

ASHRAE Ottawa Valley Chapter

Chapter Meeting #7 – 19 April 2016

Meeting Date:	19 April, 2016
Location:	Restaurant International, Algonquin College
Attendance:	Total: 57
	Members: 47 Guests: 8 Students: 2
Theme:	Student Activities/CTTC
Tour:	None
Tech Session:	None
Table Top:	HTS – Omega Heat Pumps Belimo
Program:	Design in High-rise Buildings
Speakers:	Mr. Chris Pal
Prepared by:	Daniel Redmond

Social (17:30 – 18:20)

Business Session (18:20 – 18:40)

- President Georges Maamari introduced the Board of Governors and the Executive
- Daniel Redmond introduced the guests for the evening
- Celine Baribeau introduced the new members to the Ottawa chapter.
- President Georges Maamari announced that the theme for the evening is Research Promotion. Abbey Saunders shared five fun and interesting facts about ASHRAE Research. Currently the Ottawa Valley Chapter is far ahead of Toronto and Montreal chapters in terms of our RP campaign this year.
- President Georges Maamari called upon Steve Moons to discuss the upcoming golf tournament. June 21st. info in communiqur. Anyone registered from previous years will have received an email. Waiting list. Call Andrew or look at communiqué. Sponsorship opportunities are available. Industry specific advertising.
- Bob Kilpatrick chair nomination committee announced the proposed slate of exec and BOG for the chapter for the coming year. For Exec, president abbey, pre elect adam, treas dan sec chris. Past pres georese. BOG: proposed Richard Cameron (ret) aaron dobs (Ret) adam moons (ret) Adriane mitanit (new) chris frauley (Ret). If no new nominations. None. Mike Swayne put for the motion. Paul seconded the motion. Installation of exec will occur at next meeting.
- Table top HTS – Omega heat pumps.
- Tabletop Belimo – Clark Campbell – presenting new zone valve (ball valve design) in place of paddle design.
- Tabletop EHprice – Rick – Ductsox fabric ducts – high humidity, gyms, airports. Fabric lab diffuser.
- InAIR raffle tickets to upcoming redblacks home opener.

Dinner (18:40 – 19:35)

- Four tickets were raffled off for the home-opener of the Ottawa Redblacks versus the Calgary Stampeders. The tickets were donated by InAir Environmental and raised \$740 for ASHRAE RP and were won by Georges Maamari. A prize pack donated by Belimo was won by Sulman.

Evening Program (19:45 – 21:05)

- President Georges Maamari introduced the program speaker, Mr. Chris Pal to discuss Selected topics in high rise mechanical design:
 1. Comparison of Toronto and Dubai considerations
 2. Highrise design practices in the middle east and in Toronto.
 3. There are many factors which influence building design choices beyond building height
 4. High rise residential hospitality buildings
 5. Dubai and Toronto with different design considerations.
 6. Why, what how and because
 - a. Safety, health, purpose, economics
 - b. Because
 - i. Market forces are a driver to system choices
 - ii. Labour costs versus material costs make a big difference in terms of equipment choices
 - iii. Horizontal fan coil is a system of choice (in North America more of a preference for vertical fan coils)
 - iv. Regional habit and types of ownership also influence decisions
 7. Physical realities
 - a. A column of water on top of a 1 storey building exerts 1/10th the pressure of a 10 storey building. 1/100th of the pressure of a 100 storey building.
 - b. A tall building can be considered a collection of shorter buildings.
 - i. With zones of the building that can be managed
 - c. As water, waste and other fluids are distributed up and down the building (vertical axis)
 - d. Water is preferable over air as the energy transfer medium
 - e. Pressure breaks within the building are important.
 - i. In a closed system, heat exchangers are installed as pressure breaks.
 - ii. Position of pressure break is determined by infrastructure costs and feasibility
 - iii. Temperature differential and approach (chilled water):
 1. Primary circuit (42 to 52 deg F)
 2. Secondary circuit (44 – 54 deg F)
 3. Tertiary circuit (46-56 deg F)
 - f. In fire protection systems have an open reservoir and pumping system
 - i. Water tank also can serve as a damper to combat the inertial forces generated as the building sways
 - g. Tall Building Association (CTUBH)
 - i. Tall building = above 150m
 - ii. Supertall above 300 m
 - iii. Megatall above 600m

- h. Mixed use is becoming more and more prevalent within tall buildings
 - i. Interdisciplinary issues
 - j. Cross bracing needed and is commonly used for mechanical spaces
8. Building voltages change around the world
- a. Canada 600V
 - b. USA 480V
 - c. Europe and Asia 380V
 - d. Commonly higher voltage delivered and transformed down to lower voltages through out the building
9. Plumbing Systems
- a. Water supply in Dubai is unreliable, so onsite storage is mandatory. Roof top tanks are strongly incented
 - b. In Canada there is much greater reliance upon municipal services. There is a requirement in Toronto for storage within tall buildings
 - c. System pressure regulation becomes an issue
 - i. Every 30 stories of building is 10 bar of pressure
 - 1. PRESSURE REGULATION IS NECESSARY
 - ii. Sometimes pressure reduction is accomplished within the riser (however this can present very problematic maintenance issues in the future)
 - d. Expansion is also an important consideration. Installed at temperature versus usage temperature.
 - e. Domestic Hot Water
 - i. In Dubai, water chilling is needed (otherwise hot water comes from both hot and cold taps)
 - ii. Hot water recirculation from the low pressure side cannot be connected to the high pressure side.
 - 1. put hot water tank in low pressure side, or
 - 2. provide brazed heat exchanger between sides
 - f. Drainage and venting
 - i. North American standards well documented.
 - ii. Dubai standards are less well documented.
 - iii. Tall buildings are subjected to hydraulic jumps
 - 1. Lowest floors of a drainage riser must not be connected directly to the high building riser
 - a. Take the high pressure line and do not connect it to the lowest floor where all the horizontals are connected
 - b. Make the final connection lower downstream in another location

10. Life Safety

- a. NFPA is prevalent in North America and in Dubai
- b. Smoke control
 - i. Specifically mandated for high buildings
 - ii. Isolation of fire floor
 - 1. Extraction from fire floor
 - 2. Pressurise floor above and below (differential pressure of 12 PA)

3. Pressurize stairwell
4. Stairwell pressurization
 - a. Must supply at various points in the stairwell so that backpressure at exit doors is less than 133 N
5. Elevator shaft pressurization
6. VFDs now permitted on some fans (in some jurisdictions)

11. HVAC

- a. Really need to look at the building as a series of smaller buildings
- b. System selection first must suit the function of the space
- c. System selection then must be evaluated based on economics and integration considerations
- d. System selection then must be evaluated based on economics and integration considerations
- e. Perimeter radiation
- f. Reheat of branch air terminals
- g. Overhead radiation
- h. Fan coil units
- i. Vertical stacked heat pumps are not very prevalent
- j. Fresh Air supply is an issue
 - i. In Toronto, filtered heated and cooled, humidified air
 - ii. Dubai, sand becomes an issue
- k. Humidity control
 - i. Ventilation required to maintain comfort
- l. Building exhausts
 - i. Kitchen exhausts
 1. NFPA 96
 2. Visible roof area is not a desirable location for kitchen exhaust systems
 3. Ecology units
 - ii. Residential kitchen exhaust
 1. Not regulated by NFPA 96
 2. UAE currently inclined to fried foods
 - a. Provide hoods and collection systems
 - iii. Sanitary exhaust
 1. Central extraction is common in both North American and the UAE
 2. Demand control extraction

12. So...Where does the chiller, boiler and generator go?

- a. Chillers
 - i. Dubai
 1. Air cooled chillers used to be very common
 2. Water cooled chillers now becoming more common
 3. District cooling plants and distribution
 4. When program is on a podium have more possibilities for mechanical plant space
- b. Boilers
 - i. Want to be at the top of the building
- c. In a tower it becomes even more difficult for both boilers and chillers

13. Envelope considerations

- a. Heat losses, heat gains and solar loads
 - i. Thermal resistance
 - ii. Thermal breaks
 - iii. High performance glazing
 - iv. Double skins
 - v. Active shading
 - vi. Vertical temperature distribution (can be 85 at the base of the Burj and 69 at the top)
 - vii. Wind
- b. Air leakage and ventilation
 - i. Stack effect
 - ii. Wind
 - iii. Building system pressurization
- c. Wind
 - i. Prevailing winds can be funnelled through the building
 - ii. Walls need to be sealed to the roof

14. Zero Gravity for the Dubai Financial District

- a. Entire façade is a television screen
- b. Double the original design
 - i. When you double the diameter you cube the volume

15. Summary

- a. Climate
- b. International standards
- c. Regional regulations
- d. Investor/developer expectations
- e. Long term vs short term thinking
- f. Market forces
- g. Type of ownership
- h. Engineer's position in the market
- i. Architectural influence

16. Questions

- a. Provisions for replacement of base building mechanical systems

- President Georges Maamari then thanked the speaker and reminded all attendees of the survey
- Next meeting May

Meeting adjourned 21:25