October 2014

THE LONG ISLAND SOUNDER

ASHRAE Long Island Chapter, Region 1...*Founded in 1957* www.ashraeli.org

American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.

Inside this issue:

President's Message

Well the new year has started. I thought more of you would have come down to watch me stumble through my first meeting as president. I had help, I hope I kept up the traditions that I think make our ASHRAE chapter great and I hope I have added some new things to keep us up to date. You saw last month we had name badges for you again and I thank the reception crew for getting those out. This month you will pass through a facial recognition scanner and your badge will be waiting for you as you pay. If that doesn't happen Ken or James will issue you your badge. (I like to dream).

Thank you again to David Smith and his presentation on "New Advances in High Efficiency Cooling for Data Centers". It was very informative and displayed the many considerations needed when designing a space with efficiency in mind for cooling equipment instead of our usual personal comfort designs. He showed us the many ways we could cool and left it to us to decide what best fits our projects. Also on our agenda was Ray Schmitt and our first "Bright Idea" session. Thanks Ray, you and your chimp are always a big hit at the meetings. Since we have two sessions this meeting there will be no Bright Idea session at this meeting but we will have time at the November meeting and SMACNA will be attending for this joint meeting. Call me now with your Idea!

This month's meeting will again include our first for this season "Back to Basics" Session hosted by Evans Lizardos. Our first session is on "Smoke Control System Design." Evans will talk about The design theory of smoke control, smoke containment design approach, smoke control equipment options, Mechanical and Electrical Engineer's Contractor's responsibilities, and understanding controls using ladder diagram logic. One PDH credit will be earned by those attending and certificates will be handed out that evening. Following we have Gail O'Keefe speaking to us on "Variable frequency drives and motor considerations." With ASHRAE's focus on hopes of a more energy efficient society certainly VFD's can help get us there. This topic promises to teach us a lot. You will also receive one PDH for attending this session. Be sure to read this month's CTTC article about this topic by Don Kane. He has been trying to write about the monthly lecture topics to help give a different view of the same subject.

Please check out our website www.ashraeli.org and take a look at the latest programs that Tom Fields, our Programs Chair, has scheduled for the chapter monthly meetings. Pencil in those dates on your calendar so you won't miss out on these great topics.

Thank you to all the volunteers and board members I appreciate all your time and dedication to our chapter and community. We look forward to seeing everyone at the October meeting and thank you for your continued support of the Long Island Chapter of ASHRAE.

Richard L. Rosner, P.E.
President - Long Island Chapter

CHAPTER MONTHLY MEETING

DATE:	**Tuesday, October 14, 2014**
TIME:	6:00 PM - Cocktails/Dinner 6:30 PM - Back to Basics #1 6:45 PM - Dinner Presentation 8:45 PM - Conclusion
LOCATION:	Westbury Manor South Side of Jericho Tpke. 25 Westbury, NY 11590
FEES: Members - Guest - Student -	 $40.00 $45.00 $15.00

Reservations requested, but not required.

Long Island Chapter Officers & Committees

ASHRAE 2014/2015 OFFICERS

POSITION	NAME	PHONE	FAX	EMAIL
President	**Richard Rosner, P.E.**	631.737.9170	631.737.9171	president@ashraeli.org
President-Elect	**Thomas Fields, P.E., LEED AP**	212.643.9055	212.643.0503	president_elect@ashraeli.org
Vice President	**Charles Lesniak, P.E**	516.484.1020	516.484.0926	vice_president@ashraeli.org
Financial Secretary	**Don Kane, P.E.**	631.737.9170	631.737.9171	finsec@ashraeli.org
Treasurer	**Andrew B. Dubel, P.E.**	212.967.7651	212.967.7654	treasurer@ashraeli.org
Secretary	**Richard Halley**	718.269.3809	718.269.3725	secretary@ashraeli.org
Board of Governors	**Lee Feigenbaum, LEED AP BD+C**	212.243.2555	212.924.7148	bog1@ashraeli.org
Board of Governors	**Frank Paradiso**	631.632.2791	631.632.1473	bog2@ashraeli.org
Board of Governors	**Ken Mueller**	201.395.3761	763.231.6924	bog3@ashraeli.org
Board of Governors	**Andrew Manos, LEED AP**	631.632.2791	631.632.1473	bog4@ashraeli.org

ASHRAE 2014/2015 COMMITTEES

COMMITTEE	NAME	PHONE	FAX	EMAIL
Programs & Special Events	**Thomas Fields, P.E., LEED AP**	212.643.9055	212.643.0503	programs@ashraeli.org
Membership	**Lee Feigenbaum, LEED AP BD+C**	212.243.2555	212.924.7148	membership@ashraeli.org
Chapter Technology Transfer (CTTC)	**Don Kane, P.E.**	631.737.9170	631.737.9171	cttc@ashraeli.org
Grassroots Government Activities Committee	**Charles Lesniak, P.E**	516.484.1020	516.484.0926	ggac@ashraeli.org
Newsletter Editor	**Liset Cordero**	212.643.9055	212.643.0503	editor@ashraeli.org
Research Promotion	**Andrew Manos, LEED AP**	631.632.2791	631.632.1473	rp@ashraeli.org
Historian	**Andrew B. Dubel, P.E.**	212.967.7651	212.967.7654	historian@ashraeli.org
Student Activities	**Richard Halley**	718.269.3809	718.269.3725	sa@ashraeli.org
Young Engineers in Training	**Frank Paradiso**	631.632.2791	631.632.1473	yea@ashraeli.org
Webmaster	**Richard Rosner, P.E.**	631.737.9170	631.737.9171	web@ashraeli.org
Nominating	**Michael Gerazounis, P.E., LEED AP**	212.643.9055	212.643.0503	nominating@ashraeli.org
Reception & Attendance	**James Hanna** **Ken Mueller**	718.269.3768 201.395.3761	718.269.3794 763.231.6924	reception@ashraeli.org
PR & Engineering Joint Council of LI	**Andrew Manos, LEED AP**	631.632.2791	631.632.1473	pr@ashraeli.org
2014 CRC Committee	**Richard Halley**	718.269.3809	718.269.3725	CRC@ashraeli.org
Golf Outing	**Peter Gerazounis, P.E., LEED AP** **Steven Friedman, P.E., HFDP, LEED AP**	212.643.9055 212.354.5656	212.643.0503 212.354.5668	golf@ashraeli.org

ASHRAE LI, P.O. Box 79, Commack, NY 11725

BOG Meeting Minutes

Call to Order - At 5:04 by Chapter President Rich Rosner
First roll call showed 8 Members Present
Rich Rosner, Don Kane, Andrew Dubal, Rich Halley, Charles Lesniak, Andy Manos, Lee Feigenbaum, Frank Paradiso

Secretary (Andrew Dubal/Rich Halley)
June Meeting Minutes were not read and will be submitted before October meeting

President (Richard Rosner)
Rich thanked all those who were in attendance at the ASHRAE CRC meetings held in Tarrytown NY,
Long Island Chapter was the recipient of 21 awards for 2013/2014 and he looks forward to bettering that total in 2014/2015.
Rich introduced a new system for tracking POE Points on the monthly BOG agenda. Moving forward Rich has added last year's maximum PAOE totals as a reference/stretch goal. He also noted that the Bold numbers represent the high mark for the Region. New point sheets will be handed out at each BOG Meetings
President Rosner presented Charles Lesniak with the plaque for "Outstanding Performance" in GGAC
In closing his report Rich requested that he be copied on all MBO's submitted to the Region

President-Elect/Programs (Thomas Fields)
Tom is working on filling the rest of the speaking slots and will be complete soon

Chapter Technology Transfer (Don Kane)
Don reported that September 30th is the Chapter Star Award Deadline. We get extra points for YEA & refrigeration participation on CTTC
The November Field trip is the Brooklyn Brewery Tour and we can receive points for food processing related trip if a short tour/presentation is set up.

Treasurer (Andrew Dubel)
Don and Andrew gave the report.
Balance in the General fund as of August 2014 $16,151.36 expense of $186.80 ending Balance $15,964.56
Paper work to put Andrew on the checking account has been submitted to the Bank.
The Chapter Assessment being sent out next week.
Final budget with actuals will be completed next week and ready for Andrew to pick up.
Next project is to catchup on the billing for the sounder advertising.
Don Kane noted that any expenses paid by the chapter for training, which are reimbursed by the Society (National or Regional) should be then reimbursed back to the chapter

Grassroots Government Activities (Charles Lesniak)
Charley Reported that his MBO's are going out next week.
He is looking to promote National Engineers Week and will be working with Andy Manos on this

Historian (Andrew Dubel)
Andrew reported that the Article will be going out next week.
He is continuing on digitizing chapter records
Rich Rosner will give Andrew the contact information for Carl Graber's family

Honors and Awards Chair (TBD)
No Report

Research Promotion (Andy Manos)
Meeting to be held Friday and Andy will report on this next month

Membership Promotion (Lee Feigenbaum)
Lee Reported that membership has grown by 8 new members over the summer.
He is looking into the delinquency list and developing a phone call program to address this list to keep in to a minimum.
The growth goal for this year is 20 new members. Lee is looking into surveying people who have left ASHRAE to see if we can learn how to improve retention
Lee has ordered more ASHRAE pins and they should be in tomorrow.

Cont'd. on Page 4

BOG Meeting Minutes (Cont'd. from Page 3)

Student Activities (Richard Halley)
Student Chapter Meeting are starting in Stony Brook and SCCC
MBO's are going out this month and will be copied to Rich Rosner
Student Membership is up over 200% from last year. We will be working with both the Westchester and NYC SA Chairs to come up with a collaborative way to increase our numbers

YEA (Frank Paradiso)
Leadership Retreat was closed out as we were notified to late
Frank is looking into attending Student Chapter Meetings to increase YEA Membership
He is also looking into special events to attract members

Web Master (Richard Rosner)
Looking for another way to get things updated faster

CRC 2017 (Richard Halley)
Rich Halley Reported that he is just started in the role and is looking forward to working with each member of the team and looking for any and all help to make this event all that it should be

Golf (Steven Friedman, Peter Gerazounis)
No Report, next outing is scheduled for May 4th, 2015 Cherry Valley

Old Business
- Ticket Books – Books are still available and we are asking BOG to push them
- Gift Cards

New Business
- Look into chapter dues not being paid by some chapter members
- https://www.facebook.com/USGBC?mkt_tok=3RkMMJWWfF9wsRonv6TPZKXonjHpfsX57%2B8lUKW1IMI%2F0ER3fOvrPUfGjI4ASMdrI%2BSLDwEYGJlv6SgFT7bHMaNzyrgIUxg%3D
- Facebook page for ASHRAE LI
- Congratulations Andy on being elected RP RVC
- Going to List Links to formula and/or apps for phones in next newsletters, send in what you have
- Newsletter articles due two weeks before next meeting or after last meeting.

Second Roll Call
Second roll call showed 9 Members Present
Rich Rosner, Don Kane, Andrew Dubal, Rich Halley, Charles Lesniak, Andy Manos, Lee Feigenbaum, Frank Paradiso and Tom Fields

Motion to Adjourn by Lee Feigenbaum 2nd by Charles Lesniak

Time/Place of next BOG Meeting – October 14th, 2014 5pm @ Westbury Manor

Chapter Monthly Meeting - Program for 2014/2015

September 9, 2014 * At Westbury Manor Dinner Presentation – New Advances in High Efficiency Cooling for Data Centers ****1 PDH**** Presenter - Dave Smith **Membership Promotion Night**	**February 2015** **NATIONAL ENGINEERS WEEK**
October 14, 2014 * *At Westbury Manor* Dinner Presentation – Variable Frequency Drives and Motor Considerations ****1 PDH**** Presenter - Gaile O'Keefe ***Back to Basic Session I - Evans Lizardos*** *****1 PDH***** ***"Smoke Purge System Design"***	**March 10, 2015** * *At Westbury Manor* Dinner Presentation – TBD ****1 PDH**** Presenter - TBD **Joint meeting with LI-Geo / YEA Night** ***Back to Basic Session III – Evans Lizardos*** *****1 PDH*****
November 11, 2014 * *At Westbury Manor* Dinner Presentation – Plate/Frames ****1 PDH**** Presenter - Chris Abbott **Resource Promotion Night** **Joint meeting with SMACNA** **Student Activities Night & YEA Night as well as** **Membership Promotion and Upgrade Night**	**April 14, 2015** **ANNUAL FIELD TRIP - TBD**
December 9, 2014 * *At Westbury Manor* **HOLIDAY PARTY** Free Buffet Dinner for Members	**May 4, 2015** * *Cherry Valley Club, Garden City, NY* **ANNUAL GOLF OUTING**
January 13, 2015 * *At Westbury Manor* Dinner Presentation – TBD ****1 PDH**** Presenter - TBD ***Back to Basic Session II - Evans Lizardos*** *****1 PDH*****	**May 12, 2015** * *At Westbury Manor* Dinner Presentation – TBD ****1 PDH**** Presenter - TBD **ASHRAE DISTINGUISHED LECTURER** **Student Activities Night / Refrigeration Night**
January 24-28, 2015 ASHRAE Winter Meeting Chicago, IL	**June 9, 2015** * *At Westbury Manor* **Free Buffet Dinner for Members** **PAST PRESIDENTS NIGHT & OFFICER INSTALLATION** **STUDENT SCHOLARSHIPS TO BE AWARDED** **ASHRAE History Quiz and prize Give-A-Ways**
February 10, 2015 * *At Westbury Manor* Dinner Presentation – TBD ****1 PDH**** Presenter - TBD **Joint Meeting with USGBC and IFMA-LI** **Resource Promotion Night / Membership Promotion Night / Student Activities Night**	**August 2015** **Chapter Regional Conference (CRC) Region I** **Syracuse Chapter Hosting** **August 20-22, 2015**

Long Island Chapter - Past Presidents

1958	H. Campbell, Jr. PE	1986	Jerome T. Norris, PE
1959	Clyde Alston, PE	1987	Abe Rubenstein, PE
1960	Sidney Walzer, PE	1988	Michael O'Rouke
1961	Sidney Gayle	1989	Mel Deimel
1962	William Kane	1990	Robert Rabell
1963	Louis Bloom	1991	Gerald Berman
1964	Milton Maxwell	1992	Donald Stahl
1965	Will Reichenback	1993	Ronald Kilcarr
1966	Joseph Minton, PE	1994	Jerald Griliches
1967	Irwin Miller	1995	Walter Stark
1968	Walter Gilroy	1996	Joe Marino
1969	Charles Henry	1997	Norm Maxwell, PE
1970	William Wright	1998	Alan Goerke, PE
1971	Louis Lenz	1999	Frank Morgigno
1972	Ronald Levine	2000	Michael Gerazounis, PE, LEED AP
1973	Henry Schulman	2001	Ray Schmitt
1974	Myron Goldberg	2002	Steven M. Stein, PE
1975	John N. Haarhaus	2003	Andrew Braum, PE
1976	Richard K. Ennis	2004	Claudio Darras, P.E.
1977	Kenneth A. Graff	2005	Craig D. Marshall, P.E.
1978	Evans Lizardos, PE, LEED AP	2006	John Nally
1979	Albert Edelstein	2007	Peter Gerazounis, PE, LEED AP
1980	Ralph Butler	2008	Steven Friedman, PE, HFDP, LEED AP
1981	Robert Rose, PE	2009	Steven Giammona, P.E., LEED AP
1982	Timothy Murphy, PE	2010	Nancy Román
1983	Leon Taub, PE	2011	Carolyn Arote
1984	Raymond Combs	2012	Brian Simkins, LEED AP
1985	Edward W. Hoffmann	2013	Andrew Manos, LEED AP BD+C

ASHRAE

Long Island Chapter

PAOE POINTS FOR 2014/2015

350Chapter Members	Membership Promotion	Student Activities	Research Promotion	History	Chapter Operations	CTTC	GGAC	Chapter PAOE Totals
282	300	0	275	0	0	200	0	775

October Program

Presentation #1 – Back to Basics Program

"Smoke Control System Design"
By Evans J. Lizardos, P.E., LEED AP

Presentation #2

"Variable Frequency Drives and Motor Considerations"
By Gaile O'Keefe

Attendees Will Earn 2 PDH's!

DATE:	**TUESDAY, OCTOBER 14, 2014**		
Time:	6:00 PM - Cocktails and Hors D'ouevres 6:45 PM - Dinner Presentations 8:45 PM - Conclusion	**Fee:**	$ 40.00 Member $ 45.00 Guest $ 15.00 Student
Location:	**WESTBURY MANOR** (516) 333-7117 Jericho Tpke (South Side), 3/10 of mile east from Glen Cove Rd., Nassau County, NY. **Directions are posted at @ www.ashraeli.org.**		
Presentation:	**Presentation #1 – Evans Lizardos, PE, LEED AP, will be presenting Part I – Smoke Control System Design of the 'Back to Basics" series.** **Presentation #2 -** This month's presentation will discuss Applications; Drive and Motor Basics; Inverter Duty VS Inverter Ready Motors; Common Issues applying VFDs; Bypass types, NEMA enclosures and application considerations; Types of Harmonic mitigation. **Participants will receive 1 PDH credit.** **All attendees will receive 2 PDH's.**		
About our Speaker(s):	**Evans J. Lizardos, P.E., LEED AP** is a founder and President of Lizardos Engineering Associates, P.C. A Mechanical Engineering graduate of Polytechnic Institute, Evans credentials include: Professional Engineer (licensed in 12 states), LEED Accredited Professional, Certified Energy Manager, Demand Side Manager, Indoor Air Quality Professional and Cogeneration Professional. An ASHRAE Fellow, Evans has spoken nationally on topics such as Sustainable Design for Green Buildings, Water and Air-Side Design, Efficient Central Plant Design, Piping, and Combating Mold in Building Design. **Gail O'Keefe** has worked in the Electro/Mechanical industry all her life. Starting her career at an EASA Motor Service Center working her way into VFD Product Specialist. She has worked in the electrical field on all types of power distribution equipment, and has experience with Consultants, End Users and Contractors energy efficient solutions.		

Student Activities

It's hard to believe that summer is over and the school year has started but we are definitely in full swing and the first semester well underway.

At the Chapter level we have completed our MBO's for the year and have started the process of meeting the students and getting the word out about ASHRAE.

We have meetings scheduled with most of the Higher Education Campuses and look forward to increasing our rolls. The first student night is scheduled for our November meeting.

If you know of students that would like to attend please invite them or send me their e-mail address and I would be happy to send them a personal invitation.

As always we are looking for ASHRAE handbooks in good condition that are no longer in use and could be given to our student members. If you have are in position of a hand book or two please bring them into the chapter meeting and we will find them a new home

We also encourage you to check out the ASHRAE student's zone at http://www.ashrae.org/students/. Information on society level design completions, scholarship and grant programs can all be found here.

Richard Halley
Student Activities Committee Chair

ASHRAE™ Long Island Chapter

Research Promotion

This is my fourth year as Resource Promotion Chair. This year's RP training, which was held in Chicago, was very insightful. I was able to interact with other RP Chairs in different regions and share ideas on how to better generate funds. Leaders from ASHRAE Headquarters also spoke to us about what the financial goals and research projects are for this coming year.

This year's overall resource promotion goal is $2,208,050 with over 75 research projects on board. Our chapter is expected to raise approximately $15,300 towards the overall goal. I am hoping I can count on the continued support of all of our past contributors who have generously supported us over the years.

I also look forward to gaining the support of new contributors this coming year. Please help support ASHRAE in any way you can.

CONTRIBUTIONS CAN BE MADE IN THE FOLLOWING WAYS:

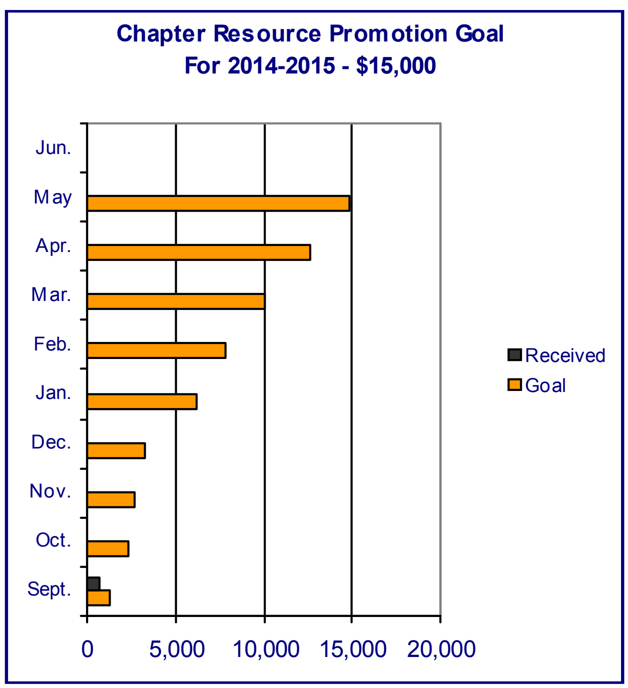
1) You can mail your checks, made out to ASHRAE Research Promotion, to:
Andrew Manos
ASHRAE Research Promotion Chair
c/o Stony Brook University
Research and Support Services, Suite 160
Development Drive
Stony Brook, NY 11794-6010

2) You can bring your check to any of the meetings and give it to me. I will mail it into headquarters.
3) You can contribute via PayPal from the ASHRAE LONG ISLAND web site just click on the donate button.
4) You can contribute directly on-line. www.ashrae.org

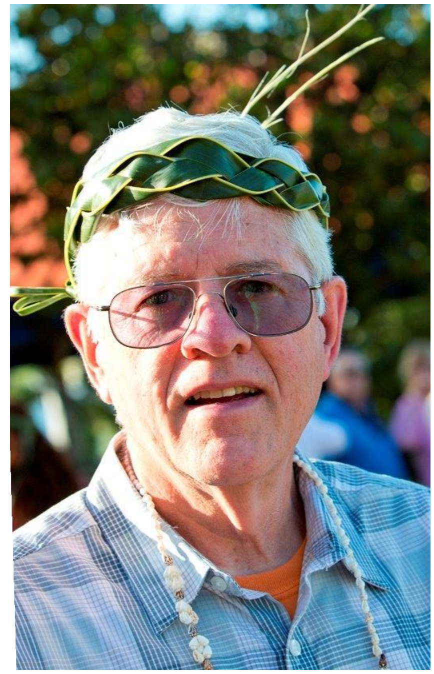
**** Please make sure you accredit your contribution to the LONG ISLAND CHAPTER 006 ****

Thank you again for all of your support!

Andrew Manos, LEED AP BD+C
Research Promotion Chair



CTTC - HVAC - Motors - Getting Up (Or Down) To Speed



HVAC systems comprise many components and it would be difficult to name one or two as the "most important" part of the system. However, if we are interested in energy consumption, and are trying to reduce that consumption, certainly electric motors stand out ahead of all other pieces of the system. Without the motors to drive the compressors, pumps and fans, we would be left with a collection of machinery, pipes and ductwork lacking the ability to alter the temperature of the interior environment. It is these very motors, that, to a large degree, drive the energy consumption of the HVAC system making them a high visibility target when one is trying to reduce the energy footprint of a building.

While the motor manufacturers have, over the last 30 years or so, supplied motors with improved efficiencies and overall performance (sometimes, ironically, by returning to designs using more copper and better steel, as they had been in the past before "value engineering" became a factor), unless you need to be running a pump or fan at full speed all the time, you will end up operating the motors at full speed and throttle the pump or fan output (with a valve or damper) to meet the operating conditions. Not an efficient use of energy! While energy savings is a prime consideration, there are other reasons while one would not want to operate motor driven equipment at a higher capacity than is needed, including; reduction in noise (in both hydronic piping and air ducts), minimizing pumping losses and throttling losses and elimination of unnecessary control valves, where variable flow can be accomplished by varying pump speed. In some cases, inrush currents, when starting motors, can be reduced while maintaining full load pickup capability, minimizing nuisance tripping of over-current relaying.

Once the decision is made to provide for variable control of motor driven components, one must decide if the desire is to be able to control the output over a broad operating range or to maintain operation at a specific operating point, based upon, for example, maintaining a specified pressure differential while the supplied load varies.

Another key consideration is the type of motor employed. For new installations, one would have the flexibility to choose the optimal combination of motor/drive; for existing installations, some economic compromises may be necessary based on the installed infrastructure and the potential for energy savings. Motors may be categorized, broadly, as AC or DC; DC motors may be further categorized as brush type or brushless and brushless motors as stepper motors or continuously driven. The driven load is also importance to categorize. Are they centrifugal pumps/compressors and fans or positive displacement loads, such as screw and reciprocating compressors/pumps, which will require a constant torque output.

While mechanical means to vary a driven device's speed, interposed between the motor and the driven device is a possibility, this would generally not be a practical choice for the smaller frame motors normally associated with HVAC systems (but not totally out of the question for large, refrigeration systems).

Speed control of AC motors was, at one time, limited to Silicon Controlled Rectifier (SCR) based devices. These controls, based on a gate-controlled SCR or Thyristor to establish the "turn-on" point for the SCR, allowing it to conduct the supply voltage for only part of the sinusoidal (half) waveform supplied to it; turn-off would occur at the next "zero" crossing of the waveform. The later use of Gate-Turn-Off (GTO) thyristors, provided additional control, as the turn-on and turn-off point could be established to maintain a specified output. Even so, the SCR based technology had a number of drawbacks. The output waveform supplied to the motor was extremely non-linear which could adversely affect power factor and result in erroneous readings on equipment measuring the line voltage. This was exacerbated when operating from a supply substantially less robust than the utility's "infinite bus". When being supplied from an emergency generator set, for example, this non-linearity sometimes was the cause of aberrations in generator operation due to the generator regulator sensing-input incorrectly responding to the distorted waveform it was measuring.

Even when operating correctly, the combination of SCR speed control and AC motors frequently resulted in up to a 50% reduction in efficiency at reduced speeds. Not the way to save energy. With advances in electronics, and the introduction of the insulated gate bipolar transistor (IGBT) to the mix, pulse width modulation (PWM), variable frequency drives came on the scene, using a constant voltage DC bus (obtained by rectifying the AC input), which helps maintain a favor-

Cont'd. on Page 11

CTTC - HVAC - Motors - Getting Up (Or Down) To Speed (Cont'd. from Page 10)

able power factor on the line side, which is switched on and off, with the "on" times selected so the time-average-integral of the drive output approximates a sinusoid. With a claimed 95% or better efficiency, this certainly sounds like a winner. However...two by-products of the PWM drive are heat and harmonics. Since the components of the drives do not have zero resistance (that's why they call them semi-conductors), there is always I^2R heating to contend with. As long as provision is made for cooling of the drive components, the heat is a manageable issue. It is when the drives are sometimes located (for reasons which follow) in close juxtaposition to the controlled motors, that sometime they are subject to arduous environmental conditions (heat, humidity, dust etc.) which can defeat provisions made for equipment cooling (cooling fins packed with dust do not reject heat very well). Why, one asks, put the electronics in such an environment? The other downside to PWM control is the generation of harmonics; extremely "steep sided" harmonics, which stress insulation in the controlled motors and the conductors supplying them. If the conductor length from the drive to the motor exceeds a critical length, an amplification of the harmonic "spikes" will be seen at the conductor's termination point, at the motor. For this reason, many drives are located close to the motors they control, to minimize the electrical stress of the connected equipment and wiring. Frequently placing the cooling fins and heat exchangers for the drives where they are exposed to dust and other contaminants, results in a degradation of the cooling capacity, which in turn, leads to early drive failure. Most motors used today with these PWM (inverter type) drives have (or should have) enhanced insulation, rated for the worst case voltage level of the spikes, including the possible amplification due to conductor length/impedance, minimizing the internal failures in motors (especially end-turn insulation), which had been experienced at the beginning of the inverter-supplied-motor learning curve.

But, as they say on the infomercials....there's more. Even with filtering to mitigate the harmonic content in the supply to the motor, there still remains some harmonics at the motor, and they have a tendency to find electrical paths through the motors bearings, resulting in abnormal wear and early failure. For this reason, the use of shaft ground brushes and, in larger frames, insulated bearings, is recommend for motors supplied from variable frequency drives.

With all these caveats, where is the benefit to using variable speed drives? The main benefit, for HVAC applications can be found in the fan and pump affinity laws, where, for centrifugal fans/pumps, the power required is a function of the cube of the flow. A reduction to 80% of rated flow will result in almost a 50% reduction in power required. For positive displacement equipment (for which the power required is a function of the square of the flow) the energy saving is not as much, but still significant. The use of variable speed drives also permits the motors to be quickly brought up to speed drawing up to only 150% of the full load current (as compared to 600% FLA if started with an across the line starter). The reduction in starting current can minimize nuisance tripping of protective relays.

With all the technology available for AC motors, one might think that DC motors were passé. Not so. Although brush type DC motors traditionally provided an easy way to vary the speed of a motor, by varying the resistance in the field circuit, the maintenance required of the brushes and commutator, as labor costs increased, became prohibitive, as did the need to remove equipment from service for routine brush replacement and commutator maintenance. Additionally, although the graphitic alchemists who conjure up the various mixtures to form the brushes (eye of newt, half a peel of persimmon...etc.) perform wonders when it comes to developing materials that will perform their commutating duties adequately over specified current and temperature ranges, when the equipment is subject to parameters outside of these design limits, performance suffers and major failures can result (... "my motor, my motor for a brush!.....") Again, thanks to the wonders of electronics, DC motor technology lives on, without the brushes! We can sub-divide the brushless DC devices into two categories. The first, stepper motors, while of possible use for precise movement of dampers and valves, do not provide the potential for energy savings of those categorized as "continuously driven" (however, they do provide a means for more precise control by a building automation system where needed). These electronically commutated motors (ECM), are, essentially, programmable brushless motors using a permanent magnet rotor and an integral inverter supply. The direction of current flow through the motor coils is controlled electronically, rather than by mechanical means, eliminating the need for brushes to change the relative pole-positions necessary to effect rotation.

EC motors are available as variable speed motors or multiple-speed motors (with a control-range centered on one of several nominal speeds). While enjoying the same benefit of reduced power required as with the AC motors previously discussed (as a result of the affinity laws), the EC motor suppliers also claim reduced power required, for the same flow, as a typical permanent split capacitor, AC motor, making them a candidate for applications such as fan powered terminal units. The multi-speed EC motors, offer more of a benefit for a manufacturer, requiring fewer parts to be stocked, as one motor can be programmed to perform for two or more different operating conditions.

Cont'd. on Page 12

CTTC - HVAC - Motors - Getting Up (Or Down) To Speed (Cont'd. from Page 11)

Since the electronics used is similar to that used for the AC variable speed drives, EC motors have many of the same caveats regarding harmonics as do the AC drives. Although some EC motors are available with replaceable control/ inverter modules, others make the electronics an integral part of the motor and, if one part fails, the entire assembly is replaced. Anecdotal information reveals some occasions of failure of the control electronics, however this is, in some cases attributed to installing the motors in existing systems, with deficient downstream ductwork, leading to excessive backpressure. Other failures have been attributed to voltage spikes on the supply circuit to the motor.

How does one select the type of motor to use? For applications involving many small motors (such as fan powered terminal units) the EC technology certainly offers some benefits, as long as protection against electrical transients and excessive back pressure are addressed up front. For those applications requiring larger frame motors, but still requiring energy savings, the AC variable speed option can be explored.

It is important that you clearly identify what it is that you are trying to achieve. If the motors involved do not see a significant time where they are operating at less than rated speed, your energy savings will be minimal. If all you need is to reduce starting inrush current, a soft start control may be adequate. Another point to evaluate is the addition of a additional technology using electronic components, which all have a finite (though usually quite long) lifetime, unless component failures occur prior to "end of life", due to external forces.

As usual, you will have to evaluate all possibilities and determine which makes the most economic sense, keeping in mind that some localities have implemented codes requiring, for example, EC motors in certain applications, which trumps economic analysis.

Before we leave the subject of motors, we should note that it is somewhat ironic that while the newer technology in motor drives is moving us away from the use of brushes and commutators for the operational function of the machine, the mitigation of harmonics (caused by these drives) has driven the development of new fiber type brushes for shaft grounding which bear a very strong appearance to the original "brushes" used for DC machines, which used splayed ends of conductive strands of wire to contact the commutator bar segments...no doubt the reason they were called brushes to begin with. Even if you don't get involved with any of the applications still using graphite brushes, the history and engineering involved is a great read, involving mechanics, chemistry and electrical technology. It is probably also the only segment of engineering where one can legitimately study (collectively) the topics of film, streaking, photographing, bar condition and smut accumulation all in the name of technology. :-)

Don Kane, P.E.
CTTC Chair - cttc@ashraeli.org

ASHRAE
Long Island
Chapter

Membership

What a great time to be in ASHRAE! I just finished renewing my membership at www.ASHRAE.org/membership in order to ensure that I can continue to enjoy the benefits of membership in this great organization! I'm not alone, as many others have committed to the continuing advancement of their careers, educations, and networks. Congratulations to (alphabetical order):

Michael Nigron
Michael Wetherell

Your Long Island Chapter wishes you many years of partnership and success with ASHRAE.

So why is renewal and uninterrupted membership so important? Did you know that there are four membership grades with different benefits, and that they are based on your time in ASHRAE?

Many people enter ASHRAE as students. While students may not hold office in ASHRAE, they can participate in technical committees that essentially shape the industry. In addition students can begin to network with HVAC professionals and build bridges that will serve them well when they are ready to enter the workforce. In terms of building a solid resume, I can't think of a better way to spend $20.

After graduation, students can advance to Affiliate Members. For three years this level of membership allows them to keep their fees relatively low while they build their network and advance their careers. As an added benefit, in addition to the obvious benefits such as access to discounted ASHRAE publications, affiliates are eligible for various products and services to include Group Health Insurance Benefits that are only available to ASHRAE members.

Affiliate members naturally advance to Associate Members after 3 years. Now that you have experience you are ready to get involved and change the world…or at least the way it's heated and cooled. Associate Members can participate in the governance of their chapters and take advantage of leadership opportunities all over the globe. If you are interested in traveling for leadership training then this is for you!

After 12 years, you become a Member. At this point you're confident in your professional skills, comfortable in leadership positions, and well established in the industry. Even better, you are eligible to hold office and vote all the way up at Society level. As an ASHRAE Member, you really can change the world through ASHRAE's global reach.

Unfortunately, none if this is possible if you allow your membership to lapse. Even if you've been a member for 20 years, allowing your membership to expire (90 days past due) forfeits your seniority, and the clock goes back to zero when you come back. Don't let this happen to you! Don't lose what you've worked so hard for. Renew your membership and hold your esteemed place in the conversation. Check back next month where we will talk about how to advance your membership, and recognize some of the people who have taken the next step.

Do you have a testimonial about the benefits of ASHRAE that you'd like to share? If so, then please forward it to me at LFeigenbaum@PJMechanical.com

Cheers!

Lee Feigenbaum, LEED AP BD+C
Membership Chairman

Young Engineers in ASHRAE (YEA)

The fall is here and we are fast approaching the heating season (if not already in need of some heating). Keep up to date with some upcoming YEA programs and events as follows:

The 2015 ASHRAE Winter conference will be held in Chicago Illinois.

Through Leadership U (offered by the YEA Institute), a handful of YEA members are selected for each conference to be matched up with Society Officers and participate in all of their events and board meetings, including social activities. Leadership U not only allows you to experience a conference like an Officer, but it is also a great opportunity to network and form connections with those active in ASHRAE.

***Applications for the 2015 Winter Conference in Chicago, IL are being accepted until Monday, October 20, 2014. Please complete the application in order to be considered for the Leadership U Program:**

- The Leadership U program in Chicago will start at 6:00pm on Friday, January 23, 2015 and will end the afternoon of Thursday, January 29, 2015.

Also, YEA is looking for the 2015 New Faces of Engineering for the National Engineers Week. Engineers 30 years of age or younger are the focus of the recognition program. ASHRAE members are encouraged to nominate deserving young engineers so that they might have the opportunity to earn recognition in their chosen field.

The individual selected as ASHRAE's New Face of Engineering 2015 will receive the following recognition:

- Featured in a full-page ad in the ASHRAE Journal
- Featured along with the other New Faces in a USA Today print ad during National Engineers Week
- Trip to the 2015 CIBSE Technical Symposium, held April 16-17, 2015 in London

More information on these programs can be found at ASHRAE.org

We will be looking for ideas for social events so please contact me if you have suggestions.
One such idea is a spring get together at a German Beer Hall in Franklin Square NY

Be sure to connect with Young Engineers in ASHRAE on Facebook and LinkedIn.

Frank Paradiso
YEA Chairman

Donate your old Handbooks

Please bring your old handbooks to the meetings for donations to our student members who do not have complete sets at this time. Frank Paradiso will be collecting them.

History

The History of Ventilation and Temperature Control [1]

When man brought fire into his abode, he discovered the need to have an opening in the roof to let out the smoke and to supply air to keep the fire burning. Control of combustion provided the first incentive for the ventilation of a space. Because the fire warmed the space to a more comfortable temperature, thermal comfort was intimately linked to ventilation.

The ancient Egyptians observed that stone carvers working indoors had a higher incidence of respiratory distress than those working outdoors did. They attributed this to a higher level of dust in the indoor workspace. Thus, control of dust was the second recognized need for ventilation.

The Romans negated the need for indoor fires when they invented radiant heating. Hollow tiles under the floors of their buildings ducted hot combustion products from "stoves" around the periphery of the buildings, through the floor tiles to a smokestack.

They developed a preferred ratio of window to floor area for daylighting. Oiled parchment over the window openings led to high infiltration. Later, the Venetians devised a method for making flat glass for windows.

In the Middle Ages, people began to realize that air in a building could somehow transmit disease among people in crowded rooms. Homes and small buildings were heated with open fires in fireplaces. Smoke often spilled into the room and poisoned the air. King Charles I of England in 1600 decreed that no building should be built with a ceiling height of less than 10 ft (3 m), and that windows had to be higher than they were wide. The objective was to improve smoke removal.

Research began to address the question, "What constitutes bad air?" In the 17th century, Mayow (cited by Michael Foster, 1902) placed small animals in a confined bottle with a burning candle. The candle flame was extinguished before the animal was asphyxiated. An animal survived about half again as long without the candle. He concluded that the "igneo-aerial particles of the air" were the cause of the animals' demise.

One hundred years later (1775) Lavoisier, the father of gaseous chemistry, identified Mayow's igneo-aerial particles as carbon dioxide (CO_2). Lavoisier began his study of oxygen and carbon dioxide in the air of crowded rooms in 1777. He concluded that excess CO_2-rather than a reduction of oxygen-caused the sensations of stuffiness and bad air. The hypothesis was that excess CO_2in the lungs interfered with their ability to absorb CO_2 from the blood. The argument as to whether "bad air" was caused by oxygen depletion or excess carbon dioxide continued for many years. Pettenkofer (1862) concluded that neither oxygen nor carbon dioxide were responsible for bad air. Rather, biological contaminants were responsible for vitiation of the air. He believed, as did Saeltzer (1872) and others, that CO_2 was a useful surrogate for vitiated air.

Minimum Ventilation

According to Klaus (1970), a Cornish mining engineer, T. Tredgold (1836) published the first estimate of the minimum quantity of ventilating air needed. He calculated from the breathing rate that a subject needed 800 cu. in./min. of unvitiated air to purge the CO_2 from his lungs.4 He also calculated 5,184 cu. in./min. for body moisture removal and 432 cu. in./min. for the miner's candle giving a total of 6,415 cu. in./min or about 4 cfm (2 L/s). These calculations, based on measured flow rates, did not consider the CO2 or moisture concentration exhaled by the occupants. Tredgold's estimate was intended to satisfy metabolic needs, but it erred on the side of too little ventilation for comfort.

Subsequent efforts to provide quantitative guidance for ventilation of buildings have ranged from Tredgold's estimate to more than 30 cfm (14 L/s) per occupant. There was a growing dichotomy in the objectives for ventilation. Should the objective be based on physiological needs or on comfort factors?

Cont'd. on Page 16

History (Cont'd. from Page 15)

Klaus states that the most authoritative American work just before the turn of the century was Ventilation and Heating by J. Billings (1893). Billings, a physician, believed that CO2 was an accurate measure of impurity emissions from the human body. He calculated that 50 cfm of ventilating air would be needed to keep the room CO2 level to 550 ppm if the exhaled respiration was limited to a concentration of 200 ppm.

Some people believed that 10 cfm (4.7 L/s) of ventilation air was sufficient. Billings argued for a 30 cfm (14 L/s) minimum and recommended 60 cfm (28 L/s). He was concerned with the spread of disease, especially tuberculosis. According to Klauss, ASHVE in 1895, "adopted the view that engineers were ready to accept the ideas of hygienists and physiologists" They recommended 30 cfm (14 L/s) per person as the minimum ventilating rate. This required mechanical ventilation and placed responsibility for system design and construction on the engineers.

For several centuries, there had been two schools of thought with respect to ventilation. Architects and engineers were concerned with providing comfort and freedom from noxious odors and the debilitating effects of oxygen depletion and/or carbon dioxide accumulation. Physicians, on the other hand, were concerned with minimizing the spread of disease. During the Crimean War, 1853–55, and a few years later in the U.S. Civil War, it was observed that there was a greater and faster spread of disease among wounded soldiers in crowded hospitals with poor ventilation. Wounded soldiers fared better when they were housed in tents or barns. Physicians wanted more ventilation to reduce the spread of disease. Thus, Billings based his recommendation of 60 cfm (28 L/s) of ventilation air per person on his concern for mdisease; whereas 30 cfm (14 L/s) was adequate for comfort. Thirty cfm of outdoor air per person was written into Massachusetts law in the 1880s. ASHVE adopted a minimum ventilation rate of 30 cfm (14 L/s) per occupant in 1895 and proposed a model law with this rate in 1914.

Temperature Effects

The report of the New York State Commission on Ventilation (1923) found that work by Hermans (1893) in Amsterdam had concluded that the negative reaction to poorly ventilated rooms was probably caused by thermal effects, i.e., temperature and humidity. Hermans appears to be the first to blame poor indoor air quality on thermal effects. His hypothesis was that excess temperature interfered with body heat loss and produced physiological effects on a person confined in a poorly ventilated room. This hypothesis was not widely endorsed, but Billings, et. al (1898) did find that the "two great causes of discomfort, though not the only ones, are excessive temperature and unpleasant odors."

Flugge (1905) and his pupils, Heyman, Paul and Ercklentz at the Institute for Hygiene in Breslau, Germany confirmed these hypotheses through a series of experiments. This work was confirmed later in England by Hill and Haldane (1905, 1907, 1913).

Flugge's endorsement of Billings' recommendation of 30 cfm (14 L/s) per occupant of outdoor air was soon adopted by state building codes. Massachusetts had already promulgated such a code in the 1880s. By 1925, 22 states required a minimum of 30 cfm (14 L/s) per occupant of outdoor air. This necessitated mechanical ventilation, which was made possible by the development of the electric power industry.

Some investigators experimented with recirculated air for part of the supply.

There was a growing resistance to heating large quantities of outdoor air for ventilation. Recommended ventilation rates sometimes failed to discriminate between the outdoor airflow rate and the total supply.

Arguments persisted as to whether the effects of poor air quality came from excess carbon dioxide, excessive temperature or biological emissions. The Department Committee Appointed to Enquire into the Ventilation of Factories and Workshops Report (1907) in England reported on the effects of restricted ventilation.

Seventeen subjects were kept-for periods of two hours to 13 Days-in small, 189 ft3 (5 m3) chambers. Air was circulated slowly while temperature was controlled externally. Carbon dioxide was usually more than 3,500 ppm (0.35%). During

Cont'd. on Page 17

History (Cont'd. from Page 16)

the daytime when the subject was active, the CO_2 was more than 10,000 ppm (1.0%), and at one time it reached 23,100 ppm (2.3%).2 Subjects felt comfortable as long as the chamber was kept adequately cool.

Other tests reported by the Departmental Committee on Humidity and Ventilation in Cotton Weaving Sheds (1909, 1911) confined subjects in an uncooled chamber of 106 ft3 (3 m3). Carbon dioxide reached 3% to 4%, oxygen fell to 17%, and the wet-bulb temperature rose to 80°F to 85°F (27°C to 29°C). Breathing was deepened by the high CO_2. These rather barbaric experiments exonerated CO_2 as a contaminant of concern. However, the fact is that CO_2 is dangerous at concentrations of 3% to 4%, and it is lethal above 5%.

Chicago/ASHVE

The Chicago Department of Health succeeded, in 1910, in having a commission appointed to study ventilation of school buildings. The commission included ASHVE, the Chicago Public School System and the Chicago Department of Health. Their report (1914) concluded that carbon dioxide was "not the harmful agent of major importance in expired air or air otherwise contaminated;" that the temperature of 68°F (20°C) with proper humidity control is desired in artificially heated living rooms; that the then current state of knowledge was insufficient to designate all harmful factors; and, "that from the standpoint of health, relative humidity is one of the important factors in ventilation. ASHVE wrote a model code in 1914 with a minimum ventilation rate of 30 cfm (14 L/s) per occupant of outdoor air.

New York Study of Schools

A study by the New York State Commission of Ventilation in schools began in 1913. During the next ten years various ventilation systems, occupant response and incidence of disease and fuel consumption were studied in 216 classrooms in schools in New York, Springfield, Mass., Fairfield, Conn., and Minneapolis, Minn.

The ventilating systems in two rooms in PS51, Bronx, N.Y. were modified to experiment with various methods of circulating the ventilating air. The resulting report (1923) concluded that overheating was the single most annoying factor in the indoor environment. A window-ventilated room with a natural draft (gravity) exhaust from near the ceiling of an inside wall was the preferred method. It produced substantially less than the recommended ventilation rate of 30 cfm (14 L/s) per occupant. Fan ventilation with supply at the ceiling and exhaust at the floor was the next best. Window-ventilated rooms at a temperature from 59°F to 67°F (15°C to 19°C) had the lowest rate of respiratory illness. Fan ventilation with a temperature of 70°F (21°C) produced 18% more absences and 70% more resdevelpiratory illnesses. It was postulated that the more uniform air conditions (i.e., better mixing) with fan-induced circulation increased the rate of the spread of airborne disease. Sixty-eight degrees Fahrenheit (20°C) was believed the ideal temperature for comfort and minimizing the spread of disease.

Ventilation through open windows had to be constrained by outdoor conditions. Noise, dirt, odors or other emissions from the streets could make window ventilation unattractive. Fan ventilation was preferred. In addition, window-ventilated rooms required radiation under the windows and deflectors to prevent cold drafts.

Recirculation was unacceptable because of odors, even when the recirculated air passed through an air washer. This conclusion appears to have been based on 100% recirculation. The possibility of partial recirculation with air washing was suggested as possibly acceptable.

The results of this project became a guide for schools throughout the United States. Using proper temperature control meant that the ventilating rate could be reduced below 30 cfm (14 L/s) of outdoor air per occupant. Yet in 1922, 22 states had building codes requiring 30 cfm (14 L/s).

The ASHVE Laboratory

Heating and Ventilating Magazine, April 1917, stated that, "ASHVE President Lyle appointed a committee to investigate

Cont'd. on Page 18

History (Cont'd. from Page 17)

the matter of establishing a bureau of research to be conducted under the auspices of the society," John Bartlett Pierce, a founder and vice president of the American Radiator Co. provided funds to establish the John B. Pierce Foundation for technical research in heating, ventilating and sanitation, "to the end that the general hygiene and comfort of human beings and their habitations may be advanced." These funds provided the initial support for the ASHVE Bureau of Research. The John B. Pierce Laboratory was established later at Yale University.

The ASHVE Bureau of Research was established in January 1919 at the U.S. Bureau of Mines Laboratory in Pittsburgh. At that time, some government laboratories were available for privately funded work. John R. Allen, dean of the college of engineering at the University of Minnesota, was the first director of research. He acquired a research staff and began research to establish heat transfer from radiators, heat transfer and air leakage rates through building wall sections and components, and studies of outdoor air quality in various cities, Allen died suddenly in 1920, so Dean Scipio continued as acting director for one year. F. Paul Anderson, dean of engineering at the University of Kentucky, took a leave of absence to become director of the ASHVE laboratory from 1921 to 1925.

He hired several outstanding research people to continue and extend the work underway. Among these was a former student from Kentucky, Margaret Ingels. She was one of the first female members of ASHVE, and one of the first American women to receive a degree in mechanical engineering.

Ingels had wanted to study architecture, but the University of Kentucky offered no courses in this field. Instead, she opted for mechanical engineering, and graduated with a bachelor's degree in 1916. She joined Carrier Engineering in Newark, N.J. They were pioneering the air conditioning of buildings. Carrier was developing the technology of humid air and had air conditioned a printing plant in 1902. Carrier had published a pioneering ASME paper on psychometrics in 1911. Ingels received a master's degree in 1920 on the basis of her experience and a thesis. One of the main air contaminants of concern was dust. Ingels worked on filtration of dust from air. She left the ASHVE Laboratory and joined her old boss at Carrier in 1929. There she worked on the marketing of air conditioning. This was directed at home air conditioning after World War II.

The laboratory, under the direction of John Allen, had hired F.C. Houghten, O.W. Armspach, Louis Ebin and Percy Nichols. Houghten went on to become a director of the lab. Armspach helped develop the dust spot meter and measured human body heat loss rates. Ebin published tables on heat transfer rates for radiators and also determined steam flow rates in one- and two-pipe steam heating systems. Allen contracted with F.B. Rowley and A.B. Algren, professors at the University of Minnesota, to measure wall heat transfer factors and air leakage rates through walls and building components. A heat flow meter invented by Percy that were published in the ASHVE Guide and Handbook are still used today. From 1921 to 1925, C.P. Yaglou worked at the lab on problems of ventilating spaces and the interaction of human occupants with their environment. He continued his work as instructor in ventilation and illumination at the Harvard School of Public Health.

Lemberg/Yaglou Research

In a laboratory environment, W.H. Lemberg, et. al. (1935), under contract from ASHVE, measured the minimum ventilation requirement using the human nose as the sensor. The olfactory nerves of the nose are exceedingly sensitive. Pierce (1935) reported that a concentration of 5 x 10-7 mg of oil of rose per cm3 of air can be distinctly smelled. The odor of butyric acid can be detected at a concentration of 9 x 10-6 mg/cm3 of air. When exposed to an odor, the olfactory sensors rapidly become saturated and lose sensitivity. It is necessary, therefore, to precondition the judge in clean air before he briefly sniffed the unknown atmosphere to be measured. Under these conditions, human judges using their sense of smell became reliable instruments for measuring odor level. The response to odor was found to be logarithmic-as is the response of the human ear and eye.

Lemberg, Brandt and Morse, all graduate students at Harvard devised an odor intensity scale ranging from zero-no perceptible odor to five-overpowering (nauseating). An index number of two was defined as a moderate odor and was deemed to be acceptable.

Cont'd. on Page 19

History (Cont'd. from Page 18)

A box 20 in. by 20 in. by 6 ft long (0.5 by 0.5 by 1.8 m) long was used as a test chamber. It was ventilated by temperature controlled air entering at one end and exiting at the other end. Judges sampled the odor through holes in the exhaust pipe.

Ten subjects were placed in the box, one at a time, and 15 trained judges performed experiments at ventilating rates ranging from 1 cfm to 50 cfm (0.47 L/s to 24 L/s) per occupant. They found the odor to be acceptable at 65°F to 72°F (18°C to 22°C) and 20 cfm (9 L/s) per person. When the temperature was raised from 79°F to 86°F (26°C to 30°C), the ventilation had to be increased to 30 cfm (14 L/s).

Yaglou, Riley and Coggins (1936) continued a more exhaustive study at Harvard. A room having a floor area of 155 ft2 (14 m2) and a ceiling height of 9 ft, 2.5 in. (2.8 m) was used. An adjoining room of identical dimensions was used as a judge's control room. All windows were weather stripped and cracks were sealed. The judge's room was ventilated at a rate of 50 cfm (24 L/s) per occupant to precondition the judges' sense of smell. A judge entered the test room with a "clean" nose, sniff the air in the test room to measure its odor, render a judgment, and return to the odor-free preconditioning room where his sense of smell was restored.

The test room was occupied by 3, 7 or 14 subjects giving an air space of 470 ft3, 200 ft3 or 100 ft3 (13 m3, 6 m3, 3 m3) per occupant respectively. The ventilation airflow was varied from 2 cfm to 30 cfm (0.9 L/s to 14 L/s) per occupant. The temperature and humidity of the two rooms were kept the same, but it was necessary to keep the ventilation rate of the preconditioning room at 50 cfm (24 L/s) per occupant to approximate a zero odor condition.

Men and women within an age range of 16 to 60 years, grade school children 7 to 14 years of age, laborers, school children of lower socioeconomic class and children of a higher class comprised the groups studied.

Yaglou and his associates found a strong correlation between the required ventilation rate and the net air space per occupant. For example, at 150 ft3 (4 m3) per person, 20 cfm (9 L/s) of outdoor was needed to control the perceived body odor to an acceptable level of 2 on Lemberg's scale. If the occupant density was reduced to the equivalent of an air space of 300 ft3 (8 m3) per occupant, ventilation was reduced to 12 cfm per occupant for sedentary adults. Grade school children required 25 cfm (12 L/s) at 150 ft3 (4 m3) per child and 17 cfm (8 L/s) at 300 ft3 (8 m3) per child. Fifty percent more ventilation was required if children had gone 6.5 days without a bath and change of underwear. Only a 33% increase in ventilation was required for adults a week after a bath.

Untreated recirculated air was found to have no effect on odor density, but washing, humidifying, cooling and dehumidifying recirculated air were all beneficial in reducing the outdoor air requirement. Twelve cfm of outdoor air in the total supply of 30 cfm (14 L/s) was acceptable for sedentary adults if there was at least 200 ft3 (6 m3) of air space per person. There were significant differences due to children vs. adults, socioeconomic class, and air space per occupant. Subsequent research by Cain, et. al. (1983) and Berg-Munch, et. al. (1984) confirmed most of Yaglou's work except for the effect of air space per occupant. This difference has not been fully explained.

Ventilation Code

W.H. Carrier's work in building air conditioning, beginning in 1902, generated a need for thermal comfort and ventilation requirements by 1920. Measurements of occupant response to their environment by Yaglou, Houghton, Riley, Coggins and others provided a growing body of knowledge. A code of "Minimum Requirements for Heating and Ventilation

of Buildings" was published in the ASHVE Guide in 1925. The code was updated as new data became available, especially in 1938. Yaglou began to develop the comfort chart in 1925. The code provided a minimum ventilating rate of 10 cfm (4.7 L/s) per person for the 1946 American Standards Association (ASA) lighting standard.

Cont'd. on Page 20

History (Cont'd. from Page 19)

ASHRAE Standards

The ASHVE research yielded a body of knowledge that led to ASHRAE Standard 55 for thermal comfort and Standard 62 for ventilation. The first, ANSI/ASHRAE Standard 62-1973, Standards for Natural and Mechanical Ventilation, presented minimum and recommended ventilation rates for 266 applications and became the basis for most state codes. The standard was updated in 1981 and again in 1989. A conflict with the Tobacco Institute and the Formaldehyde Institute concerning the way the standard treated tobacco smoke and formaldehyde vapor prevented its adoption. Subsequent research on odor made it necessary to raise the minimum ventilation rate so that these conflicts disappeared in the 1989 issue. Standard 62-1989, Ventilation for Acceptable Indoor Air Quality is widely used.

ASHVE research led to a comfort chart that correlated temperature, humidity and comfort response. It was first published in the ASHVE Guide in 1924, and it continued to be published in the guide until 1974 when ASHRAE published Standard 55-1974, Thermal Comfort. Subsequent editions of that standard were published in 1981 and 1992. The comfort chart has been modified to reflect the response due to clothing, heating/cooling system designs, and living habits.

Many papers have argued the cost/benefit of outdoor air for ventilation. T.R. Tiller (1973) of Kohloss and Tiller argued this point from an Australian point of view.16 A high dust content in desert climates sometimes makes return air preferable to outdoor air. Indeed, Standard 62-1989 says that the outdoor air should meet the U.S. Outdoor Air Quality Standard or be treated to do so. The standard mainly is concerned with dilution of indoor-generated contaminants.

W. Cain, et. al (1983) and P.O. Fanger, et. al, (1983) published results of new studies that generally confirmed Yaglou's early results. Cain working at Yale University and Fanger at the Technical University of Denmark both agreed that 15 cfm (7.5 L/s) of outdoor air was needed to dilute occupant odors to a concentration acceptable to 80% (20% dissatisfied) of the "visitors" entering an occupied space. These new data did not, however confirm Yaglou's dependence on air space. Thus, Standard 62-1989 adopted 15 cfm (7.5 L/s) per occupant of outdoor air as the minimum.

Janssen (1986) found, based on work by Leaderer and Cain (1983) and Thayer (1982) 19 that 15 cfm (7.5 L/s) of outdoor air per occupant was sufficient to reduce the concentration of tobacco smoke to a level acceptable to 80% of the population at today's reduced smoking rate. Thus, Standard 62-1989 did not discriminate between smoking allowed and smoking prohibited. The new standard did, however, require more ventilation for applications such as bars, cocktail lounges, and smoking lounges where smoking activity is expected to produce higher levels of tobacco smoke.

Whether or not carbon dioxide is a surrogate for occupant odor, a health risk, or of no concern is not adequately answered today. Should the CO_2 level be limited by comfort or only by health risk? Early investigators thought CO_2 was a useful surrogate but not a health risk. Yaglou thought it was a poor indicator because of its non-linear response with odor. Ernest B. Sangree, M.D. (1894) reported that when out walking on a cold day he restored warmth to his body, his hands, and his feet by breathing deeply and holding his breath as long as possible. One may speculate that this increased the CO_2 in his lungs. Carbon dioxide is known to influence metabolic rate and is a vasodilator that dilates the capillaries in the skin. Thus, it increases the heat available and circulate it to the extremities.

Janssen, et. al (1984) studied the response of school children to CO_2-controlled ventilation. A polarized questionnaire devised by Woods, et. al (1982) was used. When the CO_2 in the room rose to 1,600 ppm (0.16%) the children (ages 12 to 15) voted the air more "stuffy," more stagnant, about 2°C (3.6°F) warmer, and their hands and feet warmer with respect to their bodies. No correlation existed at 1,000 ppm (0.1%) when the outdoor air was raised to 15 cfm per student. Standard 62-1989 accepted 15 cfm (7.5 L/s) as the lowest permissible ventilation rate under the Ventilation Rate Procedure. Some believe (ASHRAE/ANSI Standard 62-1989) that carbon dioxide is a useful surrogate for occupant-generated biological contaminants. Some stress may exist in concentrations of 1500 ppm (0.15%), but it is not known if this is harmful.

One problem not yet adequately solved, is the ventilation of schools in warm, humid climates. The high latent load on cooling systems poses a cost penalty. Efforts are under way to determine what degradation of the indoor environment occurs if the ventilating rates are reduced.

Cont'd. on Page 21

History (Cont'd. from Page 20)

Kansas State Laboratory

The ASHRAE Board of Directors decided (1961) that it would be more economical to move the research lab to Kansas State University and contract for work at Kansas State or other laboratories. The temperature-controlled room was moved from Cleveland to Manhattan, Kan. and placed under the direction of Professor Ralph G. Nevins. Technical management of projects was placed under a new society Research and Technical committee. This has worked well.

Summary

Natural ventilation through operable windows was the only means of ventilating buildings prior to the development of the electric power industry in the late 19th century. The B.F. Sturtevent Co. of Boston did develop a steam engine-powered centrifugal blower in the 1880s, but this was useful only during the heating season. Overheating of buildings was recognized as the single most critical problem. Proper distribution of heating and ventilating air exacerbated the overheating problem.

Thermostatic controls were invented in the 1880s, but these also suffered from the lack of a power source. Thus, it was not until electric power became generally available early in the 20th century that the desired ventilating rates and temperature control could be achieved. As late as 1920, the relative location of open windows and room exhausts were still studied. The expansion of air conditioning in the 1930s made natural ventilation obsolete.

We now have a good idea of what ventilation rates should be and what the desired temperature and humidity conditions are. The oil embargo of 1974 has brought attention energy use. Today systems must be designed and operated to achieve a proper balance among therma1 comfort, air quality and energy consumption.

[1] *ASHRAE Journal, September 1999; John E. Janssen*

Andrew B. Dubel, PE
History Chairman

Programs and Apps offered on the Web or for Your Smartphone

Since the Web has become more and more useful for finding information about products and the works of others, we have decided to start a space in the Sounder to note items that some of us might find useful. This is not an endorsement of a web site nor is the information furnished said to be accurate but rather just the advice that the information is available to you for your review. Send what you find useful.

Rich Rosner

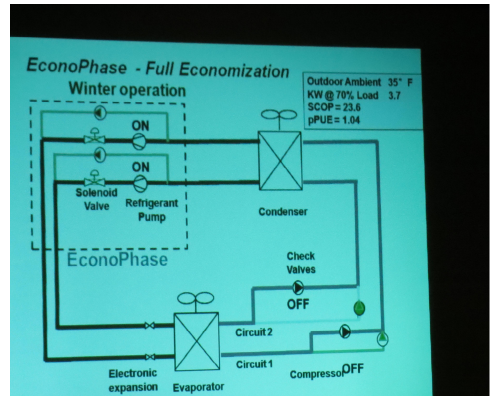
Web Sites:

Various - http://www.engineeringtoolbox.com/hvac-systems-t_23.html
Calculators - http://wea-inc.com/
Controls and Sequences - https://www.ctrlspecbuilder.com/
Pump Selector - http://pump-flo.com/

Apps for Smart Phones:

Calculators - HVAC Toolkit, Formula Free
Unit Conversion - Convert Pad
Refrigerants – PT Reference by Bitzer
Screws – iEngineer
ElecPower
EngrCalc
Sound – SoundMeter, AdvDBMeter

September Meeting Pictures



September Meeting Pictures








Save-the-Date: Free ASHRAE Webcast - April 23, 2014

SAVE THE DATE

April 23, 2015

1:00pm - 4:00 pm EDT

FREE ASHRAE WEBCAST

New Tomorrows for Today's Buildings: Existing Building Commissioning

This FREE webcast will feature industry experts who will define the benefits of existing building commissioning for the environment, occupants, operations staff, and overall ownership costs. Viewers will be able to recognize the varied scopes of commissioning, when to apply comprehensive versus focused commissioning, and best practices in existing building commissioning specifications & contracting.

Visit www.ashrae.org/Webcast for additional information about the program, sponsorships, continuing education credits, speakers, and registration.

ASHRAE™
Long Island Chapter

ASHRAE Releases Legionellosis Standard for Fourth Public Review Draft

ATLANTA - A fourth version of ASHRAE's proposed legionellosis standard is open for public comment until November 10, 2014.

Standard 188P, *Legionellosis: Risk Management for Building Water Systems*, currently under development, will establish minimum legionellosis risk management requirements for building water systems. The standard is intended for use by building owners and managers and those involved in the design, construction, installation, commissioning, operation, maintenance and service of centralized building water systems and components.

The draft of the document and instructions on submitting comments can be found at www.ashrae.org/publicreviews. The proposed standard will be available for access until Nov. 10, 2014.

Changes to the proposed standard since its last public review in January 2013 include:

- Alignment of the document with the revised title, purpose and scope.
- Removal of hazard analysis and critical control points (HACCP) terminology; some of the principles of the HACCP process are consistent with the process utilized in the document.
- Inclusion of a normative appendix for health care facilities meeting specific requirements that provides an alternate compliance path that is more stringent than for other facilities.
- More emphasis on requirements for design, construction, installation, commissioning, operation, maintenance and service.

Tom Watson, chair of the Standard 188P committee, notes that the standard contains both normative sections and appendices that specify what is required to comply. It also contains informative appendices and references as guidance about how to do things that may be necessary for a given building water system.

"Building water systems vary substantially in their design and their capability for transmission of Legionella," Watson said. "Scientific evidence is either lacking or inconclusive in certain aspects of Legionella control. The informative guidance is included to provide suggestions, recommendations and references."

To learn more about actions regarding ASHRAE standards, visit www.ashrae.org/listserv. There, ASHRAE provides subscriptions to a variety of listserves, including one for Standard 188P, that enable interested parties to stay up to date with the latest news, publication offerings, and various other Society activities.

ASHRAE, founded in 1894, is a global society advancing human well-being through sustainable technology for the built environment. The Society and its more than 50,000 members worldwide focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability. Through research, standards writing, publishing, certification and continuing education, ASHRAE shapes tomorrow's built environment today. More information can be found at www.ashrae.org/news.

###

Fall 2014 Online Courses

2 Ways to Register

Internet: www.ashrae.org/onlinecourses

Phone: 1-800-527-4723 (U.S. and Canada) or 404-636-8400 (worldwide)

$259 (ASHRAE Member: $199) | Two-part courses: $459 (ASHRAE Member: $339

NOTE: You may register up to 24 hours prior to an online course. Course times are in Eastern US Time

Multiple Participants?

Site Licenses are available when five or more attend.

Learn More

Earn Continuing Education Credits

Take 3 or More Courses & SAVE!

Courses are archived for a period of time after their initial presentation.

ASHRAE Standards

Exceeding Standard 90.1-2013 to Meet LEED® Requirements ES Practices
Wed, November 12, 2014, 1:00 pm to 4:00 pm, EST
Instructors: McHenry Wallace, P.E., Member ASHRAE, LEED® AP and Joseph Deringer, AIA, Member ASHRAE, LEED® AP

Fundamental Requirements of Standard 62.1-2013 IAQ Practices
Wed, September 24, 2014, 1:00 pm to 4:00 pm, EDT
Instructor: Hoy Bohanon, P.E., Member ASHRAE, BEAP, LEED® AP

ASHRAE Long Island Chapter Polo Shirts for Sale

New ASHRAE Long Island Chapter Polo shirts are now available for purchase at our monthly chapter meetings:

Sizes Available:	**Small to 2XL**
Colors:	**Blue or White**
Pricing:	**$30 per shirt**

$$$ SAVE MONEY $$$

ASHRAE-LI is now offering **Ticket Books** for our Monthly Meeting/Dinner presentations. **$400 for a book of Eleven** (that's right….eleven, one better than ten) tickets for the price of ten member admissions. Tickets are valid until December of 2015 and may be used by members and non-members. For those of you who attend all or most of our meetings and for organizations who normally send large groups to the meetings, this is a great way to save a few dollars and speed up the entry process. For more information and/or to purchase ticket books, **please contact Don Kane at finsec@ashraeli.org or call 631-574-4870**.

CLASSIFIEDS

ELECTRICAL TRAINING CENTER Inc.
65 Elm Street, Copiague, NY 11726
Tel: (631) 226-8021 Fax: (631) 226-8326
www.electricaltrainingcenter.edu

Help Wanted - HVAC/R Instructor

Job Description:

Electrical Training Centers HVAC/R training division is hiring HVAC/R instructors.

Full and part time available to provide instruction with an approved training curriculum and materials in accordance with the state of New York Education department standards.

Enjoy and appreciate teaching in our newly completed state of the art laboratory and classrooms to educate and develop the HVAC/R industries finest & future technicians and installers of Heating, Ventilation and Air Conditioning.

Responsibilities:

Motivate, Educate, Develop and prepare present and future technicians in all aspects of the educational process.

Maintain expertise in subject matters taught.

Provide regular, precise and timely feedback to students and school administration concerning academic progress as well as behavior and attendance.

Job Requirements:

Industry certified HVAC\R technician with experience in residential and commercial applications.

EPA Universal Certification and/or related licenses/certifications preferred.

Prior teaching experience a plus.

Ability to work with other instructors and independently while utilizing excellent communication and emphasis on organizational skills.

Gas and oil burners, controls and wiring a definite plus!

Company Overview:

The Electrical Training Center Inc. was founded in 1998 to meet the ever-increasing demand in today's market for qualified electrical helpers. In 1999, the school was licensed by the New York State Education Department and began their first class in electrical training. In 2003, the school changed ownership and began to expand the curriculums and programs offered at the school. In 2010, the school was granted accreditation from ACCET. The school is presently working towards further expanding the facilities and curriculum. Please visit our Website at: **www.electricaltrainingcenter.edu**

Send resume to: **robert@electricaltrainingcenter.edu** or Fax: (631) 226-8326

ADVERTISEMENTS

ASHRAE Long Island Chapter

PLACE YOUR AD HERE

OR HERE

OR HERE

OR HERE

OR HERE

AN AD OR BUSINESS CARD LISTING IS A GREAT WAY TO GET YOUR COMPANY'S NAME IN FRONT OF THE HUNDREDS OF LI CHAPTER MEMEBERS, AND TO HELP SUPPORT THE CHAPTER'S ACTIVITIES.

If you would like to place an advertisement in the Long Island Sounder, please contact our Chapter Financial Secretary, Don Kane, PE @ 631-574-4870 or by email at finsec@ashraeli.org for further details. Thank you.

Rates (includes all issues September-June):

Business Card	$200	Half Page	$500
Triple Size	$350	Full Page	$800

ADVERTISEMENTS

ADVERTISEMENTS

ADVERTISEMENTS

Advertising Rates:

Business Card	***$200***
Triple Size	***$350***
Half Page	***$500***
Full Page	***$800***