For information
26 May 2025

Legislative Council Panel on Transport
Subcommittee on Matters Relating to Railways

East Rail Line Engineering Train Incidents and the Operations and Maintenance of Engineering Trains

This paper reports to Members on the investigation and follow-up actions regarding two incidents involving engineering trains on the East Rail Line (EAL) in recent months, as well as the review being conducted by the Government and the MTR Corporation Limited (MTRCL) on the operation and maintenance of engineering trains.

EAL engineering train incidents and follow-up actions

2. The Government has always attached great importance to railway safety, and is highly concerned about the two incidents involving engineering trains on the EAL which occurred in the early hours of 5 February (Wednesday) and 27 April (Sunday) respectively this year. Both incidents involved the malfunctioning of MTR engineering train equipment after completing maintenance work on the tracks, and the vehicles were unable to be moved away from the relevant sections in time before the commencement of train services. The incident on 5 February involved the failure of a 25-tonne wagon structure on a crane engineering train to return to a level position; while the incident on 27 April involved equipment failure of the elevating platform of a vehicle used for overhead-line inspection. During the emergency recovery for both incidents, the MTRCL maintained train services on the entire EAL, although the frequency of train services was affected, and additional journey time was needed.

3. For each of the two incidents, the Electrical and Mechanical Services Department (EMSD) immediately deployed personnel to the site for preliminary investigations, and required the MTRCL to submit report within one month. The EMSD has also requested the MTRCL to seriously follow up with the two incidents and implement improvement measures to further enhance the reliability of engineering trains, ensuring that the overall maintenance work meets the future operational needs of the railway.

Incident on 5 February

4. The MTRCL has submitted to the EMSD an investigation report on the 5 February incident (a summary of the report is at Annex). The EMSD has also conducted an independent investigation after reviewing the report. On the cause of the incident, the EMSD's investigation confirmed that when the wagon structure of the crane engineering train was being reset to the original position on the affected section, the safety protection mechanism of the engineering train was activated, which automatically locked the levelling function. The engineering train could not be moved away for safety reasons. However, the MTRCL's operational manual and recovery guidelines for the engineering train concerned did not cover specific recovery procedures in accordance with the manufacturer's instructions, resulting in the team's inability to reset the system in a timely manner; and the response during the recovery took time, prolonging the recovery time required.

5. After a detailed inspection of the relevant equipment, meetings with relevant personnel, and review of various documents and records of the MTRCL, the EMSD has the following key observations:

(a) Engineering train operation and equipment design: The operators were not aware of all the operational options available for the equipment concerned; and the engineering train lacked sufficient alarm devices to assist operators in its operation;

(b) Risk management: The existing risk assessments did not cover the impact of various extreme scenarios on railway services and did not formulate corresponding contingency plans;

(c) Recovery procedure guidelines: The operational manual and recovery guidelines for the engineering train concerned did not set out the recovery procedures for extreme scenarios; and

(d) Emergency response capability: The maintenance team needs to enhance effective coordination during recovery work, particularly for recovery tasks not set out in the guidelines; and improve emergency response and decision-making for unique and extreme situations, along with relevant staff training.

6. The EMSD has required the MTRCL to implement a series of improvement measures based on the above investigation findings and

recommendations, covering the engineering train concerned and other similar engineering trains used across the MTR network. These measures include regularly reviewing and updating relevant work instructions and operational manuals in accordance with the manufacturer's instructions and the operational experience accumulated, improving recovery and emergency response procedure guidelines, enhancing staff training and drills (particularly for emergency recovery procedures for railway incidents), reviewing current risk assessments for incident scenarios to include extreme conditions, adding audible or visual alarm devices to engineering trains to assist operators in operation, and providing special tools to expedite recovery work having regard to the incident scenarios reviewed under risk assessments. The MTRCL is currently implementing an enhancement and improvement plan based on the above investigation findings and recommendations, with details provided at Annex.

Incident on 27 April

7. The MTRCL is currently conducting an investigation on the 27 April incident (relevant information is at Annex) and will submit a report to the EMSD outlining the cause of the incident and proposing improvement measures. The EMSD's preliminary investigation indicated that the incident was caused by a failure of the hydraulic control valve of the engineering train's hydraulic system, preventing the elevating platform from lowering. The EMSD is conducting further investigation into various aspects, including the design of the engineering train system, maintenance, and operational procedures.

8. Based on the recommendations from the 5 February incident, the EMSD has further instructed the MTRCL to conduct a comprehensive review of the management of the entire engineering train fleet, including design, maintenance, operational procedures, and emergency repair processes, to promptly identify deficiencies, with a view to enhancing the reliability of engineering trains and the ability of maintenance personnel to respond to emergencies through targeted improvement measures. The MTRCL has engaged an independent consultant to assist in the review of the engineering train fleet.

Special audit on engineering train operations and maintenance

9. To continuously strengthen railway safety regulation, the EMSD has implemented the Comprehensive and Direct Assessment (C&DA) since 2019 to proactively audit the MTRCL's asset management systems (AMS)

for the four major railway assets (i.e. permanent ways, power distribution systems, rolling stock, and signalling systems) and the safety management systems for all operational railway lines. As of the first quarter of this year, the EMSD has completed the C&DA of the AMS for trains at all MTR operational railway lines, covering all trains used by the MTRCL (including engineering train assets). The EMSD has provided the MTRCL with a series of recommendations to enhance the assessment and monitoring of the service life and equipment condition of engineering trains. Specifically, given the diverse functions, types, and models of the engineering trains in service, as well as the complexity of their many equipment and components, the EMSD has recommended the MTRCL to carefully evaluate, and include in the asset health monitoring table, each type of engineering train, key subsystems, and vulnerable components, so as to review the health status of each asset component in a more comprehensive, systematic and timely manner. The MTRCL is implementing the relevant measures by phases.

10. Under the C&DA framework, the EMSD will also conduct special audits on individual items in response to railway incidents from time to time. In light of the two consecutive incidents involving engineering trains, the EMSD has proactively initiated a special audit to comprehensively review the MTRCL's work on the maintenance and emergency response of engineering trains. The audit is expected to be completed within three months. According to the EMSD's preliminary plan, the audit will cover a review of the risks of serious incidents arising from different types of engineering trains and their subsystems and components under the MTRCL, in full consideration of various environmental factors, and develop appropriate preventive, control, and emergency response measures for the identified risks. The EMSD will also follow up on the MTRCL's implementation of the recommendations from the abovementioned regular C&DA audit during the special audit.

11. Additionally, to ensure the MTRCL's effective execution of asset management, the EMSD will regularly review the MTRCL's AMS and its maintenance management system, as well as conduct sampling or surprise inspections of the MTRCL's maintenance work.

Driving application of technologies in the MTRCL

12. As the statutory railway safety regulator, the EMSD will play the role of an "innovation facilitator" in response to the continuous expansion of the railway network and technological advancements, encouraging the

MTRCL to utilise innovative technologies to realise the "Smart Railway" vision, enhance the efficiency of asset management and maintenance, and strengthen risk management. The MTRCL will continue to actively leverage innovative technologies to promote smart maintenance, such as using smart sensors and monitoring systems to continuously collect data on critical railway assets during operations, conduct real-time data analysis and monitoring, and gain a more comprehensive understanding of the condition of different assets, thereby assisting maintenance personnel in enhancing maintenance efficiency and quality.

13. The MTRCL will continue to strengthen its "predictive inspection and maintenance" capabilities, enhance and optimise its maintenance regime and effectiveness, improve railway operational efficiency and safety, so as to prevent the recurrence of similar incidents. The EMSD will actively follow up on the MTRCL's efforts to accelerate the application of innovative technologies in railway services and asset maintenance.

Next steps

14. Railway is an integral part of Hong Kong's public transportation system, and the MTRCL is duty-bound to provide safe and reliable railway services. The Government understands the public's high expectations on MTR services and will continue to closely follow up on the MTRCL's investigation into the 27 April incident and the comprehensive review of engineering train maintenance. Through the special audit, the EMSD will systematically identify areas for improvement in the MTRCL's operations and maintenance of engineering trains, as well as its emergency incident handling workflows. At the same time, the Government will continue to urge the MTRCL to apply innovative technologies in daily train operations and maintenance and enhance its ability to respond to emergencies, so as to ensure that the MTRCL continues to provide the public with safe, reliable, and efficient railway services.

15. Members are invited to note this paper.

TLB
EMSD
May 2025

Annex

Summary of MTRCL's Investigation Findings and Follow-up Actions on East Rail Line Engineering Train Incidents

Ensuring safe and efficient railway services is the top priority for the operations of the MTR Corporation Limited (MTRCL). The MTRCL has established regular and rigorous inspection mechanisms for various railway assets, including engineering vehicles, trains, and other related equipment, and will conduct maintenance regularly.

Summary of investigation report of the engineering train incident on 5 February

The incident and immediate handling

2. On 5 February 2025 (Wednesday) at around 4 am, an engineering train performing sleeper transportation work on the East Rail Line (EAL) completed its lifting work on the section between Fanling Station and Tai Wo Station. The crane operator followed standard procedures to return the wagon structure to a level position but was unsuccessful despite several attempts using both auto and manual modes of the "Levelling Function". The safety protection mechanism was then activated, locking the "Levelling Function". For safety reasons, the engineers determined that the wagon structure needed to be levelled before the vehicle could be moved away from the incident location. While ensuring the safety of the railway, passengers, and staff, the MTRCL made full effort in carrying out recovery work. Eventually, the maintenance team moved the engineering train to a less inclined section and the safety protection mechanism was unlocked automatically. The team then used the "Levelling Function" to restore the levelling of the engineering train and moved the vehicle back to the depot.

3. During the recovery process, full line services of the East Rail Line were maintained to minimise the impact on passengers. Bi-directional single-track operations had to be adopted at certain sections, leading to adjustments in train frequency. Most EAL stations maintained train frequencies between 4 to 8 minutes, while trains running to and from Lo Wu or Lok Ma Chau stations had train frequencies of about16 to 24 minutes. The MTRCL provided timely updates on train services to the public through station announcements, passenger information display

systems, MTR Mobile app and media. Train services gradually resumed normal operations at around 1 pm.

Follow-up work

4. Following the incident, the MTRCL contacted the manufacturer for a detailed investigation on the cause of the incident and submitted an investigation report to the Electrical and Mechanical Services Department (EMSD) on 5 March 2025. The report indicated that due to the vehicle's safety design, the wagon structure must be levelled before it can be moved. Additionally, when the safety protection mechanism detects that the levelling system's tilting angle exceeded a pre-defined allowable range, it automatically locks the "Levelling Function". To ensure safety, the level of the wagon structure could not be adjusted through auto or manual modes; in such situations, emergency mode should be activated in order to reset and restore the "Levelling Function".

5. According to the investigation report, the incident occurred at the track section of EAL with the most severe cant, which is one of the few relatively unique sections. The investigation revealed that after completing the lifting works, the operator followed standard procedures to return the wagon structure to a level position, but failed to do so in either auto or manual mode of the "Levelling Function". Due to the steep track inclination, when the operator attempted to use the "Levelling Function", the base was tilted and the safety protection mechanism was triggered. The investigation found that the specific emergency handling procedures to address the relevant scenario was not included in the current work instructions of the MTRCL. The operator was not aware that the system could be reset using the emergency mode, therefore could not complete the recovery in a shorter period of time. During the recovery process, the maintenance team explored various recovery methods under prudent and safe conditions, including system recalibration, mechanical adjustments, hydraulic modifications and partial component removal, etc.. However, some attempts further increased the tilting angle or caused misalignment of the rail axle, and caused additional time for correction. Given the rarity of such incident, the maintenance team had to proceed with extreme caution, which extended the recovery time.

6. Based on the investigation findings and the recommendations from the EMSD, the MTRCL is actively implementing the following enhancement measures, including:

(a) Introducing technology to enhance reliability: to install a warning and alert system on the engineering train concerned to assist operators in performing their tasks (Completed);

(b) Strengthening training of maintenance team: to provide training, especially on emergency recovery procedures, to operators of the entire engineering train fleet, and to reinforce drills arrangement for the recovery of the specific type of engineering train (Expected to be completed by June 2025);

(c) Enhancing emergency response capabilities: to formulate contingency plan for expediting emergency handling and actively review contingency arrangement while referencing industry best practices with the manufacturer to ensure railway safety and operational efficiency. In the meantime, to strengthen the roles of on-site commander and engineering team leaders to manage extreme and complex recovery procedures, and enhance the capabilities of the Rapid Response Unit's incident handling (Expected to be completed by June 2025); and

(d) Reviewing guidelines for 25-tonne (25T) crane: to conduct a comprehensive review on the operational and recovery procedures, design and maintenance arrangements for 25T crane and optimise relevant guidelines (Completed).

The engineering train incident on 27 April

The incident and immediate handling

7. On 27 April 2025 (Sunday) at around 4 am, the elevating platform of an engineering train used for overhead line inspection could not be lowered after the completion of maintenance work near Fo Tan Station. Due to the platform's proximity to the overhead lines, for safety reasons, staff decided to handle the problem at the scene before removing the engineering train. In that morning, having ensured the safety of the railway, passengers and staff, the MTRCL carried out the repair work in full steam. Eventually, the maintenance team removed certain components of the engineering train, and upon ensuring safe clearance from the overhead lines, moved the engineering train away from the relevant

section.

8. During the recovery period, the MTRCL made efforts to maintain train services on the entire EAL. A bi-directional single-track arrangement was implemented on certain section between Sha Tin Station and Fo Tan Station. Services between Admiralty Station and Lo Wu station were adjusted from every 5.5 minutes to every 10 minutes. Overall journey time was extended by approximately 10 to 15 minutes. The MTRCL provided timely updates on relevant train services to the public through station announcements, passenger information display systems, MTR Mobile app and media. Train services gradually resumed normal at around 12 noon.

Preliminary investigation findings

9. At the Government's request, the MTRCL submitted a preliminary investigation report to the EMSD on 30 April 2025. The preliminary investigation indicated that the elevating platform of the engineering train could not be lowered due to a faulty hydraulic control valve, which controlled the hydraulic cylinder of the elevating platform. After replacing the relevant components, the functions of the platform resumed normal.

Engagement of independent consultant to conduct comprehensive review

10. According to the record, both engineering trains involved in these incidents had undergone regular routine inspections and were within their asset service cycles. The vehicle from the 27 April incident was responsible for the overhead line maintenance, which was different from the vehicle used for track maintenance from the 5 February incident. Following the incident in February this year, the MTRCL has completed an investigation with the manufacturer and is gradually implementing enhancement measures as required by the EMSD, including actively reviewing emergency response arrangements and conducting recovery training. Learning from the previous incident, the MTRCL deployed the Rapid Response Unit to assist with handling the April incident this year.

11. In light of both incidents, the MTRCL is conducting a comprehensive review, which includes:

(a) A thorough assessment of the entire fleet of engineering trains,

covering engineering train design, maintenance, staff training, operational procedures and emergency recovery processes. Independent consultant has been invited to provide professional advice and recommendations for improvements;

(b) Formulation of contingency plans based on the specific types of incident, including the provision of repairing tools and equipment to minimise recovery time while ensuring safety, and study on the feasibility of formulating rapid response plans for scenarios where an incident may have a significant impact on train service; and

(c) Exploration of the use of technology to enhance equipment reliability.

12. Upon completing the investigation and review, the MTRCL will further implement follow-up actions and improvement measures while fully cooperating with the EMSD's special audit to ensure the MTRCL's asset management system and execution processes are robust and effective.

Conclusion

13. Although full train services on the EAL were maintained during both incidents, the MTRCL fully understands that some passengers were affected by the service adjustments. The MTRCL sincerely apologises for any inconvenience and appreciates the understanding and cooperation of passengers.

14. As the main public transport service operator in Hong Kong, it is the priority of the MTRCL to provide safe, reliable and efficient railway service. Through the comprehensive and in-depth review, the MTRCL aims to further enhance the reliability of engineering trains. Together with the ongoing large scale asset replacement work, the MTRCL will ensure that the maintenance work could meet the operational needs of the railways in future, and continue to provide the public with safe, reliable and efficient services.

MTRCL
May 2025