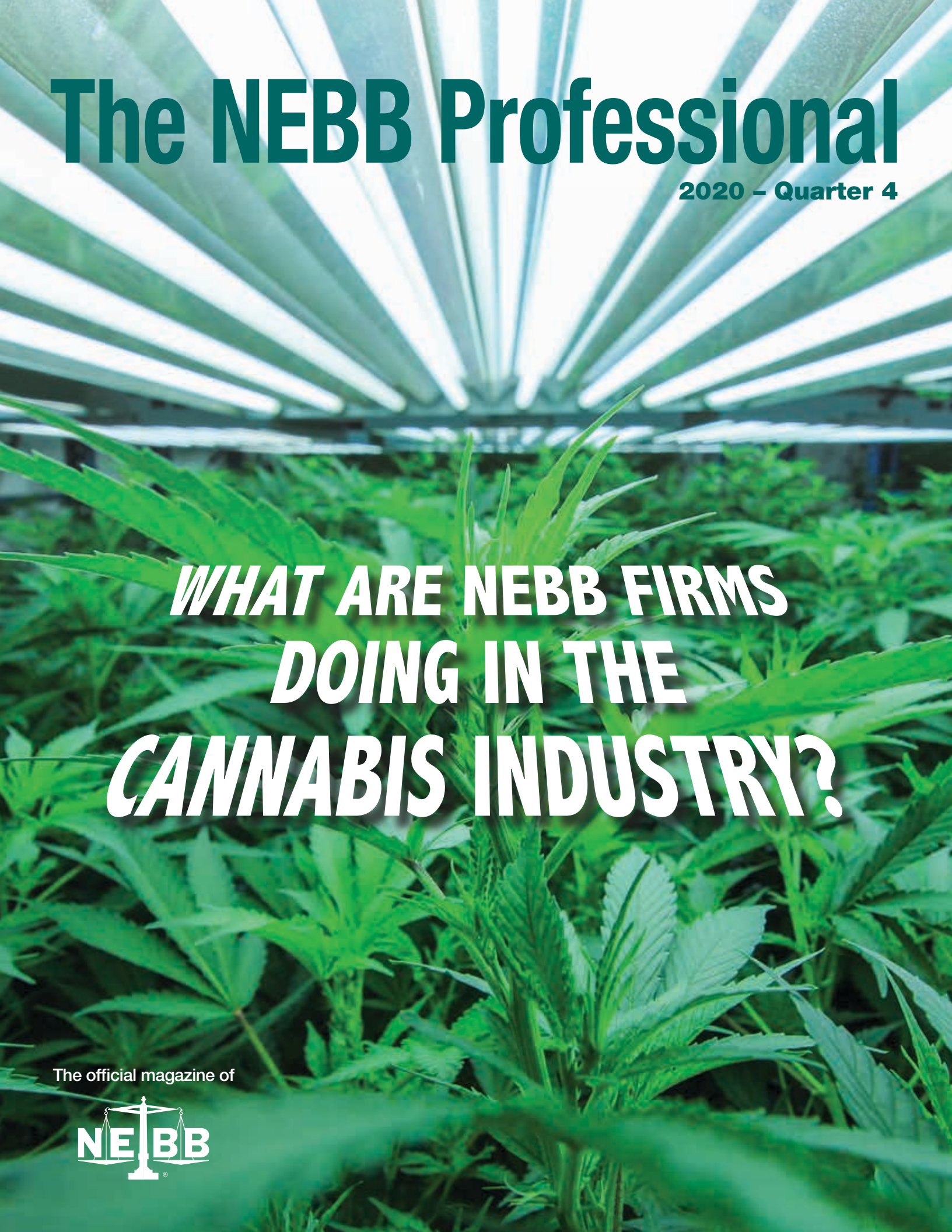
The NEBB Professional

2020 – Quarter 4



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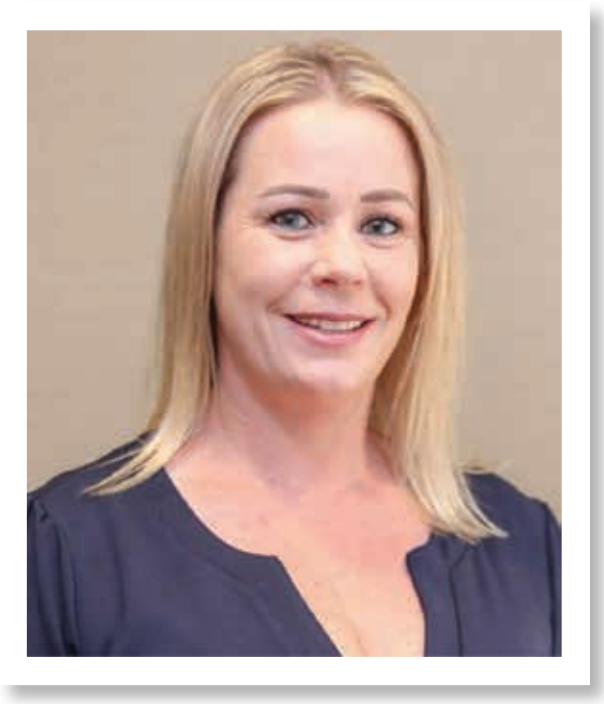

NEBB President's Message

First and foremost, I would like to thank the Board of Directors and the Executive Finance Committee for selecting me as NEBB's 50th President. I am extremely honored to hold this position and would like to express my gratitude to each and every Director who have endorsed me and provided me this opportunity.

I want to take a moment to thank Mr. Jeffrey Schools as the current Past-President. He set the tone for a promising year but unfortunately Covid-19 had a mind of its own. Jeffrey Schools, Jim Whorton, Don Hill, Jim Kelleher and Jean-Paul LeBlanc are a few of the Past Presidents who supported me in this appointment and who I call friends. It has been an honor to serve with them. Their knowledge and experience have been invaluable.

2020 is a year to remember (or forget). Covid-19 has affected all of humankind in some way. The disease knows no boundaries. It was almost a year ago when the world first felt the uncertainty of how this pandemic would affect our lives. I personally felt fear in what the future would hold, not only for me but all of my family, friends and coworkers. We all had to adapt to a "new normal" and make adjustments to our day to day life. It wasn't easy but we did it! We all managed to adjust on the fly, be uncomfortable and be okay with change. That is one common thing we will take from our experiences in 2020. With a vaccine becoming available our world will slowly change again. Our future may not look anything like Pre-Covid, and that is OK. Any adjustments towards a Post-Covid "new norm" will be welcome. I am looking forward to a time when we can comfortably be together and our worries about this disease are far behind us. I also look forward to 2021 for many other reasons. 2021 is a big year for NEBB. NEBB is celebrating 50 years of existence. It was in 1971 when SMACNA and MCAA came together to form The National Environmental Balancing Bureau. NEBB began with a vision to offer a certification for firms performing TAB work. The Board of Directors during the initial years may not have visualized NEBB as it is today. As the 50th President of NEBB I have a responsibility to acknowledge NEBB's history and I hope this year is a celebration of not only our past but our future as well.

This year has a lot in store for NEBB. I am extremely happy we have a new Technical Director on-board. Mr. Pete Rawls has joined the NEBB staff as the Technical Director as of late November. Mr. Rawls will have his hands full as he jumps in head first at NEBB but we are excited for what he brings to the table. His experience over the last 25 years in construction and commissioning make him a great fit. My number one goal during my time as president is to cut the ribbon on NEBB TEC as the state-of-the-art hands-on training facility. NEBB TEC has been hosting (Pre-Covid) seminars for each of our current disciplines and we are looking forward to being able to offer a hands-on portion for all of our courses. I know Pete sees this as one of his goals as well, so together we are on track to finalizing the build out and opening the center in the near future.

NEBB's staff is also something to be excited about. I would like to thank Ms. Tiffany Suite. She took the bull by the horns when she started in the position of the Executive Vice President and has worked endlessly in making sure NEBB's needs are always met. Her commitment to NEBB goes without saying. She has recruited an amazing staff and I am excited to work with each of them this year. I know we have a great team onboard and are in good hands. I would like to thank each of them for their hard work and dedication.

As mentioned above, I am excited for a time when we can all be together again. I know NEBB had to cancel our Annual Conference in 2020 which was to be located at the Greenbrier in West Virginia. It really was unfortunate since the Greenbrier is a treat and an experience like no other. I know Mr. Schools had a great event planned and we were all heartbroken with the decision to cancel but I am hoping to make it up to you in October 2021. NEBB's 50th year Annual Conference will be something special. We are in the initial planning stages for an amazing conference at the Ritz Carlton in Maui. The Ritz Carlton is located in Kapalua, Hawaii and is a beautiful location. If you have been to Maui you know the island energy is remarkable. If you have not been to Maui, I hope you will be excited to join us to experience it for yourself. I look forward to a Grand Celebration of NEBB and 50 years of Excellence.

Wishing you a Healthy and Prosperous 2021!

Best wishes,

Amber

Amber Ryman
NEBB President

NEBB Past President's Message

I would like to congratulate Amber Ryman, our newly installed 2021 NEBB President. What a great choice to lead NEBB into our 50th year! I have been very fortunate to be able to work with the best Board of Directors and would like to thank them for all of their hard work and dedication to move this organization forward. I would also like to thank Tiffany Suite and the staff for being able to navigate through this extraordinary year and making it look easy. Past President Jim Whorton will certainly be missed as he moves off of the Board of Directors after many years of service. Jim, thank you for all of your time, thank you for all of your knowledge, thank you for your selfless devotion to NEBB, and thank you for being a friend.

During this challenging year, it was good to know that our Committees were able to adapt and still get work done through conference calls and Zoom meetings. Thank you to all of the volunteers who stepped up and kept up with the times! Your commitment to NEBB does not go unnoticed. It just goes to show, no matter what obstacle is put in front of NEBB, we have the resilience to adapt and overcome and move forward as planned.

I am honored to have served as the 2020 NEBB President. It has been very rewarding and I look forward to continuing to volunteer on the Local and National level as needed.

Jeff

Jeff Schools
NEBB Past President

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A message from the editor

AUDREY KEARNS

First Female NEBB President Inducted in 2020!

November 2020, NEBB history was made. The first female NEBB President was inducted into a long list of illustrious presidents of our organization!

I am especially proud of the fact that Amber Ryman, was Northern California/Hawaii NEBB Chapter's first female NEBB Certified Professional. She then went on to a Chapter Board position, eventually becoming our first ever female Chapter president. A long list of firsts for her.

Not only was she an innovator and champion of our Chapter, but she was also part of the team to get NEBB as an approved provider for the State of California's Title 24 program.

We are all so proud to have her as the new NEBB President! I hope you join us in welcoming her and supporting her in this important role.

Stay safe, stay healthy and we are looking forward to a great 2021!

Audrey Kearns

What Are NEBB Firms Doing in the Cannabis Industry?

How Grow Facilities Are Relying on NEBB Professionals to Effectively Cultivate Indoor Environments

By: Kerri Souilliard

In 1996, the legalization of medical marijuana use signaled a shift in cannabis law that expanded to the majority of U.S. states over the next decade. As Colorado and Washington approved its recreational use in 2012, the cannabis market—and need for effective grow facilities—only continued to rise. Today, the demand for key players in the building industry, such as NEBB firms and professionals, continues to grow, offering vast opportunities to those ready to apply their expertise all over the country and even throughout the world.

Although some building and performance professionals may perceive the cannabis industry as uncharted territory paved with uncertainties, NEBB professionals need not look much further than their own experience with indoor environmental performance testing in familiar industries. Commissioning, test and balance, and cleanroom performance testing all apply. And despite how different this new industry may seem, it resembles certain aspects of the pharmaceutical, healthcare, manufacturing, and food and beverage industries more than you might think. Still, the industry is considered somewhat controversial within certain areas and groups, as cannabis remains a Schedule 1 drug under federal law.

"We don't actively seek out this type of work due to personal convictions. It just doesn't match the values that our company supports," explains a NEBB Certified Professional (CP) that provides testing, adjusting, and balancing (TAB) work in the San Francisco Bay Area. "However, some of these clients have come to us and we've taken on the work. We've done 12 facilities in California over the past five years. At the end of the day, it's still a job," he continues.

NEBB Cleanroom Performance Testing Committee Chair and CEO of VanirTG Tiffany Russell views her work in the cannabis industry from another angle, stating, "This is a still controversial industry to some, but there's really no difference for me. There's the argument that the industry's products are drugs, but so are pharmaceuticals. If I am helping them create a better, cleaner product, I'm doing my job. Small business owners need protection and help reducing waste and improving processes, so that is what we do for them."

Similar Industries, Familiar Expertise

The work of NEBB professionals is just as vital to grow facilities in the cannabis industry as it is to facilities in many other industries that rely on critical building performance for the success of their end products, too. For instance, pharmaceutical, semiconductor, or food and beverage manufacturing.

"Grow facility clients are a little different than our normal customer, but overall, not too different in terms of commissioning," comments Russell.

"There's similarities to several industries. For one, it is a type of agriculture, but they grow the plants mainly to extract the oils from them. So, I would definitely say

they are related or linked to a form of manufacturing and/or processing, as well. Some only grow the product and sell to other companies that extract. Some facilities only extract the raw product from the harvested plants and sell that product to a refining facility. Larger facilities take the product full-cycle, grow, extract and refine," affirms NEBB CP of Carter Air Balance Company David Galli.

The specifics of executing various NEBB disciplines do not seem to differ drastically, either. Similar to a cleanroom environment, precautions like wearing lab coats and gloves near plants are taken to keep the product pure from possible contaminants.

"It's not too far off from a normal cleanroom, but instead of semiconductor, it's an actual plant. They need to look out for contamination to ensure a clean, healthy product," Russell clarifies. "The real difference is that it's not regulated by the FDA so no certification is needed right now."

"I have applied the TAB discipline to this industry and from my experience, most facilities are balanced the same as any other 'normal' facility. There can be some strict life-safety rules in regard to the extraction and refinement rooms and labs, but it is not much different from any other building in the way TAB is executed," says Galli.

Approaching Technical Disciplines

In most cases, cannabis grow facilities consist of large warehouse buildings with many closely monitored rooms designed to ensure precise conditions that allow the plants to thrive. Each room contains a series of different climate zones, controlling everything from humidity to CO2 levels to PH levels in water that will come into contact with the plants.

Like NEBB work for many other clients, the critical conditions in these facilities require measuring and adjusting factors like temperature, humidity, and air flow. Standard equipment that is also used elsewhere is rightsized and utilized in these types of facilities just as it would be in other industries NEBB firms service. For example, humidity control strategies and hardware are often the same. Temperature controls are set to elevated set points with few degrees of variance. And, in geographic locations where possible, systems with economizers are applied to achieve 100 percent outside air.

"The two biggest differences in this industry are humidity control, which is already typical for semiconductor and surgical suite work, and odor control based on air change rates per hour," says our anonymous NEBB CP in the Bay Area. "Both are more detailed and thought about in grow facility design."

"We have to do a lot of educating on how to manage temperature and relative humidity. When heat goes up,

relative humidity goes down. It's not like a home where you just change the thermostat. Does the customer have an independent humidity system? Or an integrated system?" poses Russell. "We look at particle levels and filtration to ensure airborne cleanliness. There can't be too much moisture in the air. They need to look out to prevent mold, fungus and bacteria so that their product is not compromised."

"We measure viables, like microbial samples, to test for fungus and bacteria. We also do airborne and surface testing for them, as they need super sterile areas to grow the plants. We do air flow measurements and look at air changes per hour (loosely based on cleanroom standards), temperature, relative humidity, and the light intensity spectrum measured in nanometers," she continues.

Russell's firm also helps test the frequency strength of the specialized lights the facilities rely on to grow cannabis plants indoors. She explains, "As a third party, it's all data driven versus trying to push a product. We don't need them to buy new lightbulbs if it's not necessary yet, and therefore, can test at given milestones and advise whether the bulbs really need replacement after 5000 hours or so, or if they can continue being used. That's just one of the benefits of professional reporting, which can save them a lot in overhead, depending on the outcome of our reports."

NEBB professionals can help cannabis grow facilities uncover fundamental resource savings that could positively impact their business's bottom line. With energy consumption accounting for a large portion of these clients' expenditures, looking at options like proper filtration in order to recirculate preconditioned air, rather than filtering it out after a one-time use, can go a long way.

Despite energy being so essential to the end product in these facilities, energy efficiency goals themselves are not always as prevalent as one may imagine. Many owners are apprehensive to take certain measures to make the facility more efficient and save a little in energy costs for fear that they stand to lose much more in end product revenue if something goes wrong and the energy needed for optimal plant growth cannot be achieved. However, through hydroponic growing rooms, some clients have been able to control and cut water use by nearly half.

Implementing Standards and Safety Protocols

One area in which NEBB professionals' work in the cannabis industry may sound more difficult to navigate than it

really is surrounds the lack of federal regulatory agencies overseeing facilities as they do in other industries.

"Since this is a fledgling industry there is not much regulation from any federal agency, and cannabis is still technically illegal in federal view. However, states are still in charge of creating regulation and laws pertaining to the design, construction and overall operation of these facilities," states Galli.

Although facilities are regulated by state and local jurisdictions, most cannabis growers do not currently need to worry about ongoing regulations like inspections after obtaining licensing. In California, permits are allotted based on the projected number of plants to be grown within a particular facility in order to determine if the building's location is feasible and appropriate.

In reality, NEBB firms can expect to see the application of many familiar codes and standards in grow facilities. While some guidelines are offered specifically for facilities in the cannabis industry, others apply to facilities design, construction, and operations in the same way that they do for many other industries.

The NFPA, for example, outlines some of the inherent dangers of various cannabis-related facilities and the fire life safety systems, equipment, and processes necessary to comply with applicable building codes and occupancy classifications. Cannabis growing and processing facilities are both classified as industrial or storage according to Chapter 6 of NFPA 1, but the unique hazards associated with these facilities are addressed in Chapter 38 of the 2018 edition of NFPA 1, Fire Code.

Familiar ASHRAE standards, including technical requirements for the commissioning and TAB process, used in most other facilities are at work in the cannabis industry, too. In terms of design, however, ASHRAE warns engineers of the importance of accurate load calculations while designing for building systems and equipment sizing. As living things, plants change throughout their lifecycle and growers need to be able to control temperature, humidity, and airflow differently throughout every different stage.

Both sets of guidelines address airborne contaminants in different ways: first, to limit employee exposure to airborne toxins like those used in the extraction process converting cannabis flower to concentrates and oils, and second, to protect the plants from airborne contaminates that could cause detriment to the facilities' end products.

In addition to building codes and standards, Occupational Safety and Health Administration (OSHA) standards designed to protect all employees also apply. Common infractions for cannabis business owners not in compliance with OSHA requirements range from blocked exit routes

or electrical panels to exposing employees to electrical hazards and allowing build-up of combustible materials.

None of this is foreign to NEBB firms, which habitually perform testing based on strict standards and regulations in a variety of industries, making them a great partner for cannabis facility owners and operators. In fact, in the state of California, NEBB firms are specifically sought out as providers of Title 24 Mechanical Acceptance Testing in order for owners to be able to obtain their building certificates of occupancy.

Future Focused: Anticipating Regulations

The best way to approach an industry, such as cannabis, that isn't overseen by federal regulatory agencies is to refer to regulations in similar industries. Fortunate for NEBB firms and professionals, experience with highly regulated industries is second nature. For grow facilities, there is no harm in setting the bar higher than it is, because most hope that bar is actually set someday soon.

"Most clients in this field are proactive in terms of safety protocols in case regulations come later. They've been very responsible in my experience," recalls Russell. "If the FDA steps in on regulations, we will likely see standards like ISO, ASHRAE, and NEBB mandated."

Galli adds, "I would think they are always thinking ahead. This is an upstart industry and I believe it will eventually be legalized at the federal level."

"Growers and retailers want the feds to come online," asserts the anonymous NEBB CP. "Just keep in mind, due to federal restrictions on banking, this is a cash and carry industry, so make sure you know who your client is and that they are an upstanding person."

"The processes within may be somewhat foreign, but the methods established by NEBB are used just the same when balancing these types of facilities. They are really not overly complicated (yet) and your professional experience and expertise could be the key to establishing new regulation for construction and oversight within this industry," Galli encourages his NEBB peers. ●

About the Author

With over a decade of corporate marketing experience, Kerri Souilliard has the unique ability to interpret and create brand stories for even the most complicated, technical organizations in words their target audiences readily understand. Her strong business acumen and deep understanding of many complex processes and technical disciplines blend seamlessly with her extensive background in digital strategy, copywriting, and content development to serve clients' overarching business goals—without the wasteful spending of traditional agencies. For more info, visit www.kreativstrategy.com.

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It's 10 O'Clock, Do You Know Where Your Outside Air is Coming From?

By Andrew Boyd

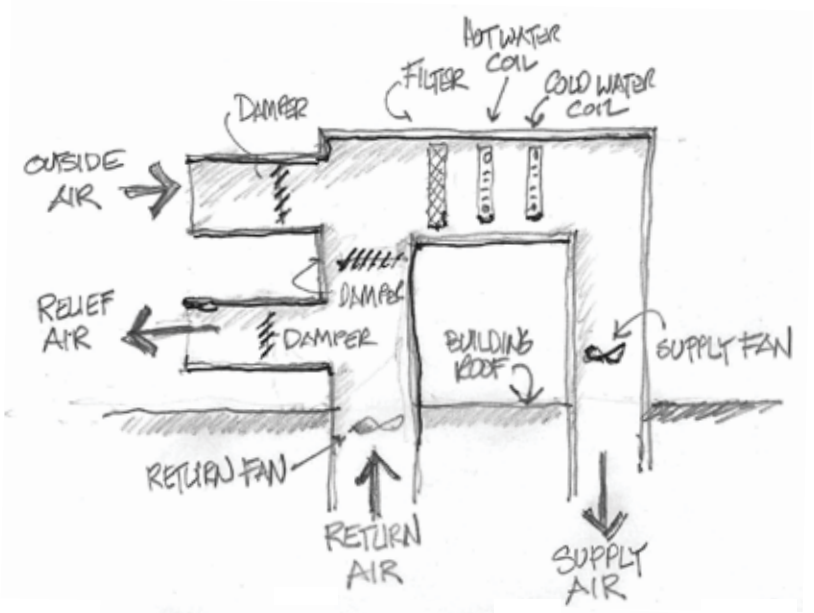
I am a big fan of DOAS – Dedicated Outdoor Air Systems. Traditionally, a building is served by an air handler which is a big metal box with fans, coils, and various dampers that are supposed to do several opposing tasks at the same time. Often, they can't handle it—pun intended. DOAS is a paradigm shift.

Mechanical engineers design systems to control both sensible and latent heat. It would require a course in thermodynamics to fully understand all the nuances, but sensible heat refers to the number on the thermometer and latent heat refers to relative humidity. Comfort wise, this explains why a 90-degree day in dry Phoenix is more tolerable than a 90-degree day in humid Louisiana. When you get the air in your building at the ideal temperature and humidity, then an air handler can just circulate it, lowering or raising the sensible temperature as needed. Outside air, however, complicates this with its wide variety of temperature and relative humidity changing hourly.

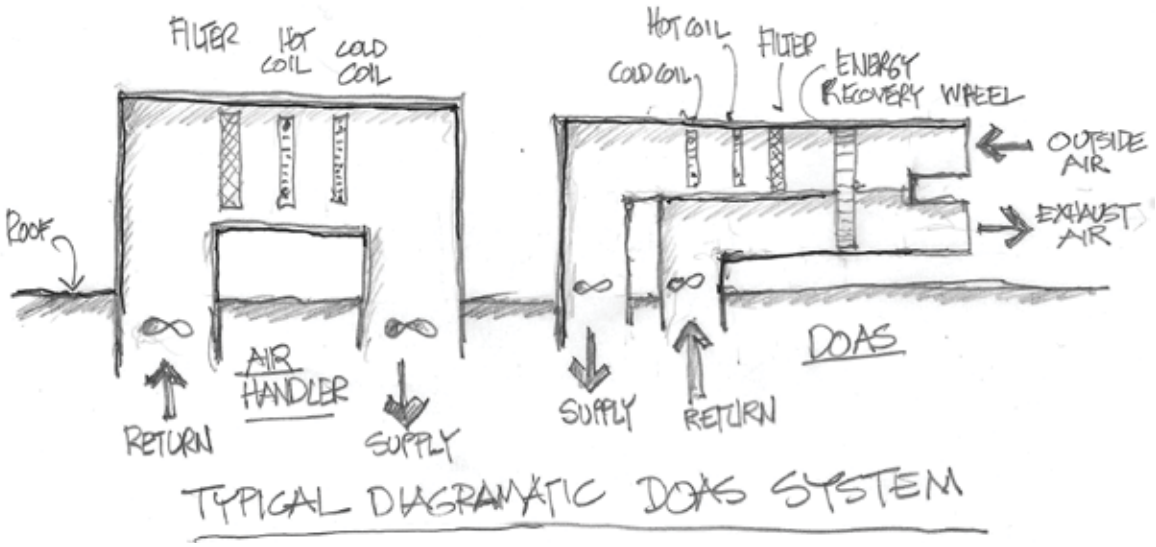
Buildings are not perfectly airtight—toilet room fans exhaust air, buildings perform better when slightly positively pressurized, people come and go, and the mechanical code requires a minimum of fresh air for human health (think sick building syndrome). In response, traditional air handlers use a system of outside air dampers, mixing boxes, fans, and controls to try to dump the right amount of outside air with its latent heat into the building, condition it, and mix it with the recirculated air. Moreover, you need to make sure to get rid of some of the existing air since blowing up the building like a balloon is not desirable.

DOAS separates this process. A simplified air handler is installed to circulate pre-conditioned air in the building, adding or subtracting sensible heat to keep occupants comfortable. A separate dedicated outdoor air system is incorporated, which adds just the right amount of air to the building, removes the right amount to keep pressures correct, adds or removes relative humidity, and often captures some of the energy from the exiting conditioned air.

The ideal concept building would be a tightly sealed envelope with fixed windows and one door. Open the door



TYPICAL DIAGRAMATIC AIR HANDLER



during the ideal ASHRAE day (70 degrees with 50% relative humidity), trap the air, and then weld the door shut once this ideal ASHRAE air is contained in the building. Henceforth the heating and cooling system can then maintain this ideal environment. Now only sensible loads require mechanical intervention. Energy saving technologies that reduce fan energy such as chilled beams and radiant heating would be possible. Unfortunately, humans would eventually batter down the door and insist in occupying the space – bringing their latent loads and annoying habit of requiring outside air for breathing.

Architects like me have neither the patience nor aptitude for complex mechanical engineering solutions, so I like the inherent simplicity one system to handle the sensible heating and cooling loads environmentally placed on the building; another system to handle the latent and ventilation loads placed on the building by the humans that inhabit it.

Bring in the DOAS system. Latent loads from breathing, sweating, going potty, and brewing coffee can be addressed; and with exhaust functions from these activities balanced, outside air can be introduced, and building pressurization can be controlled. The two separate systems can be optimized to do their jobs without treading on the other's turf.

Why do we combine the two functions in an air handler? Like the song from *Fiddler on the Roof*, "Tradition," I believe the reason we combine the two basic functions in modern air handlers is similar. They both involve moving air. Yet the two main tasks of conditioning indoor air and conditioning outside air are very different.

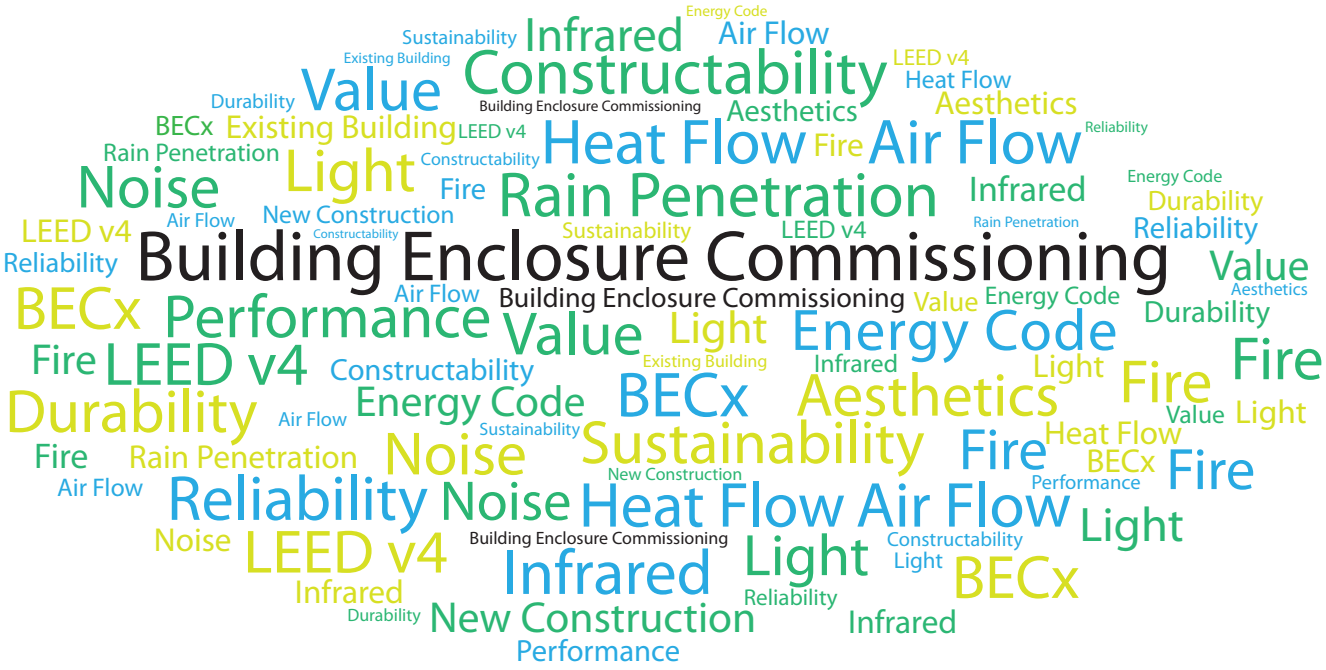
I will make an analogy to the modern residential bathroom. We do two basic functions in our bathrooms. One function is making our bodies clean, refined to an invigorating and sometimes social ritual by the Romans, Greeks, and Japanese. The other is eliminating urine and feces from our bodies. Two activities that are more dissonant are hard to imagine. The only common element is the use of water. In an ideal world, we would bathe in one room and eliminate waste in another, but we have co-evolved the two activities in modern life because the plumbing is easier and cheaper if placed in one location.

DOAS systems are not a panacea for all building mechanical system challenges. Usually they are more expensive and require more talented mechanical engineers to design. Breaking down functions, however, almost always improves both comfort and energy use.

Their use might herald an acronym change. Instead of HVAC (heating, ventilation, and air conditioning), we should update to HCCV (heating, cooling, conditioned ventilation). ●

About the Author

Andrew Boyd is a licensed architect who works for NAVFAC and is a NEBB industry representative. This article was peer-reviewed by Subject Matter Expert Phil Emory. The view expressed in the article are those of the author and do not necessarily represent the views of the agency or the United States government.



What to Expect When Commissioning the Building Enclosure

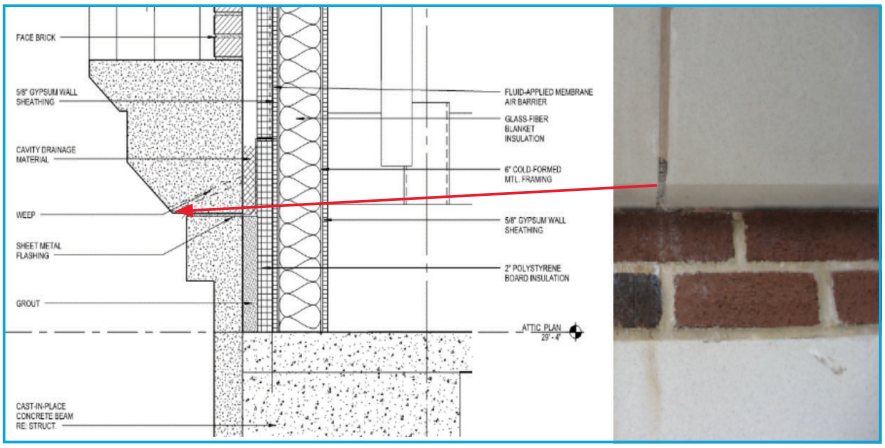
By Tony Casagrande

For several years now, the commissioning (CX) industry has been learning about the benefits of the Building Enclosure Commissioning (BECx) process. I want to dovetail into this education to drive home the value of BECx, tell the story of a few projects that implemented BECx, and share some lessons learned for owners, consultants, and providers of BECx to understand.

Lesson #1: Inspect the Mock-Up for Low Hanging Fruit

Most of us are used to looking at section views of plans and have learned how to recognize the detail in the section view as it translates into a completed system. Rarely do we get the opportunity to see a real section view in construction, except when the construction team is required to provide mock-ups of the building enclosure system. Mock-ups give the BECx provider a great head start reviewing how the contractors are actually going to install the enclosure system and also how that system will likely perform when completed. In Figure 1, we see discoloration on the face of the stone due to the actual position of the weep being shallower than the designed position. Moisture was running down the brick face and onto the

Figure 1: Plan section view versus actual installation



stone instead of dripping past the brick and falling to the ground. Correcting the installation mistake during mock-up was much less costly to the contractor and saved the owner years of operational headaches cleaning stone.

Lesson#2: Expect the Unexpected—The Design May Need to Change to Accommodate Changes

Variations in product dimensions due to availability, substitutions, or mistakes are common in construction and affect every trade. Where there is some flexibility in dimensions with HVAC, electrical, or plumbing systems that are covered up in walls, there is little flexibility with the building enclosure because so much of the waterproofing's effectiveness relies on dimensions. Case in point is a project where we encountered a potential waterproofing issue with the windows. Due to a product substitution approved by the designer, the windows in a large K-12 project were no longer going to be flush to the brick. This required a field alteration to the design of the sill and wall applied air and water barrier detail. In Figure 2, we can see a galvanized sill installed at the base of the window opening that interferes with the designed continuous air and water barrier. At this point in the project, the substituted windows were ordered and the field alteration had occurred at all of the more than 50 window locations. Sticking with the original design would have been costly and time consuming. The contractor, designer, owner, and BECx provider worked together to come up with a solution and revised the design to incorporate the air and water barrier wrapping over the sill. This correction was incorporated into the project with no lost time or added cost because the team understood sometimes the design needs to change to accommodate reality.

Lesson #3: Scheduling is Critical Because BECx Can Get Messy

I think the best lesson we learned implementing BECx is how important advocating for sequence and duration in project scheduling is for the project wellbeing and sanity of the team. BECx is becoming more popular in the industry, but is still less understood than general building commissioning. Construction teams, owners, and consultants need help from the BECx provider to get the right sequence of events and durations into the project schedule, but they themselves may not understand the process well enough to get it right. For example, AAMA 501.2 testing of finished window enclosures requires the BECx provider to shoot pressurized water at the windows while being able to detect small leaks inside of the enclosure. Figure 3 shows an intrepid BECx provider hoisted above a window enclosure for water intrusion testing. The

Figure 2: Plan section view versus actual installation

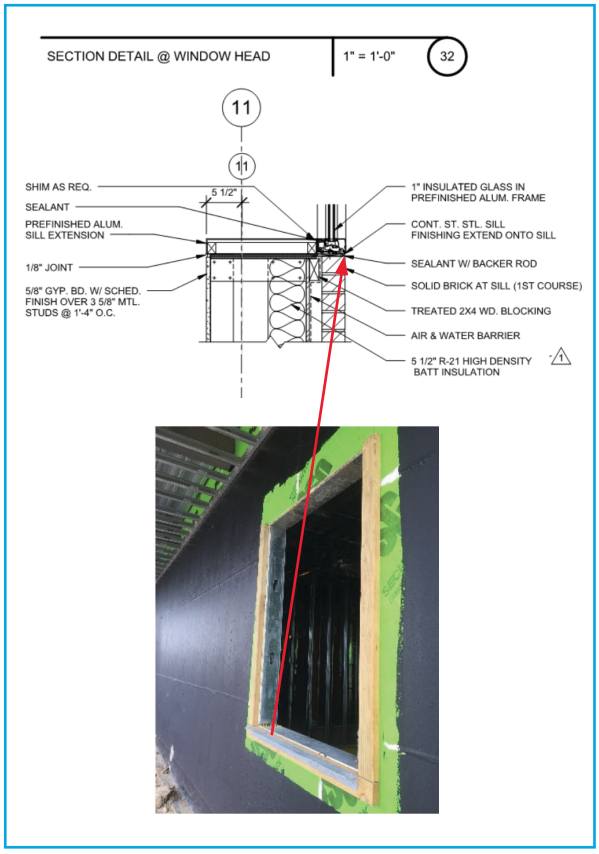


Figure 3: AAMA 501.2 Testing

coordination effort to ensure the exterior of the window was installed well in advance of the interior finish out was imperative so the water intrusion testing could occur without damaging finishes. Coordination with the landscaping contractor was also important so the scaffolding and water didn't damage finished landscaping. This coordination occurred during pre-testing meetings well in advance of actual testing. It included all of the project stakeholders involved to make sure the goals and consequences of the water intrusion testing were understood. Precautions were also incorporated to minimize damage to finished surfaces and project delays due to repair.

To get the most bang for your BECx buck, make sure to include inspection of the enclosure mock-ups to find and correct issues early in the project, be prepared to make changes to the design to accommodate reality, and insist on tight sequence and duration scheduling involving all of the project stakeholders. If you can focus your time into these three lessons learned, you will help maximize some of the benefits of BECx: better quality of the installed product, finding and correcting issues before they largely impact cost or time, and helping the team work together to turn over a finished project to the owner. ●

Tony Casagrande, PE, NEBB CP is President and Principal at Campos Engineering, a consulting engineering firm specializing in TAB, CX, MEP field and design engineering services. Tony helped develop Campos' technical process for commissioning and now leads the firm's innovation and marketing strategy.

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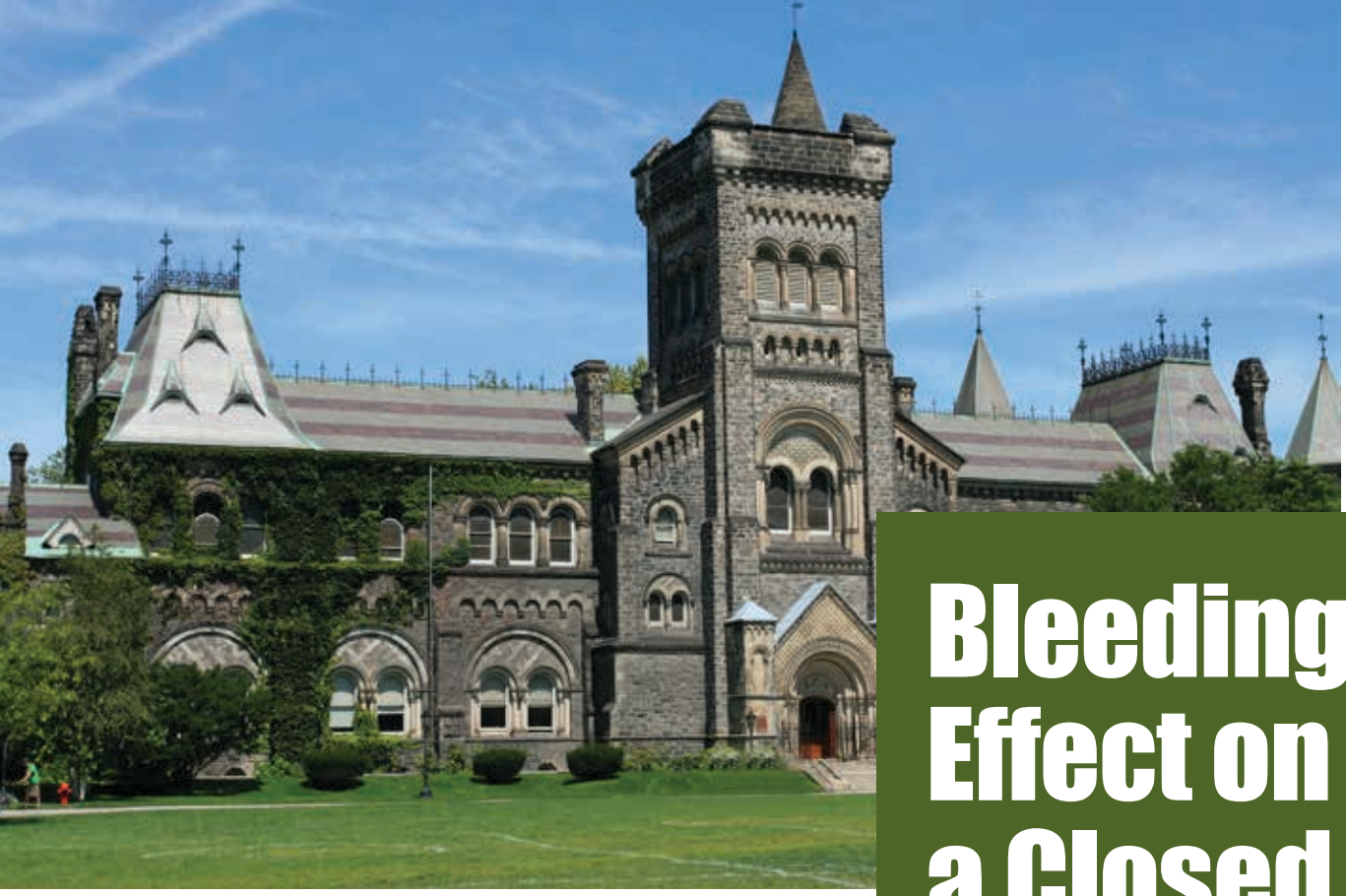


Bleeding Effect on a Closed Loop System

By Shier-Allan Layson

During the winter months, a certain area of the building of the University of Toronto, Canada located at 230 College Street, experiences extreme hot spots. The hot spots have been more prevalent on the fourth and fifth floors on the south side of the building, and would become so unbearable to the occupants that they would open the windows in the cold of winter to abate the heating issues.

Several balancing firms were called to investigate the anomaly, and many theories have been put forward and discussed concerning the heating issues. The heating issues were persistent and not resolved for over 30 years.

Enviro Balance was hired to complete the air balancing part of a large building retrofit project. This was an opportunity for the owner to tackle the long-known heating issues and Enviro was fortunate to work along a mechanical contractor and mechanical engineer who were determined to get to the bottom of the issue.

The System

The heating system is composed of two pumps in the basement, one on duty and one on stand-by. The heating pump delivers the hot water through the piping system wherein a three-way valve either lets the water flow through a series of wall fin tubes or bypass the series of wall fins. We will refer to the series of wall fin tubes as a "loop."

The direct digital control (DDC) three-way valves are modulated by thermostats sampling the temperatures in the served areas.

The constant volume pumps (no variable frequency drive) always run at full speed. In fact, one pump was tested and determined to be at 110 percent of the design flow, while the other was in stand-by mode.

Balancing

While the system was being balanced it was observed that the fourth and fifth floors where the hot spots were reported had higher water flowrates compared to the lower floors. This was unusual, as the team had anticipated higher water flowrate on the lower floors since the pumps are located in the basement. The specific areas where the hotspots were reported demonstrated this higher than usual water flowrate.

Investigation

A piping line walk was performed to check for any lines that may have crossed or any inconsistencies in the piping, and none were found. Additionally, the individual three-way valves were examined by the team to verify their functionality and eliminate the three-way valve as the source of unwanted heating.

The loops on the fourth level were investigated, followed by troubleshooting activities performed by the team. An ultrasonic flowmeter was connected to measure the flow on a loop that serves part of the area of concern. The three-way valve was set open, the water flowed to the loop, and the reading was taken. The three-way valve was then set to bypass the loop and the ultrasonic flowmeter registered a negative reading which indicated the water flow was going backwards. The team confirmed the backward water flow using a contact thermometer.

Conjecture

Having determined the backwards water flow through the bypass, the team, along with the engineer and mechanical contractor, tried to establish how the water flow came from the proper direction with the three-way valve open to the fin tubes and then backwards flow direction with the three-way valve in the bypass position.

During the winter months, a certain area of the building of the University of Toronto, Canada located at 230 College Street, experiences extreme hot spots.

The heating issues were persistent and not resolved for over 30 years.

Enviro Balance Inc. was hired to investigate the heating issue irregularities and resolve the issues once and for all before the upcoming winter months.

Since it was a closed piping system, outside influences were disregarded as a possible problem. The piping line walk also confirmed there were no crossed lines.

Based on the design, when the three-way valve was bypassing the loop, the water should have been redirected away from the loop and back to the main return pipe, thus the term "bypass." However, upon closer inspection, the water flow values measured by the ultrasonic meter and by the thermometers confirmed, there was enough pressure in the supply line to make the water flow circulate the fin tubes in the series with the three-way valve bypassing.

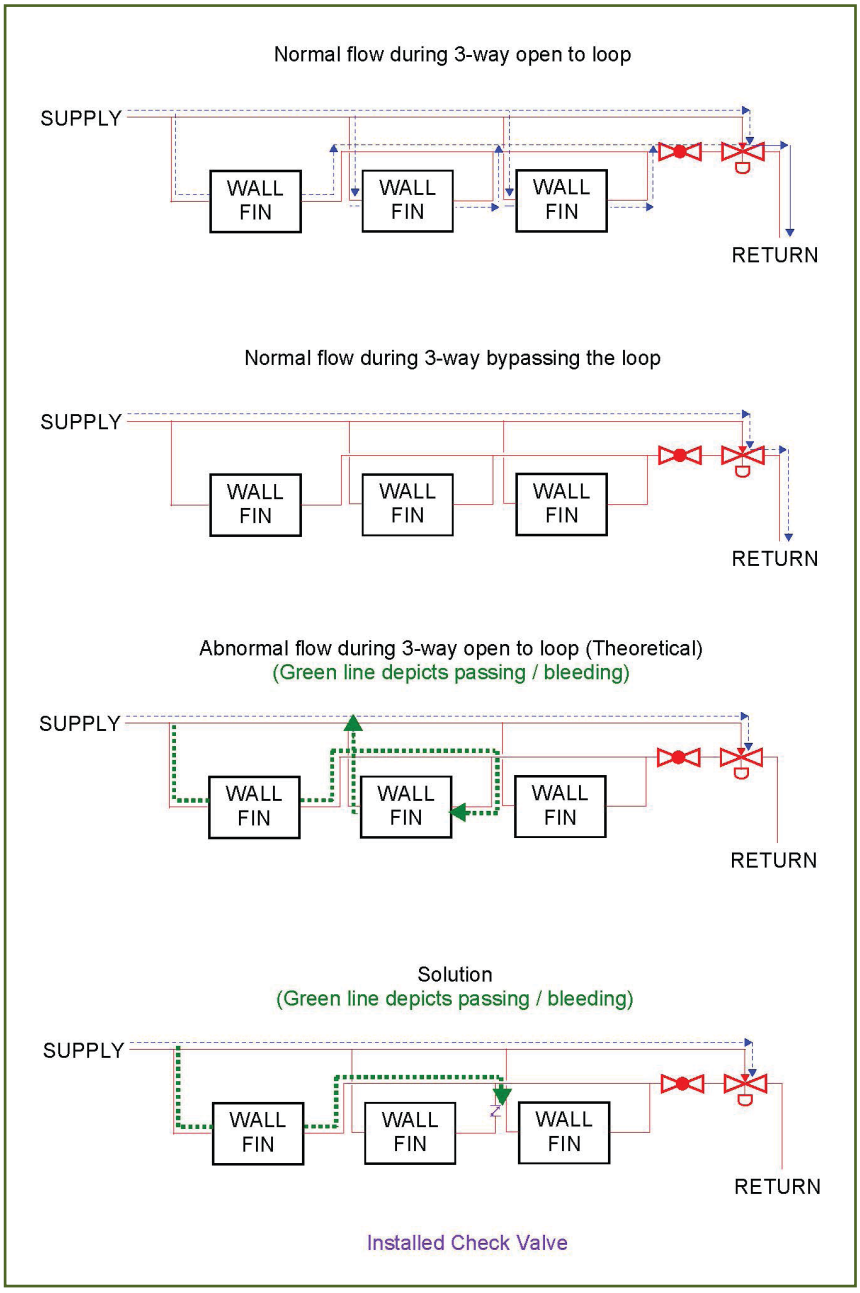
(Please refer to Diagram A for a better visualization of the loop and water circulation.)

Resolution

It was determined that the easiest and most cost-effective solution to solve the bypassing flow issue that the loops were experiencing was a simple installation of check valves. The check valves would prevent the water flowing backwards through the series of piped fin tubes and, therefore, eliminate the bleeding effect in the system.

After the mechanical contractor installed the check valves on the affected loops, the team revisited the site to perform the troubleshooting exercise once again. Based on the readings taken, the installed check valves prohibited the passing of water in the series loops when the three-way valve was in bypassing mode.

Diagram A



Conclusion

The problems in this building had persisted for a few decades. With the aid of modern instruments, the Enviro Balance Inc. team was able to determine what was occuring in the affected loops and advise how the system was functioning in a given mode. Previous investigations may have been limited due to the technological limitations.

The team is planning to revisit the hot complaint spaces during the upcoming winter months to evaluate and see how much the temperature conditions change and improve. ●

About the Author

Shier-Allan Layson studied Mechanical Engineering from Mapua Institute of Technology with over a decade of experience in QA/QC, Commissioning and TAB work. Allan is a Certified Technician.

NEBB continues to lead the way with new mobile app

By Dane Richards

NEBB has partnered with a software development firm to produce a mobile application that performs many of the calculations needed by NEBB professionals and technicians out in the field.

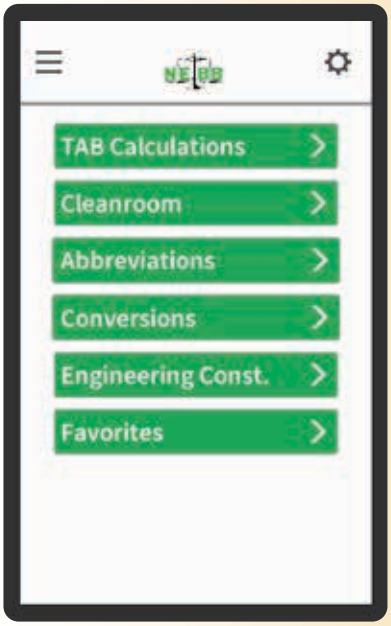
"NEBB has recently completed several exciting efforts" says Donald Pittser, chairman of the NEBB National TAB Committee. "The updated NEBB TAB Procedural Standard 9 came out last year, an ANSI-approved Commissioning Standard was released prior to that, and now we have a mobile application that will benefit the entire industry by providing an efficient tool for performing calculations."

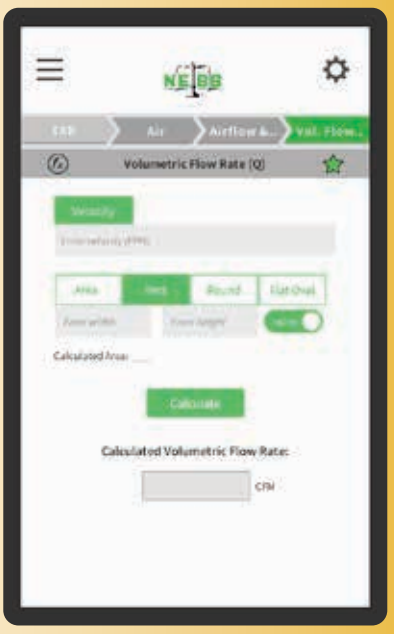
The idea for the application had been in the minds of several NEBB members for some time. It started to move forward when immediate-past NEBB TAB National Committee chairman Jon Shepherd connected with BSC and YPN committee member Dane Richards to begin the process. "Jon and I discussed the basics of what a NEBB calculation app could be and how useful it would be for NEBB Certified Professionals and Certified Technicians out in the field."

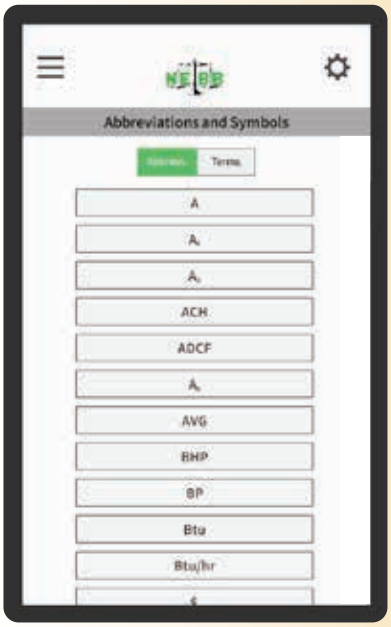
Available for download on Apple and Android devices, the "NEBB Calculator" app contains numerous calculations to evaluate system performance as well as abbreviations, conversions, and engineering constants. The content and calculations in the app are used by personnel in multiple NEBB disciplines including TAB, BSC, and RCx. Additionally, there are calculations and other content that is specifically used in relation to Cleanroom Performance Testing.

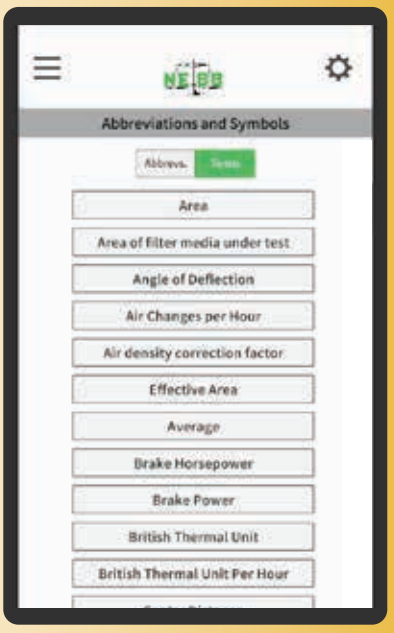
However, the app will be a useful tool and resource for those in the industry beyond NEBB members. "Jon also had a vision for it to be something that would tie others in the industry to NEBB." Mr. Richards explains. "The application can be used by anyone in the industry from design engineers, maintenance technicians, and mechanical contractors. I think this will be a helpful tool for a wide variety of people in the industry and will keep NEBB as the foremost organization for evaluating building system performance."

The application layout includes the NEBB logo prominently displayed at the top of the screen with several initial options for navigating the application including: TAB Calculations, Cleanroom Calculations, Abbreviations, Conversions, and Engineering Constants. Additionally, there is an option for "Favorites" which is populated when a user selects the star icon on the screen of a formula.









This gives users the ability to quickly navigate to those formulas that they use more frequently. Users also have the option to switch between IP and SI units, and they can also adjust the screen to "Night Mode" for easier viewing in certain lighting conditions. Finally, there are links to the NEBB website and a Help menu for the app.

"Consolidating the large amount of information that NEBB has available for things such as calculations and abbreviation was a substantial effort. We went through several iterations of beta-tests from numerous users to get the app where it is today. I can't thank everyone enough for their assistance." Says Mr. Richards. "However, it will be well worth it because leveraging the use of technology through this app will make it significantly easier for people in the field everyday and demonstrates why NEBB is such a great organization."

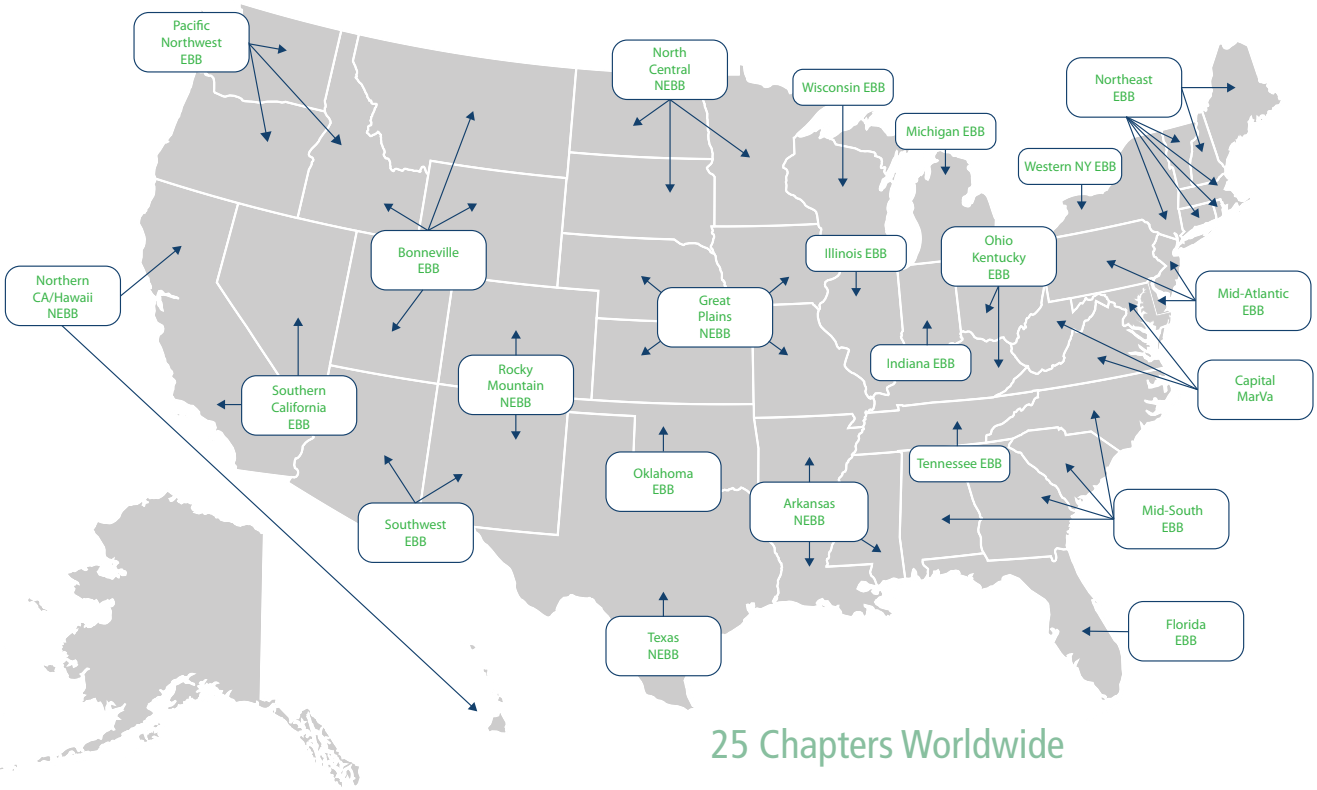
As Mr. Pittser puts it: "This mobile app is another example of how NEBB continues to be a leading organization to help our members deliver high performance building systems." ●

For more information about the app, you can email Dane@Digitize-Solutions.com

About the Author

Dane Richards is a NEBB Certified Professional who sits on the BSC and YPN Committees. Dane currently lives in Georgia.

NEBB 2021 Technical Seminars Schedule



Chapter Updates

Florida EBB

Terry Wichlenski, Chapter Coordinator

The FEBB Chapter has set its 2021 NEBB TAB Practical Exams Dates.

The TAB Certified Professional's Practical Exam for 2021 is scheduled at the FEBB Testing Sites in Jacksonville, Largo & Deerfield on January 29th or 30th; May 8th or 9th; and September 18th or 19th. We are looking at other dates with at least two candidates taking the exam.

To obtain reservation and deadline information on the exam dates, contact Chapter Coordinator, Terry Wichlenski at (727) 240-4254 or email: febbcoordinator@gmail.com.

Space is limited - so call today to reserve your spot.

Mid-South EBB (MEBB)

Ginger Slaick, Chapter Coordinator

Over the years, MEBB has been faced with several obstacles that required the Board to make tough and often quick decisions pertaining to the recertification seminar. Whether it was relocating the seminar due to a hurricane that destroyed the host city days before arrival, live-streaming presenters because of travel restrictions after 9/11 or setting up a last minute conference call so a speaker, at her request, could still give her presentation as a hurricane was hitting where she was located; MEBB has been fortunate to persevere and hold a recertification seminar every year for the last several decades. With the unprecedented times COVID-19 brought, 2020 will be added to the list of years MEBB overcame obstacles to host its recertification seminar.

Although it was necessary to cancel the in-person event, MEBB held its recertification seminar virtually over three weekdays in September. Jokingly referred

to as "Learn at Lunch", hour long presentations were scheduled each day at 12:00 p.m. EDT to provide CPs/CTs an opportunity to earn CECs. Technical sessions offered included *Chilled Beams* by Julia Lewis, Krueger Corporation, *TAB & Cleanroom – Bridging the Gap* by Patrick Law, Hepatest and *Cybercrime and Security* by Derek Hedrick, Ameritech Data Solutions. The sessions were not only well attended, averaging 70 participants each, they were also interactive since attendees were able to ask questions throughout the sessions. To uphold the integrity of the CECs issued, participants were required to answer topic specific questions that randomly displayed during the presentations. Also, through technology, a record of each participant's log-in/logout was time stamped validating his/her attendance for the entire session.

MEBB also held its Annual Membership Meeting virtually. Patrick Law, NEBB Board of Director, gave a report on the latest NEBB updates and Ginger Slaick, MEBB Executive Vice President/Chapter Coordinator gave a chapter report including information on firm recertification, continuing education credits for CPs and CTs for 2020 & 2021, instrument requirements, and NEBB/MEBB recertification application deadlines. Vendors were invited to attend, and each was given a few minutes to share information on their company's products and services.

We are thankful for technology and the ability to hold the event virtually, however we look forward to seeing everyone in-person for the 2021 MEBB Recertification Seminar, September 18th – 19th at the Battle House Renaissance Mobile Hotel & Spa.

The Battle House Renaissance Mobile Hotel & Spa

Northern California/Hawaii NEBB

Cecilia Kamakani, Chapter Coordinator

Northern California/Hawaii NEBB Chapter has a new Chapter Coordinator. After 20 years, Audrey Kearns, the Chapter's former Coordinator has retired and Cecilia Kamakani has stepped in to take over the reins.

The Northern California's Annual Chapter Meeting will be held on April 23, 2021 from 7:30 a.m. to 5:00 p.m. at the Monterey Plaza Hotel & Spa in Monterey, California.

The following speakers and presentations are currently scheduled:

The California Standards Building Commission speaking on *Non-residential CALGreen Code Updates and Checklists, How to use Title 24 and the Matrix Adoption Tables,* and *Code Adoption Process and Public Participation*; and Eli Howard and Mark Terzigni, SMACNA on *The HVAC Air Leakage Test Manual*.

Texas NEBB

Sandee Morgan, Chapter Coordinator

The 2020 Texas NEBB Annual Meeting and Recertification Seminar was postponed and will be held in the fall of 2021 at the DoubleTree Dallas Love Field.

Some of the topics that will be presented are:

3 Keys For The Perfect Hydronic Control by Luciano Belo of IMI; *Inside The Box – Fan Characteristics and Applications* by Mark Fly of AAON, Inc.; *Fluid Dynamics* by Nick White of ND White Engineering; and our final speaker, Derek Hedrick of Ameritech Computer Consultants.

Texas NEBB has released the practical exam schedule for the 1st half of 2021. Test dates are:

January 28, 2021
March 4, 2021
May 6, 2021

Please contact Sandee Morgan at texasnebb@mca-smacna.org to reserve a spot or for additional information.

TEBB

William Bailey, Chapter Coordinator

TEBB held their recertification meeting in July at Air Technical Services in Bartlett, Tennessee. Pictures show the group abiding by the CDC Safety Requirements.

Their sessions were offered to membership with a choice to either ZOOM or attend meeting in person. The meeting went well and a great time was had by all.

A questionnaire at the end of each session for the attendees that zoomed in was given. This group e-mailed their answers to the Chapter Coordinator at the end of each session so each questionnaire had a time stamp of when it was received.

Speakers for the meeting were:

Brent J. Baird, Instruments Direct, Inc.
Presented Ultra-Sonic Flow Meters

- Energy Monitoring for TAB and Commissioning

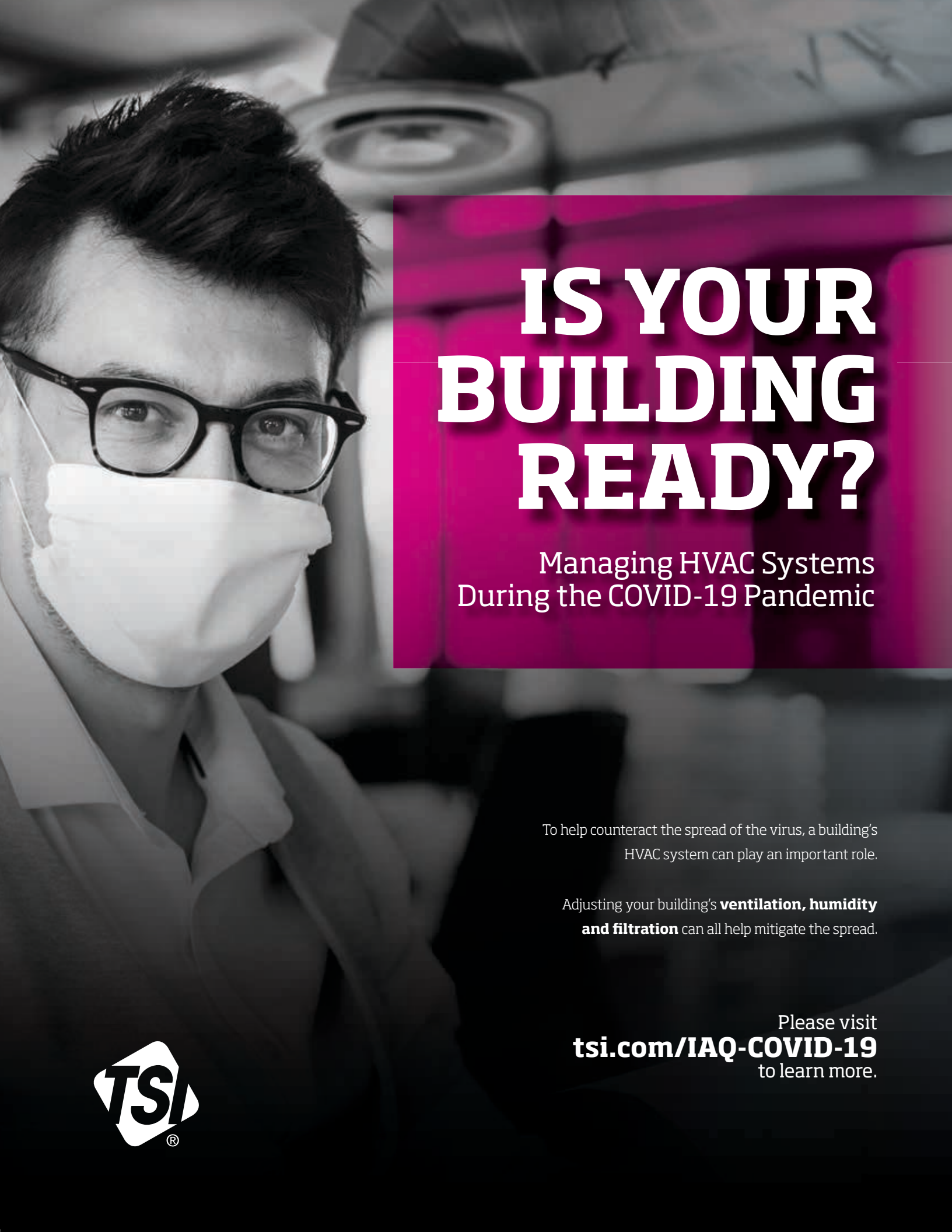
Alex Lee, PE and Stephen Greer, PE, Bernhard TME
Presented Three Ways to Improve Your Commissioning Process

- Implementing Commissioning Software
- Perfecting the Design Review Process
- Hands on Operator Training Throughout the Construction Phase

Greg Allen, Greenheck Applications Engineer II-Power Roof Ventilators
Presented Synopsis of Highly Efficient Motor Technologies

- Common Motor Technology
- How these are Installed, Controlled, and Balanced
- Common Applications and Ancillary Benefits

Images of the TEBB Recertification Meeting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