以風險管理及創新科技提升職安健

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31 - 7 - 2024

風險管理保平安，善用科技守職安
Harnessing Risk Management and Technologies
Safeguarding Occupational Safety and Health

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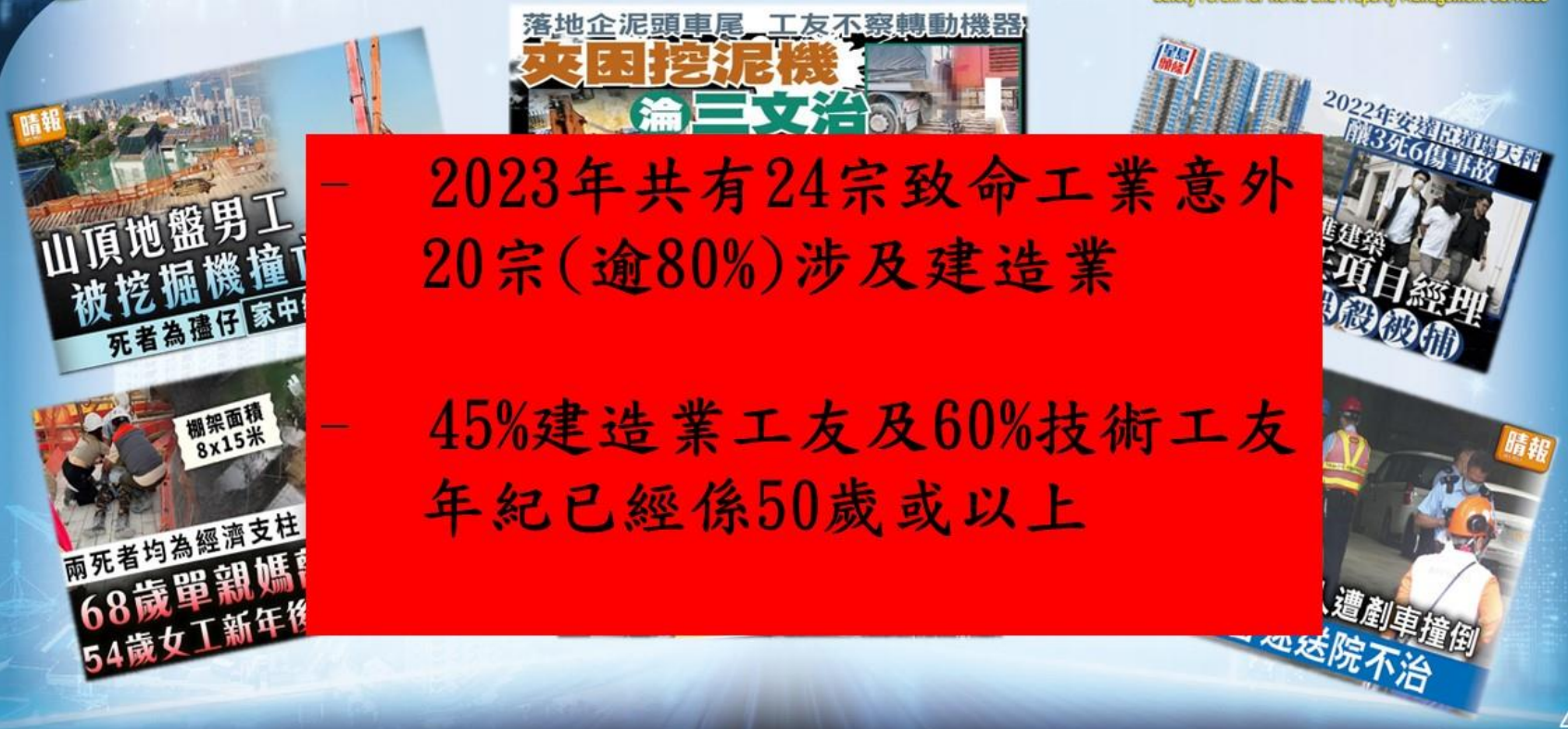
建築工地風險管理概述



- 2023年共有24宗致命工業意外20宗(逾80%)涉及建造業

- 45%建造業工友及60%技術工友年紀已經係50歲或以上

建築業出了什麼問題？

導致意外發生的主要因素

- 工地的高危環境
  - 複雜的作業流程
    - 設計沒有考慮施工安全
      - 沒有作好動態風險評估
        - 僱主、承建商、分判商、工人安全意識薄弱

工人心聲

- 做完早啲收工
- 人微言輕，冇人聽我講
- 啲裝備阻住我開工
- 天氣好熱，着住件蛤蜊衣熱死人
- 啲智能裝備我完全唔識用
- 老闆淨係識叫我快啲，又冇人手配合，一個人做幾個人嘢，顧得進度又顧唔到安全，你叫我點做
- 做咗幾十年，點會有事
- 叫得安全主任嚟做安全評估，我已經做完收工

危害識別及風險評估

2023年房委會新工程

主要意外類別	%
跌倒 / 絆倒	33
體力搬運	14
與固定物件碰撞	14
與移動物件碰撞	11
高處下墮	7
物料下墮	7

識別潛在的危害

傳統的做法 *新思維新做法*

- 透過現場巡查
- 由專業人員 、駐
  員檢視工地環境
  活動
- 識別潛在的危害因素

1) 數據分析

2) 模擬演練

3) 智能預測

管理層的行動

- 賞罰兼備的採購策略和表現監察機制
- 合約規管
- 研究、訓練和推廣
- 與工友溝通
- 安全意識灌輸

挑選最合適的承建商參與房委會工程

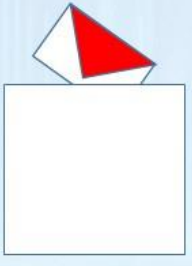
創新提議

賞

投標機會及建屋量

罰

影響投標



"主動" 安全監察機制

承建商表現評分制

房屋委員會安全稽核制度

突擊安全巡查計劃

合約規管

高於法例要求

鞏固工地嘅安全管理

優化工地嘅工作環境

提升行業嘅安全意識

安全支付計劃

鼓勵承建商達到既定安全指標

02

培育安全文化

培育安全文化

工人安全意識提升

- 安全訓練
- 危害識別
- 管理人員指導
- 創新科技

安全行為規範

- 合約規管
- 工作安全行為觀察計劃
- 巡查監察
- 獎賞及再培養

宣傳、推廣與關愛文化

- 安全講座
- 安全比賽
- 安全獎項
- 參與安全活動
- 培育關愛文化

培育安全文化 - 關愛文化

P牌及 N牌工友

P 牌

- 新入行工友

N 牌

- 富經驗而新到地盤工友

工地設施

- 防暑措施
- 休息設施
- 飲用水
- 衛生間
- 更衣室
- 淋浴設施

健康監察

- 健康計劃
- 自助健康檢查站
- 智能健康監察

培育安全文化 - 設計為“安全”文化

項目前期設計使用BIM

組裝合成建築法(MiC2.0)

機電裝備合成法(MiMEP)

運用BIM研究施工安全

於2025年推出
第三版

03

應對風險的
合約優化措施及創新科技

合約優化措施

風險

- 高處下墮

- 物料下墮

- 搬運

緩解措施

加強臨時工程管理

利用導向吊船安裝升降機

全面應用金屬棚架

創新科技 - 減少工地工序

風險

- 跌倒 / 絆倒

- 搬運

- 暑熱 / 極端天氣

緩解措施

廠房施工

場外預製

組裝合成法

創新科技 - 減少工地工序

風險

- 高處下墮

- 物料下墮

- 健康

緩解措施

室內噴塗機械人

燒焊機器人

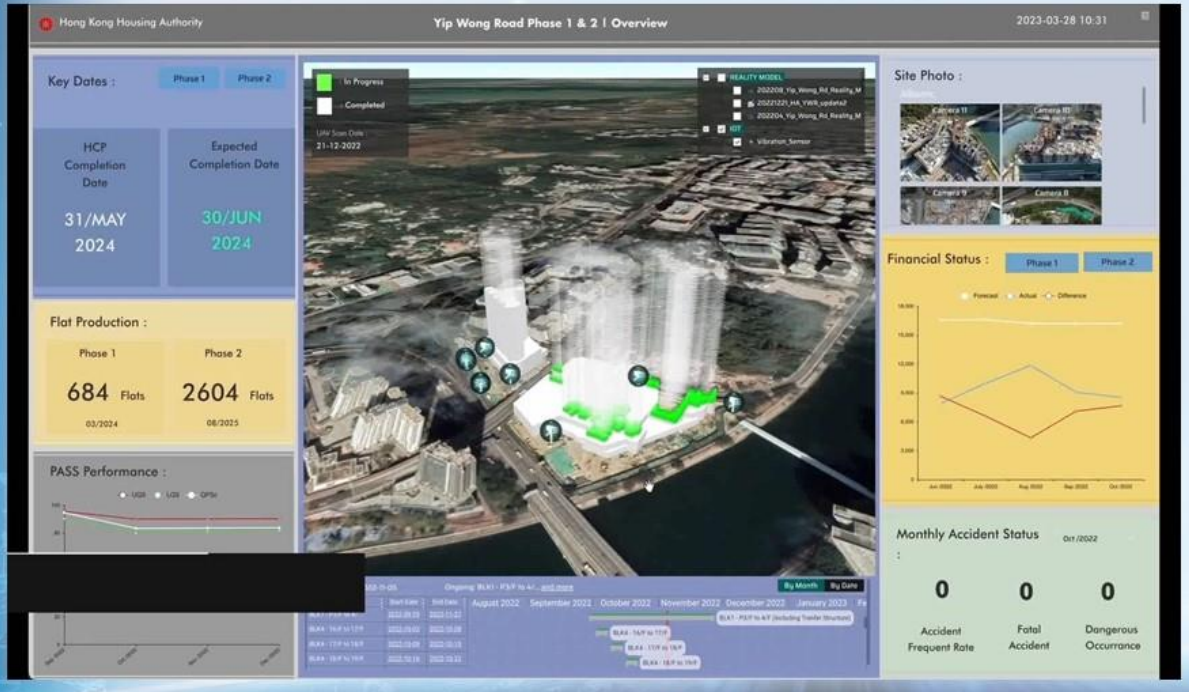
外牆噴塗機器人

創新科技 – 4S 安全智慧工地系統

- 中央管理平台
- 電子工作許可證
- 核實操作機械人員
- 虛擬實景培訓
- 資料管理系統
- 密閉空間監控
- 人工智能系統
- 監控危險區域

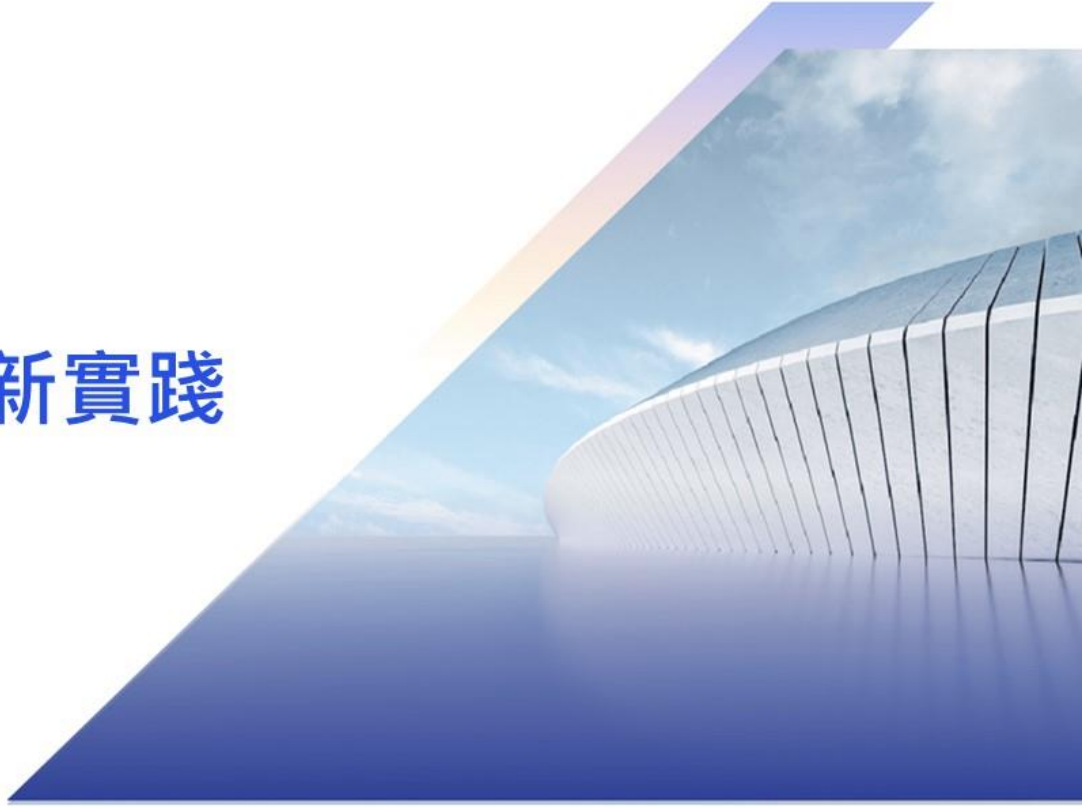
創新科技 - 智築目

項目資訊管理及分析平台「智築目」



04

工地安全創新實踐



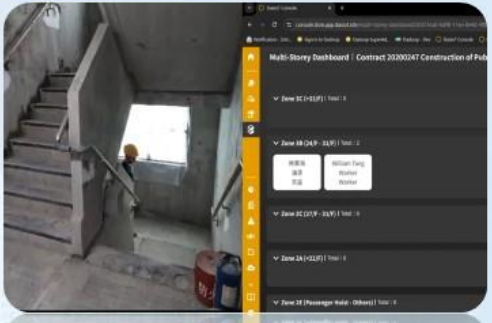
工地安全創新實踐

風險

- 失救

- 物料下墮

緩解措施



室內工友
定位系統

監察吊纜
完整性

人工智能識別
吊運路線上工友

工地安全創新實踐

風險

- 體力攀爬

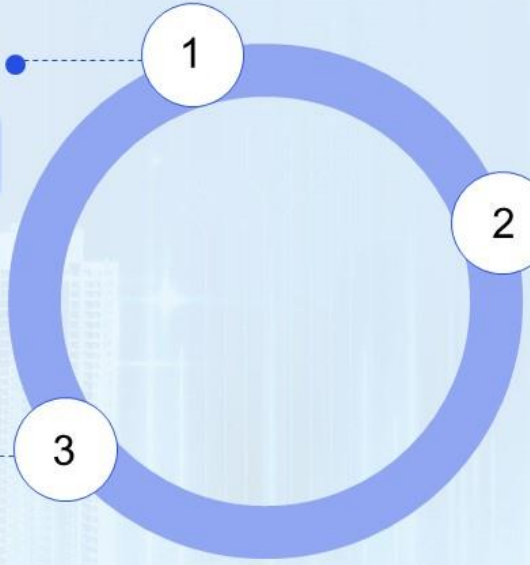
- 高處下墮

緩解措施

05

風險管理及創新科技的挑戰與展望

創新科技面臨的挑戰



1 科技融合與應用的難題

- 持續創新和優化技術來克服

2 員工接受程度與培訓

- 確保安全策略與科技應用有效整合

3 數據私隱與安全

- 保障隱私資料

未來展望

智能化工地管理發展

員工文化改變

管理層風險管理提升

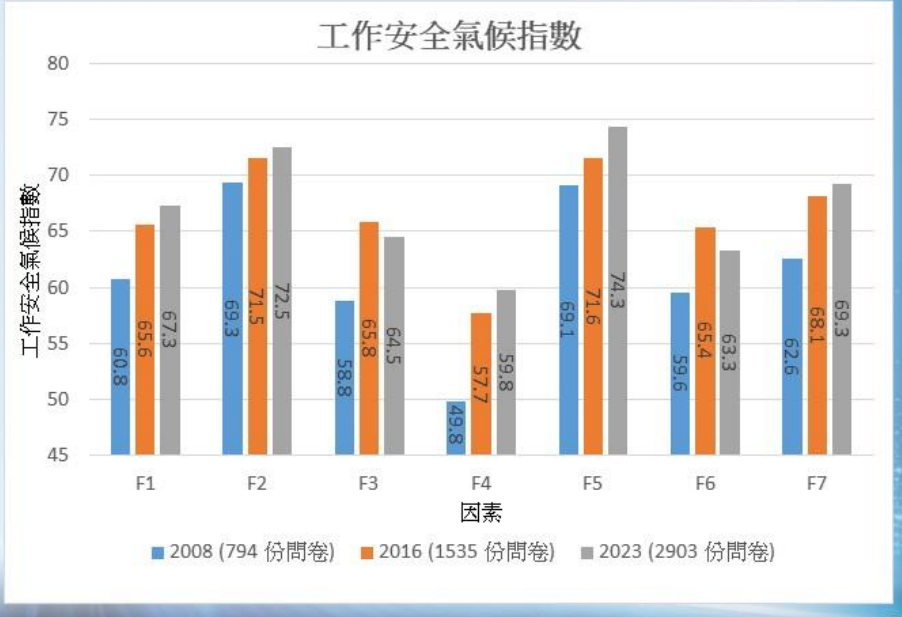
員工文化改變

安全氣候指數調查結果:

2023 對 2008

2023年較2008年全部因素上升-

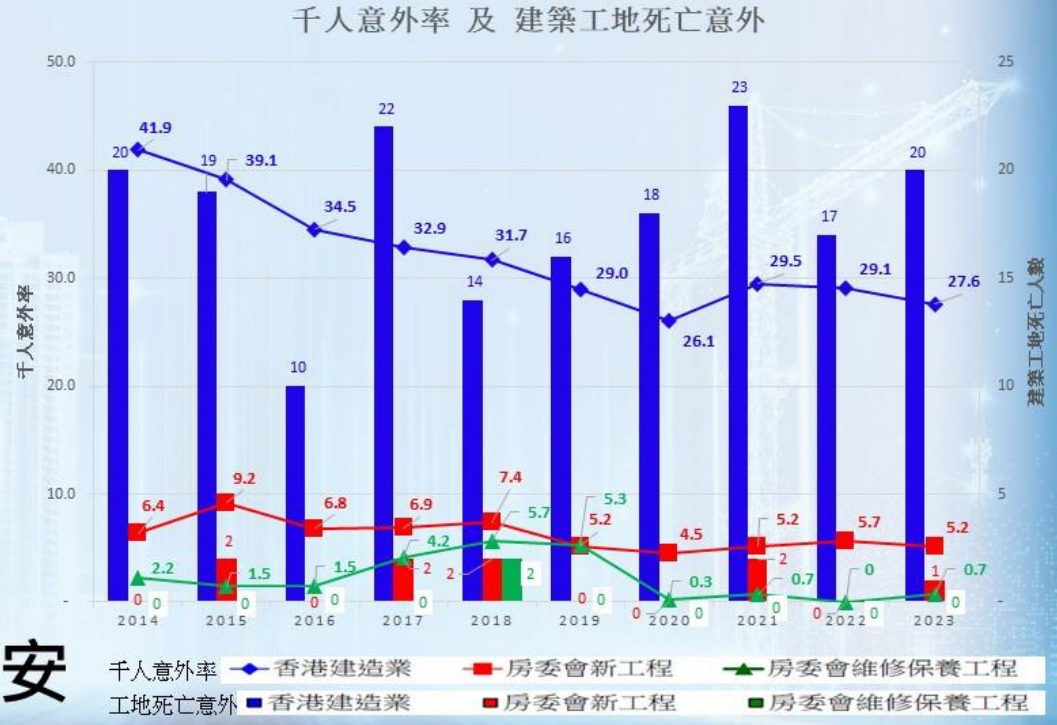
- 因素1. 機構及管理層對安全的承擔
- 因素2. 為安全所提供的資源和支援
- 因素3. 對冒險行為和風險的認識
- 因素4. 對安全規則和程序的認知
- 因素5. 個人對安全及健康事宜的參與
- 因素6. 安全工作態度
- 因素7. 安全推廣及溝通



安全指標

風險管理保平安

善用科技守職安



資料來源：勞工處、政府統計處及房委會工地報告


開開心心上班去
快快樂樂回家來


連繫
CONNECTIVITY
公屋暖萬
左鄰右里
AI
Mi∞
Community
社區
Big Data
營造
Smart Facility Management
人情味
BIM
Innovation
組裝合成
綠色+生活
是屋·也是家
TECHNOLOGY
Integration
提速 提量
以人為本
幸福感
樂齡安居
提質 提效
民嚮往
跨代共融
Home Being
MiC
健康
美好生活
Vitality
Elderly-friendly
..IS WHAT WE ARE STRIVING FOR
Housing Authority Site Safety Website:
https://www.housingauthority.gov.hk/sitesafety
風險管理保平安，善用科技守職安
Harnessing Risk Management and Technologies Safeguarding Occupational Safety and Health

This is a clip from the 31 July 2024 recording of the

Hong Kong Housing Authority

"Safety Forum 2024 for Works and Property Management Services"

The speaker on stage is Mr Daniel Leung

Deputy Director of Housing (Development & Construction)

He will give the welcome address

****

(00:21)
Good afternoon everyone

Today's safety forum is organised by the Housing Authority

Chairman Ho just mentioned that there are over 1,000 participants

Firstly, let me welcome Ms Rosanna Law, Permanent Secretary for Housing

Dr. David Mong, Chairman of the Occupational Safety and Health Council

Ir Prof Thomas Ho, Chairman of the Construction Industry Council, our old friend

Thanks also to all the guests

and over a thousand guests both online and offline

This forum

has been jointly organised by us, the OSH Council, and the Construction Industry Council

for more than 18 sessions

Thank you all for your continued support of the Housing Authority

in holding this forum

The theme of this year's forum

is displayed on the screen

"Enhancing Occupational Safety and Health by Risk Management, Innovation and Technology"

Next, I hope to briefly introduce how the Housing Authority

uses risk management and innovation technology

to enhance OSH on construction sites

Today's content will be divided into five parts

While I speak, you can follow along

I won't go into too much detail

First, let's look at

the current risk situation on our sites

This slide

was also shown by Chairman Ho earlier

When I made this slide

I found it touching and saddening

Why?

The first image shows the "sandwich"

What Chairman Ho just mentioned

The accident happened just last week, and should not have happened

If the Smart Site Safety System (4S) had been used, it could have been avoided

After this, I want to show you some figures

Chairman Ho mentioned earlier

There were twenty-four fatal industrial accidents in 2023

Over 80%, that is twenty cases, were construction accidents

These reflect

our industry

is facing some real internal problems

In fact, it also reflects

a rather serious factor

45% are construction workers

and 60% are technical workers

What are their age?

They are all over 50 years old

These figures, when presented to everyone

require careful considerations

In fact, for over the years

Chairman Ho, the Permanent Secretary, and Chairman Mong

Everyone knows

that after decades working in the engineering sector

as a construction professional

What has gone wrong in the construction industry?

Look at this

Besides the aging of construction workers

the problems shown on the screen

are the main factors leading to accidents

You can see

some high-risk conditions

some complex workflows

The most important issue is failure to consider construction safety in the design

and there is also a lack of proper dynamic risk assessments that often mentioned

Employers, contractors, subcontractors, and workers have weak safety awareness

Last week, I visited a site

specifically for this talk

I interviewed frontline workers

asking why they do not pay much attention to OSH

They immediately responded with these answers

we hope to leave work earlier

Your frequently visit often disrupt our schedule

We are just small potatoes, so please do not create trouble to us, okay?

Regarding equipment, the Permanent Secretary also noted earlier

It turns out that the oxygen tanks used for working in manholes are heavier than the workers themselves

How can they use them while working?

Wearing protective clothing in scorching heat must be hard to endure

Using smart equipment

Although we are very smart

workers may not keep up with the times

Employers often demand work to be finished quickly

but do not increase manpower

One person does the work of many

So progress is prioritised but safety neglected

What do you expect me to do?

Also, every worker says

We have done this work for decades, we do not need you to lecture us

They are all experienced workers

Many of them are over 50 years old

The last sentence is more interesting

By the time the safety officer arrives for the safety assessments, I have already finished my work

Would you agree?

Let's talk about these risks

Most accidents in Housing Authority projects

33% are falls or trips

Others include falls from height, striking against objects, etc.

These are the most common accidents in our projects

We often talk about risk identification

After decades on sites

If you ask a Resident Engineer how to identify risks

he will surely say

He would conduct site inspections

Clerk of Works walk around and check to identify risks

With increasing projects and workload, risks also increase accordingly

so we need new thinking and ideas

With technological advancement

we need to use new technologies

First, we use technology to collect all safety data

using Building Information Modelling (BIM)

The Development Bureau, Housing Department

and other private companies frequently use BIM

to conduct simulated rehearsals

Some lateral bracing works are very complex

Some sites use very advanced construction methods

How?

Very simple, using BIM

Contractors can utilise high technology in this area

We do not need workers to constantly wear helmets

Now there is new artificial intelligence technology

What is AI used for?

If workers do not wear safety equipment

it will be detected

contractors can then easily manage those risks

When we have new thinking

and understand how to identify risks

and have a solid foundation

the Housing Authority can take relevant measures

to protect workers' safety

Since the 1990s

we have established a safety management system

We have a three-pronged approach

including a continuously optimising our procurement strategy

and performance monitoring mechanisms with incentives and sanctions

We regulate contractor behaviour through contractual provisions

We also conduct research, training, and publicity

to promote our safety culture

Also, as Chairman Ho mentioned

we cannot rely only on frontline workers to enforce safety

that is wrong

Management must visit sites

communicate with staff

have afternoon tea together

I think that is good, we can do more

Our contract managers, general foremen, engineers

every few months take checklists to sites

and personally ask workers

If safety measures are implemented

continuous communication with stakeholders is also important

Another strategy

we have a procurement strategy

We implement a registration system

to select the most suitable contractors for our projects

At tender stage

we require contractors to

provide smart innovative technology and suggestions

to protect workers' safety

Safety management has rewards and penalties

Good contractors

get more opportunities

earn more money

while also protecting workers' safety

Safety policies

must have rewards and penalties

If a contractor performs poorly and an industrial accident occurs

we may disqualify them from future tenders

On the other hand, we also have a performance monitoring system

We actively

not passively

monitor their performance and behaviour

We have a system

for example

the Performance Assessment Scoring System (PASS) for contractors

I believe many of you here are familiar with the Housing Authority's PASS

We also have an active Housing Authority Safety Auditing System

We have a team, made up of our own colleagues

responsible for site inspections

Most importantly

they have excellent safety knowledge

they know the system well and can easily identify issues

We also cooperate with the OSH Council to implement Surprise Safety Inspection Programme

In terms of contracts, we are straightforward and clearly outline

the required safety standards in the agreement

We update measures and introduce new technologies

to enhance our safety management

We also have the well-known safety payment system - "Pay for Safety Scheme"

Under this system, contractors who meet contract requirements

will receive funds

to improve safety performance

Safety culture

I believe safety culture is important

We need not only hardware but also software

to cultivate a safety culture

It is very important for management to lead by example

We must focus on workers' safety attitudes

so that our employees and stakeholders

our contractors and workers

all consciously follow safe behaviour

Safety awareness cannot be forced

it must come from the heart

We want to enhance workers' safety awareness

We require contractors to provide guidance

and implement innovative technology

to remind workers

to always pay attention to safety

Through contracts

we require contractors to implement the Work Safe Behaviour Programme

We also conduct safety audits

surprise safety inspections with the OSH Council

and site staff to conduct inspections

requiring contractors to establish a system

and also encourage and educate workers

We hope this forum

can promote safety culture among frontline staff

and encourage contractors to hold safety talks and activities

We arrange courses for frontline staff

especially those responsible for safety

to keep them updated with the latest safety knowledge

We strongly advocate a caring culture

As I mentioned, caring culture is important

Not only punishment or inspection

we also need to care for frontline workers

Many accidents happen to workers on site

or even experienced workers who have not worked at the specific sites

and are unaware of the risks involved

We have a programme

to implement the "P" and "N" Caring Programme

similar to driving licenses

We assign experienced workers

to teach probationers and newcomers

to familiarise themselves with the site and accurately identify risks

We also require contractors to provide

heatstroke prevention and hygiene facilities on site

and promote safety activities and programmes

We require contractors to provide smart devices for workers on site

to monitor their health

reflecting the Housing Authority's continual care for workers

A safe working environment

I remember chatting with Chairman Ho last time

He often says beyond dynamic risk assessment

there is "Design for Safety"

In 2025, that is next year

we will publish the 3rd edition of the "Pictorial Guide to Planning and Design for Safety"

hoping that during planning and design stages

risks can be identified as early as possible

If construction safety issues are encountered during the design phrase

we try to accommodate construction needs in design

to eliminate relevant risks as quickly as possible

To address risks

we continuously optimise our contracts

and implement innovative technologies

This year, there were unfortunately two accidents related to temporary works occurred in the industry

In response to those risks

we have implemented a series of control measures for temporary works

First, let me introduce that after June this year

we require all new construction contracts

to use metal scaffolding

instead of ordinary bamboo scaffolding

What changes does metal scaffolding bring?

I believe everyone here understands that

having installation methods and fastening details traceable

can greatly reducing the associated risks

There was also a fall-from-height accident earlier

We no longer use temporary scaffolding inside lift shafts

We use guided suspended working platforms for installation of lifts

Following the tower crane incident which occurred more than a year ago

we immediately enhanced the design

and construction process of temporary works

All erection and application of temporary works are now strictly regulated

Just now we saw accident statistics from the Housing Authority

Slips, trips and falls, and manual handling injuries

are the main causes of industrial accidents

We now widely adopt Modular Integrated Construction (MiC)

and Multi-trade Integrated Mechanical, Electrical and Plumbing (MiMEP)

Most of the works are now done off-site in factories

reducing on-site concreting and bar-fixing

Especially since site temperatures often above 40 degrees Celsius everyday

We aim to reduce OSH risks

Furthermore, we have advanced to MiC 2.0

with improved modules connecting process

so that work on the floor is no longer necessary

This significantly reduces the risk for workers

when installing modular components weighing 20 to 30 tonnes

Another major risk in the industry which everyone knows

is falling from height

As early as 2020

we introduced robotics in our tenders

requiring contractors

to provide robots

These robots have often appeared in the media

and we actively promote them

Here, I call on everyone

to start adopting robots as soon as possible

With the popularisation of smart technology

Smart Site Safety System (4S) have become essential on construction sites

All Housing Authority contracts

now include 4S

For example, using artificial intelligence to detect whether workers

are wearing the proper safety equipment

If not, the system immediately notifies

site personnel or managers

and requires them to follow up promptly

There is also a central management platform

which collects various data

to help analyse potential safety hazards

Since we've collected so much data

we will integrate some of the more important

safety-related data

into our newly developed

Project Information Management and Analytics Platform

which we call "HA-PIMAP"

This platform provides a visualised project information

This platform provides a visualised project information

to enhance daily risk control

For example

the chart on the left

shows the total number of workers entering and leaving the site

If the figures do not match or if the number of workers leaving is not zero at day's end

the contractor must immediately follow up

as an accident may have occurred in the site

In addition to the implementation of smart technologies

we are also researching some innovative smart technologies

hoping to implement them at our construction sites

It is simple. If a worker is on the floor

and you cannot locate or reach him

What should you do?

Generally, people would rush up but still be unsure what to do

However, we are now collaborating with a technology development company

to invent an indoor positioning system

Through this system

we can pinpoint a worker's location and time

And if an unauthorised worker

is found on that floor

the system will send out an immediate alert

As for the risks of falling object

the image here that

we are now widely adopted a technology

that can monitor whether the lifting cables are experiencing metal fatigue

Another innovation under development

with ASTRI (Hong Kong Applied Science and Technology Research Institute)

is AI-based prediction of module lifting paths

Using artificial intelligence

we can detect the lifting path in advance

and alert workers below

that MiC modules may be hoisted above them

This helps identify risks early

As everyone knows

climbing tower crane involves the risk of falling from height

Also, there are fewer certified crane operators available

We are now researching a remote-controlled tower crane system

and even unmanned tower cranes

to eliminate the need for workers to climb

Additionally, regarding lifting operations

we have a new development in Modular Integrated Construction

It is the artificial intelligence positioning system

We hope that through artificial intelligence positioning

modular components can be precisely installed on the floor

avoiding dangerous collisions between workers and objects

Previously, there was a case where a worker was hit and thrown far

by a MiC module on the floor slab

Lastly, regarding risk management and innovative technology

we face challenges and outlooks

that requires us to adopt technology to manage these safety risks

Everyone will face several risks

as shown in this slide

First, this is about how to integrate different technologies

to address the risks of various processes

It is because the risk associated with different processes

can be effectively managed using artificial intelligence and smart technology

and it is widely adopted

Are workers willing to accept these new technologies?

Have frontline staff received adequate training?

Without it, adoption of smart technologies will be seriously affected

Lastly, we collect a lot of personal data

As mentioned, our HA-PIMAP

collects substantial information

How do we handle the personal data collected?

In the future, we have some prospects

We hope to use to the data gathered from 4S

to conduct data analysis

The Housing Authority is also running a Safety Climate Index Survey

to understand how workers perceive safety practices

safety behaviours and safety attitudes

By analysing the data and workers' attitudes

we hope to enhance

the management capabilities to oversee occupational health and safety

For the Safety Climate Index Survey I mentioned earlier

Let me elaborate

Through the survey

we collect data covering seven areas

Including views from the workers and management

We will integrate data from several years

and collaborate with Occupational Safety and Health Council to analyse the information

and identify areas that need improvement over the years

For example, point four on this slide

shows relatively low scores from 2008 to 2023

Once identified

we can target low-scoring areas

to come up with specific improvement actions

Our safety target is zero fatal accidents

We have set an upper limit of eight for the accident rate per thousand workers

Looking back at the past decade in construction

there are about 20 fatal accidents annually

with the accident rate per thousand workers of about 30

To everyone here online and offline

there is still huge room for improvement

I call on the industry to work together

to improve risk management

This takes concrete action

and active participation by management

Let's harness technology to safeguard occupational safety and health

Finally, every time I attend a safety seminar

I always share two phrases

that resonate with every construction practitioner

"Have a happy journey to work and back home!"

I believe this reflects everyone's wish for their daily work experience

Thank you

Thank you for watching

(23:04)