--- Site Safety Seminar for Capital Works New Works Contracts 16 January 2024 ---

Embarking on a Journey to Explore Innovative OSH Technologies

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職業安全健康局
OCCUPATIONAL SAFETY & HEALTH COUNCIL

☐ Well-being Tech Forum & Company Visit in Osaka

10 – 12 May 2023

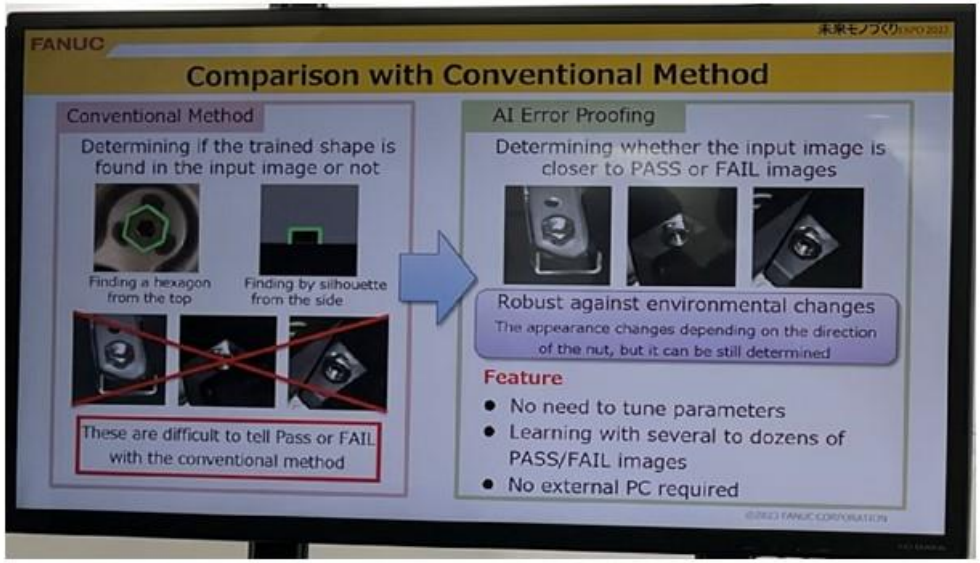
Kick-off Event - Global Initiative for Safety & Well-being (GISW) at EXPO2025

MYAKU-MYAKU

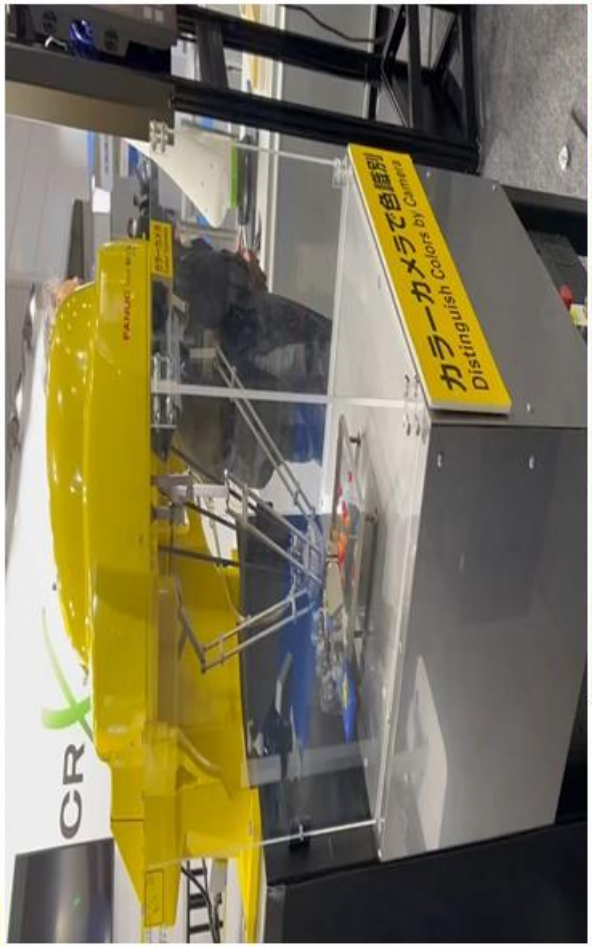
"Designing Future Society for Our Lives"

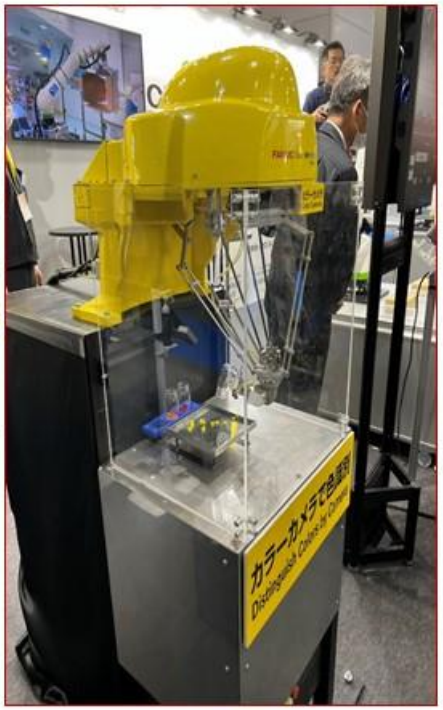
OSAKA, KANSAI, JAPAN EXPO 2025

Fanuc Robotic – Check Weld and Bolt & Nut



Fanuc Robotic – Material Handling & Picking





Shimsuzi -- VR Training Facility

Shimsuzi -- Experiential Learning Facilities

Toe Cap of safety shoe

In-running nip between belt & pulley

Electric shock

在工作場所體驗安全

移動型安全道場

かめわりごう 甕割号

Shin-Meishin Expressway plus Shin-Tomei Expressway

神戸　　名古屋　　東京

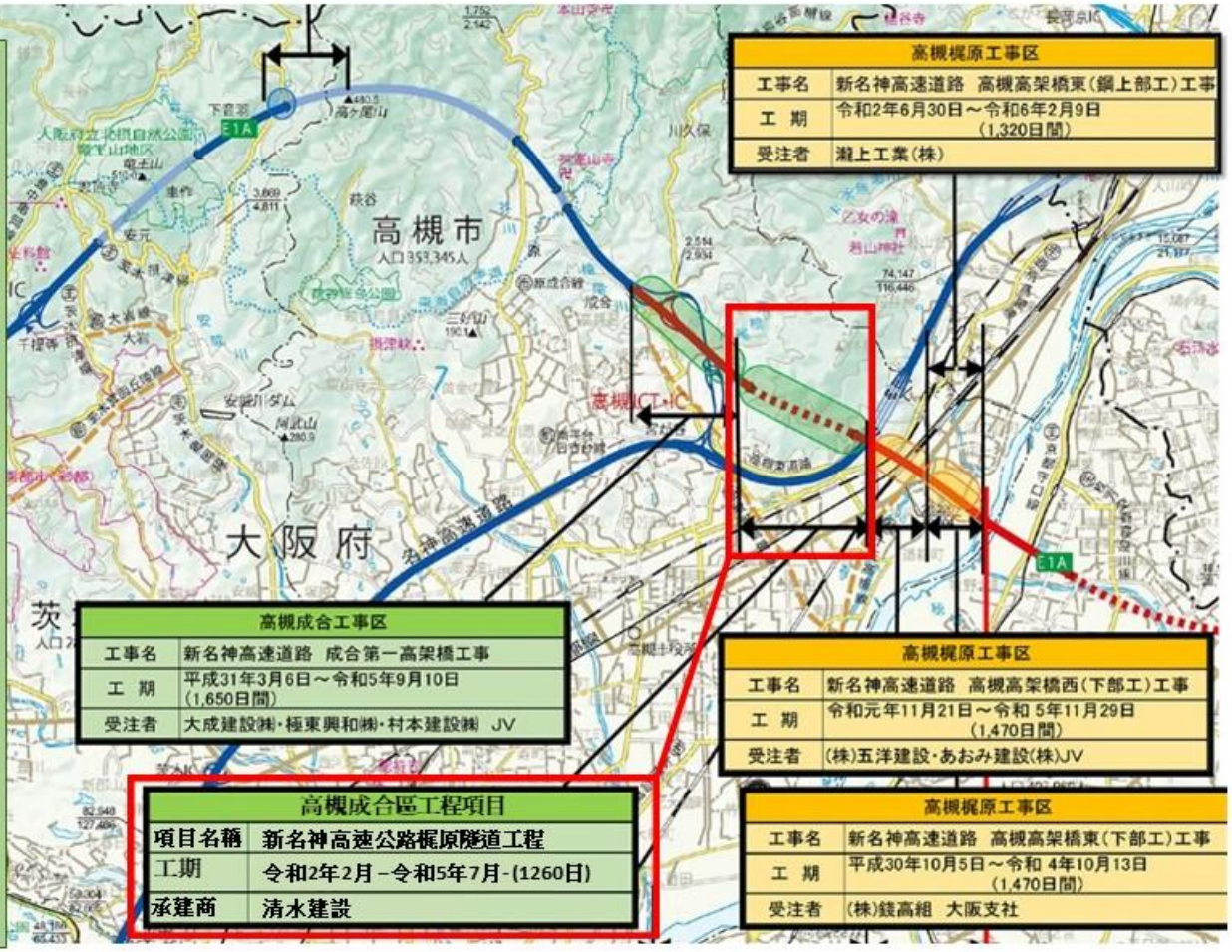
Increasing traffic volume as Tomei and Meishin expressway were opened since 1969

Minimize the impact of traffic disruption

Strengthen the transportation network to improve disaster preparedness

Shimizu Co. - Kajiwara Tunnel Construction Project

Shin-Meishin Expressway Kajiwara Tunnel Construction Project	
Contract Sum	600 million (HKD)
Length of extension	1,998m
Length of tunnel	2,669m
No. of bridge abutment	10
No. of pier	6



高槻梶原工事区	
工事名	新名神高速道路　高槻高架橋東(鋼上部工)工事
工　期	令和2年6月30日～令和6年2月9日 (1,320日間)
受注者	瀧上工業(株)

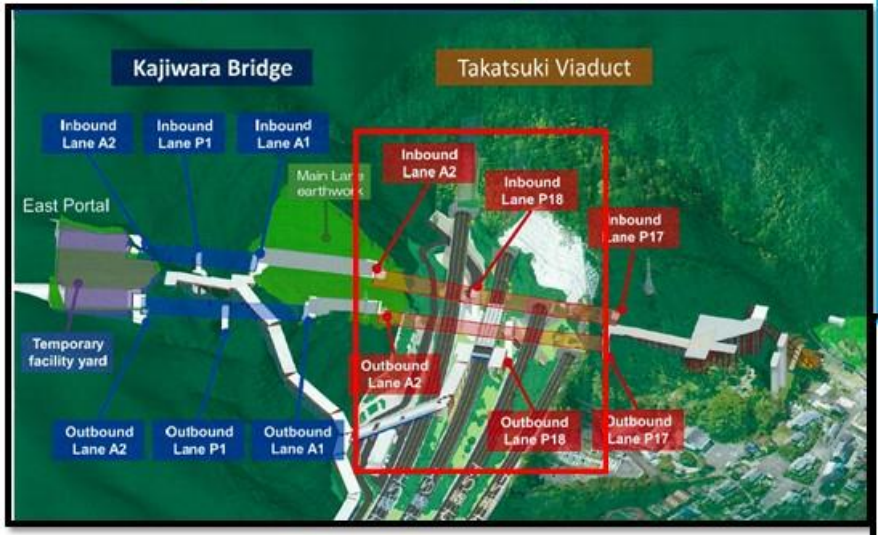
高槻成合工事区	
工事名	新名神高速道路　成合第一高架橋工事
工　期	平成31年3月6日～令和5年9月10日 (1,650日間)
受注者	大成建設㈱・極東興和㈱・村本建設㈱　JV

高槻梶原工事区	
工事名	新名神高速道路　高槻高架橋西(下部工)工事
工　期	令和元年11月21日～令和 5年11月29日 (1,470日間)
受注者	(株)五洋建設・あおみ建設(株)JV

高槻成合區工程項目	
項目名稱	新名神高速公路梶原隧道工程
工期	令和2年2月－令和5年7月-(1260日)
承建商	清水建設

高槻梶原工事区	
工事名	新名神高速道路　高槻高架橋東(下部工)工事
工　期	平成30年10月5日～令和 4年10月13日 (1,470日間)
受注者	(株)錢高組　大阪支社

Design for Safety



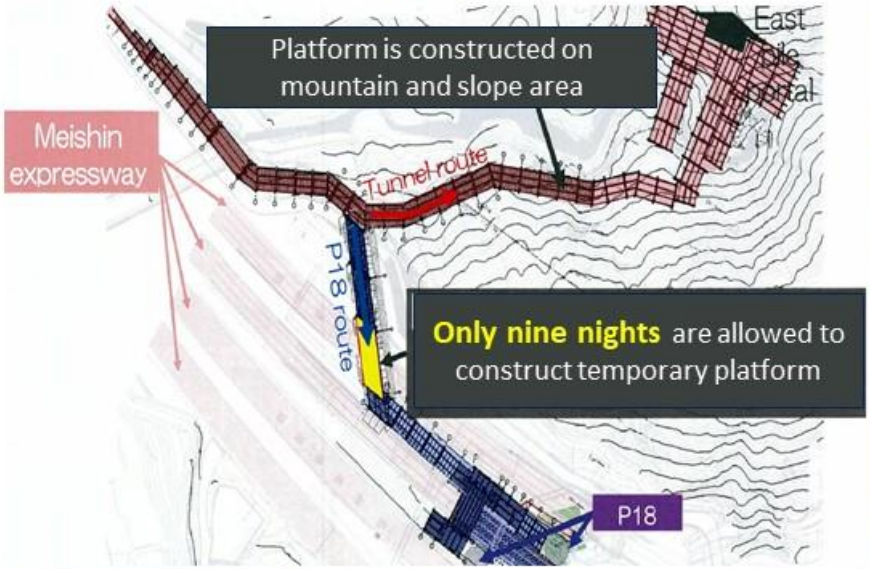
Challenge

Difficulty of construction is extremely high as there are existing highways and overhead powerlines

DfS solution

Provision of temporary bridge and incline platform for construction

Virtual Reality (VR) and BIM



Construction method was simulated by utilizing VR and BIM;

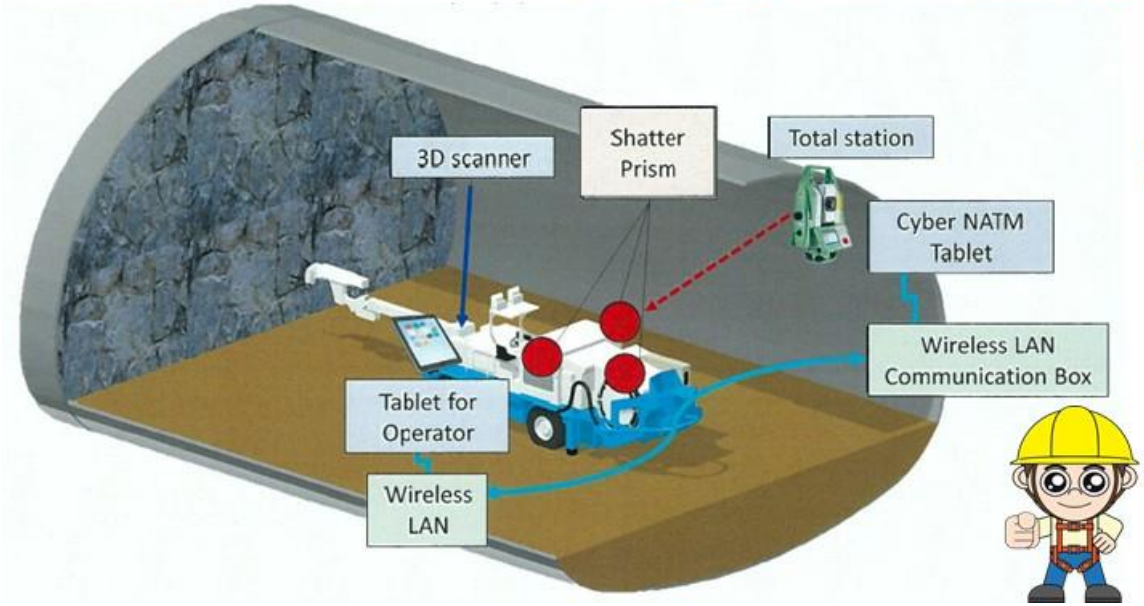
Allow supervisors and workers to have in-depth understanding of OSH risk before commencement of work

Tunnel Construction Cycle – Drill and Blast Method

1. Blasting, 2. Mucking, 3. 1st layer shotcrete, 4. Install steel-rib, 5. 2nd layer shotcrete, 6. Install rock bolt, 7.Invert excavation, 8. Invert concrete, 9. Install waterproof sheet, 10. Lining concrete

3 D Scanning and Artificial Intelligence

■3D scanner measurement equipped on Shotcrete machine



Real-time measurement of excavation face
by using 3D scanning & AI technology

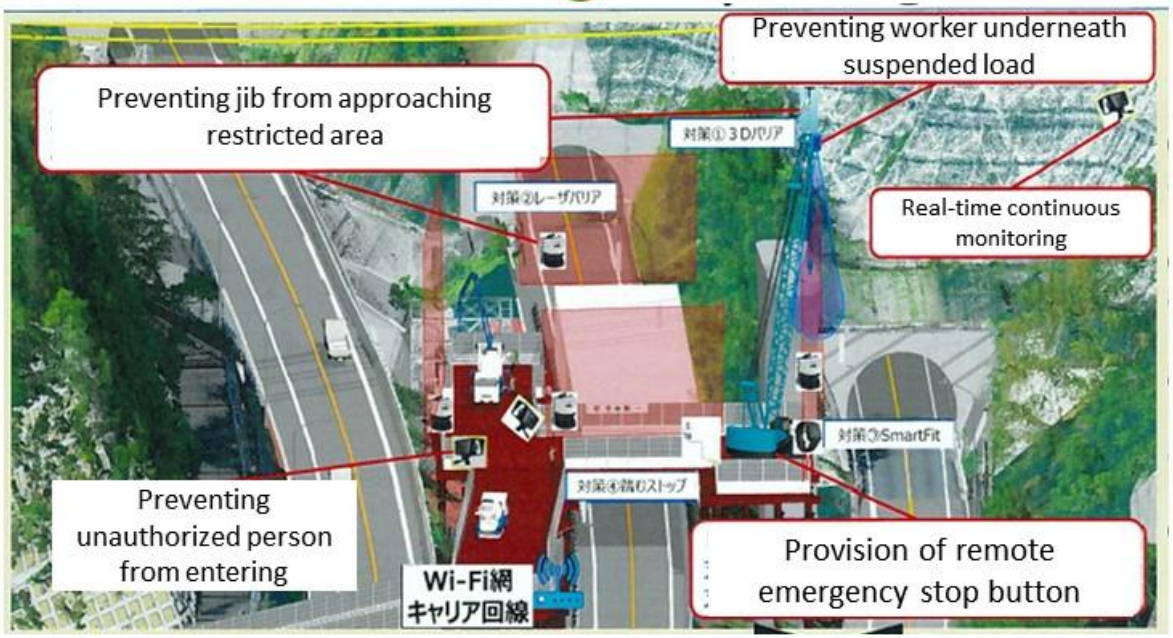
Determination of blasting pattern by AI

Monitor vibration of tunnel face to detect possible collapse of excavation face

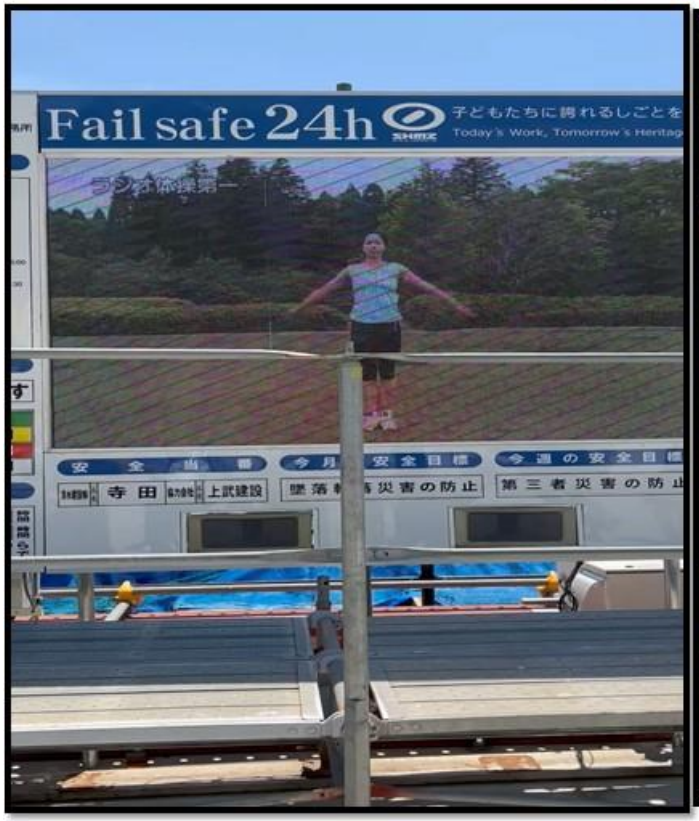
Digitalized Management Platform and AI Danger Zone Alert

ShimzRS ReamoStation

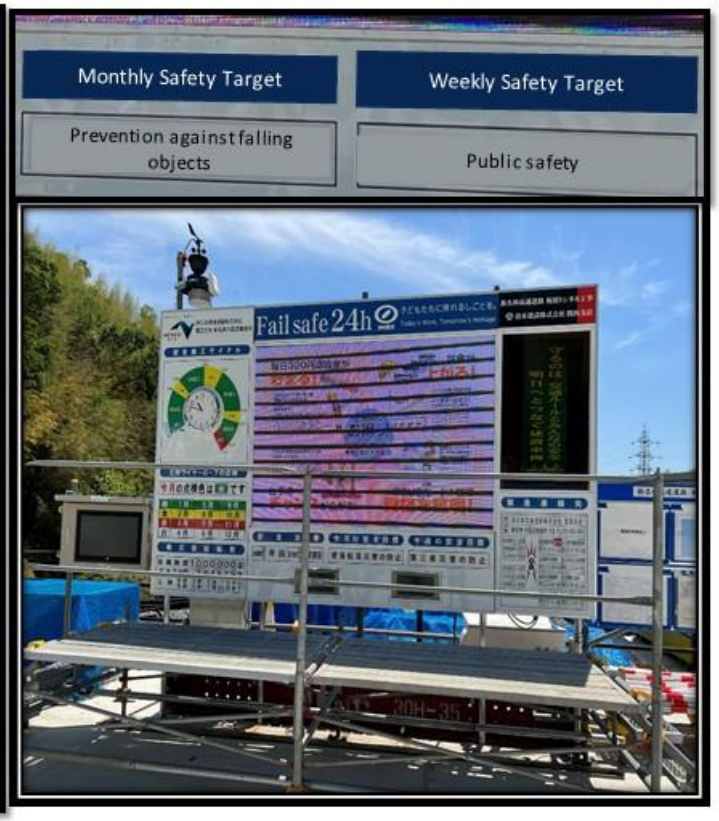
Image captured by 8K camera transmitted by local 5G network



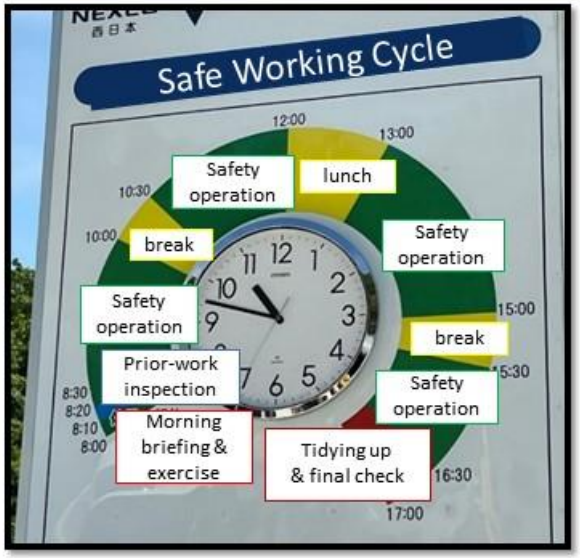
Safe Working Cycle in Japan



Morning Exercise &
Hazard Identification Activity



Timetable of
Daily Safe Working Cycle



Other Safety Measures

Kawasaki Heavy Industries, Ltd. (Robotics)--
Welcome Robot

Kawasaki Heavy Industries, Ltd. (Robotics)--
Automobile Assembly

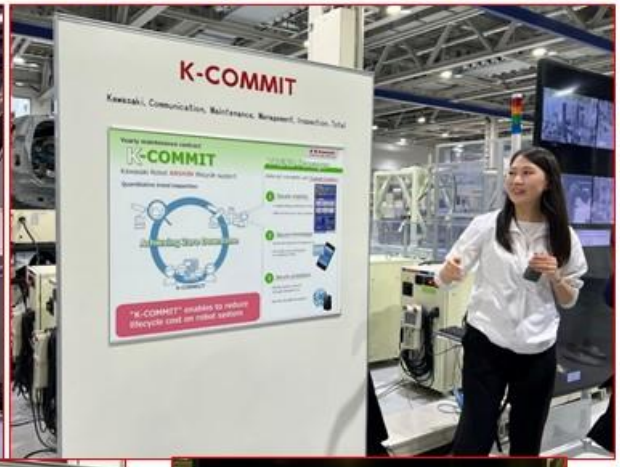
Stage 1 - Assemble Parts

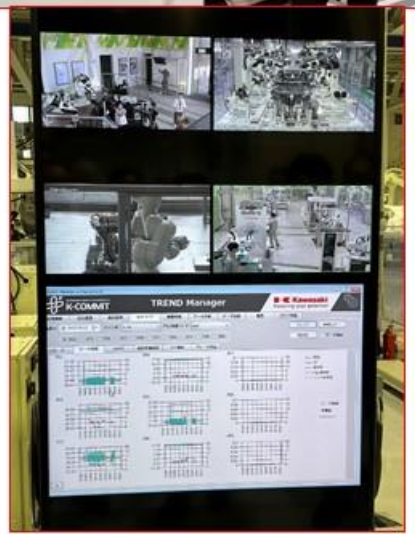
Stage 2 - Welding

Stage 3 - Paint Spraying

Kawasaki Heavy Industries, Ltd. (Robotics)—

K-Commit - Trend Manager





Kawasaki Heavy Industries, Ltd. (Robotics)--
Handling of Goods

Kawasaki Heavy Industries, Ltd. (Robotics)--

"Successor" – Remote Control Robot

Remote Control of Painting

Milling Process

Kawasaki Heavy Industries, Ltd. (Robotics)--
Medical & Pharmaceutical Application

Kawasaki Heavy Industries, Ltd. (Robotics)--
"duAro"- Dual-Armed SCARA Collaborative Robot

Safety in Robotics

Safety Standards for Industrial Robots

Fraunhofer IFF – Robotic Systems

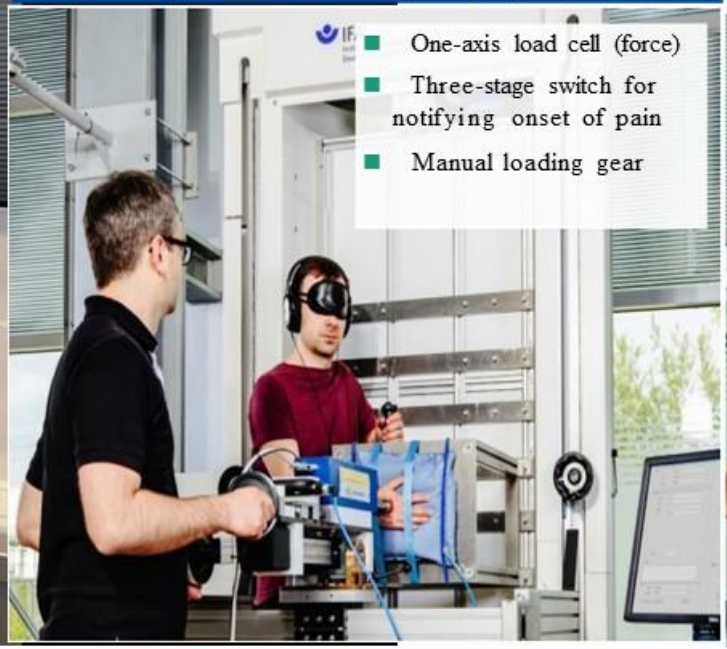
Limit Values for Power and Force Limiting

Test Facilities

Power and Force Limiting (PFL)

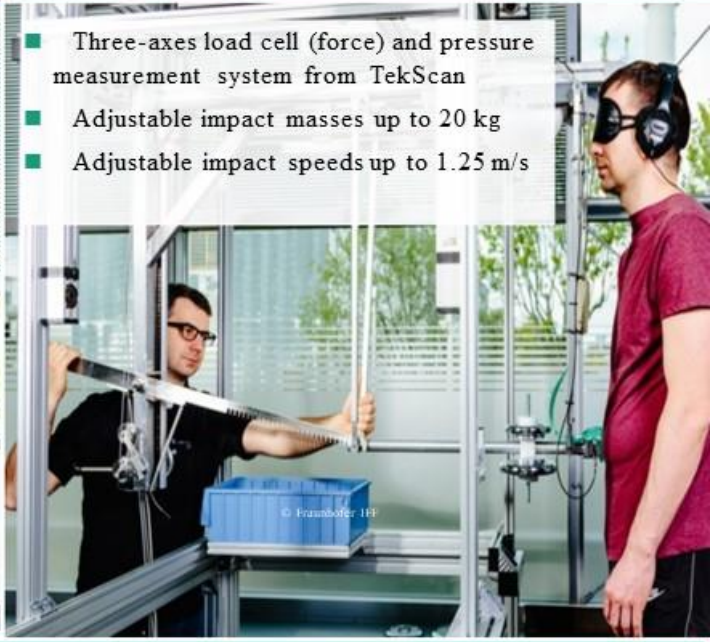
Approval of entire robot system when limit values are met

Quasi-static contact (clamping)



- One-axis load cell (force)
- Three-stage switch for notifying onset of pain
- Manual loading gear

Dynamic / transient contact (impact)

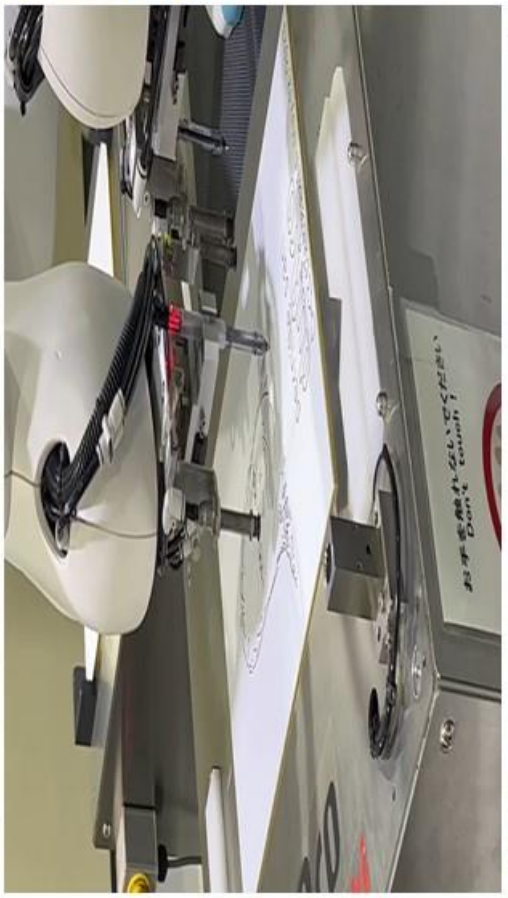


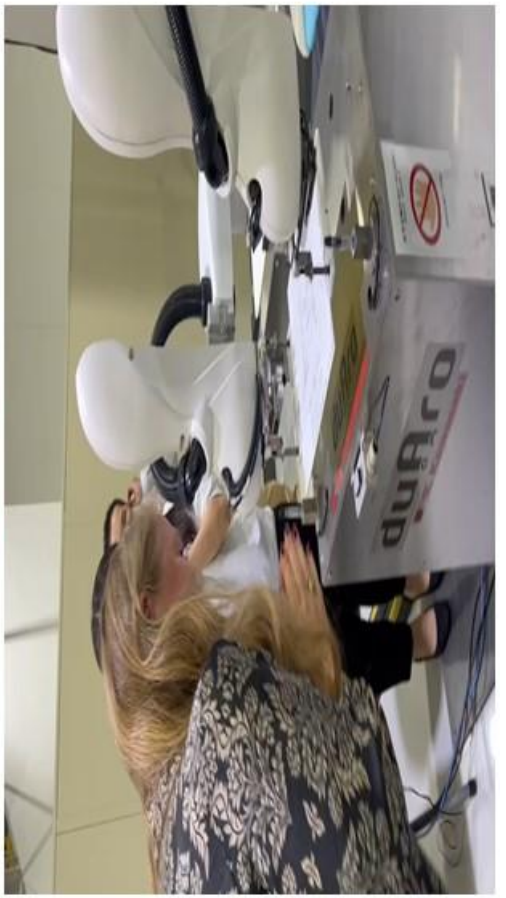
- Three-axes load cell (force) and pressure measurement system from TekScan
- Adjustable impact masses up to 20 kg
- Adjustable impact speeds up to 1.25 m/s

- Supplementary to DIN EN ISO 10218-1 & -2
- Released in 2016

Fraunhofer IFF

Kawasaki Heavy Industries, Ltd. (Robotics)--
Portrait Robot





Sysmex Corporation – Surgical Robot System

Hierarchy of Controls by Innovative OSH Technologies

Technology examples

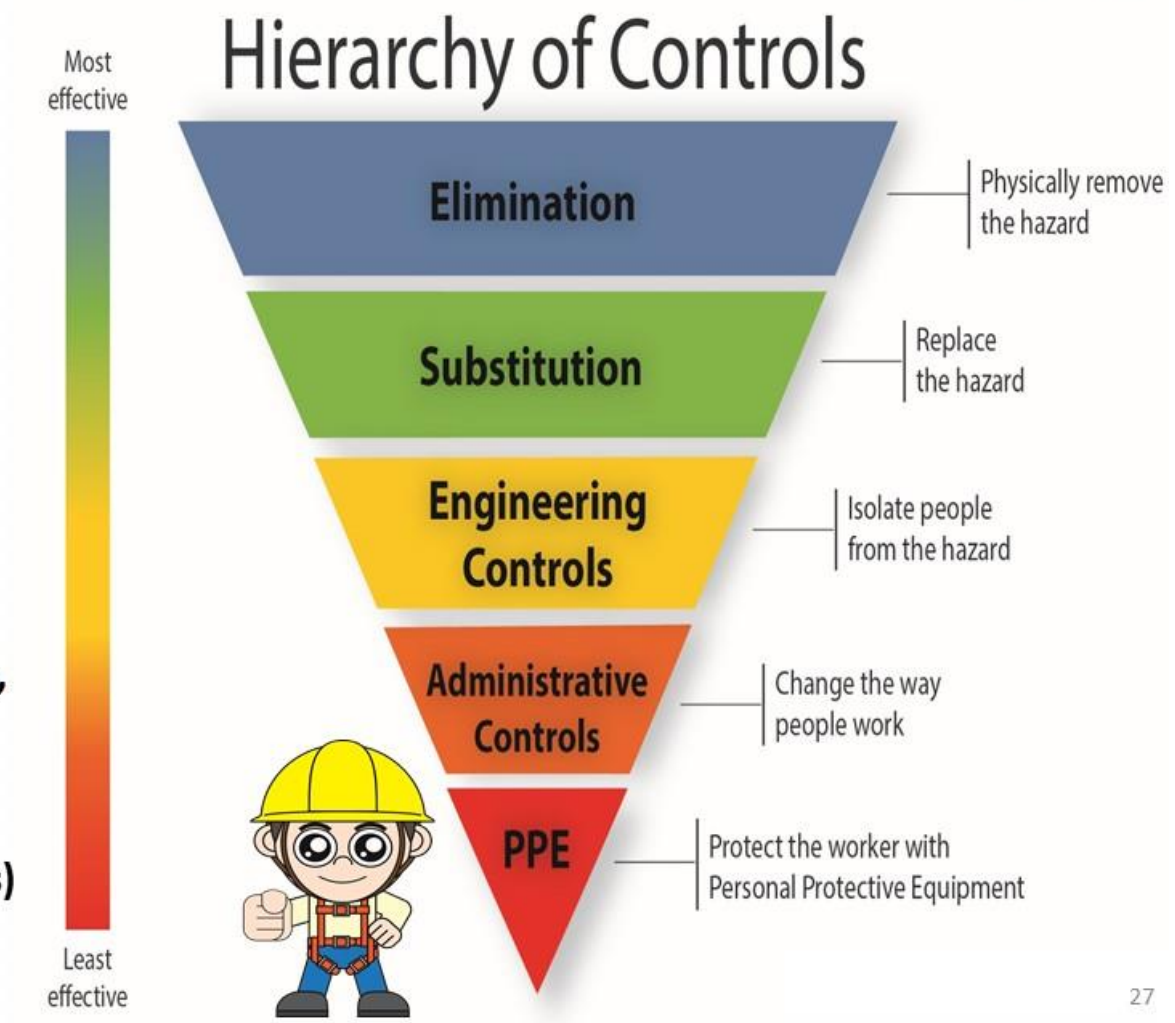
Eliminate risk through design for safety, planning using BIM, digital twins

Substitute humans with tech e.g. drones, robotics, cobots, exoskeletons

Wireless sensor networks, AI, IoT

Enhanced training and instruction using CAVE/MR/VR/AR, Enhanced KM using Regtech, Robotic process automation, Common data environments

Smart Wearables (helmets, watches, harnesses)



AI will not replace you. A person who's using AI (e.g., ChatGPT) will!

AI Thinking
(Data Center Thinking)

Design Thinking
(Human-Centered Thinking)

Scribble Diffusion

"Eiffel Tower in Paris, starry night, Van Gogh style"

Midjourney

《Théâtre D'opéra Spatial》 - Jason Allen via Midjourney

This is a clip from the 16 January 2024 recording of the

Hong Kong Housing Authority

"Site Safety Seminar for Capital Works New Works Contracts"

The speaker on stage is Dr Winson Yeung

the Principal Consultant of Occupational Safety & Health Council

His topic is

"Embarking on a Journey to Explore Innovative OSH Technologies"

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(00:21)

Hello to all friends from the industry

Firstly, I would like to thank the Housing Authority on behalf of the OSHC

for inviting us to join today's seminar

Just now Mr Tony Chan made a very good point

the application of OSH technologies

is now a major trend

especially when the construction industry

is facing the problem of an ageing workforce

and a shortage of labour

So how to make use of technology

to improve OSH performance and enhance productivity

is a topic well worth exploring together

Today I would like to share with you

in May last year I visited Osaka

to attend a large-scale technology expo

Apart from the exhibition there were also seminars

the organisers also arranged visits to construction sites

and several companies

I would like to share how they apply technology

Let's watch this clip

which was shown at the event

As everyone knows

Osaka will host the World Expo next year

This is a major mega event held every five years

What does the World Expo have to do with OSH?

The Osaka organisers

have for the first time ever made safety, health and wellbeing

one of the main themes of the Expo

Many of you may be familiar with Osaka

There is an artificial island called Yumeshima across Osaka Port

Currently many construction works are in progress there

mainly building a large-scale venue on the island

It features a large circular design

constructed entirely out of timber

Once completed it will be the world's largest timber structure

The environment there is very beautiful

inside there will be exhibitions and expos

and outside is a full sea view which creates a pleasant atmosphere

There is also a mascot called MYAKU-MYAKU

This mascot looks like what

Its appearance resembles a human cell

constantly changing like DNA

constantly evolving with vitality

this fits well with the theme of the expo "The Cycle of Life"

The Osaka World Expo will run for six months

It will open on 13 April next year and conclude in October

Last May the OSH Council had the opportunity to meet with them

to co-organise the OSH segment of next year's expo

So remember from 16 to 19 July next year

there will be an exhibition and seminar on safety, health and wellbeing

Apart from participating in the meeting

the OSH Council also visited a large-scale exhibition

There were several robotics companies on site

One of them was a very well-known company called Fanuc Robotic

This company has a history of over 60 years

and is one of the largest robotics companies in Japan

In the video on the right

they use robots combined with artificial intelligence

to inspect welded joints

as well as to detect cracks and rust on bolts and nuts

If you have worked with AI before

You will know that as reliability increases,task performance also improves

with tens of thousands of images showing rust and cracks

They trained the system for it to learn and recognise

What used to rely on visual inspection

can now be done more accurately using technology

Especially if you remember over a year ago

a tower crane collapsed due to a faulty weld on the crane base

So using technology to conduct better inspections is very important

Also for the Fanuc Robotic company

the video on the left

shows a robotic arm handling objects weighing 30 kilograms

Since only the smallest robotic arms could be displayed at the venue

In fact this company's robotic arms can handle

small items of about 30 to 40 kilograms

medium-sized items of 200 to 300 kilograms

and even the one at the bottom right can lift an entire car

weighing up to 2000 kilograms

When choosing robots people often consider

how the robotic arm is designed

These arms are modelled after human arms and joints

so the more axes a robotic arm has, the better

Why is that?

Because more axes mean greater flexibility

In the past most robotic arms had only three or four axes

but those seen at the venue now

typically have six or even seven axes

So they are very flexible

Besides flexibility

is it harder for robotic arms to lift heavier items?

Actually no, the hardest challenge for robotic arms

is to achieve the delicacy of human fingers — that's the biggest barrier

So there are still tasks that robots cannot replace humans for

because they may not handle fine or delicate work very well

On the right there is a fairly agile robot

called the "Spider", a robot shaped like spider

Its arms and legs resemble a spider's

What does it do? It sorts pills

grouping those of the same colour and placing them into bottles

Do not underestimate it — how can it do this?

Because it is equipped with a vision camera

which helps it recognise colours and then perform sorting

So some of these robots are quite precise in their work

Another company was Shimizu Corporation

you can see its name at the top left corner

If you are familiar with it, Shimizu used to work on projects in Hong Kong

It is a long-established Japanese construction company

with over 200 years of history

On that day we visited their exhibition booth

One of their displays was a training facility using virtual reality

This was not very different from what we have

On the left you can see a headset device

and the user interacts with the virtual reality scenario

using a controller

On the right there were over a dozen training modules

I tried the first one that day

The first module was quite simple

It was about climbing a ladder

You keep climbing and climbing

then all of a sudden

The top of the ladder was not properly secured

so the trainee fell all the way down

I found the experience quite shocking, but why?

Because this setup has a big difference

from what we have in Hong Kong

It includes a mobile platform

Can you see there is a platform underneath

This mobile platform is very important

At the moment of falling, you genuinely feel fear

The point of virtual reality training is to make you feel afraid

If you do not feel fear after the experience, it loses its meaning

The goal is for you to feel fear

so when you return on site, unsafe behaviours could be reduced

There are often many risks at work

so how realistic the virtual simulation really matters

Does adding a mobile platform make it dangerous for participants?

Actually no

Because there are safety rails around the trainee

and there is a soft cushion behind for support

So in terms of the experience

it feels thrilling, but it is very safe

I think this training experience was really quite good

In addition to using virtual reality equipment

Japan also places great emphasis on experiential training

Some workers feel that VR is not realistic enough

so they offer real-life sensory training instead

For example, on the left there is a panel

that drops down to draw attention to safety shoes

Safety shoes are very important

In the past, safety shoes had steel toe to protect the feet

But nowadays, manufacturers use different materials

Instead of steel, they use fibre toe

The future trend is to use aluminium alloy for safety shoe toes

because the material is lighter and can still withstand falling objects

This setup lets you experience the difference

The middle photo is very important

Ms Bonnie Yau is undergoing an experience

What is she experiencing?

According to the Factories and Industrial Undertakings (Guarding and Operation of Machinery) Regulations

Before joining the OSHC, I worked in enforcement at the Labour Department

There used to be many accidents involving in-running nips

between belts and pulleys

But workers often did not understand the danger

When you hold a stick and feel it being pulled in

I found it frightening when your whole hand is suddenly dragged forward

I still remember that experience today

That is why machine guarding is so important

I really appreciate the vehicle shown on the right

Do you know what's special about this vehicle?

Shimizu Corporation operates many sites in Japan

then how do they provide VR and experiential training to workers?

They use this vehicle to carries all the equipment

The somatic training is on module-based

Each module takes around two hours, and workers can choose which to join

The vehicle visits different worksites to let workers experience the training

This idea is very practical

Many sites now have VR setups

but they are usually fixed in place

If mobile setups are introduced and more resources were put in

they can make training more engaging for workers

In addition to visiting the seminar and expo

we also visited a construction project that day

If you have ever driven in Japan, you may find it familiar

Usually, people drive from Tokyo along the blue line

to Nagoya and then to Kobe

The blue line shows the old expressway

which has been in use for many years since 1969

and now has some issues

The traffic volume exceeds the design capacity

One expressway is no longer enough

And if an earthquake strikes, relying on one road is not enough

The red line is very important

It represents a major project in Japan over the past decade

A new expressway called Shin-Meishin and Shin-Tomei

It adds a new route from Tokyo to Nagoya and Kobe

The red line shows a new expressway

Some sections are still under construction

while others are already in use

because the construction process is divided into segments

The section we visited was

the Shin-Meishin Expressway Kajiwara Tunnel Project

The Kajiwara Tunnel Project

we call it the Kajiwara Tunnel, is not very long

It includes an elevated viaduct and a tunnel

about 2 kilometres in length, with a project cost of 600 million yen

The project is undertaken by Shimizu Corporation

and spans four years — scheduled for completion this year

This project faced major challenges

The first challenge

can be seen in the photo taken on a temporary steel platform

with is the old Meishin Expressway

The difficulty was that the new Shin-Meishin Expressway had to cross over the old one

But the old expressway had to remain in use during construction

so closure was not an option, making the job very difficult

The second challenge is shown in the picture on the right

from Kansai Electric Power

There were transmission towers and overhead cables near the site

It would be a major hazard if lifting operations hit the cables

The orange line was the original plan

to build a temporary road for transporting materials

But the steep slope made it extremely dangerous

So for construction safety considerations

at the red and blue areas

they built temporary steel platforms and access roads

to allow for material delivery and construction

In the photo at the top right, you can see a steep green slope

It is very tall and steep

but it was able to support a 70-tonne crawler crane

and allow it to operate at that height

This shows how critical safety planning is in construction

Earlier we mentioned how difficult it was to build across the existing road

They were only allowed nine nights to close the road to build temporary steel platforms

so Building Information Modelling (BIM) was used for advance simulation

In the clip on the right

with only nine nights to close off the road

how did they make it work?

A temporary road was built above

Two signaller were stationed at both ends of the detour

Vehicles were redirected to pass through the bypass

while the closed section was used to build the temporary steel platform

Crawler cranes were used to lift steel beams

The Japanese writing on the beam included "333"

"333" in lifting operations also exists in Japan

It is something we also do in Hong Kong

We are not sure if the "333" originated in Japan

"333" in lifting operations means

maintain 3 metres of distance from the load

test lift it 300 millimetres off the ground, and wait 3 seconds

This helps make lifting operations more stable

Also, we also mentioned the one-metre rule earlier

The lifting path must be clear

and one metre away from obstacles

Taglines were also used during lifting

to control the sway of the steel beams

Workers installing components at height

all used elevating work platforms to ensure safe above-ground operations

Throughout the construction period, they used virtual reality

They used the Building Information Modelling technique

Once the BIM model was completed

they transformed it into a VR training simulation

In the centre photo, you can see

workers using the VR model in advance

to understand the OSH risks more easily

In the lower left photo, we were also holding tablets

to project the BIM model onto the actual site

It shows how the new Shin-Meishin expressway will look and where it will be built
in a very detailed and vivid way
In the Kajiwara Tunnel project they used the traditional drill and blast method
In this clip
the debris needs to be cleared after blasting
Once cleared, they apply shotcrete to stabilise the surface
which is a standard procedure in tunnel construction

Next, they install steel ribs at the tunnel crown to provide structural support
Then a second layer of shotcrete is applied
After that, they install rock bolts
to further reinforce the tunnel structure
Then they will excavate the carriageway and cast concrete
giving the road surface sufficient strength
After that, waterproofing work is done to prevent groundwater from seeping in

Finally, concrete is poured again over the steel ribs
to complete the entire tunnel construction
During this project, they adopted 3D scanning technology
and artificial intelligence to monitor the rock surface condition
In the past, inspections relied on visual checks which were outdated
But now, with 3D scanning and AI
combined with big data analysis and IoT
they can monitor the rock surface condition in real time
They also installed vibration sensors
to track vibration data in the tunnel
If an issue is detected, the system can warn and evacuate the workers
The entire process makes good use of technology
with extensive application of artificial intelligence

The site was equipped with many sensors

and through IoT technology, monitoring could be done in real time

In this photo

you can see the lifting zones

If unauthorised personnel enter these zones

the system triggers an alarm

Whether the boom might strike nearby structures

can also be monitored using AI

In the top left of the image

you can see the site is large and packed with sensors

so how can all the data be managed?

They use an Centralised management platform

which gives a full view of every corner of the site

In Hong Kong, photos transmitted in 2K resolution

are already considered high quality

4K ultra-high definition is already impressive

But Japan uses 8K resolution which is far clearer than 4K

This shows the importance of the network

4G networks are not fast enough for this

4G can only support 2K resolution transmission

Why? Because 5G has many advantages

Compared to 4G, it transmits data at least 20 times faster

Another key factor is latency

If there is delay in video during site inspections

it can cause unclear views of the environment and lead to accidents

5G greatly reduces latency

which is a very important factor

I won't go into detail about the Safe Work Cycle

as it was jointly promoted by OSHC,the Housing Department and the Works Bureau

for over 20 years

The bottom right here is just a recap of the Safe Work Cycle

The concept came from Japan

Back in the late 1990s, we conducted a study tour

and learned how to integrate safety into the construction process

so that safety is not treated as something extra

In the bottom right

before work starts, we have morning briefings with some exercise

then we conduct hazard identification activities

Inspections will be done before work

and on-site guidance and supervision during construction

I won't go into these details

But I will talk about the video on the left

Japanese workers do morning briefings very well

On sites here, the safety officer usually leads morning exercises

But there, they use an LCD TV display wall

and a fitness instructor leads the session

With music, it is more engaging and lively

You might consider this to enhance morning briefings

There were many other great ideas

really too many to cover in just half an hour

Later

we explored ways to prevent heatstroke

including building site offices and rest areas

and what kind of material they use

This material was excellent—not promoting Japanese products

but they tested it on site that day

Compared with traditional materials

the temperature difference was 11 degrees under extreme heat

What kind of material is this? It is aluminium sheeting

Its benefit is that it blocks solar radiation

and it can block up to 97%

So what is the secret?

Inside the material, they used polyethylene

Between the aluminium sheets there is a layer of polyethylene

that acts as insulation

So what is the effect? The temperature can drop by 11 degrees

Using this material for site offices and rest areas

saves electricity and air conditioning and a lot of money

They also developed a special sun-shielding neck cover

You will notice how it differs from the ones in Hong Kong

Ours are typically a single piece

Theirs consists of three separate pieces which allows air to flow through more easily

This part is also reflective

They place great emphasis on using materials that reflect solar radiation

As physics tells us

heat is transmitted by conduction, convection, and radiation

and about 75% of heat is transmitted through radiation

So blocking thermal radiation is very important

We also went to Kobe

which is to the left of Osaka

and about an hour's drive away

We visited Kawasaki Heavy Industries Ltd.

a very important enterprise in Japan

A hundred years ago, their business included railways, aircraft and ships

About 50 years ago, they began developing robots

On the day of our visit, they introduced a conversational robot that chatted with us

This robot was very lively

During the visit, we were amazed by the exhibits

Have you seen the movie Transformers?

Watching the movie and seeing it in person are two different things

Seeing a large number of robots around us in person was very striking

So what did we see that day?

A whole group of robotic arms assembling car parts

Besides part assembly

the production line also included welding and spray-painting operations

Usually, welding and spray-painting generate harmful fumes

Using robots in those steps

reduces occupational health risks for workers

The spray-painting robotic arms were equipped with explosion-proof components

This is very important

A reminder for everyone

confined spaces are always a hot topic

All equipment used in confined spaces must be explosion-proof

This is essential

Due to time, I will speed up a bit

The company has a system called “K-Commit”

Kawasaki Heavy Industries focuses on preventive measures

In the past the entire production line consists of all robotic arms

when one malfunctioned, the whole line would stop for repair

and the downtime would be a waste

With the “K-Commit” preventive maintenance system

they use real-time trend data to monitor conditions

and arrange inspection and repair immediately if issues arise

In addition to this system

their robotic arms are usually six-axis models

Some of them can carry loads of several hundred kilograms

They also use a wide range of grippers

to handle different goods of various sizes and shapes

so the robotic arms can pick up many types of items

This type of robot is interesting

They introduced a new robot

called the “Successor” series

What is different about this model?

It is remotely operated

The woman in the photo was using it

I also tried operating it on the day

remotely controlling an internal robotic arm for spray-painting

So what are the benefits of remote operation?

First, you do not need to enter the spray area, reducing exposure to hazards

Second, you can control multiple robotic arms at the same time

Third, it addresses a common issue

“an ageing workforce”

Will the robotic arms make skills not be passed on in the future? No

With experienced workers operating the robotic arms

together with AI and big data analysis

AI can learn and optimise techniques to improve efficiency

So it is not just passing on skills but even improving them

This is the remote control device

This one I won’t elaborate on

It is a robotic arm used for medical applications

What is different about it?

Its surface is smooth and made of stainless steel

For medical equipment

the materials must be chemically resistant

and also corrosion resistant

And most importantly

medical robots often

use atomised hydrogen peroxide

for sterilisation and disinfection

So their design is very different and using stainless steel is essential

This type of robot is also very important

Let me show you

this is called a collaborative robot

In the past, when we used robotic arms we did not really think about the concept behind it

Over twenty years ago, I was in the Labour Department enforcing the law

Robots and robotic arms operated in such a way

that it was safest for people not to get close to the machines

But that no longer works because Industry 4.0 is now being implemented

In Industry 4.0 applications

humans and robots must work together

So this introduces the concept of collaborative robots

In the video on the right

you can see what we call dual-arm collaborative robots

They take up about the same amount of space as a person

You might say, is not that dangerous?

If people and robots work side by side, if the robot hits someone

it would be very dangerous

But these machines are equipped with many sensors

The sensors are designed so that

as a person gets closer to the robotic arm, it gradually slows down

To be honest, collaborative robots do sometimes hit their co-workers

Is it painful?

We actually tested this ourselves that day

In the photo on the left when we were struck by the robotic arm,it just felt soft and gentle

Though the design may look simple

What is the research behind it?

Let me briefly share

A few years ago, I visited Germany

and toured the Fraunhofer Institute for Systems and Innovation Research

Fraunhofer Institute for Systems and Innovation Research

This institute is one of the most advanced in Industry 4.0 applications in Germany

What did they study?

They studied how much force a human can withstand from a robot

In the middle photo, they used static loading

The robotic arm was fitted with different grippers, as shown in the top right

It lifted with static force to see how much humans could tolerate

The test subjects signed consent forms and volunteered

They were blindfolded during testing

On the right is dynamic loading

They did not just test static force

They also tested impacts from dynamic motion

to measure how much force a human can bear

This is the robot that underwent such testing

All factory-released collaborative robots must stay within human force limits

If you have time, look up ISO 15066

Putting it this way

ISO 15066 defines the safety standards

for collaborative robots

Collaborative robots are now used in a wide range of applications

This woman you see now

The company is famous

She works for a well-known consulting firm in Denmark

called Human House

She is smiling

Why? Because this collaborative robot

used its camera to capture her face

and then drew a portrait of her

Industry 4.0 technology

Collaborative robots are not just for industry uses

If you look online they can draw

but also make sushi and brew coffee

So the use of technology is not limited to industry

It is also important to employ them in daily life

Another impressive company is Sysmex

I have selected this photo to show that

In the future, surgery might no longer require human hands,it could be entirely robotic

That day, what were we doing sitting in this position?

We were seated at this console

Driving now, and involves a cockpit

the ultra-high definition display was beautiful

How do you operate it?

You control the robotic arms with your fingers on joysticks

What did we do?

We simulated human tissue like performing a surgery

moving the human tissue

Controlling the robotic arms, as seen in the top-left

you will see there are four robotic arms

Typically, surgery requires four tools

One arm holds the endoscope

Another one is for cutting

One for stitching

And one uses forceps to remove soft tissue

We found there was not much difference between using robotic arms and using hands for surgery

These robotic arms are 12-axis

The advantage is that they are extremely flexible

In fact, three years ago, Sysmex was the first company in Japan

to be approved to use robotic systems in surgery

Robotic applications are now widespread

To conclude

when we learned about risk management in the past

controlling risks is a matter of order

The same applies to technology use today

For example, elimination

through safe design in construction

Earlier, I showed some technology examples

like Building Information Modelling

using a digital replica

to eliminate hazards

If hazards cannot be eliminated, then substitute

We saw many examples like robots

I did not get to talk about exoskeletons due to time

There is a large expo on 7 & 8 March

where several Japanese exoskeleton companies will attend

The current challenge with exoskeletons is that they are too bulky

Can we develop simpler, more wearable exoskeletons?

In Japan, there are already one or two companies

making affordable, comfortable, easy-to-use exoskeletons

Engineering applications are crucial

Through sensors

through IoT, and AI

systems continuously learn and improve engineering control

Next, on administrative measures

Even personal protective equipment nowadays

has become smart wearables

There is a lot to try

Not only can it track your location

but also data like physiological indicators, heart rate and temperature

could all be measured and obtained

This is especially useful for preventing heatstroke

This final slide is a personal reflection

Because recently there is been a lot of discussion

about generative AI, it is a major trend

My younger son is in his third year of university

He uses POE and ChatGPT to write entire essays

some editing is still needed

But now we have tools like Gamma

that can make presentations and speeches

So tomorrow, I do not even need to be here

You could just get an AI avatar to give this talk

This is actually applicable and not a joke

A few months ago, I visited Hong Kong Electric

Maybe this is free advertising for them

They hold toolbox meetings

with dozens of languages spoken by foreign workers

AI can now speak in Pashto and Nepali

and conduct entire toolbox talks using AI

immediately speaking those languages

So AI's capabilities are very important

Even more striking is the bottom-right photo

This is a true story from the US

At a major art expo competition

an image titled Opera in Space

Beautiful painting, right? It won the grand prize

When they interviewed the artist

he confessed that he used Midjourney

and generated the artwork with AI tools

Generative AI is incredibly powerful

It is the results that matter

Many peers ask

will AI replace humans?

Think about that question after this seminar

I recently attended a Chamber of Commerce seminar

The speaker made a great point

For now, generative AI

Can not replace certain human traits

First, human emotion

Second, human creativity

Third, human understanding of industry shortcomings

These have not been replaced yet

So instead of worrying if AI will replace us

ask yourself this:

Those who do not know how to use AI might actually be the ones who get replaced

So in summary

we must make good use of technology, embrace it, and keep learning

Let's put our heads together

and explore how we can use technology to enhance productivity

and most importantly to improve OSH performance

That is all for today

Thank you all

Thank you for watching

(35:35)