Investigation Report on the Mirror Concert Incident at Hong Kong Coliseum on 28 July 2022

Leisure and Cultural Services Department

November 2022

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I. Introduction

The Hong Kong Coliseum (HKC) is a multi-purpose indoor stadium which is owned by the Leisure and Cultural Services Department (LCSD). The original design of HKC is for hosting of sports tournaments and thus the arena of HKC is not equipped with any particular built-in performance stage, equipment and related installation. This is the only LCSD indoor venue with a seating capacity of over 10,000 and thus has been used for events ranging from major sports tournaments, entertainment spectacles, to pop music concerts. While the hirers will have to make their own installation each time, this also allows flexible staging design and seating configurations for the best outcome of the events.

2. As the hirer decides on the design and installation of the stage, it is the hirer's responsibility to ensure the installations are safe and sound. Moreover, the hirer is required to ensure the compliance with all applicable laws and the Terms and Conditions of Hire by himself, his servants, agents, sponsors, co-presenters, contractors, sub-contractors, and all other persons admitted to the hired area. This has been clearly spelt out in the Terms and Conditions of Hire that the hirer had agreed to comply with when signing the confirmed booking form. As a safeguard to ensure the safety of the installations, hirers are also required to engage qualified professional persons to supervise the erection, installation, rigging or suspension of any structure and/or equipment as well as Authorised Persons to confirm that the installations are sound and safe upon completion of the set-up under the Terms and Conditions of Hire of HKC. Generally, Authorised Persons refer to registered professionals and in practice hirers have all along engaged registered professionals to confirm the installations are safe and sound. Such practice is also consistent with those adopted in many works projects such as building construction, infrastructure projects and other event venues, under which the hirer/contractor has to ensure the building work and installation are properly checked and certified by some registered professionals. The delineation of responsibility is clear. The Government will hold the hirers / contractors /

sub-contractors / the registered professionals responsible. For hiring of HKC, LCSD will check the report signed by the Authorised Persons to confirm that the listed stage set-up / installation items (with quantities) which had been proposed by the hirer in the proposed arrangements for use of the unit were covered in the report before allowing the event to proceed. This hiring mechanism has been well-established, well recognized in the industry and working effectively for almost four decades since the opening of HKC in 1983.

II. The Mirror Concert Incident

3. The MIRROR.WE.ARE Live Concert 2022 (Mirror Concert) was originally scheduled to be held in HKC with a total of 12 shows from 25 July 2022 to 6 August 2022. Music Nation Productions Company Limited was the hirer for HKC and the concert was co-presented by Music Nation Productions Company Limited and Makerville Company Limited. Engineering Impact Limited was the main production contractor of the concert on engineering aspect, with Hip Hing Loong Stage Engineering Co., Ltd. being the sub-contractor responsible for the mechanical installations including the LED panels. United Technical Services Ltd. was responsible for certifying site inspection report.

4. Prior to the show, LCSD had received the set of forms, certificates, permits, as well as design plans from the hirer as required under the Terms and Conditions of Hire.

5. The main production contractor Engineering Impact Limited had engaged United Technical Services Ltd. to inspect the site and issued an inspection report to confirm that the installations were in good working condition. LCSD had checked the inspection report to confirm the listed stage set-up/installation items (with quantities) which had been proposed by the hirer in the proposed arrangements for use of the hired area were covered by the report before allowing the concert to proceed.

6. At around 2235 hours on 28 July 2022, an accident happened on the fourth show of Mirror Concert where a giant LED panel fell and hit two dancers during the performance. One dancer was critically injured and remains in hospital.

7. The fallen LED panel was one of the six panels which were suspended above the main stage. These panels as designed were each suspended from a winch system that was mounted onto a sub-frame with a motor-controlled swivel system attached to a mother truss installed to the roof truss system of HKC. The suspension system of

the LED panels as installed allowed lifting, lowering and swiveling of the LED panels which could be executed by pre-programmed controller to add visual effects during the performance. The LED wall (moving), signifying the LED panel, had been covered in the inspection report which was certified as being "in good working condition" by an Authorised Person who was a registered professional of United Technical Services Ltd.

8. According to the video clips taken by the audience, the LED panels were being lifted slowly upward immediately before the accident, and all of a sudden, the suspension wire rope on one side of the LED panel in question failed. The LED panel which was then still being suspended by the other suspension wire rope started to fall and swing downward around this other suspension wire rope mounting point of the panel. However, when the subject panel had swung by approximately 45° or so, the remaining suspension of the subject panel also failed, allowing the panel which kept swinging under its inertia to fall towards the ground with one corner of the panel hitting the stage first after which the panel toppled sideway and laid flat on the stage. The fallen panel injured two dancers who were on the stage.

III. Task Force on Investigation of Mirror Concert Incident (The Task Force)

9. After the accident, the Government immediately instructed the concert to be suspended until the stage set-up was proved to be safe and suspended all activities underneath the suspending appliances on the stage until the risk of hitting by a falling object was eliminated. As HKC is owned by LCSD, the Government also announced the setting up of a Task Force (the Task Force) by LCSD to investigate the cause of accident and devise improvement measures to prevent similar incidents in future. Apart from the Task Force, the Hong Kong Police Force (the Police) and Labour Department (LD) also conducted their respective investigation to look into potential criminal liability and possible breach of the Occupational Safety and Health Ordinance in the accident. Subsequently, the organizer of Mirror Concert announced the cancellation of the remaining eight concerts from 29 July to 6 August.

10. The Task Force was led by an Assistant Director of LCSD. It comprised representatives of LCSD, LD, Electrical and Mechanical Services Department (EMSD) and a specialist nominated by the Mechanical, Marine, Naval Architecture and Chemical Division of Hong Kong Institution of Engineers. To expedite the investigation, LCSD hired an expert who has good knowledge and experience in incident investigation related to structural and mechanical installation as expert advisor (Expert Advisor) to assist in conducting the investigation. The membership list is at Annex. The terms of reference of the Task Force are as follows:

(a) To investigate and find out the cause of the accident; and

(b) To formulate recommendations to prevent recurrence of incident of similar nature.

11. The Task Force had held nine meetings from August to November 2022 to study and discuss the findings of numerous on-site and laboratory examinations of the fallen LED panel, stage equipment and related installation, and the quality and tensile

strength of wire ropes and eyebolts of LED panels with a view to finding the causes of the incident and formulating recommendations to prevent recurrence of incident of similar nature.

IV. Findings of the Task Force

12. The Task Force has completed the investigation on the cause of the accident as detailed in paragraphs 13 to 22 below. In sum, the findings indicated that the suspension wire rope broke due to its rapid deterioration as a result of accelerated metal fatigue. Metal fatigue is the combined consequence of inferior condition of wire rope as installed, problematic loading data which led to insufficient safety factor of suspension wire rope, inadequacy of design consideration and poor workmanship on assembly and installation of LED suspension system.

13. Based on the findings of the Task Force, the Government considered that some of the requirements in the Terms and Conditions of Hire for HKC were found not fully complied with by the hirer and/or its contractor(s) and sub-contractor(s), namely –

a) Clause 15(b)(2) stipulates that the hirer should provide full and accurate details of the proposed arrangement for the use of the hired area and shall include a plan showing the position and weight of any structure or equipment to be rigged or otherwise however suspended from the roof space frame.

   It was considered that the hirer had not complied with Clause 15(b)(2) as the weight of equipment submitted by hirer and/or its contractor(s), such as the LED panel, was found not accurate, which gave an inflated safety factor of suspension wire rope hanging LED panels.

b) Clause 16(d) stipulates that upon completion the erection, installation, rigging and/or suspension of any structure or equipment, appropriate qualified professional person(s) engaged by the hirer should certify to LCSD in writing that the structures and/or equipment so erected, installed, rigged and/or suspended have been erected, installed, rigged and/or suspended in a proper and workman-like manner; and in accordance with the accepted

standard of the trade; and are otherwise sound and safe and that the set-up for each and every such rigging or suspension, should there be any, has been inspected by him including but not limited to any Authorised Person(s) appointed by him.

It was considered that the hirer had not complied with Clause 16(d) as the investigation revealed that the rope guard of the winch system was found not installed and/or assembled in a proper and workman-like manner and the falling of the LED panel proved the installations were not "sound and safe", which indicated that there might not have been proper on-site supervision.

LCSD has referred the findings to the Police for further investigation.

A) Findings in the Technical Investigation

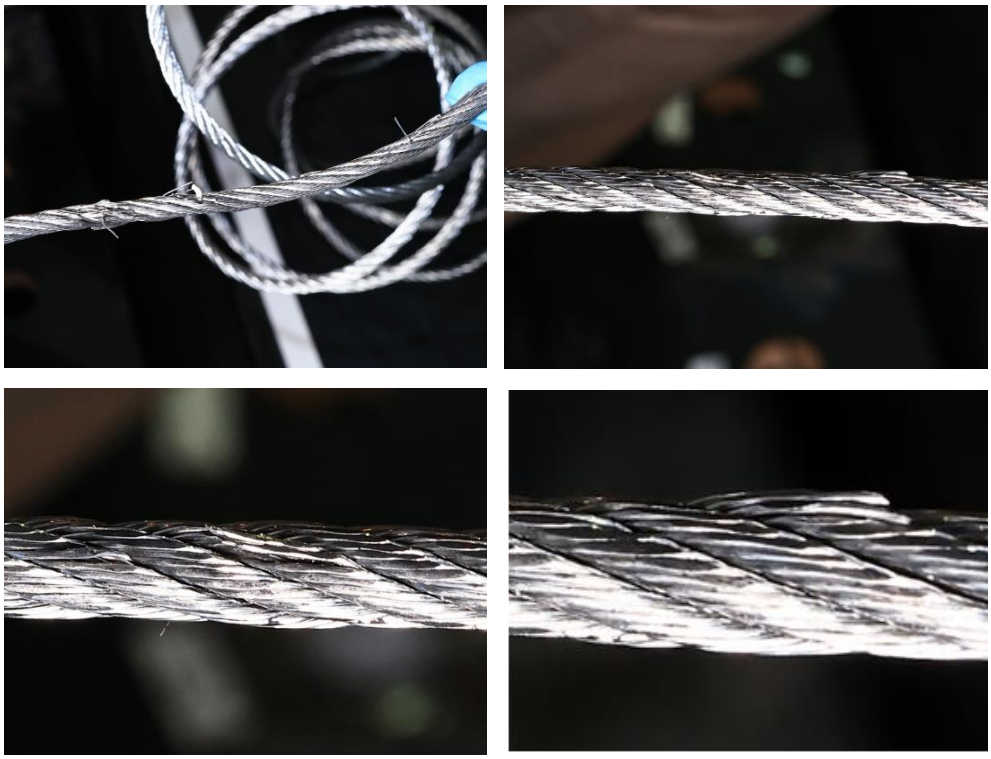
14. The investigation identified that the accident had been triggered when one of the two suspension wire ropes of the LED panel had broken. The pair of ropes was suspended from a winch system with grooved drum with the aid of a pair of spooling guide rollers assisting the sitting of the ropes into the grooves during spooling.

15. The suspension wire rope broke due to its rapid deterioration as a result of accelerated metal fatigue (which could be technically expressed as low cycle fatigue) of some wires forming the rope, that is, fatigue cracking developed rapidly after limited cycles of operation and the suspension wire rope failed after it had been in service for a short period. The accelerated fatigue failure was attributed to a combination of the following factors, which contributed to the reduction of fatigue resistance of the suspension wire rope:

15.1 Inferior Conditions of Wire Rope

(a) The broken suspension wire rope was fabricated from 6 strands of wires around a fibre core, with each strand of wires fabricated from 19 steel wires, and of right hand regular lay (i.e., a wire rope of 6x19 fibre core construction, which is normally designated as 6x19 fibre core wire rope). Its nominal diameter was 5 mm;

(b) The condition of the broken rope was examined along its length using a binocular microscope. Many wire breaks with broken ends of wire as well as short lengths of fibre protruding from the rope were found;



(c) Seven short pieces of broken wires (one exhibiting tensile overload feature and the remaining with comparatively flat fracture surface) were selected and cut out from the broken wire rope, and were examined in a Scanning Electron Microscope (SEM) to characterise their mode of failure. It was observed that apart from the one piece that exhibited cup and cone ductile overload fracture surface by which dimple like features were observed under the SEM, signs of fatigue striations were observed on the facture surfaces of the remaining 6 pieces of wires which exhibited comparatively flat fracture ends. The findings confirmed that the wire rope had deteriorated to some extent by the formation of fatigue cracks, and the final failure occurred with the remaining wires of the suspension rope not being able to cope with the service stress induced, i.e., the mode of failure was metal fatigue; and

(d) Tensile test as per BS EN12385-1 was carried out on the length of wire rope that had not been subject to the service load from the LED panel (i.e., the redundant length along the dead end beyond the rope grip of the suspension

rope tied to the eyebolt that broke away from the frame of the LED panel). The breaking strength of the rope was tested to be around 1100 kgf, which was lower than the minimum breaking strength of ropes of similar construction (6x19 fibre core wire rope of 5 mm nominal diameter) commonly available in the market.

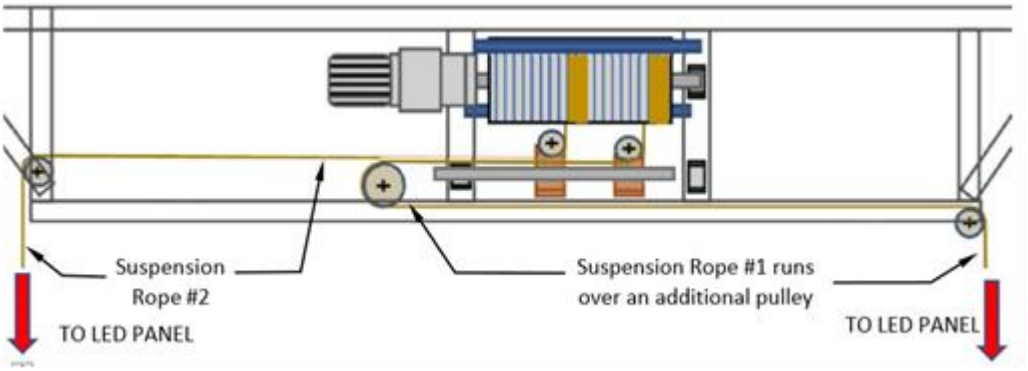
15.2 Problematic Loading Data led to Insufficient Safety Factor of Suspension Wire Rope

The LED panels were weighed during their removal from the stage. The weights of each of the 6 panels ranged from 490 - 530 kg (all measurement rounded to the nearest 10 kg), and the weight of the fallen panel was measured to be 520 kg. Based on the strength as determined from the tensile test of redundant lengths of suspension wire ropes that had not been subject to any service load as installed in the suspension system of the LED panel, and on the assumption that the two suspension wire ropes equally shared the load, the suspension rope as installed yielded a safety factor of about 4.2 whereas the safety factor commonly adopted in the trade as per International/National Standards governing such installations on performance stage is 8 - 10. The reduced safety factor in place meant that the ropes were more susceptible to fatigue failure as the fatigue resistance of the ropes was reduced with the higher actual load to rope breaking strength ratio.

15.3 Damage to Wire Rope Induced by Winch System

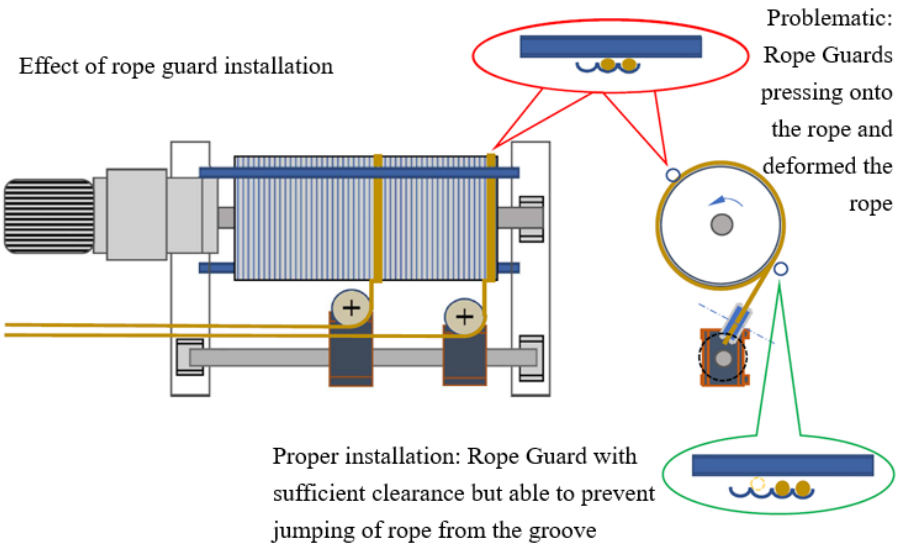
(a) The winch for suspending the LED panel was fitted with an AC Servo Motor, and its output shaft was connected through a planetary reducer gear box to the grooved winch drum which accommodated the pair of suspension wire ropes for lifting each LED panel. The winch was designed in a manner that one of the two suspension wire ropes made an additional 180° turn at an additional pulley so that both of the ropes were spooled onto the grooved

winch drum under the guidance of a pair of spooling guide rollers which moved in the same direction along a worm gear which was driven through a driving chain linked to the motor of the winch.



(b) A pair of rope guards was installed diagonally across the winch drum to prevent the ropes from jumping out from the grooves of the winch drum during spooling or unspooling. The rope guards were fabricated from spindles which as manufactured could be rotated freely if they had not been excessively tightened to the frame of the winch.

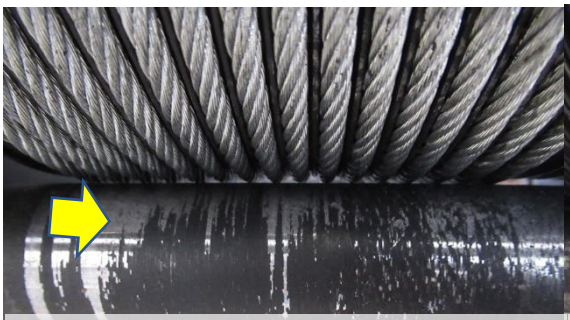
(c) It was found that almost all of the rope guards could not be rotated freely as they had been overtightened to the frame of the winches whereas by slightly releasing the bolts at the two ends of the rope guards, the rope guards became free to rotate. As a result, the rope guard(s) as installed not only resisted the free movement of the rope during the spooling action of the winch, and hence induced extra load and stress onto the rope during the spooling action, but also caused excess wearing and crushing to individual wires forming the rope and disordering of rope lay all of which seriously affected the integrity of the rope. These types of damage led to repeated plastic deformation of the rope and lowering load carrying capacity of the rope, and when worked in combination with increased loads imposed on the suspension wire rope, the fatigue resistance of the rope was enormously reduced.



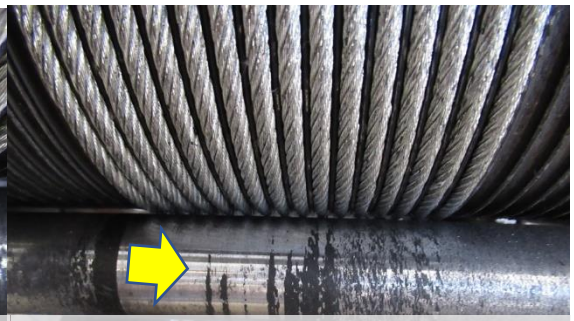
(d) The extent of wearing could be best revealed from the extent of paint coating removal on the rope guards. On the rope guards of the winch suspending the fallen LED panel, the extent of paint coating removal was found to be rather severe, with the coating almost completely removed on one of the rope guards.

Rope guard with clearance, paint coating remained more or less intact

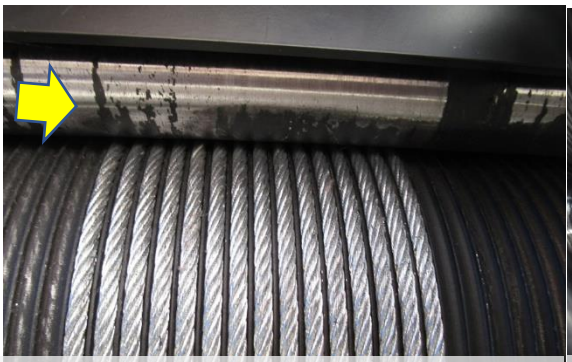
Rope guard with minimal clearance, paint coating on the guard was scratched off



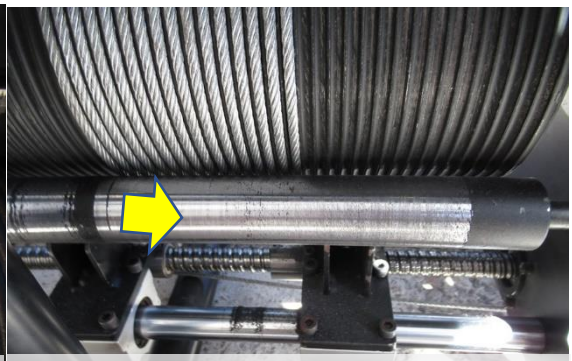
Rope guard with minimal clearance, paint coating on the guard was scratched off



Rope guard with almost no clearance, paint coating on the guard was severely scratched off



Rope guard with no clearance, paint coating almost fully scratched off



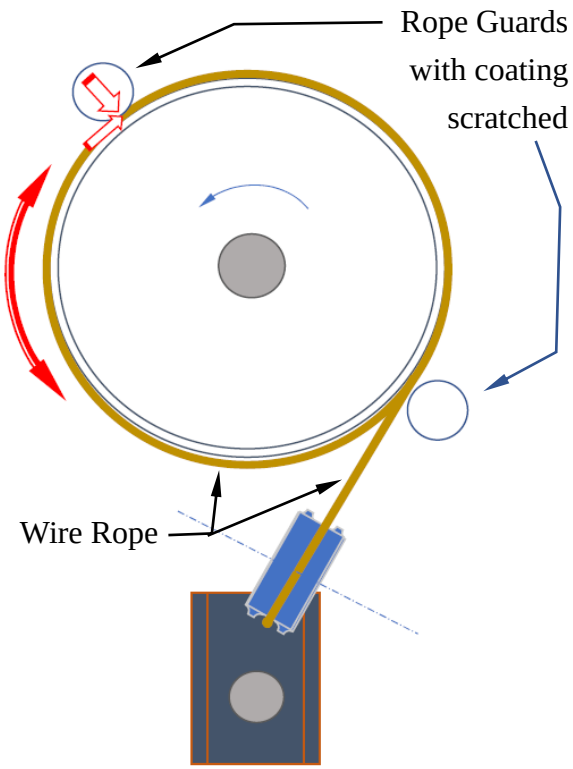
Rope guard with no clearance, paint coating almost fully scratched off

(e) The effects of rope guard(s) onto the rope are summarised in the following diagram.

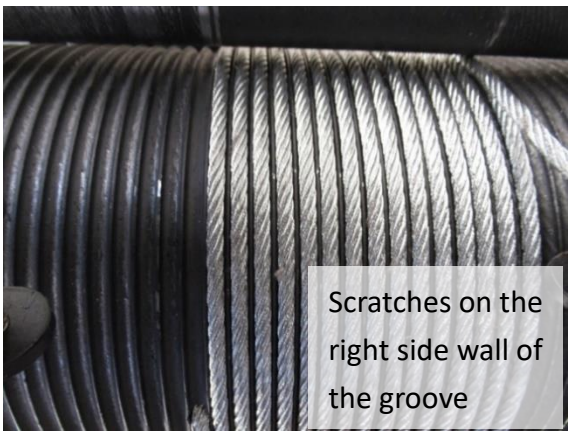
i. The rope guard would press against the rope and this would deform the rope. The rope lay would become disordered.

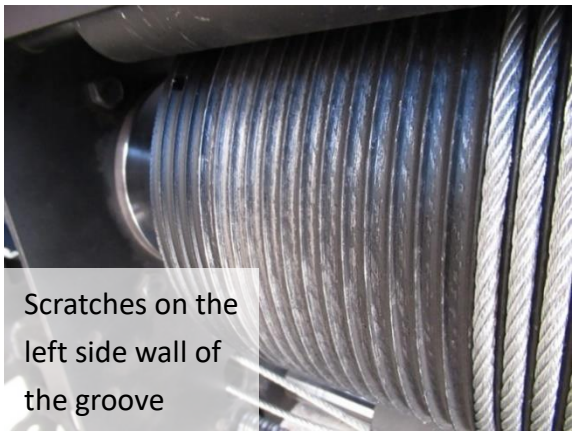
ii. Significant wearing and crushing of the rope would occur as the rope was pulled across the rope guard, with worn powder formed acting as abrasive to further accelerate the wearing.

iii. Additional stress would be induced on the rope as the rope guard would be preventing movement of the rope.

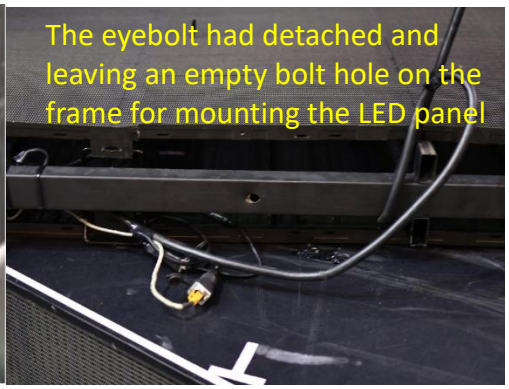


(f) Signs of scratching along the edges and walls of successive grooves on some of the winches were observed. Additional damage to the rope in the form of rope twist was induced by the slightly misaligned spooling guide rollers of the winch that further increased the stress imposed on the suspension wire ropes, and hence further reduced the fatigue resistance of the rope.

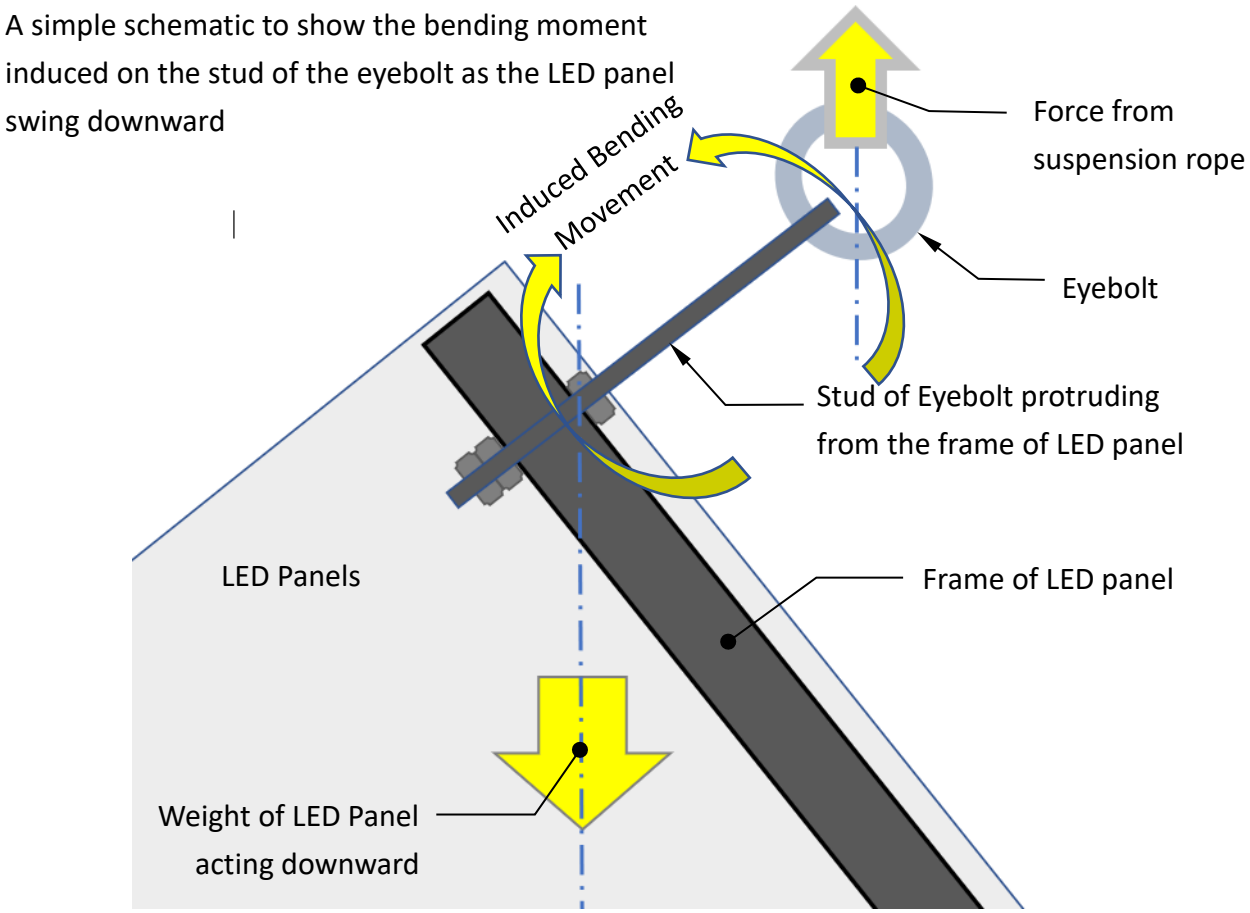




16. The investigation also revealed that after the failure of one of the suspension ropes, although the LED panel was still being suspended by the second wire rope, the eyebolt which was bolted onto the frame of the LED panel for tying the suspension rope broke.

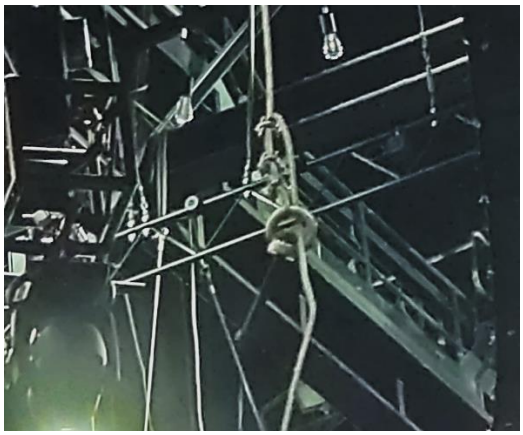


16.1 The eyebolt was found fabricated by welding a M14 eye to a M12 steel stud for tying of suspension wire rope without the use of any turnbuckle to facilitate levelling adjustment of the LED panel. As such, the levelling adjustment was achieved by adjusting the protruded length of the eyebolt and as a result significant length of the steel stud could protrude from the frame after levelling adjustment. The eyebolt was found inserted into a bolt hole on the frame of the LED panel with a nut at the top and two nuts at the bottom. There were no signs of washer in place at the tightened joint to help spread the load and maintain the tightness of the joint but a reinforcing plate was found welded to the bottom part of the frame around the bolt hole. While the upper and lower nuts which were in contact with the frame could serve to hold the bolt in place, the lowest nut could be used as a lock nut to ensure that the bottom nut would not come loose. However, the fixing method of the eyebolt is prone to loosening by untwisting action imposed by the wire rope if any rope twist had been developed by any means in the suspension wire rope, especially if the lock nut was not sufficiently tightened.



16.2 A total of 3 samples of the stud of the eyebolt, including the eyebolt from the broken suspension wire rope of the fallen LED panel were tested. The tensile strength of these studs were determined to be 840 MPa, 865 MPa, 846MPa which suggests that these studs were likely to be of Grade 8.8 (required minimum tensile strength of M12 Grade 8.8 bolt/stud is 830 MPa). No abnormality was observed in the breaking mode of these studs.

16.3 After one of the suspension wire ropes failed and the LED panel swung by about 45°, very high bending moment was then acting onto the stud of the eyebolt. The resulting tensile stress induced by the bending moment exceeded the tensile strength of the stud and this led to the failure of the eyebolt.



B). **<u>The Causes of the Incident</u>**

17. In gist, although documentary proof as required in the Terms and Conditions of Hire for HKC had been submitted with certification by Authorised Person, the requirements of the Terms and Conditions of Hire for HKC were found not fully complied with by the hirer and/or its contractor(s) and sub-contractor(s). The unsafe installation of the panel is the main cause of the Mirror Concert incident. The underlying reasons are the combined consequence of inferior condition of wire rope as installed, problematic loading data which led to insufficient safety factor of suspension wire rope, inadequacy of design consideration and poor workmanship on assembly and installation of LED suspension system. The evidence shows that the LED panel had fallen under its own weight when one of the two suspension ropes was not able to withstand the load that it was carrying, which was about 260 kgf, being half the weight of the LED panel. After the failure of the first suspension rope, the eyebolt which tied onto the second suspension rope to the frame of LED panel also broke and thus allowing the LED panel to fall.

18. The suspension system of the LED panel as installed yielded a safety factor of around 4.2, i.e., the breaking strength of the rope was about 4.2 times of the load that the wire rope was carrying at the time of the accident. However, the wire rope was unable to withstand the load because some wires of the suspension wire rope had failed progressively by metal fatigue, and thus substantially reduced the load carrying capacity

of the rope.

19. In the current case, the evidence shows that a number of factors that would reduce the fatigue life of the wire rope were present. The ropes in use were of inferior condition with wide spread of damage found even on ropes that had not been subject to service load from the current installation. In fact, the actual load imposed on the wire rope was higher than 260 kgf due to the additional resisting load from the barely rotating rope guard(s) and the creation of rope twist, as well as the increased stress due to bending action of the rope when the rope repeatedly ran over pulley system all of which were induced during spooling of the rope onto the winch drum (increased stress level and stress amplitude). The ropes had also sustained further damage in terms of wearing, deformation, crushing, and disordering of rope lay as the ropes were again being pressed by the rope guards that barely rotate while in service.

20. For the eyebolt, tensile strength testing revealed that the eyebolt in use should have been able to support the load of the LED panel when it was being lifted upward along the direction of the stud. However, the way the eyebolt being mounted to the frame was such that one may leave a long length of stud protruding from the frame, after having made levelling adjustment to the LED panel as no turnbuckle was installed for such adjustment. A simple bending moment analysis revealed that with a long length of the stud (140 mm) protruded from the frame of the LED panel, a high bending moment was created onto the eyebolt when the LED panel was suspended only by one suspension point. As a result, the eyebolt had been subjected to extreme bending stress that exceeded its tensile strength when the LED panel was lifted simply by one eyebolt with the LED Panel at about 45° to the horizontal. Therefore, the eyebolt which was tied to the second suspension wire rope broke and led to the falling of the LED panel at the time of the accident.

21. For the load table, the weight of the LED panel was wrongly reported (500 lbf vs 500 kgf). If assuming that the original design was based on 500 lbf, which is equivalent to 227 kgf, this could then meet a widely acceptable safety factor in the international/national standards for suspension systems with performers underneath

with safety factor of 8 - 10. Nevertheless, as the actual weight of the LED panel was 520 kgf, the corresponding safety factor was significantly reduced to 4.2, and did not even meet the safety factor that one would like to adopt for a suspension system while no one is allowed to stay under the suspended load.

22. Another factor that played a significant role leading to this incident was the workmanship related to the manufacturing/installation of the winch system. The positioning and operation of rope guard as well as the alignment of the spooling guide roller of the winch system as installed also contributed to the occurrence of the incident.

V. Enhancement Measures

23. During the course of the investigation, LCSD has imposed on the hirers three interim measures at its performance venues from 2 August 2022, pending the completion of the investigation of the Mirror Concert incident, namely:

(a) Hirers are required to revisit and enhance the safety of the stage design and their brought-in mechanical devices and to ensure the safety of all working staff, performers and persons attending the venue;

(b) Use of suspended mechanical devices involving swinging, rotation or carrying of persons will be temporarily ceased; and

(c) Hirers must conduct daily inspection of the mechanical devices mentioned in (a) by a competent person approved by LCSD to assure safe working.

24. The responsibility of ensuring structural integrity of the stage set-up and upholding the safety of performers and audiences rests with the hirers. They should continue to ensure good performances of themselves and all parties engaged by them including their agents, contractors and sub-contractors while protecting the safety of performers and audience. LCSD will further revise the Terms and Conditions of Hire in consultation with the trade to tighten the mechanism to enhance the safety of the performances to be staged in the venue and ensure that the hirers have fulfilled their responsibilities under the Terms and Conditions of Hire.

25. The Task Force has studied the cause of the incident and recommended a series of enhancement measures with a view to strengthening the Terms and Conditions of Hire to ensure safety for performance events, and to prevent similar incident in future. In drawing up the recommendations, the Task Force has taken into account the views expressed by the relevant stakeholders of the performing industry.

26. The recommended enhancement measures are set out below:

(a) Specification of Roles in the Checking Mechanism

Hirers should specify and elaborate clearly the roles and duties of the parties engaged by them in the checking mechanism to ensure that the proposal for the use of hired area is prepared and executed in a proper manner. Qualified professional persons should vet the design and conduct regular inspection of the stage at an early stage. Daily checking and inspection of stage installations and operations should be conducted to ensure safety.

(b) Load Proof

Hirers are required to ensure that the weight of relevant brought-in structure and equipment are accurate and properly verified by the hirers' engaged registered professional(s) who will ensure the weight of these items is correct, and carry out proof load test for all motional or elevating machinery. The relevant documentary proof should be provided to LCSD.

(c) Quality Proof

Hirers are required to submit to LCSD the Mill Test Certificates for steel wire ropes as quality proof as well as test certificate for all lifting appliances and gear. For brought-in propriety items, the product catalogues listing their compliance with international safety standard are required for the verification by the hirers' engaged registered professionals.

(d) Auditing

LCSD will study the feasibility of introducing a third party independent auditor with the relevant expertise, possibly on a selective basis, to conduct

audit of the work and installation set up by the hirers.

(e) Rehearsal

Hirers should conduct rehearsal well before the first performance to minimize the chance of accidents on stage. Briefings on details of relevant stage installation and machinery should be given to working staff and performers.

(f) Enforcement and Indemnity

LCSD will introduce proper mechanism against breaches of the Terms and Conditions of Hire for these LCSD venues. Actions and/or penalties may be imposed on hirers who seriously or repeatedly breach the Terms and Conditions. Serious breaches involving public safety, casualties or any violation of the law may result in termination of booking by LCSD, and may affect the priority accorded to the hirer in future booking applications for LCSD venues. Specific proposals for the enforcement mechanism will be refined after taking into account the views of the industry stakeholders. Their aim is to ensure hirers to comply with the requirements and fulfill their responsibilities under the Terms and Conditions of Hire. The enhancement measures include the increase of the amount of public liability insurance as required in the Terms and Conditions of Hire.

27. The above measures will be applied to all LCSD performance venues when hirers bring in sophisticated rigging system and mechanical device. LCSD will discuss the implementation details with the performing industry in the coming few months before the actual application of new enhancement measures in LCSD venues, and review the effectiveness of the measures with the performing industry in a year's time before finalizing them by amending the Terms and Condition of Hire. Pending the final application of the new enhancement measures, hirers will continue to be

required to follow the three interim measures adopted on 2 August 2022 (as set out in paragraph 23 above) in hiring LCSD venues, or adopt other adequate measures to safeguard the safety of performers, stage workers and audience as approved by LCSD.

28. While LCSD has completed the investigation as owner of the venue on aspects of compliance by the hirers with the Terms and Conditions of Hire, LCSD could not rule out the possibility of human mistakes in the process and any breach of Hong Kong law such as "fraud" and allows "Objects dropped from buildings" in the incident. Hence, LCSD has referred the case to the Police for further investigation. The Police and LD are currently carrying out their own investigation with power under their respective Ordinances. Depending on the outcome of their investigation, LCSD might put up more recommendations to enhance the safety of persons using its venues.

- End -

Leisure and Cultural Services Department
November 2022

Annex

Membership of Task Force

Chairman -

Mr. LEE Tsz-chun, Assistant Director (Libraries & Development), LCSD

Members -

Leisure and Cultural Services Department

Ms. Maria LAM, Chief Manager (Central Contract Unit)

Mr. Richard LEE, Technical Director (Performance Venue)

Ms. Zoe TANG, Senior Manager (Kowloon East)

Labour Department

Mr. Andrew LAI, Deputy Chief Occupational Safety Officer

Electrical and Mechanical Services Department

Ir. Leakey LAU, Chief Electrical & Mechanical Engineer (General Legislation)1

Ir. CHAU Shu-man, Chief Engineer (Municipal) (up to 16 Oct 2022)

Ir. POON Sing-yue, Ag. Chief Engineer (Municipal) (since 17 Oct 2022)

Representative from Mechanical, Marine, Naval Architecture and Chemical Division of Hong Kong Institution of Engineers

Ir. Louis SZETO Ka Sing

Secretary -

Ms. Iris LEUNG, Senior Executive Officer (Grade Management), LCSD

In attendance -

Dr. Eric LIM (Expert Advisor)