



LIFT & 電梯通訊

ESCALATOR NEWSLETTER

Feature Article

Introduction to Advanced Technologies in Lift Systems

As a vertical means of transport we use on a daily basis, lifts seem to be unrelated to innovative technology. However, its technology has been advancing throughout the years. Advanced lifts offer to its users spectacular passenger experience with enhanced efficiency and safety level. Let's explore the advanced technology of lifts nowadays from various perspectives.

Development of High-speed Lifts

With the rapid development of new technology and the increase in business demand, the height of the world's tallest building nowadays has more than doubled compared with that in the late 20th century¹. Today, the tallest building in the world is the Burj Khalifa (828 metres in height) in Dubai, which may be superseded in the future by the Jeddah Tower currently under construction in the Kingdom of Saudi Arabia with a design height of 1 000 metres. To allow quick and easy access to and from skyscrapers, engineers install ultra high-speed lifts in these buildings. The lifts of Taipei 101, the world's tallest skyscraper in the early 21st century, operate at a rated speed of 16.8 metres per second. Last year, the lifts of the Guangzhou Chow Tai Fook Finance Centre became the fastest lifts in the world with a rated speed of 21 metres per second.

To ensure the safety, reliability and comfort of ultra high-speed lifts, engineers adopt various advanced equipment for lifts, such as high power drive unit (the power of the lifts of Taipei 101 is 650 kW; that of the International Commerce Centre is 185 kW; and for ordinary lifts, it is only about several dozen kW), safety installations



The tallest building in the image above is the Guangzhou Chow Tai Fook Finance Centre

with special design (e.g. multi-stage buffer, safety gear and brake made of ceramic materials), streamlined enclosed lift car, roller guide shoe system with active control techniques for vibration cancellation, pressure active control system inside the lift car, etc. Similar to airplanes, lift cars are able to adjust pressure. However, if the lift climbs at an excessively high speed, the change of pressure outside the lift car will result in great pressure difference when the lift door opens, resulting in discomfort of passengers. In short, the speed of lifts is still limited despite of the state-of-the-art technology².

Multi-dimensional Lift System

Traditional lifts can only travel up and down along one axis. Despite the invention of double-deck lift and twin lift, which increases the number of lift cars in a lift well, lifts can still only operate along one axis. The concept of multi-dimensional lift was already adopted in certain places. For example, at some hilly areas in Italy, engineers designed a multi-dimensional transport system which combines lift and tramway technologies, so as to enable easy access for residents and travellers to various locations by saving the time to climb the hills



A multi-dimensional transport system that combines lift and tramway technologies

¹ Hollister N. and Wood A. (2012), "The 20 tallest in 2020: entering the era of the megatall", Elevator World, March 2012, pp. 38-44

² So A. and Chan R. (2016), "How fast could the fastest elevators be?", Elevator World, February 2016, pp. 120-127

on foot. Since modern buildings are taller and more magnificent, we may need to integrate skyscrapers into the public transport system to enhance the effectiveness in transportation in the near future, thus calling for the development of two-dimensional or even three-dimensional lift system. Few years ago, a German company designed a magnetic levitation lift which can travel vertically and horizontally inside a building, allowing users to travel inside the building conveniently.

Digital Technology for Lift Maintenance

In the past few years, lift manufacturers across the globe have been introducing digital technology to enhance lift maintenance service, so as to enhance the safety level of lifts. The examples of adopting digital technology for lift maintenance are as follows:

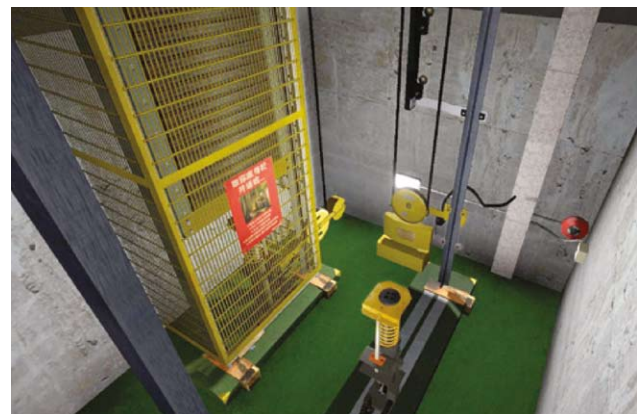
1. Store lift operation data in cloud systems and leverage big data analytics to predict the need to replace different parts and formulate maintenance cycle with high accuracy.
2. Lift engineering personnel will use a notebook computer, tablet or smartphone to handle work process and read data of the parts during maintenance. They may even use mixed reality glasses to identify different parts and look into their conditions, so as to better understand the maintenance conditions of the lifts.
3. Provide immersive safety training to engineering personnel through virtual reality training software which simulates the working environment for lift maintenance to enhance their understanding of various maintenance procedures and awareness of incident prevention.

The flexible application of digital technology will usher in a new era of lift maintenance with higher professionalism and reliability. 🔄

International Association of Elevator Engineers (HK-China Branch)



A magnetic levitation lift designed by a German company



Simulated lift well of a virtual reality training software

News -in- Brief

Virtual Reality Training System in Lift Works Safety Recognized at "Hong Kong ICT Awards 2020"

We are honoured to announce that the "Simulation System of Virtual Reality Training in Lift Works Safety" jointly developed by the Electrical and Mechanical Services Department (the EMSD), the Lift and Escalator Contractors Association and the Vocational Training Council was awarded the Smart Business (Solution for Business and Public Sector Enterprise) Certificate of Merit in the Hong Kong ICT Awards 2020 organised by the Hong Kong Computer Society.

The Simulation System makes reference to the working environment of general lift maintenance works and simulates lift incidents that are difficult to re-enact in real life, providing immersive experience to trainees to raise their awareness of preventing similar incidents. With its new form of learning, the Simulation System not only allows trainees to learn in a safe environment with enhanced learning efficiency, but also facilitates the introduction of the lift and escalator industry to young people, thereby attracting new blood to the industry. 🔄



Smart Business (Solution for Business and Public Sector Enterprise) Certificate of Merit awarded in the Hong Kong ICT Awards 2020



Pictured are the development team and Mrs CARRIE YAU TSANG Ka-lai, the Chairperson of the Judging Panel, at the award ceremony on 28 October 2020.

Stepping up Inspection of Aged Lifts



To enhance the safety of aged lifts so as to further safeguard public safety, the EMSD has, since mid-2018, allocated additional resources to step up inspection of aged lifts. As of August 2020, more than 32 000 inspections were conducted, during which the vast majority of the aged lifts were found in normal operation and in compliance with safety requirements. Besides, some matters relating to the quality of lift maintenance were also identified. More than 3 000 advisory letters were issued to the responsible persons (RPs) and contractors for the lifts, drawing their attention to related matters and follow-ups. Below are the three most commonly seen problems:

(1) Traces of rust / excessive lubricant residue or dust on the surface of the suspension ropes



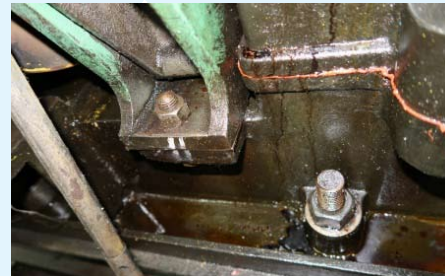
Suspension ropes are the components used to suspend the lift car. Their working condition directly affects the safety of the lift and its users. Traces of rust / excessive lubricant residue or dust on the surface of the suspension ropes may affect their normal operation and obstruct the work of lift workers in examining their condition, making it difficult for them to determine if maintenance or replacement work is required.

(2) Traces of rust / excessive dust on the surface of the overspeed governor and/or its ropes



The overspeed governor, together with its ropes, is one of the key protection means of the lift. If the suspension ropes of the lift break accidentally (which is extremely rare), causing the lift car to fall, the overspeed governor will detect the overspeed of the lift and activate its safety gear to stop the car. Traces of rust / excessive dust on the surface of the overspeed governor and/or its ropes may affect their normal operation and obstruct the work of lift workers in examining their condition, making it difficult for them to determine if maintenance or replacement work is required.

(3) Lubricant leakage from the gearbox



The driving machine of an aged lift is generally equipped with a gearbox, which is used to adjust the rotational speed and traction of the traction sheave for lift car movement. A large amount of lubricant is needed for cooling and lubrication of the gear assemblies of the gearbox. If lubricant leaks from the gearbox due to ageing of the gaskets which results in a lack of lubricant in the gearbox, the gear assemblies may get overheated and even worn out abnormally, thus affecting the safe operation of the lift. Also, if the leaked lubricant accumulates on the floor of the machine room, lift workers may be exposed to the risk of slipping.

During the inspections, the EMSD also identified a number of situations which might indirectly affect the safety of lifts or lift workers. These include:

- concrete spalling or water seepage in the lift machine room/shaft;
- accumulation of waste water or garbage at the bottom of the lift pit;
- faulty lighting in the lift machine room/shaft;
- storage of miscellaneous items in the lift machine room; and
- lack of proper protection devices for rotating parts and machinery in the lift machine room.



accumulation of waste water or garbage at the bottom of the lift pit



concrete spalling in the lift machine room

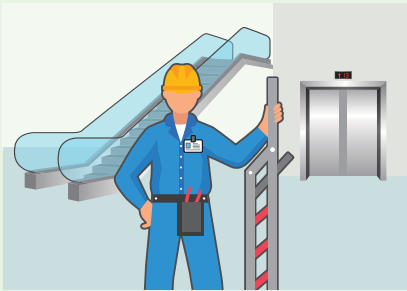
According to the Lifts and Escalators Ordinance (the Ordinance), it is the duty of the RP for a lift, including the owner / property manager of the lift, to ensure that the lift and all its associated equipment or machinery are kept in a proper state of repair and in safe working order. To this end, the RP for a lift shall ensure that the maintenance work is properly completed by the contractors. The EMSD recommends that the RP for the lift should supervise all relevant works carried out by the contractors and to maintain close and effective two-way communication with the contractors so that both parties are fully aware of the lift condition and capable of addressing all safety issues and potential hazards as early as possible, thereby ensuring the safety of lift users. 🔄

News **-in-** Brief

Recognition of Vocational and Professional Qualifications in the Lift and Escalator Industry

In October 2019, the EMSD together with representatives of the lift and escalator industry, including the Lift and Escalator Contractors Association, the Registered Elevator and Escalator Contractors Association Limited and the Hong Kong General Union of Lift and Escalator Employees, and the Vocational Training Council reached a consensus on setting up the Task Force on Recognition of Vocational and Professional Qualifications in the Lift and Escalator Industry. The Task Force aims to explore the establishment of skill-based vocational and professional qualifications under the Hong Kong Qualifications Framework (HKQF) so as to provide registered lift/escalator workers with a clear career progression path, thereby promoting healthy development of the industry.

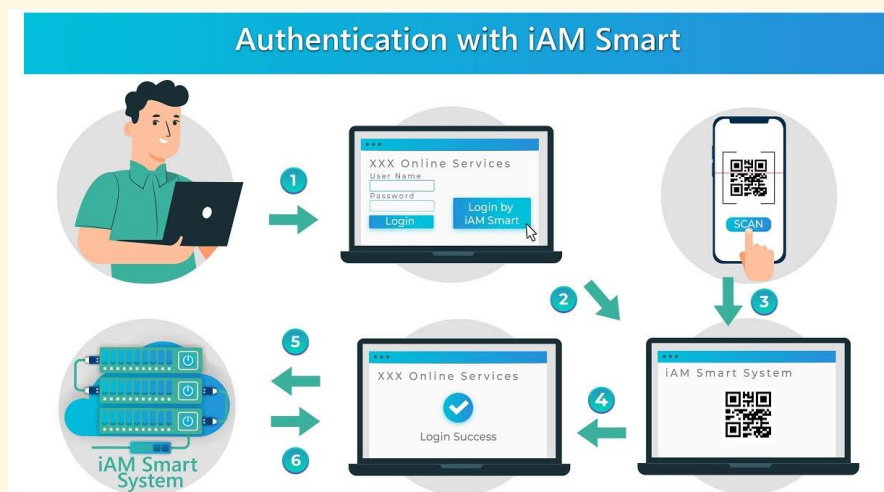
Tentatively entitled "Lift Master", the professional qualifications in the pipeline will provide a non-



academic pathway for registered lift/escalator workers to achieve professional recognition in the industry and under the HKQF through dedicated vocational and professional education and relevant working experience. Under the prevailing QF system in Hong Kong, the qualification level of "Lift Master" will be at Level 5 (QF5), showcasing the high professionalism of the lift and escalator industry.

A dedicated team on the development of the vocational and professional education programme has finalised the framework and syllabus of the programme. The initial decision is to adopt a two-year part-time mode of study, coupled with a credit accumulation system and a combination of both theoretical knowledge and practical skills to nurture talent for the industry. The Task Force plans to apply to relevant government departments for programme approval in 2021, with the target of launching the programme in 2022. 🔄

Use of iAM Smart for Online Submission of Forms



The Hong Kong Government will provide iAM Smart account for all Hong Kong residents free of charge, enabling them to use a single digital identity and authentication to conduct government and commercial transactions online. Upon successful registration, iAM Smart account will be bound to the personal mobile device of the applicant. Users can make use of the biometric functions (including facial recognition, fingerprint identification, etc.) provided by their personal mobile devices to authenticate their identities and log in to online services. iAM Smart will also support digital signing with legal backing under the Electronic Transactions Ordinance (Cap. 553) for handling statutory documents.

RP for lifts and escalators and trade practitioners are required to submit forms specified under the Ordinance

timely for approval by the EMSD. To facilitate their submission of forms, the EMSD has set up an online platform for submission of some commonly used electronic forms. In order to optimise the online submission process, the EMSD is now preparing for the introduction of iAM Smart to the process. Upon commencement of the service, registered iAM Smart users can log in to the online platform just by choosing to log in via iAM Smart on the relevant website, and then scanning the QR code of the website using the iAM Smart application on their mobile devices. Users can also authorise iAM Smart via their mobile devices to send the enrolled personal data to the online platform, fill in the forms automatically and perform digital signing, thus making the form submission process more convenient and efficient. The service is expected to be launched in the first half of 2021. 🔄

News -in- Brief

Use a Lift When Travelling with Bulky Items

In daily life, there are occasionally cases in which people travelling with bulky items, such as suitcases, handcars, strollers, etc., choose to use escalators for the sake of expediency and saving time from detouring to lifts. As you may be aware, using escalators when travelling with bulky items may cause accidents easily. Below are some examples illustrating the risks of such behaviour.

When a passenger with bulky item arrives at an escalator exit, it may be difficult for him/her to lift the item immediately because of the uneven floor and the considerable size and weight of the item. He/she may block the way of the passengers behind, resulting in congestion or even collision. Furthermore, it is rather difficult for a passenger travelling with bulky item to keep his balance on the escalator. If the escalator breaks down or stops suddenly in case of emergency, the passenger will slip and fall easily, or even loosen his/her grip on the item, causing it to fall and thus affecting other passengers. The

consequences could be dire. Besides, parts of bulky items such as strollers may get stuck with escalator components, leading to malfunction of and damage to escalators. In fact, such accidents happen every now and then. The EMSD has always attached great importance to public safety. Passengers are therefore advised to use lifts instead of escalators when travelling with bulky items to ensure safety.

To further promote safe use of escalators, the EMSD launched a new series of Announcements in the Public Interest (APIs) on TV and radio and posters in March 2020, encouraging passengers to use lifts when travelling with bulky items and reminding them of the safety tips for travelling on escalators. The TV APIs can be viewed on the EMSD YouTube channel.

<https://www.youtube.com/watch?v=B9cNPI2aO24>



An accident in which a stroller got stuck with an escalator component



New TV API launched by the EMSD in 2020



New promotional posters launched by the EMSD in 2020

Feedback

Your comments and suggestions, whether on editorial style or contents, are most welcome. Tell us how we can improve and make the Lift and Escalator Newsletter a truly informative and interesting publication for you. The Lift and Escalator Newsletter is available on our website at <http://www.emsd.gov.hk>.

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