ASHRAE Ottawa Valley Chapter

Chapter Meeting #2 – 15 Oct 2013

Meeting Date:	15 Oct 2013			
Location:	Restaurant International			
Attendance:	Total: 52			
	Members: 46	Guests:	3	Students: 3
Theme:	YEA			
Tour:	None			
Tech Session:	None			
Table Top:	Stulz Precision Air Conditioning, presented by Total HVAC EcosAire Precision Air Conditioning, presented by Longhill Energy			
Program:	**Precision A/C Design – Optimizing the Reliability and Efficiency of POD (Performance Optimized Data Centre) Cooling**			
Speaker:	Jason Koo			
Prepared by:	Abbey Saunders			

Social (17:30 – 18:15)

Business Session (18:15 –18:30)

- President Rod Potter introduced the Board of Governors and Executive.
- Abbey Saunders introduced the guests for the evening.
- Georges Maamari welcomed new members.
- Steve Moons provided a wrap-up summary for the stoke play golf tournament. Marc Parent of Longhill Energy was the tournament champion.
- Steve Moons reminded everyone of the upcoming Bowling Social event in November, and online registration is now open.
- Senators tickets donated by Walmar were raffled off raising $360 for ASHRAE Research with Andrew Douma of Total HVAC being the lucky winner of the Sens tickets.
- Rod Potter discussed the upcoming Christmas Social and encouraged everyone to register for the event being held at the St. Elias Centre on Fri., Dec. 6.

Dinner (18:30 – 20:00)

Evening Program (20:00 – 21:10)

- Following dinner, the main program event took place. Speaker Jason Koo's presentation topic was optimized design for data centre cooling systems.
- The presentation started with Mr. Koo outlining how the following relevant ASHRAE documents are tools to be utilized to enhance the reliability and efficiency of data centre cooling equipment:
    - **ASHRAE TC9.9**, which details the benefits of increased return air temperatures.
    - **ASHRAE 90.1**, which outlines the benefits of air and water side economizers as well as the latest warm water cooling technologies.

- Key elements of the cooling system design considerations which are paramount to optimized efficiency and reliability include: water/air side economizers, containment strategies, controls and humidification.
- In addition to the ASHRAE documentation, in order to achieve optimized design the benefits of controls systems were also explored.
- In general, since cooling products are designed to have an average lifespan of approximately 10–15 years, but IT equipment generally only has a useful lifespan of 2-5 years allowances, tolerable variations is temperature and humidity for data centre cooling equipment are beneficial. Issues that help define the acceptable tolerances also help optimize the design. For example, the following table outlines risks associated with various temperature and humidity issues.

Condition	Risk
High Moisture	Corrosion
Low Moisture	ESD
High Inlet Temperature	Thermal Shutdown
Low Inlet Temperature	Wasted Energy

- The recommended allowances for humidity and temperature conditions for data centre cooling applications have evolved over time, and are outlined in ASHRAE TC9.9.
- Row and perimeter cooling equipment are some of the most commonly used equipment types for POD cooling applications.
- The row cooling design concept allows for both hot and cold aisle capture, and both strategies are utilized. Hot aisle containment allows for peak efficiency in operation of the cooling system, whereas cold aisle containment allows for optimized energy efficiency in conjunction with proper air balancing. Another main advantage of cold aisle containment is improved redundancy.
- Containment design applications follow two main principles: plenum or chimney. A raised floor application can accomplish proper air flow (cooling) without containment; however plenums are often used to ensure containment design. The chimney design does not require power assistance to get hot return air back to the equipment
- An example was presented next by Mr. Koo which worked through how various modifications to a POD cooling system such as varying temperature, humidity, water temperature, air temperature, and fan speed can affect the reliability, efficiency and energy consumption, namely overall performance of the cooling system for a particular application.
- Following the example, we reviewed how free cooling is something that can be utilized in POD cooling applications to help improve the system efficiencies significantly. That being said there are special considerations that must be evaluated prior to implementation of a free cooling systems which may make an air side or water side economized preferred. For example, row cooling applications are generally more suited for water side economizer systems, and air quality and specialized filtration requirements to remove odours and residual particulate matter should be thorough investigated when contemplating use of air side economizers. In addition to water and air side economizers, warm water cooling was briefly discussed as an alternative to provide free cooling for POD cooling applications. Often warm water cooling allows for increased run time of free cooling systems, depending on the climate, which extends the window for which non-mechanical assisted cooling can be utilized.

- System integration and advanced controls are critical for POD cooling applications and have a significant impact on the efficiency of the systems.
- Proper use of controls help to maximize reliability, optimize free cooling utilization and reduce overall energy consumption of a cooling system and allow for active redundancy for certain POD cooling applications.
- In addition, the monitoring capabilities provided by an advanced control system enable trending and analysis of data which allows constant modifications and tweaking of system operation to ensure optimal and efficient system operation.
- The ASHRAE documents outline several options for POD cooling application humidification. However, they recommend the use of ultrasonic humidification systems for POD cooling as an additional energy saving measure due to the fact there is no phase change in ultrasonic humidification. This reduction in energy consumption from ultrasonic humidification over other traditional humidification methods further decreases the energy consumption of a POD cooling system, ultimately improving overall system efficiency.
- In summary, to enhance the reliability and efficiency of a POD cooling application adherence to ASHRAE TC9.9 and 90.1 recommendations and mandatory requirements, along with advanced optimized control systems are paramount.
- President Rod Potter thanked Mr. Jason Koo.
- Meeting adjourned 21:10.