

g Transcription: English subtitles

Here is the footage from "Site Safety Seminar for Capital Works New Works Contracts" organised by the Hong Kong Housing Authority on 30 April 2015.

The speaker is Mr. Peter CHAN, Chairman of Hong Kong Gondola Association Ltd
His presentation topic is "Safe Operation of Suspended Working Platform"

Mr. Peter CHAN:

Then I'll talk about gondolas.

Speaking of gondolas, many people look scared and would dangerous

Let's look at the past records. We need not go back too far

Since the return of Hong Kong to China. After 1997,

Fatal record related to gondolas, due to equipment failure
was indeed zero. No fatal record.

I mean,

even there were gondola accidents, they never caused death.

Why do I say so?

Let's take a look at these equipment.

No matter whether you have fastened a safety belt or not, whenever it fails,
once an accident occurs, Most likely it will lead to death.

If you fall from a height of 40 or 50 meters, what equipment can save you?

This equipment cannot protect you. Falling from a height of 30 or 40 meters the
injury would be serious.

Including other equipment, The access equipment is the so-called scaffolding.

In case of failure

it will cause death too

or severe injury of worker. For gondolas,

consider

them

the equipment may fail, Accidents would happen as well. But no death has ever
occurred only due to failure of equipment. There was injury,
but no fatal case.

We've seen a lot of accidents on the news.

Gondolas are of great news value.

Almost every accident was on the front page. Then are there any fatal cases?

Yes, the above picture was in Hong Kong, and the bottom one was in a foreign
country. Both had a common point.

In these fatal cases,

besides the failure of equipment,
a very simple and single action was not performed,
which was the provision of safety harness and independent lifeline specified by
legislation. The cause of death for both cases was the same.
Four to five workers were dead in each of the incidents shown at the bottom, and
one worker was dead in the incident shown on the top.

The causes were the same.

The workers did not wear the safety harness as stipulated by legislation.

This is the review of past gondola accidents.

Then let's look at

the decade after 1997 and see

what improvement had been made in the industry of gondolas and government
supervision.

Let's look at the improvement. What has been improved/modified?

First, what had been improved in the perspective of equipment and mechanical parts
of gondolas.

Previously, the motors and climbers
could lift the weight of about 500 kg.

Currently, the lifting capacity of the climber widely used in the industry are basically
630 to 800 kg,

The climbing performance had been improved. In the past, we used the so-called
disc motor.

The disc motor

had a problem, i.e., no heat dissipation. If the building had 40 floors,
the motor would have been burning hot when it climbs to the 20 th floor or so,

as it has no heat sink or cooling fan.

What is the advantage of disc motor?

It is relatively smaller and more compact.

But basically its problem is greater than its advantage as it is easy to overheat.

While the new motor has fan, heat sink, allowing it to work for a long time.

Basically, it can reach the 50 th or 60 th floor in one go,
without the overheat problem. This is an improvement.

The motor and climber

used in the past had caused many accidents.

In the aspect of gear box and gear case,

one group is called sun gear. Here is a set of planetary gear

The sun gear will drive the external set of planetary gear and play the climbing

function.

We can see that actually the sun gear is very small,
if the maintenance is inadequate, Wear and tear will occur.

When the gear is worn due to excessive abrasion When it fails,
the entire gear box will fail.

Then the climber will fail completely, as it has been unable to brake.

A lot of accidents occurred due to the sun gear.

In the new climber design, there is no such design anymore. There is a simple design,
we call it worm gear. This is the turbine This is the worm.

This structure on this side is much larger than that side. Let's look at the sun gear
again.

This is the sun gear which always fails. This place is very small

Compared with the new gearbox, the relative part of the new climber has been
enlarged for many times.

Since the introduction of the new climber, the failure of gearbox is basically zero.

And no case of gearbox failure ever happened again. This is the improvement in the
climber.

Another improvement is on the safety device, we call it safety lock.

The safety lock we used previously was called centrifugal lock. What is a centrifugal
lock?

It's just like the seat belt that we use in a car. When you get in a car,
you can pull the seat belt slowly. How does it start working?

It has a centrifuge,

when you pull it quickly, the centrifugal lock will work and buckle the seat belt.

In the past, this design was adopted as safety device of gondola.

If the climbing machine fails and slides down, the suspension rope,

the main suspension rope is broken, and the gondola falls,

over certain speed,

the safety lock will keep the gondola steady. But this lock has some problems

I have just mentioned, if you pull it slowly,

it won't lock.

If your gearbox is out of order it falls down slowly,

it will come to a vertical position, like number 1, without being locked.

Or if the electrical part has a problem, the control system has a problem

you press the button, it will move slowly, without being locked,

as it is not fast enough.

To cope with this situation, we have changed to use the new lock.

The new lock has two protective effects and its startup does not rely on speed but on angle.

Once the gondola rope was broken, as we call "goose-head" falls, the rope clip inside will clamp the safety rope

and keep the gondola from tilting over 14 degrees. There is another action.

Think about it, if the gondola falls on one side, This side will also fall, so even if the gearbox is out of order, it will slide down slowly, as long as the gondola changes its angle, the lock will be activated.

As it is not like

the flywheel with a bracket.

It just relies on the change of the angle To stabilize the gondola

This is one of our other improvements. Basically, we rarely see this.

Now we all use this lock.

About the independent lifeline

until now, many people use eye bolt, known as eye socket.

As we basically rarely use it for its high unreliability.

In our test, this kind of fracture often occurred.

Generally, a simple method and reliable method is

to use a screw to make a bracket an M16 screw,

which is safer,

but may not look very nice. This is stainless steel, more or less,

but fracture occurs like this.

Instead, there is more data on some screws on the shear.

There is also data on steel angle. Basically this seems to occur a lot in our test.

I'd like to talk about steel rope

We used to adopt six-strand steel rope very often,

In particular, in the new type of climber we use, with the capacity of 630 kg

it often becomes loosened easily,

and the bird caging will become loose. As there are a lot of gondolas, Includes those in mainland,

now there are a few hundred thousands,

the steel rope company has designed a special steel rope for gondolas, which is called four-strand torque-less.

We call it low-torque rope. It's woven.

You can see the outside of the strand is thicker, as our climber adopts some traction motor.

Traction motor

is driven by friction.

The external layer will undergo more wear and tear. So we arrange thicker strand for the outside,

which will be more durable. The most important is that, it is less easy to get loose compared with the six-strand steel rope,

and is very reliable after being used for more than a decade. This is also an improvement in our industry

We have used, for many years, up to now,

the bulldog clip, which is useful.

There isn't any problem It is good in operation.

But it has a problem that it takes time to install the bulldog clips. We need to install four here.

There is a problem.

The joints here and there

when you finish the installation, the rope is damaged.

We have made improvement on this equipment. In fact, these are not new things, just improved wedge socket, also called carp, or boot.

There is a wedge here. And there is a socket here

This can be installed quicker,

which has reduced the installation time. Now it is not very common in Hong Kong.

But in the mainland, they widely apply this method to replace the old design.

Some people are using it in Hong Kong, but it is not that popular

compared with that in the mainland. Also for our installation tools, formerly a spanner

and needle nose pliers were all we have. Now we use power tools.

Power tools have two advantages First, it's fast,

The tightening torque

on the screw or on the clip. The torque is accurate.

As it is electric,

it will give a certain torque,

which helps improving the efficiency of the industry.

These are common practices.

We used to adopt poor waterproof plug in the industry.

Industrial waterproof plug IP44 can withstand rain, or even splash. But in many cases, if there is water ponding in some places, while there is no way to hang high, There will be problems.

So we start to widely use IP67

A waterproof plug with higher level of waterproof capacity. And we also improve the function of electrical appliances In terms of installation, I have mentioned, the hardware is upgraded.

Then let's talk about

the installation, in the installation method, whether there is room for improvement to make it safer.

The safety we talk about,

refers not just to the safety of the equipment itself

but also the safety of workers in installation of gondolas , as well as the safety of buildings.

Let's continue.

As we know, many people like to use anchor bolts, as they think there is statistic support.

But don't forget that

anchor bolts are destructive to the building.

This is destructive method destructive method.

For many years, we have used non-destructive methods in the industry. These do not use any screw.

Just use the structure of the building as the supporting force, Clamp on the structure such as the columns and beams.

But unfortunately many people do not accept these practices, which have basically been used for almost 50 to 60 years

in Japan,

and 50 years in Hong Kong.

But a lot of people could not to accept it. Look at these,

the damages caused by anchor bolts. Think about it,

if I install anchor bolts Installation here this year, and install again next year,

after a few years, we cannot install any more, as the whole wall has been used.

In particular, these problems occur in maintenance. Yes, there is no problem for the first time.

You can install it and drive it in.

The next year you install in another place. When you continue,

the whole wall will be damaged,
and there is no more place for installation. We can use some of our traditional methods.
But it seems that people tend to go for this direction.
However, the methods used in our industry seem not generally acceptable.
It's weird that
we are guided by outsiders on how to install gondola. Speaking of the installation method,
let's look at
the building safety.
Our traditional installation method is basically by pulling.
There is a frame at the front and a frame at the back.
All the force is pulling toward the surface.
But we now look at the installation method in the guideline. It seems to violate our design.
There is a great bending force applied on the wall. So this wall is not safe for the building.
This wall falls,
it was not completely broken, but cracked.
We can look for some investigation.
I have to talk about the loading of the gondolas. The approved loading is 250 kg,

including people and materials.
But we can see the situation.
In view of the operation,
Only these items are already 600 kg, not including the weight of people.
I think the whole set of the equipment and gondolas are related.
But such operation cannot be performed, Right?
If you pay attention only to this, but not the operation, accidents will still occur.
As we know,
in fact, Hong Kong people will never rely on these clamps, the most sturdy thing in the whole system
is that piece of thumb size steel rope.
Many people think that this rope is easy to break. That is a steel rope.
Now we use 8mm steel rope, as thick as a small thumb.
Its breaking force is 5 tons
That is to say, in the whole set of equipment, no equipment is as strong as the steel rope. But we heard the rope breaking for many times. I worked in gondola business

for 20 years,
and steel rope never broke. The frame may be broken, the outrigger.
Our design concept is
The anchor will never break.
The frame is just for saddle operation Saddle operation.
What does the saddle mean?
The bridge tower is applied to hold the bridge. Once the tower is removed,
the bridge will collapse
This is the method it adopts.
It hangs the bridge to the ground anchor. It can slide here as well.
It just lifts the rope high, and pushes it forward. Even if this position is broken,
the gondolas will not fall,

only this position will fall down.

These are some of the practices and habits in our industry. For the decades of
gondola development in Hong Kong,
I can say that the gondola technology in Hong Kong is basically the most advanced in
the world.

If you ask who said that, I did.

I just reviewed the installation method and hardware.

In fact, the Government has paid great attention to gondolas. Why do I say so?

No equipment was ever given this level of attention.

For example, there is no specific law about tower crane or lifting appliances. Gondola
was under this legislation.

Lifting gears, lifting appliances

F&IU Lifting Appliances and Lifting Gear Regulations Shackle, lifting appliances and
excavators

all were controlled under this regulation

But later there is a specific regulation for the gondolas.

The requirement under F&IU (Suspended Working Platforms) Regulation is more
stringent than that for tower cranes and other lifting appliances For example, in the
first year of tower crane,

a new tower crane is required to test its loading capacity. In the following year, only
inspection is required.

If there is no climbing of the tower crane, and it is just set aside, testing would only
be required four years later

to test the loading capacity.

What is the inspection frequency of gondolas? For newly installed gondola, without

using,
it shall be examined every six months, a detailed inspection.
Engineers shall examine it again.
Then a loading test shall be conducted in twelve months with weight.
There is no such strict requirement on other machines. Basically, very few appliances have their own regulation,
including those elevating working platforms that are prone to accidents have mentioned,
there is no specific regulation on them, or even no regulation at all.
But for gondolas
There are a lot of codes of practice and method of inspection for gondolas,
The regulation is very stringent.
Then let's talk about the code of practice.
s
as we

According to the code, the legal requirement for practitioners is extremely stringent. There was a case,
we installed an appliance,
but the regulating authority commented that the device was unsafe and could not be used,
and initiated a prosecution to the High Court.
The sentence from the court was
the practitioners were not obliged to work in accordance with the Code of Practice,
but they had the absolute responsibility to maintain the safety of the gondolas. That is to say, no matter what the regulation has prescribed,
the practitioner should take full responsibility. There was no standardized practice in our industry Everyone had his own way.
And there is no specific instruction on how to install the gondolas. Many people depend on the so-called master experience,
Different companies and different people adopted different approaches. For this reason,
we have developed some industry guidelines so far, on how to install the gondolas.
For example, how many clamps to use?
How many clamps are used in the general practice of the industry? How to install the flying frame?
The installation method should not be applied when the angle exceeds certain figure?

We now have the guideline to instruct how to install the gondola, how to clamp the flying frame, or how to lock the electric box, how to lock it up, we have guidelines for the whole process. The guideline is developed by the industry voluntarily. In fact, we also have a systematic management system on site, including gondolas. There were no method statements, just rely on the workers' experience. Now there is a detailed method statement for every worker, and they will refer to the method statement to conduct the installation. In the past, the workers relied heavily on experience, and they had no idea whether the wall was suitable, a

whether the clamp would break the wall or not, or it may be a brick wall.

Now our structural engineers will provide us a lot of data of the wall, telling us about the loading capacity, which was not available before.

Now it is necessary, and this is the basic risk assessment.

I just talked about the present situation.

In the future review, we will review the previous situation and look at the current problems.

We have some schemes, some proposals and some comments I find that something very important was missing on site,

Which is the loading capacity of the gondolas.

For example, many people pay great attention to the installation method, how to install, how to clamp, whether the calculation is correct or not, and whether there is any supporting data.

After installation,

we always heard about the magic number of 250 kg. Right, is the loading capacity of gondolas 250 kg?

It won't be exceeded. No. This is actually very important.

What work process did you do? Painting or concrete spalling, They are different.

Or we need two people for cleaning the windows, the loading situation is different.

Now some people think that the bigger the gondolas, the greater the loading capacity.

But it's not a bus,

It's not a double-decker bus, more loading is allowed.

Relatively speaking, the bigger the gondola, the less loads it can carry. The loading

capacity will be reduced, is it correct?

As you know, the capacity of the gondolas' climber capacity will not change, Say 630 kg lifting force,

With two motors there are 1,260 kg.

If the gondolas are big, the corresponding loading capacity shall be deducted. The bigger the gondola, the less load it can carry.

Nobody has submitted this data.

Everyone just pay attention to the installation method, but no one cares about how to use the gondolas.

What are the gondolas used for? how much material is to be loaded? If you would like to load 600 kg,

it can be done by installing a motor of a larger capacity, or installing with an additional motor,

two motors.

Not just quit and complained how can we get it done? However, we never exchange this data.

We did not exchange data with the user.

We usually pay attention to the installation method only. Whether the cable has padding,

whether the corners are protected, These are very important data.

Whenever accident occurs, it was due to overweight.

And I have mentioned

the statutory inspection alert. This is a statutory inspection required by law.

Check the rope every day.

It is nonsense for our practitioners, how can you inspect the steel rope? Hundred meters long.

It cannot be done.

First, I do not know how to inspect. In fact, the guidelines are very clear

There are a few areas we shall check. Now what are the common problems? Problem of the safety lock

Problem of the emergency stop of electrical appliance Put it plainly, gondolas do not have many parts

In fact, the implementation of this guideline is to conduct inspection, which can be performed by workers every day. The daily check takes about

3 to 4 minutes, check the two locks,

Check the emergency stop,

I think it takes about 4 minutes or so. Then you can prevent many problems. It won't

take long

Check two locks

Test the emergency stop before operating the gondolas.

Let's talk about the regulatory situation. As I have mentioned, we need to inspect whether the gondolas have been properly installed,

whether the cables are new, old or any rust? In fact, accidents do not occur in those places. In these places,

if it was overloaded

It would be no use on how the installation was done, agree? So I think, except the installation,

Because the installation was done pretty well, under the current regulation and the inspection of engineers, Form 1 is required every week, and there is an inspection every day by a competent person, actually, the regulation on the installation of equipment is sufficient.

However, for the situation of usage, It seems that there is no control.

We do not know how much material is loaded on the gondolas.

As we

just mentioned,

there was an accident.

This equipment, the safety lock.

As my member asked me to mention this specifically.

Usually the safety lock was the cause of many accidents.

Without this thing, the safety lock will not be activated or will be delayed in activation.

So many members ask me to talk about it.

As we found on many sites that this was removed.

I do not know if it is for convenience or not.

Many members asked me to talk about this particularly. I hope that site inspectors would pay attention to it.

Now I'll talk about how to improve

how to improve the equipment in the future. As we know,

Currently many problems occurred are related to the climber.

Then, the second line of protection was missing. Usually, this part will go wrong.

This goes wrong first, then that one,

becoming a combination.

Two things go wrong, then accident will happen. It will fall off

and erect there.

In some of our projects

for example, currently they would replace this part.

It's easy to

replace the safety lock.

Our concept is like that for the airplane. For example, aircraft 747 has four engines, if one engine on one side fails, it still can fly.

But for the plane with only one engine on one side, if one engine fails, it cannot fly anymore.

We also refer to this concept. In some of our projects, no error is acceptable.

What does "no error is acceptable" means? After this part breaks down, you can say this is still working, as it is still hanging up there. It doesn't work.

No one can save you.

If you hang in the mid-air,

no one can get there to save you.

So we use two-climber system in many projects nowadays. We don't use this.

This is the case in law.

If you have two suspension ropes, you can abandon this.

If there are two suspension motors, safety lock is not necessary.

Then you can adopt this situation.

The advantage is

if there are two motors,

it will be much easier in the rescue. If one motor breaks down,

the second one can still make up. If there is overload problem,

If this has to be done for certain type of work. This can increase the lifting force.

We have seen a project. There are two situations.

First, it is to construct a beam above the bridge.

If you are stuck in the midair, nobody can help you. I mean, we cannot afford any error.

No one can save you if anything goes wrong. So we need to have six backup motors.

It means that the gondola is relatively heavy,

only six motors can provide sufficient lifting power.

If any climber breaks down or the steel rope is broken,

the gondola can keep the balance. We call it multi-climbers operation. Then let's look at other applications for multiclippers.

Let's look back to the last slide. I'm going down to a deep well. The key point is, after we go down,
As per our current design, if the power is gone,
I can lower it down. Safety on the ground.
For example, in the building construction, my safe point is the ground level.
For example, I was hung up there,
In case anything goes wrong, we lower the gondola. No problem.
For some projects
We are required to go down deep wells, it's of no use if you go down.
There may be sharks or crocodiles down there. If something goes wrong,
how can we save the person? We need to pull him up.
But for our climber, if someone goes down the well, Say a confined space,
if that person passes out,
it's useless even if the gondola is equipped with ten motors. You cannot save him.
So we will install two climbers above. In case of emergency, we can pull it up.
There are some cases for your consideration. If an accessory always has problems,
we should consider to replace it by the others. That's my suggestion for the future.
Well, that's my presentation today. Thank you.

