

ASHRAE Ottawa Valley Chapter

Chapter Meeting #2 – 20 October 2015

Meeting Date:	20 October, 2015
Location:	Restaurant International, Algonquin College
Attendance:	Total: 58
	Members: 42 Guests: 14 Students: 2
Theme:	Student
Tour:	None
Tech Session:	None
Table Top:	EH Price – High indication diffusers and controls Longhill Energy – Air handling units Walmar Ventilation Products – Heating products
Program:	High Induction Diffusers
Speakers:	Andrew Nader
Prepared by:	Daniel Redmond

Social (17:30 – 18:30)

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 introduced the guests
- Georges Maamari discussed the theme and that Algonquin has a team that is registered in the Society Design Competition.
- Adrienne Mitani is also working with Carleton University. They are looking for a speaker to discuss a topic related to our industry (5 to 15 minute speech on our industry). Contact Adrienne Mitani if interested.
- Adrienne Mitani is also working with Algonquin College to establish a new student chapter.
- Georges discussed the importance of sponsoring student meals. Please see Georges or Dan Redmond if interested in sponsoring a student meal.
- Georges discussed the upcoming ASHRAE seminar to be presented at the Master Group training room. Topic is air to air energy recovery. Will be a two part seminar that will provide details about popular trends. Second part will discuss more detail in regard to controls and humidification and dehumidification strategies.
- Joe Della Valle discussed the first YEA event that was held last week. Adam Moons and his band played and the event was very well received. Another event possibly at Tailgaters is being considered. Thank you to all who attended.
- Georges provided an overview of the recent Stroke Play tournament. 16 people attended. P. Nabi won with a score of 81. Steve wanted to recognize Doug Wellman for his help in securing the course.

- Adam Moons discussed the upcoming bowling social. The 18th of November is the annual bowling social to be held at Merivale bowling lanes. There are still a number of spots available. Can register through the ASHRAE Ottawa website. 5 years running and has been a lot of fun. Adam will be following up with people.
- Georges introduced the table tops
 - o Jordan Dick discussed the EH Price table top with high induction unit and some controllers. Information books and line cards are available. Rooftop information also available.
 - o Longhill (James Benny) discussed the new VTS unit that Longhill represents. This manufacturer has been in Europe for 20+ years and is now in North America. Very unique and information is available at the display. Modular units with short lead times. 800 cfm to 65000 cfm.
 - o Joe Della Valle from Walmar discussed the Rosemex terminal heating products. Radiant panels for heating applications. Joe is the primary contact at Walmar for Rosemex products.
- Georges discussed the RP raffle. Last month we raised \$700.

Dinner (18:45 - 19:25)

- Four tickets were raffled off for the upcoming hockey game between the Ottawa Senators and the Calgary Flames. The tickets were donated by Airtron and raised \$680 for ASHRAE RP won by Jordan Dick from EH Price.

Evening Program (19:30 - 20:30)

- Georges Maamari introduced the program speaker for the evening
- High induction diffusers are a new trend in the area
- Andrew Nader provided the following overview of high induction diffusers:
 1. Primary focus
 1. Occupant comfort
 1. Thermal comfort
 2. Noise control
 2. Energy savings
 2. Explanation of what induction is
 1. Isothermal air flow
 2. The higher the induction ratio, the greater the air mixing
 3. Standard square cone diffuser has an induction ratio of 4
 3. More attention is being placed on better product selection to increase occupant comfort and reduce energy usage
 1. VAV systems are good for energy savings, but the diffuser selection is compromised
 1. Typically diffuser selection is based on maximum airflow however this then means that the diffuser is not optimized for reduced (or minimum) airflow.

2. The best solution is to select a diffuser to match maximum and minimum airflow. Matching only maximum airflow can result in experiencing a cold air shower underneath the diffuser as the air dumps downwards due to lack of mixing.
3. Designers spend money on equipment, insulation etc., but often overlook the diffuser.
2. Recall ventilation failures (with taped or otherwise covered diffusers)
4. Cone diffusers need a ceiling because of the Coanda effect
5. Reviewed a number of diffuser “blunders”
 1. Plexiglas chained under diffuser – 2nd horizontal push
 2. Partially blocked or covered diffusers
6. Thermal Comfort
 1. Define comfort
 1. Comfort is subjective
 2. 4 ways to dissipate heat
 - Radiation
 - Conduction (normally negligible)
 - Convection – directly proportional to air velocities
 - Evaporation
 2. Comfort Parameters
 1. Occupant factors
 - Metabolic rate
 - Clothing rate
 2. Space factors
 - Comfort height is 6`
 - Temperature of air
 - RH of air (30-60) (minimum not defined by ASHRAE)
 3. Effective draft temperature
 1. Formula that depends on three variables
 - Effective draft temperature, ϕ
 - Local air temperatures, T_x (F)
 - Ambient temperature, T_c (F)
 - Local air velocity, V_x (fpm)
 2. Like the “wind-chill” on your body
 3. $\phi = (T_x - T_c) - 0.07(V_x - 30)$
 4. Review of ADPI (effy of system)
 1. ADPI above 80% is good
 2. Can predict ADPI during design
 3. Best way is CFD simulation or a mock-up
 4. Predicted ADPI will always be different
 5. ADPI is only valid in cooling mode

5. In Europe Induction Ratio is used
 1. Not recognized by ASHRAE
 2. Is a good approximation
 3. Uses degrees Celsius (European)
 4. Standard cone diffuser, Induction ratio = 0.25
 5. High induction diffuser, induction ratio = 0.06
6. Reviewed differences between cone diffusers and high induction diffusers
 1. Initially cone diffuser has higher throw, lower noise, lower cost, lower pressure drop, BUT
 2. Effective draft temperature is much lower with the high induction diffuser which means the system will not operate as frequently and will reduce energy costs (between -3 and +2 is a pass)
 3. What is the trade-off for comfort?
7. North American diffusers tested to ASHRAE Standard 70
 1. Note that Standard 70 allows testing under lab conditions – noise values tested with excessively long straight inlet to unit
 - Kinked inlet connection can add 12 to 15 dBA to mfg's noise rating
 - A 90 deg elbow and flex ductwork adds 0.07 to 0.1 in Ps @ 700 fpm
8. High Induction diffusers are tested to European standard and are tested as in the field
 1. Every diffuser has a plenum
 2. Ideally you want a stabilizing grille to equalize pressure across plenum
9. ASHRAE Standard 55-2013
 1. Thermal Environmental Conditions for Human Occupancy
 2. Review of PPD
 3. Control by occupants defined as one control per six occupants (Std 55-103 p.10)
 4. ASHRAE 55-103, p.11

7. Energy Savings

1. Hot air stratification
2. Review of control sequence
 1. Conventional control sequence
 2. Proposed control sequence
 3. In heating mode are as close as possible to maximum airflow
 - 80%
3. Minimum fresh air requirements – ASHRAE 62.1 and air distribution effectiveness (Ez) – note ASHRAE 129
 1. ASHRAE 129
 - If ventilation air within a space is perfectly mixed...high induction... $E = 1$ is can reach perfect mixing
4. Example
 1. Hypothetical building in Montreal – reviewed advantages and disadvantages of standard diffusers and high induction diffusers

8. Air Outlet Selection

1. Typical construction costs reviewed and compared
2. Difference between standard diffusers and high induction revealed:
 1. High induction diffusers approx. 5 x more expensive, but can reduce number of diffusers and number of branches
 2. Overall cost is comparable, but have better comfort and energy savings

9. Review

1. Comfort = ADPI > 80%
 1. Air velocity
 2. Temperature
 3. Air dumping
2. If ADPI = 1
 1. Perfect mixing
 2. Less hot air stratification
 3. Reduced fresh air
3. Plenum
 1. Installation acoustics
 2. Uniform airflow pattern

- Georges Maamari then thanked the speaker and reminded all attendees of the survey
- Next meeting November 17th
- Next meeting program topic will be NRC, tour of Bank of Canada,
- Next meeting venue will be in a different location here at Algonquin

Meeting adjourned 20:30