

Chris O'Doherty
RAIB Relationship and Recommendation Handling
Manager

Telephone: 020 7282 3752

E-mail: chris.o'doherty@orr.gsi.gov.uk

1 August 2014

Ms Carolyn Griffiths
Chief Inspector of Rail Accidents
Cullen House
Berkshire Copse Rd
Aldershot
Hampshire GU11 2HP

Dear Carolyn,

RAIB Report: Dangerous occurrence involving an engineering train at Blatchbridge Junction, near Frome, 19 March 2012.

I write to report¹ on the consideration given and action taken in respect of the recommendations addressed to ORR in the above report, published on 19 September 2013.

The annex to this letter provides details of the consideration given/action taken in respect of each recommendation where recommendations:

- Recommendations 1, 2, 3 and 5 are Implementation on-going.
- Recommendations 4 and 6 are In-progress: ORR will update RAIB by 30 January 2015 on action being taken to address this recommendation.
- Recommendation 7 is implemented.

We do not propose to take any further action in respect of these recommendations unless we become aware that any of the information provided becomes inaccurate, in which case I will write to you again².

We will publish this response on the ORR website on 22 August 2014.

Yours Sincerely,

Chris O'Doherty

¹ In accordance with Regulation 12(2)(b) of the Railways (Accident Investigation and Reporting) Regulations 2005

² In accordance with Regulation 12(2)(c)

Initial Consideration by ORR

1. All 7 recommendations contained in the report were addressed to ORR when RAIB published its report on 19 September 2013.
2. After considering the report / recommendations ORR passed: recommendations: 1, 2, 5 and 7 to Network Rail (28 December 2013) and recommendations 4, 6 and 7 to Matisa UK (30 December 2013) asking them to consider and where appropriate act upon them.
3. Details of consideration given and any action taken, in respect of these recommendations are provided below.
4. ORR also brought this report to the attention of: UK Tram Ltd; the Heritage Rail Association; London Underground Ltd and Network Rail (High Speed) Ltd as it was concluded that there are equally important lessons for them. ORR did not ask these organisations to provide a reply.

Recommendation 1

The intent of this recommendation is to reduce the risk of items of attached equipment falling from on-track machines onto the track.

Network Rail should arrange for the maintainers and operators of its on-track machines to carry out a review of those machines and identify items of attached equipment that have the potential to be a threat to safety should the securing systems fail. For each item identified, the following steps should be taken:

- a) Improve the design and/or maintenance arrangements to decrease the likelihood of the securing system failing; or fit secondary retention systems to prevent attached equipment falling onto the track should the securing system fail;
- b) Consider the use of movement 'tell tales' to help identify bolts that are becoming loose; and
- c) Describe the action that should be taken if attached equipment has been subjected to unusual loadings (such as impact or derailment forces) that may have affected the security of the fastening arrangements (for example, an assessment of the integrity of the fastening arrangements by a competent person).

Details of steps taken or being taken to implement the recommendation

5. Network Rail in its initial response on 27 November 2013 advised that:
Network Rail will address this recommendation via the following action plan:
 - *Create a central log and inspection form for all fleet assets to record the completion of item 2 below (November 2013).*
 - *Fleet Teams will carry out an inspection of their vehicles and identify external equipment securing systems. Fleet teams in conjunction with*

the Network Rail Plant & T&RS team will decide if the current design and maintenance regime effectively manages the risk of detachment or if the detachment risk needs to be eliminated (by redesign), reduced (by addition of secondary retention or tell-tale) or managed (via fastener inspections, this should cover; post incident [derailments, rough shunts, collisions etc.], corrosion, impact damage, security and details of appropriate corrective actions). Network Rail will identify if vehicle modifications or changes to maintenance regimes are to be completed under maintenance contracts (April 2014).

- *Network Rail Plant and [Traction and Rolling Stock] T&RS Team will collate details of all unfunded works and produce a scope for the entire fleet. This will then be worked into a proposal and funding sought to complete all works using both internal and external resource as required (June 2014).*
- *Network Rail Plant and T&RS Team will manage the delivery of all actions and feedback responses to demonstrate closure (November 2014).*

Timescale: 30 November 2014.

ORR Decision

6. We are content with the proposed actions which are due to be completed by November 2014 and continue to monitor progress.

Status: *Implementation on-going.*

Recommendation 2

The intent of this recommendation is to reduce the risk of staff misunderstanding the activities that need to be undertaken while maintaining on-track machines (taking into account the output from implementing recommendation).

Network Rail, in consultation with the maintainers and operators of its on-track machines, should review and improve the maintenance instructions for each machine. As a minimum, the review should include consideration of:

- a) The clarity of the description of activities to be performed and the sufficiency of the technical detail included;
- b) The provision of key information such as torque settings at those points within maintenance instructions where the maintainer is required to use them;
- c) The clarity with which technical terms are described; and
- d) Mandating checks to confirm that maintenance technicians are referring to maintenance instructions and that, where prescribed in the manufacturers' maintenance instructions, the correct torque values are being used.

Details of steps taken or being taken to implement the recommendation

7. Network Rail in its initial response on 27 November 2013 advised that:
Network Rail will address this recommendation via the following action plan:

- *Network Rail Plant & T&RS Team and Fleet Teams will carry out a review of maintenance instructions relating to the clarity of maintenance tasks, details of fasteners torques or torque tables, availability of relevant technical information. Identify where improvements are required to maintenance and assurance regimes in order to meet items (April 2014).*
- *Network Rail Plant and T&RS Team shall review audit regimes and in-service checks to maintenance technicians are completing tasks to the relevant instructions and that correct torque figures are being applied (April 2014).*
- *Network Rail Plant and T&RS Team will collate details of all unfunded works and produce a scope for the entire fleet. This will then be worked into a proposal and funding sought to complete all works using both internal and external resource as required (June 2014).*
- *Network Rail Plant and T&RS Team will manage the delivery of all actions and feedback responses to demonstrate closure (November 2014).*

Timescale: 30 November 2014

ORR Decision

8. We are content with the proposed actions which are due to be completed by November 2014 and continue to monitor progress.

Status: *Implementation on-going.*

Recommendation 3

The intent of this recommendation is to extend the scope of recommendations 1 and 2 to include all on-track machines that may operate on Network Rail infrastructure.

Network Rail should implement a process to require that the owners of all on-track machines that operate on its infrastructure implement measures consistent with the intent of Recommendations 1, 2 and 5.

Details of steps taken or being taken to implement the recommendation

9. Network Rail in its initial response on 27 November 2013 advised that:
The outputs from recommendations 1, 2 & 5 will be discharged through the Mechanical & Electrical Engineers (M&EE) cross industry group by December 2014, who will have been involved in their delivery.

The group will review outputs and will agree upon robust methods to promulgate requirements across all on-track machine operators and maintainers. This may include new or modified Codes of Practice, modifications to owning group's standards / training etc.

Timescale: 31 December 2014

ORR Decision

10. We are content with the proposed actions which are due to be completed by 31 December 2014 and continue to monitor progress.

Status: *Implementation on-going.*

Recommendation 4

The intent of this recommendation is for Matisa to provide clear instructions so that the necessary maintenance tasks are carried out.

Matisa (UK) Ltd should, in consultation with its customers, improve the clarity of the maintenance instructions for its on-track machines. As a minimum, the following improvements should be made:

- a) Describe maintenance activities with sufficient technical detail;
- b) Define the meaning of key terms that are otherwise open to interpretation such as 'check the integrity';
- c) Identify which fastenings could pose a risk to safety should they fail;
- d) Include key values, such as torque settings, at those points within maintenance instructions where the maintainer is required to use them; and
- e) Describe the action that should be taken if attached equipment has been subjected to unusual loadings (such as impact or derailment forces) that may have affected the security of the fastening arrangements (for example, an assessment of the integrity of the fastening arrangements by a competent person).

Details of steps taken or being taken to implement the recommendation

11. Matisa in its initial response on 6 December 2013 advised that:

At first, Matisa would like to thank the RAIB for this exhaustive report, its factual approach and the quality of its content. As a manufacturer Matisa fully adhere to the principle of improvement to safety and Matisa hope its responses and comments below will reflect this philosophy. Matisa has allowed, itself, to add some comments on Matisa's larger understanding and experience from other markets. It sometimes is difficult for a foreign manufacturer to pass on in English writing the appropriate meaning of our message. Be ensured that Matisa has tried to respond in a positive and constructive manner. Should there be any doubt or uncertainties please do

not hesitate to contact us and we would be more than happy to clarify any misunderstanding.

The quality of our documentation is regularly reviewed. Since delivery of this machine which took place in 2005, Matisa introduced a significant amount of improvements in the machine documentation, for example:

- The provision of a maintenance schematic (document SCH_FR_2013-11-18_1-2) together with the documentation is now delivered with all new machines.*
 - In this specific case maintenance instruction have been amended as per document Maintenance P3-4.*
 - Periodicity table, technical explanation and traceability of the different maintenance is included in the maintenance schematic.*
 - Matisa's latest documentation for a tamping machine delivered in France (no6614fre01-v1_2 to no6614fre09-v1_2) shows the improvements, in terms of quality, to the user manual and maintenance schematic. Matisa also would like to emphasize that improving the documentation is an on-going process that must constantly be adapted to safety, customers and markets in which Matisa machines operate.*
- a) The maintenance activities are explained in a certain level of detail. We have added a sentence stating that if the operator needs more detail, they should contact Matisa.*
- b) Matisa's document "Maintenance terms" gives the definition of some maintenance action. On request, this list can / shall be updated.*
- c) During the design of machines, Matisa carries out a product risk analysis. This analysis allows us to define which elements may present a danger. The purpose of this analysis is to eliminate potential risks by technical means, or if not possible to implement appropriate physical safe-guards, to provide appropriate training and to inform the end-user about the potential risk. As with the documentation, risk analysis is in constant improvement.*
- d) The key values are already mentioned in the manuals as general values. Where specific values are requested these are specified on the relevant drawings or schematics. However, in the new manuals Matisa has now implemented a table summarizing all the key values.*
- e) In case of unusual loadings (such as impacts or derailments), Matisa believe that these forces cannot be defined otherwise than through live tests. These tests are performed for large industrial series production (locomotives, wagons, cars, planes, etc.), but seem totally unrealistic for a one unit machine. This is the problem faced by a company like Matisa, to meet the same requirements governing locomotives and wagons. On our level, Matisa already take into account a safety factor in our calculations which is based on the standards acceleration factors and is assessed and commonly agreed with the VAB [Vehicle Acceptance Body] during the product acceptance process. This seems to be efficient as it is not the design of the various parts*

which seems to be the trigger problem in this particular case but the chain of events. However, in order to reduce this kind of risks Matisa has already added a general sentence in our manuals which states:

'If an accident or any other incident may have caused solicitations, distortions, damages or other impacts on the machine or it's consist, the operation of the machine shall immediately be stopped.

The operation can only be resumed once all consequences of the accident or incident have been assessed, analysed in detail and the machine is declared safe to work and transit. Potential safety risks have to be cleared. Repairs and all necessary remedies to ensure long term safety and security of the operation and transit shall be carried out. If in any uncertainty or doubt, contact the manufacturer.'

12. ORR was not satisfied that the response adequately addressed the recommendation and met with Matisa on 24 February. On 7 April 2014, Matisa stated that:

With regards to recommendation 4 raising the clarity of instructions:

- *4a) "describe maintenance activities with sufficient technical detail", recommendation*
- *4d) "key values" and recommendation*
- *4e) "action for the case of unusual loadings"*

Matisa has focussed on the maintenance of the cabin fastening. Section 3 below lists the draft modifications made on the documentation of the P95/UK1 of which you will find extracts attached.

Additionally, please find also attached:

- *20140324_customer_information_rubber_mounts.pdf;*
- *20140324_maintenance_schwab_ultrabuchse.pdf, covering the rubber elements query you raised in recommendation 4a); and*
- *20140331_fastening risk assessment, covering fastening risk identification you raised in recommendation 4c) and action to be taken in case of unusual loadings you raised in recommendation 4e)*

Matisa will now implement these changes and formally issue appropriate service bulletins.



13. On 7 May 2014, ORR wrote to Matisa asking for details on what consultation it has had with its UK customers, the findings from the consultations and any further action it may taking to address the recommendation. ORR also brought to Matisa's attention that it is a

requirement of UK law that information and instruction shall be readily comprehensible to those concerned.

14. Matisa's response, received on 27 June 2014, said:

Matisa should, in consultation with its customers, improve the clarity of the maintenance instructions for its on-track machines.

Consultations with our customer are in process with Network Rail; please find the confirmation in the annexed message. MATISA and Network Rail are working on this specific task.

I can confirm that we've had several discussions regarding the maintenance instructions for both the P95s and the D75 machines, including new maintenance bulletins as interim updates to the manual. Network Rail are currently re-formatting the manuals; we are planning to use the technical support contract with Matisa so that Matisa (as the Design Authority) can review and approve any changes to the manual.

Specifically, we've recently had a new maintenance bulletin produced by Interfleet for the new P95 P3/4 cab mountings. We are currently reviewing this with the Amey Colas maintenance teams. Once I've had their comments, I'll forward the proposed instruction on to you.

Additionally, I hope to soon have a draft of the re-formatted D75 manual available for your review.

15. The Matisa response also stated:

Instructions shall be readily comprehensible to those concerned

We are using UIC terminology. Therefore, the terms we use are generally correct. However, it happens sometimes that the customer is using different terms from those recommended by UIC. It can also happen that different customers use different wording for the same item, depending on company culture and on the region where they are located in the UK. We are aware of this situation and adapting our documents to make them easier to understand is part of our company culture.

Our documentation is also used by our Matisa UK technicians who are native English speakers. They also have daily contacts with our customer's technicians. As mentioned above, if something is not clear enough, they give us the relevant feedback and we modify the documentation accordingly.

We wrote a letter to our customers to ask them to carefully read through their entire documentation and to tell us:

- each point they don't understand*
- each phrase they want to be formulated differently*
- any other improvements they might need*

ORR decision

16. We have requested further evidence from Matisa in relation to letters to customers and evidence of responses.

Status: In-progress: ORR will update RAIB by 30 January 2015 on action being taken to address this recommendation.

Recommendation 5

The intent of this recommendation is to promote the early identification of corrosion on the bolts/fastenings of high-risk equipment so that corrective action can be taken.

Network Rail, in consultation with the maintainers of its on-track machines, and taking into account the output from implementing recommendation 1, should enhance the inspection arrangements for its on-track machines by including a periodic cycle of visual inspections of high-risk fastenings (dismantling the mounting arrangement if necessary) to detect the presence of corrosion. Where corrosion of a bolt/fastening is identified, the source of the corrosion should be found and eliminated where possible. Where this is not possible, the relevant maintenance instructions should be enhanced to include the requirement for more frequent replacement of affected bolts/fastenings.

Details of steps taken or being taken to implement the recommendation

17. Network Rail in its initial response on 27 November 2013 advised that:

Network Rail will address this recommendation via the following action plan:

- *Network Rail Plant & T&RS Team and Fleet Teams will carry out a review of the items identified in step 2 of Recommendation 1 action plan to determine where fastener corrosion could introduce a risk of component detachment without prior detection. The review will identify where enhanced maintenance regimes are required to include a periodic cycle of visual inspections of high-risk fastenings (dismantling the mounting arrangement if necessary) to detect the presence of corrosion, as detailed in Recommendation 5 (April 2014).*
- *Network Rail Plant and T&RS Team will collate details of all unfunded works and produce a scope for the entire fleet. This will then be worked into a proposal and funding sought to complete all works using both internal and external resource as required (June 2014).*
- *Network Rail Plant and T&RS Team will manage the delivery of all actions and feedback responses to demonstrate closure (November 2014).*

Timescale: 30 November 2014

ORR Decision

18. We are content with the proposed actions which are due to be completed by November 2014 and continue to monitor progress.

Status: Implementation on-going.

Recommendation 6

The intent of this recommendation is for Matisa to consider all working modes of a machine when designing component mounting arrangements.

Matisa (UK) Ltd should modify its processes for designing on-track machines so that it includes the assessment of all modes of operation when designing component mounting arrangements. This includes the mounting arrangements on machines that can operate in a defined 'working mode' (i.e. at slow-speed) as well as travelling at higher speeds (i.e. being hauled).

Details of steps taken or being taken to implement the recommendation

19. Matisa in its initial response on 6 December 2013 advised that:

When designing a machine Matisa takes into account the elements given by common practice and also the standards requirements, namely GM I RT 2400 in the UK. Matisa will re-evaluate the design process of the machines and if necessary adapt it by learning from the past. Matisa has received lately the very interesting cabin mountings accelerometer data from the operator and will take these measured forces into account in Matisa's future designs. However, a manufacturer has also to take into consideration the specific operation processes and access limitations. In any cases, Matisa is willing to consult with the machine owner and the operator to define and assess any potential improvement option.

Further, in this specific case, although the sections of the current bolts did comply with the relevant standards and safety factors, Matisa has increased the bolts diameter from M12 to M16 to further enhance the resistance. Additionally taking into account RAIB's report Matisa has also modified the cabin mountings and secondary retention in order to reduce the risk of it dropping.

20. ORR was not satisfied that the response adequately addressed the recommendation and met with Matisa on 24 February. On 7 April 2014, Matisa stated that:

Matisa would like to draw your attention to the P3-4 fastening modification made in autumn last year [2014]. You will find the details in section 1 below. This modification will strengthen the whole support concept.

However, as stated in the RAIB report, the main cause of the drop of the cabin is the impact of the clamp occurring in 2011. The fastenings which were initially rightly sized have been increased in order to reduce even more any potential risks by increasing the safety factor well above the industry standards (see section 2 below). This only to address recommendation 6 which is not formally raised in this document.

21. On 7 May 2014, ORR wrote to Matisa asking for estimated timescales for it to review the design processes for component mounting arrangements. Matisa's response, received on 27 June 2014, said:

Re-evaluation of the design process

Our machines are designed accordingly to GM/RT2400 and GM/RT2100. Suspended components such as the cabin P3/4 are designed and built in accordance with the requested loads of the specified standard.

Calculations are scrutinized by a notified body (formal vehicle acceptance body, VAB) and its build verified during the build conformance visits. During manufacturing of machines regular build review meetings take place. For machines already delivered customer complaints (TRC) or internal findings of non-conformance against our specification (ANC) are issued and presented on the management of MATISA. We consider having a design process in place that allows to continually improve our design but also to react quickly on occurrences such as the P95 cabin failure.

ORR Decision

22. This response fails to address the recommendation. It reiterates assessment of compliance with GM/RT2100 *Requirements for Rail Vehicle Structures* and GM/RT2400 *Engineering Design of On-Track Machines in Running Mode*. GM/RT2100 does not apply to vehicles covered by GM/RT2400; GM/RT2400 applies only to on-track machines in running mode. This means the intent of the recommendation that load cases should be considered for working modes as well as travelling modes is missed.

23. We have requested that Matisa clarify that the "all modes" element of GM/RT2100 is applied even though the standard is not mandatory under RGS code to OTM.

Status: In-progress: *ORR will update RAIB by 30 January 2015 on action being taken to address this recommendation.*

Recommendation 7

The intent of this recommendation is to reduce the risk of the P3 cab of P95 machines outside the United Kingdom detaching due to fastening failure.

Matisa (UK) Ltd should communicate the findings from this report to operators and maintainers of P95 machines outside the United Kingdom with advice on necessary measures to reduce the likelihood of the P3 cab becoming detached and falling onto the track due to the failure of the fastening system.

Details of steps taken or being taken to implement the recommendation

24. Matisa in its initial response on 6 December 2013 advised that:

Matisa has been liaising with its Dutch client (Strukton) with regards to the manual contents and to Strukton, "check the integrity" is perfectly understandable. Strukton feel that it is not necessary to increase the amount of information with details that should be known by its maintenance personnel. Strukton stated: "excess of basic information may lead to them not being read with the appropriate attention."

Matisa has asked 4 other of its customers in Germany (L. Weiss, Spitzke, Strabag and Schweerbau) with a questionnaire about the quality, the user manual content and the maintenance schematic. Three of them did not agree to answer our questionnaire and one answered but without detail.

The conclusion of this information campaign tends to show that every country and every contractor has its own approach regarding the maintenance and the level of information that should be available. Matisa must accommodate all such differences.

However, in order to improve safety and prevent any reoccurrence of such kind of accident, Matisa will, of course, inform its various P95 and similar cabin fitted machines about this accident, provide them with a number of propositions in order for them to assess their potential needs in terms of improvements, maintenance and checks.

25. On 7 May 2014, ORR wrote to Matisa asking for estimated timescales for it inform its customers of the incident and provide evidence of it being done.

26. Matisa's response, received on 27 June 2014, enclosed the Technical Information note "Cabin fittings check" sent to all Matisa subsidiaries on 10 July 2012. This was produced in three languages and sent to Matisa subsidiaries in UK, Spain, France, Italy, Japan, Germany and Sweden for onward dissemination to customers in each of those countries. This correlates with information given to ORR shortly after the incident by Network Rail in respect of the engineering follow-up to prevent recurrence.

ORR Decision

After reviewing information received ORR has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, Matisa has:

- taken the recommendation into consideration and
- has taken action to implement it.

Status: *Implemented*