
升降機現代化工程的安全風險管理

二零二零年十一月二日

日立電梯工程(香港)有限公司

品質保證部 經理

蕭沛鋒

- 升降機是高樓大廈不可或缺的一部分
- 透過升降機現代化工程更換或整改升降機，可大大改善升降機的安全性、舒適度以及能源效益
- 與其他工程項目一樣，升降機現代化工程涉及施工安全風險，有機會發生意外
- 升降機工程承辦商須針對風險，制訂並實踐對策，改善施工安全，避免意外



升降機工程的嚴重意外

職安警示

- 意外日期：2017年11月
- 意外地點：一個樓宇建築地盤
- 摘要：一名工人於一個樓宇建築地盤的共同升降機槽內進行升降機工程時，被夾於升降機的對重裝置與工字樑結構之間。該工人腿部嚴重受傷，並於翌日去世。

職安安全及健康部
Occupational Safety and Health Branch
勞工處
Labour Department

職安警示
在豎槽內被夾斃

1. 意外日期：2017年11月
2. 意外地點：一個樓宇建築地盤
3. 意外摘要：
一名工人於一個樓宇建築地盤的共同升降機槽內進行升降機工程時，被夾於升降機的對重裝置與工字樑結構之間，該工人腿部嚴重受傷，並於翌日去世。
4. 給承建商／僱主的職安警示：
為確保工人／僱員在升降機槽內工作的安全，承建商／僱主須提供及維持一個安全工作系統。該系統應包括，但不限於以下各項：
 - 委任合資格人士就有關工作進行針對性的風險評估，在充分考慮將要執行的工作的性質及其工作環境所涉及的影響後，找出所有涉嫌與該工作有關的潛在危害，尤其針對沒有設置適當間隔，但有多部升降機已安裝於同一豎槽內的情況；
 - 根據風險評估的結果，制定符合相關工作守則、業界指引、認可的安全標準及升降機製造商的規格／指示的安全施工方案及程序；

墮困豎槽2小時 維修工搶救24小時後不治 (2017年11月10日)



升降機維修技工昨晚被困2小時後被救出送院。(資料圖片)

(來源：on.cc)

職安警示

- 意外日期：2019年10月
- 意外地點：一個建築地盤
- 摘要：一名升降機工人在升降機槽底進行升降機安裝工作時，被升降機機廂壓斃。



職安
被下降的升降機

1. 意外日期：2019年10月

2. 意外地點：一個建築地盤

3. 意外摘要：
一名升降機工人在升降機槽內機廂壓斃。

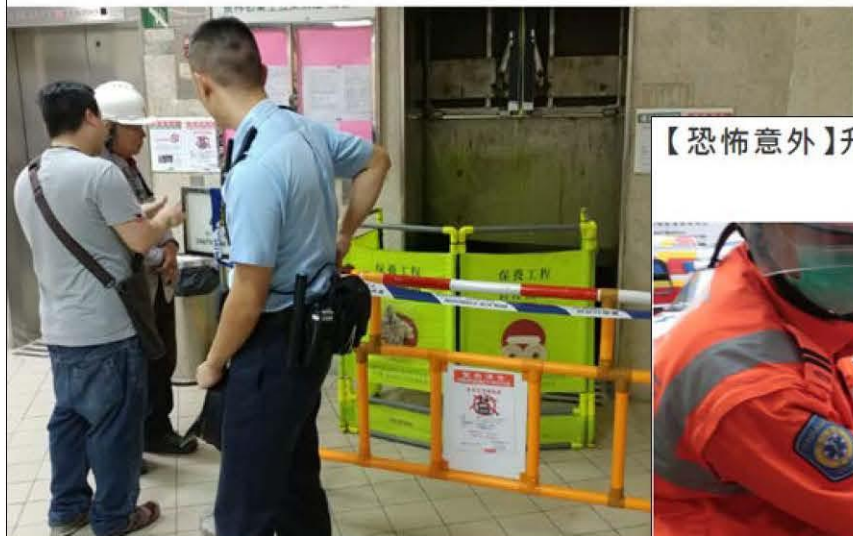
4. 給承建商／僱主的職安警示：
為確保從事任何升降機安裝工作的工人／僱員的安全，負責該等工作的承建商／僱主應提供及維持安全工作系統，該系統應包括，但不限於以下各項：

- 委任合資格人士進行針對性的風險評估，在充分考慮將會進行的工作的性質、工作地點、工作環境及升降機機廂可能會移動的情況下，找出所有與升降機安裝工作有關的潛在危害。
- 根據風險評估的結果，制定符合相關的工作守則、業界指引、認可的國際標準及升降機製造商的規格／指示的安全施工方案及程序。
- 確保工作已妥善計劃，並在有需要時實施工作許可證制度。
- 確保升降機機廂已適當及安全地懸掛或支撐，以防止其意外

(來源：hk01)

升降機工程的嚴重意外

升降機維修工被壓傷 留院近半月後不治(2017年11月15日)



(來源：hk01)

(來源：hk01)

【恐怖意外】升降機突上升 維修工被夾雙腳凌空 送院不治
(2018年2月24日)



- 升降機工程的**致命**工業意外主要涉及人體被移動的升降機機廂或對重砣夾住



(來源：appledaily)



(來源：takungpao)

升降機工程的主要危害

- 人體被夾住
- 肢體捲入活動部件
- 物件從高處下墮擊中工人
- 人體由高空墮下
- 觸電
- 火警

- 肢體捲入活動部件



- 物件從高處下墮擊中工人



- 人體由高空墮下



升降機工程的主要危害

- 升降機現代化工程的施工位置大部分是佔用中的樓宇，有大量居民出入
- 工程團隊在規劃及施工時亦必須考慮工程對居民及途人的潛在風險



升降機現代化工程的 安全風險管理措施

- **保障居民及途人安全**

- 在工程範圍之圍板外張貼相關資訊及告示
- 在切實可行的情況下時刻關上圍板之閘門，避免工程影響居民及途人
- 加強巡查，迅速糾正影響居民及途人的狀況



- 嚴格執行掛牌上鎖制度
 - 工程人員在工作時必須在切實可行的情況下截斷電源，並實施掛牌上鎖
 - 在進行升降機工程時原則上禁止帶電工作
 - 避免升降機突然運行或工程人員觸及帶電部分
 - 防止人體被夾、肢體捲入活動部件或觸電



- 使用吊船進行升降機整改

- 以往使用金屬棚架工作涉及攀爬及騎棚動作，有較大人體及物料下墮風險
- 使用吊船可確保工人在安全的平台上工作
- 吊船以電力升降，裝有合規格的圍欄及踢腳板，設有各種安全裝置，以及有更大空間進行工作及放置工具，大大減少下墮風險



- 上下幅對開式井道閘門

- 閘門分上下幅開啟，可讓工程人員在取出井道獨立救生繩時保持下幅閘門關閉，避免工程人員曝露在人體下墮風險，同時避免物料下墮
- 可讓工程人員靈活選擇需要開啟的部分，避免在物料運送或安裝門框時需要同時打開所有閘門，造成大面積的下墮空間。



- **佩戴長袖口防割手套**

- 在拆除舊升降機時，部件之間的鋒利部份會外露
- 安排工程人員使用長袖口防割手套，減低遭割傷的風險



- 妥善遮蓋地面上的孔洞
 - 在機房地面孔洞上釘上木板遮蓋，並貼上警示膠紙及警告字句
 - 減低物料跌入井道風險



- 提供充足的錨固點
 - 在有人體下墮風險的工作位置設置充足的錨固點，供工程人員連接防墮裝備
 - 防止人體下墮



- 在工作位置設置工業用防水插座箱
 - 設置工業用防水插座箱 (IP67) 為電工具提供電力
 - 確保電工具以正確、安全的方式取得電力
 - 防止觸電



- 為工程人員提供對講機
 - 確保在不同位置工作的工程人員有良好的溝通，避免因溝通上的障礙或誤會釀成意外



• 嚴格執行工作許可證制度

- 確保工人在每日工作前識別工作內容的危害以及相應對策
- 確保工人清楚工作團隊的人員分佈，防止缺乏通訊以及在井道內上下同時作業等危險情況

EMDI P09/2012 Annex B (Part 1 of 2)

自立電梯
二在許可證 (井道機櫃內工作)
Permit to Work (Work inside lift shaft)

許可證號碼: W/201001/10 01/01

第一部份
Contract No. 合約編號: 20159590
W.O. No. 工作單編號:
Project 工程項目: 升降機優化工程 湖月 CH
Work Details 工作內容: 升降機機櫃

Company 公司: 昇平
Permit valid from 許可證時間由: 9:00
Date 日期: 10/9/2020
Hours to 至: 12:00

Potential risks of injuries removed 潛在危害已移除

山下項目如適用: 請勾選
 沒有適用, 請勾選
 Falling Objects 物件從高處下墜
 Fall of Person 人員從高處下墜
 Insufficient Lighting 燈光不足
 Electric Shock 觸電
 Simultaneous working by different parties (e.g. workers contractors) at two separate levels within the lift shaft 不同人士(例如工人、承建商)在升降機機櫃內兩個不同層面同時工作
 Other - Please specify 請註明

Precaution taken 安全措施已提供:

Work platforms/Metal-Scissor lifting with valid CSRR-Form 合格的W/OB 裝點工作平台
請註明該項有資格
 Independent lifelines fixed to suitable anchorage point 繫扣於合適穩固點上的獨立救生繩
 Full body harness with fall arrestor 全身式安全帶連防墜器
 Guardrail/Toe-board/Safety net 開口圍欄/腳部防墜網
 Safety helmet/Gloves/Eye-goggles/Ear plug 安全帽/手套/眼鏡/耳塞
 Warning signs 警告牌
 Portable lighting device 手提燈光設備
 Proper electrical insulation and earth bonding 良好絕緣及接地
 Prominent display of work permit 於工作地點顯眼處張貼工作許可證
 Catch latches 吊鉤閉鎖

Please specify first aid kit location 請註明急救箱位置: 架步
 Please specify the fire extinguisher location 請註明滅火筒位置: 架步, 早給, 机房
 Other - Please specify 其他: 請註明:

- **指差呼稱**

- 透過用手指指向目標和高聲確定各重要工序處於安全狀態
- 提升員工的精神狀態及注意力
- 加強員工在工作時的警覺性和增加行動準確性
- 開掣、關掣、郁機.....



HITACHI
Inspire the Next

Title: Safety Forum 2020 for Works Contracts and Property Management Services Contracts

Super Safety Forum 2020 for Works Contracts
and Property Management Services Contracts
2 November 2020

VO: Here is the footage from
“Safety Forum 2020 for Works Contracts and Property Management Services Contracts”
which was held on 2 November 2020

Super Mr. Siu Pui Fung, Manager of
Hitachi Elevator Engineering Company (Hong Kong) Limited
Topic: “Risk Management of Lift Modernization Works”

VO: The Speaker is
Mr. Siu Pui Fung, Manager of Hitachi Elevator Engineering Company (Hong Kong) Limited
His presentation topic is “Risk Management of Lift Modernization Works”

Mr. Siu: First of all, thanks to the Housing Authority(HA)
for giving us the chance today to share our insights and experiences on safety
My surname is Siu, and I am a representative from Hitachi Elevator
In the 21st century
lifts are an indispensable part of tall buildings and skyscrapers
Some lifts might have aged, but through lift modernization
we can enhance their safety, comfort and energy efficiency

Like other engineering works
lift modernisation involves some works safety risks
accidents are possible
As a lift contractor, we have devised some strategies addressing these risks
in order to improve safety and prevent accidents
We have to know the risks involved in lift engineering works

We can firstly review some serious accidents related to lift works
One of them happened in November 2017 at a site in Tsim Sha Tsui

a worker had his leg trapped between the counterweight
and an I-beam inside the lift shaft
His leg was injured and unluckily died the next day after he was saved
The other incident happened in October 2019 at a site in Tuen Mun
where a worker was trapped to death by a moving lift car

while installing the lift inside the lift shaft
Apart from installation works
accidents have also happened during maintenance
One case happened in November 2017
while inspecting the lift pit on the ground-floor lobby
the worker was trapped to death by a suddenly moving lift car
Another maintenance worker was also trapped to death by a moving lift car
while he was checking and repairing a lift
Let us take a look at these drawings
Actually, the deadliest cause in lift works is
when the human body is trapped by a moving lift car or a counterweight
You can take a look at these drawings from newspaper cuttings
In addition, there are also other hazards in lift works

The main hazard, apart from getting trapped
is having a limb trapped inside a moving part
While working inside the lift shaft
objects or tools could fall from height and hit the worker
Also, some working at height is involved in lift works
so there is also a risk of falling from height
Lift works also involve electricity and hence electrical shocks
Hot works are often carried out in the lift shaft
for example welding works, which can cause fire
We need to devise strategies to prevent these accidents
Let us take a look at how these accidents happened
Please watch these videos first
They were about how human limbs can be trapped inside moving parts
This worker was doing some lift maintenance work
but he missed some steps in his work
such as switching off the lift in the foremost
He came into contact with some moving parts while working
as you saw in the video, it was the sheave
If a passenger unknowingly pressed for the lift outside
then the lift would move and trap the worker's hand
and his hand was injured
Another hazard is falling objects, which could hit the workers
From this video, you can see
a worker was working in the lift machine room
and there was a lot of gravel beside him
There were also some holes on the floor of the lift machine room
The lift suspension ropes and electric wires run through the holes
If these holes are not covered properly
and if we do not pay attention, tools and loose items could fall inside the shaft
and hit the workers working inside
Other situations could happen inside the lift shaft
A worker stepped on a platform plank that was not fixed properly
and the plank suddenly moved, so he fell to the bottom of the pit
This could lead to serious injury or death
In terms of lift modernisation works, we have even more factors to consider

This is because lift modernization
usually occur inside a building that is already in use
Residents and tenants pass in and out regularly
So, at planning and construction stages
engineering team has to consider the potential risks the project poses to residents and passers-
by

Let us see what safety management measures can be adopted
for a lift modernization project
First, we have to protect the safety of residents and passers-by
so we will post notices with relevant information within the works area
informing passers-by and residents of what they should pay attention to
when they pass by the site
Whenever possible, we keep the gate of the barriers closed

to prevent our work from affecting residents and passers-by
Under these circumstances, we will also assign more staff to conduct inspections
If we find that we are affecting passers-by or residents adversely
We will correct it as soon as possible
Also, we follow the lockout tagout procedure strictly

In principle, our workers must turn off the power during work so they are not allowed to carry out live work
After turning off the power, we require our colleagues to complete the lockout tagout procedure
This lockout tagout procedure can prevent the lift from suddenly powering on or operating suddenly
Lockout tagout can also prevent workers from being trapped or having their limbs trapped by moving parts or electrocuted
We now use gondolas to carry out alteration works
In the past, workers had to climb or sit on the metal scaffolding which involved a risk of falling from height or falling objects
Using gondolas in our alteration works ensures that workers have a safe working platform to work on
Gondolas are elevated electrically with proper fences and toe boards as well as all sorts of safety switches
There is more space for work and for placing our tools so they reduce the risk of falling from height and falling objects
Let us look at this picture on the right
There are gangways where you get on or off the gondola
This is different from scaffold which we had to climb
Also, when carrying out lift alterations we use a vertical biparting gate for the lift shaft
If a worker needs to take out the independent lifeline from inside the lift shaft he/she does not need to open the gate completely
This reduces the risk of workers falling from height and it also prevents objects from falling down
This was a photo of one of our colleagues collecting the independent lifeline hanging inside the lift shaft
He chose to open only the top half of the gate and let the bottom half remain closed
This reduces the risk of falling from height and falling objects
Furthermore, while altering a lift or when carrying out lift modernisation we usually need to dismantle and remove the old lift
The dismantling process poses a high risk to our workers who could get cut by the pieces and components
So, for our workers who are in charge of dismantling we provide long-sleeved cut-resistant gloves that comply with EN388 standards to reduce the risk of being cut while doing dismantling work
Also, we cover the holes on the floor of the machine room
As you can see here
There were wooden planks on top of the holes and they were secured using screws
There were also stickers and warnings on top to remind workers of the risks of falling
We provided enough anchorage points in this place where there was a risk of falling from height
These points allowed workers to anchor the lanyard of their safety harness which helped to prevent falling from height
We have also placed IP67 water-resistant plug-in boxes in working areas

Ensuring our workers getting appropriate power safely for their tools and also preventing electrical shock

To facilitate communication among workers
we provide a walkie-talkie for each worker to prevent accidents
caused by miscommunication or misunderstanding instructions
Aside from these measures
our company also strictly enforces a permit-to-work system
This ensures before they start their work
workers communicate to understand their work for the day
what hazards are there? What are relevant strategies?
This also gives them the opportunity to learn
which colleagues on the team are working and their positions
This prevents accidents due to a lack of communication or co-ordination
Lastly, our firm greatly commends this safety practice developed in Japan
Pointing and Calling
We use fingers to point at a target and we call out loudly
When we have to execute more important procedures
such as switching on or off, or pressing the emergency button
or turning on the power for a lift
we require our colleagues to 'point and call'
to help improve their mental concentration and focus
So, how does 'pointing and calling' work?
Put your hands on your hips, look at the target, point your finger at it
This helps you concentrate and focus
so it enhances your awareness and the accuracy of your work
and in turn, this helps reduce the likelihood of accidents
OK, it is the end of my sharing
Thank you

VO: Thank You For Watching