

NAFLIC

National Association For Leisure Industry Certification

Standards & Related Documents Committee

TECHNICAL BULLETIN — July 2014

375. Superstar Fatigue Failure

Please refer to the attached publication from the HSE dated 18th February 2013 regarding Superstar ride fatigue failure. It is believed that there are approx. 11 of these devices operating in the UK.

The committee's interpretation of the letter is that any controller of this type of device that has operated the ride since before 2003 is in breach of a prohibition notice unless these machines are subject to the NDT schedule enclosed with the letter. Controllers that have acquired the device since 2003 are likely to be served with a prohibition notice unless these machines are subject to the NDT schedule enclosed with the letter.

IBs are reminded that any Superstar rides for which a DOC has been issued for the 2013/14 season must ensure that the device has been subject to this NDT schedule.

Operational Policy Division

M Sandell

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Principal Inspector
Mr Cameron Adam

All IBs and Controllers

Reference 2.1.1278.

Date 18 February 2013

Dear Sir

OPERATION AND NON DESTRUCTIVE TESTING (NDT) OF SUPERSTAR TYPE RIDES

In 2002, at Marlow Regatta Fair, a Superstar type machine suffered catastrophic weld failure in a number of areas along the main boom arm, the banana arms and elsewhere. Checks of other machines found similar cracks in the same areas.

Following this HSE conducted a thorough investigation to find out what happened and to find solutions that would allow the machines to continue to be used. During this investigation 2 separate Prohibition Notices (PN) involving all but two Superstar machines (SS6 & SS11) were issued. The latter of these notices contained in its Schedule a list of options that operators could choose from in order that their machines could operate again. These options included NDT testing conditions and restrictions on operation. This PN was appealed to the Industrial Tribunal but the Appeal failed and so the Notices stood and Controllers were required to comply with its provisions.

Following an incident on a similar machine in Northern Ireland during the 2012/2013 New Year celebrations, HSE's investigations suggest that some Superstar machines working on the UK mainland may not have been adhering to the conditions which allowed the PN issued in 2003 to be lifted.

In some cases machines may have been sold on or otherwise disposed of but the reasons for the issue of the PNs remain and consequently the following actions should now be taken to ensure the machines are safe to operate:

- In cases where the machines are still owned by the same controller on which the PN was served in 2003, these PNs technically remain in force and failure to comply with the Notice may be seen as a breach of it. Controllers should ensure their machine is operating within the terms of the schedule to the PN. If the machine is found to be operating other than within those terms it is highly probable the Notice will be reissued with immediate effect and Fee for Intervention (FFI) cost recovery charges will apply.

- In cases where machines have been sold on since the 2003 PNs were served, these will no longer be valid as the Notices were written on the controller at the time. The same risks of weld failure still exist however and the new controllers should take steps to ensure they have measures in place that are at least as effective as those outlined in the Schedule to the 2003 PN. If this cannot be demonstrated it is highly probable that the machine will be prohibited from use with immediate effect and FFI cost recovery charges will apply during any follow up work conducted by HSE.
- Inspection bodies (IB) that have issued Declarations of Compliance (DOC) on Superstar type machines where the Schedule to the 2003 PNs have not been complied with (or equally effective steps taken) should consider whether these DOCs remain valid in light of this letter. Any investigation by HSE (whether proactive or resulting from an incident) involving the testing or NDT of these machines is likely to include the issue of DOCs with a high likelihood of FFI cost recovery charges applying to IBs.

I include with this letter for your information a copy of the Schedule to the 2003 PN which gives the detail of the Options given to affected controllers at the time to ensure their machines were operated in line with the findings of the investigation.

Any reduction in NDT testing or relaxation of operating standards must not be put in place until a complete design review of the machine has been undertaken by a person competent to do so and a revised NDT Schedule and operating procedures produced and complied with.

Yours faithfully

M Sandell
HM Inspector of Health and Safety
Entertainments

SCHEDULE PN

Compliance with this notice may be achieved by;

(1)

1.1 Establishing the integrity of the original welds (e.g. as manufactured) on the boom. This will require the removal of any modifications to the boom and boom to hub connection such as strengthening plates. The welds on the boom, and boom root should then be subject to ultra sonic examination or any equally effective method capable of detecting cracks originating on the inside of the welds. The boom to hub weld should be subject to examination by a suitable method (e.g. Magnetic Particle Inspection). These Non Destructive Examination (NDE) procedures should be approved by a competent person qualified to Personal Certification in NDE Level 3 (PCN) prior to any examination taking place. A competent person qualified to at least PCN Level 2 (or an equivalent standard) should carry out these examinations. 100% examination of welds is required.

1.2 Any subsequent action will be dependent on this examination proving that the welds are crack free. If any welds are found to be cracked no further operation of the ride will be possible until all defects have been remedied and the procedure outlined above has been repeated.

And

1.3 Permanently and physically disabling the ability of the boom on Superstar amusement device SS5 to rotate while the ride is capable of being operated with the carousel rotating. Disconnecting the motor that drives the revolving mechanism on the boom can adequately achieve this. The boom must also be securely fixed in place to prevent rotation.

1.4 Having a schedule of Non Destructive Examination (NDE) drawn up by a person qualified to PCN Level 3 that identifies the safety critical parts requiring examination. In particular it must consider the following areas (a) banana arms (b) Inter arm tie rods (c) stabiliser legs, that have been shown to have design lives in the order of 10,000 ride cycles. A competent person qualified to at least PCN Level 2 (or an equivalent standard) must carry out this NDE.

1.5 This option requires that the strengthening plates that have been added to the ride since its manufacture are removed and not replaced, as they prevent the examination of the welds.

And

1.6 Arranging for Superstar ride number SS5 to be assessed by an Inspection Body registered with the Amusement Devices Inspection Procedures Scheme (ADIPS) in accordance with HSG 175, qualified and registered to carry out design reviews of fairground rides and the findings documented, including any recommendations for action.

1.7 Ensuring the ride is subjected to assessment of conformity to design and, if appropriate, to initial test, all of which must be completed before the ride is put back into use.

1.8 Ensuring that the outcome of the design review includes detailed information on the method, frequency and location of Non Destructive Testing of the safety critical parts of the ride throughout its intended life. In particular the design review should consider the issue of ensuring the effective securing of the boom in position.

1.9 Ensuring that any additional information from the design review is provided to the registered inspection body that is engaged to carry out the annual thorough examination of the Superstar ride SS5

1.10 Ensuring that a system of work is drawn up to implement any specific actions identified on the operator/owner as a result of the design review.

OR

(2)

2.1 Establishing the integrity of the original welds (e.g. as manufactured) on the boom. This will require the removal of any modifications to the boom and boom to hub connection such as strengthening plates. The welds on the boom, and boom root should be then be subject to ultra sonic examination, and the boom to hub weld subject to examination by a suitable method (e.g. MPI) specified by a competent person qualified to PCN Level 3, to be carried out by a competent person qualified to PCN Level 2. This examination must be capable of detecting cracks originating from the inside of the boom structure. 100% examination of welds is required.

2.2 Any subsequent action will be dependent on this examination proving that the welds are crack free. If any welds are found to be cracked no further operation of the ride will be possible until all defects have been remedied and the procedure outlined above has been repeated.

2.3 Fitting a device, such as a counter, to the ride that will accurately measure the number of revolutions carried out by the boom both clockwise and anti clockwise. It must measure revolutions on a cumulative basis and not be capable of being reset. The boom will be said to have made one revolution when the boom rotates 15 degrees (either clockwise or anti-clockwise) from its centralised position at rest.

2.4 Having a schedule of Non Destructive Examination drawn up by a person qualified to PCN Level 3, in consultation with a suitably competent mechanical/structural engineer that identifies the safety critical parts requiring examination. The schedule should detail the inspection technique(s) to be used, the level of disassembly and the frequency of examination (expressed in boom rotations),

the weld location and the acceptance criteria for each weld detail. The schedule should be based on current UK national standards and acceptance levels quoted to a current UK national standard, or equivalent. Any schedule that is drawn up will not be adequate unless it (a) addresses as a minimum the information identified in Table 1 relating to safety critical areas, and (b) any other safety critical welds identified by the manufacturer, e.g. welds at the car mounting pin brackets. Any defects found should be documented and referred to a competent engineer for assessment.

TABLE 1

Weld Location	PREDICTED FATIGUE LIVES
Rear stabiliser leg	732
Rear chassis cross beam	962,208
Longitudinal chassis beam	50,124
Base of tower	331, 962
Top of tower	9,113, 741
Lower ram attachment	>10 million
Main lift ram	>10 million
Boom root (lower)	39,073
Boom root (upper)	1871
Boom weld detail 20mm-25mm transverse butt weld	17,711
Boom weld detail 15mm-20mm transverse butt weld	13,410
Boom weld detail 10-15mm transverse butt weld	7, 388
Boom weld detail 6-10mm transverse butt weld	3,428
Central tube (boom weld)	4, 129
Central tube (tube weld)	69,122
Pivoted arm	57,541
Fixed Arm	22,793
Arm at banana pivot	4,902
Inter arm tie rods	7,282
Banana arm elbow	6,727

2.5 A ride cycle should be taken to be a cycle of operation incorporating 1.5 rotations of the boom clockwise followed by 1.5 rotations of the boom anticlockwise, or vice versa.

2.6 This option requires that the strengthening plates that have been added to the ride since its manufacture are removed and not replaced, as they prevent the examination of the welds.

Or

3 Any other equally effective means. Such means to be notified in writing to the server of the accompanying Notice and to the HSE address detailed on the accompanying Notice