香港空調及冷凍商會有限公司
THE HONG KONG AIR CONDITIONING AND REFRIGERATION ASSOCIATION LIMITED
SUMMER 2017
Newsletter 會員通訊

5 years+ 同心展關懷
caringorganisation®
Awarded by The Hong Kong Council of Social Service 香港社會服務聯會頒發

## Contents





*ACRA Office*
Room 1801,
Tung Wai Commercial Bldg.,
109-111 Gloucester Road,
Wanchai, Hong Kong.
Tel: (852) 2598 0101
Fax: (852) 2598 0102
E-mail: info@acra.org.hk
Web Site: www.acra.org.hk

# Message from the President

Ir C. F. Wu
*President*

The Government Policy Address 2017 quoted implementing Building Information Modelling (BIM) as part of cost management for Public Works which will undoubtedly accelerate the development of BIM in Hong Kong. On behalf of HKFEMC, ACRA representative has been nominated to the Committee on BIM of Construction Industry Council (CIC) to ensure that the E&M contractor's concerns can be addressed along with the BIM policy and infrastructure development. Besides, ACRA Taskforce of refrigerant has been proactively taking the key role to promote safe handling of refrigerant. For this matter, we are invited by EMSD for joining the Government and the newly formed Trade Liaison Group to monitor the progresses and conducting actions in Eco-friendly Flammable Refrigerants Handling.

ACRA has been conducting regular Liaison Meetings with various Government Departments. Key topics covered in the recent meeting with ArchSD included review of General Specification, review of Guidance Drawing and application of energy efficient equipment. In addition, information of the forthcoming AC-related Energy Saving Projects was shared by EMSD in the meeting with them recently. As for the latest meeting with Housing Authority, ACRA provided feedback to their proposed Material Quality Control System.

Another emphasis of ACRA is to enhance the recruitment of new blood and development of talents for the industry. With strong support from our council members, ACRA Youth Committee was formed in Dec 2016 with 23 representatives offering a platform for talents development as well as succession of the association. The E&M Trade Promotion Group headed by EMSD organized an E&M Trade Expo 2017 at Kwai Chung VTC with the theme of E&M New Generation, ACRA conducted a career talk and hosted a booth to demonstrate the AC career path with experience sharing for the potential newcomers. In the Joint Professional Training Courses organized by HKFEMC, ACRA representatives contributed 3 lectures on the latest HVAC technologies and practices where overwhelming response was received.

Subsequent to the technical visit to Thailand organized by ACRA in June last year, ACRA jointly organized a 4-day technical visit with Macau Air-Conditioning & Refrigeration Chamber of Commerce (MARCC) to Japan in March 2017. The team of more than 40 delegates visited various locations including Factory Plant producing highly corrosion-resistant hot-dip coated steel sheet, Incineration Plant converting city daily refuse into energy, and Air-conditioning Technology & Innovation Centre that meets the highest global standards for the building environmental assessment. Likewise, a 4-day technical visit was jointly organized with HKAEE, ASHRAE (HK Chapter) and HKRVCA to the China Refrigeration Expo 2017 at Shanghai in April.

We are truly pleased to have continuous solid support from members being as sponsor or volunteer joining various charity and social caring events. In Oct 2016, we gathered more than 100 volunteers from members and their family to support ACRA Caring Event – Happy Rice Delivery 2016. We also achieved great success in another ACRA Caring Event - Joyful Dinner in December 2016 serving over 200 elderlies in a restaurant at Lam Tin. Besides, we have been actively participating in various sports such as the 400m charity run in the Construction Industry Sports Day cum Charity Fun Day 2016 in addition to the 10km and 4km run in the CIC 2017 Happy Run.

I would like to express my sincere appreciation to all council members, committee members and other members for the dedication to ACRA, it has been a great motivation to keep us moving forward and becoming stronger. Thank you.

# 嘉毅冷凍空調設備有限公司
# Ever Cool Refrigerating & Air Conditioning Co. Ltd

TECH FREE

*Air Handling Equipment & Precision A/C unit*



*Certified Integrated Performance Test Laboratory*

**Your Special Climate**
**Our Climate Specialist**

**特殊環境冷暖**
**非凡專業空調**

**Quality Certification**

Intertek ISO 9001 : 2008 | UKAS | TUV SUD EN 1886 | CE | Q

A-PLUS®

***Aire-Plus Technology***

***Filtration Products***

*PreAir*

*FinePak*

*FineAir I*

*RadiCel I*

*RadiCel II*

*RadiCel P*

BROAN FRESH AIR SYSTEMS

***BROAN***

***In-Line Duct Ventilators***

*Super Quiet Duct Ventilator*

*Super Quiet Duct Ventilator with PM2.5 Filter*

**Distributor of:**

KRUGER | NICOTRA Gebhardt | ebmpapst | BELIMO | REGIN | NanoMax® Clean Revolution | CAREL | SWEP

**Ever Cool Refrigerating & Air Conditioning Co., Ltd.**
Unit 20, 13/F Grandtech Centre, 8 On Ping Street, Siu Lek Yuen, Shatin, Hong Kong
Tel: (852) 2356 8598 Fax: (852) 3118 6363 E-mail: info@evercoolhk.com Website: www.evercoolhk.com

ATAL

MULTISTACK

# Modular Oil-free Chiller
## Maximise Flexibility for Future Capacity Add-on

Multistack is a US-based market leader of magnetic levitation oil-free centrifugal chillers and modular chillers. Their expandable design on modular chillers guarantees the maximization of flexibility for future capacity add-on, accommodating any variable challenges in new installation or retrofit.

Can split condenser be used with oil-free chiller?

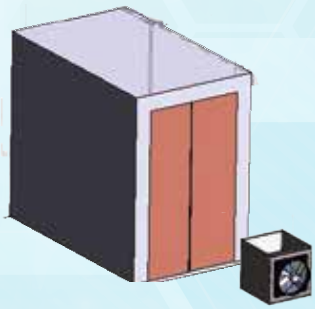
Is high static fan available for selection?

Can plate type heat exchanger be used in oil free chiller?

Can oil free chiller fit into a passenger lift?

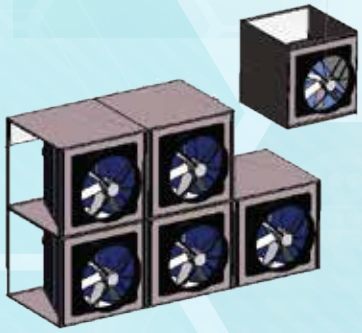
Is oil free chiller available in modular design?

**1 Fit into lift**



**Compact Design & Space-saving**

**2 On-site Installation**



**Quick and Man-power Saving Installation**

**3 Assembled**

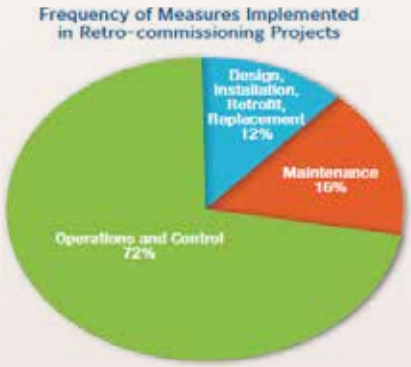
**High Expandability**

# Technology Enhancing Retro-Commissioning for HVAC & Controls System

By: **Kelvin Yip**

## The Need for Retro-Commissioning (RCx) in Hong Kong

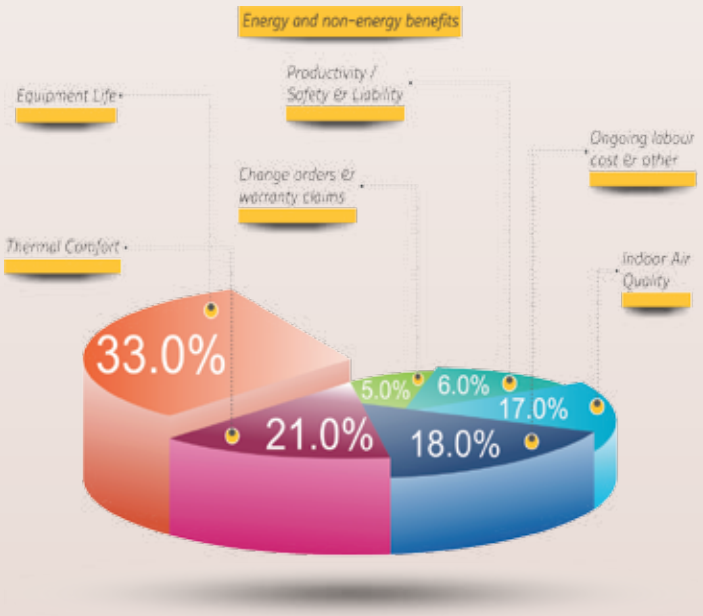
Information from Rating and Valuation Department indicates that the total stock of private offices and commercial building amounted to 22,590,700m$^2$ in Hong Kong, in which more than 60% have been built over the past 25 years [1]. Knowing that buildings experience performance degradation over time, actions shall be taken to ensure the building efficiency of such "old" building stock. With reference to the energy intensity reduction target of 40% by 2025 in the Energy Saving Plan 2015~2025+ [2], saving opportunities for existing building through RCx are being discussed and to be rolled out in existing government buildings [2].




## What is RCx?

RCx refers to a systematic process for identifying and improving less-than-optimal energy performance in existing building's equipment and control systems. It can often resolve problems that occurred during design or construction stage, or address problems that have developed throughout the building's life as equipment has aged, or as building usage has changed. RCx involves a systemic evaluation of opportunities to improve energy-using systems.

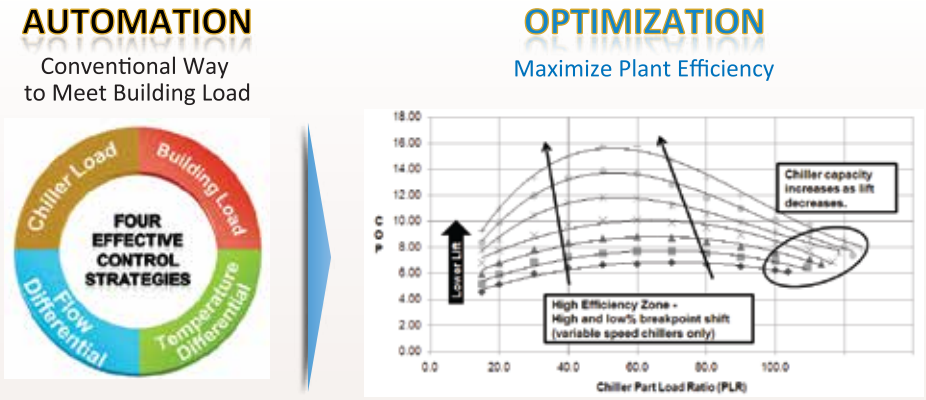
RCx can cover most of the system in building such as HVAC system, equipment & lighting system, BMS & field controls, air distribution system, heating system, building operation & schedule etc. The resulting measures can be ranged from changes of operation practice to system retrofit. In fact, over 70% of the resulting measures from RCx go for small changes in operation and controls [3], which do not incur major cost to implement, but have impact. RCx introduces energy and non-energy benefits [4] to stakeholders of building including reduction in operating costs, better equipment performance, more comfortable operating environment, fewer complaints, healthy building system, better occupancy level and brand value.




## Technologies to Facilitate RCx and System Improvement

### 1) Adoption of Intelligent Chiller Plant Optimization (CPO) Program

More than 35% of the power required to run a building is consumed in one place: the central chilled water plant. As such, energy improvement activities including RCx will look at central chilled water plant, to improve the plant efficiency and save money for the total facility. In the real world, buildings frequently undergo operational and occupancy changes that challenge the building service systems, hindering optimal performance. Improvement or update of chiller plant control shall be done to cater these significant changes, hence to ensure it performs to their design standard.

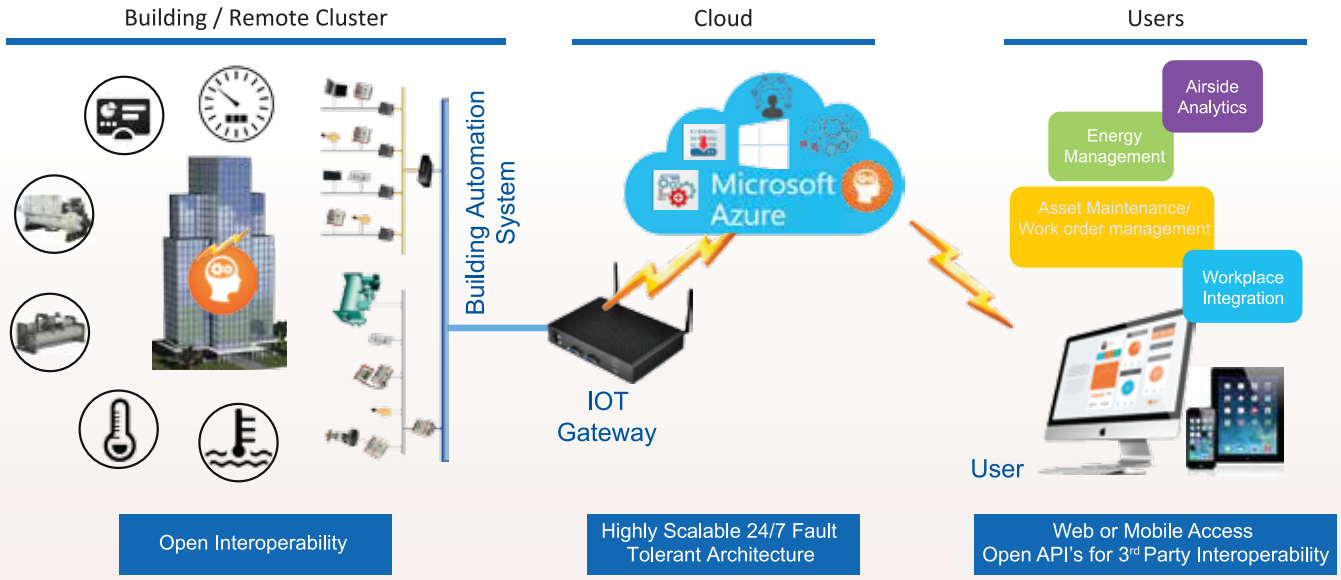



CPO application is the intelligent logic that controls the chillers, pumps, cooling towers fans in maximizing the plant efficiency. It is the brain behind the operation and can help to save up to 15% [5] of energy consumption on the same plant against standard chiller plant automation. Today's optimization software takes advantage of BMS to maximize central plant efficiency with relational-control algorithms that optimize all the equipment so that the chiller plant uses the least amount of power. Control set points are automatically calculated based on real-time building load information from BMS, and the optimization software then evaluates that data and makes recommendations back to BMS to improve performance. Nowadays, such optimization software is standardized, documented, tested and proven to reduce both cost and risk for the purchaser.

**2) Automatic Fault Detection and Diagnostic (FDD) Features**


Traditional BMS provides alarms that identify problems in a building after they have happened, based on system thresholds. For example, a room temperature alarm activates if the temperature rises above or falls below the range of temperature setpoints. The response thus happens after the fact, when the temperature is already too high or too low. The BMS alarm requires further analysis by the facility manager to identify the fault and the way to fix the problem. In addition, BMS alarms primarily focus on critical failures or problems that will lead to significant comfort or repair issues. In comparison, FDD system focuses on identifying non-critical deficiencies in which the building environment still performs. FDD enables continuous RCx by ensuring that a building is meeting the current facility requirements on an ongoing basis. As such, it allows RCx to become part of routine building operation and maintenance, instead of a periodic event.

## Smart Connected Enterprise Helps Buildings Become More Efficient




**3) Advanced Analytics Platform with Cloud Based for System Monitoring**

For today's smart and intelligent building, a single solution platform to empower building owners and facility managers to efficiently manage the respective building services is necessary. Comprehensive solution with cloud based scalable platform is proposed with the characteristics as follows:

- Able to trend, display & report the energy consumption, equipment analytics with FDD coupled with asset maintenance & work order management and space management.
- Capable of providing Tenant insights by accurately generating tenant-level views of costs and consumption.
- Comprehensive and analytical web based enterprise optimization tool that proactively reports and manages all the buildings functions, identifies operational efficiency opportunities, driving action and enabling ongoing savings over the long-term.
- Provide a system that proactively predicts the future using pattern analysis allowing teams to quickly and seamlessly understand the return on efficiency investments
- Provide a system that allows easy enterprise performance comparisons and lifecycle management offering detailed visibility into site operations.

**Case Study** - RCx project focuses on the HVAC system is launched at a 21-storey office building opened in 2015 in Hong Kong. The building consists of a central chiller plant comprising four units of 400 ton variable speed centrifugal chillers in a variable primary flow configuration. Two major improvement works is carried out after the RCx process, including 1) the adoption of CPO for chiller operation and sequencing, and 2) reset of chilled water differential pressure setpoint to improve AHU cooling valve operation. Measurement and verification are carried out after the completion of improvement works. It is indicated that the chiller plant efficiency has increased by 7.7% comparing with the same period in previous year.

Reference
(1) Hong Kong Property Review 2017, Rating and Valuation Department
(2) Energy Saving Plan for Hong Kong Built Environment 2015-2025+
(3) Mills, E, 2009. "Building commissioning; A Golden opportunity for Reducing Energy Cost and Greenhouse Gas Emission"
(4) Data from Lawrence Berkeley National Laboratory. Portland Energy Conservation Inc. And Energy System Laboratory. Texas A & M University
(5) Central Plant Optimization 10 Power by Metasys, Johnson Controls

# 唔駛爭啲啲
# Fit晒窗台位
# 變頻窗分

珍寶368變頻窗分冷氣機

珍寶368mm


1級能源效益標籤 慳電環保

## 毋須搭棚*

*須視乎個別實際情況

# People Interview with SK Ho


**何世景先生**

何世景先生於香港大學電機工程系畢業後，在香港政府任職，服務市民超過35年。期間分別曾於建築署及機電工程署任助理署長，在任期間參與過多個重要建築項目的屋宇裝備設計和施工監督。主要項目包括香港政府總部、香港警察總部、科學園、郵輪碼頭、醫院、康體設施及學校等。

何先生一直盡心盡力以其專業知識回饋社會，現在光榮完成在政府的職務。本會有幸能邀請到何先生與大家分享他在政府工程項目寶貴的經驗和知識，對空調冷凍行業的展望及對年青人的寄語。

## 懷才抱器　備受重用

何世景先生自1981年投身香港政府由見習工程師做起，到1986年成為註冊工程師及晉升為屋宇裝備工程師，何先生一直表現出色，深得上級信賴，相信和他工作目標清晰、敢於採納新技術、自信果斷的性格不無關係。

由於他甚有潛質，1991年9月被派往英國克蘭菲爾大學(Cranfield University) 修讀工程項目管理碩士課程，吸收最新知識及開展眼界。回港後於建築署的10年間，負責了各種不同的新工程項目，把英國所學盡情發揮，展現所長。期間工作表現突出，不斷晉升，擔任要職，他更曾被派往衛生福利局處理安老政策，以充實行政管理經驗，在不同的位置角度服務市民。就如何先生所說，一定要做到急市民所急，急市民所需，保証各項工作如期完工，政府與市民之間便能建立良好互信關係。

## 專業睿智　精益求精

何世景先生早年便已有份參與香港政府總部和香港警察總部的前期工程項目。香港政府總部在海傍的地下空調系統排熱海水泵房設計便是何先生不斷求進創新的意念之一。原本泵房入口狹窄，不便使用舊式地下泵房設計，在何先生的改良下，空調冷凍業工作人員不用再爬”貓梯”進出泵房，維修車輛亦可直接到達入口，提高了運作效率及工業安全。現時泵房頂部更用作公眾平台，成為一個觀賞維港煙花的好去處。

香港警察總部的工程中，何先生要在交通繁忙的夏慤道地下安裝空調系統排熱水管亦是一大挑戰，但何先生專業及靈活的思維使一切困難變得簡單。經多番與相關工業安全部門及承建商商議後，採用了改良的「頂管」作業方法，使工程在不需影響夏慤道馬路地面交通及確保施工安全內依期完成。此項「頂管」作業方式至今已成為空調冷凍行業廣為參考的個案。

很多冷氣承辦商都經驗過，何先生在每個冷氣工程項目完工時，他為確保設施不影響附近居民的日常生活，他會要求承辦商作一次又一次的冷氣減噪設備的調試直至完美，甚至在深夜親身與工程管理團隊及承辦商到民居中一起進行噪音檢測，以符合法例要求及使市民安心。

## 能源效益　建樹良多

機電工程署在制訂、推廣及實施能源效益及節約能源計劃其間，何世景先生亦擔任著重要的角色。他主要負責空調裝置能源效益守則、淡水冷卻塔計劃、預防退伍軍人病方面工作。何先生對空調行業貢獻不少，他在空調裝置能源效益守則的制定和實行上，細心聆聽業界商會意見和平衡社會各方利益，使計劃能順利有效地推行。

提到何先生在空調冷凍行業令人津津樂道的貢獻之一，當然不少得推廣淡水冷卻塔計劃。此計劃更令水冷式空調系統在香港變得普及。空調系統是建築能源消耗中佔最大比重的一環，香港大量現有商業建築轉用水冷式空調系統，使整體建築能源效益大幅提升。計劃亦開拓了空調冷凍行業不少就業機會，如淡水冷卻塔安裝、清洗、水質衛生監控、空調系統更新等，環環相扣。此舉無論在環境保護，社會經濟，市民安全各方面均有裨益。

何先生亦積極推行落實啟德區域供冷系統，為空調冷凍行業在2500冷噸級以上機組安裝、調試、運行及能源管理提供了機遇和挑戰，彙績行業在這方面的人材和寶貴經驗，為日後在香港多個新發展區推行區域供冷系統及達致成綠色城市的目標，奠定良好的基礎。

何先生在建築署任內亦負責出版及定期更新「香港特區政府建築物內安裝空調、製冷、通風，以及中央監察及控制系統的一般規格」，由專業角度、安裝技術、物料應用及香港整體空調冷凍作業方式協商制訂而成。使行業得到適當的指引及規範，有例可依。新的2017年版已最近上載於建築署網頁。

## 行業前瞻　人才培訓

面對週邊地區急速發展，何世景先生預計空調冷凍行業未來發展趨向，認為必然是科技化，加速產品技術研發。標準板塊式空調安裝，一裝即用，以節省時間及人手。何先生提倡3S概念，簡單化，標準化，單一集成元件應用在空調工程項目上。

基於本港自九十年代安裝大型空調系統已需要更新，加上多個數據中心和區域供冷系統的計劃，未來空調冷凍工程人材需求甚大，尤其是新式大型機組操作及維修人才可能出現緊絀，業界需及早培訓以應付未來工程項目。

## 勉勵後輩　貢獻社會

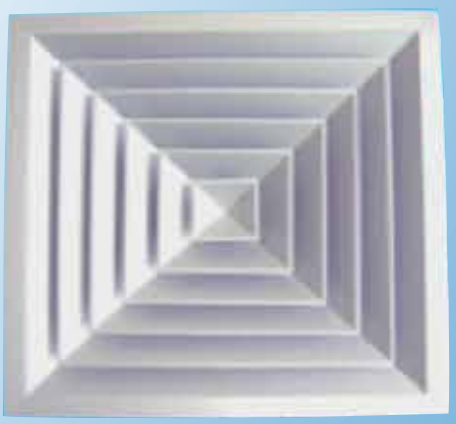
何世景先生強調工程師需要通透明白系統的技術原理，運算準確，工作態度必需認真，因為輕微錯誤和疏忽都可能壞成很大的損失。另一方面，年青人更要不怕嘗新，使技術不斷改進創新才是工程師的使命。

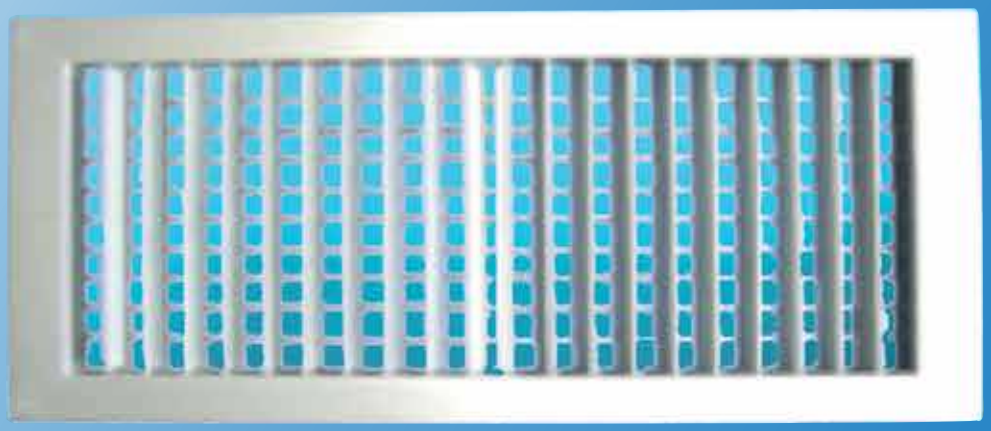
在何先生自信爽朗的言談間，他將以往三十多年在香港政府工作中難忘的挑戰和成就細細道來。何先生從現職退下來後，將繼續參與工程界會務工作貢獻社會。本會衷心感謝何世景先生接受本會訪問。

# 無滴汗風咀
# Sweatless Diffuser

DDS 佳得風管系統有限公司
Delta Duct Systems Ltd
Tel: 2511 2118 Fax: 2507 5078 heidichan@dpx.hk

採用日本先進技術在風咀表面用靜電植上尼龍66纖維，主要功能是防止結露水滴、防火、耐用、耐腐食性及防霉。
「無滴汗風咀」特別為商鋪及食肆出入口冷氣位而設，完全防止因滴水而產生的不便與問題。





## 工程參考

天水圍西鐵站　君悅酒店 香港/澳門　九龍香格里拉酒店　萬宜酒店　四方大廈　澳門皇冠酒店　旺角新世紀廣場
朗豪坊UA戲院　深水埗寶血醫院　APM　藍灣半島　福臨門酒家 旺角/尖沙咀　合和中心　美國會　世紀大廈
海立方娛樂場　加拿大國際學校　粉嶺警察宿舍　海濱南岸　荃灣廣場　瑪麗醫院　黃大仙醫院　港威豪庭

# Fast & Light Hanging System

# 施工快5倍，
# 比絲桿輕9成

- BS476 : Part20 : 1987
- DIN4102-2

DDS 佳得風管系統有限公司
Delta Duct Systems Ltd
Tel: 2511 2118 Fax: 2507 5078 ivanlee@dpx.hk

GRIPPLE

Chiltern ECA Intertek Apave

# SUPAFLEX®

## Flexible air duct

Ultra tough aluminium layer
Fire rated of BS476 Part 6,7 and 12
Comply to HK & Macau FSD requirement
UK building regulations class 0

## DDS Electric Duct Heater
## Heater Box


Tailor made Heater Box
for AHU/PAU
VAV and FCU

304 stainless steel tube & fin
U shape / W shape
Black heat type
CE certificate
Comply to HK & Macau FSD

DDS Delta Duct Systems Ltd.
佳得風管系統有限公司

(852) 2511 2118
(852) 2507 5078
Sales@dpx.hk

# 甚麼是「過往資歷認可」?

機電業「過往資歷認可」從2015年12月15日開始正式推行，提供電機工程及焊接兩個範疇共31個資歷予業界從業員申請。政府會提供資助，最高可達100%。

1. **甚麼是「過往資歷認可」?**

   香港的資歷架構之下設有一個「過往資歷認可」機制，用以確認從業員在職場上所積累的工作經驗和能力，有助他們持續進修，提升個人競爭力。香港的資歷架構是一個七級的資歷級別制度，涵蓋學術、職業專才及持續教育及培訓等不同界別，藉此推廣及支持終身學習，並不斷提升本港工作人口的素質，專業性和競爭力。所有資歷架構認可的資歷皆通過質素保證，並按照客觀及明確的標準去釐定其級別。職業訓練局獲教育局委任為機電業「過往資歷認可」的評估機構，為機電業「過往資歷認可」的申請人提供評估服務。

2. **「過往資歷認可」有甚麼特別之處?**

   「過往資歷認可」是一個直接確認的機制，合資格申請人毋須讀書，因應不同的級別，於過渡期內只需要提供年資及相關工作經驗證明文件給評估機構評核，或透過評估，便可直接獲得確認。「過往資歷認可」機制對於學歷不高但已具備豐富行業經驗的從業員特別有用。

3. **為甚麼申請「過往資歷認可」?**

   僱主方面

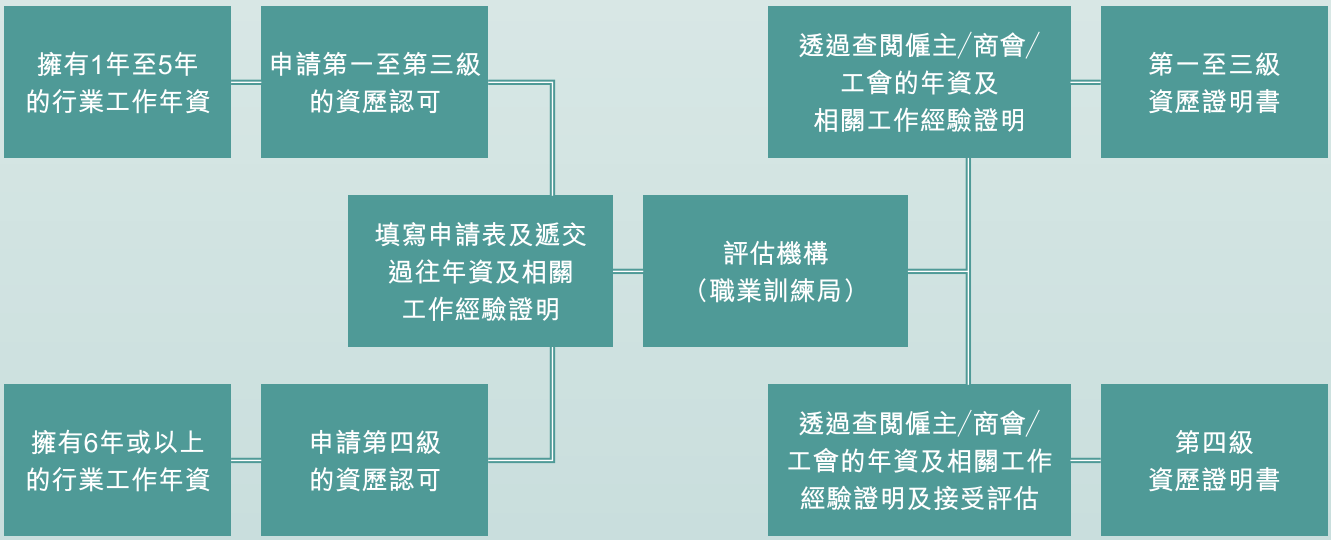
   - 提升公司的專業形象，有助投標或拓展業務
   - 有助公司規劃內部培訓課程及安排同事擔任合適崗位
   - 讓員工對公司更有歸屬感，鼓勵員工持續進修，提升公司整體競爭力

   僱員方面

   - 確認從業員在工作崗位上所積累的經驗、知識和技能，從而肯定個人的專業和工作能力
   - 取得資歷架構認可的資歷，提升他們在學習甚至工作上的進階機會

4. **申請「過往資歷認可」的程序是怎樣?**

   申請程序簡單，現於過渡期內，申請第一至第三級認可的人士可以透過查核證明文件的方式獲得認可，只有申請第四級認可的人士才需要接受評估。申請文件包括填妥的申請表、年資證明和身份證明文件等。



5. **有甚麼資歷可供申請？**

機電業**電機工程**及**焊接**兩個範疇的「過往資歷認可」設有不同的資歷給予不同工作性質的機電行業從業員、工程或管理人員申請，範疇包括安裝、設計、保養維修、營運及管理或不同焊接種類等，歡迎從事空調及冷凍行業的從業員申請。視乎工作範疇和年資，從業員可申請低壓或高壓電力裝置安裝、設計、保養維修、電機保養維修或控制裝置等資歷；工程或管理人員則可申請營運及管理的資歷。

6. **除了電機工程及焊接兩個範疇外，機電行業還有甚麼與從事空調及冷凍行業的從業員相關的範疇將推行「過往資歷認可」？**

與從事空調及冷凍行業的從業員相關之機電業另一範疇**水務工程**的「過往資歷認可」預計於今年年底推出，各從業員屆時請留意詳情。

**申請及查詢**

職業訓練局　過往資歷認可事務組

網頁：http://rpl.vtc.edu.hk　　電話：3907 6868

地址：香港九龍長沙灣長裕街10號億京廣場2期29樓A室（近港鐵荔枝角站A出口）

PACO
PUMPS

# GRUNDFOS PUMPS

# DEMAND DRIVEN DISTRIBUTION SYSTEM

**Pressure management is essential to effective leakage management. With Grundfos Demand Driven Distribution, pumps, intelligent components and system surveillance are packaged to build unique pressure management solutions that minimise water losses, reduce energy consumption and minimise operational costs for leaks and pipe maintenance.**

be
think
innovate

GRUNDFOS

三菱重工空調

# Q-ton Air to Water

## Commercial Use $CO_2$ for Air to Water Heat Pump


**PERFORMANCE**

-25°C → 90°C

90°C water supply even in extremely cold regions with temps as low as -25°C

**CAPACITY**

-7°C → 100

Keeping 100% capacity down to -7°C

**EFFICIENCY**

COP 4.3

The industry's highest COP level COP4.3 (intermediate season)

**WORLD'S FIRST**

ROTARY & SCROLL COMPRESSOR

Unique Patented Technology


**MITSUBISHI HEAVY INDUSTRIES, (HONG KONG) LTD.**

**Air Conditioning Division**

Unit 602B, 6/F, Tower II, Cheung Sha Wan Plaza,
833 Cheung Sha Wan Road, Kowloon

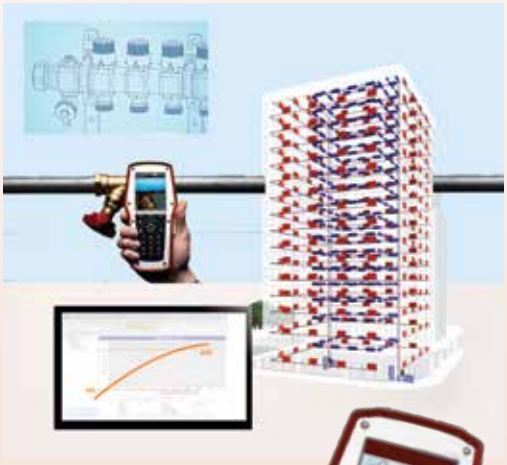
Tel: +852 3158 2990 Fax: +852 3153 5883 Website: www.mhi-ac.com

# The Importance of Hydronic Balancing to Ensure your HVAC System Operating at Optimum Energy Efficiency

By: **Ir Prof Francis YIK**
**Prof Robert Petitjean**

Total Hydronic Balancing is a set of means and methods for making hydronic systems readily controllable so that they can provide the intended indoor climate at the minimum operating cost. For the operations staff, it is a potent prescription for trouble-free operation and ease of maintenance. For the property owner, it is a long-term guarantee against excessive operating costs. It can be applied to various types of hydronic systems handling constant flow or variable flow.

## Fast Facts & Common Challenges



On-site commissioning of hydronic systems often brings surprises, such as clogged strainers, damaged pipes or circuits not connected as expected, etc. Here are some fast facts –

- Two out of three buildings have indoor climate problems
- Most problems are caused by hydronic imbalances, not by control malfunctions
- No hydronic system will function properly unless accurately balanced
- Balancing devices account for less than 2 per cent of the HVAC investment
- Yet balancing can cut a significant amount of energy consumption

## Optimising Hydronic Distributions for Energy Efficiency

The availability of modern measuring and balancing instruments can greatly facilitate proper commissioning of an HVAC system for energy efficient operation. To achieve optimum energy efficiency, the hydronic system in an HVAC system must be fully controllable and, to be controllable, it must fulfil three conditions:

1. **Design flows must be available at all terminals at full load**
   In order to achieve this, hydronic balancing is necessary. Hydronic balancing prevents overflows in circuits at favourable locations and underflows in circuits at unfavourable locations. Hydronic balancing detects possible over-sizing of pumps and verifies that the plant actually provides the functions and performance intended by the designer.

2. **The differential pressure across the control valves must not vary too much**
   This requires proper selection of control valves while hydronic balancing can help identify and resolve the real causes of operational problems in the plant.

3. **Flows must be compatible at system interfaces**
   This refers to cases where multiple secondary circuits are served by a single primary circuit and where proper balancing among the secondary circuits is essential to ensuring cooling output of the plant can be effectively distributed to the secondary circuits. The balancing procedure allows hydronic problems to be to localised and resolved.

## Three Steps to Achieving Energy Saving

In an unbalanced system, the terminals closest to the pump operate in overflow while those further away are in underflow. This is a typical issue in HVAC systems, which will result in varying indoor climates in different rooms. People may then attempt to compensate for this discomfort by adjusting thermostat settings, which reduces efficiency and can compromise comfort. There are a few steps to take to establish a reliable hydronic balance -

1. **Adequate allowances in design**

   The first step in reaching the optimal solution is making allowances in design for all the necessary measuring and balancing instruments in the system. Commissioning experts should be consulted in this process, to ensure the solution would deliver from the outset optimum indoor comfort control and energy performance. Software program may be used for hydronic calculation and component selection.

2. **Installation**

   The next step is the installation of the selected system components, which include balancing valves and instruments for measuring temperature, pressure and flow rate. Proper installation of all these components, including the availability of access space for the subsequent testing, adjusting and balancing work, must be verified.

3. **Testing & Commissioning**

   Upon completion of installation, the system needs to be tested, adjusted and balanced to ensure it can deliver the intended performance. Dedicated hardware and software may also be used to predict balancing valve settings based on measured operating conditions of the hydronic system which can help expedite the otherwise very time-consuming process.

As a result of the commissioned solution, the water flow remains stable, minimising temperature fluctuation and enables an excellent level of control. The commissioning work should be carried out periodically in an existing building to cope with possible changes in operating conditions. With well-executed commissioning, energy consumption can be reduced by up to 40% with a full payback on its initial investment in just about 14 months.

Proper hydronic balancing helps ensure HVAC plants will actually perform according to design. There is a wide range of hydronic balancing solutions available in the market, including balancing devices, modern balancing and measuring instruments, as well as the cutting-edge technology, pressure independent balancing control valves (PIBCV).

Reference: Total Hydronic Balancing – R. Petitjean Edition TA HYDRONICS – 520 pages - 1997

MITSUBISHI ELECTRIC
三菱電機
*Changes for the Better*

2017

# Mr.SLIM · 商用分體式空調
## COMMERCIAL SPLIT-TYPE AIR CONDITIONER

### SP 系列 / SERIES


**建築物（小型工程）**
*Building (Minor Works) Re*

**室外機運作溫度**
*Outdoor Unit operc*

**室外43℃下PUMY-CP系**
**Mr. Slim SP系**
*PUMY-CP series maintains*
*and Mr. Slim SP series*

**接駁多款室內機**
***Various Series Connectable***

**PLY**
**天花板卡式**
Ceiling Cassette Type

**PCY**
**天吊式**
Ceiling Suspended Type

**PEY**
**天花板埋入式**
Ceiling Concealed Type

三菱電機(香港)有限公司
MITSUBISHI ELECTRIC (HONG KONG) LIMITED

辦公室及陳列室 *OFFICE & SHOWROOM:*
香港太古城英皇道1111號太古城中心一座20樓
20/F., CITYPLAZA ONE, 1111 KING'S ROAD, TAIKOO SHING, HONG K

電話 *TEL:* (852) 2510 0555

# 全新單風扇變頻淨冷系列
# SINGLE FAN INVERTER COOLING ONLY SERIES

## CITY MULTI · 多聯分體式空調
VARIABLE REFRIGERANT FLOW (VRF) AIR CONDITIONER

### PUMY-CP 系列 / SERIES

**規例第III級別項目**
*egulation Class III Projects*

**度範圍可達52℃**
*ating range at 52℃*

**系列保持額定能力不變，**
**系列為約90%**
*at a rated capacity of 43℃*
*s runs at around 90%.*


### 多種接駁方法
***Multiple Connections***

**多聯式室內機**
VRF Indoor Unit

**PLFY**
**系列** / Series

**PEFY**
**系列** / Series

或/*OR*

**分歧箱 + 家用式室內機**
Branch Box + Residential Indoor Unit

**分歧箱**
Branch Box

**MSZ-GE**
**系列** / Series

*尚有更多室內機型號，請向銷售人員查詢。
Please contact our sales person for other models.


維修服務中心 *SERVICE CENTRE:*
香港 HONG KONG: 香港九龍九龍灣臨樂街8號商業廣場7樓
7/F., CORPORATION SQUARE, 8 LAM LOK STREET, KOWLOON BAY, KOWLOON, HONG KONG
電話 *TEL:* (852) 2427 8484
澳門 MACAU: 電話 *TEL:* (853) 6540 3096