

**Legislative Council Panel on Transport  
Subcommittee on Matters Relating to Railways**

**Government's Assessment on the Consultancy Report on Rail  
Commissioned by the MTR Corporation Limited**

**Purpose**

This paper briefs Members on the Government's assessment on the consultancy report on rail commissioned by the MTR Corporation Limited (MTRCL).

**Background**

2. In view of the MTR rail breakage incidents in early 2011, MTRCL engaged the Institute of Railway Technology (IRT) at Monash University, Australia in March 2011 to conduct a study. The scope of the study included assessment and comparison of MTRCL standards with international standards and practices adopted by other railway operators in respect of MTRCL's rail procurement; quality control, inspection and maintenance of rails relevant to rail breakages; non-destructive testing (NDT) technology; and management measures taken upon detection of rail breakages.

3. The Electrical and Mechanical Services Department (EMSD) has also commissioned the Office of Rail Regulation (ORR) of the United Kingdom<sup>1</sup> to review the consultancy report prepared by IRT to ensure that the methodology adopted and scope covered are appropriate.

**Consultant's Findings and Recommendations on Improvement Measures**

*Rail Procurement*

4. IRT pointed out in its consultancy report that the rail procurement specifications currently adopted by MTRCL have been formulated according to relevant international standards. For different types of rails, IRT made the following recommendations -

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<sup>1</sup> ORR is a railway safety regulator of the United Kingdom.

(a) Plain rail and switches

IRT agreed that it is appropriate for MTRCL to refer to the European standard EN13674-1 on rail procurement specifications for the procurement of plain rail and switches, and can ensure that rail supplied is fit for the operating characteristics of MTR. To further enhance the procurement specifications and maintain the quality of rail supplied, IRT recommended that MTRCL should require new suppliers to produce evidence of meeting the requirements for production qualifying tests as outlined in the EN13674-1 standard.

(b) Cast crossings

On the procurement of cast crossings, IRT took the view that while MTRCL has appropriately adopted the UIC866 standard laid down by the International Union of Railways, the European standard EN15689 is more comprehensive in respect of the testing requirements for the production of cast crossings and can thus enhance their quality. Therefore, IRT recommended that MTRCL should adopt the European standard EN15689 for the procurement of cast crossings.

(c) Tri-metal welds

Among the 14 rail breakage incidents, three were caused by defective tri-metal welds supplied by the manufacturers. IRT was of the view that while MTRCL has set out the technical requirements for tri-metal welds in their procurement specifications, reference should be made to relevant international standards and specifications. MTRCL should thus require the suppliers of tri-metal welds to meet the specifications outlined in the more comprehensive European standard EN14587-3. The standard is currently in draft version and is expected to be issued in 2012.

### *Quality Control*

5. To ensure that the quality and mechanical properties of rail supplied fully comply with the procurement specifications, MTRCL conducted appropriate material inspections and examinations before shipment. IRT considered that such quality control was appropriate and robust and should be maintained. IRT

also recommended that MTRCL should adopt the good commercial practice of inspecting all incoming components to check that their component numbers and batch numbers match those listed on the consignment notes.

### *Inspection and Maintenance*

6. IRT was of the view that the MTRCL standards for rail inspection and maintenance management including visual inspection and non-destructive testing (NDT) etc are on a par with those adopted by similar railway systems around the world. Moreover, IRT also found the frequency of ultrasonic inspections conducted by MTRCL higher than that for other similar railways.

7. IRT was of the view that the NDT technology currently adopted by MTRCL was broadly comparable to that adopted by other railways worldwide. For the 14 rail breakage incidents, IRT indicated that relevant technology could have detected nine cases, among which seven cases involved the effectiveness of NDT and two cases involved aluminothermic weld of poor quality. IRT suggested that the relevant defects could have been detected if the training and certification regime for NDT personnel could be strengthened and ultrasonic testing could be conducted within 48 hours after installation of the weld. As regards the five rail defects which could not have been discovered prior to failure, four cases were considered hardly detectable by the existing NDT technology. IRT was not able to judge on the remaining one case due to the lack of relevant information. MTRCL agreed with IRT's recommendations in general, and has undertaken to adopt the following recommendations -

(a) ISO9712 Standard

The existing system used by MTRCL for the training and qualification of NDT personnel is based on the system established by the American Society for Non-destructive Testing (ASNT). The ASNT and similar systems are used in many railway operations worldwide. Given that the ASNT system is an in-house training and qualification system, IRT recommends that MTRCL should adopt the ISO9712 standard to enable its NDT personnel to obtain the relevant qualification and certification from independent institutes to enhance effectiveness.

(b) European Standard EN14730

Rail breakage incidents involving aluminothermic welding are due to defects arising from site welding. The defects could not have

been detected prior to breakage because the rate of defect growth was rather rapid, or the position of the defect meant that detection was not possible. The British Railways Board standard BR522 adopted by MTRCL, which sets out procedures for the production of aluminothermic welds as well as training and certification of its welders, is considered outdated. IRT took the view that there is room for improvement, and recommended that MTRCL should adopt the European standard EN14730 instead of the British Railways Board standard.

MTRCL should conduct regular auditing of the quality of aluminothermic welding and regular training of welding personnel according to the EN14730 standard; and conduct ultrasonic testing within 48 hours after the welding to ensure the quality of welding.

#### *Management measures taken upon detection of rail breakages*

8. Upon detection of rail defects, the engineering staff of MTRCL would take follow-up actions according to the established procedures, such as imposing temporary speed restrictions or setting time scales for the replacement of defective rails. Having analysed and compared the rail defect categorisation systems used by different railways worldwide, IRT took the view that there is room for improvement in the follow-up actions taken by MTRCL upon detection of rail defects. While the risk-based philosophy adopted by MTRCL reflected practices around the world, for the management of rail defects that are not so common in Hong Kong and have a higher risk, MTRCL should adjust its categorisation and action system according to the findings of risk assessment. IRT was also of the view that the overall performance of MTRCL in managing rail breakage risks is comparable to that of other similar rail systems worldwide. If a rail breakage is detected during train operation, engineering staff will be sent to the scene to conduct a detailed inspection and assessment to ensure that safe operation of trains will not be affected. Temporary repairs will also be conducted by applying steel plates to hold the rail concerned in place so that train operation can be resumed. The 14 rail breakage incidents that occurred since 2008 were all managed properly.

## **Independent Expert's Advice and Government's Assessment**

### *Rail procurement, quality control, inspection and maintenance*

9. At the request of EMSD, ORR has conducted an independent review of the report prepared by IRT. The review is based on comparisons of similar circumstances on Great Britain's railways and how they would have been addressed there. ORR conceded that IRT have not identified any major problems on MTR that should cause immediate concern. ORR also concluded that IRT has conducted a thorough study in a professional manner, and that the conclusions and recommendations made in the IRT report are logical and sensible.

### **Government's Assessment**

10. EMSD has scrutinised the consultancy report prepared by IRT. The report compared MTRCL standards in respect of rail procurement, quality control, inspection and maintenance with international standards and practices adopted by other railway operators. The current loading and speed characteristics of European railways are broadly comparable to those of MTRCL. Therefore, EMSD agreed that MTRCL should adopt the latest European standards for all procedures and tests in respect of material supply, rail welding and NDT. Most importantly, measures should be taken to enhance the quality of the production and supply of rail components to reduce the possible occurrence of defects.

11. EMSD considered that the improvement measures suggested in the IRT report are appropriate, and agreed with the assessment results and recommendations set out in the report. In addition to the recommendations made in the IRT report, EMSD took the view that MTRCL should conduct local random inspections for each batch of rail components shipped to Hong Kong. This can ensure that rail components are not damaged during the delivery and packaging processes, and in turn enhance the quality control of rail components in terms of safety. MTRCL has accepted the recommendation of EMSD.

12. Based on the recommendations made in the consultancy report, MTRCL has drawn up an implementation programme to improve the procurement of rail components, quality assurance of rail maintenance personnel and relevant management procedures to enhance the safety effectiveness of the rail maintenance regime. EMSD considered MTRCL's implementation programme practicable, and will continue to monitor and follow up MTRCL's improvement measures and their progress to ensure their implementation.

## **The Way Forward**

13. MTRCL has undertaken to adopt the improvement measures recommended by IRT and EMSD. EMSD will closely monitor the implementation of the said improvement measures by MTRCL, and will require MTRCL to report the progress and effectiveness of the improvement measures on a regular basis.

Transport and Housing Bureau  
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