

NAFLIC

National Association For Leisure Industry Certification

Standards & Related Documents Committee

TECHNICAL BULLETIN — JUNE 2008

335. Orbitor NDT Schedule

The committee has received the following NDT Schedule from the HSE. This NDT Schedule only applies to the device discussed in the document. It should not be used for any other Orbitor ride. However, it can be used as a guide for writing NDT Schedules for Orbitor type rides.

Further guidance on NDT schedules in general will be given in a future bulletin.

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Schedule Number: LINDT05 1006
NDT schedule for the 'Orbiter' ride.

HSE NDT Inspection Schedule For The 'Orbiter' Fairground Ride.



	NAME (PRINT)	SIGNATURE	POSITION	DATE
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Reviewed by:	Dr. S. Joel.			

Schedule Number: LINDT051008
NDT schedule for the 'Orbiter' ride.

1. **Scope:** The purpose of this NDT inspection schedule is to standardise all inspections conducted on the 'Orbiter' rides manufactured by Tivoli Manufacturing Limited, Kent.

This document has been produced for the Health and Safety Executive and the purpose of it is to provide a baseline to allow comparison of existing NDT schedules held by ride controllers to determine the adequacy of their existing inspections.

2. **Contents:** This inspection schedule is divided into sections;

Section A: Retaining bolts and surrounding material attaching the seat modules to the three legged spider fabrication.

Section B: Welded fabrication attaching the three legs to the hub assembly.

Section C: Articulating arm connecting pins and hydraulic ram mountings.

Section D: Central rotating tower.

Section E: Chair assemblies.

Section F: General Visual Assessment of Structural Integrity

Section G: General safety checks

Section H: Reporting

Section I: Responsibility

3. **Ride Owner:** It is the responsibility of the ride owner/controller to ensure compliance with current safety legislation including ensuring that suitable non destructive testing (such as is required by this schedule) is carried out on their ride.

4. **Personnel:** All persons conducting NDT in the form of UT, MT, PT or ET shall hold current certification to EN473 level 2 in the method of test. The British certification scheme PCN complies with the requirements of EN473 and PCN certificates will be acceptable evidence of NDT operator qualification.

Persons conducting the structural assessments visually shall be familiar with inspection of fairground equipment and experienced in visual inspection of in service structures.

All persons conducting NDT on this type of ride should be registered with ADIPS for the type of inspection they are carrying out.

5. **Terms and definitions used in this schedule:**

NDT or Non-destructive testing; This includes use of recognised methods such as ultrasonic testing (UT), magnetic particle testing (MT), liquid penetrant testing (PT) and eddy current testing (ET).

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Critical inspection points; These are specific locations that require use of non-destructive testing methods and techniques to be applied to detect any evidence of deterioration structurally or mechanically that could adversely affect the safe operation and use of the ride. The Non-destructive methods are specified in the following photographs.

Structural assessment points; This covers the general welded structure of the ride concentrating on changes in material thickness and welded joints including connection to the trailer chassis assembly and also includes engineering fit up between bolted and pinned assemblies.

General safety checks; This covers daily visual and physical inspection of hand rails, safety guards, seat restraint mechanisms and integrity of electrical fittings and insulation.

6. **Standards;** The following standards shall be used as reference documents in connection with this NDT schedule:

BS EN ISO 9934-1: 2001 Non-destructive testing – Magnetic Particle Testing – Part 1, General principles.

BSEN 473: 2000 Non-destructive testing - Qualification and certification of NDT personnel - General principles.

BS EN 571-1: 1997 Non-destructive testing – Penetrant Testing – Part 1, General principles.

BS EN 10228-3: 1998 Non-destructive testing of steel forgings – Part 3, Ultrasonic testing of ferritic and martensitic steel forgings.

BS EN 1711: 2000: Non-destructive examination of welds – Eddy current examination of welds by complex plane analysis.

BS EN 13814:2004 Fairground and amusement park machinery and structures – Safety.

7. **Procedures;** Companies providing an inspection service in the form of UT, MT, PT and ET shall work to an NDT procedure approved by a person certified to EN473 (PCN) NDT level 3 in the method of test. The procedure shall be formulated from the appropriate standard referenced in this schedule. A specifically designed technique sheet shall accompany any general NDT procedures to address individual areas of test application unique to this design of ride. The technique sheet shall also be approved by the NDT level 3.

Note: This requirement is common practice in the NDT service Inspection Industry.

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Critical Inspection Points

The following locations around the ride assembly shall be inspected on an annual basis by a certified NDT operator using the specified NDT methods and concentrating on critical locations highlighted in this section.

- A. Retaining bolts and surrounding material attaching the seat modules to the three legged spider fabrication.

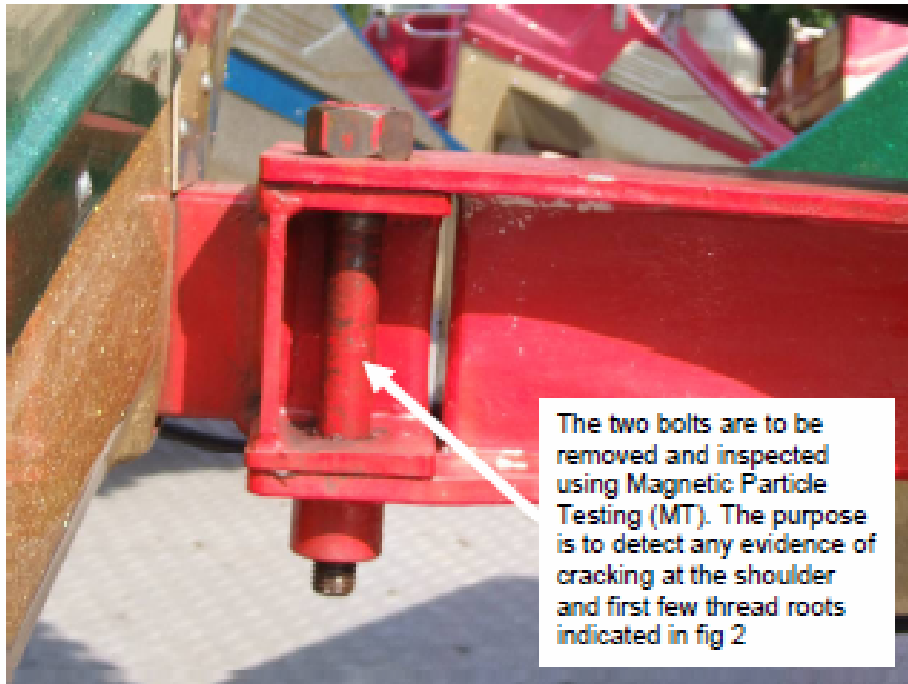


Fig 1: General view of the seat retaining bolt in position on the ride.

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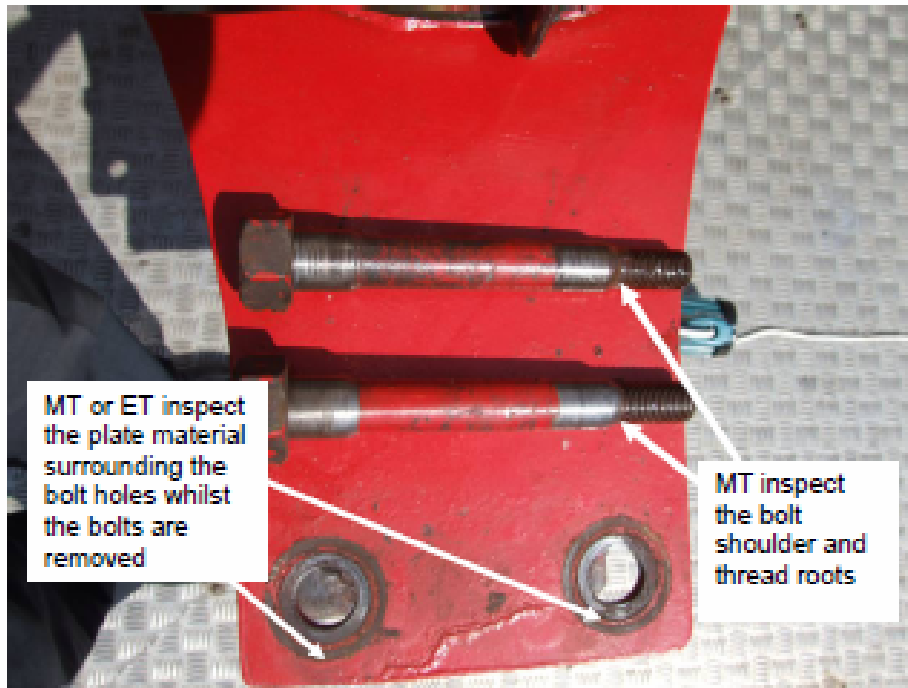


Fig 2: View looking down on the seat attachment arm with the seat assembly removed.

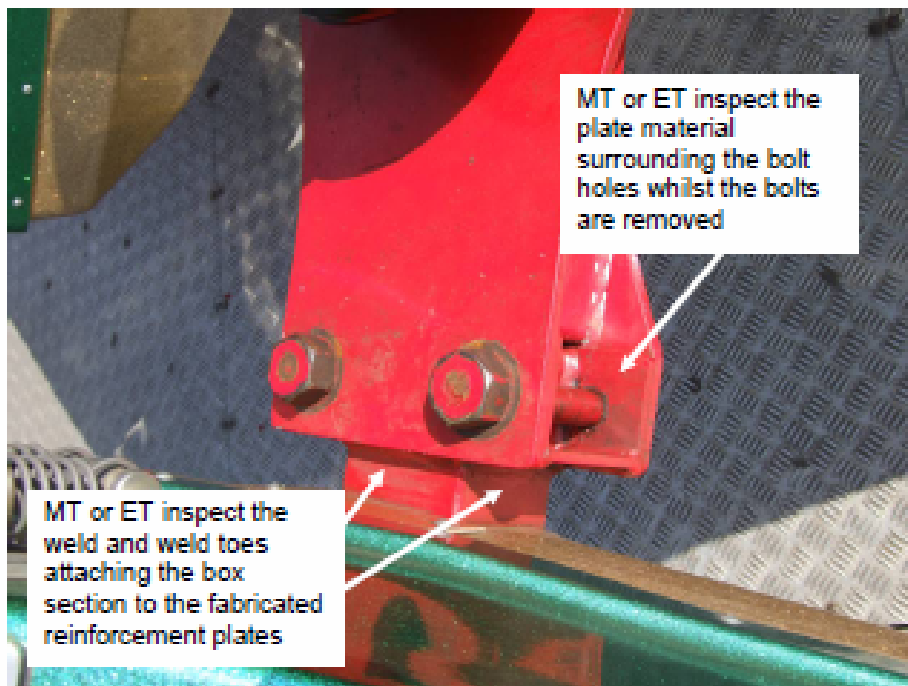


Fig 3: View from above the seat attachment bolts with seat in position.

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B. Welded fabrication attaching the three legs to the slew ring assembly (later design).

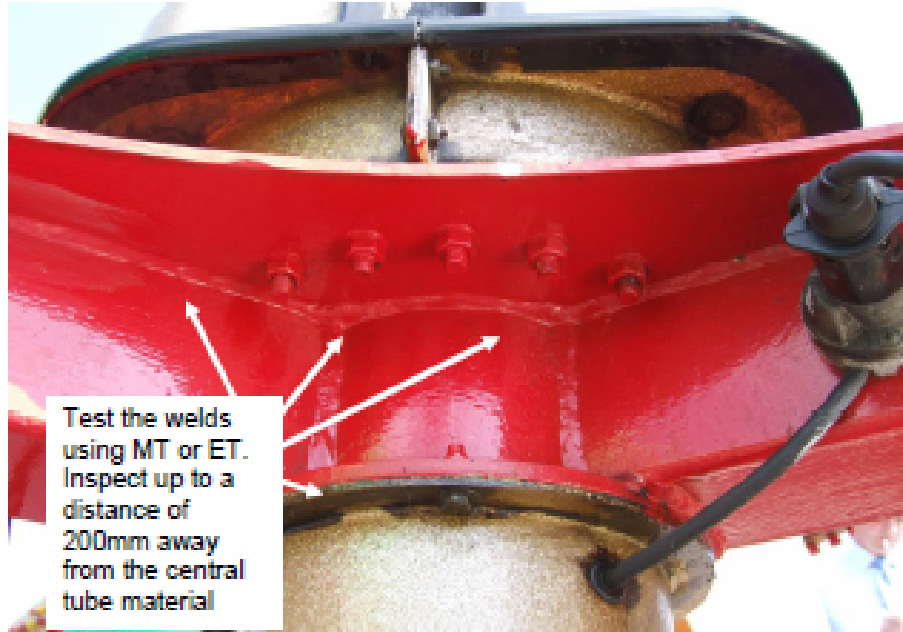


Fig 4: View of the welded fabrication attaching the three legs holding the seat assemblies to the slew ring (later design).

Note: This later design is reinforced by adding a profile cut plate fully welded across the top edge of all three box section legs.

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C: Articulating arm connecting pins and hydraulic ram mountings.

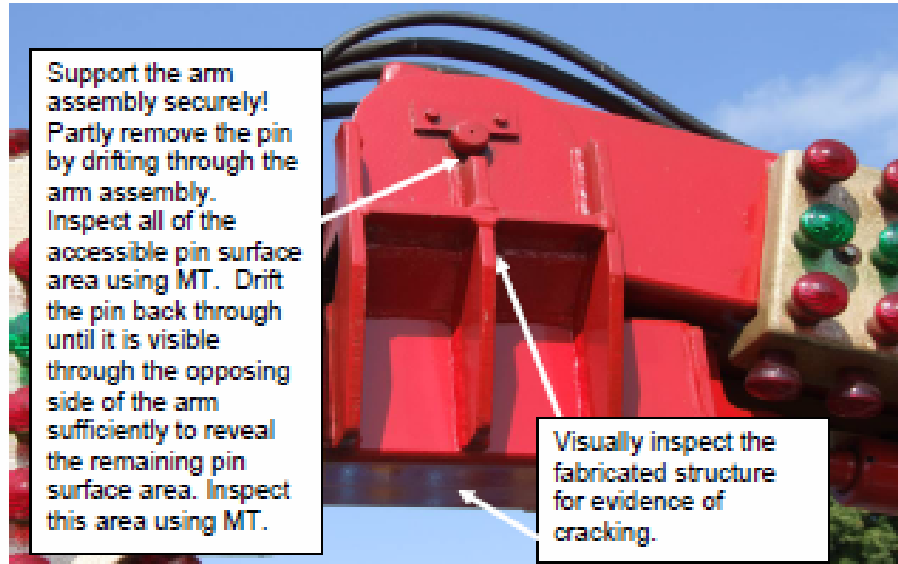


Fig 5: Magnetic Testing of the pin.

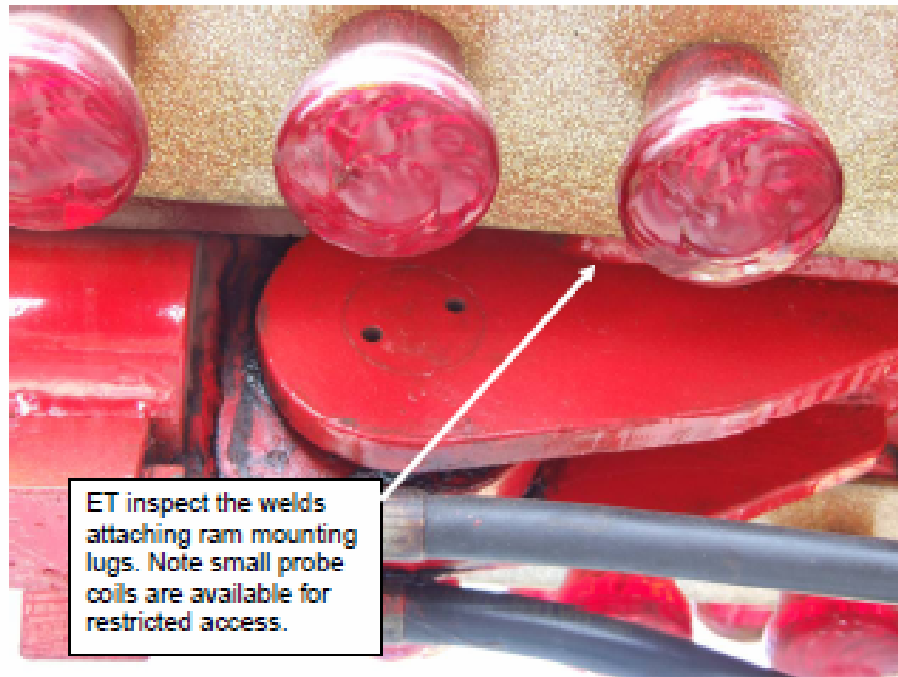


Fig 6: Attachment welds retaining the hydraulic ram on the arms.

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Fig 7: Welded brackets holding the hydraulic ram on the arm assembly.

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D: Central rotating tower.



Fig: 8 Intersection of the arm assembly to the central tower fabrication.



Fig 9: Retaining pins that prevent the arms folding.

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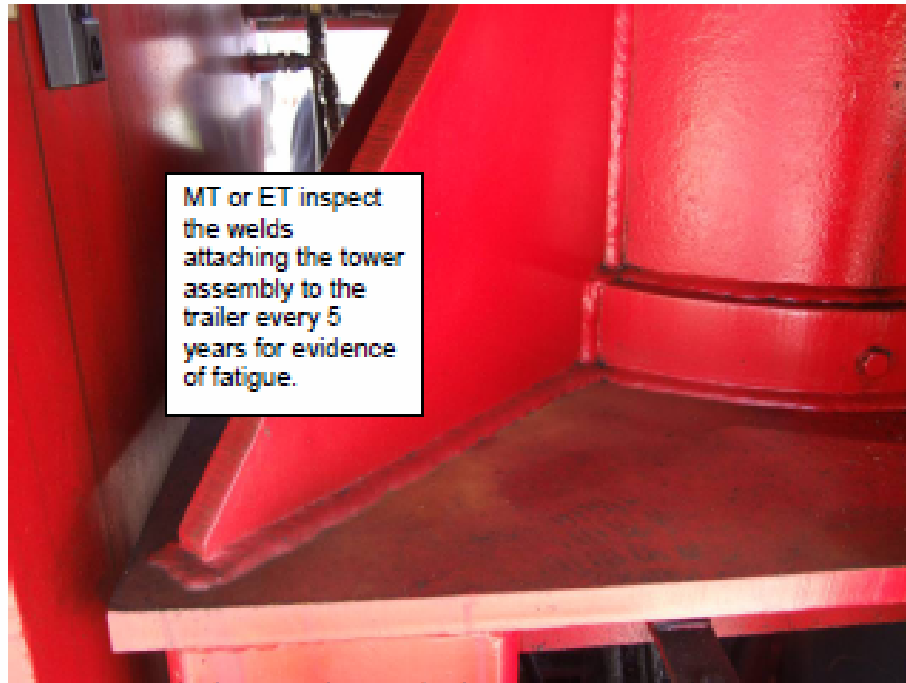


Fig 10: General structural inspection mounting the central tower to the trailer chassis.



Fig 11: Welded brackets holding the central tower elevation rams.

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E: Chair assemblies.



Fig 12: View of a chair assembly with lower fairing removed to gain access to the structure.



Fig 13: Passenger restraint bars fabricated from stainless steel.

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F: General Visual Assessment of Structural Assessment Points

The general structural integrity of all components of the ride shall be visually inspected annually by an ADIPS Registered Ride Examiner.

G: General Safety Checks

The responsibility for daily inspection of structural and mechanical components is with the ride operator. Before use each day a series of functional tests shall be run. This shall be followed by a visual inspection of the general structure.

The passenger restraining bar closure mechanism shall be checked for secure operation before use on a daily basis.

H: Reporting

All inspections completed by competent inspectors including specialist NDT operators shall include an end report. The formal report shall identify the following information as a minimum:

1. Ride owner
2. Location of the ride at the time of inspection
3. Date of inspection
4. Components inspected
5. Procedures used during the inspection
6. Calibration records of NDT equipment used
7. Name of inspector or NDT operator
8. Copy of professional and NDT qualifications and certificates
9. Annual vision acuity certificate
10. Results of the test
11. Details of any evidence of cracking
12. Detail of who is the recipient of the report
13. Recommendations and general observations requiring attention
14. Signature of the person who completed the inspection

The NDT report shall be scrutinised by the registered inspection body. The inspection body needs to assess the implications of the NDT report in terms of the overall integrity of the device and make necessary recommendations for further work and, if necessary, retest.

I: Responsibility

It is the responsibility of the ride owner and operator to fulfil regular inspections to ensure the safe working operation of ride equipment. This schedule is for guidance and is produced as minimum inspection criteria. Additional inspection frequencies and details to be tested are at the discretion of the competent inspection persons and the ride owner.

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This schedule is not intended as an exhaustive document to cover all aspects of the ride but is to be used as a considered focal document to address regions of mechanical and structural risk at the time of writing. Any additional risk assessments can be added to this document in the future in the form of document revisions.

End of document.