ASHRAE Ottawa Valley Chapter

Chapter Meeting #2 – October 27, 2016

Meeting Date:	
Location:	Restaurant International, Algonquin College
Attendance:	Total: 51 Members: 39 Guests: 11 Students: 2
Theme:	Students
Tour:	Seresco Manufacturing Facility
Tech Session:	None
Table Top:	HTS – EMCO
Program:	You cannot afford Discomfort
Speakers:	Mr. Dan Int-Hout, Chief Engineer, Kreuger, ASHRAE Distinguished Lecturer
Prepared by:	Daniel Redmond

Social (17:30 – 18:31)

Business Session (18:18 –18:59)

- President Abbey Saunders 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 Abbey Saunders welcomed Peter Shaw-Wood to discuss student activities. Peter talked about the interest in the HVAC industry by students and the point that HVAC is often overlooked. Peter is trying to set up different tours of mechanical spaces and active construction sites through the year.
- President Abbey Saunders welcomed Joe Della Valle to discuss upcoming YEA events including the event scheduled for Thursday October 20th.
- President Abbey Saunders discussed the Research Promotion campaign for the November 17th game featuring the Senators and the Nashville predators. Adam will be making phone calls to promote the fundraising campaign.
- President Abbey Saunders called upon Rod Lancefield to discuss his table top. Emco Germany is one of the pioneers in high induction diffusers for applications with high amounts of air mixing into spaces. A few examples were on hand.
- President Abbey Saunders welcomed Clark Campbell to discuss the Seresco tour that occurred before the program meeting.
- President Abbey Saunders talked about the awards presented to the Ottawa Valley Chapter at the recent CRC in Moncton.

Dinner (18:31 – 19:46)

Evening Program (19:46 – 21:30)

- President Abbey Saunders called upon Adam Moons to discuss bowling. Nov 16th, the annual bowling tournament will be held at the Merivale Lanes. Registration is now

open online.

- Adam Moons drew the raffle ticket. The winner was Ryan Dickinson
- President Abbey Saunders introduced the speaker for the evening; Dan Int-Hout to discuss comfort.

- So we want to save money
    - Things to consider
        - First cost
        - Energy cost
        - Occupant salary cost
        - Life cycle cost
- First cost
    - $US costs per square foot for HVAC in a commercial buildings (high end open office) 35$/ft^2
    - Healthcare can be $120/sqft
    - Strip malls and low end offices are normally higher than 20 $/ft^2
- Energy costs
    - US - $2/sqft/year to heat and cool
    - Higher in places with high utility rates.
    - Lower where economizers more effective
- Occupant salary costs
    - 150 sqft/occupant, salary costs no less than $200 sqft/year, as much as $500/sqft/year
    - With higher occupancy this can be much higher.
    - Health care is much higher.
- Goal of ASHRAE is providing adequate, comfortable spaces.
- ASHRAE Journal, June 2008 – Thermal comfort economics
    - People will do what they need to do to make themselves comfortable
- What is the reality?
    - Energy costs are often much higher than predicted
    - BOMA once reported dissatisfaction with the thermal environment is the #1 reason for not renewing the lease in high rise buildings.
- So what about energy cost predictions
    - Loads are not what engineers think they are
        - Overestimating the load creates more problems and occupant dissatisfaction rises
    - Energy use computer programs don't have inputs for many emerging technologies
    - Validation of energy models is seldom accomplished
    - Building operators don't understand how the system is supposed to operate to ensure both comfort and energy efficiency
- So what is the result
    - Spaces are often too cold
    - Acoustics are poor (typically too quiet)
    - Energy bills are higher than predicted
    - Productivity suffers
    - Tenants don't renew the lease
- Spaces are often too cold

    - In order to control humidity, and still meet minimum ventilation requirements, spaces are often sub cooled
    - Reheat, while a solution to the comfort issue, is expensive
    - Perimeter zones, in winter, are often severely stratified, with it being very cold near the floor and near exterior walls
    - All too often, space heaters are found throughout the interior
- Acoustics are poor
    - In order to achieve a good acoustical environment, it is almost always necessary to add background sound masking
    - Asking the HVAC system to provide that noise is very expensive
    - Poor acoustical treatment of surfaces compound the issue. Open ceilings bad
- Energy bills higher than predicted
    - Systems have difficulty controlling humidity at low loads
    - Poorly adjusted or selected air outlets don't allow thermostats to sense room temperatures correctly
    - Linear slot diffusers must blow horizontally (unless at a window)
    - Operators don't know how to run the system efficiently
    - Opportunities for free cooling or heat removal aren't utilized
        - Hottest spot at the window – return grilles above window
- Productivity suffers
    - Occupants have high absenteeism from poo environmental controls
    - Lack of acoustical privacy reduces ability to concentrate
    - Inability of management to provide comfort reduces employee morale
    - Increasing ventilation is proven to improve productivity (and can gain a LEED point)
    - See ASHRAE journal article (July 2013)
- Let's look at some of the issues
    - Interior loads: the reality vs the rule of thumb
        - Almost all interior designs assum 1 cfm/sqft for the air load cooling
        - Actual loads as we have seen in many research projects is closer to 0.3 cfm/sqft
        - Many engineers "have never been sued for too much capacity"
    - The need to properly select and adjust air outlets
        - The ASHRAE handbook suggest selecting diffuser to acheieve an 80% ADPI at all air flow rates
        - Most diffuser layouts have diffusers too close together resulting in drafts at full flow
        - Some diffuser designs work better than others at low flows – a plaque-type is a good choice
        - Perforated and swirl diffusers don't tend to perform well at low airflows
        - New ASHRAE standard 55 user's manual says compliance can be proved using ADPI
        - ASHRAE RP 1515 proved that high occupant satisfaction can be achieved at 0.25 cfm/sqft
    - Designing for low interior loads
        - The default minimum ventilation rate in offices is 17 cfm/person
        - A person generates approx. 100 w

        - Minimum ventilation rate provides approx. 370 btuh
    - Making overhead heating work (and meet code)
        - People will do what they need to do to make themselves comfortable
        - Overhead heating is the most popular means of heating an office space
        - Maximum temperature difference between supply air and room temperature for effective mixing when heating is 15 degrees F (90 deg F discharge)
        - 150 fpm must reach 4.5 feet from the floor or less
        - ASHRAE 62.1 requires that ventilation be increased by 25 5 if the above rules are not followed.
        - Put a return slot above the window to carry away solar heat gain.
    - Predicting and controlling acoustics
        - AHRI 885 acoustical application standard
        - AHRI 880 air terminal test standard
        - AHRI 260 ducted equipment except air terminals
        - ASHRAE 70, air diffuser performance
            - Add 5 NC to everyone's data to account for bends, etc
            - When double the number of diffusers, add 3 NC
        - Acoustical quality suggests the use of RC (or newer measures) rather than NC. Many acousticians are heading back to dBA
        - LEED V4 includes acoustical credits and requirements
    - Indoor air quality
        - ASHRAE standard 62.1
        - ASHRAE standard 62.2
        - Current standard is ASHRAE std 62.1-2016
            - Several addenda for the '13 version have already been approved
            - New simplified ventilation rate procedure
    - Minimum ventilation rates
        - At a recent ASHRAE meeting, an interpretation request discussed ventilation rates. It was stated that there are actually three rates:
            - Occupied minimums are the sum of occupant and floor area
            - Unoccupied (but available) is just based on floor area
            - Not occupied means off
        - So what we need is to have three ventilation rates, not one
        - Washington State just passed a code requiring direct injection of outdoor air (DOAS) into every occupied space
    - So what can we do?
        - The rules are becoming code
        - Loads are dropping as ventilation rates are increasing
        - Perimter loads are becoming less
        - Ventilation rates are not constant
        - The solution starts at the input of outside air.
    - Measurable and controllable ventilation supply is required
        - Ducted ventilation into zones required per 62.1
        - Ventilation rates vary depending on several factorys
        - Changing air flow rate on one zone affects all other zones

        - Pressure independent ventilation dampers are effective
            - Round VAV dampers with flow sensors
            - Square slip-in dampers with flow control
            - Electronic actuators with flow transducers
            - Analog signals to control ventilation rates
        - DOAS Dual Duct
            - 20:1 mixing ratio is recommended
            - One duct DOAS, other provides 100% return air, cooled or heated
            - Supplemental reheat coils or even sensible cooling coils have been considered.
        - Fresh air terminal unit
            - Has been replaced by the chilled box
                - ECM motor in box
                - DOAS ventilation air should be typically as cold and dry as possible
                - Increase fan cfm slightly to bring in warm plenum air as required to avoid sub cooling
    - Energy calculations research
        - Texax A&M completed an ASHRAE and AHRI study comparing series, parallel, PSC and ECM fan box whole system energy use
        - Data is fed into HAP, TRACE and Energy Plus software
        - 1 hp motor turned down is more efficient than a half horse motor at the same flow
    - So what have we learned
        - Spaces often too cold due to vertical stratification and/or poor humidity control. Adjustable diffusers need to be adjusted.
        - Acoustics are poor
        - Energy bills are higher than predicted
        - Productivity can be increased
        - Systems should be operated at as low an airflow as possible while meeting code
    - You can't afford discomfort!
        - Building occupants are unhappy
        - New construction payback is longer as occupants move out
        - Energy bills are likely higher than "predicted"
        - Building Owners are dissatisfied!
- Questions
    - Would you recommend radiant heat at windows
        - Answer: NO – radiant panels at the window cause stratification – too much heat is required to overcome and treat the space

- President Abbey Saunders then thanked the speaker and reminded all attendees of the survey
- Next meeting November 2016

Meeting adjourned 21:33