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2021 – Quarter 2

Cover Story

Building Enclosure Inspections

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President's Message

As we move through NEBB's 50th year, we continue to focus on NEBB's training programs for each discipline by offering extraordinary educational opportunities.

The upcoming seminars are filling up quickly. NEBB Tec has been able to host three seminars this year. Take a look at the article in this edition on the build out and progress of NEBB Tec.

Building Enclosure Testing kicked off the seminar streak in April after canceling most of NEBB's 2020 previously scheduled seminars. Testing, Adjusting and Balancing and Fume Hood Performance Testing sold out for both of their seminars in June.

It has been a breath of fresh air to see students flocking to NEBB Tec for educational seminars. Future classes and dates are listed on NEBB's website under the Events tab at www.nebb.org . Now is the time to take a look at the available schedule and sign up before the classes fill up.

In other news, California's Title 24 program is finally taking off with the state mandating certification to perform Mechanical Acceptance Testing on all jobs permitted after October 1, 2021. NEBB has worked tirelessly on their Title 24 training and certification process and has been patiently waiting for the state mandate to be enforced. I was overjoyed with these news and I look forward to celebrating this exciting milestone while in Maui.

The annual conference is approaching faster than any of us can imagine. Before we know it we will be starting our festivities in Kapalua, HI at the Ritz Carlton. Our speakers are set and we are in final planning mode. If you have not registered I suggest doing so now, you do not want to miss this event. I am personally excited and cannot wait to step onto the island. I look forward to greeting each and every one who will be in attendance.

See you in Hawaii!

Amber Ryman

Amber Ryman
NEBB President

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A message from the editor

AUDREY KEARNS

. . . we count ourselves fortunate that we were able to play an important role in our communities.

As we dive deeper into 2021 and we see businesses and life around us re-opening and going back to a new normal, we are all busier than ever.

Even with Covid and many businesses shuttering, we count ourselves fortunate that we were able to play an important role in our communities. We kept buildings safe and prepared others for when they were ready to re-open.

Even with time being precious, the contributors to our magazine made the time to submit informative and knowledgeable articles on electric motors and building envelope inspections. Some, like Silent Killers, were down-right entertaining.

I continue to reach out to industry leaders and contributors to provide us and you, current data in our industry. Feel free to be a contributor and contact us at info@nebb.org. Thank you.

Audrey P. Kearns
Editor

BUILDING ENCLOSURE INSPECTION

By Mike Peak

On February 1, 2021, the new Washington State Energy Code took effect, meaning more general construction companies will be required to request air barrier inspections throughout the installation phase of their projects. Modifications to the code require every commercial building to pass a building enclosure test. For years, the United States Army Corps of Engineers specifications have required this—with more stringent testing criterion.

Since building enclosures are typically enclosure tested when the building is complete, most of the installed air barrier is covered and inaccessible to repair without significant cost. These costs can potentially include schedule delays that bear additional costs to the entire construction project and team. Building enclosure inspections are being listed in the project specifications as a responsibility of the firm conducting the air barrier testing. Therein lies the dilemma: are we ready to provide these services?

NEBB's Building Enclosure Testing (BET) certification concentrates on the physical testing of the building enclosure. We do cover inspections and plan review in the seminars, as well as require some knowledge of the inspection process to pass the certified professional exam. However, inspections lie on the periphery of this discipline, representing only 10 percent of the currently published Building Enclosure Testing body of knowledge.

With increasing pressure on contractors to pass prior to building turnover (at least in Washington state and for United States Army Corps of Engineer projects), the need for competent air barrier inspections

The author, Mike Peak, is a NEBB Certified BET Professional, NEBB TAB Certified Professional and Chairman of the NEBB BET Committee.

THE NEED FOR COMPETENT AIR BARRIER INSPECTIONS WILL BE CRITICAL GOING FORWARD!

will be critical going forward. However, it is unclear if this should be incorporated into the BET certification or if it warrants a separate discipline. On recent projects, this responsibility has been given to the commissioning authority, but what is the typical level of training when it comes to inspecting building enclosures? This is something the Building Enclosure Testing Committee will be discussing in the coming months.

Recently, I became certified as an air barrier auditor through the Air Barrier Association of America (ABAA). The certification included a three-day seminar devoted to inspecting air barrier installations, building science, codes and standards, material selection, and installer responsibilities. It was eye-opening just how in-depth inspecting air barrier installations is.

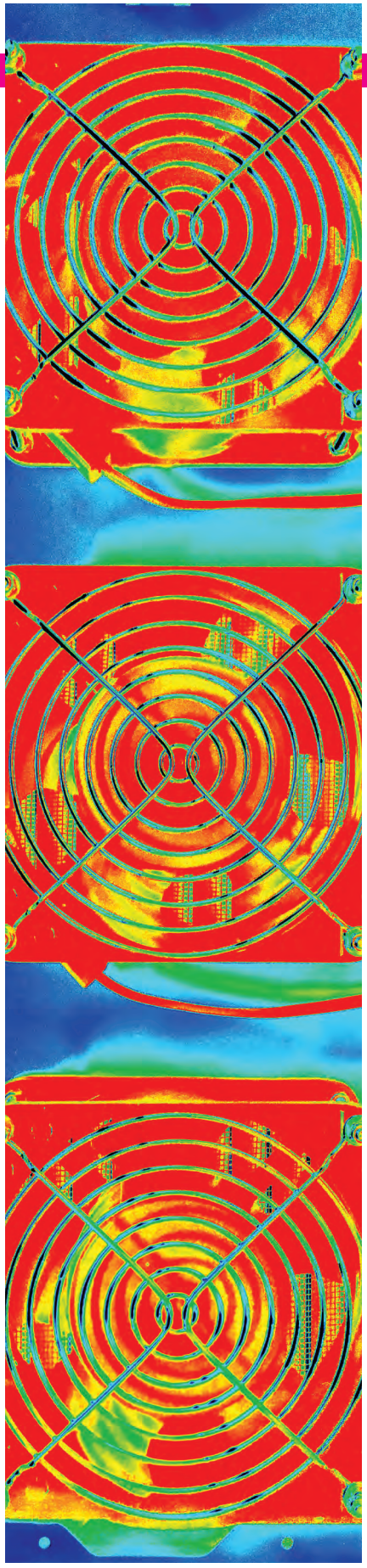
As with most disciplines, a preliminary design review is conducted to determine if there is true continuity in the proposed design. Air barrier drawings are becoming more prevalent but often crude, including blanket clauses stating, "air barrier must be continuous." But, of course, the devil is in the details. The information may be there, but the reviewer will need to sift through multiple—maybe even dozens of—details on the drawings to determine if adequate overlap and continuity is being achieved.

Next, comes submittal reviews. With several different products designed to overlap one another, these products need to be compatible. In addition, weather conditions during installation need to be considered when installing these products to ensure they adhere properly and withstand the building enclosure test.

Once the design and submittal reviews have been completed, project site visits and inspections can begin. One of the main inspections should be coordinated with the first week of wall air barrier system installation. This gives an opportunity to inspect the conditions of the substrate (which should be clean,

dry, and smooth) and see how the wall to floor transitions are going to be flashed. Additionally, it gives a feel for the installation contractor's level of professionalism and workmanship. Is the self-adhered membrane system sufficiently rolled out, or properly overlapped to the manufacturer's recommendations, and installed for water shedding? Is it delaminating in areas? Is the fluid applied system being sprayed evenly and at the proper wet mils thickness for that product? Is it blistering or slumping? Is the spray polyurethane foam being applied too thick to avoid additional passes? Is the proper ratio of resin and isocyanate being used? Are the products achieving proper adhesion? Is the sound attenuating roof decking being properly filled as it travels over the exterior walls? There are many other considerations to be observed during an inspection. In addition, this is a great time to talk with the installers and document everything with photographs.

Some inspections may require a pull test to determine proper adhesion, which can be conducted on any adhered system. Specifications may require testing the density on spray polyurethane foam once it has been installed, which will require pulling a sample, or a report on the dry mil thickness of a fluid applied system after measuring samples. All of this testing will require additional instrumentation and tools.



Follow up inspections may be included in the project specifications and are warranted. This will give an opportunity to see how all the rough openings and transitions are flashed. Determine if the continuity between the walls and the roof is being achieved and how the parapet wall is being addressed. See how the windows are being installed and attached to the air barrier system. Another form of enclosure testing would include window penetration testing, but that is another article. Each inspection should include a site visit report with pictures highlighting deficiencies and commentary with regards to recommendations. These reports will serve as an ongoing journal of how the air barrier systems are being installed and provide insight should a project fail the building enclosure test. It is proven that the projects that have had multiple inspections have some of the best test results for buildings. The previous passing rate of 0.40 CFM/Ft.2 at 75 Pa for the Washington state energy code was predominately passed with a competent design and adequate installation. However, with the new code requirement of 0.25 CFM/Ft.2 at 75 Pa, will likely require multiple inspections to ensure the building passes.

In closing, building enclosure inspections are going to become a significant portion of any project scope for building envelope testing. Be prepared. ●

George B. Hightower Distinguished Service Award Recipient:

Daniel J. Driscoll

On December 19, 2019, the Mid-Atlantic Environmental Balancing Bureau (MAEBA) Board of Directors proudly voted to nominate Mr. Daniel J. Driscoll for the George B. Hightower Distinguished Service Award, NEBB's most prestigious honor.

Created in November 1999, the George H. Hightower Distinguished Service Award was established to recognize those who have made outstanding achievements and contributions to the HVAC industry and the success of NEBB. Just as George H. Hightower played an instrumental role in promoting and positioning NEBB as the respected organization it is today, each Hightower Award recipient has accomplished similarly outstanding feats and acts of service. As you will see below from Mr. Driscoll's long list of accomplishments, he spent the majority of his years volunteering locally and nationally.

Born and raised in Upstate New York, Mr. Driscoll graduated high school in Utica before attending University of Michigan's College of Engineering and graduating with a bachelor's degree in Mechanical Engineering in 1944. Joining Carrier Corporation to pursue a career in heating, air-conditioning and refrigeration, he held several roles in engineering sales and management. He then became a registered Professional Engineer.

Moving over to Peabody and Wind Engineering in 1964, Mr. Driscoll soon became an equity partner. He was also the original founder and first President of Eastern Air Balance Corporation, a division of the firm. Twenty years later, he retired from Peabody and Wind as President and CEO.

Throughout his career, Mr. Driscoll served many industry and technical organizations in many different leadership capacities. His aptitude for volunteering was truly remarkable.

Beginning in 1978, Mr. Driscoll served on the Delaware Valley Environmental Balancing Association (later renamed the Pennsylvania Environmental Balancing Association) founding

Board of Directors. In 1978, he became its President.

In 1978, SMACNA National appointed Mr. Driscoll to serve on the NEBB Board of Directors. He also served on the Pennsylvania Environmental Balancing Association (now known as MAEBA) Board of Directors and became President from 1978 to 1980.

In 1981, Mr. Driscoll became NEBB's 10th National President.

That same year, the Philadelphia SMACNA Chapter Board of Directors established the Melvin J. Wind Award to memorialize its namesake and recognize individuals' contributions to the sheet metal industry. In 1983, Mr. Driscoll was the recipient of this award.

From 1984 to 1985, Mr. Driscoll served as President of the Roofing and Sheet Metal Contractors Association.

Appointed NEBB Field Representative in 1987, Mr. Driscoll was responsible for visiting NEBB chapters needing assistance as well as assessing areas to possibly establish new chapters. The NEBB Seattle Chapter was the first example of this, as a chapter charter was applied for soon after his visit. He served the organization in this role until 1993.

In 2005, the MAEBA Board of Directors voted to establish a memorial award honoring William G. Eads, PE, developer of one of the first TAB training programs' curriculum, and Mr. Driscoll was named the first recipient of the award.

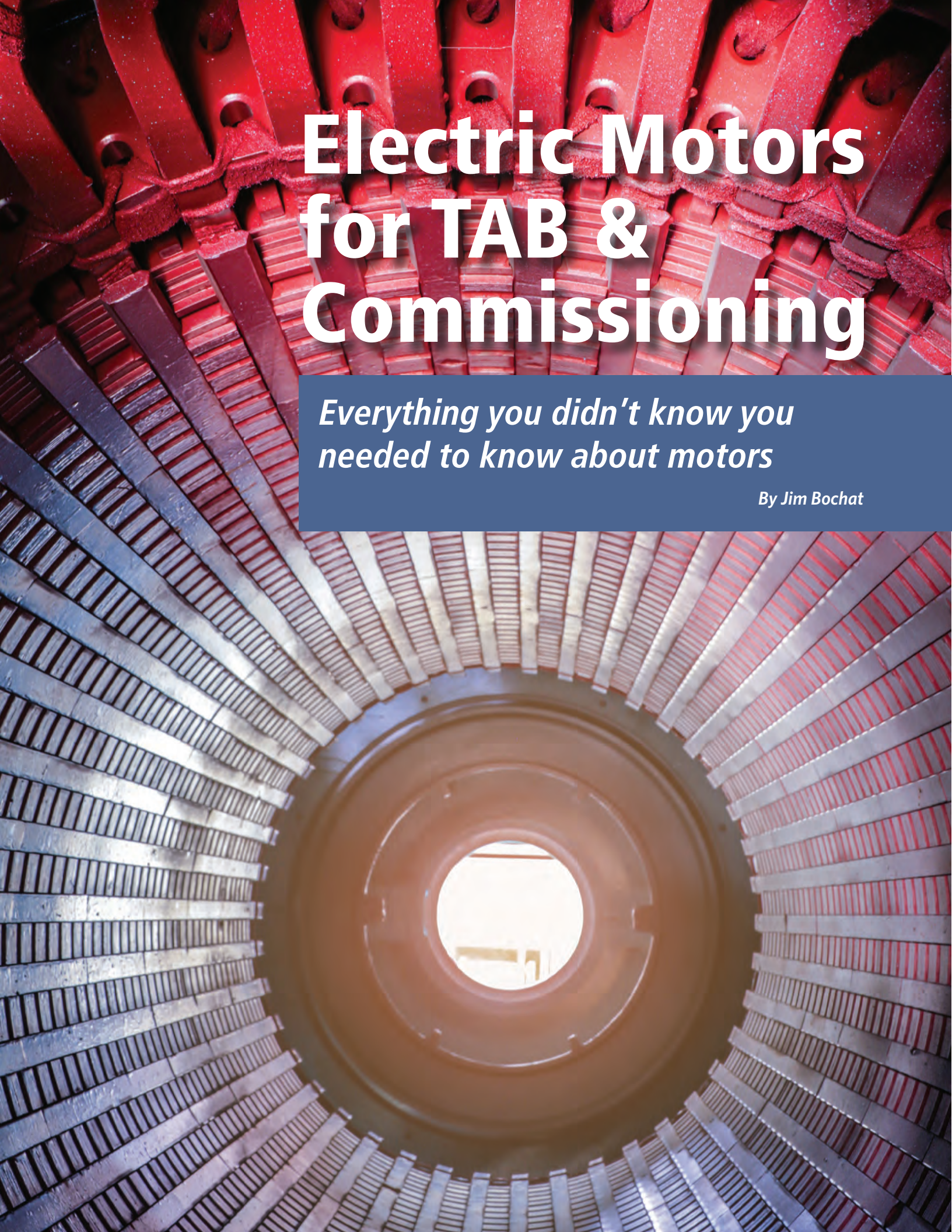
The list of technical and contracting organizations he played a pivotal part in goes on and on. Mr. Driscoll served as President of the Valley Forge Professional Engineers Society, the Subcontractors Association of Delaware Valley, the Roofing and Sheet Metal Contractors Association of Philadelphia and Vicinity, and the ASHRAE Philadelphia Chapter. He was a Panelist in the American Arbitration, a Trustee of The National Energy Management Institute, as well as an ASHRAE Life Member and on the ASHRAE Philadelphia Chapter Board of Governors. He achieved Fellow status in both ASHRAE and SMACNA due to his devotion and contributions to the industry.

In addition to his impressive career, Mr. Driscoll was a proud father of three sons, grandfather of four, and great-grandfather of seven. He was a longtime participant in the Society of Saint Vincent de Paul-Friends of the Poor, and served as Council President in Sarasota, FL. Upon moving to Lansdale, PA, he became active in the Brittany Pointe Residents Association, and served as president from 2003 through 2004.

This long list of accomplishments certainly leaves us wondering how he found time to do it all.

Sadly, Mr. Driscoll passed away July 30, 2020 before the Hightower Award could be presented to him. He was 96 years old. We will always remember his helpful nature and dedication to advancing our industry. ●

The list of technical and contracting organizations he played a pivotal part in goes on and on...



Electric Motors for TAB & Commissioning

Everything you didn't know you needed to know about motors

By Jim Bochat

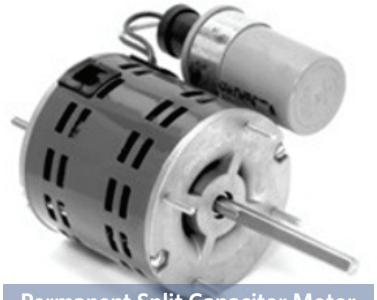
Motors are key to any mechanical system working correctly and are always a major component of any TAB job or Commissioning project. So, it is important that the technician understands the basics of motor operation and control so that if any installation deviates from accepted standard practices the technician will know how to correctly respond.

Let's review the basic characteristics of electric motors and the conditions that effect their correct operation.

1. Motor Types[1]

HVAC **single phase motors** are normally Permeant Split Capacitor, Split Phase, Shaded Pole motors or Electrically Commuted Motors (ECM).

The **Permanent Split Capacitor motor** (PSC) also has a cage rotor and the two windings similar to that of a Capacitor Start Motor but the capacitor is always in the circuit and does not contain any starting switch. The auxiliary winding is always in the circuit and the motor operates as a balanced two-phase motor. The motor produces a uniform torque and has noise free operation.



Permanent Split Capacitor Motor

A **Split-Phase motor** has a secondary startup winding that is 90 electrical degrees to the main winding, always centered directly between the poles of the main winding, and connected to the main winding by a set of electrical contacts. The position of the winding creates a small phase shift between the flux of the main winding and the flux of the starting winding, causing the rotor to rotate. When the speed of the motor is sufficient to overcome the inertia of the load, the contacts are opened automatically by a centrifugal switch or electric relay. The direction of rotation is determined by the connection between the main winding and the start circuit.

Split-Phase Motor

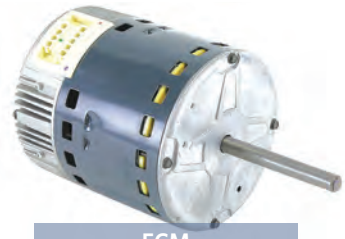
Shaded-pole motors are used in devices requiring low starting torque, such as electric fans, small pumps, or small household appliances. In this motor, small single-turn copper "shading coils" create the moving magnetic field. Part of each pole is encircled by a copper coil or strap; the induced current in the strap opposes the change of flux through the coil. This causes a time lag in the flux passing through the shading coil, so that the maximum field intensity moves higher across the pole face on each cycle. This produces a low level rotating magnetic field which is large enough to turn both the rotor and its attached load. As the rotor picks up speed the torque builds up to its full level as the principal magnetic field is rotating relative to the rotating rotor.

Shaded-Pole Motor

A **capacitor start motor** is a split-phase induction motor with a starting capacitor inserted in series with the startup winding, creating a circuit which produces a greater phase shift (and so, a much greater starting torque) than both split-phase and shaded pole motors.

Capacitor Start Motor

The **Electronically Commutated Motor** (ECM) are single phase motors that are electronically controlled and are equipped with integral electronic controllers that know when to turn on the motor or when to apply more or less power. The controller allows the motor to receive feedback from its environment or external controls. ECM motors can provide variable speed operation. ECM motors are 70% to 83% more efficient than shaded pole or PSC motors.



ECM

HVAC **3-phase motors** are normally Squirrel Cage Induction Motors which have windings for each phase that induce current from the stator coils into the rotor coils causing the rotor to turn. Direction is determined by how the stator phase order is wired.

3-Phase Motor

2. Voltage

In the United States (US), most of the Americas and some parts of Asia, the 60hz voltages are used while most of the rest of the world uses 50hz voltages. There is no easy explanation why the US uses 120V for receptacle power and the rest of the world uses 220 volts except transformers and motors are less expensive for 60 cycles rather than 50 cycles but transmission is easier at 50 cycles. There is not really a direct connection between frequency and delivered power since power is dictated by the formula P=E x I or Watts=Volts x Amps. When dealing with alternating currents, power is affected by circuit impedance and reactance caused by circuit resistance and motor slip. This gets really complicated and leads to very little usable information for us less than physicist types.

My easiest explanation is that if the integral of the sign wave, which is the area under the curves is the same for both a 60hz and a 50hz circuits, power will be the same, if they are not then one will have to change the voltage to keep the power equal. (Store this away for when we talk about VFD's)

For motors in the US prior to 1965 NEMA standards used 110, 208, 220, 440 and 550 volts which are 10% above the lower operating limits. Since 1965 NEMA has used 115, 208, 230, 460 and 575V, but sometimes you will see 120, 208, 240, and 460 volts which are at the top of the operating limits. Single phase motors are normally 115, 208 or 230 volts and three-phase motors are 208, 230, or 460 volts. Of course, there are also higher voltage motors but are not common on HVAC projects. It is important to understand that multiple voltage motors operate at different torque ratings for each voltage, the issue is you must be careful when using a multi voltage three phase motor at 208 volts, you may have to use a true 200 volts motor or use a larger multi voltage motor at 208 volts to achieve the needed torque.

3. Voltage and Temperature[2]

Motor damage can occur when the utilization voltage is significantly different than the voltage for which a device is rated. Overvoltage is a condition that, per the listed standards, begins with a voltage 10 percent above the rated motor voltage. Higher output or efficiency cannot be achieved by supplying a higher than nominal voltage to the motor. The motor will convert this extra energy into heat instead of usable output such as torque. The heat accelerates the degradation of the insulation and bearing systems.

While overvoltage can degrade equipment, constant undervoltage does more harm and greatly impacts equipment performance and reliability. To drive a load, a motor must have enough power to overcome the torque required by that load. Motor power is calculated by voltage x current, otherwise known as Ohm's Law. So, if voltage drops, the current must increase to maintain enough power to transfer the required torque to the driven load. This increase in current causes excess heat to be generated which, over time, can lead to premature motor failure like that seen in overvoltage. A good rule of thumb, per NEMA, is that for every 10-degree rise in motor temperature, motor life is reduced by half.

Motor insulation is rated by standard NEMA classifications according to maximum allowable operating temperatures. See Table 1.

Table 1 - Motor Insulation Class

Class	Maximum Temperature*
A	105°C (221°F)
B	130°C (266°F)
F	155°C (311°F)
H	180°C (356°F)

Generally, replace a motor with one having an equal or higher insulation class. Replacement with one of lower temperature rating could result in premature failure of the motor.

Table 2 - Effect of Under / Over Motor Voltage

Motor Characteristics	90% of Nameplate Voltage	110% of Nameplate Voltage
Starting & Running Torque	-19%	+21%
Percent Slip	+22%	-19%
Full Load Slip	-0.2% to -1.0%	+2.0% to +1.0%
Starting Current	-10%	+10%
Full Load Current	+5% to +10%	-5% to -10%
No Load Current	-10% to -30%	+10% to +30%
Temperature Rise	+10% to +15%	-10% to -15%
Full Load Efficiency	-1% to -3%	+1% to +3%
Full Load Power Factor	+3% to +7%	-2% to -7%
Magnetic Noise	Decrease	Increase

The equation for synchronous speed is

$$\textbf{Speed} = \frac{\textbf{Frequency x 120}}{\textbf{\# Poles}}$$

Table 3 - Motor Speed RPM

Motor Type	50HZ	60HZ	Synchronous
Two Pole	2,850	3,450	3,600
Four Pole	1,425	1,725	1,800
Six Pole	950	1,140	1,200
Eight Pole	700	850	900

4. Speed

Motor speeds are dictated by the number of poles for each phase in a complete rotation of the rotor. A two-pole, three phase motor actually has 6 poles or 3 sets of poles at 120 degrees apart. This creates a rotating field at the same frequency as the AC power, if operating on 60Hz, the field rotates around the motor 60 times per second. The synchronous speed (no slip, so no current induced in rotor so no torque) of a 60-cycle motor would be 3,600 rpm. A 4-pole, 60 cycle single phase motor has 4 poles and a synchronous speed of 1,800 rpm. But in order to create initial torque to start the motor, the single-phase motor must have another set of windings with lower inductance creating poles in between the stator windings that are slightly out of phase so as to create a rotating field at startup. These auxiliary starter windings are not counted as poles.

The equation for synchronous speed is

$$\textbf{Speed} = \frac{\textbf{Frequency x 120}}{\textbf{\# Poles}}$$

Table 3 indicates synchronous speeds and actual common speeds of motors. Please note the actual speed is the results of the motor losses subtracted from the synchronous speed which include friction losses (Bearings) and motor slip from the total torque. The difference between the synchronous speed of the electric motor magnetic field, and the shaft rotating speed is slip - measured in RPM or frequency. This value also represents the efficiency loss of the motor; thus, each efficiency grade of motor will have a different slip or actual speed. That why you may see name plate data of 1,780, 1,750, 1,740 or 1,725 for an 1,800 RPM motor.

5. Service Factor

The service factor (SF) is a measure of continuous overload capacity at which a motor can operate without overload or damage, provided the other design parameters such as rated voltage, frequency and ambient temperature are within norms. Typical service factors are found in Table 4.

Table 4 - Motor Insulation Class

Class	Maximum Temperature*
A	105°C (221°F)
B	130°C (266°F)
F	155°C (311°F)
H	180°C (356°F)

6. Horsepower & Torque

Torque is equal to the force applied, its distance from the axis of rotation (radius) and the angle (θ) at which the force is applied and is derived by the formula: t = f (r sin θ) Torque indicates how much work is performed, but it shows nothing about how quickly that work is completed.

Power is the rate at which torque (work) is performed over time and is derived by the formula:

$$p = t/time$$

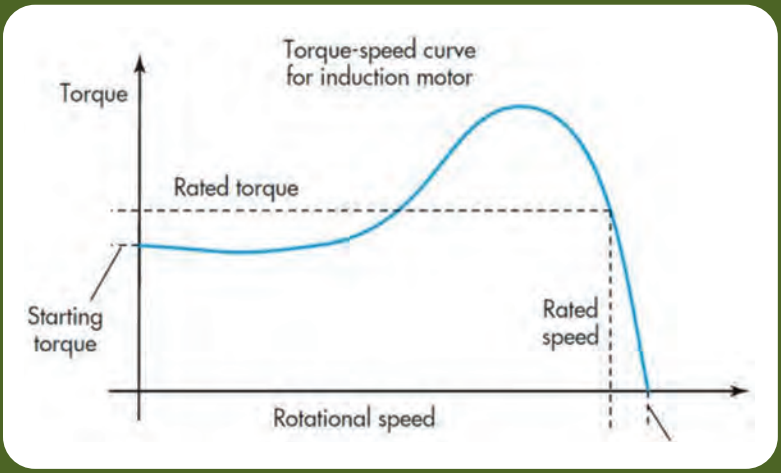
Horsepower is related to torque by the equation:

$$HP = \frac{\text{Torque (Lb/Ft) x RPM}}{5{,}250}$$

Based on this relationship, torque must double if HP is to remain constant when speed is reduced by half. To produce the same HP at the lower speed, a motor has to do twice as much work per rotation, which requires twice as much torque. That is why the shaft and frame of a 900-rpm motor are usually larger than those of an 1,800-rpm motor of the same HP.

Exactly 746 watts of electrical power will produce 1 HP if a motor could operate at 100% efficiency, but of course no motor is 100% efficient. A 1 HP motor operating at 84% efficiency will have a total watt consumption of 888 watts. This amounts to 746 watts of usable power and 142 watts loss due to heat, friction, etc.

Figure 1. Induction Motor Torque vs Speed Curve



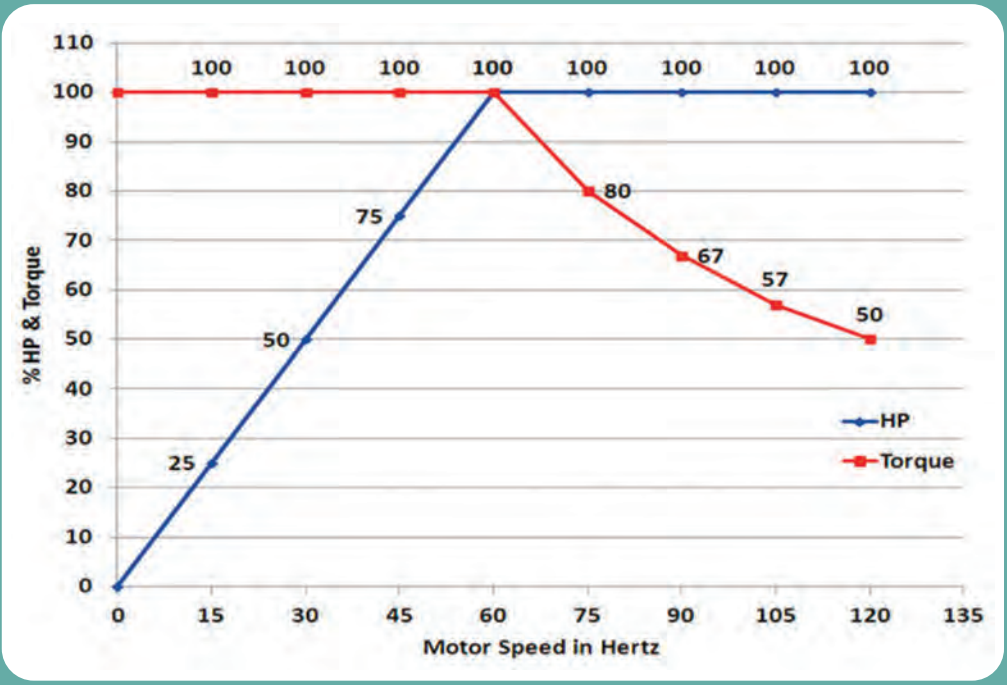
7. Variable Speed with a VFD[3]

When the speed of an AC motor is controlled by a VFD, HP or torque will change depending on the change in frequency. Figure 2 provides a graphical illustration of these changes. The X axis is motor speed from 0 to 120 hertz. The Y axis is the percent of HP and torque. At 60 hertz (base motor speed), both HP and torque are at 100 percent. When the VFD reduces frequency and motor speed, it also reduces voltage to keep the volts/hertz ratio constant. Torque remains at 100 percent, but HP is reduced in direct proportion to the change in speed.

At 30 hertz, the HP is just 50 percent of the 60hertz HP. The reason this occurs is because the total torque produced per unit of time is also reduced by 50 percent because of fewer motor rotations. You

VFD

Figure 2. HP and Torque Changes with Change in Frequency



can use the HP and torque equations to verify this relationship.

When a VFD increases frequency above 60 hertz, HP and torque do a complete flip flop. HP remains at 100 percent, and torque decreases as frequency increases. The torque reduction occurs because motor impedance increases with increasing frequency. Since a VFD cannot increase the voltage above its supply voltage, the current decreases as frequency increases, decreasing the available torque.

Theoretically, torque is reduced by the ratio of the base speed to the higher speed (60 hertz / 90 hertz = 67 percent). In real applications, other factors can reduce the actual available torque well below the theoretical values shown in Figure 2. These include increased bearing friction, increased fan loading and additional rotor windage. A motor's full-load torque must be derated when operated at speeds above 60 hertz. Typical manufacturers' derating guidelines suggest using the base frequency to maximum frequency ratio for speeds up to 90 hertz. At speeds above 90 hertz, the square of the ratio is often used.

What this means is as you speed up a motor above 60 HZ the motor torque goes down, motor horsepower stays the same but the load of the fan or pump and friction is actually going up and will require more torque or horsepower to operate. There are other concerns as well for over speeding a motor:

- Standard motor bearings are rated for a maximum 3,600 RPM so unless your motor has magnetic bearings or special high-speed bearings do not speed up a 3,600 RPM motor.
- Overspeed motors may have rotor dynamic balance issues or critical speed vibrations that did not appear at or below 60 HZ.
- Operating at overspeed RPM's will reduce the life of the motor bearings, the driven machine bearings, drive belts and increase maintenance of the system.
- Operating above 60 HZ speed will increase static electrical discharge on the motor shaft

8. VFD Damage to Motor Bearings

VFD's induce shaft voltages on the motor shaft caused by the extreme voltage spikes from the insulated gate bipolar transistors (IGBTs) which produce the pulse width modulation used to control AC mo-

tor. The higher the carrier frequency (1,250 to 15,000 cps) of the drive the more voltage is induced to the shaft. Eventually the voltage buildup on the shaft exceeds the dielectric properties of the bearing grease and arcs across the bearing, micro machining the bearing race. Eventually causing the bearing to fail, this happens much faster if the motor speed is not varied very often. I have seen new motors fail within three months from this issue.

No matter what your drive vendor tells you this cannot be mitigated by any drive feature; it must be corrected at the motor.

There are four common techniques that can minimize or eliminate this bearing damage caused by these ground currents and every VFD controlled motor should have one of the following devices to protect the motor:

1. **Faraday shield** is an electrostatic shield built inside the induction motor (ESIM) which reduces voltage levels on the shaft below the dielectric breakdown.

Faraday Shield

2. **Insulated bearings or ceramic bearings.** Insulated or ceramic bearings eliminate the path to ground through the bearing for current to flow.

3. **Shaft Ground Ring.** A shaft grounding ring (SGR) uses a conductive micro fiber brush, creating a low impedance path from the motor shaft.

4. **High Dielectric Bearing Grease.** Though not an actual solution to the problem of high voltage on the motor shaft, high dielectric grease can help prevent serious damage from the voltage build up if it is not significantly high or as an interim repair until other solutions can be implemented.

Hope this information helps some of you when dealing with motor issues in the field.

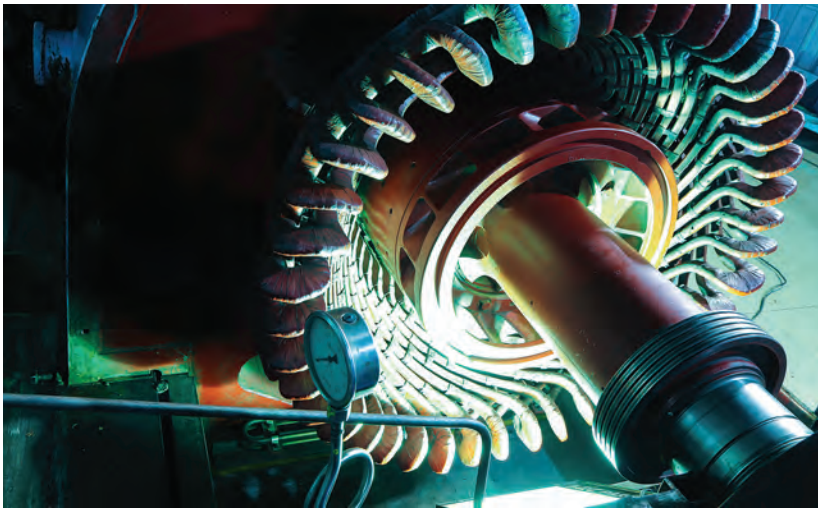
Thanks for reading. ●

About the author

Jim Bochat is a regular contributor to The NEBB Professional. He is a NEBB Certified Professional at KFI Engineers in Arizona with certifications in Building Enclosure Testing, Technical Retro-Commissioning of Existing Building Systems, Testing, Adjusting and Balancing of Environmental Systems and Whole Building Technical Commissioning of New Construction.

References:

1. https://en.wikipedia.org/wiki/AC_motor
2. https://www.piprocessinstrumentation.com/pumps-motors-drives/article/15563640/how-to-specify-motor-voltage-for-better-performance-and-longer-life
3. https://www.pumpsandsystems.com/pumps/motor-horsepower-torque-versus-vfd-frequency



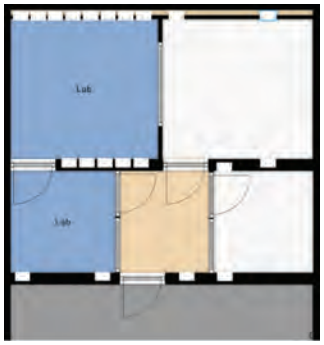
NEBB TEC FIT-OUT

by Peter Rawls, P.E., NEBB CP – NEBB Technical Director

After many years, NEBB has started the process of finishing our Teaching Lab, NEBB TEC. The lab is located adjacent to the education room at the NEBB Headquarters in Gaithersburg, MD, and is slightly less than 1000sqft. The lab and will house a cleanroom suite including a working fume hood, bio-safety cabinet, laminar flow bench, and isolator.

The goal of NEBB TEC is to be a teaching facility for all our disciplines as well as testing when needed. It will house hydronic and air rigs, along with a full controls system. We have been blessed to have much of the instruments and equipment donated, and we are still finalizing all the systems and contractors to install the equipment. Stromberg Metal Works has taken the lion's share of the project by donating the ductwork and devices as well as the install throughout the lab space. We are very thankful for their hard work and generous donation.

Any questions concerning NEBB TEC can be directed to the Technical Director at pete@nebb.org. ●



NEBB TEC Cleanroom Floorplan

Current NEBB TEC Education room.

Ductwork and partial in-wall return installation.

1 of 2 fume hoods to be permanently set in place after finishes are complete.

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Silent Killers of Energy Performance

By Andrew Boyd

Medical professionals describe high blood pressure as the "Silent Killer". With no obvious symptoms, negative consequences occur if not treated. Similarly, I believe that there are numerous "Silent Killers" of energy performance in buildings; conditions where occupants are not whining but utility bills are higher than they should be. Here are a few of my favorites:

It's a Beatiful Morning

(*with apologies to The Rascals*) It's 60 degrees and 50% relative humidity when you, as the building manager or controls technician show up early to work. After your Starbucks, you should check to make sure the outside air dampers are wide open, as are the relief dampers, and the mixing damper is closed. Hot and Cold coils should still be sleeping in their "off" position. If not, there could be something amiss with the economizer cycle. This is a perfect opportunity for the building HVAC system to take advantage of free cooling, flush the building with lots of fresh air, and reduce fossil fuel use. Time for some sleuthing if the settings are not as described.

Under Pressure

(*with apologies to David Bowie*) The consensus among mechanical engineers is that a building should be under slight positive pressure to prevent infiltration. A few wise apostates may argue in climate zones 5 and above during the heating season it should be negative to reduce moist air condensing in the walls – but I digress – and a trip to Key West during February with libations may cure them of this delusion. Awareness of building

Andrew Boyd is a regular contributor to The NEBB Professional. He is a licensed architect for NAVFAC and is a NEBB industry representative.

pressure, both direction and force, will help discover potential problems.

I like to carry an inexpensive manometer during building surveys, or being my forgetful self, grab a strip toilet paper from the restroom as a sophisticated visual indicator. Check differential pressure at ground floor entrance doors and vestibules, noting readings that suggest poorly sealed vestibules. A quick check at stair towers can give an indication of stack effect; if egregious go up and remove the wedge at the roof penthouse door that maintenance folks used when they forgot the key.

Look for excessive pressure in the building and confirm if so, that the static duct pressure is excessive at the controls front end. If VFDs are running wide open, investigate. If the building pressure is neutral with the VFDs in this condition, it could be a sign of a very leaky building enclosure. Poor building pressure control could also indicate poor coordination of the sequence of operation with supply, return, and relief fans.

You have probably had the experience of trying to open the door of your local pizza joint and finding it an unexpected test of your manhood as you struggle to enter. Obviously, the hoods are not balanced, and conditioned air is vainly trying to provide make-up air. Buy a pitcher, invite the manager over, and suggest he or she consider upgrading to a more efficient hood system that balances exhaust with outside air, and uses a VFD to vary the fan speed depending on load. The energy savings – not to mention January customer comfort -may result in free pitchers for life.

Be Still Beating My Heart

(*with apologies to Sting*) Ever been in the mechanical room with its low murmur of running machinery when you are suddenly startled by the staccato rhapsody of the air compressor kicking on for the pneumatic lines? Typically, I am crouched under a large strainer valve when my head jerks up. Make a mental note of the run time of this device, since longer run times suggest air leaks in the system. Electric motors use around half of all electric energy in the US, and starting amps create a stressful load on the electrical system each time the motor starts. One building we surveyed had a compressor that never ceased running, not only adding its KW load but also the latent energy load for the constantly dripping condensate.

Wide Open Spaces

(*with apologies to The Chicks*) Our team was called to a LEED certified building with excessive propane use in primarily the swing seasons. The facility had a high-bay maintenance area for vehicles, with large garage doors, conveniently facing South. On a beautiful sunny spring or fall day with temperature in the high 50's the crews put on their light fleece sweaters and worked with the doors open to enjoy the wonderfully comfortable conditions. The poor space thermostat, however, did not find the conditions so salubrious and insisted on trying to heat the entire county. A simple cut-off switch to disable the heating system when the door was open solved the problem. The design of the building was fine, and the system was highly efficient – but the designers did not fully realize the irrationality of the human occupants.

I Can See Clearly Now

(*with apologies to Jimmy Cliff*) I once sat in a cubicle with an attractive window which was perfect for daydreaming and forgetting meetings. During the winter months, from approximately 9:00 to 11:30 AM there was excessive glare on my monitor, and I had to pull the shades down. After lunch I raised them. With the adequate natural light, I turned off the overhead lights and saved energy. The occupant of the adjacent cubicle enjoyed the natural light spring through fall, and then closed the shades when the dreaded winter glare arrived. The shades stayed down for the next year, and he turned on the overhead lights to compensate, usually forgetting to turn them off when leaving for the day. It is hard to change human behavior without the lash and withholding grog but building managers and occupants should be encouraged to use window shades to control temporary glare only as needed and enjoy natural light and views both for mental health and energy savings.

I have also found several instances at double-hung windows of insidious energy pirates. As an architect, these wonderful 17th century inventions are a great part of the design tool kit. Hard to imagine Monticello without them. Before air conditioning, lowering the upper sash could provide much needed ventilation while keeping the lower portion of the opening sealed from rain. Traditionally they were controlled with weighted sash cords; current windows typically use springs to control position. Too often the springs weaken or the cords release, and the upper sash sags permanently from the closed position. Those attractive window treatments often hide the sin. When surveying a building with double-hung windows, make sure to reach above the upper sash, especially on cold days. You may want to bring your gloves.

Coda-Simple Gifts

(*with apologies to the Shakers and Aaron Copeland*) Lowering your blood pressure is elementary simple. Just reduce your weight, exercise more, stop smoking, drink less alcohol, and reduce stress. Simple – even in a pandemic. Easy for all of us - right.

Examples of energy silent killers like those above are insidious in part because they are so easy to correct and because they are top-right quadrant of the Eisenhower Decision Matrix. A roof leak at the CEO's office, top-left quadrant, gets fixed right away (Important and urgent). A poorly controlled VAV with simultaneous chilled water and reheat may be locked in a duel of energy profligacy resulting in a draw but have comfortable space temperatures. Top-right quadrant (important but not urgent) – and may never get addressed. ●

To get serious about reducing energy use and addressing global warming, not only address the obvious major efficiency system flaws and the "low hanging fruit," but do some sleuthing for those less obvious gremlins.

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WAR STORIES

This story starts with my team being asked to balance two new dry coolers that were recently added to a client's system. And ends with the modification of the entire mechanical system. The system was part of a data center that had twenty-four dry coolers (forty-eight total circuits) installed with a bi-directional piping configuration for the mechanical plant. Due to the system utilizing dry coolers as a means of heat rejection, the glycol/water system had the ability to do both mechanical cooling and economizing, if ambient conditions proved favorable. The pump package included eight total pumps installed on two separate skids. Of the eight pumps, only four pumps were needed to provide the design flow and were controlled by four differential pressure transducers. In the data center world this is known a 2N configuration (See Figure 1). As an added advantage the Chief Engineer could monitor and trend the pump skid power consumption from the VFD's via MODBUS to the BMS. This was going to play a vital role in the reporting energy savings to the client.

In the Nashville, Tennessee area, the typical average summer ambient temperature highs are 95˚F / 35˚C. In the previous year, the area was experiencing temperature's that were near 105˚F / 40.5˚C for several consecutive days. In addition to abnormally high ambient temperatures, the facility had added additional IT equipment which caused an increase in the electrical and mechanical load. These conditions caused an increase in the supply and return condenser

War Stories is a new NEBB Professional quarterly column. The articles submitted have been by a regular contributor, William Bailey.

If you would like to submit your own War Story for this column, please send your draft or inquiries to the editor of the magazine at info@nebb.org.

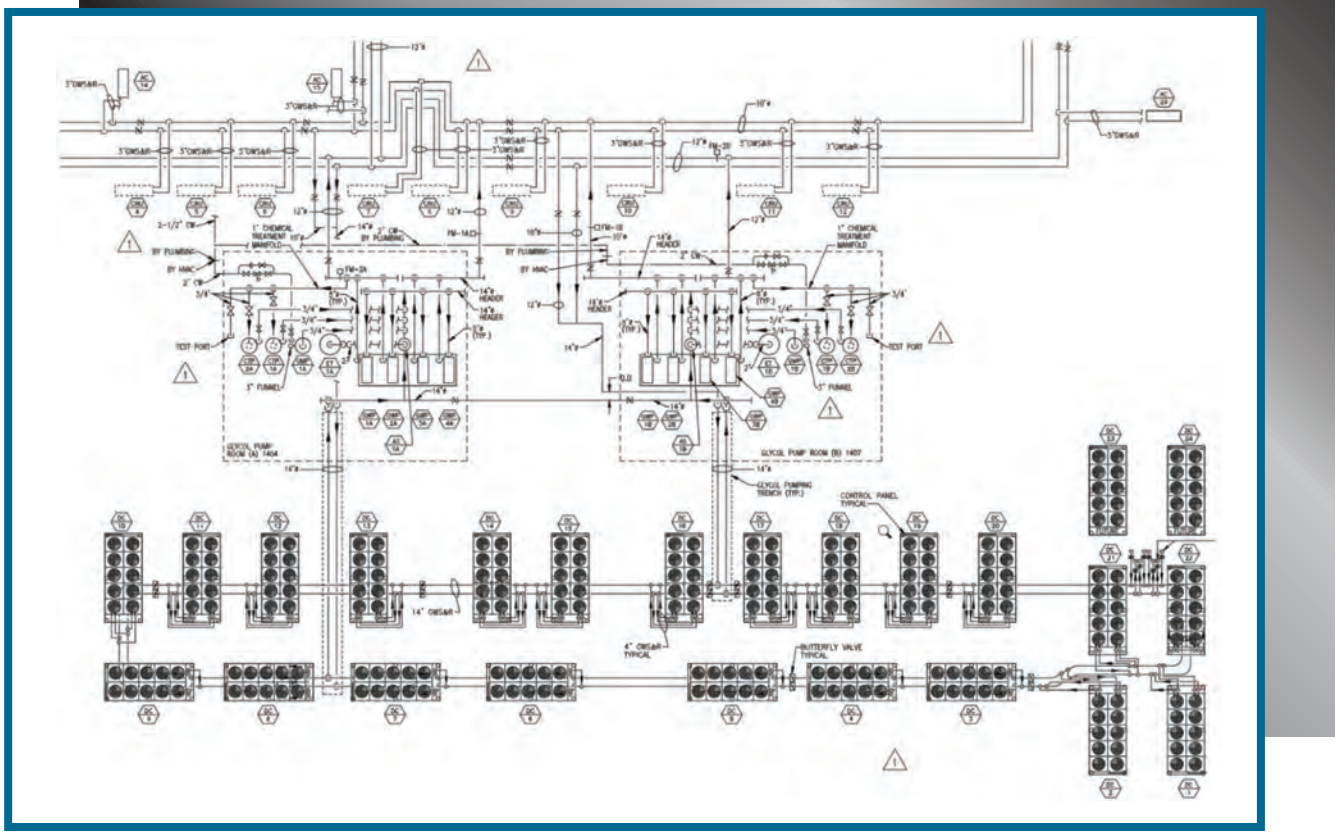


Figure 1

water loop temperatures, which had an adverse effect on the compressors in the heat pumps. The data center corporate management team did not want to continue to see this issue, so additional dry coolers were added to help maintain the loop temperature at or near the ambient conditions for leaving water.

With the new dry coolers installed, we scheduled a site visit and set the flow rate for the dry coolers as requested by the Engineer of Record. When we arrived to perform TAB, the balancing valves were in a closed position with the manual isolation valves in a full-open position. When we started opening the balancing valves, we could hear a high velocity of the water rushing through. This seemed very unusual. We closed the balancing valve for the new dry coolers and went to investigate. We reviewed the current settings of the existing dry coolers from the original mechanical installation. The dry coolers were balanced by using 2" plug-cock valves. We reviewed the TAB report from the original installation which indicated the dry coolers were set to design water flow at a differential pressure of 9' through the Pressure / Temperature (P/T) ports.

We discovered that the entire dry cooler farm was adjusted around 40% open (60% closed). At this point, we went back to the chief engineer and asked if he was aware of the dry cooler farm being throttled down 60% for each dry cooler. We explained that this would need to be addressed as this was causing increased head and a decreased GPM flow to the pump packages. He was informed that we felt that the piping configuration should allow the system to be somewhat self-balancing if all plug-cock valves were to be opened 100%. Furthermore, once we opened all the plug-cock valves, we would need to review the system. Then, the dry coolers and the Liebert Computer Room Units (CRU) that are served by the same condenser water loop would be balanced. Since the condenser water system was serving a mission critical data center; adjustments could not be made that day. The recommendations made needed to be discussed by the corporate management team and the work would be scheduled during the proper data center safe-time hours.

Once we gained the approval from the corporate management team, it took about an hour to open all for-

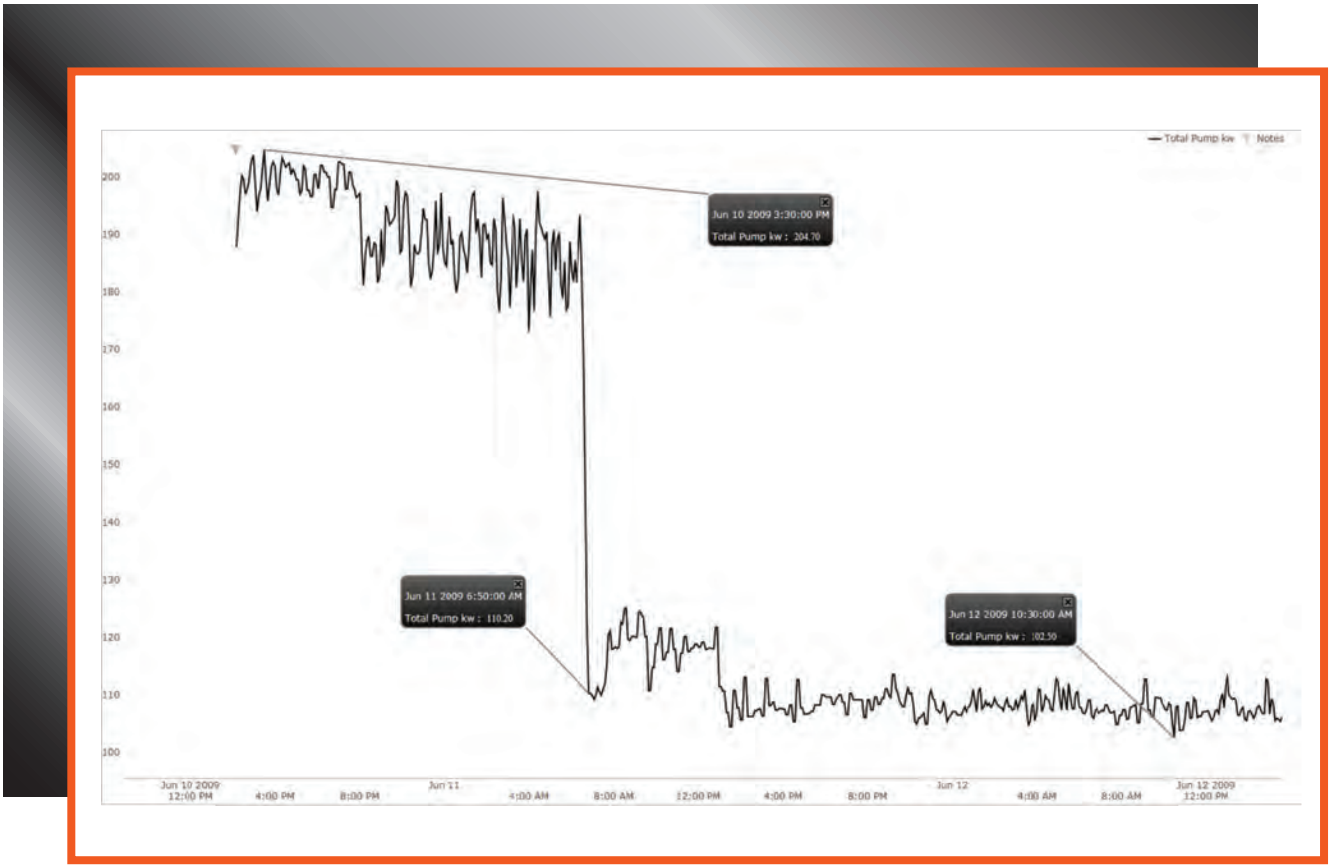


Figure 2

ty-eight (48) balancing valves serving the dry coolers. Removing the restrictions resulted in a lower required system pressure allowing the pump VFDs to slow down. Figure 2 is a snapshot of the BMS trend after about an hour of opening all the dry cooler balancing valves. What is shown, is over a 24-hour period the peak energy consumption of the system pumps peaked at 204.70 kW and dropped to a minimum of 102.50 kW. The average energy savings was later calculated to be 82 kW, a $43,099.20 yearly savings on the electricity bill. Once we had gone back to review the data from the dry coolers, we found that every dry cooler was within design by less than 1' of head-loss from each other. The next recommendation we made to the chief engineer was to consider removing the plug-cock valves. A 2" plug-cock valve has an actual opening the size of your pinky finger which causes additional system pressure loss.

After balancing the dry coolers, we proceeded to each Liebert Computer Room Unit (CRU) to verify the hydronic balancing. We needed to verify the key systems had at least one 100% open balancing valve and that a minimum number of balancing valves was throttled (closed) down. After all the balancing valves to the Liebert's were set, the loop DP set point was adjusted from 16 PSI down to 8 PSI. This in turn helped over all pump energy consumption as well.

The project was tricky to balance since the systems were active on a fully functional datacenter and we could not risk having any portion of the system go down, allowing servers to exceed maximum temperatures. This war story helps to remind us that a properly balanced hydronic system can save energy and perform better. Understanding piping systems and the design intent is key to doing a proper balance of a hydronic system.

We hope this has been helpful and gives you something to think about when discussing opportunities to help save energy for Data Centers and other types of facilities.

Thanks

William C. Bailey
TEBB Chapter ●

TheTOOLBOX

Instrument Calibration

by Peter Rawls, P.E., NEBB CP – NEBB Technical Director

REQUIRED INSTRUMENTS

NEBB Certified Firms are undoubtedly familiar with the Required Instrument Lists for each of the discipline firm certifications. The lists include instruments that are essential for performing each function listed in the discipline procedural standards, along with a required range, accuracy, resolution, and any special calibration information. These instruments and their parameters are developed by the respective NEBB Discipline Committees and reviewed each year by the Board of Directors for approval. NEBB requires that each Certified Firm have one (1) set of calibrated instruments for any disciplines the firm is certified in. This Toolbox will address the calibration aspect of the required instruments, but first, here are some general items to note about the required instruments:

1. Instruments required can be submitted for more than one function and across several disciplines. For example, you do not need to and should not claim different instruments to read amperage and voltage across TAB, Cx and RCx disciplines provided they meet the required list parameters. For example, not all multi-meters meet the required accuracy for both amps and voltage, but many do. Typically, the manometer used to measure air pressure can also be used for air velocity with a pitot tube or airfoil. There is no need to list a different air velocity meter. **Note that an RVA does not meet the revised January 1, 2022 required instrument list. That does not mean it cannot be used by the NEBB Certified Firm (NCF) for velocity readings at a grille or register. Only that it does not meet the required list which is clarified to be for duct traverse velocity readings with a pitot tube.*

2. The instruments listed are the **MINIMUM** required and the only instruments required to be NIST Traceable for NEBB certification and recertification. As stated in a previous article, use the right tool for the job. There are many instruments available that serve a purpose that may be more efficient and appropriate than your required calibrated set.

3. Some firms elect to keep a "Sheltered Set" of instruments that are used strictly for in-house calibration or, more precisely, verification of calibration. Some instruments can be calibrated in the field and some will have to be be sent to a certified calibration lab or returned to the manufacturer. The Sheltered Set is not taken out of storage to save them from typical field bumps and drops that may affect calibration. While this practice does meet the requirements of NEBB, it may not be accepted as "calibrated" for all projects. Those needs should be verified for each individual project.

NEBB requires 1 set of calibrated instruments for any discipline the firm is certified in.

From the *NEBB Procedural Standard for Testing, Adjusting, and Balancing of Environmental Systems: Section 4. STANDARDS FOR INSTRUMENTS AND CALIBRATIONS, Paragraph 4.2 RANGE AND ACCURACY.*

"Firms with multiple sets of instrumentation shall comply with either of the following conditions as a minimum requirement for NEBB certification:

a. Calibrate all instrumentation used by the firm on TAB projects in accordance with NEBB Instrument Requirements as listed in the NEBB TAB Required Instrumentation List.

OR

b. Maintain a complete set of calibrated instrumentation used for comparison with regularly used instrumentation. Instruments shall be calibrated in accordance with NEBB Instrument Requirements as listed in the NEBB TAB Required Instrumentation List. Periodic checking of regularly used instrumentation against the calibrated set shall be performed. Acceptance criteria for the results of the comparisons are the responsibility of the NEBB Certified TAB Firm and Professional. "

NATIONAL METROLOGY INSTITUTES

National Metrology Institutes (NMI) are organizations that maintain national measurement standards and provide services that link their country or region's measurement system to the International System of Units (SI). NMIs exist throughout the world as a baseline for calibration in their region. They house the most accurate measures that can be calibrated or verified to. NMI's exist internationally under different names such as National Institute of Standards and Technology (NIST; USA), National Measurements Institute (NMI; Australia), The Standards and Metrology Institute for Islamic Countries (SMIIC; located in Qatar) and National Metrology Institute of Malaysia (NMIM; Malaysia) to name a few. For a list of NMI's for other countries, follow this link: https://www.nist.gov/iaao/national-metrology-laboratories.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

The National Institute of Standards and Technology (NIST) is a government organization housed under the U.S. Department of Commerce. Congress established NIST in 1901 to combat then industrial rivals such as the United Kingdom and Germany. At 110 years old, it is listed as one of the oldest physical science laboratories in the United States and serves as its NMI. NIST Quality system for calibration and measurement is based on ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories which is the International Reference for testing and calibration laboratories.

CALIBRATION

In the upcoming 2022 Required Instrument Lists, the calibration note has been modified slightly to read:

"Instruments require a 3-point calibration, traceable to National Institute of Standards and Technology (NIST) or National Metrology Institute (NMI) unless noted otherwise."

What does this statement mean for an NCF?

NIST TRACEABLE

NIST Traceability or Traceable, is a physical chain of calibrations that can be traced back to the NMI. For example, in the USA, NIST in Gaithersburg, MD houses a calibrated instrument that sets the standard for what 0-100% relative humidity and 0-100°F (more or less) is. A calibration laboratory will deliver their in-house RH/T device, that is used to produce and measure those conditions for calibration, to NIST Laboratories in Maryland. NIST will calibrate the delivered instrument to their standards of %RH and °F. Once the NIST has completed their work, the calibration laboratory's RH/T instrument is now calibrated and traceable back to NIST.

Next, a NEBB TAB firm delivers their RH/T measurement instrument to the calibration lab where is it first verified as "in or out" of tolerance by comparing it to their NIST Traceable RH/T device. If the instrument is within tolerance, it passes and is certified as calibrated and is NIST Traceable. If the instrument is found to be out of tolerance, the lab can attempt to calibrate it by adjusting is programming back into tolerance or it may have to be delivered back to the manufacture for repair or calibration. Not all instruments can be calibrated by a local certified lab and may require a trip back to the manufacturer, or a possible replacement.

Calibration labs and equipment manufacturers can be accredited on a company level as meeting ISO/IEC 17025. There are also different accreditation programs such as

Photo Courtesy of Cat Lab, Providence Forge, Virginia

American Association for Laboratory Accreditation (A2LA) which uses ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories conformance as their baseline while adding its own competency guidelines for accreditation. All these accreditations include NIST Traceable as part of their process.

3-POINT CALIBRATION

3-point calibration was a documented requirement of NEBB at one time but had been removed. This requirement will be reinstated for all submissions for 2022 certification or recertification cycles. In explaining NIST Traceable above, it should be noted that it does not state the means and methods by which an instrument is calibrated. Only that it was calibrated by an instrument using the NIST chain of traceability. An instrument can meet NIST Traceable requirements and only have one point (%RH, °F, 1psig, etc.) verified, which may be adequate in certain instances, but will not meet NEBB requirements. 3-point calibration means that instead of verifying a single point within the instrument's range of accuracy, the calibration lab certifies three separate points to be within tolerance, providing a linear verification. NEBB does not specify the three points, only that it should be a verification of a high, mid, and low point in the normal operating range of use. These three points should be determined between the calibration laboratory and the NCF. For some calibration laboratories, three points is the standard procedure, however this needs to be verified and requested, as necessary.

Not all instruments will require 3-point calibration and will be noted on the 2022 Required Instrument List. Among these are Particle Counters and Aerosol Photometers used for Cleanroom Performance Testing as these instruments are calibrated across several different ranges.

HOW DOES THIS AFFECT THE NCF INSTRUMENT SUBMISSION?

When the NCF submits instruments to their Chapter for approval, the following items need to be shown on the uploaded calibration sheet(s):

1. The calibration sheet(s) must include terms of Traceability. This can include any of the following: Calibration is NIST Traceable, Traceable to NMI, Traceable to International Standards of Measurement (SI), or the similar. But calibration must state traceable as included, not as an unchecked option. Refence to ISO/IEC 17025:2017 is acceptable as it includes Traceability to an NMI.

2. The calibration sheet(s) must include the three points that have been verified or calibrated to as well as the normal calibration instrument information.

Any questions concerning Instrument Lists and their requirements can be directed to the Technical Director at pete@nebb.org. ●

Chapter News

Capital-MarVa Chapter

Barbara Huber, Chapter Coordinator

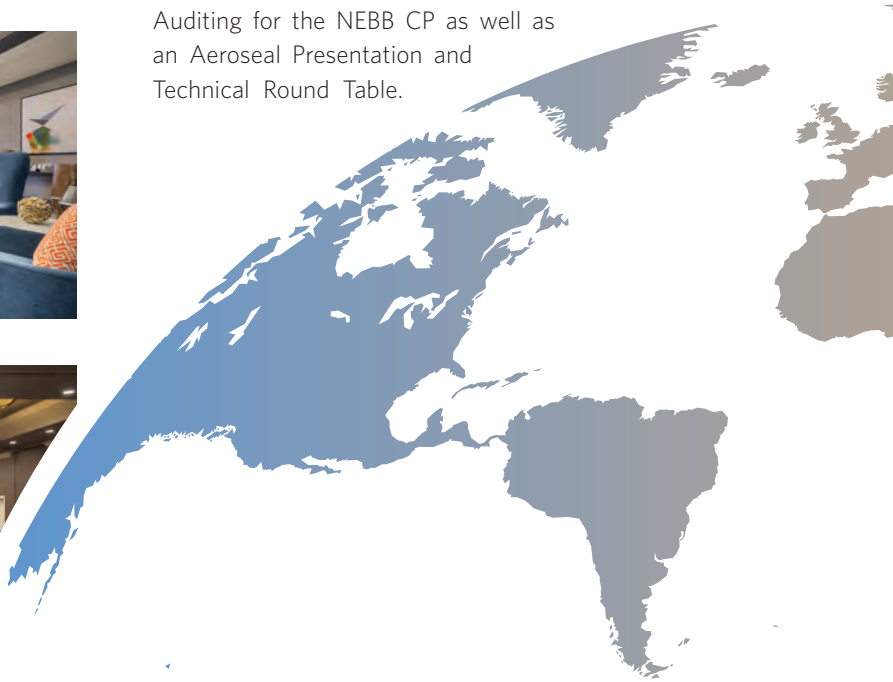
Capital-MarVa's Recertification Seminar is scheduled for September 15, 2021 at the Crowne Plaza in Annapolis, Maryland. Final touches are being put together for an exciting program. Registration will open soon. We look forward to seeing our members there!

COVID-19 impacted the Chapter's ability to offer educational and exam opportunities. With restrictions starting to lessen, the Chapter hopes to be able to reopen practical exam testing and other educational classes this summer or fall.

Florida EBB Chapter (FEBB)

Terry Wichlenski, Chapter Coordinator

FEBB hosted its 40th Recertification Conference and Business Meeting at The Omni Champions Gate in Orlando on April 29-30, 2021. It was a great recertification meeting welcoming NEBB President Amber Ryman along with several other Speakers and Vendors. Attendees had the chance to learn about Pump Affinity Laws & Fundamentals; Psychrometrics; Energy Auditing for the NEBB CP as well as an Aeroseal Presentation and Technical Round Table.



Thanks to everyone who participated and came to our 40th Annual Recertification Sessions.

Our next planned NEBB Practical Exams are set for September 17th or 18th. Contact our Chapter Coordinator for additional earlier dates at 727-240-4254 or Febbcoordinator@gmail.com.

MAEBA

Trish Casey, Chapter Coordinator

Things are finally getting back to normal. The MAEBA Technical Committee is hard at work planning the MAEBA Recertification Seminar, being held on September 19-20, 2021, at the Hershey Lodge in Hershey, Pennsylvania. The meeting will begin with a Dinner Reception on Sunday evening, September 19, 2021, followed by a full day of informative speakers on Monday, September 20, 2021.

Take advantage of this opportunity to earn your Continuing Educational Credits (that are once again required this year), while visiting the Sweetest Place on Earth!

Tour Hershey's Chocolate World, visit the Hershey Gardens or the Hershey Story Museum. For the more adventurous, go to Hershey Park and try some of the rides. You can also visit ZooAmerica Wildlife Park or take a trip back in time to see vehicles from the past at the AACA Museum (Smithsonian Affiliate), displaying beautifully restored automobiles, buses, and motorcycles from the 1890's to the 1980's. Everyone is welcome to join MAEBA in the land of chocolate!

The MAEBA Technical Committee is also planning on holding a NEBB Practical Exam on October 23, 2021. This is the first exam in a long time due to COVID-19, a true sign that things are getting back to normal.

North Central NEBB

Ashley Lang, Chapter Coordinator

A sponsorship was given by the North Central NEBB Chapter to ASHRAE. This sponsorship will provide research for updating standards, guides, codes and development of new equipment to help keep the public healthy and safe.

The Chapter's NEBB Recertification seminar will be held at the Doubletree in Roseville, Minnesota, October 14, 2021.

SoCal EBB Chapter

James Rosier, Chapter Coordinator

The Chapter's Recertification meeting will be held on Friday, August 27, 2022 from 7:30 a.m. to 4:00 p.m. at the Fullerton Marriott at California State University Fullerton. Space is limited so be sure to register early with the Chapter Coordinator.

Texas NEBB

Sandee Morgan, Chapter Coordinator

The Texas NEBB Annual Meeting and Recertification Seminar will be held on Thursday, October 21, 2021 at the DoubleTree Love Field. Registration will open in September.

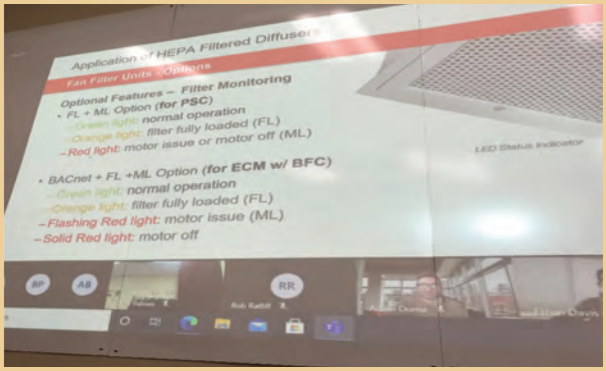
TEBB Chapter

William Bailey, Chapter Coordinator

The TEBB Chapter held its CEC meeting in Nashville, Tennessee at Nashville Machine on April 30, 2021. Attending the meeting was NEBB's board member, Luis Chinchilla who joined the meeting from Costa Rica. Luis reported on upcoming Firm and Individual certifications and the important dates and deadlines for all disciplines. Luis stressed the importance of firms and individuals staying on top of submitting their information to NEBB and NEBB staff working to make these processes as easy as possible. (Thanks Luis)

The Nashville Machine Company's training room provided the Chapter meeting's participants the option to remote in or join through Microsoft Teams thereby providing a safe environment for all. The presentations were well received and informative.

A big thanks goes out to the TEBB board members for help putting this seminar together so local NEBB Certified Professionals and Technicians had the ability to get the CEC's required by NEBB. The current workload in the Nashville area is still very heavy and multiple buildings are going up all over downtown along with a new Soccer Stadium which is scheduled to open the first part of next year. ●



NEBB 2021 Technical Seminars Schedule

Sound and Vibration Measurement Seminar

All Day Event

Monday, August 23 - Friday, August 27, 2021 at NEBB TEC in Gaithersburg, Maryland

Sound and vibration measurement is a valuable service for building owners who strive to maintain quality environment and minimize maintenance costs. Sound and vibration measurement has been shown to provide tangible cost savings.

Learning Objectives

- Learn how to satisfy specification and customer requirements and know how to perform accurate repeatable sound and vibration measurements
- Learn basic troubleshooting and diagnostic knowledge
- Learn how to make simple recommendations and to guide appropriate parties towards possible remediation solutions

Registration is now open!

Seminar Registration Deadline: August 09, 2021

Cleanroom Performance Testing Seminar

All Day Event

Monday, September 13 - Wednesday, September 15, 2021 at NEBB TEC in Gaithersburg, Maryland

This seminar provides practical instruction needed for this specialized discipline. Attendees will learn from professional presentations, class lessons and interactive discussions.

Learning Objectives

- Understand the NEBB Procedural Standards for Certified Testing of Cleanrooms
- Learn best practices for certified testing of cleanrooms in healthcare, pharmaceuticals, microelectronics and other environments
- Review critical guides, standards and codes for cleanroom testing
- Analyze case studies focusing on real-life scenarios and solutions

Registration is now open!

Seminar Registration Deadline: August 30, 2021

Building Enclosure Testing Seminar

All Day Event

Monday, October 04 - Tuesday, October 05, 2021 at The Ritz-Carlton, Kapalua Maui, Hawaii

Building Enclosure Testing (BET) is an important and growing field in our industry. It addresses a distinct need within the building and construction industry - the ability to test and quantitatively and qualitatively report the performance of the airtightness of today's building enclosures.

Learning Objectives:

This two-day seminar provides Attendees with an overview of building enclosure testing concepts including:

- Discussions of air barrier enclosures from design to material selection and installation
- Review of various testing methods and procedures currently specified and their correct application
- Basic operation of the blower door equipment, respective applications and features will be presented
- How to analyze and trouble shoot enclosure test issues
- Trouble shooting air barrier leakage issues and problem resolution focusing on the use of thermal imaging

Registration is now open!

Seminar Registration Deadline: September 20, 2021

Retro-Commissioning for Existing Buildings Seminar

All Day Event

Monday, October 18 - Thursday, October 21, 2021 at NEBB TEC in Gaithersburg, Maryland

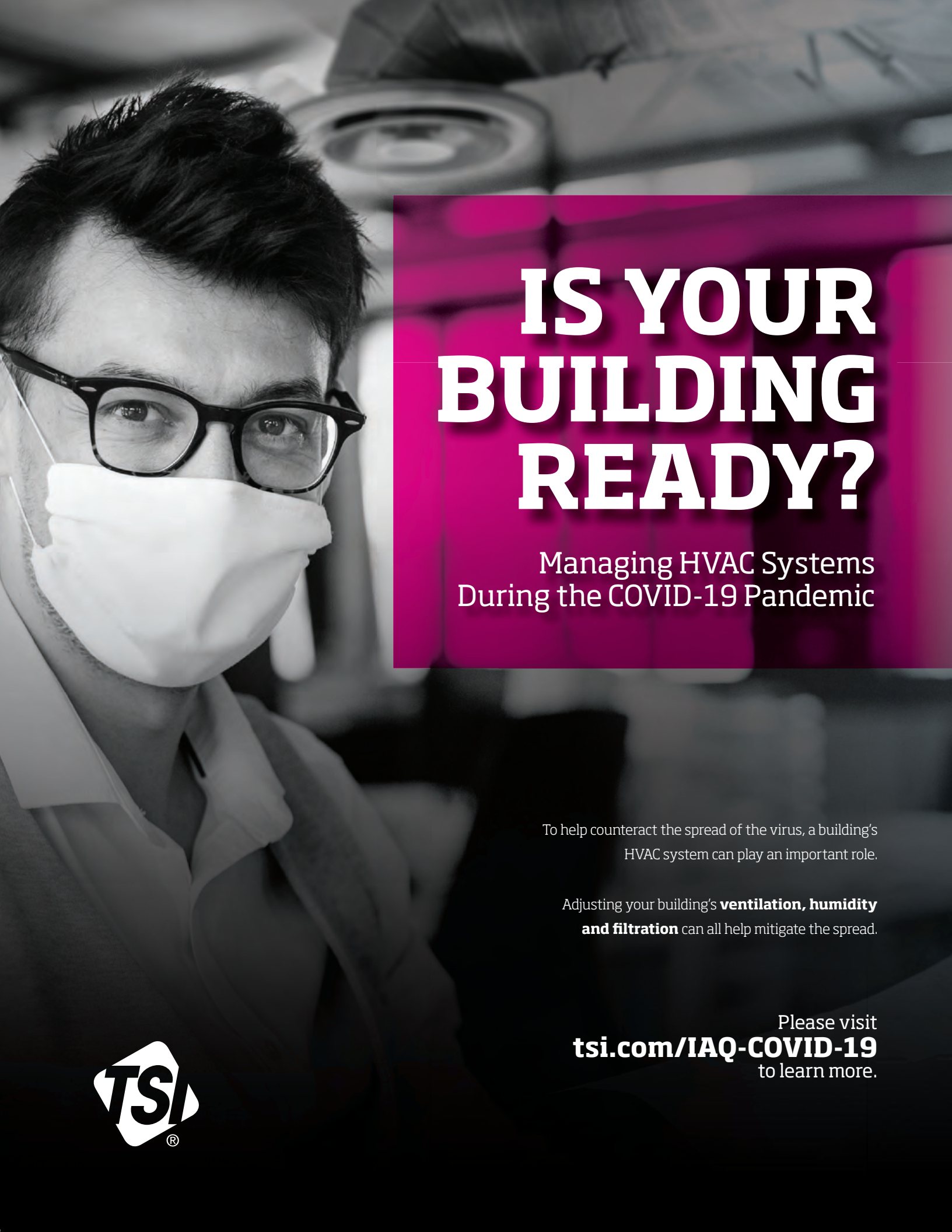
The introduction of ANSI/NEBB S120-2019, Third Edition along with the enhanced Technical Retro-Commissioning (RCx) program, has allowed NEBB to produce a significant business opportunity for contractors, TAB professionals, engineering and commissioning firms providing corrective action for under-performing buildings, improving indoor environment and comfort, and optimizing energy usage for aging facilities. The seminar will cover the main content domains in the RCx-EB Body of Knowledge (included in the RCx-EB CP Candidate Handbook Appendix) which include:

Learning Objectives:

- Overview of the NEBB Technical Retro-Commissioning Program
- Introduction to the Technical Retro-Commissioning Process
- Investigation Process Best Practices
- Activities within the Analysis and Recommendation Phases
- Energy Calculations
- Marketing Retro-Commissioning Services

Registration is now open!

Seminar Registration Deadline: October 04, 2021



IS YOUR BUILDING READY?

Managing HVAC Systems During the COVID-19 Pandemic

To help counteract the spread of the virus, a building's HVAC system can play an important role.

Adjusting your building's **ventilation, humidity and filtration** can all help mitigate the spread.

Please visit
tsi.com/IAQ-COVID-19
to learn more.

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