ASHRAE Ottawa Valley Chapter

Chapter Meeting #7 –April 18th 2017

Meeting Date:	April 18th 2017					
Location:	Algonquin College					
Attendance:	Total:	55				
	Members:	45	Guests:	7	Students:	3
Theme:	Research Promotion					
Tour:	Dilfo Mechanical					
Tech Session:	Electrical Fundamentals					
Table Top:	None					
Program:	Aircraft Ventilation System Operation and Enabling the Canadian Industry to Improve its Design					
Speakers:	Dr. Paul Lebbin, NRC					
Prepared by:	Chris Fudge					

Social (17:30 – 18:10)

Business Session (18:10 – 18:59)

- President Abbey Saunders called the meeting to order.
- President Saunders introduced the Board of Governors and the Executive.
- Secretary Chris Fudge introduced the guests for the evening.
- Membership promotion chair Celine Baribeau introduced the new members
- President elect Adam Graham gave an update on research promotion. Currently at 22,000. Program is going very well. The research promotion prize for the night will be a 50/50 draw.
- President Abbey Saunders gave an update an on ASHRAE CTTC Awards
- Nominations committee chair Bob Kilpatrick presented the results of nominations for the executive and board of governors. New to the Executive is Aaron Graham new to the board is Jacob Hough.
- CTTC chair Jacob Hough gave an overview of the technical tour done at the Dilfo shop.
- President Abbey Saunders gave an update on chapter awards and encouraged members to update their BIOS.-
- Peter Shaw-Wood gave an update on student activities. He discussed a recent presentation done at Ottawa University. He also mentioned that many students are looking for jobs right now and that if company are interested in hiring a student to please contact him.

Dinner (18:30–)

Evening Program (19:30 –)

- President Saunders introduced the evening's speaker Paul Lebbin
- President Abbey Saunders thanked the speaker and presented them with a gift.
- Paul Lebbin did the draw for the 50/50 ticket Cathy Godin won the draw. 270 dollars were raised for ASHRAE research.
- Main points of the evenings session were overview of the differences between air craft

ventilation systems and building HVAC systems.

- Market differences between HVAC and Air Craft ventilation are significant. Construction market is 8.4 T while Aerospace market is 300 B. The costs are vastly different though with Aerospace being roughly 10 times the cost per "bolt". Buildings are also typically custom while Aerospace systems are mass produced. Aerospace industry is extremely risk averse while construction industry has low to moderate risk aversion.
- Many of the standard terminology is also different in from one industry to the other. AHU's are called air cycle machine or "Air Pack", reheat is called trim for example.
- Operational environments are also very different. Certifications are done at 8,000 ft in aerospace and wind chills in Aerospace can reach -180 F. Occupancy rates per square foot are over 10 times in Aerospace. There is essentially zero humidity at altitude. Ventilation rates are typically 40 to 100 where in buildings they are 10 – 20.
- Different standards are used to calculate ventilation rates. The results are that air change rates in Aerospace are typically from 25 to 30 ACH. There are also more detailed data on contaminants that typical buildings.
- Pressurization must be provided. Systems are in place that will provide pressure for 15 seconds at 45,000 feet. At 25,000 ft systems are in place that will
- Flights are limited on how fast the cabin can pressure and depressurize. Reasons are for stress on human ear as well as the fuselage of the plane.
- There are no limits for RH in the Aerospace industry. The only sources of humidity are the occupants and the hot/cold drinks served on the plane.
- At ground operation the ventilation air is fed directly to the air plane from ground HVAC systems.
- Alternate ground operation comes from the Auxiliary power unit. This is not typical
- Rare ground operation can be provided by ground pneumatics…???
- The rest of the operation, taxi, takeoff, climb, cruise and descent. Bleed port locations vary by engine type however the air always comes from the engine. This air is extremely high temperature. This extremely hot air introduced into a precooler. This device gets the air down to a temperature that will not harm the passengers. The air is then sent othe air cycling machine. This unit controls the cabin pressure and temperature. It also contains ozone converter??
- Delivery into the air craft is typically through slot diffusers located at the perimeter.
- ECS other considerations. Avionics generate a lot of heat, galleys, personal airflow outlets (PAO) lavatories, crew rest area and cabin liner.
- Pressure control is normally accomplished through two valves at the rear of the aircraft.
- ECS exceptions: Boing 787 Dreamliner. This units have generators that are powered off the main compressors. These generators provide power to turbo compressors that provide ventilation air to the air changer machine.
- Air craft cabin air distribution is normally a multi-zone system. The air temperature is controlled using trim air.
- NRC value proposition. Through collaboration help airframers, the aerospace supply chain, opertors and regulators in the cabin and flight deck technologies are meet the growing consumer demand for economical and comfortable air transport:
    - Enhance passenger comfort
    - Improve flight operations efficiency
    - Increase cabin safety
- Focus on integrated human systems engineering.
- NRC's partners will learn new ways to improve cabin comfort and crew effectiveness,

evaluate new product designs and cabin layouts, reduce certification and installation risks

- The aerospace industry is risk averse. NRC will provide an environment where systems can be tested at no risk to passenger safety. This will assist with introduction of new technologies and systems.
- A new building is being constructed at the Uplands Airport. The purpose of the facility is to provide a realistic passenger environment.
- The facility is layout out like a typical airport terminal which serves a few purposes one being to acclimatize the passengers to controller environment prior to the experiments.
- The ECS system at Uplands does not have redundancy as in the event of failure there is no danger. There is a make up air unit which provides air at 5 % RH. The supply air is provided through standard air handler is lieu of the systems that provide pressurized air on a air craft. There are chillers used to cool air as well as a gas fired MUA unit.
- Mr. Lebbin gave a very detailed overview of the cabin environment that is recreated at NRC.
- Thermal manikins are also used in order to simulate passengers during some of the experiments. These manikins have roughly a 100 w heat output.
- Other areas of study are acoustics many newer air craft are getting quite quiet which is not necessarily desirable. Systems are being looked at to provide ambient noise or which can mask cabin noise.
- Vibration lab is also on site.
- Cabin simulator is an order or two less expensive to modify for experiments – creates a playground for companies to test new technologies.
- The NRC facility will allow smaller Canadian players to play on a global stage.
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- PAS reminded members that next months meeting is at the Centurion and that the HVAC essential course is taking place next May.