January 2016

Pile of Bones

Published by the Regina Chapter of ASHRAE

President's Message

By Dan Brothers

Greetings from 2016, and so long 2015! I hope you were able to enjoy some time off over the holidays; it never seems to last as long as you'd like. I tried to lobby our office for a soft start to this New Year: quit work this week at 10:00 Monday, 12:00 Tuesday, 2:00 Wednesday, and all day Thursday/Friday, to no avail. Better luck next year.

It was great to see everyone out for the Christmas party. We were well taken care of at the Delta, and Brent Butt was as entertaining as expected.

We've got a good lineup of presentations to take us through the winter and into spring. The first one, on January 13, is a presentation from Fulton, to do with centralized hot water heating. You can check out Jared's article for more info.

You have by now likely heard from Janel regarding research promotion donations, and from Brad, who is distributing invoices. Your contributions are greatly appreciated; our Chapter has a long history of donating generously to improve our industry standards. Invoices are more directly rewarding, as you get to fill your belly once a month.

Meeting Notice

Wednesday, January 13, 2016

Lakeshore Restaurant
1350 23rd Avenue
Regina, SK

Cocktails begin at 5:00PM

Speaker: *Kyle Bottorff - Hydronic Design and Control Strategies for Condensing Boilers*

7 in 7 Presenter: *Connor Tant – Southampton Trane*

Upcoming Events

January 25-27
ASHRAE Winter Conference

February 9, 2016
David Underwood – Presidential Visit

In this Issue

President's Message - Continued

Our Board is down one person, as Brandon Ganne and his wife Tammy, moved to Calgary for bigger and better things. It was great to have Brandon on the Board at Student Activities, if only for a short while. Hopefully he'll recognize that wheat and potash trump oil and mountains and will make his way back here. Also, if any of you are interested in joining the Board at Student Activities for the remainder of the year, get in touch with me. The work load won't be huge, and you get to have fun with us on the Board.

About the Speaker

Kyle Bottorff is Commercial Heating Product Manager at The Fulton Companies. He is a graduate of Syracuse University's L.C. Smith mechanical engineering program. Kyle is responsible for ensuring Fulton offers commercial heating products and services as desired by customers and driven by overall market needs. This also includes new product releases and major product updates for the high-efficiency hydronic product lines, product literature, marketing, engineering support, technical and professional development presentations, heating and process systems design, and education of proper product application to maximize both boiler and overall system efficiency.

Committee Chair Reports

Membership Promotion Chair's Message

By Jason Danyliw

I would like to welcome the following 2 new members to our ASHRAE Regina Chapter:

Dylan Zwozdesky – Mechanical Technologist from WSP Group Regina
Cailin MacPherson – Mechanical Engineer-in-Training from MacPherson Engineering Regina

It is great to see new younger members joining our Chapter to get the benefits of industry networking, along with valuable technical knowledge on industry topics. I am continually searching for new members for our local Chapter. So if you know of anyone within your organizations that would be interested in joining our local ASHRAE Regina Chapter, please have them contact me at jason@skhvac.com, and I can help to get them registered.

I want the take the opportunity to wish you and yours all the best this holiday season, and health and prosperity for 2016!

CTTC's Message

By Jared Larson

With all the warm weather we have been having it's easy to forget about heating systems. If this is the case it is a great month to come out and hear a presentation about heating plant design. A representative from Fulton Boilers will be presenting on *Hydronic Design and Control Strategies for Condensing Boilers*. The presentation is an introduction to modern condensing boiler piping strategies, applications, and control system optimization. The discussion includes an introduction to the principles behind flue gas condensate, industry test standards for defining efficiency, how piping arrangements influence installation and operating costs, the benefits of variable primary flow designs, and utilizing modern control platforms to load match energy loss and gain throughout seasonal changes.

Our 7 in 7 presentation will be from Connor Tant, EIT from Southampton-Trane. He will present on some of the work he has been engaged with since starting with the company.

The deadline for submitting projects to ASHRAE is coming up. Projects submitted will be sent to compete at the regional level. The committee will select finalists in categories which will then be submitted to the society level. Based on what we see each year at CRC, I think our chapter has great potential for many projects in our chapter to compete. If you are interested, let me know and I will help walk you through the requirements. The following list is for each category. For each one you can apply for: New, Existing, or Retrocommissioning (RCx):

Commercial Buildings
Institutional Buildings
Educational Facilities
Other Institutional
Health Care Facilities
Industrial Facilities or Processes
Public Assembly
Residential (Single and Multi-Family)

Also, there are refrigeration based awards:
Milton W. Garland Commemorative Award for Project Excellence
Comfort Cooling Award for Project Excellence

TECH TIPS | Overhead Air Distribution Systems

By Jerry Sipes, PH.D., P.E.

When a designer selects overhead air distribution as the basis for designing a building space, there are several design considerations. Overhead air distribution is characterized by an injection of conditioned air (typically a mixture of fresh air and re-circulated air) into a region of the building space that will not directly enter the occupied zone. The occupied zone is described as one foot from the walls and six feet above the floor in the building space (see Figure 1). Ideal overhead air distribution is characterized by uniform mixing throughout the entire building space, even where there are no occupants. See Figure 2 for a computational fluid dynamics (CFD) image of this mixing.

Most buildings use variable air volume (VAV) systems which vary the supply air volume based on demand. In heating mode, the supply volume is usually significantly lower than the cooling supply volume. In most places, the normal turn down ratio of cooling air volume to heating air volume is around 30%.

ASHRAE Standard 62.1 defines Zone Air Distribution Effectiveness (Ez) as a measure of how effectively the zone air distribution uses the supply air to maintain acceptable air quality in the occupied zone (also known as the breathing zone). The zone air distribution effectiveness is described by Table 1 in ASHRAE Standard 62.1. For overhead cooling, the Ez is 1.0. For overhead heating, the Ez is only 0.8, unless the warm air is distributed down the walls in the unoccupied zone to at least 4.5 ft above the floor. This proves to be a challenge for designers as VAV systems usually have the highest airflow rate in cooling mode and a lower airflow rate in heating mode. Making this even more interesting is the buoyancy effect of warm and cold air. Cold air seeks to fall downward as it is denser than the room air, and warm air tends to rise due to its lower density than the room air.

There is a solution that will help satisfy both cooling and heating and provide an Ez of 1.0 for both cases. Use a diffuser that changes the distribution pattern of the discharge air, such as the TBDI6-HC. It operates with a horizontal discharge pattern in cooling mode and uses an internal thermally operated actuator to change the discharge pattern to a vertical discharge when the supply air rises above 81°F.

As an example, consider an office that is 30 ft wide by 20 ft long and has a 9 ft ceiling. During cooling operation, the air volume is 690 CFM. During heating mode the room will have 210 CFM of warm air supplied. Three diffusers will be used to supply this zone.

From the catalog, the performance of the TBDI6-HC diffuser is thus:

Size 24", 8" inlet at 230 CFM has isothermal horizontal throw values of 19-24-34 (150 fpm, 100 fpm and 50fpm) with an NC value of 35. When the horizontal throw is corrected for the actual supply air temperature — 55°F supply air temperature (Ts), 75°F room air temperature (Tr) for every 1 degree lower the throw is reduced by approximately 1% — the 50 fpm throw is determined to be: 34 x 0.8= 27 ft. Since the room is 30 ft long in the discharge direction, the throw distance of 27 ft is considered adequate. The throw would be an issue if it were to exceed the horizontal distance of 30 ft plus the vertical distance of 9 ft (the air path will follow surfaces until the air velocity falls below 50 fpm).

Size 24", 8" inlet at 70 CFM vertical discharge throw values are 7-9-12 with an NC of less than

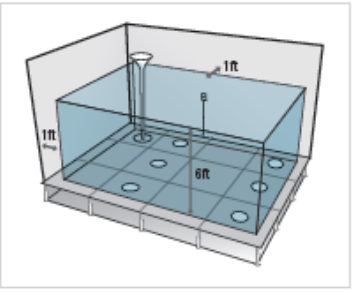

Figure 1: Occupied Zone

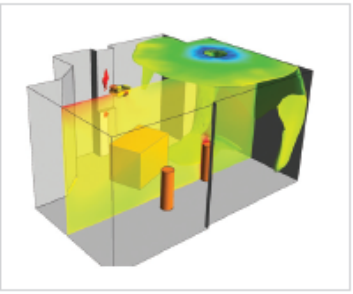

Figure 2: CFD velocity profile for overhead mixing

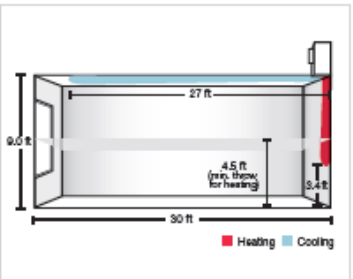

Figure 3: Throw pattern for heating and cooling

15. Correcting for temperature effects (Ts=95F, Tr=75F) involves lowering the throw by 1% per degree of temperature difference and the 150 fpm throw is determined to be 7 x .8=5.6 ft. Vertical downward throw for 150 fpm is 9 ft – 5.6 ft = 3.4 ft. See Figure 3.

Since ASHRAE 62.1 requires the warm air to penetrate to at least the 4.5 ft level above the floor, this diffuser is a good selection, and in both heating and cooling modes the Ez is a 1.0.

Air Distribution Configuration	E_z
Ceiling supply of cool air	1.0
Ceiling supply of warm air and floor return	1.0
Ceiling supply of warm air 15°F (8°C) or more above space temperature and ceiling return	0.8
Ceiling supply of warm air less than 15°F (8°C) above space temperature and ceiling return provided that the 150 fpm (0.8 m/s) supply air jet reaches to within 4.5 ft (1.4 m) of floor level. Note: For lower velocity supply air, E_z = 0.8	1.0
Floor supply of cool air and ceiling return provided that the 150 fpm (0.8 m/s) supply reaches 4.5 ft (1.4 m) or more above the floor. Note: Most underfloor air distribution systems comply with this proviso	1.0
Floor supply of cool air and ceiling return, provided low-velocity displacement ventilation achieves unidirectional flow and thermal stratification	1.2
Floor supply of warm air and floor return	1.0
Floor supply of warm air and ceiling return	0.7
Make up supply drawn in on the opposite side of the room from the exhaust and/or return	0.8
Make up supply drawn in near to the exhaust and/or return location	0.5

1. "Cool air" is air cooler than space temperature
2. "Warm air" is air warmer than space temperature
3. "Ceiling" includes any point above the breathing zone
4. "Floor" includes any point below the breathing zone
5. As an alternative to using the above values, E_z may be regarded as equal to air change effectiveness determined in accordance with ASHRAE Standard 129[16] for all air distribution configuration except unidirectional flow.

Table 1: Zone Air Distribution Effectiveness

2015-2016 Meetings and Events

September 23, 2015
Tour of RRI Roughrider Stadium
Speaker: Chad Arcand
Bushwakker Brewpub

October 13, 2015
ASHRAE 90.1 Seminar
Double Tree Hotel

October 13, 2015
Speaker: Chris Mathis –
ASHRAE 90.1 Flyover
Double Tree Hotel

November 10, 2015
Speaker: Dan O'Brien –
Halton Kitchen Equipment
The Chimney

December 4, 2015
Christmas Social – Brent Butt
Casino Regina Show Lounge

January 13, 2016
Speaker: Kyle Bottorff - Hydronic Design and Control Strategies for Condensing Boilers
Lakeshore Restaurant

January 25-27, 2016
ASHRAE Winter Conference
Orlando, FL

February 9, 2016
Speaker: David Underwood – Presidential Visit
Hotel Saskatchewan

March 9, 2016
Speaker: Greg Scrivener – Refrigeration
Location TBD

April 2016
Student Night
Location TBD

May 2016
Speaker: TBD
Location TBD

June 23, 2016
ASHRAE Research Golf Tournament

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