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Practical Sharing on Transportation and Lifting Operation Safety in MEP Installations

Seminar on Transportation and
Lifting Operation Safety in Construction Site

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Practical Sharing on Transportation and Lifting Operation Safety in MEP Installations

Ir KC Lau

The Hong Kong Institution of Engineers
- Safety Specialist Committee - Past Chairman
Gammon E&M Limited – General Manager

BEng(Hons), MSc, CEng, RPE, FHKIE, FCIBSE, FIPlantE, CEnv, C.BuildE, FCABE, MIET, SMCMES, CSMe, REA, AS-RSC(V), 中国正高级工程师

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Challenges in MIMEP Transportation & Lifting Operations
MIMEP 運輸及吊運工作的挑戰

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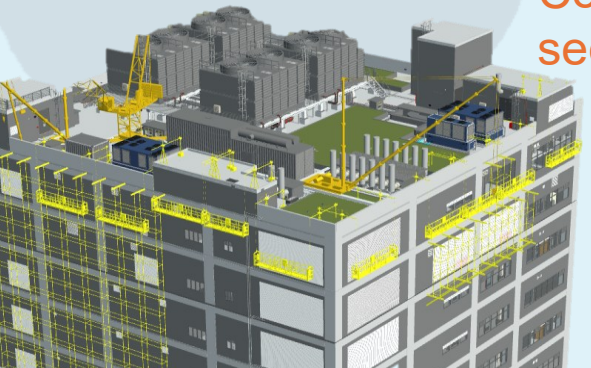
Why It's More Difficult

- Complex Geometry & Limited Access: Lifting environments often have irregular shapes and constrained spaces.
- Heavy & Sensitive Equipment: MIMEP components are bulky, heavy, and sensitive to vibration or tilt.
- Lack of Standard Guidelines: Few reference cases for complicated operations.

Key Limitations

- Inadequate lifting points or anchorage.
- Restricted crane or hoist access.
- Coordination with MC works and sequencing.



為何更具挑戰性

- 結構複雜及通道受限：吊運作業環境通常形狀不規則，空間狹窄，限制設備進出。
- 重型及敏感設備：設備體積大、重量重，對震動及傾斜敏感。
- 缺乏標準指引：複雜操作安裝案例少，現有指引未必適用。

主要限制

- 吊點不足或錨固位置不理想
- 吊機或起重設備進場受限
- 須與土建工程緊密協調，避免施工衝突

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Key Planning Concerns & Safety Assurance
主要策劃考慮及安全保障措施

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1. **Load Path & Stability： Ensure clear and stable paths for transport and lifting.**
   負載路徑及穩定性： 確保運輸及吊運路徑清晰穩定。
2. **Interface Management： Coordinate with civil and structural teams.**
   界面協調： 與土建及結構團隊協調，避免施工衝突。
3. **Risk Assessment & Method Statements： Tailored risk analysis and lifting method statements.**
   風險評估及施工方案： 制定針對性風險評估及吊運方案。
4. **Ensuring Safe Operation： Early Engagement with Specialists**
   確保安全操作： 及早與專家合作包括吊運工程師及MIMEP專業人員。
5. **Mock-Up & Simulation： Use BIM and lifting simulation tools to visualize operations.**
   模擬及預演： 利用BIM及模擬工具預視操作流程。
6. **Training & Supervision： Ensure all personnel are trained in site-specific lifting protocols.**
   培訓及監督： 所有人員須接受特定培訓。
7. **Appoint competent lifting supervisors and signalers.**
   設立合資格監督及指揮員。
8. **Monitoring & Emergency Planning： Real-time monitoring of lifting operations. Emergency response plans for equipment failure or instability.**
   實時監察及應急計劃： 吊運期間進行實時監控，制定應急方案。

2009

The HKJC AC Infrastructure upgrade

- Chiller Replacement Operation

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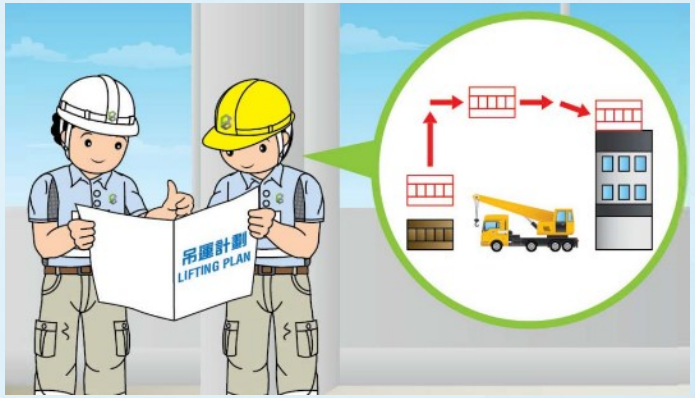
Safety Operation

Back to basic

PLAN-DO-CHECK-ACT

P Develop Lifting Plan 制定吊運計劃



D Initiate Safety Procedure 定立安全吊運方法

A Operate Safety Hoisting 實行安全吊運

C Monitor Safety Execution 監察安全的執行

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2010

The HKJC AC Infrastructure upgrade

- Chiller Replacement Operation

Dummy Hoisting Trial

Heavy Hoisting Operation

2011

The HKJC AC Infrastructure upgrade

- Roof Piping Replacement

Comparison of
1st Lifting Plan v Advanced Lifting Plan

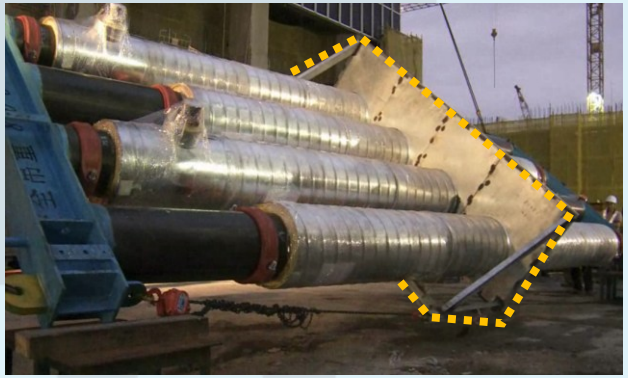
1st Lifting Plan
x Road Close for Operation 需要封閉車路 x Lifting Setup in Various Position 在多個地點設立多種吊運配置
Advanced Lifting Plan
✓ Avoid Road Close for Operation 避免封閉車路 ✓ Reduce Operation Point 減小施工位置 ✓ Reduce 80% of the setup matrix 減小80%施工配置 ✓ Internal Design for advancement 獨立設計加强吊運效益

2011

Central Government Complex (HKSAR)

- Riser Module with working platform

Designed working platform for module connection
設計工作平台用於模組修口工作的企位



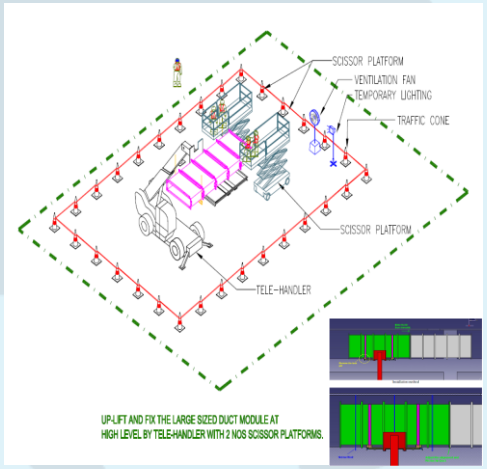
Advanced Consideration to smoothen operation
在設計吊運過程中加入對施工需求的考慮

2013

CX Cargo

- AC Ductwork Module Hoisting by Telehandler

Designed hosting frame to raise ductwork modules
獨立設計的托架, 活用器械安全托舉到位



Consider practical needs and Design a Safe Delivering
考慮實際需求, 設計出安全的運輸到位方法

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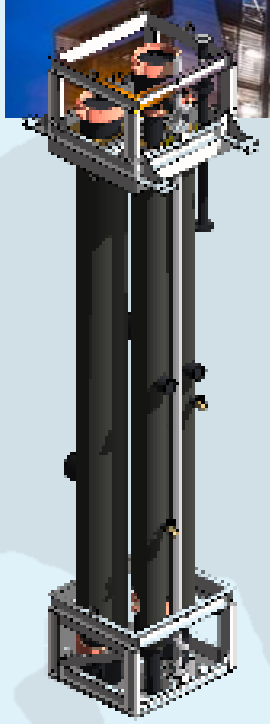
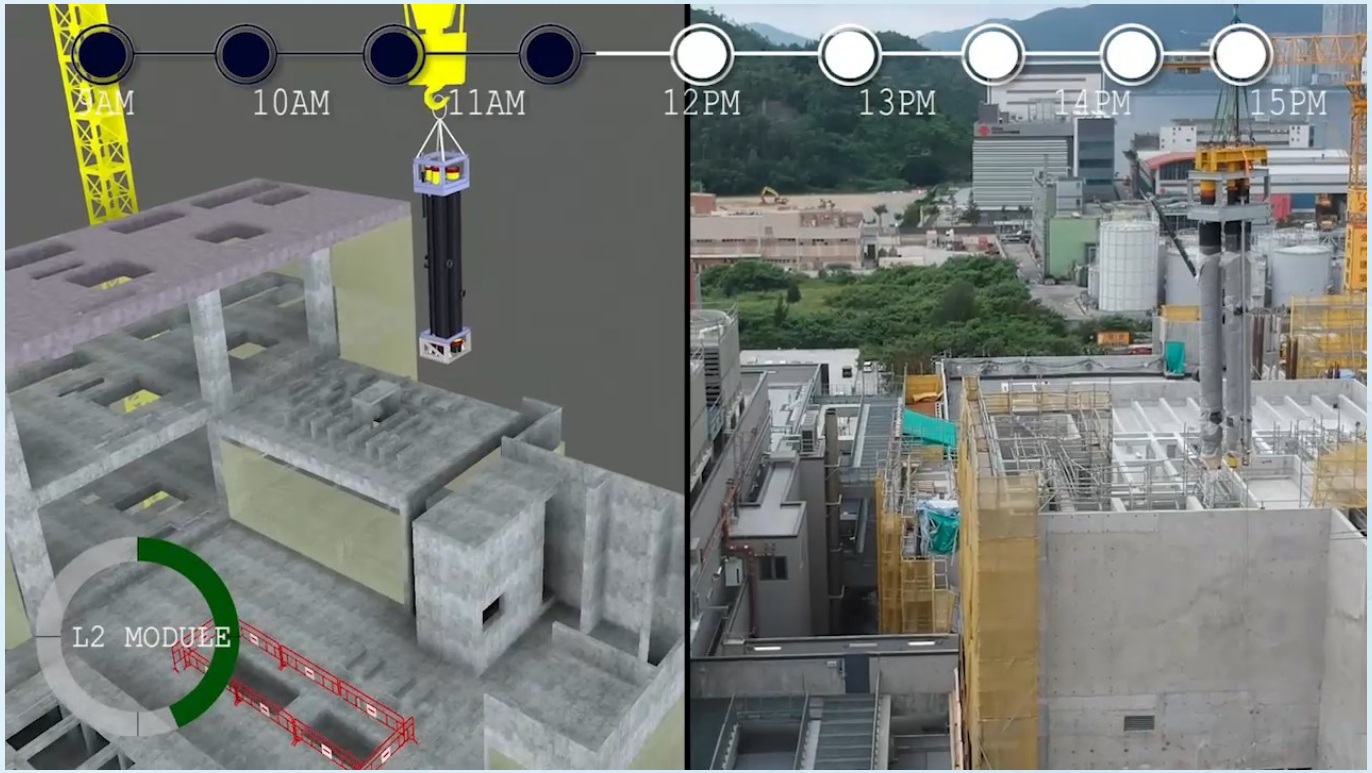
2018

TKO Data Centre

- Riser Module Series



6M Modules for phase 2
12M Modules for phase 3



Introduce of BIM Planning for Logistic Plan
為吊運施工計劃引入BIM虛擬施工預演

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2018

TKO Data Centre

- Low-Level Corridor Module with Raised Floor

12M MEP Modules
Integrated with
ABWF Raised Floor

Designed Specific
Hoisting Container
for Module Delivery
為吊運獨立設計集裝吊具

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2019

TKO Data Centre

- Container Type DRUPS & Gen-set

Container Type DRUPS at Phase1

Container Type Gen-set at Phase2

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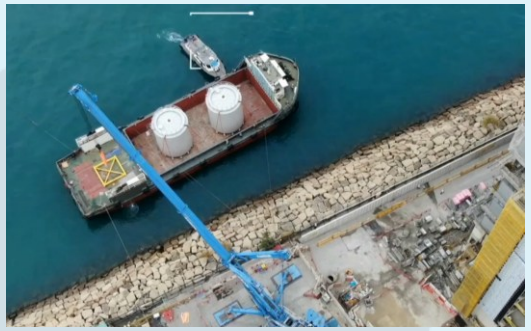
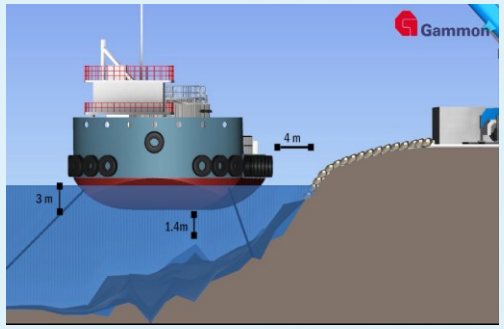
2019

TKO Data Centre

- MiMEP Thermal Tank Delivery





4x 50tons Free standing MiMEP Thermal Tanks Deliver in 4 Days.

Complicate Delivery with Maritime Transport, Heavy Lifting, Vertical Hoisting & Horizontal Shifting

四組重達 50噸的MiMEP預製冰缸以四個工作天完成到位。

複雜的運輸工序包括海床聲納探測，海事運輸，重型吊運，垂直吊運，橫向拖移

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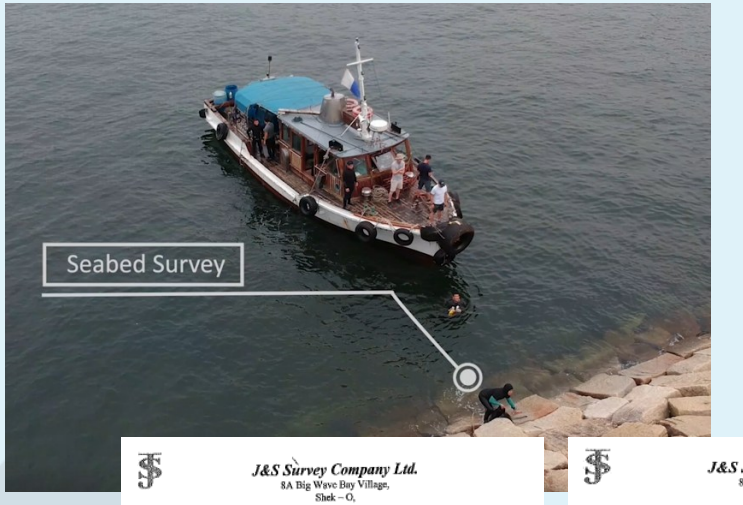
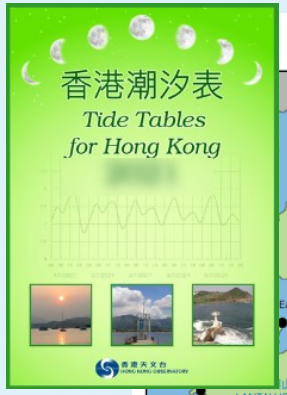
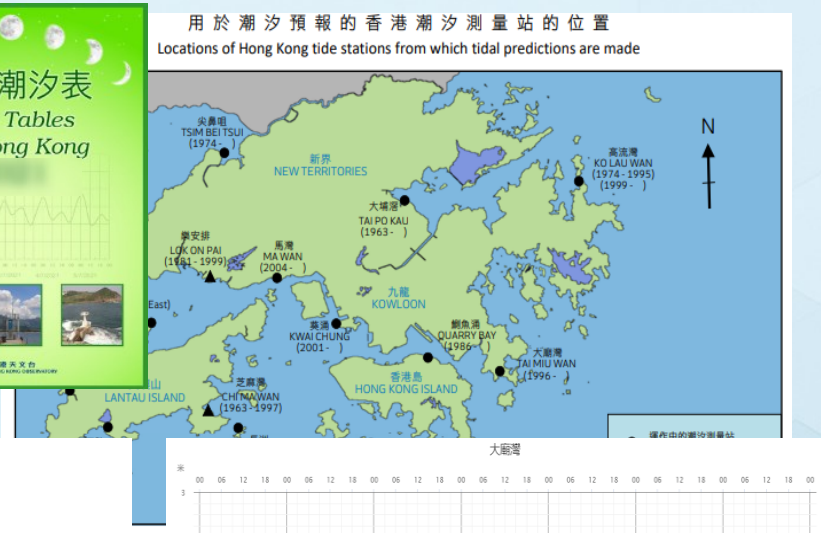
2019

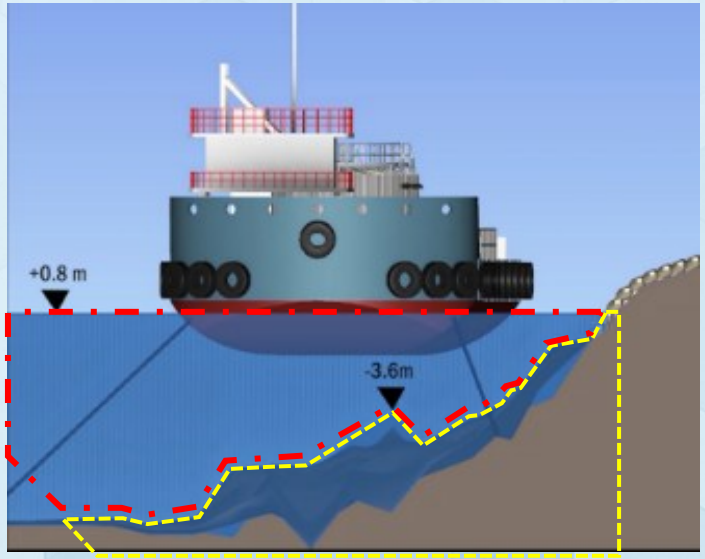
TKO Data Centre

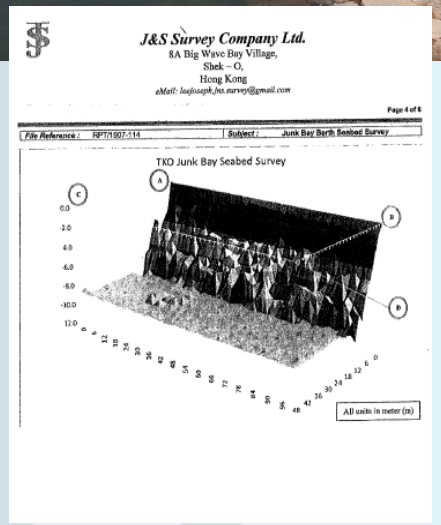
- MiMEP Thermal Tank Delivery

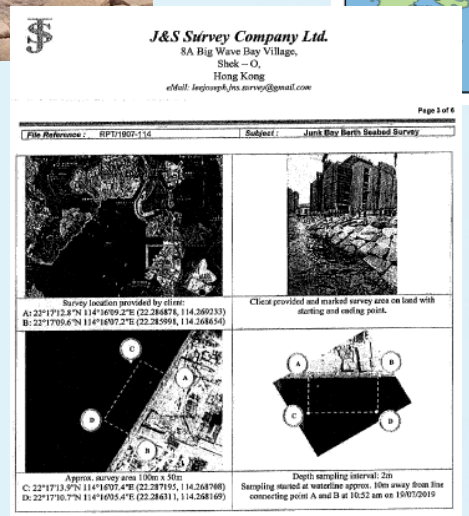


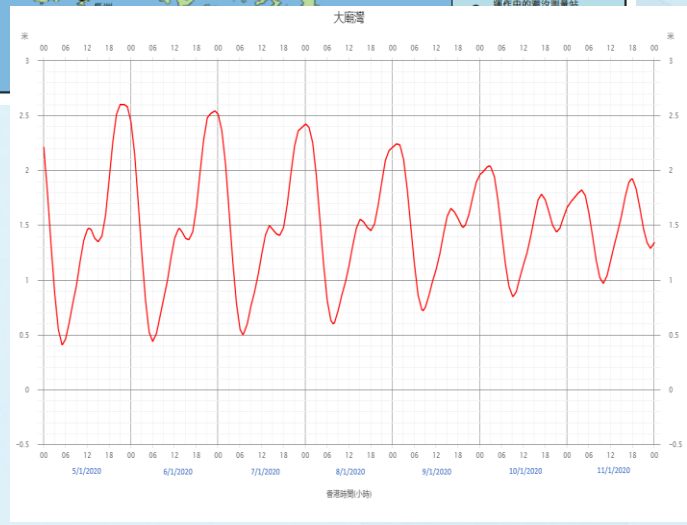












- ✓ Ultrasonic seabed survey
- ✓ Tide studying

Ensure water depth catering barge draught.

- ✓ 海床聲納探測
- ✓ 潮汐預測參考

確保水深和貨船吃水關係, 預防觸礁。

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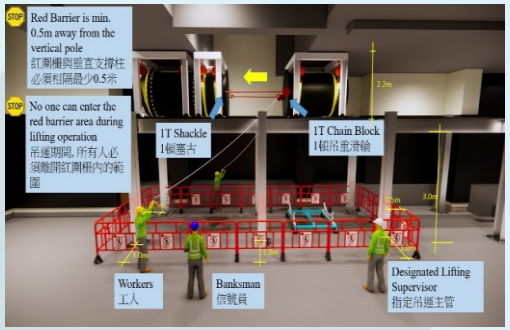
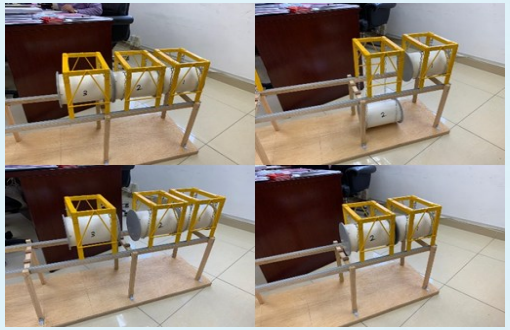
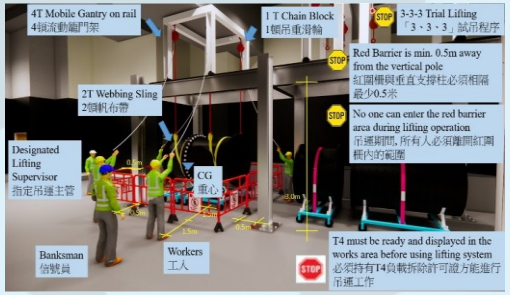
2020

WestK Lyric Theatre Project

- DCS Mega Piping







DN1600 DCS
Sea Water Pipe Hoisting
with permanent bracket
and special gantry.

Achieving with smart & effective method integrated
with safety enhancement
透過創新及更有效率的方法施工同時提升安全

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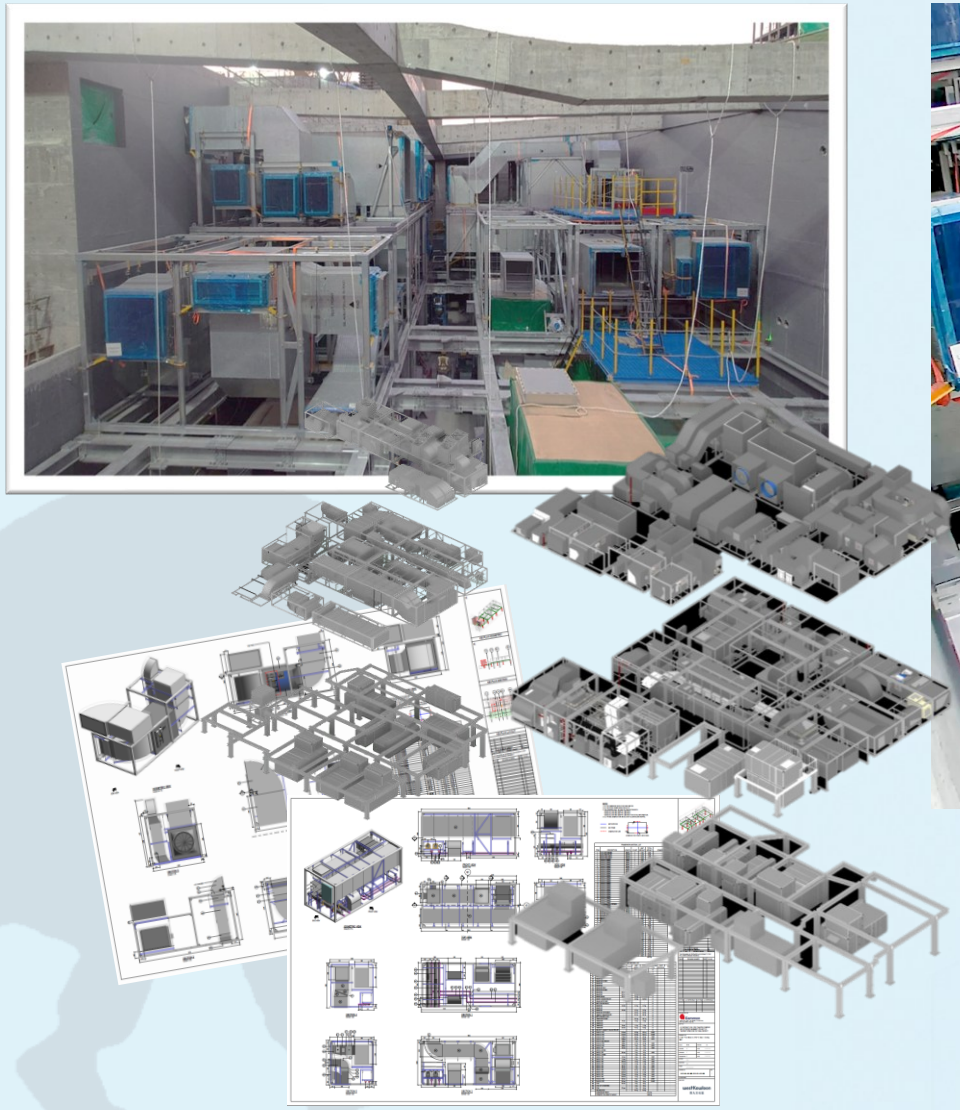
2025

WestK Lyric Theatre Project

- Roof Mega Modules



Assembled with over 80 trips heavy hoisting under comprehensive planning

在全面計劃的施工方案下, 項目以超過80次重型吊運完成組裝

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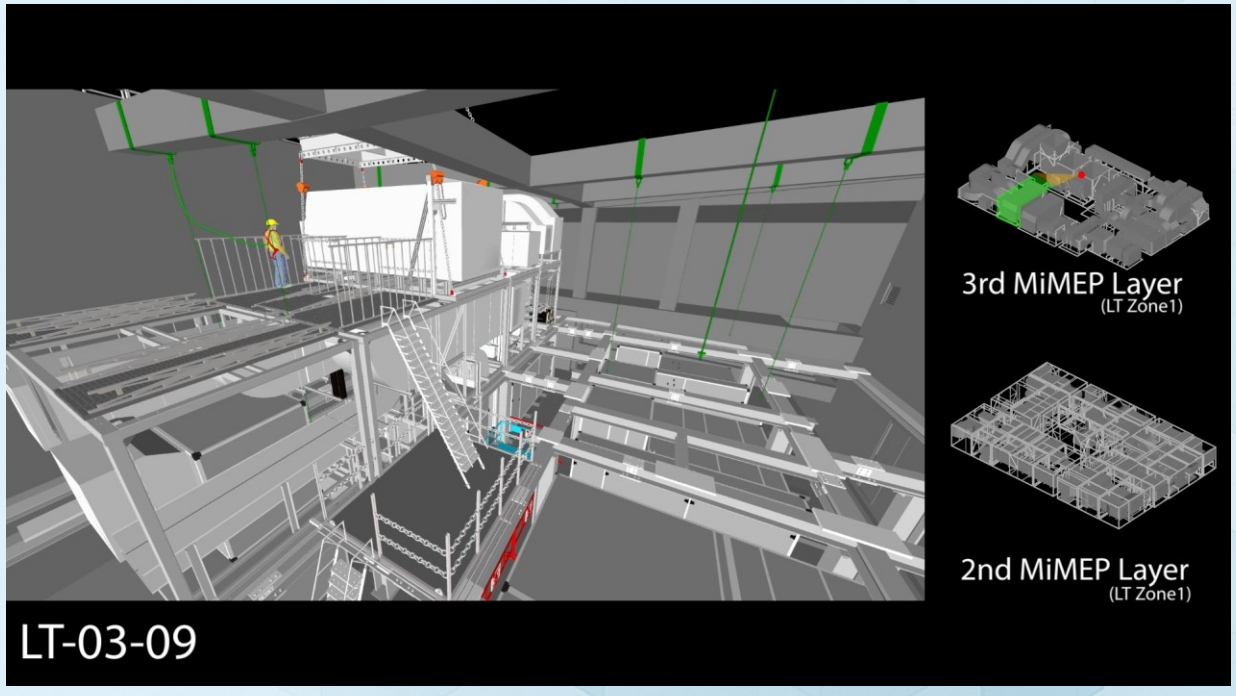
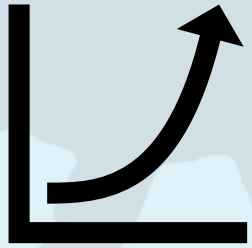
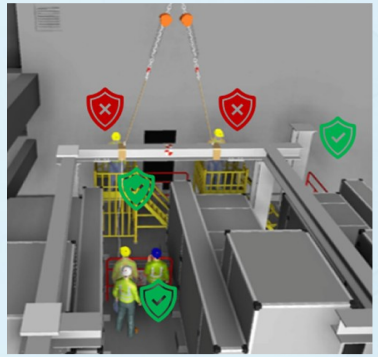


Key Challenges:
a sharp rise of Heavy Lifting Activities



- ✓ Comprehensive Work Plan
- ✓ Detail Method Statement
- ✓ Frontline Allocation
- ✓ CG of every hoist



- Access Control — Fatal Zone Management
- Proper Platform — Safe Working Platform
- Work Supervision — Proper site supervision
- Worker Position — Risky working position
- Nos. of Worker — Lower Nos. of worker in risk

- Worker Position — Worker under load
- PPE for Worker — Should not rely on PPE
- Centre of Gravity — CG considered when rigging?
- Temporary Works — Fall arrest well calculated?

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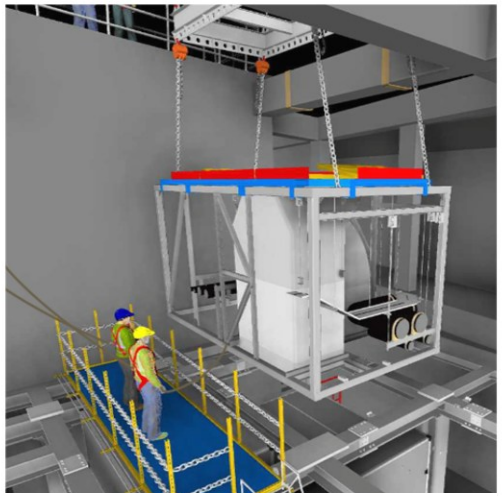
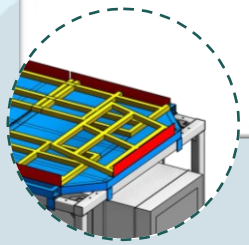
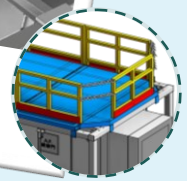


Hoisting

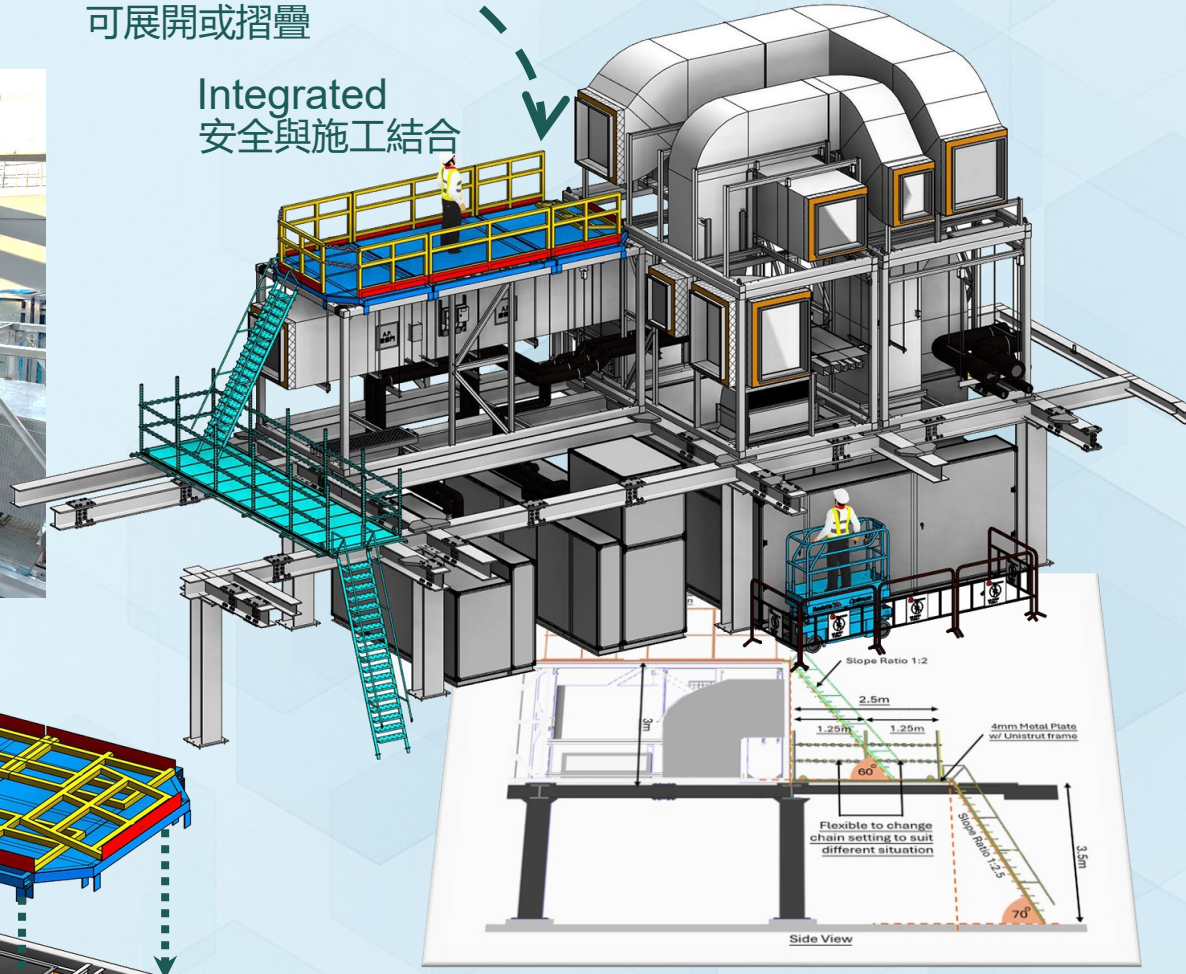


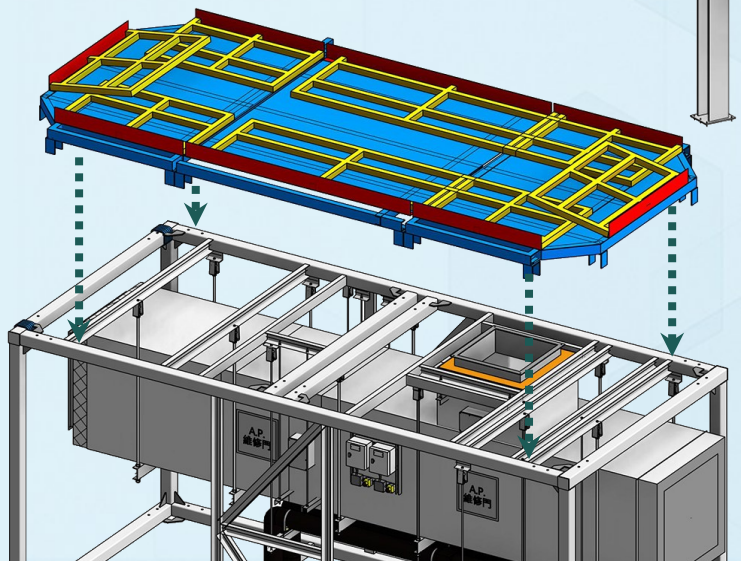
Working on Top



Transformable
可展開或摺疊

Integrated
安全與施工結合





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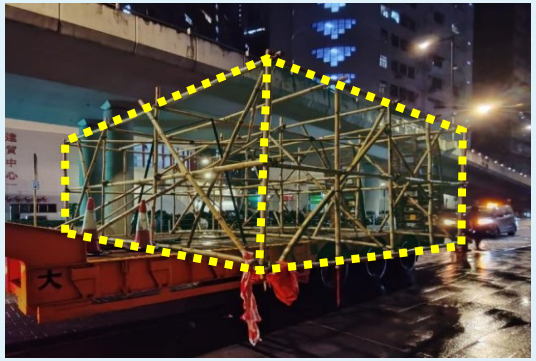
2025

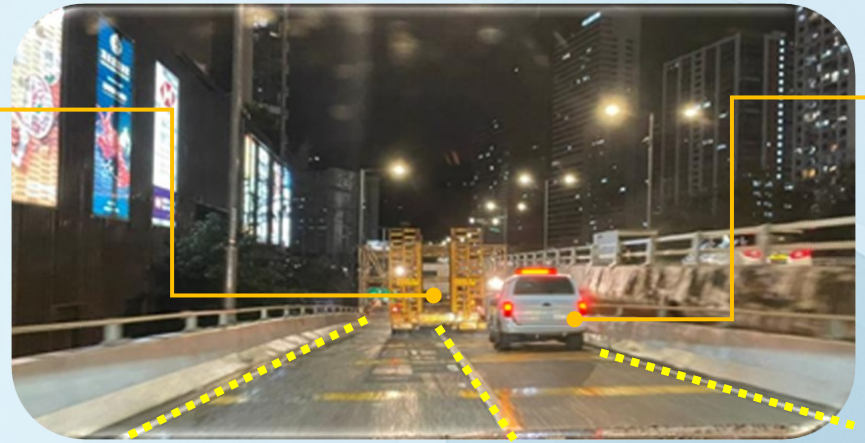
TWW Data Centre

- Underground Fuel Tank Delivery



Dummy Trial Run to understand hidden risks
在大型運輸前預先試行, 評估潛在風險

Double Lane
雙線道行車



Escort Car
護航車

Wide Load
特闊貨物

Wide Load
Permit
特闊貨物
許可證

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Safe planning is essential for any lifting operation.
任何吊運作業都必須進行安全策劃。

Thank You!