

升降機現代化工程 井道工作防墮措施

KASEY SHAM

二零一八年建造業之職業傷亡個案 - 按意外類別分析

資料來源：勞工處

Type of Accident 意外類別		2017 二零一七年		2018 二零一八年	
Trapped in or between objects	受困於物件之內或物件之間	147	(3)	157	(1)
Injured whilst lifting or carrying	提舉或搬運物件時受傷	724		710	
Slip, trip or fall on same level	滑倒、絆倒或在同一高度跌倒	1 086		960	
Fall of person from height	人體從高處墮下	381	(11)	347	(11)
Striking against fixed or stationary object	與固定或不動的物件碰撞	447		392	
Striking against or struck by moving object	被移動物件或與移動物件碰撞	549	(3)	493	
Stepping on object	踏在物件上	21		27	
Exposure to or contact with harmful substance	暴露於有害物質中或接觸有害物質	31		16	
Contact with electricity or electric discharge	觸電或接觸放出的電流	9		10	(1)
Trapped by collapsing or overturning object	受困於倒塌或翻側的物件	7	(3)	9	

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Injured by animal	被動物所傷	4		2	
Injured in workplace violence	於工作場所暴力事件中受傷	21		16	
Others	其他類別	132	(26)	91	(30)
TOTAL	總數	4 114	(51)	3 726	(44)

人體從高處墮下，例如：



工人從樓層槽口墮下



工人從槽內之棚架墮下

升降機井道工作

井道工作防墮措施的實行過程

計劃階段

- 與有關承辦商商討
- 制定安全計劃

施工階段

- 實施安全計劃
- 監察安全計劃的有效性

重審階段

- 制定改善方案並實行

計劃階段

編製升降機現代化工程安全計劃

1. 升降機類型
2. 工程中使用的裝置及設備
 - * 金屬棚架、導向吊船
3. 升降機機房樓層開口
4. 獨立救生繩的結構錨固裝置
5. 安全和健康培訓課程的內容、次數
6. 工作許可證制度的實施
7. 制定一份「移交清單」用以核查和記錄雙方接管升降機槽的狀況等

PLANNING



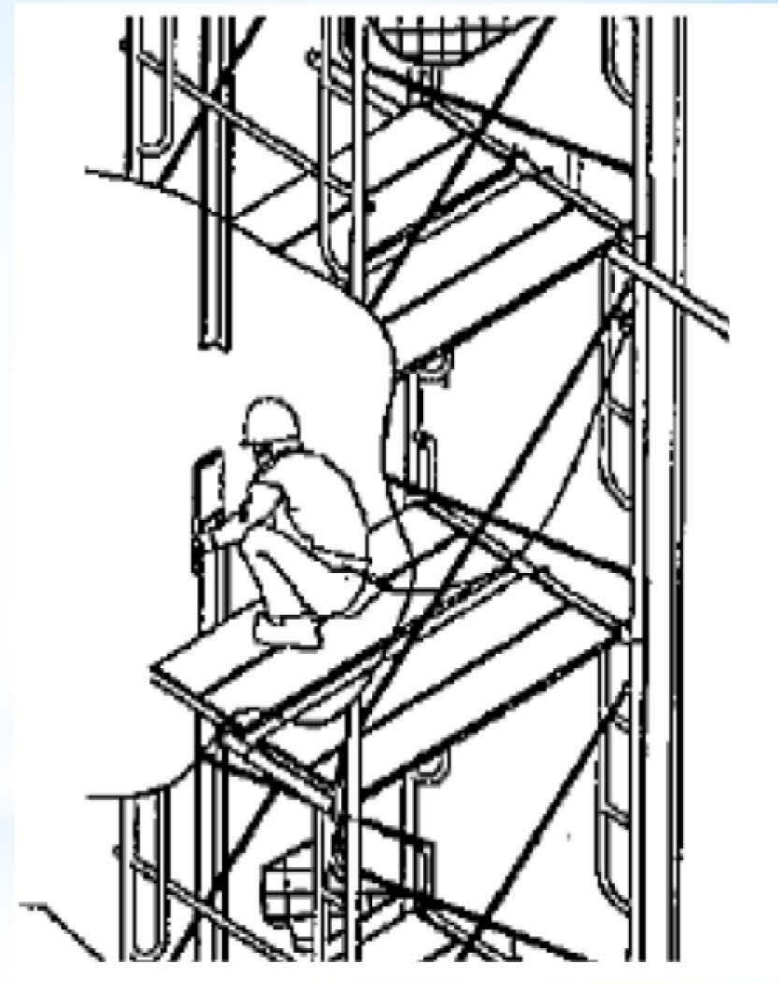
工程中使用的裝置及設備

棚架

- * 傳統安裝方法
- * 工人利用棚架在井道內上落
- * 於棚上進行安裝工作

缺點

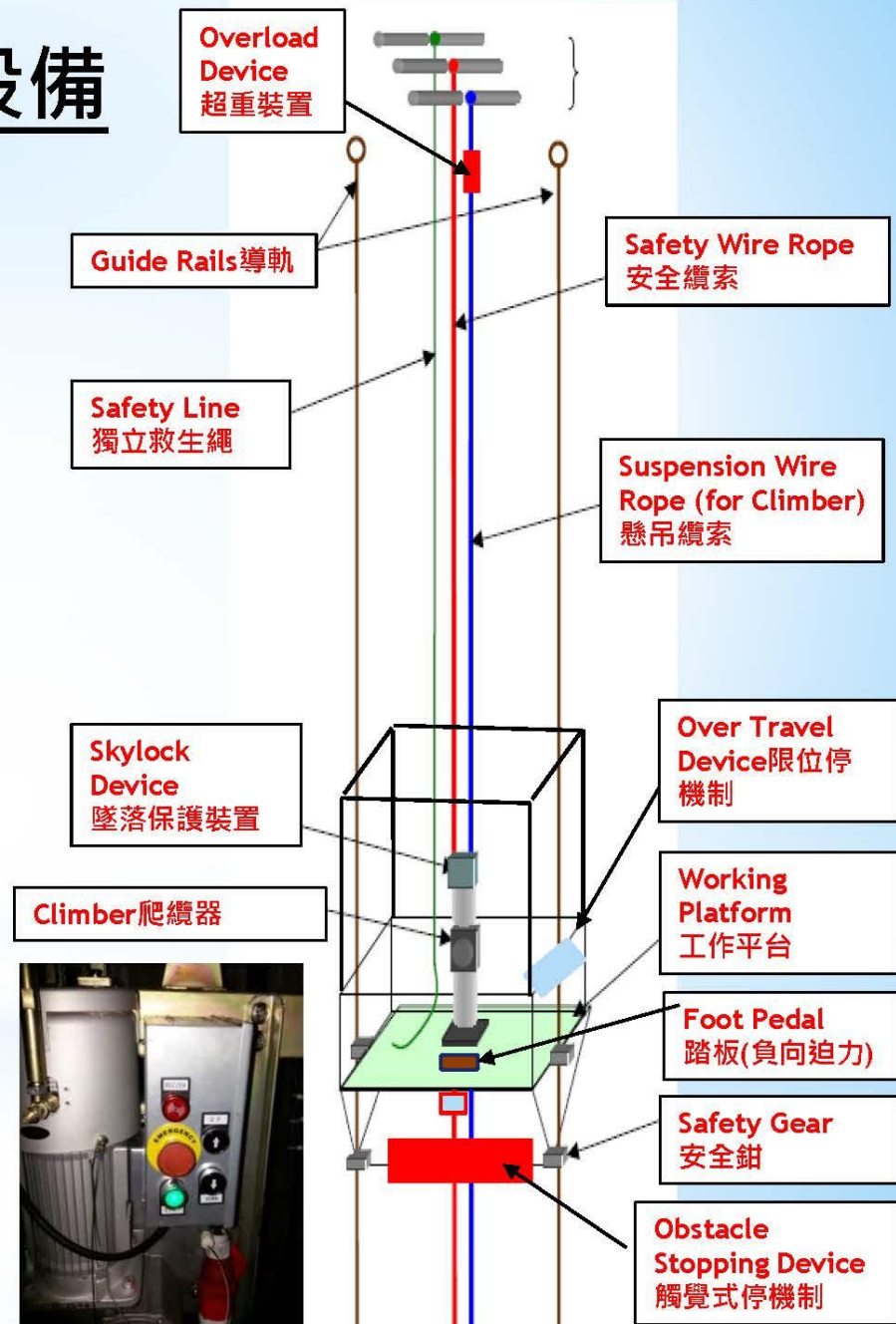
- 安裝和拆除需要額外時間
- 花費體力於棚架中移動
- 運送物料時需要拆除部分工作台
- 井道內上下同時工作
- 缺乏安全工作台的機會較大
 - e.g. 安全進出口, 圍欄, 踢腳板



工程中使用的裝置及設備

無棚安裝

- ✓ 導向吊船
- ✓ 運用動力升降接載工人及工具於井道內移動
- ✓ 於吊船上進行安裝工作
- ✓ 工作平台兩側是利用井道牆壁上的導軌來穩定吊船升降
- ✓ 導軌與安裝在平台底部的安全鉗，會提供保護
- ✓ 電動爬纜器攀附著一條由升降機機房垂下的纜 (主纜) 帶動吊船升降



工程中使用的裝置及設備

無棚安裝

- ✓ 減低發生人體下墮的機會
- ✓ 減低物料下墮的機會
- ✓ 減少工人的體力勞動
- ✓ 增加工作效率
- ✓ 提高整體安裝品質及顧客滿意度



導向吊船的安全設備

(1) 緊急停止掣

- * 當電動爬纜器控制箱的「EMERGENCY STOP」(緊急停止) 按鈕被按下或電源被切斷時，爬纜器的制動器(迫力) 就會將主纜鎖緊而將工作平台煞停。



導向吊船的安全設備

(2) 墜落保護裝置連限速

當工作平台的下降速度超出每分鐘22公尺墜落

電動爬纜器攀附著的主纜鬆脫，折斷時啟動

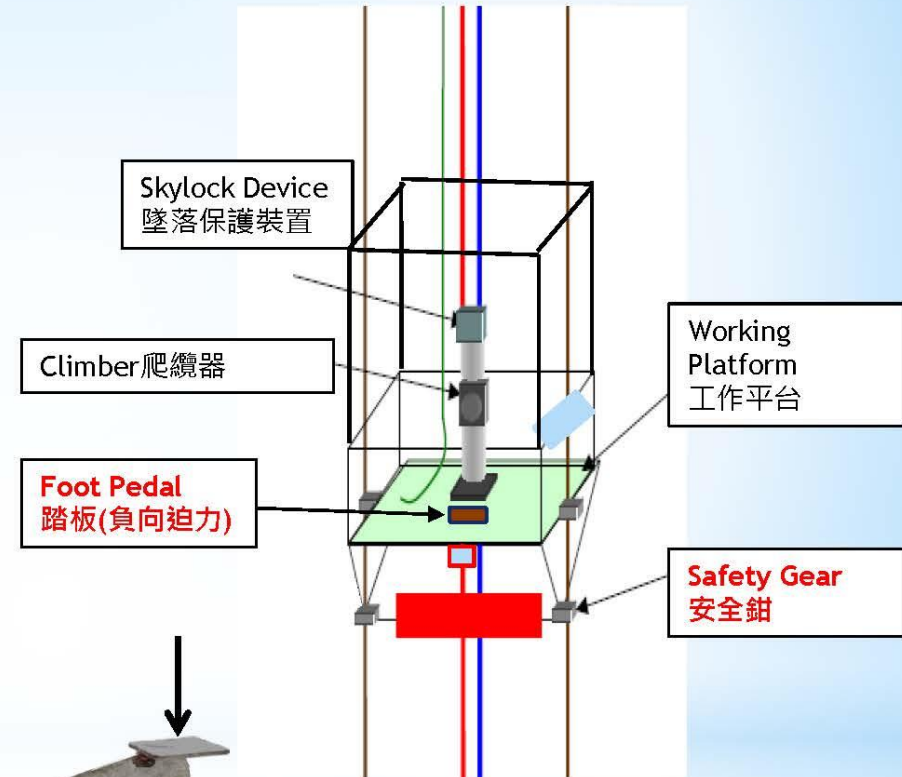
- * 啟動墜落保護裝置連限速
- * 保護裝置會即時起動將工作平台煞停
- * 可承托工作平台上的工作人員，工具及設備的總負載



導向吊船的安全設備

(3) 踏板(負向迫力)

- * 輔向迫力連接著安全鉗
- * 輔向迫力在沒有被按下時，安裝於平台底的安全鉗是處於啟動狀態
- * 安全鉗會把導軌鉗緊並保持工作平台穩定
- * 避免左右移動



導向吊船的安全設備

(4) 電器安全制

限位停機制(撞制)

當工作平台離升降機槽天花 / 頂結構不少於2公尺的位置時，及下降至槽底不少於0.5公尺位置時，便會觸及限位停機制，工作平台會立刻停止繼續上升 / 下降。



導向吊船的安全設備

(4) 電器安全制

工作平台進出口互鎖式閘門

當閘門被推開，工作平台會立刻停止運作。



導向吊船的安全設備

(4) 電器安全制

進出口邊緣底部觸覺式停機制

當工作平台向下行並觸及障礙物時工作平台會立刻停止運作。

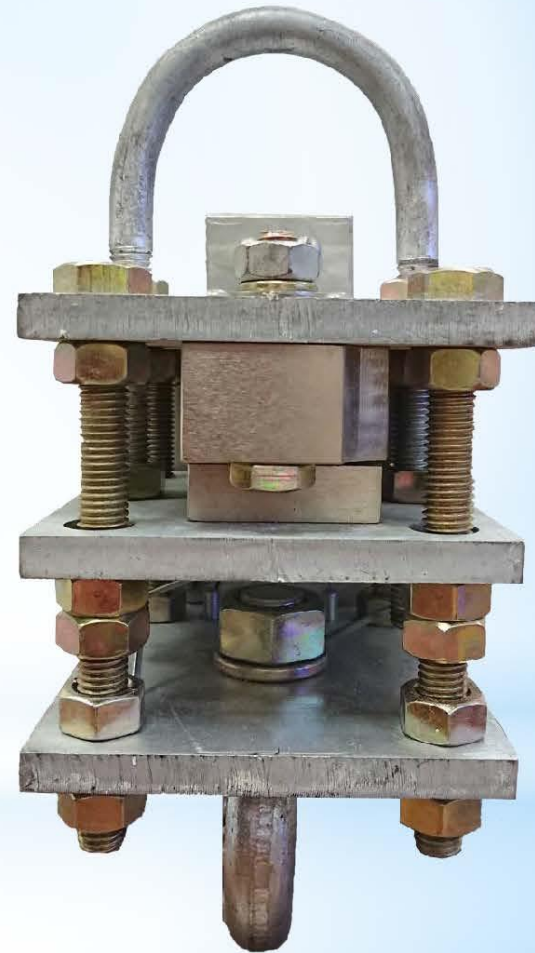


導向吊船的安全設備

(5) 超重裝置

限制實際負荷不超過安全負荷

一般以200kg ~ 350kg負荷測試



施工階段安全要點

工程管理/行政控制

每天執行工作許可證制度

- ✓ 進行施工前的危害識別
- ✓ 確保使用個人防護裝備及執行安全措施
- ✓ 避免井道內同時進行不相容的工作

繫扣於合適穩固點上的獨立救生繩

全身式安全帶連防墮器

井口圍欄 / 踢腳板 / 防墮鐵網

工作許可證 (升降機槽內工作)
Permit to Work (Work inside lift shaft)

Permit No. 許可證號碼: _____

Project 地點名稱: _____
Location 工作地點: (Lift shaft no. 升降機槽) _____ (Floor 樓層) _____
Description of work 工作性質: _____

Company 公司: _____ 日期 Date: _____
Permit valid from 許可工作由: _____ hrs. to 至: _____ hrs.

Foreseeable hazards associated with the work 可預見危害:

- Falling Objects 物料從高處下墮
- Fall of person 人體從高處下墮
- 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) 在升降機槽內兩個不同層面同時工作
- Other, please specify 其他, 請註明: _____

Safety precautions taken 安全措施:

- Suitable working platform w/valid CSSR-Form 5 檢驗合格的工作台及表格五
- Independent lifeline fixed to suitable anchorage point 繫扣於合適穩固點上的獨立救生繩
- Full body harness w/fall arrestor 全身式安全帶連防墮器
- Guardrail / Toe-board / Wire net 井口圍欄 / 踢腳板 / 防墮鐵網
- Safety helmet / Gloves / Eye-protector / Ear-protector 安全帽 / 手套 / 眼罩 / 耳塞
- Warning signs 警告牌
- Portable lighting device 燈光設備
- Proper isolation of electricity and grounding 良好絕緣及接地
- Prominent display of work permit 於工作地點張掛工作許可證
- Catch Fence 防墮物屏障
- Other, please specify 其他, 請列明: _____

Ensure that all lift shaft openings above the working level are properly fenced off and completed with wire net and toe-board

確保工作地點上方之升降機槽口, 已經圍封及裝有防墮鐵網及踢腳板

施工階段安全要點

工程管理/行政控制

法例第59AC章《工廠及工業經營(吊船)規例》

- * 每7天內經合資格的人檢查
- * 每日工作前懸吊纜索及安全纜索均經合資格的人檢查
- * 由合資格的人負責實地檢查、監督吊船的安裝及使用
- * 每六個月內經合資格檢驗員徹底檢驗
- * 每使用前的 12 個月內應經合資格檢驗員進行負荷測試及徹底檢驗

FORM 3 (Section 29(2) & (3) | 表格三 (第59A章第29(2)條及(3)條)

FACTORIES AND INDUSTRIAL UNDERTAKINGS (SUSPENDED WORKING PLATFORMS) REGULATION
CERTIFICATE OF LOAD TEST AND THOROUGH EXAMINATION OF SUSPENDED WORKING PLATFORM
 Form approved by the Commissioner for Labour for the purposes of Section 29(2) & (3) of the Factories and Industrial Undertakings (Suspended Working Platforms) Regulation

工廠及工業經營 (吊船) 規例
吊船的負荷測試及徹底檢驗證明書
 本表格乃由勞工處處長就工廠及工業經營(吊船)規例第29(2)及(3)條的需要而認可

1. Name of owner of the suspended working platform. 吊船擁有人姓名。	
2. Address of installation of the suspended working platform. 吊船的安装地址。	
3. (a) Description of suspended working platform, e.g. identification mark, mode of suspension, dimensions of platform, etc. 吊船的描述，例如識別標誌、懸吊形式、平台平台尺寸等。 (b) Date of manufacture (if ascertainable) 製造日期 (如能確定)	

FORM 1 (Section 19(1)(b) | 表格一 (第59A章第19(1)條)

FACTORIES AND INDUSTRIAL UNDERTAKINGS (SUSPENDED WORKING PLATFORMS) REGULATION
CERTIFICATE OF WEEKLY INSPECTIONS OF SUSPENDED WORKING PLATFORM
 Form approved by the Commissioner for Labour for the purposes of Section 19(1) of the Factories and Industrial Undertakings (Suspended Working Platforms) Regulation

工廠及工業經營 (吊船) 規例
吊船的每週檢查證明書
 本表格乃由勞工處處長就工廠及工業經營(吊船)規例第19(1)條的需要而認可

Description of suspended working platform and identification mark 吊船的描述及識別標誌	Date of inspection 檢查日期	Result of inspection (covering all lifting appliances and area of the working platform, counter-balance, bridle, outgrip, anchoring, supporting or fixing arrangements, all mechanical and electrical apparatus and safety devices) State whether in safe working order 檢查結果 (包括所有起重機械及裝置、工作平台、平衡系統、繩索、支線物、鎖止、支撐及固定裝置，所有機械、電氣及安全裝置。說明其否處於安全操作狀態)	Name, signature and designation of the competent person who made the inspection 進行檢查的合資格的人 姓名、簽署及職銜
(1)	(2)	(3)	(4)

At owner shall ensure that a suspended working platform is not used for carrying persons unless he has obtained a certificate of weekly inspection signed by a competent person stating that the suspended working platform is in safe working order. Otherwise, he commits an offence and is liable on conviction to a fine of \$2,000.00 and to imprisonment for 12 months.
 在未取得合資格的人簽署的每週檢查證明書，證明吊船處於安全操作狀態，擁有人及裝用該吊船載人，即屬犯罪；一經定罪，可處罰款二萬元及監禁十二個月。

施工階段安全要點

井道口全高閘門

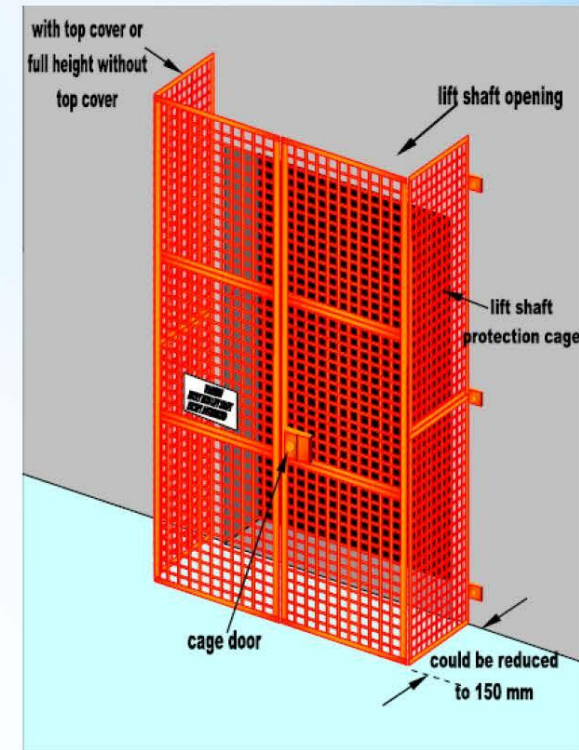
- ✓ 進出井道後須保持井道口閘門關妥鎖好
- ✓ 如工序需要拆除閘門，須加上臨時保護

獨立救生繩

- ✓ 至少三條(其中一條靠近井道口)
- ✓ 足夠長度由機房至井底

全身式安全帶

- ✓ 井道內/井道口工作都必須使用
- ✓ 將防墮扣扣於救生繩上
- ✓ 高掛低用



重審階段

- *定期進行內部及外部安全審核
- *根據結果評定安全計劃的有效性
- *制定改善方案
- *確切實行改善方案



井道工作防墮措施的實行過程



*問題一

請例舉導向吊船的其中一種安全設備。

*問題二

井道工作防墮措施的實行過程中有那4個步驟？

THANK YOU

Here is the footage of

“Safety Forum 2019 for Works Contracts and Property Services Contracts”

which was held on 3 July 2019

by the Hong Kong Housing Authority

The Speaker is

Ms. Sham Wan Yi Lift & Escalator Contractors Association

Her topic is Fall Protection in Lift Shaft Work of the Lift Modernisation

May we now invite

Miss Sham Wan Yi from Lift & Escalator Contractors Association

to share with us

Please

Hello, I am Kasey

Today, on behalf of Lift & Escalator Contractors Association

speak on the lift modernisation of fall protection in lift shaft work

First, let me share some information

According to statistics of the Labour Department

for the construction industry, in 2018

there were 3736 occupational accidents

We will mainly look at fall of person from height

Cases involving fall of person from height

made up roughly 10% of the total

Regarding fatality

11 out of 44 deaths involved fall of person from height

Compared to other accident types

fall of person from height accounted for the highest fatality rate

Thus we must take sufficient fall protection measures

Before taking preventive measures

we need to examine lift shafts

Under what conditions would a person fall?

The first circumstance occurs

when a worker falls through the lift shaft opening

This is the first circumstance

The second circumstance occurs on a scaffold

when the scaffold has a problem, workers may fall from it

Fall protection in the lift shaft

can mainly be divided into three stages

The first one is the planning stage in which

plan with the contractors to draw up a safety plan

In the working stage, implement the safety plan

In the process, monitor the effectiveness of the safety plan

Third is the final assessment

Improvement plan will be set up according to assessment data

I just said there must be a safety plan

There are multi elements in this plan

Today I will focus on equipment and facilities used at work, for example

Today I will focus on equipment and facilities used at work, for example

metal scaffolding and guided suspended working platform

I will then introduce where to fix an independent lifeline

and the execution of permit-to-work system

Finally there is a list of handover

for verification and recording the handover of shaft

There are 2 installation methods

First is metal scaffolding

This is a relatively traditional way of installation

Workers move up and down the shaft on a metal scaffold

There is a working platform on every level

Workers carry out installation work on the working platform

But there are drawbacks

It takes extra time to be installed and dismantled

Workers need to do plenty of climbing inside the shaft

That requires a lot of physical energy

Then materials need to be transported at height

Part of the working platform needs to be dismantled

After dismantling, it needs to be installed again

There is a risk of forgetting to fix some parts, such as
safe means of access and egress, guard rails, toe board, etc

That may increase workers' risk of falling inside the shaft
and the risk of falling objects

Another installation method does not involve scaffolding

A guided suspended working platform is used

to transport workers and tools up and down the shaft

Workers can do installation in the working platform

The advantage is that chances of persons falling from height are reduced

Also there is no need to dismantle the platform to transport materials

Risk of falling objects will be reduced

Workers do not need to climb

That will reduce consumption of physical energy

To ensure that the working platform is safe

there are different safety facilities on the platform

We can see overload devices, over travel device

obstacle stopping device and foot pedal

I will explain these later

Let us look at some diagrams

The 3 lines in the middle

are the main cable, safety cable and independent lifeline

The climber is attached to the main cable

When it operates, it moves the working platform along

What will happen if the main cable breaks?

When the main cable breaks, the skylock device will

support workers and weight of the tools on the platform

support workers and weight of the tools on the platform

the guide rail of the suspended working platform

is different from the conventional type

I will explain later the function of the guide rail

There are different safety facilities on the guided suspended working platform

First is the emergency stop

The stop will cut off electricity when it is switched on

The brake of the climber will lock the main cable

The working platform will be stopped

In case of emergency, use the emergency stop

The second safety device is skylock device

When the main cable breaks or is falling at high speed

The skylock device will operate to stop the working platform

Workers on the platform and the entire platform will not fall down

Workers on the platform and the entire platform will not fall down

They will stay at a safe location

Third is negative brake

The function is when a worker is on the working platform

and he needs to move the platform

He will have to step on the foot pedal

The pedal will loosen to move the platform

Conversely, when workers reach a safe location that they need to stop and work

Conversely, when workers reach a safe location that they need to stop and work

they can loosen the foot pedal, the brake will grip fast to the guide rail

to stabilize the working platform

Fourth is appliances safety switch

It is a safe electric circuit

It ensures that in case of danger

the working platform will remain stationary

There are three kinds of appliances safety switches

First is the over travel device

From the diagram

when the working platform is at a too high or too low position

it will trigger the appliances safety switch on the platform

The working platform will stop operating immediately
to avoid bumping into the ceiling or the bottom of the shaft

Second is an interlocking gate

Once the gate is opened, the working platform will stop moving

Other platforms in operation will stop operating at once

Third is the obstacle stopping device

It is installed at the base of the exit edge

When the yellow panel, that is the ground cover

is in contact with an object or a person

the obstacle stopping device will be switched on

The working platform will stop operating immediately

Finally there is the overload device

In the event of overloading

it will stop the operation of working platforms in the shaft

The safe working load of working platform inside lift shaft is 200-350 kg

I have mentioned so far the safety facilities on suspended working platforms

Next I will talk about safety measures to be paid attention to

The first is Permit-to-Work system

The implementation of Permit-to-Work system

is to understand the work procedures on the day

Hazard analysis can then be conducted

Identify the hazards

Take proper safety precautions and wear safety equipment

You can see clearly

there is a list on the Permit-to-Work certificate

Check whether there are adequate

protective equipment and safety precautions taken

All must be checked before work commencement

Secondly, check the suspended working platforms

According to the Factories & Industrial Undertakings

(Suspended Working Platforms) Regulation

Every 7 days and before work commencement

Suspended working platforms must be checked by competent persons

Second point is that before work commencement

that is, before using a suspended working platform

or every 6 and 12 months

the platforms must be checked by competent persons

That is, engineers

Working platforms need to be certified safe before use

In addition

we must pay attention to the safety of the work environment

A full height gate is required for the lift shaft opening

to separate lift workers inside the lift shaft from other workers

The second is to install an independent lifeline

For every worker in the shaft, there must be an independent lifeline

Besides, there must be full body safety harness and fall arrest clip

Hang the safety harness high when the worker works below

Make sure every safety precaution is followed

Lastly it is the final assessment

Do according to what was mentioned just now

all fall protection measures as required

Also conduct internal and external assessments and inspections

Assess the effectiveness of the safety program

Set revised improvement plans

Make sure these are implemented

The entire fall protection measure needs a safety plan

A safety plan is implemented when work is in progress

In the process, assessments and inspections are necessary

to see to the effectiveness of the safety plan

Finally draw up an improvement plan

The management system must put workers first

Care for the workers and provide a safe work environment

system and equipment for frontline workers
Guarantying work safety and minimising chances of accidents
are our targets and goals

This ends my presentation today

Thank you, Miss Shum

I know you have prepared a question for the audience

The question is about

safety facilities on suspended working platforms

Please name one of the facilities

Audience, please

That's fast

Over travel device

Correct. Over travel device is one of the safety facilities

Please applaud. Congratulations

Thank you for your answer

Our staff will give you a gift coupon

We will give Miss Sham a round of applause

Please be seated

Accident involving person falling from height

is a major cause of industrial fatality

So, we have to exhaust all means

to minimise this type of accidents

In case of accident

fall protection facilities set in place

will reduce injuries and mortality

It was mentioned just now, when you work at height

it may be on scaffolding or suspended working platforms

All measures must be taken

facilities, setups to guarantee safety

so that workers can work without worries

Thank you for watching