

**Legislative Council Panel on Transport  
Subcommittee on matters relating to railways  
Meeting on 17 February 2006**

**East Rail underframe equipment mounting problem**

**Purpose**

This paper sets out Government's follow-up actions to ensure the safety of train operation in light of East Rail's underframe equipment mounting problem, and our evaluation of the appropriateness of KCRC's immediate mitigation measures to address the problem.

**Government's follow-up actions**

*Government's Expert Team*

2. On 11 January 2006, the Government set up a designated expert team comprising 7 professionals of the Hong Kong Railway Inspectorate ("HKRI") and 8 professionals of Electrical and Mechanical Services Department ("EMSD") to conduct frequent on-site inspections of the East Rail trains and monitor KCRC's inspections around the clock. Our objectives are to ensure the safety of daily East Rail operation, the effectiveness of mitigation measures taken by KCRC, and to monitor KCRC's prompt investigation into the root causes of the problem.

3. In order to ensure the safety of daily train operation, the Government has requested KCRC to check all the trains to be deployed each day every 48-hour and submit certification on their safety before commencement of the daily passenger service.

4. In addition, to evaluate the effectiveness of the interim mitigation measures, the Government's expert team would conduct the fleet check on the temporary remedial measures including the industrial nylon straps and metal supports. It would also vet the designs of all the metal supports before they are installed to underframe components to confirm the soundness of such designs, and monitor the installation process to ensure its compliance with the approved designs.

5. Recognising that the effectiveness of the measures also depends on the ability of KCRC to carry out inspection appropriately and timely, the team has been collecting data from KCRC daily to check the actual repair and inspection progress, conducting spot check on KCRC's 48-hour hammering and visual inspection and site checks on the non-destructive testing ("NDT"), and monitoring the progress of NDT according to the specified schedule of testing for each train.

6. After rigorous evaluation of KCRC's interim mitigation measures and close monitoring of KCRC's inspections, we consider that the interim measures taken by KCRC are in order.

7. To facilitate the identification of the root causes of the underframe equipment mounting problem, KCRC has accepted the Government's suggestion of developing and maintaining a database to capture data on the crack length and location. This will assist systematic and scientific analysis of the crack profile, which is essential for the root causes investigation.

8. Our view on the adequacy of KCRC's interim mitigation measures are shared by the consultants appointed by the Government. The consultants' findings are set out in the ensuing paragraphs.

#### *Consultants' Assessment*

9. In order to obtain a thorough assessment on whether the immediate rectification measures implemented by KCRC are adequate to contain the problem and ensure a safe railway operation, we engaged Lloyd's Register Rail, a renowned railway consultancy firm, to provide expert advice to the Government. The consultants deployed rolling stock and structural engineering specialists to undertake the review. We requested the consultants to carry out systematic analysis to assess the adequacy of the immediate remedial works performed by KCRC, as well as KCRC's methodology in handling and containing the problem.

10. As regards the immediate remedial works done by KCRC, the consultants observed the maintenance activities, inspected the mitigation measures and observed the testing of equipment and components in the workshop to verify that the mitigations were being implemented effectively. The consultants considered that the KCRC staff were diligent in their application of hammer and visual inspection. The procedure for the NDT was observed, operator certification, records of

examination were properly prepared and verified. The consultants considered the use of the nylon straps on the vehicles also effective. There was also a frequent inspection regime that checks the security and tension of the straps. Fundamental design assumptions and sample designs of metal support were checked and found to be acceptable. The consultants reviewed the welding procedures for the repair welds, which were found to be adequate.

11. The consultants also reviewed KCRC's approach in handling the problem and considered it standard and acceptable in engineering terms for dealing with a problem with an unknown cause. In other words, KCRC should be able to contain and manage the problem until it can be completely resolved through engineering modification.

12. As regards whether the measures taken by KCRC did contain the likelihood of deterioration of the problem, the consultants observed that KCRC's inspections had been conducted more frequently than recommended by the manufacturer (Alstom). For visual inspections, although the recommended frequencies ranged from 48 hours to 1 month depending on the length of the cracks, KCRC inspected all major components every 48 hours. Moreover, while the recommended frequencies for NDT ranged from 1 week to 12 months depending on the length of the cracks, KCRC carried out more frequent inspections for components with cracks identified. The Corporation also undertook fleet-wide inspections for major components every 2 months and minor components every 3 months regardless of whether cracks were found.

13. Having reviewed the crack propagation calculations, the frequency of inspection, the training records and qualifications of the staff carrying out the inspections and having observed the inspection approach, the consultants considered that it is unlikely for new cracks to propagate and fracture a component mounting on the equipment monitored without the awareness and intervention of KCRC.

### **Observation and Way Forward**

14. With the consultants' assessment as well as the Government's expert team's continued monitoring and inspection of KCRC's mitigation measures and inspection regime, we consider that the interim rectification measures implemented by KCRC are appropriate to ensure the safety of railway operation before the root causes of the underframe equipment mounting problem can be identified.

15. It is also observed that the disruption to normal East Rail service due to the underframe equipment mounting problem has so far been kept to the minimum. The service level of East Rail has been able to meet the peak passenger demand during normal working days as well as the Chinese New Year holidays.

16. Notwithstanding the above, we consider that the prevention of future crack problem depends on the identification of root causes and the formulation of effective measures to resolve the problem. As such, it is of crucial importance that KCRC accord priority to this task. We have specifically asked KCRC to take the following actions –

- (a) Remain vigilant in the continued implementation of interim mitigation measures;
- (b) Ensure the deployment of adequate staff resources to sustain the current inspection work given that the work involved is labour intensive;
- (c) Given that the root causes are yet to be identified, KCRC should ensure the on-going inspections cover the whole train to ensure overall rail safety;
- (d) In identification of the root causes of the problem and formulation of a permanent solution to the problem, KCRC should adopt a scientific, prudent and thorough approach to analyse the data; and
- (e) Should launch a review of its current maintenance and asset management regime for East Rail, given its importance in upholding the functional capability of the trains. KCRC should submit a review report to the Government.

17. The Government will continue to rigorously monitor the rectification and investigation works carried out by KCRC with a view to ensuring its continued safe operation of East Rail.

ETWB  
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