香港空調及冷凍商會有限公司
THE HONG KONG AIR CONDITIONING AND REFRIGERATION ASSOCIATION LIMITED
WINTER 2020
Newsletter 會員通訊

60th 週年紀念 Anniversary

10 years+ 同心展關懷 caringorganisation

Contents

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Message from the President

Ir Franklin Lau
President

Dear friends and members:

Greetings to you all!

It is my privilege and honour to be elected as the new President of Air Conditioning and Refrigeration Associations (ACRA) at the Annual General Meeting (AGM) in July 2020, and I am grateful that we have the first female Office Bearer to join our executive team for the term year 2020 to 2022.

Despite Hong Kong experienced 2 difficult years due to social unrest and Covid-19, I am deeply grateful to my predecessor, Ir Antonio Chan, and the council members for their hard work and outstanding contributions to the Association in the last term which enable ACRA to go from strength to strength in challenging times, and I plan to carry on with this significant commitment towards fulfilling the mission of ACRA.

Immediately after my election, the city was hit by the 3rd wave of pandemic which further restricted our social activities and meetings, however, with the application of technology tools such as Zoom, our council meetings carried on as usual, and we managed to help Hong Kong Green Building Council (HKGBC) setting up a green product standard for Air Handling Unit (AHU) and Fan Coil Unit (FCU) under CIC Green Product certification. I am also pleased to see the adoption of ACRA's opinion on the new type H minor works (Ventilation System inside a Building Related works) under Buildings Department starting from 1st September 2020. Liaison work with various government bureaus and departments will remain to be one of our major obligations of ACRA, our upcoming activities will focus on reviewing ArchSD's and EMSD's General Specifications and Building Energy Code 2022 edition.

By using Zoom, ACRA continued our collaboration with Vocational Training Council (VTC) to offer various trainings to the industry which is crucial to the professional development of members and industry stakeholders. ACRA also extended its care to the community amid pandemic, despite there were some charity functions cancelled due to social distancing measures, ACRA is in full support towards CIC's Construction Caring Campaign 2.0 under Covid-19 Pandemic which assists the workers to overcome the short term financial burden also in addition to the upcoming joint caring event – Happy Bags Delivery to Elderly which catering the epidemic materials and daily necessities.

New blood and young talents are important to our future, ACRA is dedicated, through the Young Member Committee (YMC) to attract and nurture more young people for the industry through different trainings organized by the Association and with the support from VTC.

With over 200 members and reaching 23 council members today, ACRA will enter the 60th birthday in 2021, apart from grand anniversary dinner in November 2021 under preparation, we are also planning the 60th anniversary booklet with a theme on the history and prominent people of air conditioning and refrigeration in Hong Kong, and also arranging a series of 60th anniversary activities to bring our members together.

The road ahead is still full of challenges but I wish you all prosperity and every success in 2021, I would also like to thank FEMC, CIC, the Government, professional bodies, institutions and associations, and last but not least, our members for their full support to ACRA.

Let us be strong, healthy and work together for a brighter future.

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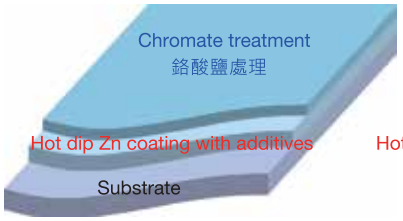
Material Comparison for ductwork usage

	Current Material	ECOGAL-Neo™	
Product Name	傳統鋅花GI (regular spangle)	環保無鋅花lar spangle)	-
Plating Components	Zn鋅	Zn鋅-5%Al鋁-small amounts of Mg鎂 and Ni鎳	
JIS日標	G3302	G3317	
EN歐標	BSEN 10346:2009 Z	BSEN 10346:2015 ZM	
	hot-dip zinc coating application of a zinc coating by immersing the prepared strip in a molten bath of zinc The zinc content is at least 99%.	hot dip zinc-magnesium coating application of a zinc-magnesium coating by immersing the prepared strip in a molten bath of zinc-aluminium-magnesium The composition of the bath is sum of aluminium and magnesium from 1,5 % to 8 %, containing minimum of 0,2 % magnesium and the balance zinc.	
Coating塗層	hot-dip zinc coating(Z)	hot dip zinc-magnesium coating (ZM)	Better corrosion resistance ZM較Z防蝕保護更強
Coating designation 塗層規格	Z275	ZM100	
Minimum coating mass 最少塗層量	275	100	
Classification 級別	DX51D	DX51D	Same同級
Coating finish塗層表面	Normal spangle (N) 普通鋅花	Uniform	No Reflection of Light不反光
Surface treatment 表面處理	Chemical passivation, C(Chromate) 化學鈍化，鉻處理	**Chromate free 無鉻酸鹽**	Free from environmental load substaces不會污染環境
Country of orgin 產地	China, China(Taiwan) 中國大陸及台灣	**Japan 日本**	Made in Japan
Environmental load substances	Lead, Hexavalent chromium 含有鉛，六價鉻	**Not included 不含有害物質**	Free from environmental load substaces不會污染環境



Examples of environmental load substances in the coating

	Chemical conversion coating	Plating	
	Total Cr鉻 (Cr^{3+}+Cr^{6+})	Pb鉛	Sb銻
GI regular spangle (Current material) 普通鋅花材料 (傳統材料)	10～20mg/㎡	0.002%	0.04%
ECOGAL-Neo™ 環保無鋅花材料	N/A	N/A	N/A

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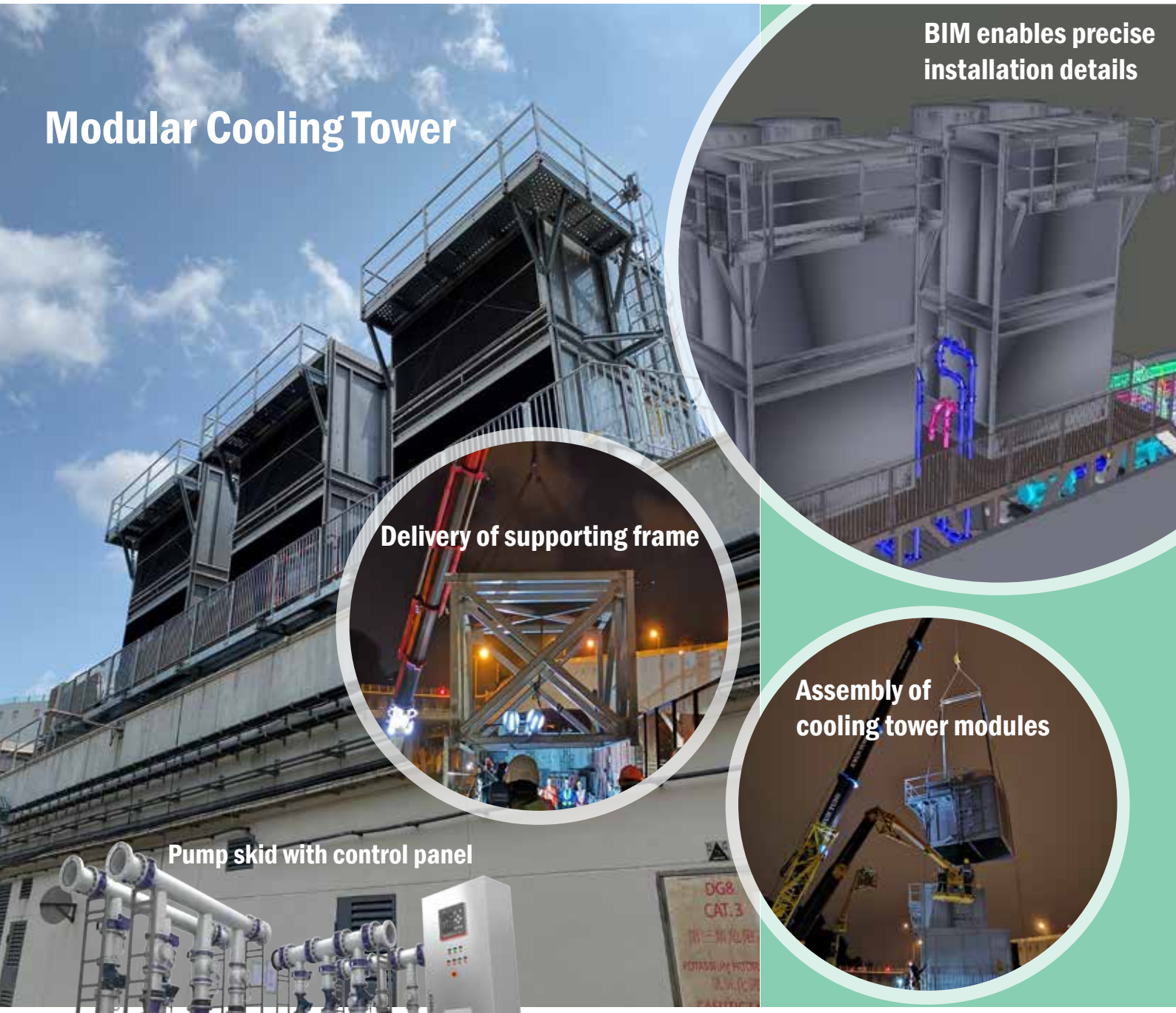

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DfMA in Air Conditioning

Introduction

Design for Manufacture and Assembly (DfMA) is a design approach that focuses on ease of manufacture and efficiency of assembly. By simplifying the design of a product, it is possible to manufacture and assemble it more efficiently, in the minimum time and at a lower cost.

DfMA has been applied to sectors such as the design of automotive and consumer products for many years, both of which need to efficiently produce high quality products in large quantities. Recently, construction contractors have begun to adopt DfMA for the off-site prefabrication of construction components such as concrete floor slabs, structural columns and beams, as well as other building systems with application of Building Information Modelling (BIM).

DfMA combines two methodologies:

Design for Manufacture (DfM) : It involves designing for the ease of manufacture of a product's constituent parts. It is concerned with selecting the most cost-effective materials and processes to be used in production, and minimizing the complexity of the manufacturing operations.

Design for Assembly (DfA) : It involves design for a product's ease of assembly. It is concerned with reducing the product assembly cost and minimizing the number of assembly operations.

DfMA Principles

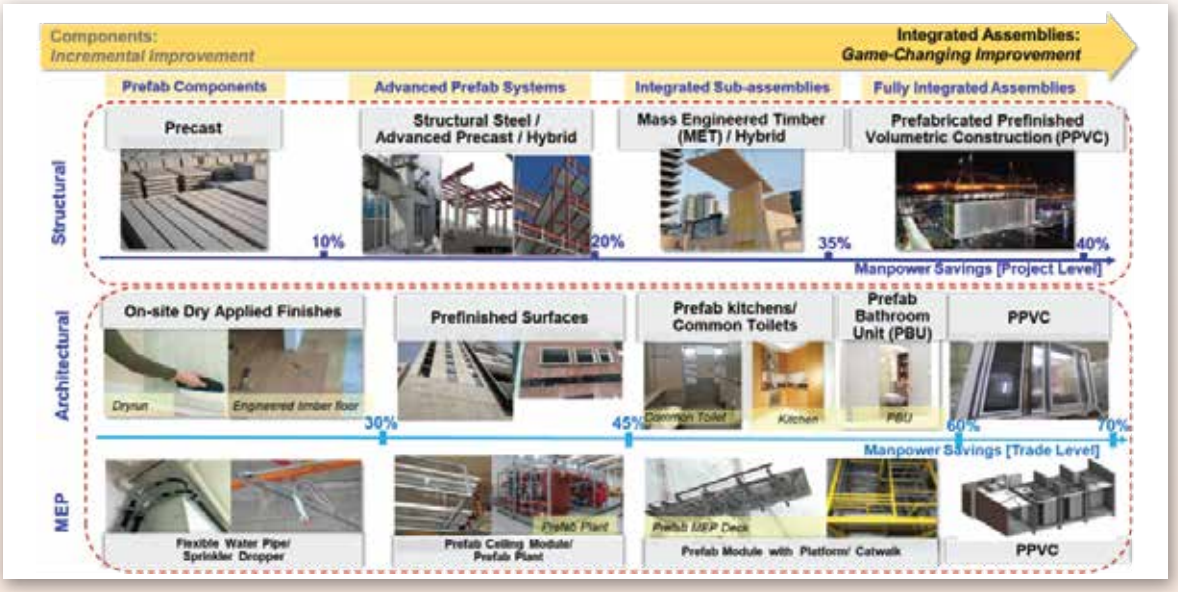
In a similar approach to lean construction, applying DfMA enables the identification, quantification and elimination of waste or inefficiency in product manufacture and assembly. It can also be used as a benchmarking tool to study the products of competitors. The main principles of DfMA are:

* Minimize Number of Components: Thereby reducing assembly and ordering costs, reducing work-in-process, and simplifying automation.
* Design for Ease of Part-fabrication: The geometry of parts is simplified and unnecessary features are avoided.
* Tolerances of Parts: Part should be designed to be within process capability.
* Clarity: Components should be designed so they can only be assembled one way.
* Design for Ease of Assembly: For example, the use of snap-fits and adhesive bonding rather than threaded fasteners such as nuts and bolts. Where possible a product should be designed with a base component for locating other components quickly and accurately.
* Eliminate or Reduce Required Adjustments: Designing adjustments into a product means there are more opportunities for out-of-adjustment conditions to arise.

Advantages of DfMA

* Speed : One of the primary advantages of DfMA in construction is the significantly reduced programme on-site through the use of prefabricated elements.
* Safety : By removing construction activities from the site and placing them in a controlled factory environment there is the possibility of a significant positive impact on safety.
* Higher Quality and Sustainability : A highly automated approach can enhance quality and efficiency at each stage. There may be less waste generation in the construction phase, greater efficiency in site logistics, and a reduction in vehicle movements transporting materials to site.

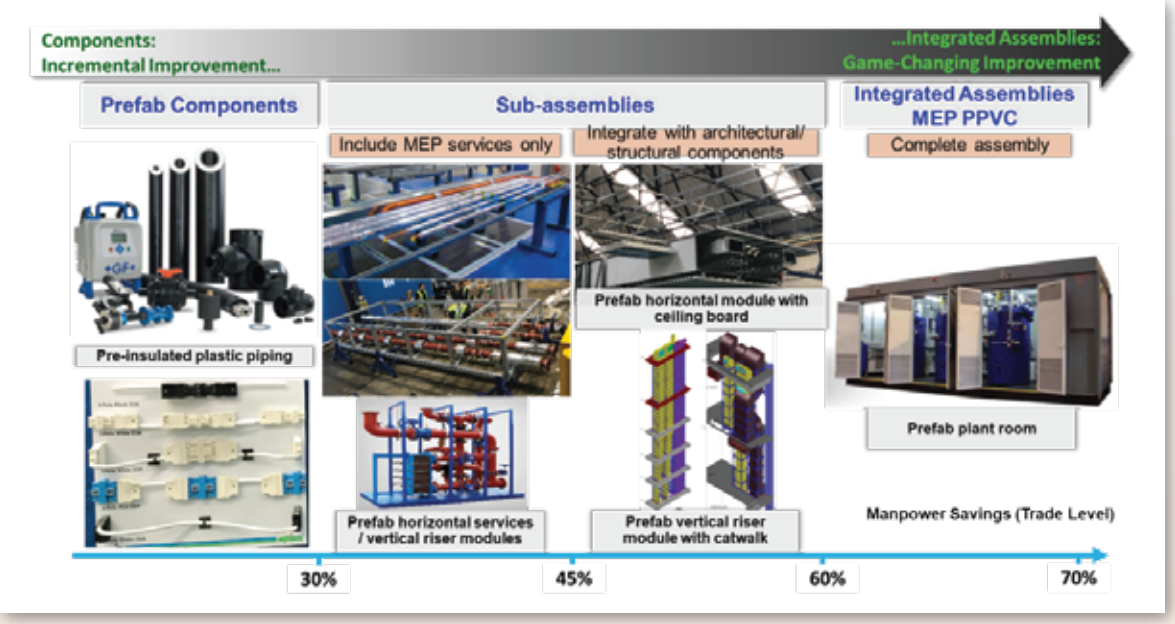
* Lower Site Assembly Cost : By using fewer parts, decreasing the amount of labour required, and reducing the number of unique parts, DfMA can significantly lower the cost of assembly.
* Shorter Assembly Time : DFMA shortens assembly time by utilizing standard assembly practices such as vertical assembly and self-aligning parts. DFMA also ensures that the transition from the design phase to the production phase is as smooth and rapid as possible.
* Increased Reliability : DfMA increases reliability by lowering the number of parts, thereby decreasing the chance of failure.



DfMA comprises a continuum of various technologies and methodologies that promote off-site fabrication from prefabricated components to fully integrated assemblies across the structural, architectural and Mechanical Electrical and Plumbing (MEP) disciplines.

* Advanced Precast Concrete System (APCS): A construction method that adopts precast concrete components and applies features under the '3S' principles of Standardization, Simplicity and Single.
* Mass Engineered Timber (MET): A building material comprising engineered wood products with improved structural integrity.
* Prefabricated Prefinished Volumetric Construction (PPVC): A construction method whereby free-standing 3-dimensional modules are completed with internal finishes, fixtures and fittings in an off-site fabrication facility, before it is delivered and installed on-site.
* Prefabricated Bathroom Units (PBU): A bathroom module which is preassembled off-site complete with finishes, fixtures and sanitary wares before it is delivered and installed on-site.
* Structural Steel: A category of steel used for making construction materials, such as beams and joints.
* Prefabricated MEP System (including HVAC System): MEP components and equipment that are integrated into a sub-assembly off-site and then installed on site. By using BIM, MEP stakeholder can envisage the potential outcome, relevant benefit and define potential risks may be encountered. Plant room or terminal unit can be preassembled off-site in modules and vertical & horizontal distribution of chilled & hot water pipework and air ductwork can also be prefabricated instead of the traditional site work.

DfMA continuum for MEP services



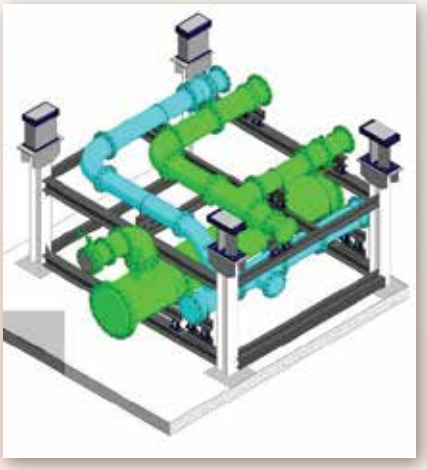
Considerations Applying to Prefabricated MEP

* Identification of Suitable Areas for Prefabrication: Project stakeholders should come together to identify areas within the development that are suitable for prefabrication. Adopting prefab MEP in areas with a higher density of MEP services (e.g. near service cores, near MEP plants) will bring about higher productivity gains.
* Early Involvement of Contractors and MEP Specialists: The early involvement of contractors and specialists in the coordination of MEP services will allow more time for optimising service distribution.
* Site/Project Management: As the modules of prefab MEP systems can be relatively bulky and heavy, the project team should plan appropriate delivery routes and lifting equipment right from the beginning. A Just-in-Time approach to module delivery to site will also facilitate efficient installation.
* Maintenance, Replacement and Renovation: The maintenance of prefabricated MEP installations will not vary much compared to the conventional MEP installations. Basic maintenance considerations (e.g. location & orientation of valves, working space for maintenance activities) will need to be incorporated into the design before the modules are fabricated.
* Compliance to Regulation: The installation of prefab MEP systems must comply with the statutory requirements relevant to each system. Project stakeholders have to ensure such compliance, and any deviations should be brought up, discussed, and approved by the relevant authority prior to work being done.

Business Opportunities for Various Stakeholders

As DfMA for HVAC is evolving in Hong Kong, there will be many opportunities to share benefits from DfMA to the stakeholders in the construction industry.

* Developers: To achieve better quality of construction work with lower cost and shorter on-site program.
* Designers: The investment in BIM or other digitalization tools will be paid off when the design is more buildable and constructible without clashes to save time in site coordination.
* Manufacturers: Engage higher technology manufacturing process to preassembly or prefabrication off-site.
* Contractors: Convert traditional site construction to high-tech factory preassembly and prefabrication work. Better management for worker attendance, safety, product quality assurance and environmental.



Challenges of DfMA Adoption in HVAC in Hong Kong

DfMA application in HVAC industry is challenged by the following factors:

1. **No Common Guidelines and Standards :**

   The first challenge facing DfMA application in construction is lack of a suitable ecosystem that enables its widespread adoption. An ecosystem includes guidelines, standards, and affordable technologies. Guidelines and standards are important for stakeholders, especially those with less experience, to govern its procedures of DfMA applications.

2. **Higher Capital Investment :**

   The gross capital cost of DfMA assembly, at the early adoption stage, is comparable to that of traditional construction methods. However, if new technologies were required to support DfMA applications, extra investment might be needed, making DfMA less competitive. These challenges necessitate a robust ecosystem enabling wide acceptance of DfMA.

3. **Processes Changes**

   Another challenge is associated with the new processes brought about by DfMA applications. DfMA requires stakeholders to shift their paradigm from conventional means of design, production, and construction. However, it is not always easy for stakeholders to adjust to new processes. The resistance to change could be considerably overwhelming. Therefore, additional efforts are necessary to manage the change, for instance, by increasing stakeholder awareness of the advantages of DfMA.

4. Unseen Results

There are few cases of DfMA application in actual projects, perhaps owing to insufficient hands-on training and re-training arranged for different stakeholders to implement DfMA. Some stakeholders might choose to wait and see whether competitors implementing DfMA can receive actual benefits. By using BIM and other digital construction tools, most stakeholders could have a big picture for the potential outcome.

5. Problems in Supply Chain

a. Detriment of cash flow to suppler if there is no off-site payment schedule, it is difficult for suppliers to provide DfMA solution.

b. Material or equipment from overseas will have impact as this involves importing materials into, and exporting finished goods from, the mainland China. The extra cost will impose to the customers. Importing to HK first may be an option to handle taxation but it will involve double handling on logistic and transportation, the cost will also impose to customers.

c. Many global suppliers have adopted local agencies policies who can only sell/market their products in the regions they represent, HK has no exception. DfMA requires the material or equipment to be shipped from overseas to factory in Mainland China for prefabricated before shipping to HK, therefore it will be in conflict with the agencies arrangement as the recognized sales location will be in China rather than HK, therefore it will reduce the interest of HK local supplier to provide DfMA package.

d. Volumetric and repetitive are also important to enhance suppliers to provide DfMA solution otherwise cost savings is not that obvious when adding all taxes and extra logistic arrangement unless there is a real project demand such as Government specification requirement with subsidies, however, the subsidies will not go to suppliers' level.

e. Co-operation from main contractors are another important factors to make success as DfMA requires prefabricated in a bigger piece before delivering to the job site location, it requires main contractors/builders to facilitate such as increase the opening or provide vertical transportation.

CIC DfMA Alliance

To promote and facilitate off-site prefabrication and modular construction through collaborative work in Hong Kong, Construction Industry Council (CIC) has organized a DfMa Alliance. The Alliance engages a wide spectrum of industry stakeholders to drive the adoption of DfMA. Its members include developers, government bureaus and departments, consultants, contractors, suppliers, professional bodies, trade associations and academia. The Alliance aims to deliver a step improvement in construction productivity by co-creating an ecosystem for adoption of DfMA in Hong Kong. This Alliance facilitates the members to connect directly with construction clients and/or supply chain partners who are looking for enhanced capability internally or across projects. The Alliance is now calling industry stakeholders to join as members on a corporate basis with the free-of-charge membership fee up to 2021. Please visit CIC website www.cic.hk/eng/main/dfma_alliance/ for details.

Bibliographies

Design for Manufacturing and Assembly (DfMA) – Prefabricated Mechanical, Electrical and Plumbing (MEP) System by Building and Construction Authority, Singapore

DfMA for MEP in West Kowloon Government Office - CIC DfMA Alliance Forum - Integrated Digital Delivery

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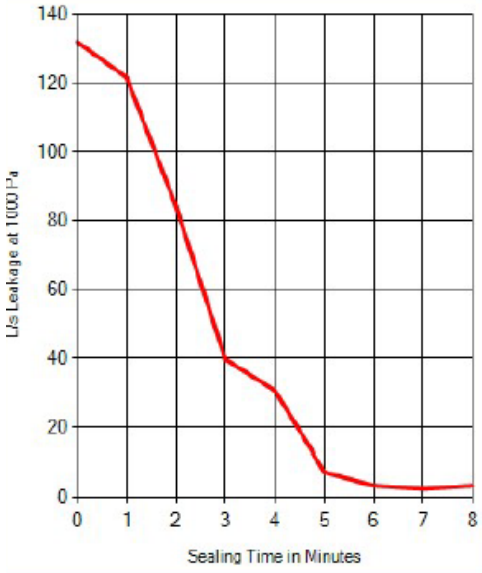

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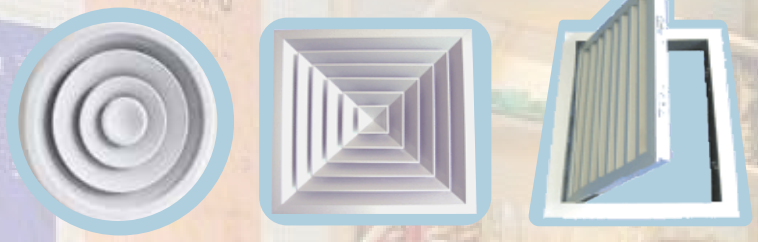

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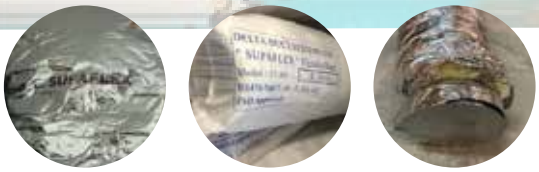

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人物專訪
陳永康博士

眾所周知，陳永康博士工程師（Ir Dr. Cary W.H. Chan, JP）是我們香港推動綠色環保建築的重心人物，也是香港綠色建築議會的現任執行董事。從議會於2009年成立至今，陳博士和他的團隊一直致力為建築業推動環保建築，並為提升香港在可持續建築的發展作出了莫大貢獻。當中為人熟悉的ACT-SHOP計劃、綠色產品認證、重新校驗（Retro-commissioning）課程及註冊計劃等，都得到各方的嚮應和好評，讓業界同仁和朋友們獲益良多。

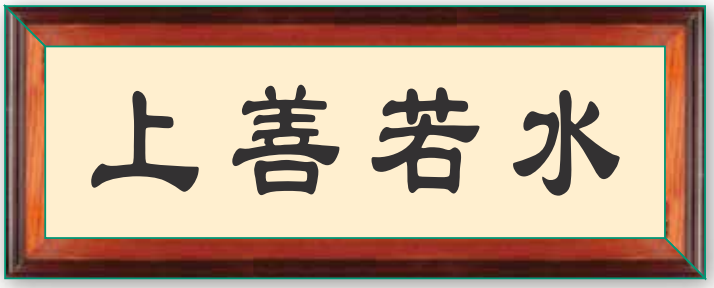
在其職業生涯中，陳博士一直圍繞着不同的新科技和減排碳項目，在推動綠色建築的領域上可謂不遺餘力。從他過往參與的專案也印證着香港在減排碳的發展歷程。今期的冷氣商會通訊專訪很榮幸能邀請到陳永康博士與我們分享他從多年在這方面的努力和成果。

黃金歲月

從小立志成為工程師的Cary於1976年高中畢業後，便考進了香港理工大學修讀機械工程高級文憑課程。當時的Cary與其他男孩子一樣，對尖端的航空科技都抱有濃厚興趣。憑著優異的成績，Cary輕易地取得於國泰及香港飛機工程的工作機會；唯三思後覺得航空工程在香港發展過於狹窄，最終選擇了投身香港蓬勃的建造業市場，並在一家機電設計顧問公司開始了職途上的第一份工作。初入行的Cary抱着熱衷學習的精神，希望能盡早掌握建築行內多方面的專業知識，而第一項參與的設計項目就是我們熟識，位於深水埗的「黃金商場」。剛入行的Cary初期對樓宇設備行內的專業知識還是很陌生，有賴同僚和上司的指導，加上自己的一番努力，兩年後終於熟習基本知識，對專業規條和機電手冊內的知識也是駕輕就熟。無奈Cary卻開始覺得公司所承接的中小型工程對自己未能有再大的突破，恰巧這時一家專門承接地鐵特殊項目的日本承建公司 - HMT(Hitachi Mitsubishi Toshiba Consortium)正要招攬擁有設計經驗的工程師參與一項盛大觸目的建築項目，Cary憑著這個機會進到HMT，而這個項目也成為了他職業生涯上的一個重大轉捩點。

八十年代的MIC

加入HMT後，Cary首份工作便單人匹馬飛到日本與當地的設計及投標團隊會合，共同籌備競爭激烈的匯豐銀行總行重建其中一份機電設計建造工程合約，當中包括設計、生產和組裝每個樓層的特殊模塊組合裝置的機電設備。過程困難重重，新穎的模塊式設計概念就相等於今天的MIC，在80年代卻是非常前衛，再加上需要把日本的JIS標準演繹到標書中的BS標準規範內等，最終由原定逗留在日本的一個月籌備時間，拖延到兩個月才把標書完成。團隊的努力沒有白費，最終也不負眾望成功贏得合約。匯豐總行的建築設計別俱一格，建築師的吊籃飾樓層、模塊式的機電設施組合、和全鋼鐵枝柱的大廈建設，都是全球罕有，在香港更是前所未見，當中嶄新的技術在業界都沒有先例可作參考，Cary和他們的施工團隊在多種建造技術難題上都要重新思考，迎難而上。整個項目到完工經歷了五年時間，打造了香港建築史上一項創舉。



艱巨的翻新工程

隨後的幾年Cary轉接加入過幾間公司，位於不同角色層面的工程崗位，有太古旗下的HUD、MECO、利苑酒店和恆生銀行等，每處都得以重任。但他笑言每次轉工，新公司的工作崗位或環境都像是往下調，由當初最受尊重的設計顧問，變為承辦商，再變成「通渠佬」角色。Cary回想在酒店和銀行大廈內的工程部工作的日子時坦言要處理一切機電渠務問題。雖然如此，在這段期間Cary也帶領過多項艱難並具考驗的大型翻新工程，就如在MECO期間承接了一單十個月時限的項目，那是分兩階段把香港歷史悠久的半島酒店徹底翻新，期間酒店其餘部份仍需如常運作營業，因此酒店對施工要求極之嚴格，其難度更不是普通承建商所能輕易銜接。在Cary近乎不眠不休的努力下完成了工程的第一階段，還得到酒店的肯定和讚賞，更主動邀請他兼任為第二階段工程的顧問角色。經過十個月艱苦緊張的生活，Cary又再笑言：「以後再也不要做這些翻新工程了。」並轉職到昔日的利苑酒店任職工程部的總工程師，有趣是上任後不久，酒店又展開了類似的翻新項目，不同的是Cary以業主代表身份領導着團隊，並不負眾望的完成了該翻新工程。

銀行高層

90年代期間因緣際遇下，Cary得到早前在半島酒店一起共事的建築師推薦，受聘到恆生銀行的行產組。期間新的恆生銀行大廈剛落成，加上推行大改革，特別是旗下的銀行物業，Cary在上任短短三個月便晉升為部門主管。剛當上部門主管，首要任務便是把搬遷後的舊總行大廈徹底翻新，工程難度比新建設還要高，例如策劃新的風冷冷氣系統、安排拆卸殘舊的海水冷卻系統、編排更換全棟大廈的外牆窗框等。工程期間更需要維持正常的空調和其它樓宇設備服務給予在八樓繼續營運的醫生診所。雖然複雜，不過Cary憑藉之前累積下來的經驗，所有難題最終也迎刃而解。大廈翻新工程順利完成，他得到銀行管理層高度讚賞和嘉許，並委派給他其它更多的分行翻新項目，當中Cary更萌生了在新項目中加入慳電方案，公司的地位得到肯定。

在恆生銀行短短幾個月，晉升到高級管理層，時年35歲，是銀行中少有的年輕高層，無奈對傳統銀行的固有文化和重複的瑣碎行政工作開始厭倦，剛巧遇到太古地產招聘總工程師。雖然在職級上似是由銀行高層下調到工程師，Cary還是抱著對工程的熱誠去應徵。經過四輪面試及評核，最終從四十多位應徵者脫穎而出，成功被取錄。

學術理論的實踐

太古當時旗下的物業不多，但公司希望把所有物業實行有系統的管理，並設立一個中央管理部門，專門負責研究和推行一系列的樓宇科技及自動化操作系統。Cary就盡顯他對工程和創新所長，利用日常運的數據加上細心的分析，成功在千禧期間推行了多項新的樓宇科技，如電腦人流點算技術、冷凍機組冷凝器自動清洗系統和電機變頻技術等，而且得到行內普遍接受和廣泛應用。

對於科技的熱衷也讓Cary喜歡上與同好者分享業界最新的技術。他曾編寫一份論文，指出很多早期的空調系統中的冷凍水操控系統，錯誤地運用大廈的冷水流量作為大廈的冷凍量要求指標，而導至系統多啟動了冷凍機組數量，最終用户亦因此而消耗了更多電能。該論文被廣泛傳閱，更流傳到清華大學朱妍森教授手中。湊巧Cary應邀到清華大學進行國情學術交流，朱教授特別安排Cary與魏慶芃教授及一眾研究學生討論他的論文，之後更得到朱教授的認同。藉着這個機會，他邀請了江億及魏教授一眾到香港太古旗下的物業作更深入的考察和技術交流，在港考察期間雙方更達成一項為期一年的合作計劃，期間太古聘請江教授研究團隊在港進行實地監察、分析和研究、以研發更高成效的樓宇節能技術，提升物管業務表現。結果令入十分鼓舞，研究團隊列出多項節能方案，尤其在耗電最高的空調系統方案上，多項措施更在研究期間得以實行和考證，為物管成功省回可觀營運成本，耗電的差距令電力公司一度懷疑儀錶損壞了而把商場內所有電錶更換。而學界亦樂見商界提供多座大型物業及樓宇設備的數據，將大學學術研究徹徹實實地展現和應用到市場上。一個機緣巧合，奠定了雙方長遠合作的契機，而Cary更是功不可沒。

人生的新一頁

在太古工作20年間，Cary很享受公司對他的認同和支持，職位由總工程師到部門經理，再晉升為總經理，奈何已到界太古的退休年齡，適逢香港綠色建築議會誠邀出任執行董事一職，新職既可繼續推動綠色建築和有關方面的科技，更可用商界的經驗為議會帶來改變。「上善若水」最能代表Cary的職業生涯，不計較名利，放棄穩定的銀行工作回歸到工程師，發揮自己專長，為香港環保業奠下穩固根基。他寄語年青人要利用科技去創新而不是被科技駕馭，要利用數據分析配合科技、跳出固有的框框改善未來。在過去幾年間Cary備受各方面的認可及嘉許，在17年獲委任為太平紳士，19年獲英國UCEM在其100周年畢業禮上頒授榮譽博士，在2020年獲香港城市大學委任為能源及環境學院的特約教授。

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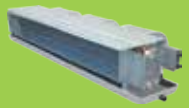

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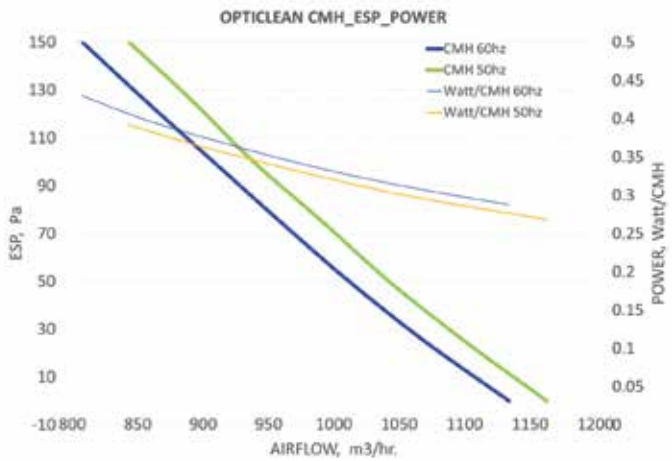
FN1SXF005000 – NOMINAL 500 CFM

The Carrier OptiClean negative air machine is a portable, nominal 500 CFM solution primarily designed to help convert normal hospital rooms into airborne infectious isolation rooms (AIIR). Designed to comply with ASHRAE's Standard 170 for Ventilation of Health Care Facilities, the Carrier OptiClean uses a 99.97% efficient filter and a heavy duty, yet quiet, motor to remove filtered contaminated air from the room. The resulting negative air pressure, or "vacuum effect," helps limit the spread of airborne contaminants into surrounding areas. If negative pressure is not required, such as an open-air, temporary hospital, the machine can be used as an air "scrubber," pulling air in, removing many contaminants, and discharging cleaner air back into the space.

Product Highlights and Specifications

- 99.97% efficient, long-life HEPA filter removes particles as small as 0.3 microns
- Pleated synthetic MERV 7 pre-filter
- Nominal 500 CFM
- Meets ASHRAE Standard 170: Ventilation of Health Care Facilities
- HEPA filter rack and sealing design meets filter air by-pass leakage Class F9 EN 1886
- Vertical design for smaller footprint
- Portable and adaptable to nearly any appropriately-sized location
- Heavy-duty, lockable casters for easy transport
- Red filter indicator light alerts user when it's time to replace a filter
- Green on/off switch illuminates when the unit is on and operating
- 3 meters long power cord with strain relief
- Exhaust transition plate to standard 10-inch round (005 size)
- Galvanized steel, powder painted cabinet is fully insulated
- 230V/50hz/60hz/1-ph
- Cabinet dimensions, cm: 44.5W x 56D x 126H

Opticlean CFM, ESP, Power



Airflow performances curve with factory installed filters (MERV 7 and HEPA H13), 230V, without duct.

ADDITIONAL PRODUCT DETAILS

Pre-Installed Filters

- The Carrier OptiCleanTM ships with two filters pre-installed for your convenience: synthetics pleated MERV 7 pre-filter and a HEPA H13 filter
  - MERV 7 pre-filter recommended replacement is 60-90 days
  - The long-life HEPA filter provides approximately 40,000 hours of operation, or four years, under normal operation and maintenance*

* Applies to negative air machine applications only.
Filter life in air scrubber applications would be reduced.

Multi-Function Control Panel

- On/Off Switch – A green on/off switch illuminates when the unit is on and operating.
- Filter Alert – A red light illuminates when it is time to check and/or replace one or both of the unit's filters.
- Pressure Indicator – Compares room/ambient pressure versus internal pressure on the back side of the HEPA filter. Sets off the red indicator light when the filters are dirty.

Some Assembly Required

- Locking casters and round or oval duct transition assembly are shipped with every unit

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EMSD Guidance Notes on Flammable Refrigerant

Background

In current Hong Kong's market, most air-conditioning equipment adopt such refrigerants as hydrofluorocarbons (HFCs) which are neither flammable nor ozone depleting and are compliant with the existing relevant safety and environmental statutory requirements. However, HFCs have high global warming potential (GWP) and their emission into the atmosphere would negatively impact global warming. In recently years, there has been an increasingly commonly use of some low GWP and mildly flammable refrigerants in air-conditioning and refrigeration systems around the world.

At present, the mildly flammable refrigerant that may be used in domestic air-conditioners is Difluoromethane (R32). However, R32 refrigerant is one of the 18 HFCs which is subject to control based on its GWP as specified at the Montreal Protocol Amendment Meeting, and it will ultimately be phased down. As the GWP of R32 refrigerant stands at 675, which is lower than that of the HFC refrigerants widely adopted nowadays e.g. the GWP of R134a and R410A refrigerants is 1430 and 2088 respectively, some manufacturers of air-conditioners have switched to R32 refrigerant from HFC refrigerants that have higher GWP in recent years, with a view to addressing the global warming problem.

According to the American Society of Heating, Refrigerating and Air-Conditioning Engineers Standard 34 (ASHRAE 34) and International Organization for Standardization 817 (ISO 817), refrigerants are classified based on their safety level. The safety classification shall consist of two alphanumeric characters with a third character L designating low burning velocity. The capital letter indicates the toxicity, whereas the Arabic numeral denotes the flammability.

In view of Hong Kong's crowded and densely populated environment with congested high-rise buildings, it is not recommended to install refrigeration equipment using flammable refrigerants (e.g. R32, R1234ze(E), R1234yf, R600a and R290) in industrial and commercial buildings from the perspectives of safety and risk management.

The storage, handling and use of refrigerants are subject to some statutory regulations in different Government Departments.

A joint departmental circular from the EMSD, FSD and LD was issued in 2017, which reminds stakeholder of the local air-conditioning and refrigeration to consider the regulation and safety regarding flammable refrigerants, and to take public safety as the primary consideration when choosing refrigeration equipment and its refrigerants.

New Guidance Notes Issued

Electrical and Mechanical Services Department issue two safety guidelines on September 2020 to cover the standards, storage transportation, installation, maintenance and disposal of household air conditioners using mildly flammable refrigerant and standalone commercial refrigerators using flammable refrigerant respectively.

The content of "Guidance Note on Household Air-Conditioners Using Mildly Flammable Refrigerant" include :

1. Classification of refrigerant and type of mildly flammable use in household air conditioner i.e. Class A2L;
2. Equation to express the relationship between "Required Minimum Room Area" of the air conditioner installation and the common mildly flammable refrigerant i.e. R32 charged ;
3. Statutory requirements and special process in marking, sales, storage, transportation, installation, maintenance and disposal of this type of air conditioners e.g. flame symbols of flammable refrigerants on the unit; safety messages in sales documents; competency service personnel etc. which may be different from the other air conditioners using non-flammable refrigerant.

IEC 60335-2-40:2013+AMD1:2016	IEC 60335-2-40:2018
	
Symbol for flammability classes 2L, 2 and 3	Symbol for flammability class 2L only e.g. R32 etc.

The content of "Guidance Note on Standalone Commercial Refrigerators Using Flammable Refrigerant" include :

1. Classification of refrigerant and type of flammable use in refrigerators i.e. Class A3;
2. Equation to determine area to install a commercial refrigerator with refrigerant charge;
3. Statutory requirements and special process in marking, sales, storage, transportation, installation, maintenance and disposal of this type of air conditioners e.g. flame symbols ISO 7010 W021; safety instruction in user manual; competency service personnel etc.

The Guidance Notes are available on the following EMSD website

https://www.emsd.gov.hk/en/other_regulatory_services/flammable_refrigerant_safety/publications/index.html

ACRA Training of Using Mildly Flammable Refrigerant

As mentioned in the Guidance Notes, service personnel shall complete special training on working with mildly flammable refrigerants provided by relevant supplier/supplier's agent or recognized training institute. ACRA will co-organize a training with EMSD and VTC at VTC Pro-Act Training and Development Center, Pokfulam, Hong Kong in coming months.

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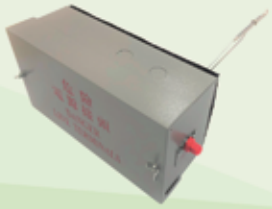

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