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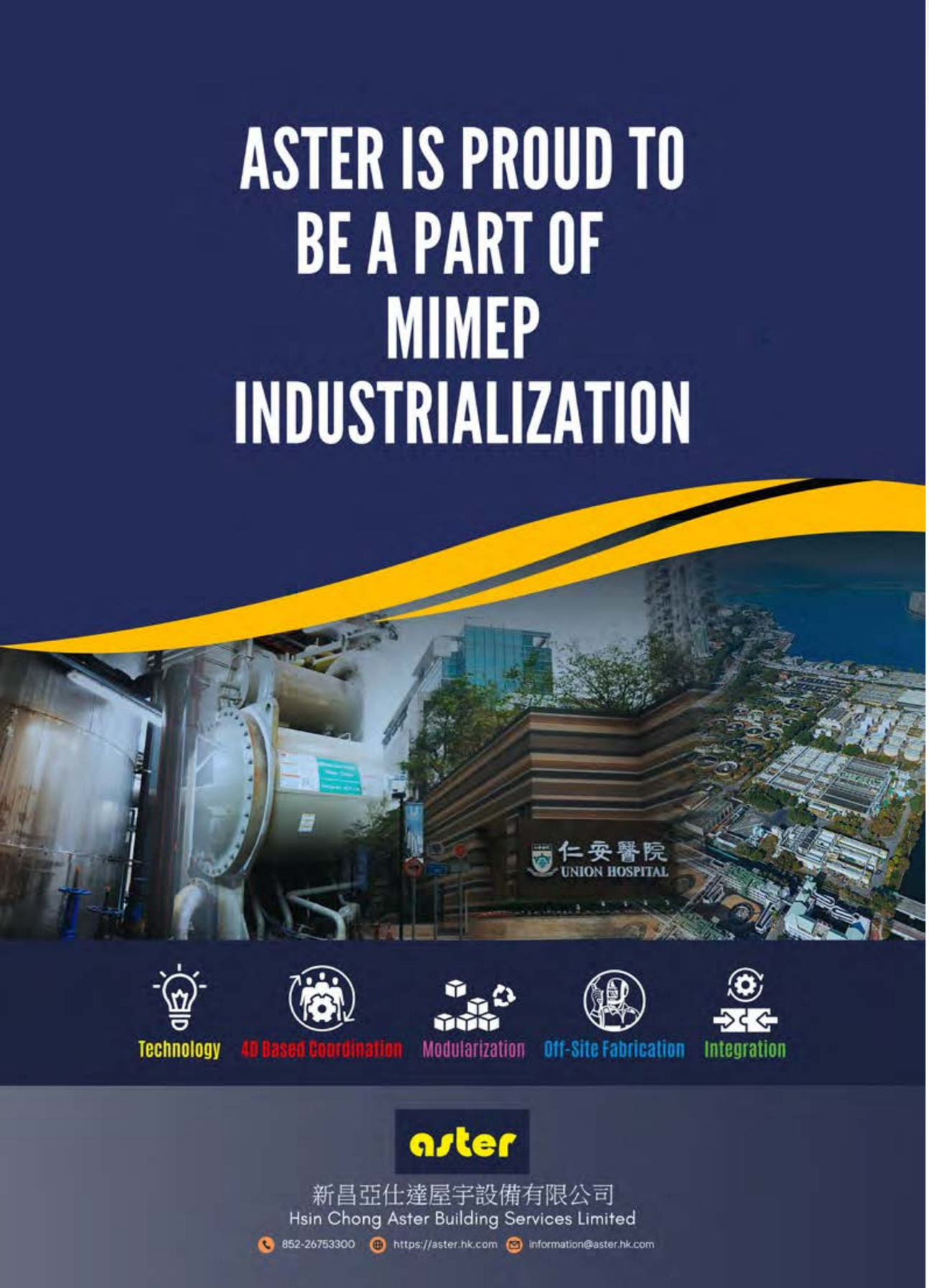
Contractual And Administrative Implications On MiMEP Installations

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Editorial Board
Chairman Message



Daniel CHONG
Chairman of the Editorial Board

Contractual and Administrative Implication on MiMEP Installation

Scorching heat of Summer, blue sky and sunshine are perfect for water sports and costal travel in Hong Kong but certainly not good for working on site. Like all the developed cities, aging problem and shortage of new-blood on all trades, including the construction industry are the most challenging issue to sustain our development in time. Thanks HKSAR in implementing appropriate short-term policies to mitigate the shortage of skilled professionals and setting up funding scheme to encourage the construction industry to adopt innovative technology, green and sustainable approach on all construction activities. In fact, some of the Government projects have already specified for DfMA / MiMEP construction. We, fellow E/M practitioners, are fully support and welcome for such an advanced construction approach. If most of the construction activities can be carried out in the factory, huge benefits can be realised. However, numbers of contractual and administrative implications are yet to be resolved:

1. Valuation / Payment for Material On site:
The material/equipment instead of being delivered to site, they are shipped to the factories, mostly in PRC, for MiMEP production. The assessment and payment are indeed a concern.

2. NSCs / Tiers of Sub-contractors:
Most of Main Contractors, if not having their own off-site construction hubs, are hiring services from their PRC's counterparts. The instituted E/M works along with the modular concrete structure construction would be done by their own local sub-contractors. The contractual relationship is becoming complicated, particularly on the P/D specialist sub-contract, unless certain relaxations on the contract terms are being made. Also, the current requirement for a Licensed Plumber (LP) of a project should be reviewed as practically the LP would not be able to handle the P/D installation both in the factory and site at the same period of time.

3. Quality Control and Administration in the Factory:
A consultant / client team and/or appointed agency is required to establish in the factory for day-to-day administration / witness inspection/T&C etc.

4. Transportation & Hoisting:
A thoughtful planning is required to allow appropriate openings, hoisting facilities and "free from obstruction" site deliver route ready for the DfMA / MiMEP construction approach is a MUST. The traditional site administration attitude that allows no time for the E/M contractors to use Main Contractor's hoisting facilities and/or piling up tons of construction materials blocking site travelling route resulted in delaying/double handling of the activities should not be allowed.

5. T&C and Verification of the DfMA / MiMEP Installation on Site:
Save from additional time and cost on double handling re-T&C on the DfMA/MiMEP installations which have had satisfactory T&C at the factory before shipping to site, we suggest adopting a simplified visual inspection instead.

Labour Department has had introduced a system of Heat Stress at Work (HSW) Warning code recently, i.e Amber, Red and Black for temperature index from 30°C to over 34°C (based on H.K. Observatory) to allow workers for appropriate rest-time when working in hot weather. For health and safety to protect workers and all site personnel, we are obliged to follow. However, most of the MEP site activities such as equipment/material hoisting and delivery, large pipe/ductwork welding and assembly and plant test etc. are of continuous process and practically not likely can adopt the HSW recommendations. To be exact, the site progress would be totally out of control, all fellow MEP contractors would have to face to the possible additional cost and time, prolongations on programme leading to contract claims by other trades and L.D. on delay of the Contract. The outdoor temperature in Summer is well-over 32°C, the situation can become worse in time, we would suggest reviewing if "Night Work Policy" (say working hours from 18:00 to 02:00) between June to September can be adopted instead.

Fellow Members, embracing changes with MiMEP elements, let's shape new horizons to the E&M industry!

專題文章
Theme Article

Managing Contracts and Administration for Multi-trade Integrated MEP (MiMEP) Installations

By **ACRA**

Dr. Pachu LEUNG



"... Clear contractual agreements, effective risk allocation, and performance guarantees are crucial for successful implementation, ... robust project management, design coordination, and comprehensive commissioning processes are vital administrative considerations ..."

Introduction



MiMEP represents the next step in the ongoing success of MiC (Modular Integrated Construction) for the local construction industry. MiC refers to the seamless integration of multi-trade building services components into prefabricated modules that are manufactured in a factory and later transported to the construction site. With the MiMEP construction method, these modules are connected on-site to complete various trades of building services installations. One of the significant advantages of MiMEP is its ability to significantly reduce the demand for on-site labor while remaining unaffected by site constraints.

Pre-fabrication, pre-testing, and effective communication for Multi-trade integrated Mechanical Electrical and Plumbing (MiMEP) installations can bring numerous benefits to the industry, including improved site work efficiency, reduced waste on-site, enhanced workmanship and quality, and increased attraction for new and young engineers. Let's explore these advantages in detail:

Improved Site Work Efficiency:

By employing pre-fabrication techniques, components of MiMEP systems can be manufactured off-site in controlled environments. This allows for simultaneous work to take place on-site, reducing overall project timelines. When pre-fabricated components arrive at the site, they can be quickly and easily installed, minimizing disruptions and improving overall work efficiency.

Reduced Waste on Site:

Pre-fabrication reduces material waste on-site as components are precisely manufactured to meet project specifications. Off-site fabrication also allows for better material management and optimization, minimizing excess material usage. By significantly reducing on-site waste, MiMEP installations contribute to sustainable construction practices and promote environmental stewardship.

Enhanced Workmanship and Quality:

Pre-fabrication allows for improved precision and quality control during the manufacturing process. Skilled technicians can focus on producing high-quality components in controlled environments, reducing the chances of errors or defects. Consistent quality in pre-fabricated elements translates into improved workmanship and overall system performance once installed on-site.

Effective Communication and Collaboration:

Multi-trade integrated MiMEP installations necessitate effective communication and collaboration among different trades and contractors involved. Through regular coordination meetings and advanced communication tools, such as Building Information Modeling (BIM) and cloud-based collaboration platforms, stakeholders can streamline information sharing, resolve design clashes, and ensure smooth integration. Clear communication channels foster a collaborative environment, enhancing project efficiency and reducing costly rework.

Encouragement of Innovation:

MiMEP installations present an opportunity for innovation within the industry. By integrating various trades into a cohesive system, new engineering solutions can be developed to optimize energy efficiency, enhance occupant comfort, and streamline maintenance processes. The pre-fabrication and pre-testing phases provide an ideal environment to experiment with new technologies, materials, and installation methods, fostering innovation within the industry.

Attraction of New and Young Engineers:

Adopting advanced construction practices like MiMEP, which embrace technology, off-site fabrication, and collaborative approaches, can make the industry more appealing to new and young engineers. These innovative methods showcase a forward-thinking approach, aligning with the aspirations of younger generations entering the workforce. By highlighting the use of cutting-edge technologies and sustainable practices, the industry can attract and retain talented individuals, driving future growth and development.

Contractual and Administrative Implications:

In this article, we delve into the contractual and administrative implications surrounding Multi-trade Integrated MEP (MiMEP) installations. As the construction industry embraces innovative approaches to building systems integration, MiMEP offers a promising solution to streamline and optimize Mechanical, Electrical, and Plumbing (MEP) installations. However, it is crucial to understand the contractual and administrative considerations involved in implementing and managing these integrated systems.

Contractual Considerations:

1. Scope and Responsibility:
   When implementing MiMEP installations, clear contractual agreements must define the scope of work and responsibilities for each trade involved. Careful coordination between different contractors and trades is essential to ensure a seamless integration process. Contracts should clearly outline roles, obligations, and deliverables to avoid potential conflicts or gaps in accountability.

2. Risk Allocation:
   MiMEP installations involve multiple trades working together, which requires a thoughtful approach to risk allocation. Contracts should clearly define the responsibilities for design coordination, system compatibility, and timely delivery of equipment and materials. Establishing mechanisms for dispute resolution and change management will help address any unforeseen challenges that may arise during the project.

3. Performance Guarantees:
   Given the integrated nature of MiMEP installations, performance guarantees become more critical. Contractors should provide performance guarantees for the overall integrated system, as well as individual trade-specific components. Clear benchmarks and measurable performance criteria should be defined to ensure the system operates efficiently and effectively.

Administrative Considerations:

1. Project Management and Coordination:
   MiMEP installations require effective project management and coordination to ensure seamless integration across multiple trades. Establishing a project management team responsible for overseeing the coordination efforts, scheduling, and progress monitoring becomes crucial. Regular meetings, communication channels, and collaboration platforms can help facilitate effective coordination among contractors and trades.

2. Design and Documentation:
   Design coordination is vital in MiMEP installations to ensure the compatibility and integration of different systems. Contractual obligations should specify the requirements for design review and coordination meetings to address potential clashes and conflicts during the design phase. Documentation, including as-built drawings and system manuals, should be clearly defined to ensure accurate record keeping and future maintenance.

3. Commissioning and Handover:
   MiMEP installations require a comprehensive commissioning process to verify the integration and functionality of the systems. Administrative considerations include developing commissioning plans, conducting testing and inspections, and obtaining regulatory approvals. Proper documentation and handover processes should be established to ensure a smooth transition and seamless operation after project completion.

Payment and liability considerations

When implementing MiMEP installations, a substantial portion of the materials and work required for the project are completed in the factory before being delivered to the construction site. While this approach offers various benefits, it also presents some payment and liability considerations for the contractors, sub-contractors, and suppliers involved.

1. From a payment perspective, the upfront costs associated with manufacturing the prefabricated modules can create cash flow challenges. Contractors and sub-contractors may need to invest significant resources in procuring materials, fabricating the modules, and completing the work off-site. However, they may not receive payment for their services until the modules are delivered and installed on the construction site, which could occur weeks or even months later. This time gap between incurring expenses and receiving payment can strain the financial resources of the parties involved.

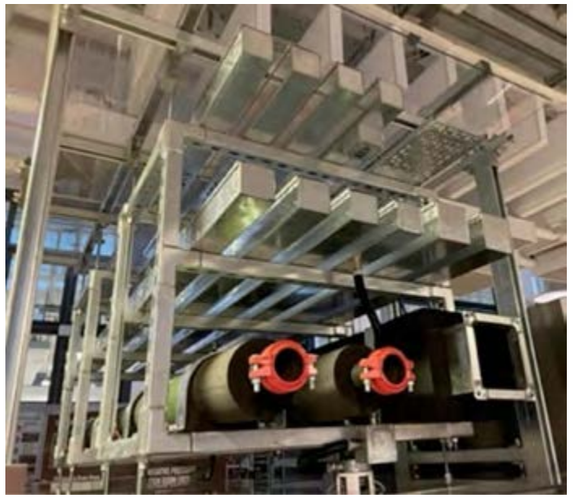
2. The liability aspect should also be taken into account. Since the majority of the construction work is completed in the controlled environmentof the factory, any defects or issues that arise during the manufacturing process may not become apparent until the modules are assembled on-site. In such cases, contractors, sub-contractors, and suppliers could face potential liabilities for the defects or short comings discovered later. This places a significant responsibility on these parties to ensure the quality and integrity of the prefabricated modules during the manufacturing phase.

3. To mitigate these challenges, all stakeholders must establish clear contractual agreements that outline payment terms, milestones, and any provisions for addressing liabilities arising from factory-based work. Close collaboration between the contractors, sub-contractors, and suppliers is essential to manage cash flow effectively and minimize potential risks. Additionally, implementing stringent quality control measures during manufacturing can help identify and rectify any issues before the modules are transported to the construction site, reducing the likelihood of future liabilities.

In conclusion, pre-fabrication, pre-testing, and effective communication for Multi-trade integrated MiMEP installations offer several advantages to the industry. These practices improve site work efficiency, reduce waste, enhance workmanship and quality, encourage innovation, and make the industry more attractive to new and young engineers. By embracing these approaches, the industry can embrace sustainable and efficient construction practices while fostering a culture of collaboration and innovation. By proactively addressing the payment and liability considerations associated with MiMEP installations, contractors, sub-contractors, and suppliers can navigate these challenges while enjoying the benefits of reduced on-site labor demand and increased efficiency in the construction process.

Further Development:





With a focus on the promising future prospects of MiMEP, experienced manufacturers have taken the initiative to develop double-skin ductwork that accommodates various multi-trade services, including piping control valves, VAV boxes, sensors and control, power points, lighting, CCTV, CCMS, and more. This innovative approach addresses some of the major disadvantages associated with traditional air ducts, such as leakage and the need for heavy steel Unistrut for support, which has previously made MiMEP modules cumbersome and challenging to assemble on-site.



The adoption of double-skinned air ductwork in MiMEP projects brings forth a host of benefits:

Enhanced Energy Efficiency:
The design of double-skinned air ductwork incorporates insulation between its inner and outer layers, reducing heat transfer and minimizing thermal losses. This ensures that the conditioned air maintains its desired temperature, leading to improved energy efficiency and reduced operating costs.

Reduced Air Leakage:
Precisely engineered joints and connections in double-skinned air ducts minimize air leakage, a common issue in traditional ductwork. This feature ensures that air reaches its intended destination without significant losses, resulting in better airflow distribution and improved overall system performance.

Improved Indoor Air Quality:
The reduced air leakage in double-skinned air ducts prevents the ingress of contaminants, such as dust, dirt, and pollutants, resulting in improved indoor air quality. This factor significantly contributes to the health and comfort of building occupants.

Noise Reduction:
The double-skinned construction of these ducts offers superior acoustic insulation compared to traditional ducts, leading to a quieter environment within the building by reducing noise transmission through the system.

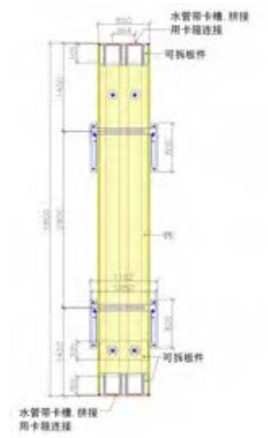
Lightweight and Easy Installation:
The lighter weight of double-skinned air ducts makes them easier to handle and install, significantly benefiting multi-trade integrated mechanical and plumbing (MiMEP) projects. The reduced physical strain on workers streamlines the installation process.

Space Optimization:
The incorporation of insulation within the ductwork allows for a more compact system, optimizing space utilization in building designs, especially when space is limited.

Durability and Longevity:
Typically crafted from durable materials like galvanized steel double-skin panel onto aluminium framed air ducts offer longevity and structural integrity, even in challenging environmental conditions.

It is important to note that the suitability of double-skinned air ductwork may vary depending on the specific requirements and applications of each project. Factors such as building design, budget, and local regulations should be taken into consideration when selecting the most appropriate air duct system for a particular application. Consulting with HVAC professionals or experts can provide more tailored guidance based on the project's unique needs and specifications.





Conclusion:

As the construction industry embraces Multi-trade Integrated MEP (MiMEP) installations, understanding the contractual and administrative implications becomes paramount. Clear contractual agreements, effective risk allocation, and performance guarantees are crucial for successful implementation. Additionally, robust project management, design coordination, and comprehensive commissioning processes are vital administrative considerations.

The HKFEMC is dedicated to supporting the electrical and mechanical contracting industry in Hong Kong. We encourage our members to stay informed and proactive in addressing the challenges and opportunities presented by MiMEP installations. By understanding and addressing the contractual and administrative aspects, we can foster a culture of collaboration and innovation, leading to successful and efficient MiMEP projects.

Stay connected with HKFEMC for future newsletters, where we will continue to explore emerging trends, technologies, and best practices in the electrical and mechanical contracting industry. Together, we can shape the future of MEP installations in Hong Kong.

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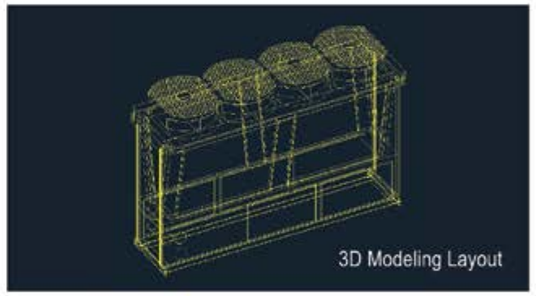


Recently, the first MultiTrade Integrated MEP (MiMEP) Pilot Project in the Electrical and Mechanical Services Trading Fund (EMSTF) was completed. The project combined advanced technologies such as 3D laser scanning, Augmented Reality (AR), and MiMEP. With the benefit of these technologies, not only construction period was shortened, but also site management and safety were improved, materials consumption was reduced and productivity was enhanced. As a result, services provided became more efficient and rigorous quality control could be bringing out.

In order to collaborate with BIM technology, 3D Modeling layout was provided. By consolidate the layout from each parties, BIM could maximize its advantage on proper installation and minimize errors produced.

Supported by the modular design, Mitsubishi Electric modular chillers reduced the installation time compare with traditional chillers. Moreover, the compact size made it easier to crain. Air-cooled was also an advantage that no cooling tower was required such that space was saved on the compact-sized rooftop.

With ever-changing technology, it is believed that the future construction projects will be leaded by BIM. In the future, Mitsubishi Electric will uphold our consistent in high-quality; continue to bring energy-efficient, high-quality and stable equipment to the industry and provide users with a comfortable and stable environment.


3D Modeling Layout

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- Sustainable Construction Methods (MiC, DfMA, MiMEP)
- IoT Applications (RFID, Hololens, 4D)

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專題文章
Theme Article

Contractual and Administrative Implications on MiMEP Installations

By **ECA**

LEE Hau Ming



By **ECA**

Roy LAW



Background

MIMEP - the new way to complete MEP installation in a more effective and organized manner, has the advantage that fewer E&M trades will be working at the same time on the same spot, better for site management and more controllable in terms of safety and quality. In connection with this, there are issues in relation to "Contractual and administrative implication on MIMEP installation" could be an interesting subject(s) to be discussed in this article.

In our traditional construction Industry practice, clients, architects, and consultants issued a tender with their design and specification. The tenderer (contractor(s)) would base on the specification and drawings to submit the price, while usually the lower price tenderer will be chosen.

Is the construction industry = a price-driven market??

MIMEP is a good way but may not be the most competitive way.

No doubt the MIMEP will bring us benefits in many aspects. However, if MIMEP is not called for in the tender document, it will be difficult to implement during the construction phase. The main reason is MIMEP is not the cheapest way for construction. We observed that some recent public works tenders have specified MIMEP requirements. If in case MIMEP appears as a compulsory requirement and is specified in the contract document, it brings us some interesting issues to consider contractually.

There are also administrative implications for the industry. In the past, site management deployed significant resources to rationalize the work process. It involves a lot of subcontractor management and the production of combined services drawings (CSD). In recent BIM modeling, as well as MIMEP, are we reducing our site coordination resources? Are any other subjects to be dealt with by MIMEP implementation? E&M services coordination must be completed much earlier? Method statement, inspection, and test plan to be developed, and from fabrication in the factory or fabrication yard to the site after installation? All these kinds of new considerations could be obstacles to MIMEP development.

> ***"... E&M services coordination, method statement, inspection, test plan, prefabrication facilities, supply chain, ... are considerable obstacles to the MIMEP development in Hong Kong? ..."***

MIMEP coordination and subletting consideration will subsequently generate Administrative Implications

Before we discuss the MIMEP coordination and subletting consideration, let us have a quick review of the common MEP coordination process.

MEP subcontractors usually included Electrical, Mechanical, Fire Services, Plumbing, and other specialist subcontractors. Depending on the type of contract (design and built or built only) and type of subletting (domestic or nominated subcontractors), there are many ways of managing the MEP installations on-site by the supervisor office or the main contractor. Starting from drawing coordination and subsequent site implementation, without going into too many details, the below-simplified flow chart is a typical process commonly adopted in the construction industry for a building project **MEP service drawings coordination or BIM modeling.**

Before MEP subcontractors are on board → The main contractor starts the coordination process and produces combined builders' work drawings (CBW) and combined services drawings (CSD) or BIM modeling, usually based on the consultant's design.

After MEP subcontractors are on board → The subcontractors will be involved in CBW and CSD or BIM modeling process, and MEP services design verification from the subcontractor will also be progressing. There must be some adjustment from the subcontractors after confirmation of material selections etc. before CSD could be finalized.

Once completed the CSD or BIM modeling → MEP subcontractors extract their own trades services from the coordinated CSD or BIM model and produce their own services shop drawings. Services routing should be based on the CSD as it was already coordinated with other services.

Implementation MIMEP usually focuses on plant rooms, services risers, and services corridors, which involve major services installation with different trades. Instead of on-site installation, which can be done by trades subcontractors independently and individually after the building structure substantially completed, all services shall be assembled in **modules in fabrication facilities – but by individual subcontractor or by the manufacturer? (This will be discussed further in this article)** The MIMEP can be done prior to structure works completed - No doubt, this is one of the advantages of implementing MIMEP.

Before we could proceed to the MIMEP fabrication phases, it should be noted that MIMEP modular design cannot be finalized, not until services coordination or BIM modeling are substantially completed. The completion of the services coordination very much depends on the final services equipment selection to confirm the size and weight of modular assemblies.

Therefore, the **services drawing coordination or BIM modeling** must be completed earlier compared to the traditional method.

Before the MEP subcontractors are on board

The Architect and Consultant engineers may at the earlier stage start to create a BIM model to facilitate the design and coordination. However, the coordination must require to be revisited after the MEP subcontractors are on board because MEP equipment selection cannot be finalized without the MEP contractors. This BIM modeling may be included as part of the tender documents for the MEP subcontractor to comply with. MIMEP requirements may be defined at this stage of the project and Main Contractor/ subcontractor will price the MIMEP works accordingly.

After MEP subcontractors are on board and MIMEP fabricator is on board

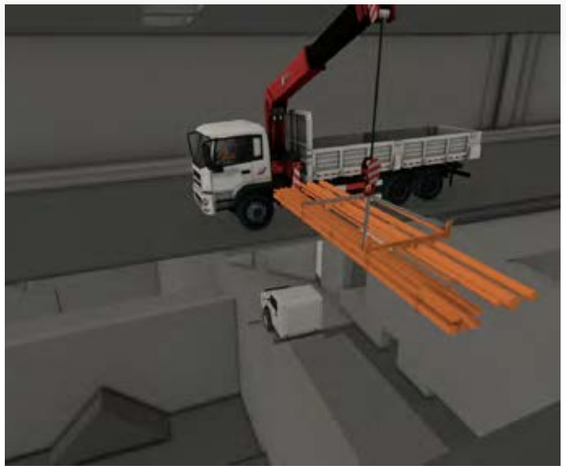
Based on the BIM model developed by the design team, subcontractors shall revisit the BIM model to input their requirements such as the proposed equipment, detail size, etc. In parallel, MEP design verification and verification in relation to the buildability of MIMEP specified by the consultants should also take place during this period. **Up to this point, this become an interesting subject for further investigation: scope demarcation between the main contractor and subcontractors, including the MIMEP fabricator. This will be discussed further hereinafter.**

Once completed CSD or BIM modeling

MEP subcontractors can extract their services layer to produce shop drawings. The MIMEP fabricator can also extract relevant parts of the services for fabrication shop drawings production. The Types and number of Modules can be selected from the BIM model and the works can move forward to the fabrication phase.

After MIMEP modules have been fabricated off-site, they will be delivered to the site for installation. This will create issues related to logistics outside and within the construction site. Considerations of the delivery route from the fabrication yard/ factory to the final installation location require the cooperation of different parties. Depending on the size and weight of the plant or modules, the delivery may need to take place at nighttime where temporary traffic diversion may be required on some occasions.

What is the best way to implement MIMEP by combining all MEP services among all subcontractors will be a challenging task for the Project Manager?



Contractual Implications

In the project design phase, consultants may not have finalized those MEP equipment selections, and the design usually comes with equipment design duty/ratings only, therefore equipment size and weight during the tender stage are not confirmed. The MIMEP design, if require to be developed by the tenderer during the tender stage, will be based on his own assumptions. Alternatively, if the consultants could provide the MIMEP design, this could share with the tenderer/contractor for further development – while usually, this version would not be the latest design due to limited time for the consultant to incorporate the design into the model, though the tenderer/contractor have to based on the available information for further development and verification of the model.

The followings are the contractual issues that may appear:

- Size and weight of equipment are not confirmed during tender stage.
- Undersize of MIMEP supporting frame. The consultant provided a typical detail of the MIMEP supporting system but during construction stage, it is discovered that the design is not strong enough.
- The tender submission date is usually tight. There is limited time available for BIM/MIMEP development.
- BIM/ MIMEP model provided in tender stage are not in line with latest design (e.g. structure, general layout), especially the construction design is still on-going.

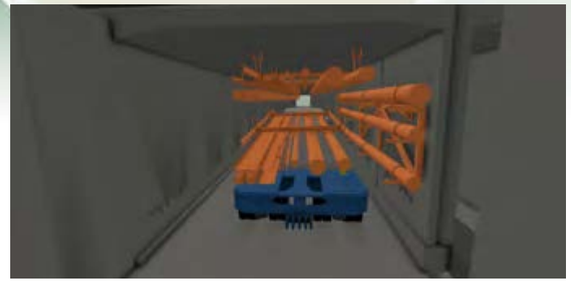
What administrative issues may we anticipate?

"MIMEP" = "Offsite Fabrication" + "Delivery": What control measures could be deployed to control the manufacturing process of MIMEP modules? Any standard specification to be followed? What facilities are considered as acceptable fabrication facilities to be used for MIMEP fabrication?

In the tender stage, equipment selections, services spatial coordination, or BIM model can only be halfway completed due to various reasons. It could include only the necessary performance and requirement of equipment, such as pumps, chillers, cooling towers, diesel generators, UPS, LV switchboards, motor control centers, etc. It should be noted that different equipment brands have different weights and spatial requirements and these will affect BIM model development as well as MIMEP module design.

MEP Prefabrication Facilities

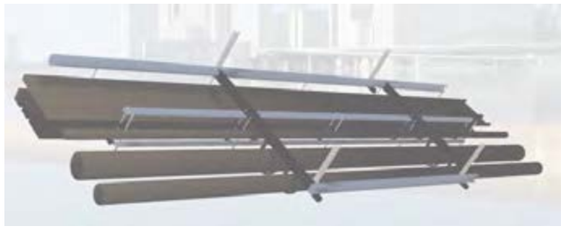
The basic concept of MIMEP is to have the majority of works prefabricated off-site and deliver to the site for installation. The offsite prefabrication facilities are usually in a more controllable environment (eg. more space for mass production, availability of utilities, lighting, air ventilation, better environmental control for noise and dust emission, and less likely to be affected by adverse weather conditions). It could have more equipment and tools that are specifically designed to complete the prefabrication efficiently. Some of this equipment and tools may not be deemed suitable to use within the construction site, such as heavy power demand welding machines, lifting gantry, etc. There are emerging challenges to the construction industry that how to govern the prefabrication facilities to acceptable standards in different aspects.



As Hong Kong is an international city with a free economy, principally the fabrication facilities or factory can be located anywhere in the world, though the main initiative to determine fabrication location must be competitiveness – in terms of efficiency, costs, and logistic arrangement, together with other factors such as availability of skilled labors, quality control, and environmental impacts, while the governing rules shall maintain open to different countries.

Implications for Projects in Hong Kong

Fabrication in Mainland China



The rapid development of the Greater Bay Area is helping to improve transportation networks among the southern cities in China. The lower labor and production costs in the region can reduce the overall construction cost to some extent. Fabrication in the Great Bay Area can also ease the shortage of skilled workers in the construction industry in Hong Kong recently. However, behind the benefits of fabrication in Mainland China, there are some limitations that need to be considered thoroughly. The quality of production can vary widely among different manufacturers, and it is important to research and vet potential manufacturers before making any decisions.

Quality control

The trade standards and practices in Hong Kong are not in line with those of Mainland China. Skilled workers in Mainland China would follow GB Standards for purchasing and assembling modules, as they may not be familiar with the BS and IEC standards in Hong Kong project specifications. In this circumstance, the quality and arrangement of MIMEP may differ from expectations. On-site inspection plays an important role in harmonizing these two types of construction practices through close coordination and collaboration. However, frequent module inspection may be challenging for some remote fabrication locations in the Great Bay Area, as travel time directly affects the design period and construction program.

Fabrication in Hong Kong

The lack of fabrication facilities in Hong Kong is one of the problems encountered in the trade. Higher workshop rental costs, labor costs, modules storage, and logistic costs boost the overall MIMEP cost in Hong Kong. This is the reason why the adoption of MIMEP is over-reliance on facilities outside Hong Kong.

Fabrication in Hong Kong would benefit from the fast-track process of mock-up inspection and associated modification work. It shortensthe back-and-forth module re-inspection and verification time to finalize mass production compared with fabrication in Mainland China.

The choice of MIMEP fabrication location shall be fully evaluated on the specific needs of the project, the desired level of quality, and the budget available. But no matter what the choice is, it is important to work with experienced manufacturers with proven track records for ensuring workable products are manufactured.

Design of MIMEP

MIMEP involves the integration of various aspects of building services, including mechanical, electrical, and plumbing systems. It requires a high degree of coordination and collaboration between different trades.

Therefore, cross-discipline collaboration is necessary throughout the process, and more detailed design input is required from consultant teams. By utilizing BIM technology, it is foreseeable that the full design can be delivered at the early design stage, shortening the construction period.



Method statement

The method of MIMEP shall undergo DfMA considerations to maximize module standardization, reduce wastage, and minimize on-site installation time. At the module design stage, each type of module shall meet the client's requirements, local regulations, and standards. Module code and identification shall be assigned to ensure that the design is suitable for fabrication and installation.

Materials and accessories shall be listed and approved by concerned parties before installation to the MEP module. The fabrication components of the MEP module shall be assembled in accordance with approved design drawings or BIM models. It is essential to ensure that the fabrication is carried out accurately and precisely to ensure the module functions properly.

Testing of the MEP module shall be performed to ensure that it meets the required specifications and standards. This involves electrical, mechanical, and plumbing testing to verify the module's performance. The MEP module shall be delivered to the site based on the planned logistic schedule for final fixing.

The MEP module shall be installed in its final location and position, ensuring proper alignment and level. All necessary connection points to electrical, mechanical, and plumbing components shall be made correspondingly to the building's systems.

Commissioning of the MEP module shall be performed to ensure that it operates correctly. This involves verifying that all the components are functioning and that the module meets the required performance standards as per the T&C plan.

Lifting capacity determines the MS and the extent of the size of the MIMEP

The shortage of fabrication facilities in Hong Kong has resulted in higher construction costs and a lower adoption rate of MIMEP technology. This has led to the majority of MIMEP adoption being driven by project specifications. To address this issue, it is necessary to enhance the MIMEP supply chain in Hong Kong. Doing so would not only help to reduce fabrication costs but also enable real cost savings without the need for government subsidies.

To enhance the MIMEP supply chain, it is crucial to establish partnerships among various stakeholders in the industry, including developers, manufacturers, contractors, and consultants. Collaboration among these stakeholders can help to identify and address the specific challenges faced by the industry in Hong Kong, such as high production costs and limited fabrication facilities. Raising awareness of MIMEP technology and providing education and training to stakeholders can also help them understand the advantages of incorporating MIMEP into their projects.

Conclusions

MIMEP provides a healthy, and safe environment because of fewer working procedures on site and is worth adopting in a larger scale project or, a typical installation project. It also benefits to site progress because the prefabrication of MIMEP modules could start before the civil works handover for E&M installation. Implementation of the BIM model could further assist the MIMEP module design coordination to minimize materials wastage and abortive work.

However, thinking of the logistics and module storage will be a challenge. In the year 2019 to 2022, during the COVID-19 pandemic, the cross-border logistics to and from mainland China had been affected. This greatly affected the progress of many construction projects during this period. Even though the epidemic has been mitigated now, a logistic arrangement is the most important consideration to have punctual delivery of modules.

Planning shall include logistics inside the construction site boundary, especially MIMEP modules with bigger sizes and weights. Delivery route may include reservation of access openings, machines, and tools for loading and unloading. Lifting gears for installation shall also be considered.

There is no doubt that MIMEP become the mainstream of project installation. With the help of advanced technologies, for instance, 3D scanning and augmented reality, the design of MIMEP modules will become more accurate and sustainable in Hong Kong projects.

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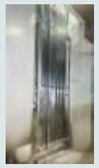
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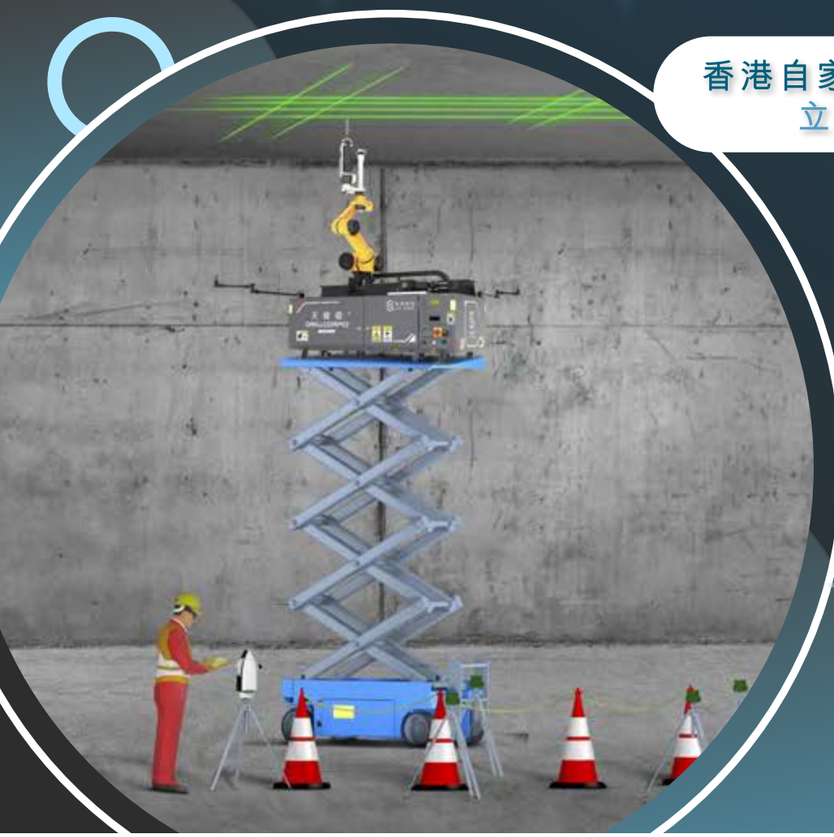
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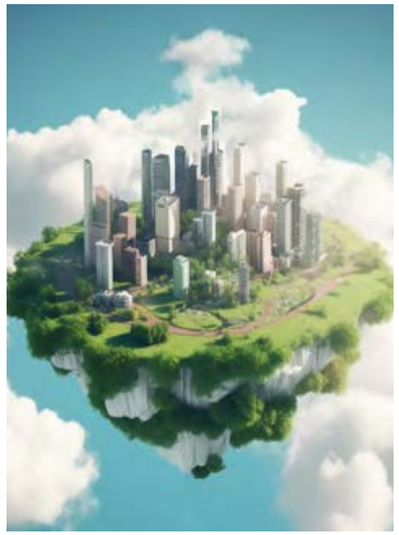
Building a Sustainable Future with MiMEP
Key Elements for Long-Term Success

By **EMCA**

Theresa CHAU



"... in practice, there are far some hurdles one could imagine, ... all these need to be surmounted before sustainable and long-term development of MiMEP ..."



Our construction industry has been implementing innovative transformations over the years where various technological advancements have been widely applied so as to increase productivity and efficiency. Among others, one of the most promising approaches in this realm is "design for manufacture and assembly" (DfMA). In the Electrical & Mechanical (E&M) trade, Multi-trade integrated Mechanical, Electrical and Plumbing (MiMEP) has emerged as a transformative solution to revolutionize traditional construction and engineering practices. The concept of MiMEP is to manufacture the E&M modules offsite, then assemble the modules inside the construction site in a "plug & play" manner. With the implementation of MiMEP, construction projects could be completed faster, with less construction waste, and higher quality when compared with the conventional construction method. However, in practice, there are far some hurdles one could imagine, name but a few include shortage of site storage spaces, limitation of the supply chain, tantalizing cross-border logistics, intricate taxation, and inexorable resistance to change – all these need to be surmounted before sustainable and long-term development of MiMEP can become within reach.



Site Storage Space

Although MiMEP has many benefits, it frankly requires additional space to suit the off-site application when compared with the conventional on-site construction methods since contractors need to construct MiMEP modules and temporarily store them in the work site before delivering them to the construction site for subsequent assembly works. This raises a concern to project teams (i.e. Developers, Architects, Builders, and MEP Contractors) whether land provisions have been allowed.

The stance of project teams is also crucial for the long-term development of MiMEP. If the team has the same goal for the achievement of MiMEP and incorporates effective planning and collaborative effort for the adoption of MiMEP during the initial planning and design stages of projects, it could advance the development. For instance, Builders and MEP contractors could plan ahead together for the allocation of the necessary space for MiMEP installations. Taking advantage of higher productivity in E&M works through MiMEP, could bring a beneficial effect on the overall construction program and achieve optimal construction outcomes.

Based on a necessity consideration, one major factor that can emerge as the need for additional space for MIMEP is the difference in acceptable tolerance levels between building works and E&M works. Building works may generally have a higher tolerance level for certain aspects of construction, such as the placement of walls or ceilings. While in E&M works, MEP contractors may require higher precision for the installation of mechanical, electrical, and plumbing modules, in particular the water pipe/gas pipe risers installation.



Cross-Border Logistics and Taxation Challenges

Cross-border logistics pose another formidable challenge to the implementation of MiMEP. It is inevitable that certain components from Hong Kong need to be imported into the place where modules are assembled (notably the Mainland) and then modules exported back to Hong Kong. Such import to and export from Mainland China requires custom clearance procedures, compliance with cross-border regulations, and tax rebate arrangements. Compared with traditional construction, this imposes additional logistical difficulties such as possible material delivery delays and escalated transportation expenses.

In addition, the lack of standardization in cross-border logistics processes is also another significant concern. Due to the fact that the regulations and constraints in transporting goods across countries vastly vary, which may confuse project teams resulting in mistakes. To tackle these challenges, practitioners of MiMEP must establish close collaboration with logistics companies to ensure timely and cost-effective material and component delivery. They must also identify dependable and efficient logistics providers who can undertake the transportation, storage, and delivery of components with ease.



Another challenge to MiMEP implementation in Hong Kong is taxation. The importation of materials and components from other countries should involve value-added tax (VAT) and duties, which could significantly increase the ultimate cost of MiMEP projects. To overcome these challenges, MiMEP practitioners need to work closely with tax experts to ensure that they are aware of the tax implications relating to the importation of materials and components from other countries. They may also need to explore alternative sourcing options, such as sourcing materials and components from countries with lower tax rates. This requires careful planning and research to identify alternative sources of supply for meeting the required quality standards and specifications. Moreover, it is also an option to consider the use of free trade agreements or preferential trade agreements which could reduce or eliminate tariffs and duties.

A Mature Supply Chain

Nurturing a Mature Supply Chain in MiMEP is another crucial element in the transformation of the construction industry. To kick-start, establishing a strong partnership with suppliers is a fundamental factor in nurturing a mature supply chain in MiMEP and collaborative efforts with suppliers could largely streamline the procurement process. Indeed, time could be saved in identifying and selecting dependable suppliers who can provide high-quality materials and components within the stipulated time frame and at a reasonable cost. Adopting a standardized approach to supplier management and implementing effective communication channels for ensuring timely delivery and response to any impending issues are instrumental in the process.



Fostering innovation and continuous improvement is another key aspect of achieving a mature supply chain in MiMEP. Encouraging suppliers to explore new technologies and processes that can enhance the efficiency and quality of the supply chain, as well as promoting a culture of continuous learning and development, are simply pivotal.

A mature supply chain can lead to increased manufacturing accuracy, productivity, production flexibility, and real-time control and adjustments, as well as improved assembly accuracy and efficiency despite inherent properties of construction such as variability of outside conditions and geographic dispersion of activities. To establish a mature supply chain in MiMEP, a comprehensive and collaborative approach is necessary. This includes standardized supplier management, effective communication channels, and a culture of innovation and continuous improvement.

Paradigm Shift



MiC / MiMEP is an emerging construction method that offers many benefits. However, their adoption would also pose challenges for builders, particularly in terms of site coordination and the extra burden on the usage of tower cranes and builder's lifts. Thus, from the builders' mindset, the adoption of MiMEP has created a negative connotation for them since the new ideas of the work process would impose an extra workload on their daily routines.

To soothe the nerves of practitioners in the change process, construction companies should, first of all, get well prepared the manpower and provisions to cope with the potential increase in the usage of tower cranes and builder's lifts, and consider using alternative lifting methods, such as prefabricated lifting frames or lifting gantries, to reduce the reliance on tower cranes and minimize the impact on the construction site when they decide to adopt MiC / MiMEP in their construction process. Nevertheless, the readiness of builders to handle the changes and challenges associated with MiC / MiMEP may depend on various factors, such as their level of experience, expertise, resources, and financial viability. Builders who are willing to invest in training and upskilling their workforce, adopting new technologies and equipment, and collaborating with manufacturing partners are more likely to be prepared for shifting towards MiC / MiMEP.

Builders who want to embrace changes associated with MiC / MiMEP should start by understanding the principles and practices of this novel construction method. They should also assess their current capabilities and identify areas to transform. For example, they may need to invest in new equipment, such as modular construction tools, or train their workforce in new technologies, such as BIM and AI. In addition, it is of paramount importance to collaborate with manufacturing partners to procure pre-manufactured components and ensure that they meet the necessary quality standards. This collaboration can help builders to streamline their construction processes, reduce waste and the possibility of reworking, and improve overall productivity.

In conclusion, those builders who are willing to adapt to the transformative changes and challenges associated with MiC / MiMEP will definitely benefit from improved construction quality, time, and cost savings, thus increasing competitiveness.

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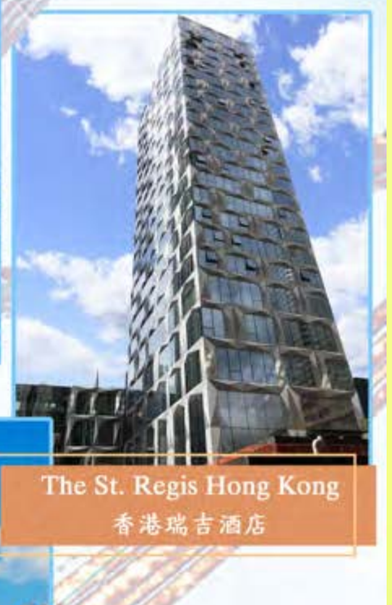
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MiMEP Application for Life Safety and FS Installations

By **FSICA**
Ben YUEN



By **FSICA**
Victor NG



"... the "DNA" of "MiMEP" is "Standardization", "Mass Production" and "Centralization" to obtain the common goals on the enhancement of speed, manpower, sustainability & efficiency, ... our Building Services industries are forming an indispensable portion of this construction strategy ..."

Introduction

The Development Bureau published Construction 2.0 – Time to Change, it was adopted as a key strategic direction for the onward HK Construction Industry; furthermore, PSGO (Project Strategy and Governance Office) aims to enhance the capacities and sustainability in long-term planning in the HK market. It is not just limited to the builder's works, structural elements, and architecture, but also our Building Services industries are forming an indispensable portion of this construction strategy, even some parts of building elements are not efficient in MiC, the DfMA (Design for Manufacturing Assembly) / MiMEP can still contribute on the enhancement of speed, manpower, sustainability & so on efficiency.

As one of the major BS trades, Life Safety and Fire Services Installations is one of the most major trades in any premises and SHOULD BE incorporated with MiMEP installations. In this paper, would like to share the experience and technical point of view of the design engineer and Contractor.

Design Considerations and Planning

A. Design Consideration for adopting MiMEP in different FSI systems and planning

Commonly understand on advantage application of MiMEP is those repetitive elements.

MiMEP elements are normally consisting a combination of different parts/components from different manufacturers; for example (1) sprinkler installation valve sets with a combination of control valve + stop valves with monitoring device / proving pipe / pressure switch/pipeline & fittings / etc. example (2), hose reel station with hose reel set + manual call point + alarm bell + pipeline & fittings + supporting frame / etc. The other common MiMEP items of this nature are sprinkler subsidiary valve sets, FS inlet & cabinet, etc.

In order to incorporate such multiple / pre-fabricated elements, the accepted standard and compatibility should be listed in project technical specifications for onward assembly & manufacturing and ensure the quality and compliance in the end-products and onward connection to other portions of installations, especially the factory testing procedures and secure the quality, dimensions, alignment, and compatibility with other portion of FSI.

Other MiMEP types are related to critical equipment that needs extensive time for on-site installation, if they are designed in the form of MiMEP will minimize the necessary labor and time for on-site installation, such as pump & control panel sets, Fire annunciator panels, water storage tanks, etc. Having comprehensive assembly in the MiMEP factory and performing necessary testing before delivery to the site and putting in designated positions, will not only save site work quantities but also can shorten the T&C period. However, it is necessary to plan for suitable plant allocation and delivery paths in the early design stage. The completed MiMEP element of major equipment will normally be large in physical sizes, such as a completed pump set assembly may be as wide / tall as ~2 to 2.5m; therefore it is better to design an easy path / adjacent to the façade for corresponding plant allocations; otherwise wide / large spatial path required to be clear before delivery which may have adverse implication to tight MiC / MiMEP construction program.

B. Possible MiMEP elements in the recent market and possible items can be in MiMEP modules

Besides those elements mentioned above, other possible and common MiMEP applied items are:

- smoke control fan sets completed with control panel + supporting frame + necessary dampers: on-site will need to connect ductwork and power only.
- Smoke control Minic panel completed with control console + display + control wiring: on-site will need to connect power and control wiring only .
- Emergency generator set with integrated fuel tank / cooler / engine / acoustic installation / etc: on-site connect the wiring with Switchboard only.
- Total Gas Flooding system with gas cylinder(s) / manifold / actuation / control device / release panel: on-site need to connect power and out-going pipeline only.

C. Possible technical feature and material improving MiMEP and pre-fabrication module connection efficiency

The efficiency of MiMEP construction will be related to the on-site services connection methods among MiMEP modules and other non-MiC portions, they are mainly regarding cabling and pipework. Wiring connection depended on the reservation of cable lengths and marshaling boxes, yet to have a specific way unless the Authority can adopt the application of wireless AFA devices and transmit signals through reliable networks.

For other wet-type FS installations, G.I. steel pipe is a common pipe material applied, although the grooved coupling connection method is widely adopted in the FS industry, normally for distribution and large pipe size only.

For smaller pipe sizes, DN65mm and below, the largest amount of connections in a typical project, can also be considered to adopt grooved joints or Press-fit jointing (which had been commonly adopted in the plumbing industry in the copper pipe).

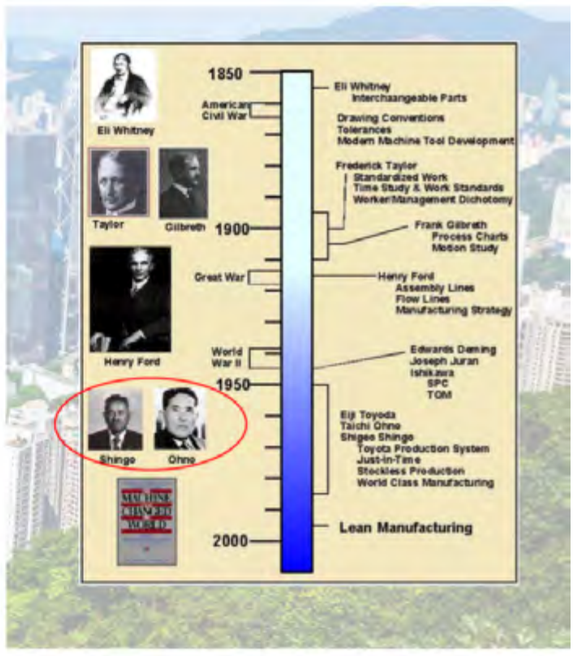
Another alternative pipe material that can be considered is CPVC which is light in weight and just simply in cement jointing, it is also having UL listed and LPCB approved products for sprinkler installations; yet to be adopted in the local market subject to acceptance from Authorities.

Also, if standardized the layout and structural framing arrangements, each bay of sprinkler and dry-fire system can also be in the MiMEP module for ceiling void installation together with other MEP installations.

D. Planning and preparation works before manufacturing

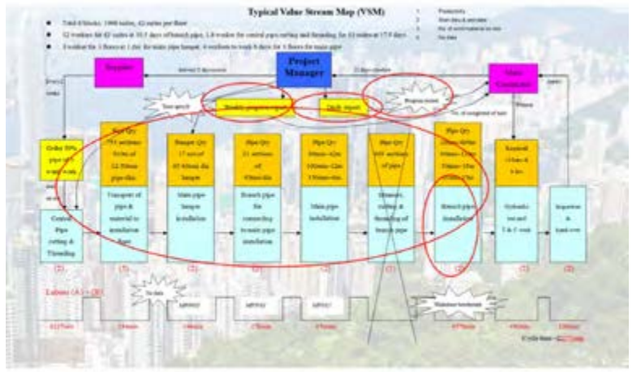
The wording “MiMEP” came from DevB. I daringly linkup this word with “Lean Thinking” which has been well-known since 1950 in Toyota Production System. The principle of “Lean Thinking” is using “Value Stream Mapping (VSM)” to identify the whole process for “Waste Elimination” and then to obtain the optimate goal – “Saving”.





In my view, the “DNA” of “MiMEP” is “Standardization”, “Mass Production” and “Centralization” to obtain the common goals:

(1) “cost-effective”;
(2) “time-effective”;
(3) “safety”; and
(4) “efficient”.

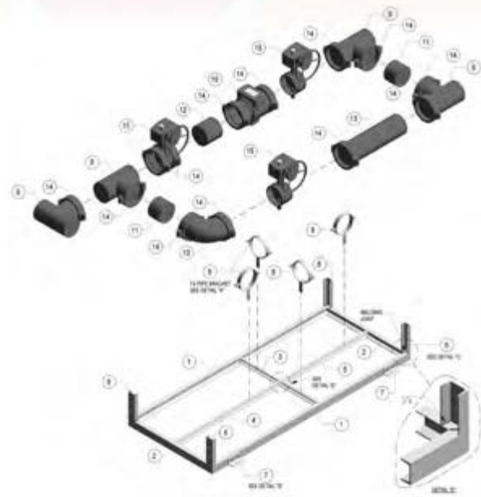


E. Revit / dwg preparation from factory models and info with detailed setting-out and leveling

BIM is commonly used in manufacturing. Now, BIM has also become a trend and MUST technology in the construction industry. The assembly drawing can provide all necessary information for manufacturing and assembly, e.g., quantity, size, weight, mounting method and etc.

F. Planning for delivery path and programme

On the other hand, we need clearly identify the “Size” and “Weight” of the module and by using suitable and proper “Tools” for delivery and installation.



G. Authority submissions

Continuous improvement is mandatory in the construction industry, not just a policy.

The government is promoting “MiMEP” for a few years. Building Department (BD), Environmental Protection Department (EPD), Electrical & Mechanical Services Department (EMSD), Water Supplies Department (WSD), and Fire Services Department (FSD) had published some guidelines for stakeholders to follow.



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(8) in WSD 3318/50 Pt. 7
Our ref
來函檔號
Your ref

電話 Tel : 2829 4355
傳真 Fax : 2824 0578

20 February 2019

Distribution: To all Licensed Plumbers and Authorized Persons

Dear Sirs,

Circular Letter No. 2/2019
Procedures for Applications for Water Supply in New Building Projects adopting “Modular Integrated Construction” Method

To facilitate the adoption of the “Modular Integrated Construction” (MiC)[1] method in Hong Kong, the Water Supplies Department (WSD) promulgates below the procedures for the applications for water supply in new building projects adopting MiC method (MiC projects). The WSD has consulted the Technical Committee on Plumbing on the procedures. The WSD will review the procedures from time to time with reference to the development in the adoption of MiC method in Hong Kong and the experience gained in implementing the procedures.

Applicability of the Procedures



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YOUR REF.:
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TEL. NO.: (852) 2733 7744

22 March 2019

To: Recipients of FSD Circular Letters and Authorized Persons

Dear Sir/Madam,

FSD Circular Letter No. 3/2019

Guidance Notes on Submission, Approval and Acceptance Inspection of Fire Service Installations and Equipment in Modular Integrated Construction Building Projects

Modular Integrated Construction (MiC) refers to a construction method whereby free-standing integrated modules are manufactured off-site and then transported for constructing buildings on sites. The concept of “factory assembly followed by on-site installation” represents a shift of traditional method from the on-site construction to the modern off-site manufacturing and assembly.

We believe that we can see our future through “MiMEP” !

ATAL

ESG-centric Digital Twin for Complying with Regulatory Requirements



Mandatory ESG (Environmental, Social & Governance) disclosures for complying with a growing wave of regulations is an increasing challenge for organisations. Integrating ESG aspects into the day-to-day decision-making process has become essential for business success. ATAL's ESG-centric Digital Twin enables organisations to automate operations and perform data analytics for ESG insights and business intelligence in addressing specific challenges from energy saving and maintenance optimisation to space utilisation and emergency response.

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- Identify and Prioritise ESG Opportunities
- Analyse ESG Data with AI Models
- Implement ESG Initiatives
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Smart HVAC systems revolutionize next-generation building in Hong Kong

Hong Kong is known as Skyscraper City, and it ranks as one of the most densely populated cities in the world. Its 42,000 buildings – 8000 of which are high rises[1] – are vital and integral to helping the city achieve its mission to achieve carbon neutrality by 2050. But meeting this audacious goal will require a revolution in how buildings manage their energy demand and emissions.

Following the Smart City Blueprint 2.0 under the Hong Kong Government initiatives, the demand for more HVAC efficient product to lower energy consumption is highly recommended. A study by Tsinghua University's (China) Building Technology and Urban Systems Division and Lawrence Berkeley National Laboratory (USA) found that VRF consumed up to 70% less energy for air conditioning than variable air volume (VAV) in Hong Kong office buildings[2]. Not requiring intense structural alterations to the building, VRF systems are also one of the most feasible and sustainable options to retrofit or upgrade the legacy HVAC systems in old buildings for better energy efficiency.

Johnson Controls-Hitachi Air Conditioning recently launched VRF systems, the air365 Max Pro is designed for HVAC professionals, architects & building owners looking for a modern HVAC solution that is cost efficient and adaptable. The air365 Max Pro is an end-to-end solution that's easy to work from design to installation, operation, and maintenance, offering incredible energy efficiency and seamless comfort for users.

Within the air365 Max Pro complete ecosystem solutions, the combination of indoor & outdoor units, controllers, smart apps and hardware features work perfectly as a comprehensive HVAC solution for a smart building. Built in best-in-class Energy Efficiency with EER up to 5.60*[3] & COP up to 5.31, the VRF systems have been designed with significant improvements in EER with new HEX and Compressor design, enhanced energy savings in part-load with SmoothDrive2.0 technology which helps reduce running costs during part-load operation and also leads to reduce CO2 emissions. In addition, air365 Max requires 12%*[4] less refrigerant compared to the conventional Hitachi VRF.

Engineers can also configure Hitachi VRF outdoor units up to 4X faster using the airCloud Tap application. The airCloud Tap is the latest app by Hitachi Cooling & Heating dedicated to HVAC professionals. The app enables professionals to read and modify settings during commissioning and servicing, via contactless communication between the equipment and a smartphone. Simply tap a smart phone near an outdoor unit or wired controller to access more than 200 setting parameters via NFC. For complex installations settings may be copy-pasted to multiple units in just a few clicks.

Notes:
1. What Is Green Building?, Hong Kong Green Building Council (2021)

2 Yu, X., Yan, D., Sun, K., Hong, T., Zhu, D. (2016). A Comparative Study on Energy Performance of Variable Refrigerant Flow Systems and Variable Air Volume Systems in Office Buildings. https://simulationresearch.lbl.gov/sites/all/files/t_hong_-_report_a_comparative_study_on_energy_performance_of_variable_refrigerant_flow_systems_and_variable_air_volume_systems_in_office_buildings.pdf

*3 EER5.60 is applicable for the following models:
RAS-080HNCBLW for SEA market, RAS-080RNCCLW for LA market(380V) and RAS-080RNCCRW for LA market(220V).

*4 Comparison of (for a system equivalent to 16HP class (45.0kW)) Between [RAS-FSNS previous model VRF of 5years ago] VS [air365 Max RAS-HNCC**]
Simulation Condition:
16HP class ODU (45.0kW) *1unit, 3HP class IDU (8.0kW) * 5units, Total piping length; 120m, IDU connection ratio: 94%

*5 Testing Laboratory: Japan Textile Products Quality and Technology Center Test Report No. : 21KB080432-1 Test Procedure: ISO 18184 : 2019 "Textiles -- Determination of antiviral activity of textile products." application Tested Virus: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)

*6 Tested by Kitasato Research Center for Environmental Science. Test No. 2020_0386. Suppress Virus effect observation test by operating FrostWash™. Test was conducted with E.Coli and operating FroshWash™ for 280 continuous minutes.

**7 Tested by Kitasato Research Center of Environmental Science. Test No. 2017_40194: antibacterial & anti-mold effects when operating FrostWash™ four times.

Over the years, the IoT has changed the HVAC landscape by enabling users to remotely control air conditioning units, customizing indoor airflow and temperatures to achieve their ideal comfort level. Advancements in data analysis takes this one step further by giving insights into the HVAC carbon footprint, where companies can use the power of AI to track carbon emissions and take actions to reduce their energy comsuption.

The Hitachi airCloud Pro which enables you to communicate with your VRF systems through the cloud, is an excellent example of how this technology can be used to reduce a building's energy consumption and carbon emissions. Besides being able to tailor temperatures and comfort levels, this app can also provide a complete analysis of the system's energy consumption, enabling users to take the right actions.

Responding to the growing demand for better indoor air quality (IAQ), Johnson Controls-Hitachi Air Conditioning developed a series of air filtration systems to optimize indoor air comfort. Within our commercial range, our IAQ product line ups consist of ViroSense ZPT Filter for cassette units and Aqtiv-Ion ionizer kit is designed to provide a better and healthier indoor environment. The efficiency of the ViroSense Z2 filter against SARS-CoV-2 been confirmed with inhibition rate up to more than 99.9% *[5].

For household use, Hitachi's wall-mounted air conditioner is furnished with FrostWash™ technology, which reduces the accumulation of dust, mold, and bacteria on the heat exchanger of your air conditioner. FrostWash™ can reduce the presence of these impurities inside your unit by up to 99.99%*[6] of viruses and 93%**[7] of bacteria and mold, promoting healthier air and keeping unpleasant odors at bay.

In conclusion, implementing greener and energy-efficient HVAC systems can lead to a significant reduction in carbon emissions, fostering the development of sustainable buildings and cities. At Johnson Controls-Hitachi Air Conditioning, we understand the utmost significance of health and comfort in promoting overall wellbeing. Our HVAC innovations are consistently driven by sustainability, wellbeing, and digitalization, ensuring a harmonious and balanced indoor environment for our customers.

Find out more about Johnson Controls-Hitachi Air Conditioning's innovative products and solutions at **www.hitachiaircon.com/hk**



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專題文章
Theme Article

Adoption of MiC and MiMEP in the Construction Industry - Contractual, Procurement, and Design Arrangement Concerns

By **LECA**

Betty LEE



"... this game-changing technology is not without its pitfalls, it is critical to establish a proper procurement and contracting approach early on..."

With the advancement of technology in recent years, there is now a great opportunity for the construction industry to transform through the off-site prefabrication of MEP components which can then be assembled on-site. In view of this, the government has been actively promoting the adoption of MiC and MiMEP in the construction industry of Hong Kong. MiC is an innovative construction method whereby free-standing volumetric modules (with finishes, fixtures, fittings, etc.) are manufactured off-site and then transported for constructing buildings. MiMEP is regarded as a continuation of the successful MiC construction method in the local construction industry, as it involves the integration of multi-trade building service components into a single assembly of prefabricated modules. Various trades of building services installations were completed on site by connecting modules manufactured in a factory and transported to the site for assembly.

The traditional approach to MEP installation is that it is always the final stage in a construction project. This means that there is enormous time pressure and errors are easily prone to occur. By modularizing these processes in an off-site factory, it is possible to work on them in parallel with building construction. This will make the best use of available time, avoid last-minute rushes, and lessen the impact of unforeseen events such as unexpected weather.



Figure 1 Prefab & Modular MEP Systems

Some common examples of MiMEP include plant modules, multi-trade horizontal ceiling modules, vertical MEP riser modules, modular pump set, modular condensing pipework for cooling tower, modular pump set with control panels, integrated air-handling units, panelized electrical modules, and so on.

Advantages of prefabricated MEP installations

Owing to its mode of operation, MiMEP reduces construction waste, greenhouse gas emissions, shortens construction time, reduces labour and project lifecycle costs, improves health and safety of workers, facilitates change without demolition, and improves construction flexibility and adaptability. Furthermore, adopting this innovative construction method is beneficial to alleviating the challenges that the construction industry is encountering, including the labour demand, aging skilled workforce, stringent site safety and quality requirements, and high demand on construction productivity especially in a challenging time.

A business model of modular construction is associated with a unique supply chain, stakeholders' composition, and management process which may have contractual and administrative implications on MEP installations (in terms of contractual arrangement, procurement arrangement, and Design changes) when compared with those of the traditional cast-in-situ construction.

Contractual Arrangement

(a) Progress payment

In traditional practice, contractors are paid when works are progressively done on-site, but off-site payments for materials are uncommon. Usually, there is no contractual relationship between the developer and the module manufacturers. Module manufacturers would expect to receive payment progressively from the clients with the production of modules. In addition, the costs for design and set of facilities offsite are also substantial and module manufacturers would wish the clients to settle these expenses before the start of the production line. The situation is similar to the contractor's payment on the preliminaries of a construction project.



Figure 2 Progress payment

Procurement Arrangement

(a) Early Involvement of contractors

Even though many on-site projects were previously prefabricated in factories, the on-site assembly must still be done with care, as there is less room and time to retrofit than traditional construction. Allowing contractors to participate early is an effective way to minimize the chance of unnecessary modifications. It is strongly recommended to bring together the module manufacturer and the main contractor early in the design stage so that their input can be incorporated into the design for a more efficient technical solution. This is because each module manufacturer has a unique proprietary system for module production.

(b) On site Traffic Management

Compared to traditional precast pieces, prefabricated modules are too bulky and inconvenient to store on-site on a regular basis. As a result, a Just in Time (JIT) strategy for module installation on-site should be applied. To ensure a seamless JIT operation without interfering with other routine traffic on site, the workflow of delivery, lifting, and installation must be planned and handled. Material on-site payment for prefabricated



Figure 3 On-site Traffic Management

If projects adopt MiC, the main contractor is likely to encounter great pressure on the cash flow when employing the traditional payment method. To alleviate this burden, contract terms should be modified to allow the main contractor to receive some sort of advance payment or stage payment for offsite modular manufacture. To reduce the developer's risk exposure, the contractor would provide suitable insurance and indemnification against any loss or damage to the modules offsite.

(b) Intellectual property

While architects develop the building's plan and design, it is up to the module manufacturers to develop the fabrication system and jointing methods for the projects. Many manufacturers believe that it is necessary to patent their design since the success of their modular system is strongly tied to such design. Owing to their concerns about intellectual property, manufacturers may be hesitant to share construction information with the project design team, which may give rise to some coordination issues. In order to impartially safeguard the interests of contractual parties, especially those involved in innovation, it is highly important for the contract terms to explicitly define the right and liability of the patent.

modules would be relatively small at locations where JIT functions successfully. The delivery-hoisting installation may be probably completed within a single day. The modules are assembled shortly after arriving on site.

(c) Hoisting Facilities

The tower crane is in charge of elevating the prefabricated modules to the place of installation in high-rise construction. Although a tower crane is a standard on-site facility, the lifting capability required for MiC is far greater than that required for traditional construction. Therefore, it is vital to discuss with the design team before deciding on the size and arrangement of the crane to ensure the smooth operation of the lifting work.



Figure 4
Prefabricated modules are lifted and installed one by one

Design Changes

When the work is moved from the construction site to the factory, additional attention must be given on an extremely comprehensive level, requiring the design concept to be re-established in different dimensions. To allow sufficient time for off-site production of modular units when MiC is employed, the design freeze must take place significantly earlier than during traditional construction.

It is critical to make early decisions and finalize owner's design requirements before starting factory fabrication of modules. If further changes are made after something has already started, it can have knock-on effects throughout the workflow. If the modification is significant, such as layout changes requiring redesign of prefabricated modules, connections, or other processes, progress may slip back to the submission or setup stages.

When the traditional procurement approach is applied, design changes may also occur when the contractor proposes an alternative design (different from the conforming design) prior to construction. This is especially true for MiC as design details can vary from company to company. Design and build contracts can be used to address this issue. The shortcoming of this approach is that the developer will have a lower level of control over design details, as achieving the desired result depends on the attitude and skill of the design and build contractor.

Furthermore, variation orders are unavoidable in all construction contracts. Implementation of these changes may become more challenging if they are initiated after the commencement of mass manufacturing or on-site assembly of the units. A clear indication of factory labor rates and site labor rates at the tender stage would be of benefit if future variant orders are to be priced fairly.

As observed from the above, this game-changing technology is not without its pitfalls for the construction industry. When implementing MiC, it is critical to establish a proper procurement and contracting approach early on. Contractual issues should be identified and resolved from the outset, including agreeing on a critical point of time for design freeze, and any necessary amendments to standard contract forms, notably with regard to interim payments. With the advancement of technology, it is expected to make more breakthroughs in this field, achieve sustainable development, and improve the construction process and overall quality of buildings.



Figure 5 Design-and-Build Contract

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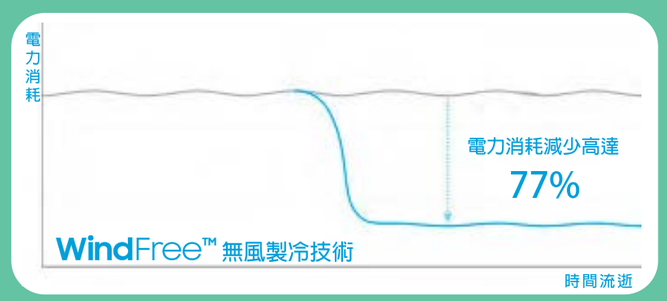
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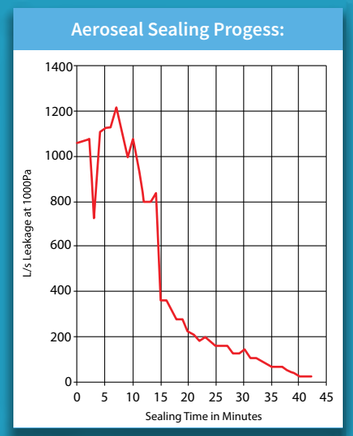
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工程項目:

港鐵各車站，麥當勞叔叔之家，American Club 美國會，官塘馬會投注站，葵涌馬會投注站，赤柱監獄，荃灣港安醫院，中信銀行，海事博物館，問月酒店，萬國殯儀館，荃灣柏傲灣，太古廣場，青衣城，香港都會大學，沙田馬場，理工大學，聯合醫院，怡和大廈，油麻地圖書館，友誠商業中心，九龍灣宏天廣場，怡和大廈，旺角友誠，青衣城

WIN POWER

SCR (無斷式)功率控制器

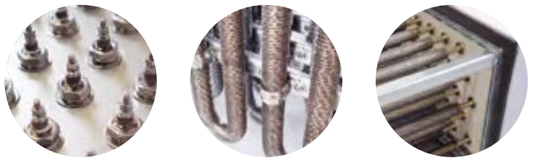


工程項目:

中文大學
哈羅香港國際學校
屯門醫院
陽明山莊
黃道益
香港大學



DDS 不銹鋼電熱管



工程項目:

香港大學、香港中文大學
香港賽馬會
港珠澳大橋
港怡醫院
澳門新濠天地
澳門新地



SUPAFLEX®
美佳软性风管

Supaflex Flexible Duct



工程項目:

將軍澳入境事務大樓
啟德體育園
港怡醫院
庫務大樓
沙田威爾斯親王醫院
西九文化區





DDS 佳得風管系統有限公司
Delta Duct Systems Ltd.
☎ +852 2511 2118 ✉ sales@dpx.hk 🌐 www.dds.hk
3/F, Unit A, Kader Building, 22 Kai Cheung Road, Kowloon Bay, HK

「工程」與「人工智能」

活動簡報 Summary on Activity

現今工程技術日新月異，既有機電裝備合成法(MiMEP)，又有供製造和裝配設計(DfMA)，但是有了人工智能，會否通通被取代呢？

六月十一日星期日，青委會舉辦了首個「人工智能講座及清酒品嚐晚宴」，邀請了人工智能研究專家，立法會議員黃錦輝教授為主講嘉賓，而立法會議員盧偉國博士太平紳士亦是座上客。



黃教授的演講主題十分之貼地ChatGPT。由資料搜集、內容組裝到自我學習，ChatGPT就好像人腦，時間越長，資料越多，不斷進步。 現今工程進度要跑贏實際社會所需，我們不停創新。晚宴接近尾聲，大家有點酒意，道出了很多新奇想法，已忘了人工智能的厲害了。大家言語間只希望越來越多青年人加入工程業界，ChatGPT都是人類創造出來，我們都是「食腦的」，絕不愚蠢。

「**人工智能會否取代人類呢?**」有會員發問。
「**一定不會!**」話沒說完，教授已極速回答。



屬會會員回應

「這次參加FEMC YMC舉辦的日本清酒晚宴加入人工智能專題演講，是創新破格的組合。

黃錦輝議員講解AI概念及發展精簡易明，還可以品嘗美酒佳餚，以及跟YMC會員相聚唱談歡，十分享受這次聚會。感謝東哥（青委會主席曾向東先生）及工作團隊悉心安排。」

吳綺菁小姐
消防商會青年委員會主席

Sake tasting plus artificial intelligence explanation are diversified and interesting. The two elements are also very suitable for our young members in the electrical and mechanical industry to participate, and the response is very enthusiastic.

黃松禧先生
水喉潔具商會青年委員會主席

WE build to serve and care.....

FSE ENGINEERING GROUP LTD
豐盛機電工程集團有限公司

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A Member of FSE Lifestyle

Majestic Engineering Co Ltd 定安工程有限公司
Young's Engineering Co Ltd 景福工程有限公司
Far East Engineering Services Ltd 遠東工程服務有限公司

香港九龍九龍灣宏開道8號其士商業中心8樓801-810室
Units 801-810, 8/F, Chevalier Commercial Centre,
8 Wang Hoi Road, Kowloon Bay, Kowloon, Hong Kong
Tel: (852) 2733 4188 Fax: (852) 2722 5587
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Condensing and Chilled Water Pipe Risers Modules





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Gammon E&M Limited offers full range of building services and strive to introduce innovative solutions to each project. We are dedicated to satisfying the ever changing demand for construction expertise, providing a first-class service and delivering projects in safe environmentally sustainable manner.

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Modular SDCS plant

Advanced Manufacturing Centre



MIMEP services installation

< Moving Forward with Pride and Professionalism >

Incorporated in 1993, Shun Hing Engineering Contracting Co., Ltd. (SHECON) is an engineering contracting company within the Shun Hing Group, which operates in Hong Kong and Macau.

The experience of SHECON dated back to 1986 when it was the Engineering Contracting Division of another Shun Hing Group Company.

SHECON provides engineering contracting and maintenance services to buildings and E&M facilities.

SHECON commits to a policy of satisfying all business partners with quality products and services, and continual improvement of environmental performance.





Shun Hing Engineering Contracting Co., Ltd.

16/F., Shun Hing Centre.
2 Shing Yiu Street.
Kwai Chung, N.T.

Tel : 2419 8282
Fax : 2419 8234
Email : shecon@shunhinggroup.com
Website : http://www.shecon.com



SHUN HING GROUP 信興集團 SINCE 1953

Walking out from COVID, the construction industry is getting momentum, we have planned for a series of activities has been in 2023. Thanks for members' participation in the following events / activities held during the first-half of year :

New Year Gathering Dinner

23 February 2023

At the beginning of year of Rabbit, by networking with fellows and young members to exchange positive views and information, it certainly would lighten up the spirit of each other to face the challenge ahead. A Gathering Dinner was organized on 23 February, members and guests were happy for sharing fun during the dinner at warmth atmosphere, so enjoyable!





E&M Expo 2023

3 March 2023

One day career promotion show with booths leaded by EMSD, co-organized by stakeholders including FEMC and fellow constituent associations was held again on 3 March 2023. It aims to continue in encouraging new blood to join in the E&M industry.





This is a platform for communication with young people and to attract them to learn more about the E&M trades. The people visiting us were included students from VTC and secondary schools. A session on career experience sharing with young members and the participants was well received.

聯會活動
Activties Report

陳帆榮譽顧問及李鎮強議員「全國兩會精神」分享會

24 March 2023

香港機電工程商聯會榮譽顧問陳帆工程師，將於二月二十四日為本會特別安排的一個分享會與會員見面，並分享2023年全國兩會精神之心得。





陳帆先生曾任運輸及房屋局局長，現任全國人大代表，他會聯同立法會李鎮強議員（全國政協委員）一起出席這個特別會議，並傳達兩會（全國人民代表大會，以及全國人民政治協商會議）精神。參與者珍惜會面時間，並提問及了解多方面業界持份者對「全國兩會精神」的意見。

Shoreline Cleaning Day

18 March 2023

An activity of Shoreline Cleaning Day (健步行x海岸清潔x午餐小聚) was organized by our Young Members Committee for young members' participation. The event was taking place at Baishui Bowl Beach next to the University of Science and Technology (UST) in the morning of 18 March (Saturday). Walking 30 minutes to Baishui Bowl Beach from UST to clean up the shoreline for 2 hours, then having a lunch for gathering in 南北小廚 of UST. Participants were happy to join this meaningful activity with full energy. This was a FREE event and allowed for maximum capacity of 50 participants.





Technical Visit 2023 - Innovations and New Technologies at GBA, Mainland China

28 - 29 April 2023



To facilitate experience sharing and to promote innovations, new technologies, development on DfMA / MiMEP and related subjects between the Mainland and HKSAR, HKFEMC organized a two-day technical visit to Great Bay Area, PRC. Participants were given the opportunity of having full day visit to 'Huawei' campuses at Antohill, Bantian and Songshan Lake. In addition, experience sharing was made on the 2nd day's visit to Shun Cheong's DfMA / MiMEP factory in Dongguan.

The visit was held successfully with full house of 33 participants, all were interested in the programme with positive comments.



AI Theme Talk & Sake Tasting Dinner

11 June 2023

This is another activity "AI Theme Talk & Sake Tasting Dinner" organized by Young Members Committee on 11 June 2023 (Sunday), full house of over 40 young members and members joined. We were honoured to invite Prof. WONG Kam-fai, AI Expert, as the speaker of Theme Talk during the dinner. Participants were very interested in the topic on "What is Chat GPT? "





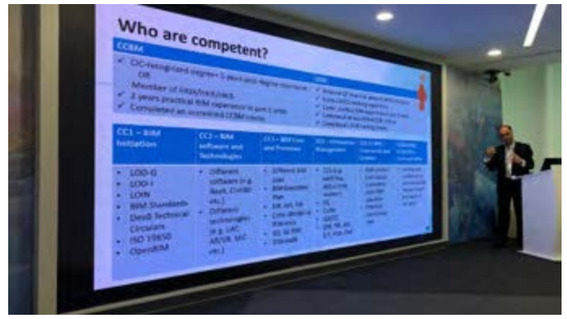
Seminar on Hints and Tips of CCBM / CCBC Application and Interview

23 June 2023

A face-to-face seminar on Hints and Tips of CCBM / CCBC Application and interview conducted by CIC was tailored made for our members' participation.

The market's demand on CIC Certified BIM Manager (CCBM) / CIC Certified BIM Coordinator (CCBC) has been increasing. This seminar was designed for those members who have had completed the CCBM / CCBC course but not yet submitted report to attend the interview for accreditation of their qualification, the seminar has covered the latest news of the schemes as well as sharing by CCBM / CCBC assessors on how to prepare for the application and interview, e.g. CCBC (Associate) and re-sitting arrangement.







We take this opportunity to thank all of you in supporting the above events, we will continue to organize seminars / talks / activities for members in the 2nd-half of 2023. Any comments and suggestions from members are welcome.

機電安全健步嘉年華 2023

主辦機構：香港機電業工會聯合會 與 香港機電工程商聯會 合辦

日期：**2023** 年 **11** 月 **26** 日（星期日）

時間：上午 **10** 時至下午 **4** 時

地點：大棠有機生態園（新界元朗大棠山道十一號）

費用：每位**$170** 元 **(**大小同價，手抱嬰兒不佔座位免費**)**

包括：旅遊巴士接載、燒烤食物、旅遊平安保險。

紀念品 **–** 冰爽防晒手袖



食物燒烤套裝

五香雞全翼 2 隻	黑椒牛扒 1 件
太陽雞腸 2 條	薑汁豬扒 1 件
玫瑰紅腸 2 件	爽滑魚蛋 2 粒
獅子狗 2 粒	礦泉水 2 支

請勿攜帶外來食物及飲品入場《以上食物因應當天貨源而定，如有任何變更，恕不另行通知！》

活動形式：

1. 為方便同業及家屬參加，將於全港各區設 **9** 個不同上車點，到達會場後先來一個健體操熱身，隨即舉行簡單而隆重的開步儀式，其後由主禮場地沿園內漫步，沿途環境清幽，山青水秀，菓樹婆娑，經山上繞一圈，整片元朗大平原遙遙在望，盡情吸收清新的負離子氧氣，令人為之心曠神怡，全程需時大約一小時。

2. 健步行完成後，中午園內享受燒烤樂趣，並有職業安全問答遊戲、「使用個人安全裝備」親子比賽等等，參加者可在主禮場內追蹤安全健步定向索引遊戲，填寫職業安全問答遊戲券，參加開心大抽獎，贏取豐富獎品。期間參加者可享用園內的康樂設施**(**部份康樂活動需要自費**)**。

10月3日開始發售

查詢熱線電話 2626 1927

集合時間	集合地點
上午 **9:00**	九龍汝州街 **5** 號地下（太子港鐵 **D** 出口-工會樓下）
上午 **8:45**	香港灣仔軒尼詩道 **62** 號上海實業大廈側（工會樓下）
上午 **9:00**	九龍觀塘開源道 **55** 號開聯工業中心 **A** 座地下
上午 **9:15**	新界荃灣地鐵站（港鐵 **E** 出口西樓角路）
上午 **9:00**	新界大埔墟火車站（新達廣場）
上午 **9:15**	新界上水中心第二座對面（火車往九龍方向頭卡位置）
上午 **9:00**	新界沙田廣場（渣打銀行門口）
上午 **9:30**	新界屯門市中心（柏麗廣場）
上午 **9:35**	新界元朗大球場停車場（元朗體育路）

安全施工 人人有責

Latest Technical Circulars on Safety Measures from Development Bureau and Labour Department

1) Development Bureau
Technical Circular (Works) No. 5/2023 dated: 28/7/2023
Regulating Action against Contractors for Occurrence of a Serious Incident or Conviction for Site Safety or Environmental Offences.

2) Labour Department

https://www.labour.gov.hk/eng/osh/content.htm
Occupational Safety and Health
provides advisory service on matters concerning the health of employees and the hygiene of workplaces

Boilers and Pressure Vessels Division
enforces legislation regulating the safe operation of pressure equipment

https://www.labour.gov.hk/eng/news/work_safety_alert.htm
Work Safety Alert
July 2023 — The purpose of this Work Safety Alert is to alert employers/ contractors and employees to the occurrences of serious or fatal work injuries ···

https://www.labour.gov.hk/eng/legislat/content4.htm
Occupational Safety and Health Ordinance, Chapter 509
23 May 2023 — The Commissioner for Labour is empowered to issue improvement notices and suspension notices against activity of workplace which may create an imminent hazard to the employees.

https://www.labour.gov.hk/eng/news/systemic_safety_alert.htm
Systemic Safety Alert
17 May 2023 — An effective inspection system should be developed and implemented to proactively detect violations of safety requirements, to timely report irregularities to the employer, and to promptly rectify irregularities.

https://www.labour.gov.hk/eng/news/prevention_of_heat_stroke_at_work.htm
Prevention of Hear Stroke at Work
30 Jun 2023 — General Guides on Occupational Health and Hygiene Guidance Notes on Prevention of Heat Stroke at Work (revised)Prevention of Heat Stroke at Work.

HKFEMC 香港機電工程商聯會

會員名錄
Membership List 2023-2024

Company Name	Tel No	Fax No
Aires Engineering Co Ltd	2658 8856	2658 8863
Alliance Contracting Co Ltd	2891 9083	2838 2120
Alpha Appliances Ltd	2529 7555	2865 0302
Analogue Technical Agencies Ltd	2561 8278	2565 7638
Anlev Elex Elevator Ltd	2561 8278	2565 7638
A-Plus (HK) Group Ltd	3563 7212	3563 8793
Arnhold & Co Ltd	2807 9400	2806 1744
Associated Engineers Ltd	2767 1000	2767 2000
ATAL Building Services Engineering Ltd	2561 8278	2565 7638
ATAL Data Centre Infrastructure Ltd	2561 8278	2565 7638
ATAL Engineering Ltd	2561 8278	2565 7638
Atom E&M Engineering Ltd	3428 3691	3428 3693
Auto Integrated Ltd	2612 0758	3007 1081
Beghelli Asia Pacific Ltd	2620 5522	2620 6677
BeSpark Technologies Engineering Ltd	2602 6888	2606 7862
Bestwise Envirotech Ltd	2416 2828	2413 6278
Brilliant Lighting Ltd	2690 3037	2690 9927
Bun Kee (International) Ltd	2748 9310	2387 2999
BYME Engineering (HK) Ltd	2881 6690	2881 7096
Carrier Hong Kong Ltd	2694 5333	2694 5358
Chat Horn Engineering Ltd	2348 8363	2340 7872
Che Luen Electrical Engineering Co Ltd	2898 8700	2554 8773
Chevalier (E&M Contracting) Ltd	2111 4811	2757 6841
Chevalier (HK) Ltd	2318 1818	2756 4852
Chi Chiu Engineering Co Ltd	2571 0621	2806 8249
China Overseas Mechanical & Electrical Engineering Ltd	2823 7821	2527 1595
China State Mechanical & Electrical Engineering Ltd	2823 7821	2527 1595
Chubb Hong Kong Ltd	2746 9695	2627 6768
Chun Lee Engineering Co Ltd	2573 2301	2838 1611
Chun Wo E& M Engineering Ltd	3758 8007	2959 0993
Citic Guo Hua International Contracting (Overseas) Ltd	2866 7933	2866 7937
CLPe Solutions Ltd	2678 7900	2424 1155
Clydeman Engineering Ltd	2332 3591	2374 2166
Cornwall Contracting Co Ltd	2420 0090	2485 0822
Crystalite Electrical Engineering Co	2485 3880	2489 2087
Crystalite Electrical Engineering Co Ltd	2485 3880	2489 2087
CSC Robotic Engineering Ltd	2426 3123	2481 3463
Delta Pyramax Co Ltd	2511 2118	2507 5078
Europower (China) Ltd	3168 2056	3162 8509
Everlight Engineering Co Ltd	2828 5365	2827 0725

Company Name	Tel No	Fax No
Extensive Trading Co Ltd	2889 1681	2556 6029
Far East Engineering Services Ltd	2898 7331	2558 7280
Fordex Electric Co Ltd	3188 4612	3188 4611
Fortune Link Engineering Co Ltd	2342 0066	2342 2352
FSE Engineering Group Ltd	2733 4188	2722 5587
Fujitec (HK) Co Ltd	2547 8339	2858 3406
G4S Security Systems (HK) Ltd	2173 3333	2856 1684
Galaxy Engineering Holding Co Ltd	2529 4885	2529 4886
Gammon E&M Ltd	2516 8823	2562 3790
Gason Electrical Contracting Ltd	2102 4826	2565 8271
GELEC (HK) Ltd	2919 8383	2591 0548
Gether-Force Air-Conditioning Engineering Co Ltd	2890 2622	2890 2653
Goodwell Electrical Contractor & Supplier Ltd	2796 3992	2796 4083
Grandeur Electrical Co Ltd	2556 7882	2556 1140
GTECH Services (Hong Kong) Ltd	2123 0888	2123 0889
Guardian Fire Engineers & Consultants Ltd	2889 7995	2889 7175
Hilti (Hong Kong) Ltd	8228 8118	-
Hitachi Elevator Engineering Co (HK) Ltd	2311 7611	2311 6646
Honeywell Ltd	2331 9133	2953 6778
Hong Lee Plumbing Services Ltd	2424 2921	2424 2962
Hotpool Industries Ltd	3622 3800	3622 3820
Hsin Chong Aster Building Services Ltd	2675 3300	2564 0793
HUD General Engineering Services Ltd	2431 2828	2433 6955
Huns Engineering Co Ltd	2334 7788	2363 9813
InnoTec Engineering Ltd	3706 6333	3706 6300
Integral E&M Contracting Ltd	2272 3690	3464 0913
Iu Cheong Electric Co Ltd	2757 7382	2750 6304
Johnson Controls Hong Kong Ltd	2513 4396	2885 7760
Joint Effort Engineering (Asia) Ltd	2803 0808	2803 0262
Junefair Engineering Co Ltd	2359 8000	2359 8099
Keio Engineering Co Ltd	2695 8872	2602 0457
Kembla (HK) Ltd	2528 0999	2528 3113
Keystone Electric Wire & Cable Co Ltd	2691 7183	2695 9738
Kinetics Noise Control (Asia) Ltd	2191 2488	2191 2477
KML Engineering Ltd	2686 7777	2636 5652
KONE Elevator (HK) Ltd	2786 6500	2786 6739
Krueger Engineering (Asia) Ltd	2860 7333	2866 7132
Kum Shing Engineering Co Ltd	2363 8688	2363 7425
Lee Tack Engineering Co Ltd	2305 3111	2796 6573
Lik Kai Engineering Co Ltd	2627 0888	2371 0379

會員名錄
Membership List 2023-2024

Company Name	Tel No	Fax No
Link The Best Co Ltd	2568 4092	2423 7829
Lucky Engineering Co Ltd	2780 5285	2780 2887
Luen Ming E&M Engineering Ltd	2636 7168	3619 7139
Majestic Engineering Co Ltd	2235 1881	2391 9787
Majestic Plumbing Engineers Ltd	2235 1881	2391 9787
Mansion Fire Services Co Ltd	2907 9393	2907 9911
Masterway-Bolton Ltd	2892 1871	2838 7597
Maxgrand Ltd	3927 6363	3927 6371
McQuay Air-conditioning Ltd	2893 6261	2574 8599
Meco Engineering Ltd	2774 8200	2365 8688
Meiden Pacific (China) Ltd	2481 2881	2487 5039
Mesan Fiberglass Engineering (International) Ltd	2787 5717	2787 2983
Mitsubishi Electric (Hong Kong) Ltd	2510 0555	2510 8445
Mitsubishi Elevator Hong Kong Co Ltd	2510 1030	2806 3364
MK Electric (China) Ltd	2331 9133	2151 9465
Netsphere Solution Ltd	2344 3728	2344 3778
Newland Engineering Ltd	2967 8620	2967 8630
Newton Engineering Co Ltd	2571 7261	2887 8628
Oxprime (International) Ltd	2590 8088	2590 8128
Pacific Sense Enterprises Ltd	3749 5272	3159 7994
Paul Y. (E&M) Contractors Ltd	2831 4038	2834 1731
Pekko Engineers Ltd	3973 0828	2529 8784
Powerkontrol Australia Ltd	2661 4433	2664 2000
Powers Technical Services Ltd	2770 2110	2770 2977
Prysmian Hong Kong Holding Ltd	2588 7280	2827 7212
Pyrofoe Engineers Ltd	2388 8038	2385 2150
Quad-Tech Engineering (HK) Co Ltd	2573 1832	2572 3599
Raising Engineering Ltd	2395 6081	2395 6933
REC Engineering Co Ltd	2619 8888	2481 2870
REC Green Technologies Co Ltd	2619 8817	2481 2870
Rickson Engineering Ltd	3120 7500	3120 7511
Ridgid Plumbing Ltd	2402 1899	2490 3180
Ryowo (Holding) Co Ltd	2391 8381	2789 3802
S. P. Engineering (HK) Ltd	2687 4218	2688 0644
Sanwa Shutter (HK) Ltd	2833 6619	2834 5742
Savills Engineering Ltd	2525 2873	2801 5975
Schneider Electric (Hong Kong) Ltd	2579 9699	2811 1029
Shell Electric Holdings Ltd	2558 0181	2897 2095
Shielder Hong Kong Ltd	3464 0405	3020 9649
Shinryo (Hong Kong) Ltd	2519 3383	2519 6209

Company Name	Tel No	Fax No
Shun Cheong Electrical Engineering Co Ltd	2426 3123	2481 3463
Shun Hing E & M Engineering Ltd	2387 2882	2725 0862
Shun Hing Engineering Contracting Co Ltd	2419 8282	2419 8234
Shun Yick & Co Ltd	2527 9663	2529 7969
Siemens Ltd	2583 3389	2583 3493
SIGMA Elevator (HK) Ltd	2598 6822	2598 5010
Skyforce Engineering Ltd	2885 1620	2886 9935
Southa Engineering Ltd	2963 7133	2963 7102
Southa Technical Ltd	2963 7122	2963 7101
Sundart (M&E) Ltd	2493 9368	2417 4998
Superpower Pumping Engineering Co Ltd	2746 4933	2786 2307
S'Wah Engineering Co Ltd	2362 6344	2765 0598
Technicon Engineering Ltd	3193 1300	2481 1300
Ted Engineering Ltd	2893 4921	2891 5553
The Jardine Engineering Corporation Ltd	2807 1717	2887 9090
Titan International Ltd	2549 4888	2549 5222
Token Engineering Ltd	2411 4933	2411 0085
Trane Hong Kong o/b TYS Ltd	3128 4711	2887 9111
Trustful Engineering & Construction Co Ltd	2627 0888	2611 4595
Union (Luen Hop) Refrigeration Co Ltd	2627 4600	3163 2603
Union Construction (Group) Ltd	2345 5808	2345 5898
Wai Ming M&E Ltd	3973 1111	3973 1188
Wai Yuen Electric Co	2423 3922	2423 3603
Wang Tak Engineering & Shipbuilding Co Ltd	2746 2888	2307 5500
Welcome Air-Tech Ltd	2806 8316	2806 2426
Wenden Engineering Service Co Ltd	2834 4368	2838 9026
Westco Airconditioning Ltd	2426 3123	2481 3463
Windmill Engineering Co Ltd	2887 9208	2807 3649
Winston Air Conditioning & Engineering (HK) Co Ltd	2764 1200	2764 0465
Wo Lee Steel Co Ltd	2393 0131	2381 9710
Wong Po Kee Ltd	2341 0305	2341 4976
Wylam's Services Ltd	2557 3131	2558 2551
Yordland Engineering Ltd	2362 2186	2362 2996
York Choi Industrial Ltd	2795 8286	2795 9030
Young's Engineering Co Ltd	2235 1868	2258 0968
Yuen Cheong Engineering Co Ltd	2381 8327	2397 0686
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