Dear fellows of the industry,
I am very happy to attend the seminar today
I remembered I was invited to talk about the safe design of building previously
Most of seminars'theme this year
are on the same aspect,
including the Development Bureau
The theme of the Safety Week held by the Development Bureau at the end of May
was also about building safety design
After setting off the wave,
the same theme was used at the seminar
of Hong Kong Institution of Engineers (HKIE) at the end of June
The Joint Utility Seminar last month
had also mentioned this topic
There would be more seminars in the coming months
to cover this topic. This was good,
because everyone started to pay attention to
how to consider safety issues in terms of design
Everyone knows that the architectural design of Hong Kong
is beautifully designed and has won many awards
And everyone knows that there are also many famous landmarks
Behind the design, have you considered the occupational safety problems involved
in the maintenance and repair at the post-construction period?
Nowadays, many buildings are beautifully designed
with irregular shapes and protruded floors
The gondolas may not be able to reach these areas during maintenance,
and rope access was certainly not feasible
Twenty years ago, the Labour Department had clearly
listed in the Construction Site (Safety) Regulations,
that boatswain's chair or similar devices were prohibited,
How can the maintenance work be carried out in the future?
These photos were shot by the fellows of the industry,
we often shared photos with each other.
Obviously, when the air conditioner requires repairing,
the only way is to climb out of the window directly without any protection
Is it dangerous? Yes, it is very dangerous
This position is also shot by an industrial practitioner
Climbing out of the window from the balcony to
repair the air conditioner

is also very dangerous
Everyone should take heed of this
The external walls of building are finished with better materials,
such as, aluminum panels, marbles, and large bay windows, etc.
There are no places for installing anchor bolts
There are no places for installing anchor bolts
Can this metal brackets fully perform here or
just appear as a fake installation?
The louver couldn't take up the loading and the anchor bolts were not used
The bolts installed close to the louver were also dangerous,
because the position of the anchor bolts were too close to the wall edge and
the concrete would be broken easily
You have more knowledge about these than me
The anchor bolt would be safer if it is at a minimum distance of 150 mm from the edge of wall.
When repairing and maintaining these places,
if there are no places to install anchor bolts to secure the scaffolds,
it would be dangerous
Besides, about the rooftop of the building,
the water tank needs regular maintenance and cleaning,
it would be dangerous if there are no guardrails on the roof
The canopies are also the same, the cleaning worker needs to clean it outside
At a meeting with cleaners many years ago,
I understood that the cleansing company only provided safety harnesses for them
The effect would be limited if there were safety harnesses only,
the biggest problem was that there were no places to anchor the safety harness securely.
If you propose to install "anchor bolts" on the wall,
the property management company would not accept the proposal
If the safety equipment and measures are not considered at the design stage,
there will be many problems in future maintenance and repair
Development Bureau and Housing Authority are promoting building safety design
which is a brilliant idea
During the design phase,
the owners, designers and related stakeholders,
all joined to discuss the probable problems relating to
the occupational safety and health during the construction and maintenance stage
It is very good

The Housing Authority held a Workshop on Planning and Design for Safety
at the end of March 2010
HA published this 100-page
Pictorial Guide to Planning and Design For Safety
This book is very informative with plenty of pictures and texts
The editor is enthusiastic and this book is being updated
There are many examples of building safety designs
HA coordinates
all construction safety designs and
requires the contractors to observe through the contract
Under the coordination of the Development Bureau,
in different works departments,
for example, the chief engineers vet and approve the safety design
We reviewed the "Guidance Notes of Design for Safety" with the Development
Bureau three years ago
The Housing Authority and the Development Bureau implemented simultaneously
Three years ago, they invited us,
we also contacted experts from
to discuss how to promote building safety design
in the works departments
Three years ago, we visited seven construction sites
of the works departments and two construction sites of the Housing Authority
We met different stakeholders to discuss how to promote building safety designs,
we opined that their opinions were very important
We interviewed 232 people, including owners, designers,
project supervisor and contractors, etc.
They provided a large number of opinions
How to promote? We believe that
the communication and cooperation of stakeholders is extremely important
During the review process, many stakeholders said that
because it involved too many stakeholders during the design phase,
it might not be able to adopt measures to address the problem at the root
UK implemented the Construction (Design & Management) Regulation (CDM)
which had considered this issue in 1994
In the past, safety was considered to be the scope of contractors
The UK regulated owners and designers to participate together
through the Construction (Design & Management) Regulation (CDM) and
set up a role called "CDM coordinator"

From the past experiences of the UK and the Development Bureau,
we called this person
the Project Supervisor,
and he is called "CDM coordinator" in Britain
During the design phase, let the owners consider
and give advice on issues and measures related to occupational safety and health
If the coordinator is the principal designer,
it would be more effective and able to adopt measures to address the problem at the root.
Gradually simplify the stakeholders during the review,
owners, designers, contractors, future users
and maintenance supervisors, all of them have the responsibility to promote building safety.
What should different stakeholders do
at different stages in the project can be decided after deliberation,
but it is quite difficult when we come to actual execution
Everyone is quite familiar with the whole project phases from design,
tendering, construction period, occupation and maintenance after the handover
which are inter-related
Owners, designers, and relevant stakeholders
discussed the risk assessment during
the design phase and this is very important
Currently, many risk assessments
only focus on the construction period
However stakeholders related to the design phase,
should conduct risk assessment too
Considering the future construction and maintenance periods,
if all the risks could be addressed, it was quite good already
However if not, there are risks left, they would be in a puzzle
The tender should indicate that
the contractor must submit the
Pre-tender Health and Safety Plan when submitting a bid
Safety plans are divided into two categories,
the Pre-tender safety plan before entering the bid,
which was very important because it was about the residual risk,
whether the construction method or the materials used could solve these problems or not in the future
After awarding, they also needed to submit a detailed safety plan

According to the requirements of the Safety Management Regulations of the Labour Department,
the pre-tender and post-tender safety plan submitted by the contractor must meet the fourteen elements
This information was very important which
was for the use, repair and maintenance period after the handover
The users must know
the information related to maintenance and application
The occupational safety and health information must be given to the user which allows the users to notice the safety of maintenance and repair
I would not go into details. We made different lists
during that review meeting
People often asked for tools for them to use
These matrices are simple,
preliminary hazard analysis is conducted during the design stage,
taking into consideration the construction site, entrances and exits, transportation facilities,
and a number of issues such as how to handle temporary bracket,
the potential risks of these structures,
the risk of anyone or material falling from height
We will consider different issues
through these matrices, let the peers do
a proper risk assessment in the design stage
In the UK, they emphasize colour management
There are three colours here,
red, orange, green
Red means dangerous in terms of occupational safety,
dangerous processes and materials which
should be eliminated during the design phase
If it can't be eliminated, orange means that these processes and materials should be minimized
Green is the safe processes and materials which our industry peers are encouraged to use
At the design stage,
for example, rooftop maintenance facilities are red
We must provide safe entrance and exit
Green, the HA is also adopting,
for example, the use of prefabricated building components

to reduce the risk of working at height
Through the classifications of different colours,
let the colleagues work ahead at the design stage
These photos are extracted from the Pictorial Guide to Planning and Design for Safety published by the Housing Authority. After editing, the Guide contains hundreds of good examples
Guardrails provided at the edge of the canopy can
provide a safer environment for the cleaners to work
It is safer to have a working platform and guardrails when repairing facilities
The design concept of the HA is brilliant,
the designer will try not to use the fixed climbing ladder (cat ladder) and
will design a staircase with a handrail because it is safer
HA plans early during the design phase
It is also very difficult to work on covered walkways
It is common that the workers fasten their safety harness on the horizontal wire on the top of the covered walkway
but this is actually useless
Covered walkways are 2 to 4 meters high from the ground,
workers usually wear safety harnesses, lanyards, fall-arrest buckles
and the lifeline, you can calculate the falling distance
If it is "hanging at high and using at low" is still good,
otherwise, the horizontal wire should be installed at a low level
The height of a person is about 1.7 meters,
plus 1.2 to 1.5 meters lanyard,
the sum of the two is more than 3 meters already
There should also be a fall arrestor if you want to grasp the lifeline,
this also takes a little length
The falling distance is only 4 meters
If you think it would be safe to wear all the equipment,
this will only lead to direct fall
Smarter colleagues will use telescopic fall-arrest devices
which include a lanyard, a fall arrestor and a lifeline
A device with a three-in-one function will be better
However the HA has done a better job by adding the guardrails
We must consider the hierarchy
Instead of considering fall-arrest measures only,
HA would consider adding guardrails and solve problems from the source
Is personal protective equipment the first or the last line of defence?

It is the last line of defence and this concept is very important
This is also an example of the Housing Authority
I want to point out a very important point,
we need to consider the relevant safety measures during the design phase when we are constructing a new building
Currently at the meeting of the Construction Industry Council (CIC),
the committees have difficulties in recognising the needs for safety measures
Regarding current building safety design,
there is no Building Safety Design Committee,
but the Committee on Construction Safety,
needs to work on different tasks
One of the tasks is called
Repair, Maintenance, Alteration and Addition(RMAA),
Renovation, Maintenance, Alteration and Addition Sites",
into which the concept of safety design is infiltrated
There are two areas under discussion in the Task Force,
one is to discuss with the Buildings Department
about approval of the floor plan for building a newly designed building
The other one is post-additional measures relating to existing buildings
If you only consider the new buildings, how to deal with existing buildings?
There are a large number of buildings in Hong Kong that have existed for 30 years to 50 years,
how to carry out maintenance?
Another group is thinking about how to handle the existing buildings,
as a good example, there are many buildings with canopies
Ten years ago, the Housing Authority
installed horizontal wire on canopies
Other measures include the fall-arrest device
for access to lift shaft
These catladders are close to the wall,
workers may fall carelessly when they are climbing them
Now the Housing Department added the anchor bolts,
fasten the bolt through the "sheep eyes ring" to
make the work safer
It will be difficult to implement these fall arrestors
if they are not considered during the design phase
The OSHC emphasizes the importance of safety design
Ten years ago, I was in charge of a project,

13 people died in an accident in a truss out scaffold in 2006
and half of them were young people
In the industry, young people prefer working on truss out scaffolds,
and don’t like to obey the fairly large number of safety rules on large construction sites
Young people love to work in the truss out scaffolds because they can work in their own way
The truss out scaffolding companies can complete 5 working locations a day,
it takes an hour to erect a truss out scaffold
They are busier than the pop stars. They went to Yuen Long after finishing their work at Tuen Mun
going hither and thither
Implementing a mobile temporary fall-arrest anchor device,
many users report that some locations are not suitable for installation
Honestly speaking, it is better to use the anchor bolt and find someone to examine the bolt
Some truss out scaffolding companies said that,
it took an hour to build a truss out scaffold, and it was still necessary to find a structural engineer to inspect it
they found it difficult to do this
Therefore, we implemented the mobile
temporary fall-arrest anchor device ten years ago
However some places are still unsuitable for installation of the device
We introduced "aircraft clips" three years ago,
which is a modified version of the Transportable Temporary Anchorage Devices (TTAD)
Clip it on the old buildings that have short walls or a position without a bay window,
as long as it can be clamped, it will be fine
In terms of design, we are discussing with suppliers
We are studying the situation that if there are fixed windows,
whether this position can be lengthened to cross the position of the fixed window
Even the positions that have a window sill can be clamped
The aircraft clamp can be fitted with two supports with extension to the working platform
to carry out support. This is possible
If we have ideas,
We still need the safety equipment company to persuade manufacturers to manufacture

for us to examine
We have another plan
We worked with another team on the design of work at height two years ago
Currently, the accidents of work at height usually occur at height of 2 to 3 meters
Please don't underestimate its lethality
In the past, we used to say that work at height,
Then we renamed it to work- at- height,
and now called off-ground work
We gradually took our guard down,
we thought that the height is only 2 to 3 meters,
why do we need so many safety measures?
Death accident happened because of this
The steel bars just seen, depending on the position of the fall,
if a person falls on the steel bars,
even if he only falls for 2 to 3 meters, it will cause great injury to him
There was an accident last year which was stabbed by steel bar,
the worker did not know how to deal with it and pull the bar out
The worker's blood came out continuously on the way to the hospital
which was very dangerous
Please discuss with suppliers when designing ideas,
think about using the mobile working platform firstly
You guys are more familiar, usually a 2 meters or 4 meters high working platform
However we are discussing with the safety products company whether
they can design a mobile working platform which is shorter than 2 meters?
2 years ago, we promoted the design
which is suitable for working at 1.8 meters
The lower part of the working platform is foldable
which is different from ordinary frames
The upper part needs to be built and the bottom part is foldable, which is more convenient
For the use of these mobile racks,
we discussed with the contractors association and the HKFEMC,
the Subcontractor Association gave us a lot of opinions,
and they all expressed they couldn't use it
especially in the machine room and pump room
They switched to use step platforms
The contractors used to tackle all kinds of problems with ladders in the past
However we hope to give the industry more choices

We don’t encourage workers to work by using ladders,
The Labour Department also does not encourage this working format
Can there be other ways?
We discussed with the safety equipment company to add equipment to the ladder
In the past, the ladder did not have guardrails,
but the ladders nowadays have guardrails, handrails, and toe boards and
two wheels are added at the back
which allow the folded ladder to be easily transported
Colleagues said that the step platforms are able to be used in the machine room and pump room
However if you want to apply wallpaper in the interior decoration,
you still need 1-meter moving range
So, we also created the hop-up platforms
There are different kinds of hop-up platforms in the market
Ten years ago, there were aluminum hop-up platforms
After adding guardrails on it, it will make the hop-up platforms flip
Now the design of hop-up platforms include cross supports at the bottom
in order to strengthen the support and meet the standards practically
For example, in the past, the standard for mobile racks was EN1004
and usually, there is a standard for racks of 2 meters or more in height, but no standard for those below 2 meters
It needs suppliers to find certification body to conduct
load test according to the standard of EN1004 to see if the hop-up platform can bear 150kg
There is also an anti-tilting test that needs to be done properly
standards-compliant reports,
then it can be introduced to the industry
Since we are all concerned about the safety issues in the industry,
the design of the portable circuit breaker was introduced a few months ago
There are countless circuit breakers in the market
We found that there are several problems
The circuit breakers have the body only,
the other components need to be assembled by yourself
thus making the quality difficult to be guaranteed.
Secondly we find that the one who got an electric shock may not be an electrician,
but workers who use electric tools
The original distribution box has a circuit breaker,
the reason for using the portable circuit breaker is that if the circuit breaker in the

distribution box fails,
the portable circuit breaker can provide extra protection
It is not replacing the circuit breaker in the distribution box
However the protection of workers should be strengthened
In order to accomplish this,
we held meetings for half a year to discuss with suppliers
All components require a certified component safety document
This is still not enough. After the assembly of components is completed,
it needs to have a product certification
I hope to explain to you on other occasions in the future
We are implementing a product certification system,
including design, product certification on
how to ensure the products meet the safety standards
For example, we use the IP67 waterproof rating,
the waterproof rating in the market is only IP44, how can we accept this standard?
Some of them reach the IP5 level, but we still think that is not enough
IP67 is the highest standard
If you search online,
this is the highest standard of dustproof and waterproof
We hope that the product will ensure the safety of the workers
and meet safety standards
You also did some safety designs,
I am also familiar with these designs
For example, these " nets above and snare below”installation were provided ten years ago
The telescopic tools used in the bar bending yard
are very convenient
Mentioned just now, please don’t mind
The Labour Department inspectors here are more professional than us
There are various protection devices in the market now,
I am not trying to say that these devices are fraudulent
My major is safety design, please don't mind
If the workers are falling from a height, will they be safe?
Fortunately, the short film just failed to play,
if it can be played, everyone may be scared
The short film was taken by a colleague,
they threw the dummy from a height of 2 meters,
the steel bars stabbed into the body of the dummy

If it’s a real person, it’s really unimaginable
We are not promoting products for suppliers,
as a consultant, we seem to be selling products, but it is not
This British product is made of reinforced rubber
There are two models of your helmets,
either reinforced rubber or ABS manufacturing,
reinforced rubber is a reinforced material
The falling test is not deliberated,
will the dummy be pierced after the fall?
We emphasize the importance of safety standards,
the industry is also concerned that the electric box lock is broken
When a short circuit is encountered, the electric box lock will be broken
to reset the power of the electric box
If an unauthorized person opens the electric box,
the power will be cut off under this design,
and there is an alarm device to prevent abuse by others
In addition, this hook has a safety lock because there have been accidents in which
the sling slipped out of the hook
The safety latch with a safety lock will be safer
Look at this wrench clamp, this tube
and many other designs, these are created by the industry
for safe design
In the past, for pouring concrete,
it was necessary to hang a worker to operate concrete pouring at height
Now there is a remote-control method
to address the issue of working at height
I have also seen colleagues using
an aluminum telescopic working platform
In the truss out scaffold, you can also see the aluminum telescopic working platform
which can be used at different heights
Just mentioned,
if we use building information modelling (BIM) more often,
in fact, it helps the Housing Department, the Development Bureau
and the Construction Industry Council (CIC) to promote workplace safety
Various equipment such as guardrails throughout the construction period
can be simulated by Building Information Modelling (BIM)
Even lifting can be simulated,
when lifting large components, simply

simulate through Building Information Modelling (BIM)
After the simulation, it can also be combined with safety training,
and let the contractor understand more about the situation at the time
I have another role in the Logistics and Supply Chain MultiTech R&D center
under the Innovation and Technology Commission
Radio Frequency Identification (RFID) is not a secret,
it was widely used in the logistics industry twenty years ago
For example, aircraft baggage transport,
it only needs to use the radio frequency identification (RFID)
code, the baggage can be automatically transported to the appropriate location
In recent years, radio frequency identification (RFID) technology
started to be applied in the construction industry
There is a group under the Construction Industry Council (CIC),
named safety technology research and development
I am also one of the members, working with the Innovation and Technology Commission,
trying to use radio frequency identification (RFID) technology
in danger zones
There are many dangerous zones in the construction industry,
for example, lifting has a danger zone
Don't underestimate the situation of reversing the vehicles,
there were some accidents,
the dredgers are carrying out road maintenance works,
when reversing, the position is limited and they will encounter blind spots,
workers will be injured, this is also one of the blind spots
What about the danger zones?
For example, the contractors are doing the same thing
Installing the RFID at the hook position, it will enter the danger zone when it descends,
the system will sound an alarm when someone is inside the danger zone
Radio Frequency Identification (RFID) are also placed
beside and behind the crane
which can remind workers
We are assisting the Innovation and Technology Commission in research and development of safety harness
Even you put on the safety harness, you might forget to have it buckled onto lifeline in the past
Can we remind workers to remember to fasten

the safety harness through technology?
The sensor is installed on the fall-arrest buckles,
which can sense whether the fall arrest buckles are connected to the lifeline
If the fall-arrest buckles are buckled reversely, the sensor will also prompt,
and the sensors are also installed on the other side
We visit the Innovation and Technology Commission with the four major suppliers earlier,
lobbying them to conduct product testing and
look for a brand to test
after obtaining product certification
The scaffolding industry is willing to accept
A few months ago, I met the four scaffolding companies unions,
they also hoped to get the data for reference
The current data can show the use of safety harnesses by co-workers
through smartphone applications.
Not only can remind the workers on the spot,
but also can help site managers to monitor
We are also thinking about how to drill down
The contractors have also developed different mobile apps
Today's mobile apps are diverse,
which can be used for safety inspections easily and checking certificates,
and it can also be applied to work permits
After use, data can be uploaded to cloud storage for sharing
Recently, we also studied the application of technology onto the gondola,
it’t not the deficiency of safety measures, actually, it was done well
In terms of designs,
the Anti-tilt Device
will stop the operation of the gondola when the inclination is more than 14 degrees
The downward movement can still be less than 14 degrees, but the device cannot work when the gondola moves upwards
Therefore, there is a potential danger in terms of upwards movements
In a similar situation, one side of the gondola was obstructed by a bamboo member,
but the gondola continued to climb,
and the gondola became tilted, and this is troublesome
A study is being conducted in which there is a mechanical locking system when the gondola descends,
and ensured that the maximum tilting angle is 14 degrees,
and when the gondola moves upwards, it is monitored by an electronic locking

system
When using an electronic system, it must meet building standards
The EN1804 has listed all standards
Anti-tilt Device
is the direction of recent research
Sometimes, it also involves the overloading devices
We are familiar with
the Automatic Safe Load Indicator (ASLI) used in cranes
For gondolas, it cannot be ignored,
I know that some colleagues have some research in this area,
but EN1804 also clearly states that
if the gondola is overloaded, the operation will be stopped,
which cannot continue both ascending and descending
These designs of these devices are able to meet the BSEN standards
We are following up with the design of the gondola companies on meeting the standards
for these safety devices
We are also studying the truss out scaffolds for wall maintenance
which is also considered as high-risk activity
There are some other options for the industry
The foreign countries are popular with something called
Window Scaffold Design,
this is not a secret
This is from the Netherlands, this is from Germany,
which is used outside the window for maintenance purposes
There is a difference between the window of a foreign country and the window of Hong Kong
Those windows of foreign countries are opening inward, while Hong Kong is pushing outwards
There is a support in the middle and also fixed windows
I am also responsible for another research project,
which is designing another combination
There was a related research 10 years ago,
after winning the award, it can only be stored in the warehouse
The design should be practical, and the manufacturer is willing to produce it for the industry to use,
which is not easy at all
Last week, we implemented an action,

and found a metal scaffolding company to do the design
They looked for another consultant company to
take care of accreditation and testing of those designs
We are also responsible for product certification
of the material quality of the aluminum frame and how to do the load test after completion
We also emphasize how to repair in the future
General maintenance can be done from the side of the window,
the new design requires the frame to be extended to 300mm,
and it is movable
They can do the maintenance work on one side
Materials should be convenient and lightweight
to make it easier for transportation after combination,
and the price cannot be too high
It is still in the research and development stage,
after production, it is expected to be priced below 10,000 dollars,
the price is not too high
Now the cost of truss out scaffolds and insurance is more than 3,000 dollars,
10,000 dollars can be used more than three times
Now the aluminum frame pulleys generally cost more than 20,000 dollars,
fiber racks are even more expensive
We tried to develop and design a product
which is simple, convenient and does not cost too much
We hope to rewrite the history,
by providing more options on exterior wall repairing
besides the truss out scaffolds
Thank you