ASHRAE Ottawa Valley Chapter

Chapter Meeting #7 – 17 April 2018

Meeting Date:	17 April 2018					
Location:	Centurion Conference & Event Center, 170 Colonnade Road South					
Attendance:	Total:	46				
	Members:	33	Guests:	13	Students:	0
Theme:	Research					
Tour:	None					
Tech Session:	None					
Table Top:	S&P Canada Ventilation and Master Group					
Program:	Acoustics: Supporting Sound Mechanical HVAC Design					
Speakers:	Emanuel Mouratidis, M.Eng., P.Eng.					
Prepared by:	Aaron Dobson					

Social (17:30 – 18:25)

Business Session (18:30 – 18:56)

- President Adam Graham welcome message, call to order.
- President Adam Graham introduced the Board of Governors and the Executive.
- Secretary Aaron Dobson introduced the 13 guests.
- Membership Promotion Chair Celine Baribeau introduced the 6 new members since last meeting.
- Nominations Chair Steve Moons followed up on the opening of nominations from last month's meeting. Before Steve announced the leadership for next year he asked one more time if there were any final nominations to be brought forth. There were no additional nominations. Steve asked for someone to motion the nominations be closed. Nick Lea motioned and Mike Swayne seconded motion. Steve announced the 2018-2019 Chapter Year with Dan Redmond as President, Chris Fudge as President - Elect, Aaron Dobson as Treasurer and Adrianne Mitani as Secretary. Adam Graham will be the Past-President. Board of Governors will be Adam Moons, Chris Frauley, Jacob Hough, Celine Baribeau and Peter Shaw-Wood. Executive and BOG will be sworn in at May Meeting. Adam thanked Steve and Abbey for taking over nominations committee and congratulated incoming Executive and BOG.
- YEA Chair Joe Della Valle talked about the next YEA event on May 3rd (Thursday) at Tail Gators. Joe mentioned Students are welcome to the event to network with YEA members. Joe will work with Student Activity Chair Peter Shaw-Wood to send out invites to the Students.
- Adam Graham talked about the two seminars held today. First seminar was presented by Frank Mills on Cold Climate Design and the second was presented by Emanuel Mouratidis (also the Chapter Meeting Speaker) on Acoustics, product design and system selections. Adam thanked seminar speakers and presented Frank Mills with gift from the Chapter for the seminar.
- CTTC Chair Jacob Hough talked about the ASHRAE Technology Awards which are to promote and give praise to local projects in innovative engineering design or

sustainability. Jacob announced the 3 winners at the chapter level and thanked everyone who applied. First award - existing education facility was presented to Dan Redmond from Carleton University for the Herzberg Renewal Project. Second award – other institution category was presented to Martin Ma from JP2G for the CMHC National HQ Building C Project. In Martin's absence, Mike Swayne accepted the award. Third award – existing commercial facilities was presented to Patrick St-Onge from BPA for the Bank of Canada Head Office Renewal. In Patrick's absence, Georges Maamari accepted the award. Jacob congratulated all the award winners.

- Adam gave an overview of ASHRAE golf on June 4th at the Marshes for 12pm. The golf tournament is open to previous teams first and remaining spots, if any, will be open for registration next week.
- Adam invited Chris Frauley to talk about the Ottawa Regional Science Fair. Chris mentioned the science fair has been going on for over 50 years. The science fair was held at Carleton university. There was a large turnout with teams from grade school, right to high school. The ASHRAE Chapter awarded prizes to 3 teams. The 3rd place prize was to "Shrink that Footprint", Angelika Boehm and Mackenzie Watson, an experiment testing the effectiveness of low-e window coatings. The 2nd Place prize was to "Creation de Maisons Solaires Passives Adaptees", Camille Arseneault and Tia Jones, experiment testing different attributes of a solar house (house orientation, type of window, paint colour, etc). The 1st place prize was to "Is Fiberglass Insulation the BEST choice?", Hana Abdelwahhab, an experiment testing the effectiveness of different insulations using hot water in tupperware containers. This was done by a single 8th grader where the other finalist was in high school groups of 2. Chris also mentioned that Algonquin College had a career fair last week at their ACCE building. It was a meet and greet for the construction industry with students and hiring companies. The career fair is like the ASHRAE Career fair. Chris encourage members to get involved next year for the career fair.
- Adam invited Dan Vivian to talk about an ASHRAE sponsored event with PEO in early May. The joint ASHRAE/PEO event will be a field trip to a passive house (EcoGen house in Merrickville) and high-performance building (warehouse office building for solar city). Showcasing highest level technology performance for HVAC. EcoGen passive house in Merrickville. R-70 exterior insulation, passive solar heating, solar PV generation, radiant floor heating, HRV, hydronic thermal energy storage. The house has a hydronic recirculation pump that uses only 23 watts and the house is cooled with only 43 watts. Solar City is a 10,300 sq-ft high performance warehouse/office building features high performance insulation, metal construction, passive solar heating, solar PV generation, radiant hydronic floor heating and cooling. The building generates 2.5 more energy then consumes. The field trip will be May 5th at 1 pm. Details will be posted on the ASHRAE website.
- Research Promotion Chair Dan Redmond gave an update on research promotion. ASHRAE RP generates funding for standards and guidelines. Research goals are given to the Society, Region and Chapter. The Ottawa Chapter Goal has been achieved. Dan thanked the membership and Research Promotion team (Adam Graham, Abbey Saunders, Georges Maamari, Frank Bann, Mike Swayne, Rob Lefebvre and Dan Redmond as RP Chair). Dan mentioned that additional Research money raised will go towards the ASHRAE scholarship fund. The OVC Research goal was $30,100. A total of $30,709.54 has been raised to date. Dan mentioned 4 tickets were donated by Ainsworth for 4 field-level RedBlack tickets for the May 31st game against Montreal.

- Adam Graham invited the companies to talk about their table-tops. Tim Sutton from S&P ventilation talked about their ventilation products sold through Mastron. Chris Fudge from Master Group talked about their York low pressure centrifugal chiller with magnetic bearing compressor. Adam Moons from Master Group talked about VAW systems sound solutions and noise abatement.

Business Session Finished at 6:56pm

Dinner (18:56 – 19:24)

- Dinner served at 6:56pm
- Dinner was Garden Salad for starter. Roast beef with potatoes, carrots and asparagus for main and black forest cake for dessert

Evening Program (19:24 - 21:05)

- Evening program started at 7:24pm
- Adam invited Nick Lea, Global product Manager from Nortec, and vice-chair on tech committee 5.11 to talk about ASHRAE technical committees. Nick talked about the ASHRAE Society, particularly the ASHRAE technical committees. ASHRAE has 4 different types of technical committees that focus on technical information (Technical Committee TC, Task Group TG, Technical Resource Group TRG, Multidisciplinary Task Group MTG). The members of these committees could be Engineers, Manufacturers, Consultants, Researchers, Universities, Utilities, Regulators, Contractors, Government. Nick went over an org chart of a technical committee with the Section Head, Chair, Officers, committee members, subcommittees and communications. Technical committees are divided into areas of expertise called "Sections". There are 10 different sections. Nick discussed the different tasks of the technical committees such as research, standards, handbooks, conference programs. TC's meet in person twice per year at ASHRAE Conferences. Additional conference calls during the year for specific tasks. To get involved with a technical committee you can apply online at the ASHRAE website to automatically become a Provisional Corresponding Member. There is no charge to attend a TC meeting.
- Dan Redmond invited Emanuel to draw the winning raffle ticket. Winner of the RedBlacks tickets was Evans Mutua. Dan mentioned that $560 was raised for ASHRAE research promotion thanks to Ainsworth.
- Adam Graham introduced the speaker Emanuel Mouratidis and gave an overview of the presentation. The presentation will cover occupant comfort, limited space and energy available, initial and operating costs - there are many challenges encountered in today's building designs. The mechanical HVAC system designer should consider some key noise related factors and available tools to avoid potential issues on their projects. The presentation will discuss cost-effective design strategies and a range of evaluation methods to help achieve acoustics success. Emanuel Mouratidis is the Director of Acoustic Engineering at VAW Systems Ltd., a noise control manufacturer based in Winnipeg, Manitoba. In his role at VAW Systems, Emanuel manages the firm's noise control laboratory, special applications engineering and software development. Emanuel is a Professional Engineer with a Master of Engineering in Acoustics from Penn State University. He is active at the ASHRAE and ASTM Committees for Acoustics. This includes work as the lead investigator in the ASHRAE Research Project on the aero-acoustic properties of HVAC plenums, which received an ASHRAE Symposium

Paper Award. Mr. Mouratidis has presented research papers at the Canadian Acoustical Association, Noise-Con and Inter-Noise conferences. Emanuel has been employed in noise control manufacturing, applied research, and acoustic consulting fields for over 23-years.

- Emanuel started the presentation talking about practical mechanical HVAC acoustics design. Acoustics is a common occupant complaint of HVAC systems and is a key components of whole building comfort and healthier environments. If ignored, it may result in costly repairs, delays, loss or reduced space usage and damaged reputation.
- The focus of the presentation is to review direct, cost-effective strategies and methods. The motivation is to help your projects achieve acoustic success.
- Emanuel gave a brief overview of VAW system products and services and went through commercial noise control implemented for new and retrofitted buildings.
- Emanuel went through different types of silencers that are encountered. Fume hood silencers for labs, extended width silencers for high velocity systems. Other products encountered in design are acoustic enclosures which are fabricated from acoustic panels. When designing the enclosure, the supporting equipment needs to be addressed. The enclosure needs to be ventilated. How do we ventilate the enclosure without compromising the acoustics? If you add a louvre, what type of silencer you need for it? Special type of doors need to be specified. Does the enclosure sit on a separate pad or another structure?
- Acoustic louvres are the noise control last line of defense when you do not have any more room in your system. Emanuel talked about the different types of louvres and their applications. You can use a standard rain louvre, side proof louvre (added acoustic benefit from bending the air and eliminating the view into the building from the outside) or airfoil louvre (lowest pressure drop solution but not as high performing as the other 2 louvres). For retrofit solutions you can take an existing rain louvre and add baffling.
- Emanuel talked about strategies for acoustics success. Obtain Owner and Design Team “buy-in” at onset of Project. Clearly define the acceptable sound levels in each space. Form a noise control team consisting of Architectural Design Lead, Mechanical Design Lead, Acoustic Engineer, Noise Control Supplier and Other Specialists & Stakeholders. Manage the mechanical “foot-print”. Locate noisy equipment away from critical spaces. For Indoors, how much natural attenuation do you have? Consider 18x36” unlined sheet metal duct between fan and critical space. 10ft length provides 2dB low frequency natural attenuation and 40ft length provides 10dB low frequency natural attenuation. For outdoor applications, are you taking advantage of divergence and barrier losses? Point source sound pressure level decreases 6dB with doubling distance. There is a -16dB reduction 6ft from the source, a -22dB reduction 12ft from the source and a -34 dB reduction 48ft from the source. Barriers provide sound pressure level reductions. There is -10dB reduction for “partially shielded” and -20dB reduction for “fully-shielded”.
- Emanuel gave an example of a commercial building near a residential area with acoustics issues from noisy fans and the suggestions made to improve the sound levels.
- Select suitable construction materials and observe speed limits. Duct velocities that meet desired room noise levels. If spec changes from stainless steel to aluminum, it is a big deal with acoustics. The difference in mass will impact the amount of noise radiating. Control duct velocity and minimize regenerated noise and pressure drop issues. For diffuser, grill & damper velocities, the selection is based on specified NC

and/or dBA as per Manufacturer's ratings.

- Emanuel went through a Manufactures data sheet for air device noise. They rate their equipment against a Noise Criteria (NC). NC ratings are based on an acoustically soft room (carpet floor, gypsum wall and ceiling tiles). Sound levels are based on ideal airflow into diffuser.
- Maintain enough space. Fan and duct clearances meet guidelines (AMCA, ASHRAE, etc.). Specify quality equipment and avoid undesirable operating points.
- It is time to call an Acoustics Expert if you have a high-performance building, mixed use space, very low noise space (< NC-30), unusual noise paths (e.g. room-ceiling-room), potential for mock-up testing (lab, factory, at site).
- Emanuel gave an overview of the practical designs to achieve acoustics success including noise criteria, noise path analysis, cost effective design/specification (control noise at the source, silencer characteristics) and aerodynamic system effects.
- Maintain the room maximum sound pressure level, in noise criteria (NC) for indoor spaces (specification may be defined by the ASHRAE Handbook). The NC levels are the go to criteria in our industry where there is a single number for different spaces. Emanuel talked about the history of the Noise Criteria curves which were created through psychoacoustics testing in the 1970's by subjecting people to different sound level intensities and frequencies. For outdoor spaces, do not exceed maximum allowed SPL (dBA) at nearby receptor. Noise receptor may be adjacent property line (at-grade, patio, window), on-site (patient, classroom windows).
- Consider tone prominence criteria for critical applications. Tone may be prominent if the sound level within any 1/3 octave band exceeds the average of the adjacent bands by the following: 15dB for 25Hz to 125Hz, 8dB for 160Hz to 400 Hz, 5dB for 500Hz to 10kHz
- For low frequency noise, which in the HVAC world is 125 Hz or lower. Sounds with low frequency noise may deliver noise-induced rattles and rumbles resulting in greater receptor annoyance (ANSI S12.9). If dBC – dBA >10dB; need to assess, if dBC – dBA > 20 dB; low frequency noise is likely. If sound pressure level (frequency <= 63) > 70 dB (~NC-50); low frequency noise is likely.
- Effective noise path analysis can be broken down into Source (AHU, VAV, Pump etc.), Path (duct, elbow, plenum, atmosphere etc.) and Receiver (space use, indoor/outdoor)
- Emanuel went through a series of slides talking about each of the different noise paths and key features to consider when designing the systems
- When specifying duct liner, silencer or noise control the thermal insulation and acoustic materials used in HVAC systems are required to pass air exposure/erosion test standards. ASHRAE standards 62.1 requirements (refers to various UL and ASTM test methods) for resistance to mold growth, resistance to erosion. Some concerns relating to fiber-type materials are life expectancy, exposed edges / surfaces and duct cleaning.
- Emanuel talked about silencers for any application. These were absorptive - common, fiber-filled media type, lined – absorptive with liner protection (no fibers exposed to airstream), Reactive – 100% no-media. For the various silencer types, Emanuel went through the insertion loss with variable free area, variable silencer length, variable extended width
- Emanuel touched on aerodynamic system effects when it comes to noise control. Real-life installations rarely resemble lab tests. HVAC component interactions (silencers, elbows, transitions, fans, etc.) are called system effects. System effects are believed to

increase pressure drop and generated noise. ASHRAE handbook Table 27 describes pressure drop factors on silencers.

- Emanuel went through a case study with a RTU serving critical spaces. Most installations require at least one air/duct borne and one break-out path assessment. Apply noise control as close as possible to the source. Under the roof-top unit, in the mechanical room, at the fan inlet/outlet and at a wall partition
- Questions – No questions were asked
- President Adam Graham thanking the speaker and presenting gift (commemorative coin) to Emanuel Mouratidis from ASHRAE Ottawa Valley Chapter
- President Adam Graham reminding members and guest to fill out evaluation form
- President Adam Graham saying thank you and reminding that next meeting is May 15th, 2018 at the Centurion Conference Centre.

Meeting adjourned 9:05