



**Joint ASHRAE Hong Kong/Macao Chapters**  
**Half-Day Technical Seminar 2018 on**  
**‘High Performing Healthcare HVAC Systems’**

Date : 17 May 2018 (Thursday)  
Time : 2:15pm – 5:30pm (Registration will start at 1:45pm)  
Venue : BEC Auditorium, G/F Jockey Club Environmental Building, 77 Tat Chee Avenue, Kowloon  
Tong, Hong Kong

**Background:**

Announced in 2016 Policy Address, the Government of Hong Kong Special Administrative Region has set aside a dedicated provision of HK\$200 billion for the implementation of a 10-year Hospital Development Plan (HDP) in the coming ten years. The 10-year HDP includes Construction of one New Acute Hospital at Kai Tak Development Area, Redevelopment / Expansion of existing 11 hospitals, Construction of three new Community Health Centres and Construction of one new Supporting Services Centre. The implementation of the 10-year HDP will deliver around 5,000 additional hospital bed spaces, around 90 additional operating theatres as well as around 430,000 additional annual capacity of general outpatient clinic attendances and 2,800,000 additional annual capacity of specialist outpatient clinic attendances.

Regarding healthcare mentioned in the Five-Year Development Plan of the Macao Special Administrative Region (2016-2020), MSAR focuses on two major projects which is the Islands District Medical Complex and the Public Health and Infectious Diseases Building, through which MSAR intends to support and facilitate establishment of a healthy city, by raising Macao’s overall healthcare standard, and providing quality medical services to the public.

This technical seminar focuses on HVAC Systems for high performing healthcare design concerns on airborne pattern and infection control. The speakers also share his valuable experience on their research, operation & maintenance on HVAC systems for healthcare facilities.

**Topic 1:**  
**Mechanisms of Disease Transmission in Healthcare – Implication to Engineering Control**

It is known that ventilation can reduce exposure to airborne infectious agents in a building, and mitigate epidemics of infectious diseases transmitted through the airborne route. A significant knowledge gap, however, persists with respect to the impact of ventilation at the community level on infectious diseases transmitted through multiple routes. We estimated the probability and duration of any two individuals meeting (subject to airborne transmission) and in close contact (subject to droplet transmission) in each indoor environment in a large city. We considered detailed transmission process of droplets and droplet nuclei via air, surfaces and direct deposition. We studied the roles of respiratory activities, human plumes and dispersion and evaporation of expiratory droplets in buildings as associated with effect of ventilation on infection.

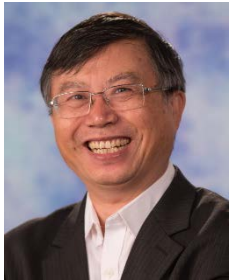
We find that ventilation is significantly effective in airborne transmission dominated conditions. Moreover, when the airborne route only contributes 20% to the total infection risk increasing the ventilation rate also has a strong

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influence on the outbreak dynamics, and it also can achieve similar control effect as wearing masks for patients, isolation and vaccination (small daily distribution number). The results indicate that we should not neglect the old and traditional “open-air treatment” (ventilation) for respiratory infections even when the infection is only partially transmitted through the aerial route.

**Speaker:**



**Yuguo Li**  
*Professor and Associate Dean (Research) of Engineering  
 The University of Hong Kong*

Yuguo Li is a Professor and Associate Dean (Research) of Engineering, former Head of Department of Mechanical Engineering, the University of Hong Kong. Li was a Principal Research Scientist and the team leader of indoor environments at CSIRO Australia prior to 2000 when he joined the University. He studied at Shanghai Jiaotong University, Tsinghua University Royal Institute of Technology, Sweden. His research interests are in building environment engineering. His current research topics include city climate, environment studies of infection and indoor air quality. His work led to the findings of the roles played by airflow in the 2003 Amoy Gardens SARS outbreak. He led and developed the 2009 WHO guidelines on natural ventilation. He has been leading two collaborative research grants in Hong Kong with one on ventilating a high-rise compact city and another on spread of virus in a large city. His work has also been supported by GRC GRF, RFCID, NSFC, WHO, Boeing and Microsoft. He currently also serves as President, Academy of Fellows of International Society of Indoor Air Quality (ISIAQ). He received the Rydberg Gold Medal of SCANVAC in 2014, Honorary Doctor Degree of Aalborg University in 2015 and the Inoue Memorial Award, SHASE, Japan in 2016. He was elected a Fellow of ASHRAE, ISIAQ, HKIE, and IMechE.

**Topic 2:  
 Combating Infectious Disease through Design Engineering – The Design of Isolation Ward for Reducing Airborne Infection in Common Clinical Settings**

The design of airborne infection isolation (AII) room has become one of the major research domains following the emergence of the global concern of acute respiratory diseases in this century. These include severe acute respiratory syndrome (SARS) in 2003, pandemic influenza H1N1 in 2009, and Middle East Respiratory Syndrome (MERS) in 2012. All of which have claimed thousands of lives. Even with the current stringent design and practice guidelines, nosocomial infection of healthcare workers (HCWs) and inpatients continues to occur. This implies that there might be limitations in current isolation ward designs.

A series of on-site experiments were conducted to verify the ventilation performance and the airflow structure of isolation room. Experiments investigated the effects of ACH, the control of airflow direction, the airtightness of the automatic swing door and the application of positive pressure ventilation procedures, such as high flow rate oxygen masks and jet nebulizers.

The aerodynamic data in this thesis informs architects and engineers on how to improve the hospital ward ventilation design to avoid aerosol and ventilation leakage. Ultimately, it is hoped that the finding may play a role in preventing devastating nosocomial outbreaks in the future.

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**Speaker:**



**Benny Chow**  
*Director of Sustainability*  
Aedas

Dr. Benny Chow is the Director of Sustainability at Aedas, focusing on the green buildings and sustainable development, an award winning sustainable design expert with worldwide project experience. Dr. Chow is now appointed as the Member of the Board of Directors, Chairman of the Industry Standards and Practices Committee (ISPC), and GB Faculty of the Hong Kong Green Building Council (HKGBC), co-opt members of the Committee on Environment and the Committee on BIM in Construction Industry Council (CIC) and the chairman of the Sustainability Committee of the ASHRAE Hong Kong Chapter. Dr. Chow brings with him more than 22 years of experience in Sustainable Design and involved in more than 400 projects located in more than 40 cities. Dr. Chow is specializing in Green-BIM, building physics computer modeling and analysis, urban microclimate study, façade solar heat gain calculations, global daylight illumination simulation, performance-based building energy use and efficiency modeling, and air ventilation assessment using Computational Fluid Dynamics (CFD), and the design of healthcare facility to the prevention of airborne infectious disease.

Dr. Chow was appointed as an Honorary Associate Professor in the Department of Mechanical Engineering at University of Hong Kong (HKU), Adjunct Associate Professor in the Institute of Space and Earth Information Science at the Chinese University of Hong Kong (CUHK), and is currently the Adjunct Assistant Professor of the Faculty of Medicine at CUHK.

**Topic 3:**

**Contaminant Control Considerations in Hospitals and Health Care Settings**

[GBCI Approved | 1 CE Hour | 0920014361 / AIA Approved | 1LU/HSW | VIJAYAKUMAR03]

Intensive care units, surgical theaters, hospital wards, and other health care settings are, arguably, the most important contamination control challenges facing HVAC and cleanroom professionals. The occupants in these settings are generally compromised, health wise, or carry transmittable infectious diseases. These patients are cared for by medical staff, who are moving from one patient to another, often in a hurry. While traditional HVAC and cleanroom designs may not be readily transferable, several of the good practices should be considered. This topic presents key considerations for air borne contamination control in medical settings. Although not a prescriptive lecture, the audience will take away good practices and ideas to improve the air quality in these and similar facilities.

**Speaker:**



**R. Vijayakumar**  
*ASHRAE Distinguished Lecturer*

Vijayakumar is the founder and head of AERFIL, a consulting company devoted to providing technical and business solutions and services for the filtration and contamination control industry as well as educational and training support for the industry. His current clients include major filtration companies in China, Brazil and India. With over 30 years' experience in leading filtration and particle test instrument companies to go with his PhD in particle technology, Vijayakumar is a globally recognized expert and mentor in contamination control and filtration sought after by clients worldwide. He is an advisor to NASA for air filtration systems for space habitat.

In keeping with his philosophy that knowledge grows only by sharing, he teaches freely and often wherever someone wants to learn the subject. He has been on the faculty of the short course on air and gas filtration at the University of Minnesota since its inception and is a Distinguished Visiting Professor at the Chinese Academy of Building Research. He has taught courses in

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cleanroom designs for ASHRAE, and is a Distinguished Lecturer for them lecturing around the world on various aspects of filtration and cleanroom designs. He has served as the President of the IEST, the premiere contamination control organization in the US. Currently, he chairs standards development committees at the ISO and in the US writing standards for high efficiency filters used in cleanrooms, hospitals, and indoor environments.

**Topic 4:**  
**Design of HVAC System in Operating Theatre Suites**  
**in accordance with International Standards with T&C Case Studies**

**Speaker:**



**Ricson Tsang**

*Fellow of the Institute of Healthcare Engineering and Estate Management*

Mr Tsang practiced in the Hong Kong as a professional engineer for nearly 30 years in the field of Building Services and Healthcare Engineering. He is the Director of an Engineering Firm in Hong Kong since 2000. He has involved in the design, testing and commissioning of more than twenty operating suites and the design of several BSL3 laboratory, special laboratories and cleanroom in Hong Kong. Health, safety and energy saving solution are his goal to achieve a better green and clean environment.

He is a Corporate Member of the Hong Kong Institution of Engineers, Fellow of the Institute of Healthcare Engineering and Estate Management and Fellow of the Chartered Institution of Building Services Engineers.

**Seminar Program:**

13:45 – 14:15	<b>Registration</b>
14:15 – 14:20	<b>Welcome Address</b> Michael Sung, <i>President of ASHRAE Hong Kong Chapter</i>
14:20 – 15:00	<b>Mechanisms of Disease Transmission in Healthcare – Implication to Engineering Control</b> Yuguo Li, <i>Professor and Associate Dean (Research) of Engineering, The University of Hong Kong</i>
15:00 – 15:40	<b>Combating Infectious Disease through Design Engineering – The Design of Isolation Ward for Reducing Airborne Infection in Common Clinical Settings</b> Benny Chow, <i>Director of Sustainability, Aedas</i>
15:40 – 16:05	<b>Tea Break</b>
16:05 – 16:45	<b>Contaminant Control Considerations in Hospitals and Health Care Settings</b> R. Vijayakumar, <i>ASHRAE Distinguished Lecturer</i>
16:45 – 17:25	<b>Design of HVAC System in Operating Theatre Suites in accordance with International Standards with T&amp;C Case Studies</b> <i>Ricson Tsang, Fellow of the Institute of Healthcare Engineering and Estate Management</i>
17:25 – 17:30	<b>Closing Address</b> Syed Mubarak, <i>President of ASHRAE Macao Chapter</i>

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Language: English

Fee: HK\$ 400 [Member of ASHRAE Hong Kong/Macao Chapter]  
HK\$ 500 [Member / Staff of Supporting Organizations]  
HK\$ 600 [Standard]

Remark: 3-hour CPD certificate will be provided.

Registration & Enquiry:

Number of participants is limited and prior registration is required. For registration, please complete Registration Form in the following link: <https://goo.gl/forms/iDC9ifEj4HNbpG322>. The deadline of application is on 10 May 2018. Successful members will be notified by e-mail on or before 12 May 2018, which has to be presented at the registry of the venue entrance for verification. If the applicants have not received the confirmation e-mail on or before 12 May 2018, their applications will be regarded as not successful.

If typhoon signal no. 8 or black rainstorm signal is in force and still hoisted after 1:00 pm of 17 May 2018, the seminar would be cancelled without further notification.

For enquiry, please contact Mr. Joe Chow at email to [ashraehk@gmail.com](mailto:ashraehk@gmail.com).

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