NAFLIC

National Association For Leisure Industry Certification

Standards & Related Documents Committee

TECHNICAL BULLETIN — July 2014

374. Pinfari Z40 Anti Roll Back (ARB)

Please see attached Safety Alert from the HSE regarding an incident in 2012 where a Pinfari Z40 roller coaster detached from the chain whilst travelling up the lift hill and collided with a second train in the station.

The committee's interpretation of the safety alert is that the HSE require that all ARB pawls (i.e. on each individual car) are checked for proper engagement along the entire length of the ARB rack. Particular attention should be paid at the top to ensure correct engagement of the pawl as it goes over the crest of the hill.

HEALTH AND SAFETY EXECUTIVE - SAFETY ALERT/SAFETY NOTICE/GENERAL SAFETY NOTICE create a drop down box for options	
Department Name:	*FOD – Entertainment & Leisure Sector*
Bulletin No:	*(Bulletin number to be allocated by STSU, Safety Unit 2)*
Issue Date:	**Click here to type the date of issue that the Safety Alert or Notice is due for publication.*
Target Audience:	*Fairground operators, ADIPS, Thorough Examiners*
Key Issues:	*Runaway car on a Pinfari Zyclone Z40 rollercoaster. Actions for owner/operators to take and information for Inspection Bodies on problem and findings*

Pinfari Z40 Roller Coaster Car Runaway 2012

INTRODUCTION:

The HSE is issuing this notice to those who own, operate, maintain and inspect Pinfari Zyclone Z40 roller coasters. In 2012, a car carrying 3 people (one in front and two in the rear) was travelling up the lift hill of the coaster. As it reached the top, the car detached from the lift chain and rolled backwards down the hill. The anti fall back system failed and the car accelerated down the hill before re-entering the station and hitting the two waiting cars loaded with people.
Fortunately, there were no major injuries, although most involved received minor injuries and were in shock following the incident.

Fig 1

BACKGROUND:

Anti fall back device

Fig 2

Underneath each car there is a –

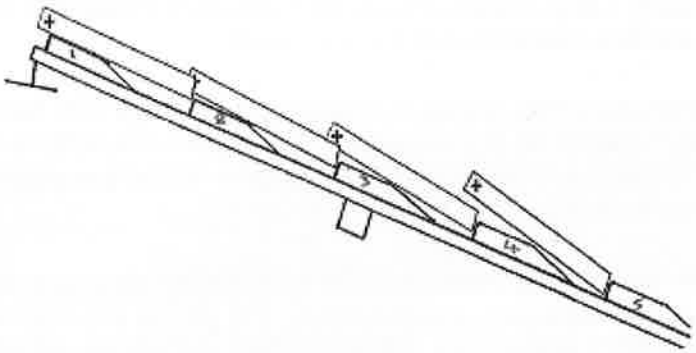
- Chain pawl - this is mounted on a pivot so that it can move up and down and is designed to locate onto the lift chain to pull the car up the lifts
- An anti-fall back device –this is mounted on a pivot. As the car is pulled up the hill the anti-fallback pawl is dragged over the stop blocks on the rack. The pawl should drop into each gap between the stop blocks as the cars moves up the hill. Therefore, in the event of the pick-up pawl becoming disengaged from the chain, the car should move no more than the pitch of the stop blocks/teeth (approximately 205 mm) before being brought to rest as the anti-fallback pawl engages on a stop block.

In this case, as the car reached the crest of the climb hill where the car starts to level out, the pawl disengaged and the car was not arrested as it descended the hill backwards.

Investigation Findings

At the beginning of the investigation, the bearings in the anti fall back pawl were found to be sticky and did not move freely. It was thought that they might have held the pawl up preventing it from dropping between the stops on the anti fall back rack. This was found not to be the case however their condition would have had a small affect on the speed and ability of the anti fall back pawl to drop down between the stops.

Further investigation found that there was only partial engagement of the anti-fallback pawl into stop blocks 2, 3 and 4 on the anti-fallback rack as the car was levelling out towards the brow of the hill. The pawl was sitting over the back of the preceding stop block and was only partially engaging at the top of the block. (see Fig 3)



ANTI ROLL BACK PAWL & RACK

Fig 3

Therefore the anti-rollback pawl was not able to fully engage when the chain disengaged and the car began to roll back.

The anti fall back pawl continued to try to engage within the stops as it descended. At stop 21 on the rack the pawl did engage however the car had gained significant momentum and subsequently ripped the metal stop from the rack. Below this point there was further damage to the stops on the anti fall back rack including flattening of the stops.

It is not known exactly why the chain pick up disengaged however the structure is used as a resting place for numerous Sea Gulls. Shells and other items which the gulls had dropped were seen and it is believed that a small piece of debris may have been dropped onto or been blown onto the chain, and that this was enough to prevent the pickup pawl from fully engaging. As the car travelled over the crest of the lift hill, movement of the pawl was sufficient for it to become disengaged.

ACTION REQUIRED:

Owner/Operators of Pinfari Z40 roller coasters should ensure that the following is done in conjunction with the Inspection Body for the ride.

- Each operator/owner should undertake a functional test, stop by stop, to ensure the full engagement of the anti fall back pawl into each of the rack stops blocks particularly in the top section.

  If the anti fall back pawl does not engage properly at the bottom of each stop then the profile of the stops should be adjusted to ensure correct engagement at each one.

- The sides of the stops on the anti fall back rack should be filled in with a metal gusset to provide extra strength.

- The anti-fall back rack should be extended at the top of the hill, beyond the top dead centre point of the track after which the car would tend to roll forward and not back down the hill.

- The condition of the bearings in the anti-fallback pawl assemblies should be checked. Where they are sticky /not free running they should be replaced. The assemblies should be striped and the bearings replaced at appropriate intervals as agreed with the ADIPS registered ride examiners, but not less

than annually. Daily checks should be made on the bearings to ensure smooth and free movement of the pawl lever.

- Owner/Operators may decide to replace the bearings with bushes. If this is done then it should be discussed and agreed with the ADIPS registered design examiner and the appropriate documentation completed in accordance with HSG175.

- During the annual ride inspection, the rack should be inspected to ensure the integrity of the stops. It is recommended that during the inspection, a number of teeth are NDT tested on a rolling program. As well as the welds, NDT should take place at the 90° form where damage caused by the metal forming process can provide a point of ingress for corrosive elements

FURTHER INFORMATION:

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

GENERAL NOTE: *(this should be added in all cases)*

Please pass this information to a colleague who may have this Product/ Equipment or operate this type of system/process.