

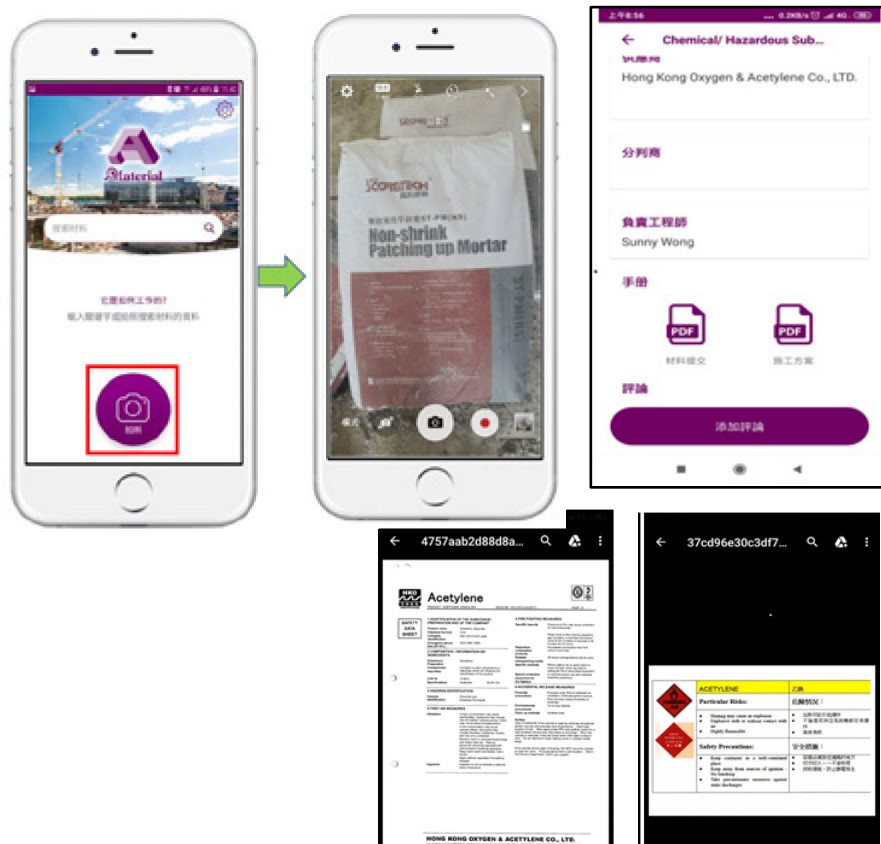
安全創意

# Safety Innovation & Trials by contractors

Recommended in HASAS (2017Q1 – 2019Q2)

# Safety Innovation 創新工地安全措施

- Mat Search Apps
- 搜尋物料資料的手機程式

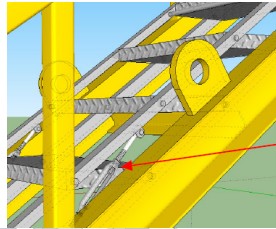


- Using mobile application, site staff can obtain the relevant information promptly, by capturing images of material or inputting keywords, such as MSDS, responsible persons and method statement, etc.
- 透過手機應用程式，員工可透過拍攝照片或輸入關鍵詞快速獲取物料的相關資料，例如物料安全資料表、負責人員與及施工方案等。

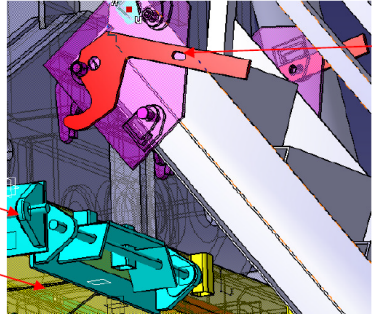


# Safety Innovation 創新工地安全措施

## •Adjustable Ladder for RCD platform



Adjust staircase inclination



Interlock

Hinge

RCD Platform



- The interlock of the ladder is designed to be movable and locked at two sets of slots. The interlock could be adjusted and secured in the suitable slot for variable heights. Also the staircase can adjust the angle of inclination for safe access.
- 梯子設有兩組互鎖裝置設計，令梯子可更穩固扣於工作台上。固定互鎖裝置可調校梯子的高度。腳踏的傾斜角度亦可以調校，以便工人可安全上落。



# Safety Innovation 創新工地安全措施

## • Mobile 360 View for Safety Training • 360 流動資訊平臺



- The mobile platform provides interactive menu and buttons where users are able to navigate from first person perspective through out all the preset site locations/ spots. Specific safety information spots (text and images) are preset in specific locations in the 360 degree image.

- 流動平臺提供互動功能表和按鍵，使用者可以從第一身視角導航到所有預設的位置。在預設的360度圖像中點擊特定位置，可進一步獲得文字和圖像資訊。





# Safety Innovation 創新工地安全措施

- RFID Lift Shaft Control System
- RFID升降機槽人員管理系統

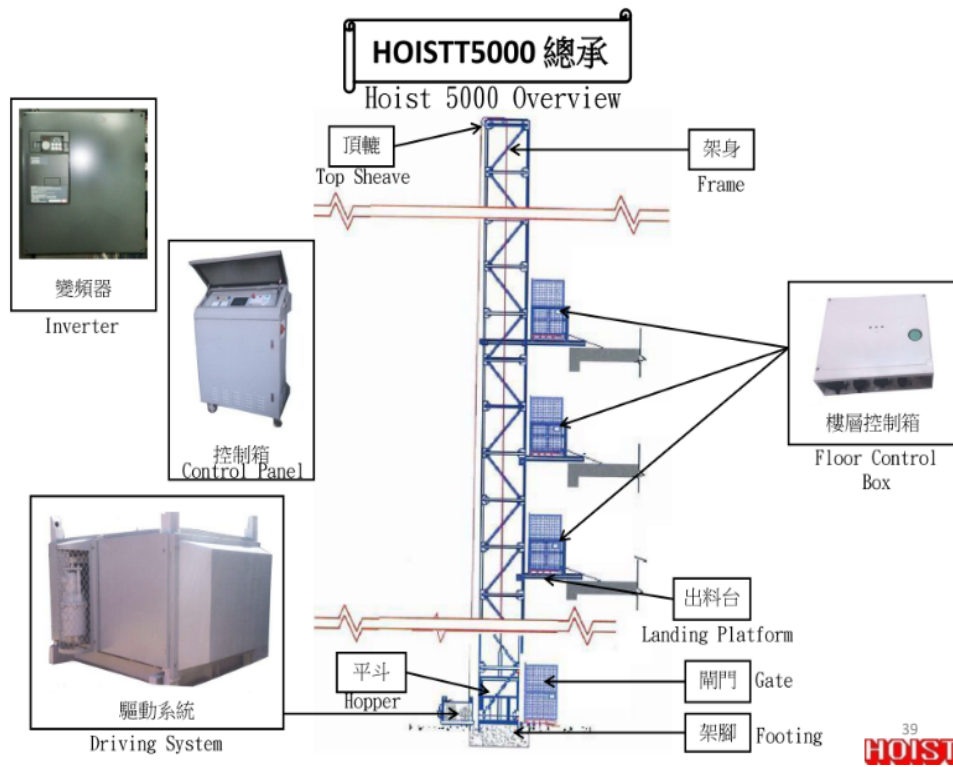


- The system applies to the lift shaft works, included application of work permit, real time monitoring of worker inside lift shaft, lift shaft in & out record summary, etc. When an unauthorized worker get into the lift shaft, the RFID antenna will notice the system to trigger the alarm system.
- 適用於電梯井道工程，包括工作許可證的應用，井道內工人的即時監控，井道進出記錄摘要等。當未經授權的工人進入井道時，RFID天線會連接系統並觸動警報系統。

# Safety Innovation 創新工地安全措施

## RFID Material Hoist Landing Gate Locking System

### 物料吊重機射頻識別技術開關系統



- RFID user card system was used as the start key for material hoist at the control panel. The RFID cards are only given to the designated operators. Site Mechanics had edited the system and restricted the transportation of materials in only one direction from ground floor to the landing floor, of which, transportation between any two landing floors is not allowed.
- RFID射頻識別技術用戶卡被用作控制物料吊重機的啟動鑰匙。RFID卡僅供給指定的操作員。機械部已對系統進行了編輯，限制了必須要從地面至樓層的一個方向物料運輸，任何兩個層站之間的運輸都是不允許的。

# Safety Innovation 創新工地安全措施

Fabrication of Reinforcement Cages

Working Platform Extension

繫結鐵籠可伸延工作臺



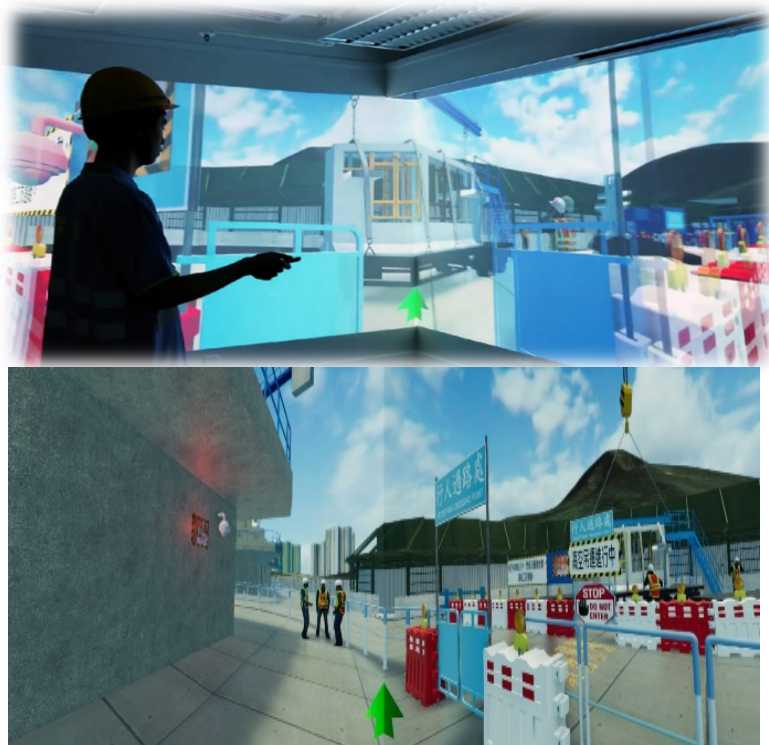
- This working platform is adjustable which can reduce the gap between reinforcement cage. It can reduce related accident.
- 使用這個可調較的工作臺，可減少工作臺與鐵籠之間的距離，減少相關的意外發生。





# Safety Innovation 創新工地安全措施

- Apply BIM and VR technology in safety training
- 建造資訊模型(BIM)和虛擬實境(VR)的科技進行安全訓練
- Using BIM and VR technology in safety training, it is an easier way for workers to safety at work. The interactive scenes can allow the workers to experience the actual operation on the site.
- 讓工友利用虛擬實境的技術更容易吸收安全訓練的內容，並透過可互動的場景來體驗工地的運作情況。



# Safety Innovation 創新工地安全措施

- External Wall Mounted Working Platform with Wall Mounted Catch Fan
- 外牆式工作平臺連掛牆斜棚



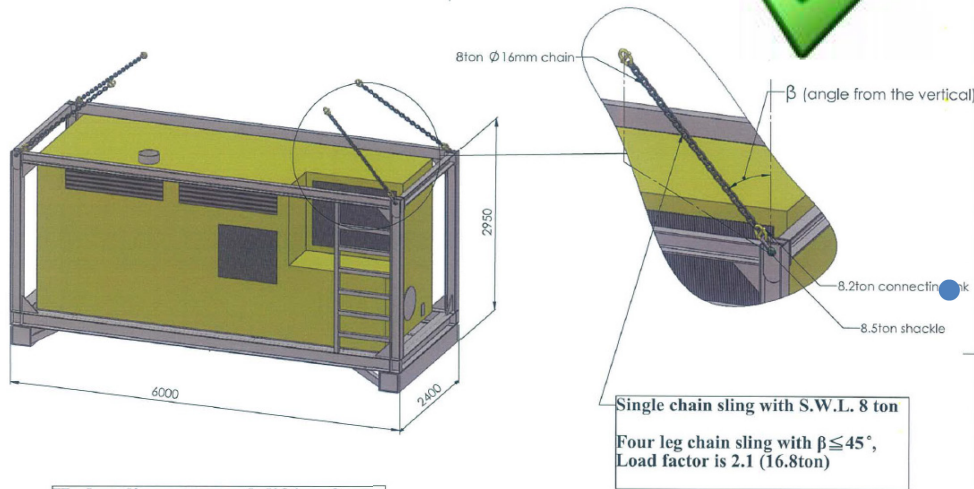
- The external wall mounted working platform was installed with catch fan which could help to collect falling materials of the building. This safety design could effectively improve the risk of falling objects.
- 外牆式工作平臺及裝有掛牆斜棚，有助收集建築物的下墜物。這安全設計可以有效地改善物料下墜的風險。





# Safety Innovation 創新工地安全措施

- Bridging Chains on Corners of Steel Frame
- 吊架加裝接駁短鏈



**Hydraulic powerpack lifting frame**  
Dimensions: 6000x2400x2950  
Weight: 2.9tons  
S.W.L: 15tons

- Adding bridging chains on the 4 corners of steel frame to eliminate workers to work at height while rigging. This device would allow workers rigging on ground and reduce the chance to work-above ground. It can effectively eliminate the risk of working at height while rigging.

於吊架頂部每只角位置，加裝接駁鏈一條(即共4條)，以便埋碼員可以站於地上進行埋碼工作，以完全剔除高空工作之風險。

# Safety Innovation 創新工地安全措施

- Smart Tag
- 智能吊牌



- Print the tailor made Smart Tag on the 3D printer with RFID label. Worker/Site Supervisory Staff can read the lifting certificates information by touching the Smart Tag with their mobile phone.
- 根據不同吊具尺寸以3D印表機度身訂造內置RFID標籤吊具牌，工友/地盤管理人員以手機觸碰標籤以閱讀吊運證書資料。

# Safety Innovation 創新工地安全措施

- Permanent working platform at the trailer for handling precast facade
  - 拖車預製件永久工作平臺
- The permanent working platform was installed at the trailer to reduce the worker using temporary working platform or ladder. Risk of fall from height would be reduced significantly. This provision would further enhance the working at height safety and improve the efficiency of the worker.



安裝在拖車上之預製件永久工作平臺，可以減少埋碼員在臨時工作臺或梯子上進行埋碼工作。從而減少從高處下墮的風險。這項設計將進一步改善高空工作的安全，並提高工作效率。

# Safety Innovation 創新工地安全措施

- 3D Virtual Reality technology to typical floor



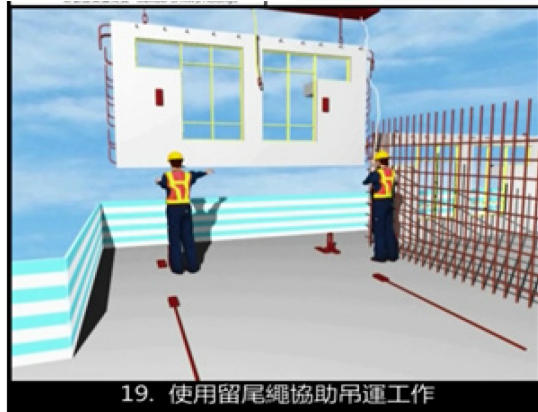
- Virtual Reality program is designed to introduce typical floor layout to New worker.
- With the aid of VR display, new workers can experience the site condition including fire service bump, temporary fire extinguishing, fire hydrant, general layout, refuse chute, electrical supply system and escape exit, etc. The worker can understand the site condition without going to the scene
- 透過3D科技來展示工地的環境，可讓工友不用到實境現場仍瞭解到工地的環境。





# Safety Innovation 創新工地安全措施

- 3D Virtual Reality technology to typical floor



- The BIM to introduce precast unit transportation and installation safety working procedures.
- The BIM was used to describe safety working procedures It clearly describes every step safety precaution measure; It is good training material to workers and frontline supervisor.
- 在安全訓練上，透過建造資訊模型(BIM)，向員工講解吊運預製元件的安全工作程式，使員工更易明白吊運的安全程式及安全措施。





# Safety Innovation 創新工地安全措施

- RFID Card Control System
- RFID 讀卡系統



- This system using RFID technology which installed bob cat. The authorized person must use the RFID card together with the key in order to operate bob cat.
- 透過射頻識別技術，獲授權者須透過RFID讀卡器，來啟動搬土機或進入危險區域內



# Safety Innovation 創新工地安全措施

- Mobile Phone Apps for Permit-to-work and In/Out record system for liftshaft works



- The mobile Apps helps to approve and check the permit-to-work system in an efficient and effective way. It can also provide workers' information to supervisor / authorized persons for verification of approved workers in the liftshaft.

- 透過手機應用程式可有效地批核不同工作許可證，讓管工/授權人更安全及快捷地工作。同時配合軌槽出入記錄系統，更有效監管工人在軌槽的工作情況。



# Safety Innovation 創新工地安全措施

- RFID Card Control System
- RFID 高臺車拍卡系統



- Sensor was installed on the guardrail of the elevated working platform. The authorized worker must close the guardrail completely before he / she can turn on and operate the elevated working platform through the RFID reader.
- 高臺車安裝了護欄感測器，獲授權工友必須將護欄完全關上後，才可透過RFID讀卡器，來啟動及升降高臺車。



# Safety Innovation 創新工地安全措施

- RFID Card Control System
- RFID讀卡系統



- In order to effective control of competent operators, a RFID system was in place. The authorized worker must use the RFID card together with the key in order to operate the gondola / enter into the lift shaft.



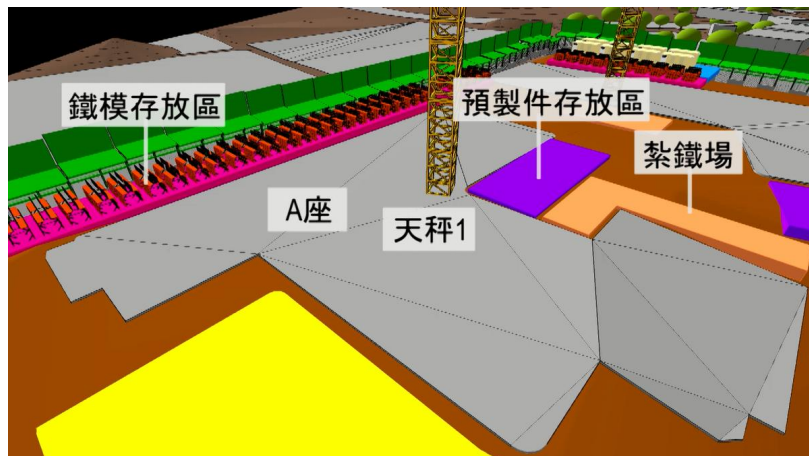
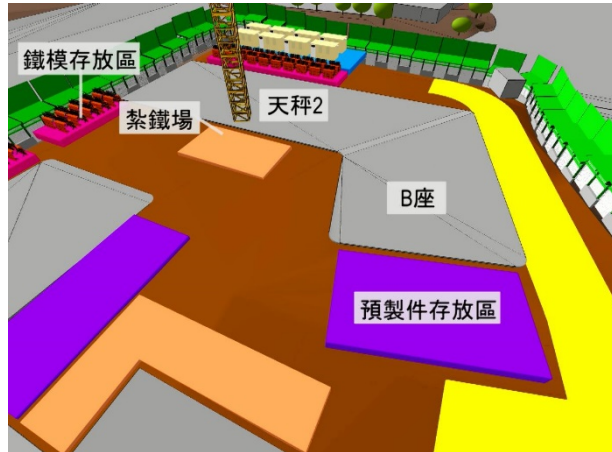
- 為了有效監控合資格操作員，工地于吊船/進入軌井使用RFID系統。獲授權工友必須使用RFID卡與鑰匙來啟動吊船或進入軌井。





# Safety Innovation 創新工地安全措施

- Building Information Modeling (BIM) Safety Training
- 把建造資訊模型(BIM)應用在安全訓練

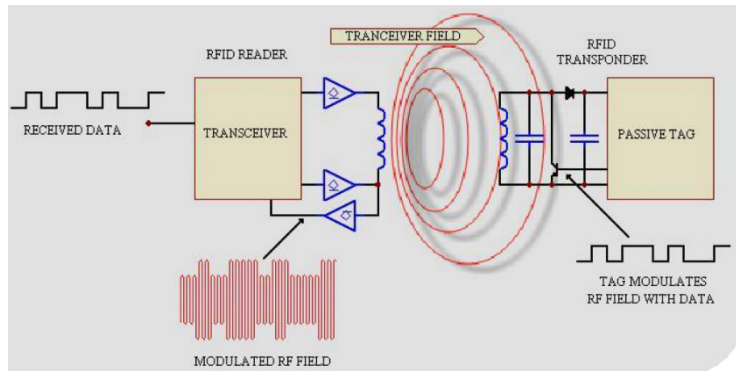


- The BIM site facility layout displayed different work areas on the construction site. Through BIM, it can be used in the induction training course and allow better understanding for new coming workers.
- 建造資訊模型(BIM)顯示工地內不同的工作區域。透過BIM，可以應用在入職安全訓練上，向新入職員工介紹工地設備位置，使他們更易瞭解和掌握工地狀況。





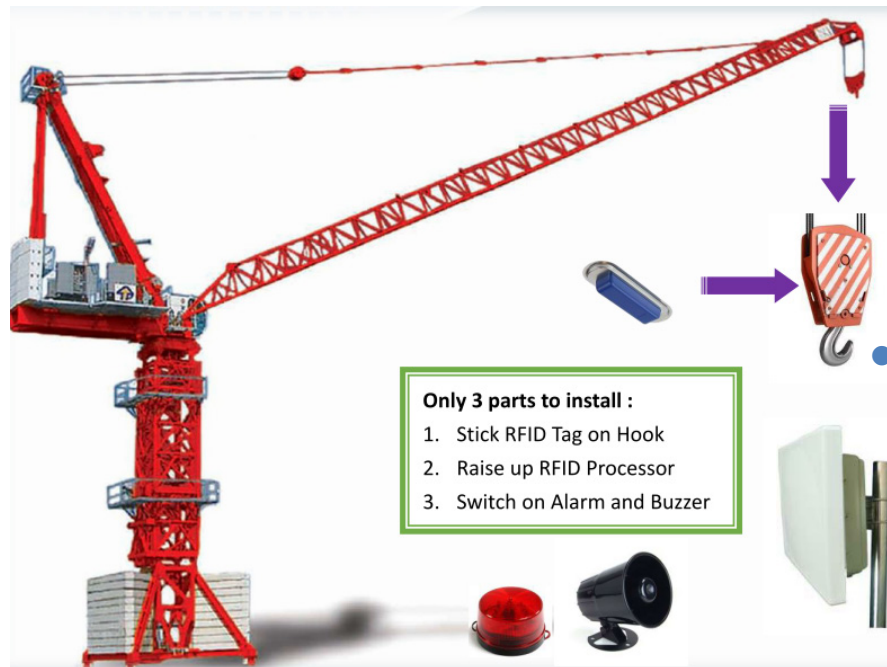
# Safety Innovation 創新工地安全措施



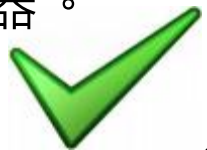
## •RFID Lifting Zone Alert System

## •RFID天秤吊運警報系統

- RFID tag stuck on the hook. Antennas and processors were installed in the lifting zones. Antennas emit signal to the coverage of 15 meters above ground. When the RFID tag enters the coverage of the signal, the alarm and buzzer will be triggered.



- 吊勾上安裝RFID標籤、而天線及處理器則安裝於吊運區內。天線會發射信號到地面以上15米的覆蓋範圍。當RFID標籤進入信號的覆蓋範圍時，便會觸動警報器和蜂鳴器。



# Safety Innovation 創新工地安全措施

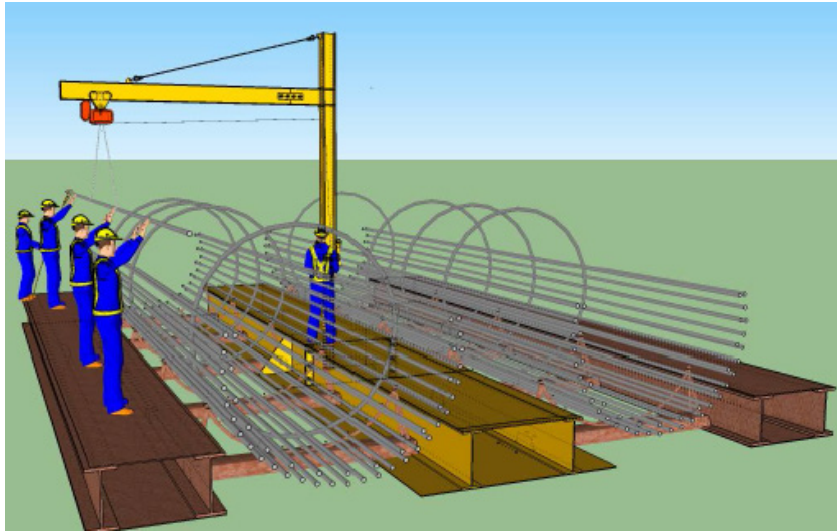


- Hanger Frame for Strut Removal
- 使用吊架來支撐框架拆除

- The common practice of strut removal is to flame-cut both ends of the strut and allows it to free-fall on the ground. The design of hanger frame could prevent the free-fall of the strut and reduce the chance of working above ground and reduce body injury due to improper body posture.
- 支柱拆除的常見做法是將支柱的兩端火焰切割，並允許其自由跌落在地面上。而使用特製吊架，可以防止支柱自由跌落和減少離地工作的機會。



# Safety Innovation 創新工地安全措施



- T-Frame for Steel Lifting
- 使用T型框架提起鋼筋

- T-Frame with electric chain block is used to lift up a heavy rebar and place it at the position as designated. T-Frame can also rotate and allow workers to use on both side. This can significantly reduce manual handling and the number of steel fixers for cage fabrication.

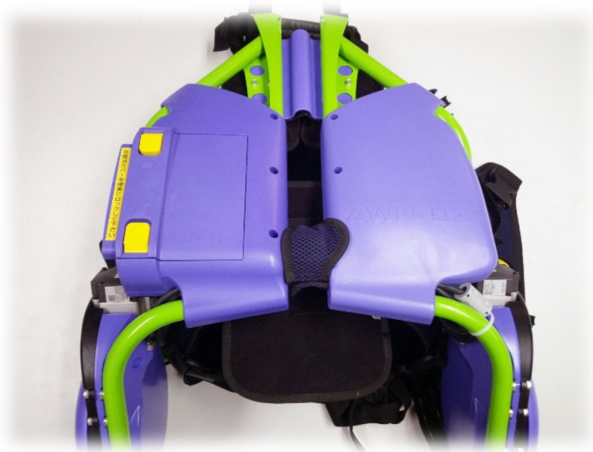


- 利用T型框架及電動起重機械提起重型鋼筋，並放到指定位置。T型框架亦可以旋轉並允許兩邊使用。這可以顯著減少體力處理操作和紮鐵籠的工人數量。





# Safety Innovation 創新工地安全措施



- Exoskeleton Power Assist Suit
- 連身機械人
- The suit is powered by battery and weight about 6 kg. When a worker is about to pick up a heavy object, the Exoskeleton Power Assist Suit will sense the movements and goes into operation to provide back support. Strain is reduced by as much as 15 kg. This can lower the risk of back injuries on construction workers.
- 此裝備重約6kg和由電池推動。當工人準備提起重物時，裝備能感應他的動作，發揮承托背部的效能，並能減少多達15公斤壓力。可以有效減少背部拉扯和減低工人腰背受傷的風險。

