

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

**Results of tests on the underframe components of East Rail trains**

**Purpose**

This paper provides Members with information on the result of the tests performed on the underframe components of East Rail trains, the improvement measures taken, the progress of the investigation, and the updated status of the East Rail services provided by the Kowloon-Canton Railway Corporation (KCRC).

**Progress and results of the tests performed on the underframe components of East Rail trains**

2. KCRC completed non-destructive tests (NDT) on all major underframe components of East Rail trains on 22 January 2006. Of the 1,465 major components checked, cracks were found in the welding of 189 lower mounting brackets and 23 upper mounting brackets.

3. Following completion of the NDT on all major underframe components, KCRC immediately stepped up the NDT on all 6,535 non-major underframe components of East Rail trains. The testing of all non-major components is expected to be completed in May. As at 10 February 2006, a total of 594 non-major components had been checked, and cracks were found on the welding of mounting brackets of 46 of them. (Details of the number of components tested are shown in the attached.)

4. In order to collect additional statistical data to determine the root causes of the cracks in the welding of the train underframe components, the

scope of NDT has also been extended to all components that may similarly be affected by the root causes. This is a preventive measure designed to collect further statistical data for root causes analysis, which will enable the early detection of minor cracks so that timely mitigation measures can be taken.

5. During these checks, KCRC engineering staff found minor cracks in an assembly piece in the couplers on a small number of East Rail trains. The minor cracks should not affect the safe operation of train services. KCRC carried out immediate repairs and included the cracks in its regular crack management programme. The programme includes administration of a hammering test and visual inspection every 48 hours to ensure that all components meet stringent safety standards. KCRC also completed NDT on all related assembly pieces on 11 February 2006.

### **Improvement measures**

6. KCRC completed interim reinforcement work to ensure the integrity of all compressors and the 12 other types of major components before 28 January 2006. The works included re-welding and / or the installation of additional metal support, including cradles, on all major components with cracks and the use of industrial straps on two types of non-major components.

7. Other on-going improvement measures include:

- Conducting hammering tests on, and visual inspections of, all metal cradles of all major components every 48 hours; and conducting hammering tests on, and visual inspections of, the industrial straps of non-major components every seven days;
- Devising a crack management regime to closely monitor the development of cracks, so that appropriate measures can be taken before any problem arises;

- From 15 January 2006 onwards, switching the operation of East Rail trains from Automatic Train Operation (ATO) Mode to manual driving under the safety protection of the Automatic Train Protection (ATP) Mode, so as to reduce the stress on underframe components during the acceleration and deceleration of trains; and
- KCRC will also study reinforcement work to further strengthen the underframe components' stress endurance where needed.

### **Progress of Investigation**

8. KCRC has commissioned an Independent Review Panel (IRP) comprising local engineering experts and AEA Railway Consulting Company of UK to assist in the investigation of the root causes of the cracks. The IRP will focus on reviewing the validity of statistical data collected by KCRC and the effectiveness of the improvement measures. The IRP will also advise on the way forward for the investigation work.

9. KCRC is pursuing four main avenues of investigation into the potential causes of the problem, namely, the rate of change of the acceleration and deceleration of trains, the welding of the mounting brackets of the components, the profile of the tracks and wheels, and the suspension system of the trains. In this respect, KCRC is gathering relevant statistical data and related evidence for analysis. KCRC aims to identify the actual root causes of the cracks by elimination of irrelevant ones.

### **Current service**

10. Since 15 January 2006 when KCRC switched the operation of East Rail trains from ATO Mode to manual driving under the safety protection of ATP Mode, the operation of train services has been smooth. Under the ATP mode, the total journey time between East Tsim Sha Tsui and Lo Wu has been

extended by about one and a half minutes. During the morning peak, there are now 22 hourly runs in each direction. The switch to ATP Mode has not affected off-peak hour and evening peak hour frequency. Intercity through trains and freight services have also not been affected by the change.

11. As in previous years, East Rail provided all night service on the Chinese New Year's Eve (28 January 2006). The frequency of service on the second day of the Chinese New Year (30 January 2006) was also enhanced to cope with the increased passenger demand following the fireworks display. On the third day of the Lunar New Year (31 January 2006), East Rail and Ma On Shan Rail services were strengthened to facilitate visits to the Che Kung Temple. Special services were arranged in the afternoon to meet the passenger demand on the Race Day, and additional resources were also deployed to cope with the large number of cross boundary travellers returning from the Mainland. Throughout this busy period, East Rail train services ran smoothly and safely.

## **Conclusion**

12. Train services during Lunar New Year were normal and the number of passengers increased slightly compared with the same period in 2005. KCRC would like to thank passengers for their understanding and support and we remain confident that we will continue to provide safe and reliable passenger service.

Kowloon-Canton Railway Corporation  
February 2006

**Results of tests on East Rail train underframe components**

As at 10 Feb 2006 Major Item	Total	No. of cracked equipment found after NDT			Progress of applying nylon straps	Progress of installation of metal reinforcement (i.e. cradles, extra brackets and / or weld repair)
		No. of equipment inspected	No. of equipment with cracks found	No. of upper mounting bracket with crack found		
DC Equipment Case	59	59	3	0	59	59
Main Equipment Case	57	57	18	<6>	57	57
Main Compressor	116	116	10	<2>	N/A	116
MA Set	116	116	32	<4>	116	116
MA Converter Case	116	116	15	0	116	116
Auxilliary Equipment Case	116	116	72	0	116	116
Main Transformer	116	116	1	<4>	116	116
Battery Charger	84	84	12	0	84	84
Battery Box	336	336	11	<5>	336	336
Cab Air Conditioning Unit	58	58	3	0	58	58
Compressor Choke	116	116	8	<1>	116	116
MA Choke	116	116	4	<1>	116	116
Smoothing Inductor	59	59	0	0	59	59
<b>Total</b>	<b>1465</b>	<b>1465</b>	<b>189</b>	<b>&lt;23&gt;</b>	<b>1465</b>	<b>1465</b>
Non-major item						
Traction Motor Mounting	464	24	0	0	---	---
Brake Unit	348	27	1	0	---	---
Main Reservoir	792	54	12	0	792	---
Auxiliary Reservoir	116	38	1	0	---	---
Surge Suppression Reservoir	1392	90	23	0	---	---
Wheel Slide Unit	348	27	1	0	---	---
Brake Caliper	2784	144	0	0	---	---
APC Antennae	116	12	1	0	---	---
Resistor Case	116	5	0	0	---	---
Rectifier Case	59	59	7	0	59	---
<b>Total</b>	<b>6535</b>	<b>594</b>	<b>46</b>	<b>0</b>	<b>851</b>	<b>---</b>

◇ Represents upper mounting brackets.