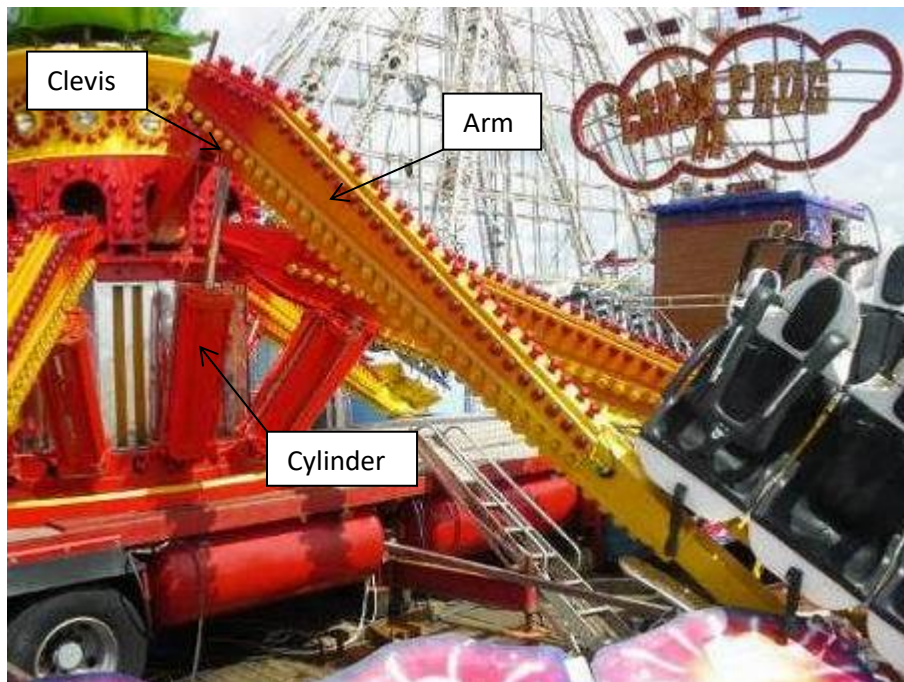
- a) A visual inspection is undertaken to identify, if there are any secondary mechanical methods of locking the clevis to the rod (e.g. a locknut) between the pneumatic cylinder and clevis.
 - If there are no locking methods apparent the ride should be taken out of use, and the ride owner should seek advice from the ride inspection bodies competent person.
 - If secondary locking methods are used, seek advice from the inspection bodies competent person regarding recommended tightening torque and consider using visual tell-tale indication.
- b) At annual inspection check the condition of the connection between the cylinder rod end and clevis, with particular attention given to check the condition of the threadform.
- c) Attention should also be paid to any pre-existing looseness, wear/condition of the threadforms, play in the two engaged components and the use of appropriate non-destructive testing techniques.
- d) They determine an appropriate tightening torque for reassembly, including a method for achieving and measuring tightening torque.
- e) They consider the risk of loosening and appropriate mitigation. Some designs may already have lock-nut arrangements, where this is not the case additional security must be fitted giving due consideration to what is practicable and may range from tell-tales, retrofitting locknuts, wiring, and other fastening security measures.
- f) Any significant modifications should only be made after completing a design review and design risk assessment and if an existing ride is to be modified, the owner of the ride should select a competent person to coordinate the modification process. This is to ensure that all the safety-related aspects of the modification are considered. Only inspection bodies deemed competent to carry out design review work by their registration body should undertake this work.
- g) They monitor the condition of the connection at subsequent annual inspection.
- h) The identification of play, wear or movement in the connection results in the replacement of rod and clevis components were appropriate.

Information Note: Crazy Frog Type Rides

This Note follows a recent incident involving a Jump and Smile (Crazy Frog or Grasshopper type) ride. It sets out actions that inspection bodies should take with regard to Crazy Frog and generic rides.

The incident involved a carriage arm lift cylinder becoming detached, causing the arm to drop. The connection between the arm and lift cylinder comprises a clevis mounted on a male thread at the end of the cylinder rod, with a corresponding female threaded hole in the clevis. The clevis is pinned to the carriage arm. Initial inspection of the affected ride identified that several of the connections between the clevis and cylinder rod were loose.





Inspection bodies, on inspecting such rides, should ensure that the connections between the arms and lift cylinders of these rides are secure and that there is no movement or play in the connection.

Controllers should advise all operators that:

- Prior to further use all operators of crazy frog type rides should make an inspection of all lift cylinder rod/clevis connections. This can be undertaken by applying hand force to the clevis to check for any looseness, rocking or evidence of unwinding. This action should be undertaken with the clevis free of the arm.
- When using hand force there should be NO movement or play in the connection.
- Where play is discovered then this is an indication that the issue is already well developed. In this case the machine should have all of its cylinder/clevis connections inspected by a competent person prior to any further use.
- Following inspection it is expected that the operator will act upon advice of the competent person before next use of the ride.
- The above check should be undertaken frequently, at least weekly or arrival at new location and build up of the ride.
- The completion of these checks should be recorded, preferably within the operator manual, for referral to by Inspection Body or Regulator if required in the future.

This enhanced frequency of connection checking should be maintained until such time as the cause of the failure is established and further advice issued; or cylinder rods are dismantled from the clevis, an inspection of threads made and the connection re-tightened to the manufacturer's recommended tightening torque.