

Here is the footage of "Site Safety Forum for Works Contracts and Property Services Contracts 2017" which was held on 6 July 2017.

The speaker is the General Manager (Technical) of Chun Wo Construction Holdings Company Limited, Mr. Chou Shu-kai.

His presentation topic is measures to avoid work injuries by applying Suit X (industrial exoskeleton).

Good afternoon, distinguished guests, friends from the industry, ladies and gentlemen. Thank you for giving me this opportunity to share the risk reduction design which is the industrial exoskeleton, which also called Suit X.

First, let me explain the common musculoskeletal disorders (MSD).

There are three types, which are upper limb disorders, lower limb disorders and spinal health problem, referred to as ULD, LLD, BP

Everyone is also aware of its scope of influence, it won't be detailed here.

The causes are execution of repetitive work, incorrect working posture, excessive force and even working for a long time can cause musculoskeletal disorders.

This "prevention through design" is:

Chun Wo has an innovation committee to conduct joint research work with Hong Kong and overseas universities

and we conduct some innovative research work.

Under the framework,

we met professor Kazerooni from University of Berkeley.

He and his research team designed the exoskeleton called MAX, which is a whole body frame.

The full name is Modular Agile Exoskeleton.

The purpose is to reduce the risk of being injured

when the workers are doing intensive work by using their hands, feet and waist by wearing MAX.

They also hope that the wearer feels comfortable.

MAX is formed by 3 components.

The first part is Back X,

then Shoulder X and Leg X.

Briefly introduce the Back X, which is 2 kg for weight.

It is relatively heavy, and easy to feel the weight after wearing it.

After wearing it, when the worker is working,

it can reduce the load of the back muscles

How does this work?

We can look at the graphic of human in the middle,

there is a cushion at the chest which is linked to the legs, a mechanical spring is installed to it.

If you lean forward,

there will be a reaction preventing the body from leaning forward.

Some studies have statistically analysed the difference between wearing and not wearing the MAX, the difference between having support and not having support is around 60%.

The other component is Shoulder X

which is suitable for the work above the chest level.

As shown in the figure, lifting up the drill for drilling.

Workers can feel the support to his hand.

It weighs 5.6 kg originally,

If it is properly worn, the force will be exerted on the waist,

and then the force is transferred to the ground by the waist,  
then the weight will be acceptable.  
If it is not worn properly by tightening it up on your shoulder,  
The shoulder will bear 5.6 kg of weight.  
So it needs to be worn properly in order to get the effect.

The other component is Leg X,  
it is suitable for squat work, such as laying floor tiles, paving lighting conduit.  
Leg X can help the workers reduce fatigue  
if they need to squat for a long period of time.  
It also provides a small chair function,  
it has a lock mode, like sitting on a chair.  
Of course, we must maintain our balance.

In December last year, I met the professor for the first time,  
I invited the professor to visit Hong Kong and  
study whether this component can help the workers work or not.  
This component looks complicated,  
and we have concern about workers wearing it wrongly,  
and the equipment may fail to work.  
We invited the professor and his team to explain MAX.  
They gave us a lot of guidance.  
Before the workers put on the device, the managers wore it first  
and felt the weight of the device.  
Also, we invited industry professionals to give valuable advice  
when the team stayed in Hong Kong,  
Dr. Yeung also tried it on and gave valuable advice.  
After more in-depth understanding, we conducted a series of tests  
which lasted for 1 to 2 months.  
The 3 components were applied to 7 different sites  
and also the project of Housing Authority.  
During the trial period, workers wearing and not wearing the device were assigned to carry out the same  
work process.

For example, Worker A wore the device for two weeks of work,  
but Worker B didn't.  
They interchange position after two weeks.  
Let the two workers experience the difference and  
have an interview  
after two months of trials.  
Data was collected and analyzed by questionnaire.  
I share the results of the questionnaire with you here.  
The first question is:  
Can the device improve your safety standards in everyday operations?  
Everyone agreed to the benefit of Back X, and the effects were remarkable.  
There was resistance when leaning forward to lift a weight,  
so you could not over lean.  
The results of other components were vague,  
some workers even thought that it didn't help.  
The function of this device is to reduce the risk of workers having injuries,  
It does not make you powerful.  
It improves your safety standards.  
It just serves to protect you,  
makes you feel that it doesn't exist but  
It improves the safety standard.  
The second question is: can you improve the performance in your daily processes?  
As mentioned earlier, this device is not to make you more powerful, but to reduce the chance of injury.

So everyone did not feel that it could improve performance.  
This is the same as we expected.  
The third question: Will the device hinder your actions?

All interviewees agreed.  
For Back X, this is the answer we expect.  
If the bending is not correct, it will hinder bending.  
Keep your spine stay vertical.  
Fourth question: Will this device reduce fatigue?  
No need to explain one by one.  
Question 5: Will it be used every day?  
Most of them said no. This is the same as we expected, just as the beginning I said.  
Only a few people are willing to wear personal protective equipment (PPE).

I believe the reasons are the same.  
If the question is about safety helmet, the answer will also be similar.  
Of course, everyone wears safety helmets nowadays  
but is still unwilling to accept new components.  
This is the summary of our two-month trial.

Our next step is to use the survey analysis results  
for further research with the professor.  
They accepted our opinions  
and tried in different places,  
also got a lot of feedback and continuously improved the components by,  
for example, reducing weight, or using fiber to make frames.  
There will be a new version in August.  
Then we will carry out the test again.  
The sharing will finish here, thank you.  
The following part is the audience answering the questions asked by the speaker.

Mr. Chau, please ask a question for the audience.  
I have a question  
but forgot to give a hint previously, now I'm asking it anyway.  
I just mentioned musculoskeletal disorders (MSD),  
please tell me one of the causes.  
Anyone? Please answer through the microphone.

Assembly staff, this one at the front.  
Audience is answering question  
ULD.

Guest response  
This is just one of the symptoms  
Three disorders we talked about are  
upper limb disorders, lower limb disorders and spinal health problem,  
then what is the cause?

There is another friend in front who tries to answer this question.

Audience is answering question

Repeated actions.

Guest response

Correct.

Congratulations. Thank you, everyone.

Disclaimer

Safe Work· Zero Incident

Site Safety Forum 2017 for Works Contracts and Property Services Contracts

"Careful design can reduce accidents and ensure smooth and safe execution of works"

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