

The NEBB Professional

2020 – Quarter 2

Cover Story:

TECHNICAL Retro-Commissioning: The HANDS-ON Approach to Improve Building Performance

The official magazine of



- Epilogomena
- “What Should I Know Before Selling My Business?”
- “State of the Union”: BET and Where Are We Today?
- Was It Worth It?: The Young Professionals Network
- 2020 NEBB Conference New Schedule



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Please send your submissions to Tiffany Suite, EVP at tiffany@nebb.org. Thank you.



NEBB President's Message

President's Message

I hope this message finds you well during these extraordinary times. As I write this, it seems like we are starting to flatten the curve and head in a positive direction. Let's continue what we are doing and try to help eliminate this virus and get back to as normal as we possibly can. I know from personal experience that this pandemic has increased my companies' workload dramatically. We have been in and out of many of the hospitals in the Philadelphia Tri-State area helping to assure that their existing Isolation Rooms are working properly as well as helping in making Intensive Care Units and whole wings perform under Negative pressure.

I'm sure many of you are doing the same work and I would like to ask if you could send in your stories, pictures, videos, lessons learned and even horror stories of what you have experienced while carrying out this work. Please send them to marketing@nebb.org.

In the meantime, planning efforts continue for the 2020 Annual Conference at the Greenbrier August 18-20, 2020. NEBB is making every effort to safeguard the health and safety of our attendees, as well as provide an exceptional program. We were able to secure the same speakers, in addition to adding a session on the effects and experience of COVID in an effort to learn more about the virus and how to safeguard health facilities in the future. West Virginia is beautiful in the fall, and I hope you will consider joining us for another great conference!

Please take care, stay positive and find sometime for having fun and smiling. It is a challenge trying to operate under these current circumstances, however, I am confident that we will get through this together.

Stay safe, be well.



Jeff Schools
NEBB President



I hope this message finds
you well during these
extraordinary times.

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*A message
from the editor*
AUDREY KEARNS

It has been almost a year since I took over as editor of The NEBB Professional magazine. We have been working hard over this time to transform the magazine and I hope that you like what you have seen. My vision has been to make the magazine more engaging, more appealing, a magazine you want to pick up and share because of all the great content. I hope I have succeeded!

The world is going thru unprecedented times right now and it has affected us all in many ways. Many of our firms and our professionals are out there working on essential buildings and projects, such as hospitals, isolation rooms and more.

NEBB wants to hear your story.

NEBB wants to hear about your contributions towards this good fight. We have just posted on our social media platforms a request to all of you to share your story. Here are the links for our Facebook, Twitter and LinkedIn accounts:

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Stay safe, stay healthy!

Audrey Kearns



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TECHNICAL RETRO-COMMISSIONING

By James Bochat

Technical Retro-Commissioning is a process utilized to correct your building's deficiencies and to improve its performance. Retro-Commissioning (RCx) is intended to be a low-cost method of providing the highest level of building performance without spending a lot of money on capital improvements.

Retro-Commissioning normally is initiated in response to poor system performance issues that the owner has not been able to fix. There are many reasons why these kinds of problems are persistent in buildings, one of them is that most technicians or service organizations cannot find the root cause of the issue and spend their time trying to correct symptoms instead of dealing with the root cause of the issue. The complexity of our buildings systems also contribute to persistent poor performance, especially for DDC control systems. Another contributing factor to poor performance is deferred maintenance issues and out of balance air and water systems. Any deferred maintenance will directly affect system performance.

What is Building Performance: Building performance is the quality of the indoor environment and the level of energy and water usage. By indoor environment we mean how comfortable the building is for its occupants for temperature, humidity, air flow drafts, air quality and sound and vibration.

What are the main benefits of Technical Retro-Commissioning: The expected benefit of Technical Retro-Commissioning is that your building's performance

improves during the process of performing the RCx. Be aware that this is the main difference between a normal RCx project and a Technical Retro-Commissioning process. Normal RCx or Existing Building Commissioning is a hands-off approach which is basically an expanded energy audit where no actual adjustment, optimization or system improvements are made. Technical Retro-Commissioning is a hands-on approach where the provider is responsible to actually make a difference in your systems performance.

Technical Retro-Commissioning is a hands-on approach where the provider is responsible to actually make a difference in your systems performance.

The possible benefits of Technical Retro-Commissioning include:

- Improvement in occupant comfort allowing more productivity and happier occupants
- Reduced future system maintenance and repair costs
- Reduced energy and water utility costs
- Improved operations requiring less operator time due to a lower amount of trouble calls
- Increased expected life time of equipment and systems due to improved operation
- Increased value of your building asset

Retro-Commissioning can be performed utilizing many different approaches as to who accomplishes the required tasks. The RCx process can be implemented by utilizing an outside consultant to perform all of the required tasks or It can be accomplished by using in-house expertise or a combination of an outside consultant and in-house expertise. The important thing is not who performs the tasks but that they are all performed.

If you are interested in establishing an in-house RCx team, your RCx consultant can provide a training program to train your staff on how RCx is performed. I have also operated these programs in the past by providing the owner with a commissioning engineer to lead their team in the RCx efforts. This allowed a full RCx effort with the lowest possible outside costs.

The basic steps in the retro-commissioning process are as follows:

1. RCx Contract

The RCx contract can be any kind of contract as preferred by the owner, most RCx contracts are fixed cost, or fixed costs for the discovery process with an allowance for quick fixes and deferred maintenance issue corrections. The contract can also be time & material based upon fixed labor rates. It is also possible to perform RCx under a guaranteed performance contract where savings from the process are guaranteed against the cost of the RCx.

2. Project Planning

Before starting an RCx project, a plan should be established for the goals of the project and how the project is to implemented. If you have multiple buildings it is also advisable to instigate a process to evaluate all your buildings to determine what buildings and in what order you wish to include them in the RCx process.

During this planning stage a basic Current Facility Requirement (CFR) is created to document how the spaces are intended to be used, what their environmental conditions need to be, how many occupants are normally present and any other pertinent data that will affect how the RCx is implemented.





From the CFR and the goals of the owner, a RCx Plan is created that details how the RCx process will be implemented to achieve the goals of the project. The plan details what process will be used and by whom they will be performed. The plan may also contain a general schedule of the anticipated process.

3. Initial data collection

To start the actual RCx process, obtain all existing design drawings, system submittals, balance reports, energy and water utility bills for the last few years, copies of replaced equipment submittals or purchase details and summary reports of maintenance management reports, and copies of outside purchased maintenance contracts for what is included in their services.



4. Drawing and Design Review

Perform a drawing and design review of the existing systems. If original construction documents exist, review these to understand the original design intent and to compare with what you actually find installed. Review original control sequences to establish areas of concern that will require site investigation. From your review start an issue log for field investigation use.

5. Building System Assessment & Deferred Maintenance Assessment

As the first field test, inspect each piece of equipment as to its general condition, its operating condition, estimate its current life expectancy, record any obvious operating issues or deferred maintenance issues and record its present load, power usage or water usage.



6. Data Logging Space Conditions

To evaluate system performance, it is important to have a reliable history of the actual space conditions. Normally we place calibrated data loggers in each control zone when we do the system assessment. These data loggers are left in place for at least two full weeks to gather both week day and week end data. It is possible to use the existing control system for this data but you must first calibrate all sensors utilized before you can trust the data. Another issue with using the control system is it normally does not have the points we need to record for the space, temperature, humidity and lighting level.



7. Operator and Occupant Interviews

During the assessment perform operator and occupant interviews. The purpose of the interviews is to listen to their evaluation of their space and to learn what has been done in the past to alleviate any issues.

8. System Testing

From the design review, energy audit, field assessment, space data logs, and the interviews we can determine which systems are not performing correctly and what testing is required to discover the root cause of the issues. System testing includes any or all of the following:

- Control system point and sequence testing
- As found balance readings
- Energy and water usage tests
- Operating procedure review

9. Root Cause Analysis

From all the data and testing performed, determine the root causes of the issues discovered. Many times, one solution solves more than one issue. During this process recommendations are created for future capital measures to improve future performance.

10. Quick Fixes and Deferred Maintenance issue elimination

During the assessment or testing discovery process any quick fixes found are fixed so they do not hide the true root

cause of the performance issue. A quick fix is defined by the contract and is usually something that can be fixed without material in a few minutes. Examples of a quick fix is adjusting damper linkage, re-attaching a flex duct, adjusting a damper or valve or making a small control adjustment. Depending on how the RCx contract is configured, all deferred maintenance issues are corrected as they are found. Normally it is preferred that the owner's staff or outside contractors perform the deferred maintenance issues. Deferred maintenance issues consist of:

- Changing Filters
- Cleaning Coils & Fans
- Changing fan belts
- Repairing dampers or valves
- Cleaning strainers
- Cleaning tube bundles
- Cleaning cooling towers

11. System Optimization & Corrections

Near the end of the RCx process, when all deferred maintenance issues are corrected, all quick fixes completed, all issues have been analyzed and the root causes identified, we start the process of RCx corrections or optimizations. Systems are optimized by trimming the air and water flow balance, calibrating sensors or devices, and adjusting control sequences and setpoints as required to improve system performance.

12. Operator Training

Depending upon what changes or corrections were made operating instructions are updated and operators are

trained and instructed on the updated operations and maintenance practices for the systems.

13. Performance Tracking and Evaluation of the results

As an important part of the RCx project, the owner's performance tracking system is updated and reviewed for correct tracking for future system performance. If the owner does not have an operating tracking system a manual system will be provided, setup and operators trained on its use. It is critical that operators know how they are doing and without a performance tracking system you will never be able to improve performance.

14. Final RCx Report

After all work is complete a final RCx report is issued. This report contains documentation of all work completed and includes a list of recommendations for future capital projects that will improve future performance. The report contains estimated budgets, anticipated cost savings and ROI for each recommendation.

I hope this information has been helpful. If I can help you in any way with your building performance issues or if you would like more information please call or email.

Thanks for reading! ●

About the Author

James Bochat has been involved in the Arizona Engineering and Construction industry for over forty years. His experience includes Mechanical Design, Mechanical Construction, Controls, Test & Balance, Commissioning, Retro Commissioning and On-Going Commissioning. He is a former President of NEBB and has been instrumental in developing and teaching commissioning standards for NEBB. He has been involved with ASHRAE serving as chair of the Professional Development Committee and the PMP Best Practices Committee, and voting member of other ASHRAE committees.



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EPILOGOMENA

By: **Matthew C. Lemieux** | **Daldrop SBB, LLC**

Like the atheist's response to the monotheist; "mankind is getting closer and closer to the actual number all the time", the present revision of USP <800>, implemented in December, has made improvements to its section 5, facilities and engineering room pressurization controls specifications, however; for one of the most common architectural layouts, the specifications are unachievable. In the Q-4 2018 issue of the NEBB Professional, I published an article entitled Mission Impossible, in which I explained how USP <797> 2008 pressures cannot be practically achieved in a strict interpretation. Since the 2008 issue of USP, etc., important changes were made to room pressure specifications. One of those changes involved the ambiguity of "a minimum of 0.02 inH₂O to 0.05 in H₂O" as meaning either a minimum to maximum range or a suggestion of minimum values. This statement was clarified to mean a minimum of 0.02 in H₂O in the anticipated revision of USP <797>. This was a very pragmatic modification as facility airflow, enthalpic, ductwork, grilles, dampers, and general HVAC installation considerations are all interrelated to pressure differential, and not all facilities were capable of achieving tight parenthetical pressurization conditions. Additionally, while the minimum pressure of 0.02 in H₂O has some historical precedent for efficacy, the justification for a maximum of 0.05 in H₂O, has no such rationale and was largely arbitrary. USP <800> was released on December 2019 while USP <797> and USP <795> linger in appellate purgatory.

To clarify my assertion in the preceding paragraph, the following citations are excerpted from the 2019 revision of USP General Chapter <800> Hazardous Drugs, Handling in Health Care Settings. The citations refer to part 5 - Facilities and Engineering Controls.

CITATION 1:

- Designated areas must be available for:
- Receipt and unpacking
- Storage of HDs
- Nonsterile HD compounding (if performed by the entity)
- Sterile HD compounding (if performed by the entity)

CITATION 2:

Certain areas are required to have negative pressure from surrounding areas to contain HDs and minimize the risk of exposure.

CITATION 3:

HDs must not be unpacked from their external shipping containers in sterile compounding areas or in positive pressure areas.

CITATION 4:

Antineoplastic HDs requiring manipulation other than counting or repackaging of final dosage forms and any

HD API must be stored separately from non-HDs in a manner that prevents contamination and personnel exposure. These HDs must be stored in an externally ventilated, negative-pressure room with at least 12 air changes per hour (ACPH).

CITATION 5:

Sterile and nonsterile HDs must be compounded within a C-PEC located in a C-SEC. The C-SEC used for sterile and nonsterile compounding must:

- Be externally vented
- Be physically separated (i.e., a different room from other preparation areas)
- Have an appropriate air exchange (e.g., ACPH)
- Have a negative pressure between 0.01 and 0.03 inches of water column relative to all adjacent areas

Table 2. Engineering Controls for Nonsterile HD Compounding

C-PEC	C-SEC Requirements
Externally vented (preferred) or redundant-HEPA filtered in series	Externally vented 12 ACPH
Examples: CVE, Class I or II BSC, CACI	Negative pressure between 0.01 and 0.03 inches of water column relative to adjacent areas

CITATION 6:

Table 3. Engineering Controls for Sterile HD Compounding

Configuration	C-PEC	C-SEC	Maximum BUD
ISO Class 7 buffer room with an ISO Class 7 ante-room	Externally vented Examples: Class II BSC or CACI	Externally vented 30 ACPH Negative pressure between 0.01 and 0.03 inches of water column relative to adjacent areas	As described in <797>
Unclassified C-SCA	Externally vented Examples: Class II BSC or CACI	Externally vented 12 ACPH Negative pressure between 0.01 and 0.03 inches of water column relative to adjacent areas	As described in <797> for CSPs prepared in a segregated compounding area

CITATION 7:

ISO Class 7 buffer room with an ISO class 7 ante-room: The C-PEC is placed in an ISO Class 7 buffer room that has fixed walls, HEPA-filtered supply air, a negative pressure between 0.01 and 0.03 inches of water column relative to all adjacent areas and a minimum of 30 ACPH.

CITATION 8:

The buffer room must be externally vented. Because the room through which entry into the HD buffer room (e.g., ante-room or non-HD buffer room) plays an important role in terms of total contamination control, the following is required:

- Minimum of 30 ACPH of HEPA-filtered supply air
- Maintain a positive pressure of at least 0.02 inches of water column relative to all adjacent unclassified areas
- Maintain an air quality of ISO Class 7 or better
- In addition to this chapter, sterile compounding must follow standards in <797>.

CITATION 9:

Negative-pressure room: A room that is maintained at a lower pressure than the adjacent areas; therefore, the net flow of air is into the room.

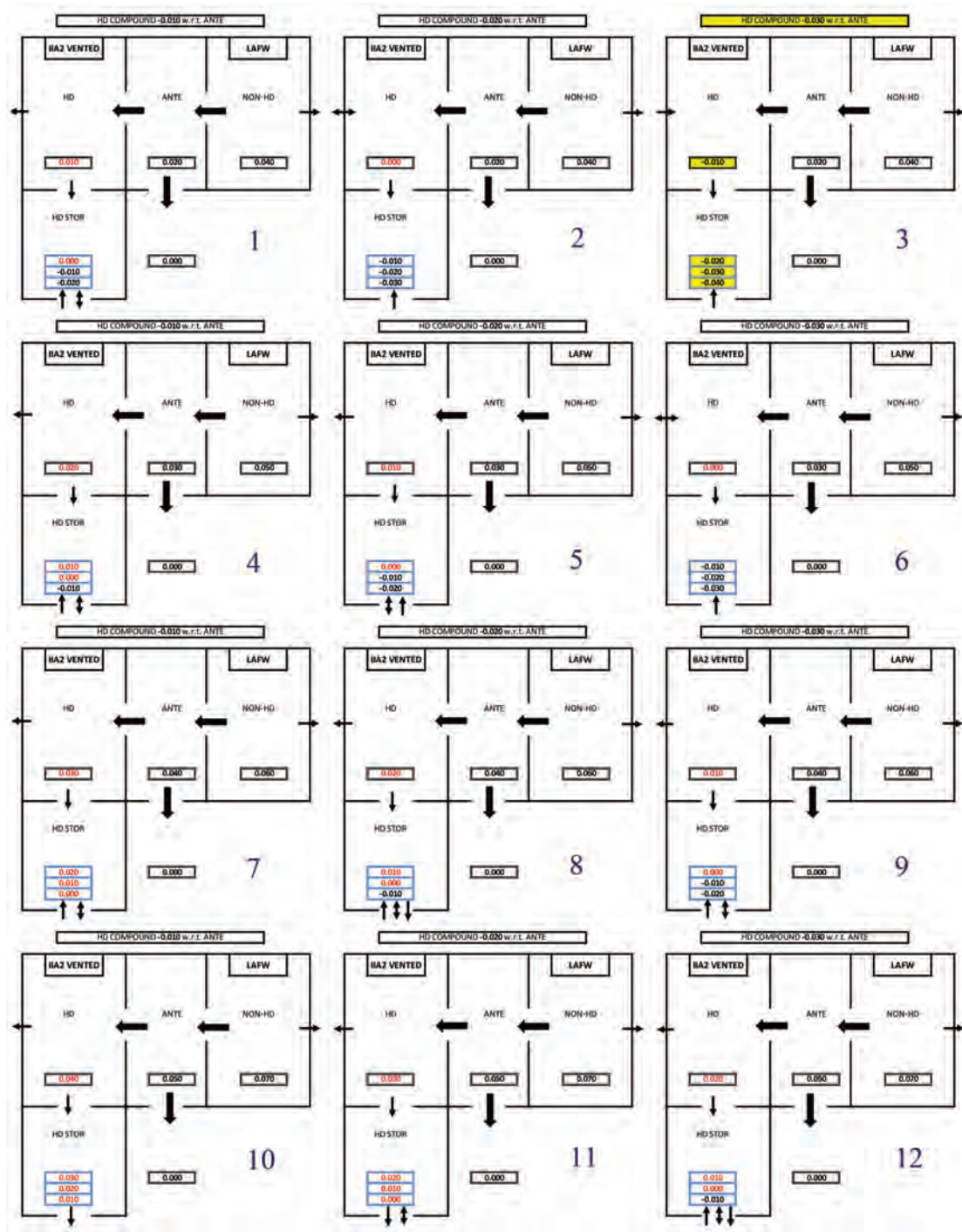
CITATION 10:

Positive-pressure room: A room that is maintained at a higher pressure than the adjacent areas; therefore, the net flow of air is out of the room.

These 10 citations, while well-intentioned, nonetheless, taken as a whole, contain inescapable paradoxes concerning room pressurization.

In figure 1, I chose a very common architectural layout for hazardous compounding pharmacies adapted from the USP <800> Appendix 2-Example Designs. The adapta-

Figure 1. Common architectural layout for hazardous compounding pharmacies adapted from the USP <800> Appendix 2-Example Designs



tion involves incorporating a hazardous storage room. The hazardous storage room is adjacent to the HD compounding suite, and while this example has a connecting door between the two rooms, this feature is not crucial to this discussion.

Within the context of this layout, I detailed 12 possible room pressure cascades, in the following figure, using the USP <797> requirements of a minimum of 0.02" positive anteroom with a non-hazardous IV room at 0.02" positive to the anteroom as directed in USP <800>. The four rows of three permutations each represent increasing the anteroom pressure in increments of 0.01" from 0.02" to 0.05" positive with respect to ambient. The three columns represent the hazardous compound room regulation of -0.01", -0.02" and -0.03", relative to the anteroom (by default). Then, within each individual numbered example, I presented three possible hazardous storage room pressures of -0.01", -0.02" and -0.03" relative to the hazardous compounding room. This matrix is comprehensive, in that it represents all the possible room pressure permutations within the constraints listed above.

We can evaluate each of the twelve scenarios with regard to the proposed USP <800> citations for compliance.

Case 1. The HD compound room is positive to ambient and to HD storage; this violates citations 5 and 7.

Case 2. The HD compound room is neutral to ambient and positive to HD storage in violation of citations 5 and 7.

Case 3. This case specifically was highlighted as it best approximates total compliance. However, the mutual relationship between HD compound and HD storage violates citation 7. In fact, the mutual existence of citations 4 and 7 inherently preclude strict compliance in this room design. If both HD Compound and HD Storage need to be negative pressure with respect to all adjacent areas, then they need both to be negative pressure with respect to each other. That is like saying: I have two children, and each one is shorter than the other.

Case 4. This situation also violates citations 5 and 7 as HD compound is positive with respect to ambient. It is also not negative with respect to HD storage as required by citations 4 and 9.

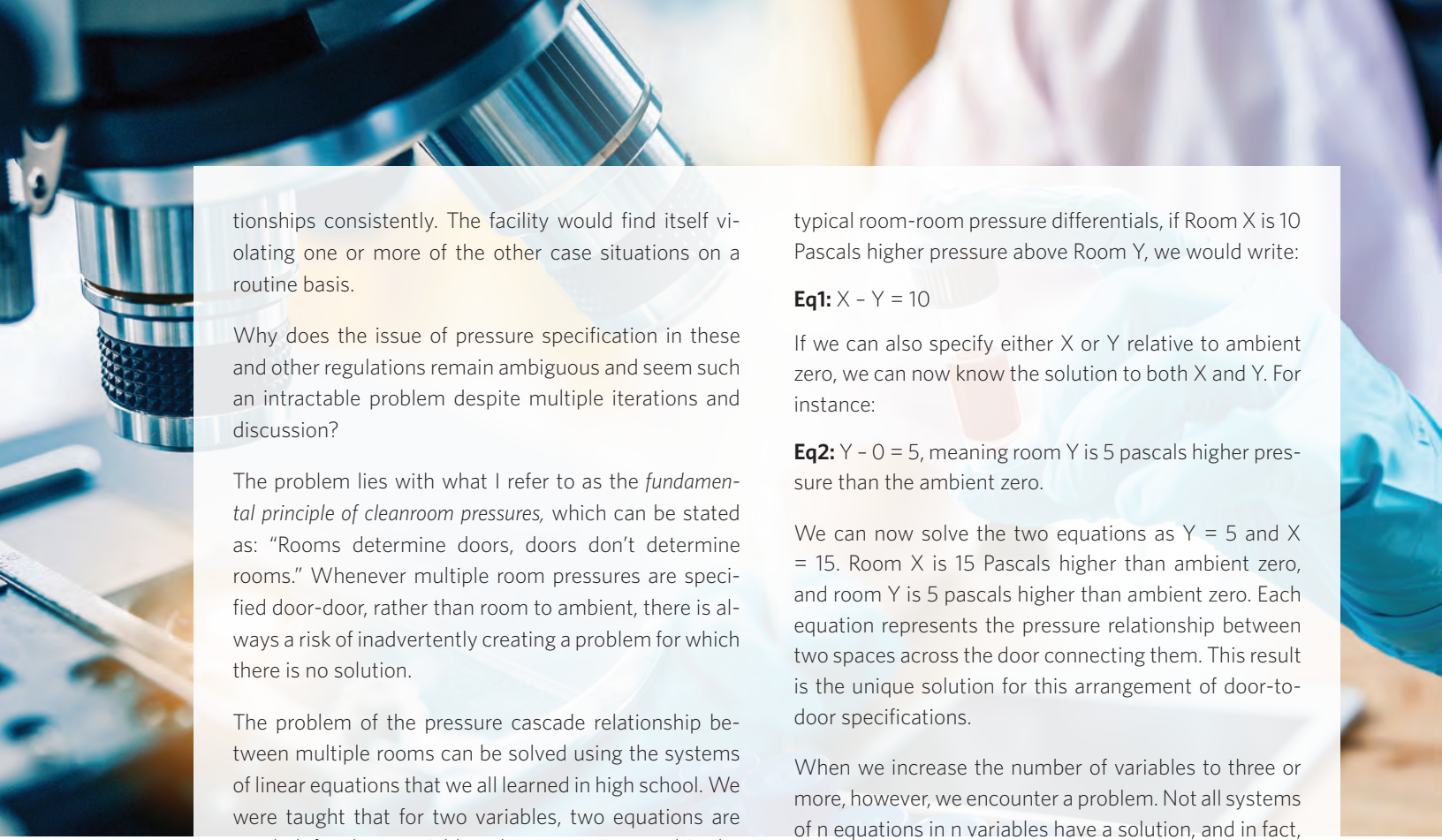
Case 5. This situation violates citations 5 and 7 as well as 4 as in case #4.

Case 6. HD compound is not negative to all adjacent areas as required by citation 7.

Case 7 through Case 12 and beyond. With the increasing pressure relationship between the anteroom and ambient, citation 5 will be consistently in violation. Further, citation 4 will continue to oppose citation 5. Citation 9 cannot be demonstrated in any of these cases, either.

Even if case 3 was universally agreed as representing the precise intent of the USP <800> regulations, it is unlikely that most facilities would have the installed ductwork, dampers, prefilters, pressure controls, and exhaust fan control simultaneously to precisely maintain these rela-





tionships consistently. The facility would find itself violating one or more of the other case situations on a routine basis.

Why does the issue of pressure specification in these and other regulations remain ambiguous and seem such an intractable problem despite multiple iterations and discussion?

The problem lies with what I refer to as the *fundamental principle of cleanroom pressures*, which can be stated as: "Rooms determine doors, doors don't determine rooms." Whenever multiple room pressures are specified door-door, rather than room to ambient, there is always a risk of inadvertently creating a problem for which there is no solution.

The problem of the pressure cascade relationship between multiple rooms can be solved using the systems of linear equations that we all learned in high school. We were taught that for two variables, two equations are needed, for three variables, three equations and in the case of n variables, n equations. In the case of industrial cleanroom facilities, n can be fairly large.

For example, with two variables, we might have this system:

Eq1: $X + Y = 12$

Eq2: $2X + 4Y = 38$

What are the two values of the variables, X and Y , that satisfy both equations? If X is 5 and Y is 7, then both equations are true. With a system of two equations, I can change the sum or the coefficients and still find a unique solution. If I change the sum of equation 2 to 44 from 38, then we can find another solution, whereby $X = 2$ and $Y = 10$. If I change the sum of equation 1 to 14 instead of 12, and equation 2 remains 44, the unique solution can be found as $X = 6$ and $Y = 8$. Within reason (in the independent, non-trivial, real number system, etc.), I can arbitrarily change any of the coefficients of X and Y , or the equation sums to any value I wish without risking a dilemma.

To correlate the high school algebra example to real-world cleanroom pressure applications, the letters X and Y represent the respective room pressures relative to some arbitrary ambient space (0.000) of rooms X and Y . Each of the two equations is a statement of specification between the door connecting X and Y . To reflect

typical room-room pressure differentials, if Room X is 10 Pascals higher pressure above Room Y , we would write:

Eq1: $X - Y = 10$

If we can also specify either X or Y relative to ambient zero, we can now know the solution to both X and Y . For instance:

Eq2: $Y - 0 = 5$, meaning room Y is 5 pascals higher pressure than the ambient zero.

We can now solve the two equations as $Y = 5$ and $X = 15$. Room X is 15 Pascals higher than ambient zero, and room Y is 5 pascals higher than ambient zero. Each equation represents the pressure relationship between two spaces across the door connecting them. This result is the unique solution for this arrangement of door-to-door specifications.

When we increase the number of variables to three or more, however, we encounter a problem. Not all systems of n equations in n variables have a solution, and in fact, most do not. If $X = 5$, $Y = 10$ and $Z = 15$ (pascals relative to zero ambient), I can write the system of equations as:

Eq1: $Z - Y = 5$

Eq2: $Y - X = 5$

Eq 3: $Z - X = 10$

Which does happen to have a unique solution, namely; $X = 5$, $Y = 10$, and $Z = 15$. But we knew that before we wrote the system of equations, and that is the entire point! If I go back to that system and make just one seemingly innocent change such as in Eq2A to have a difference of 6 pascals:

Eq1: $Z - Y = 5$

Eq2A: $Y - X = 6$

Eq 3: $Z - X = 10$

We then find that the system of equations has absolutely no solution whatsoever, there are no possible combinations of room pressures relative to ambient, X , Y , and Z , that will satisfy the three equations! If eq2A is correct, then $Y = 11$ pascals, so far so good, but then equation1; $Z - Y = 5$ is no longer true. If equations 1 and 2 are correct, then $X = 5$, $Y = 11$ and $Z = 16$, but that would mean that equation 3; $Z - X \neq 10$ rather; $Z - X = 11$ and so it goes on forever, with no satisfactory solution for X , Y , and Z that satisfy all three equations.



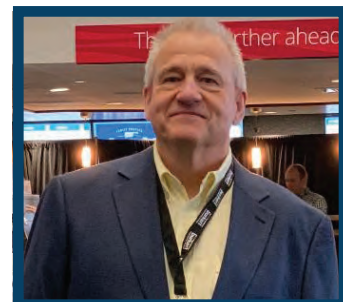
This situation is what has been occurring in the USP pressurization regulations. In the compounding pharmacy layout, as illustrated above, we have four variables, namely: ANTE, IV, HD, and STORAGE. The regulations call for pressure relationship between ANTE and ambient, IV and ANTE, IV and ambient, HD and ANTE, HD and ambient, STORAGE and ambient, and HD and STORAGE. This conclusion can be inferred from explicit citations and also implicitly from such language as all adjacent areas, adjacent areas, surrounding areas, negative pressure rooms, positive pressure rooms, etc.

By writing pressure regulations in terms of relative door-door pressurizations, the editors are committing the error demonstrated in the three-variable example above. The regulations are mandating equations, 1, 2, 3, etc. without regard to their solvability. In the context of *rooms determine doors, doors do not determine rooms*; the equations are the door-door specifications, and the X, Y, and Z solutions are the room specifications. Without first establishing X, Y, and Z, one cannot arbitrarily write equations 1, 2 & 3, etc. Without regard to the pressure values of the various rooms involved, relative to ambient, one cannot arbitrarily specify their door-door pressure differentials (with or without an actual passage door) without frequently encountering unsolvable problems.

Before rushing to comply with the December-2019 USP <800> regulations, one should take a minute and reflect on what the regulation is requiring. In the early part of the last century, ambitious young theoretical physicists were submitting papers for publication, which appeared to disprove some of the results of Einstein's recently published theory of general relativity. One common tactic for these young physicists was to conduct a thought experiment imagining themselves sitting on the top of an atom or hitching a ride on a single photon. Finally, the Nobel prize-winning Danish physicist Nils Bohr sagaciously offered: "before proposing such a thought experiment, the physicist must precisely specify exactly how this shrinking down to the size of an atom is to be accomplished." ●

About the Author

Matt Lemieux is a senior staff engineer Daldrop SBB, LLC. in Ipswich Massachusetts. Mechanical engineer and NEBB CPT-CP with 38 years of cleanroom industry experience.





Recently a restoration contractor called and asked, “What should I know before selling my business?” It’s a perfect question and should be asked by every owner nearing retirement.

Obvious answers include business value, deal structure, timing, best buyers, wealth preservation and more. However, after 20+ years of ensuring successful retirements for specialty contractors, some key lessons have been learned. They extend well beyond the obvious.

Recognize the Emotions Behind Selling

When you’ve worked for 20 - 30 years building a business, let’s face it, it’s scary to think about doing anything else! Ownership has its privileges, financial and otherwise. You are needed, people depend on you and your opinion is paramount. It’s troubling to some when realizing those privileges will not exist post sale. A range of emotions is very common when considering retirement.

“What Should I Know Before Selling My Business?”

By: JT Kraai | Exit Strategies 360

Understand the Process of Selling

Transitioning your business is not a decision, it’s a process. In fact, a detailed process with your life’s work at stake. Many are scared by the term ‘exit planning’ as it sounds daunting. Believe me, it’s not. It is simply assembling a few answers allowing you to make the best decisions.

Clarify Sales Price vs. Yield

I often hear something like, “I have an HVAC company doing \$5.2M a year... what’s it worth?” I appreciate the question, but clarifying questions *must* include:

- Will it be an asset or stock sale?
- What’s included or not included?
- How is the balance sheet adjusted?
- What will you pay in taxes post sale?

Sales price is important to be sure. However, your ultimate yield is the critical figure.

Select an Advisor You Trust

An advisor will help educate, prepare, then navigate. An advisor should also ensure a Transition Team is in place, potentially including the seller’s CPA, estate planner, wealth advisor and business attorney.



Together the team focuses exclusively on your best sale and quality of retirement. Every advisor should be a highly experienced and trusted individual.

Pay Attention to the Details

Packaging and selling a business is a highly detailed process – valuations, assembling accurate and convincing marketing material, communicating with a multitude of buyers, defending the significant goodwill or blue-sky present, LOL's, negotiations and due diligence.

You'll rely heavily on an advisor for these details. Understanding the process in advance will clarify your expectations... and protect your sanity.

Buy a Good Pair of Running Shoes

Properly selling a business will take approx. 8 - 14 months. Once the decision is made to sell, your marathon begins. These months become the longest of your life. Why? Once the decision is made, you'd like it sold by tomorrow... sooner if possible. A week will feel like a month, a month like a year. All too common.

The best advice – recognize and address your emotions, get educated, stay engaged in the business, and get yourself a good pair of running shoes for the journey ahead. ●

About the Author

JT is the founder and president of Exit Strategies 360 and has been delivering worry-free retirements for 20+ years. He specializes in business sales, valuations and exit planning for specialty contractors nationwide. JT can be reached 100% confidentially at 503.577.5649 or info@exitstrategies360.com.



“State of the Union”

BET and Where Are We Today?

By Phil Emory

In 2014, I gave my first “State of the Union” presentation at the NEBB Annual Conference regarding Building Enclosure Testing (BET) and where we are to date. In 2020, six years later if I was to give that same presentation again I think I would break it down to “The Good News” and the “The Bad News”.

First the “The Good News”: During the time I’ve started testing, which started for me in 2009, enough tests have now been performed on a significant variety of buildings, in size and type to say that the modifications that entities like the Corp of Engineers, NEBB and ABAA have done to the two ASTM’s, ASTM E-779 and ASTM-1827 have been a huge success. The modifications now allow the testing to be performed without restriction to the external environment, to be performed on extremely large structures and once finally tested, proved that the methods work on high-rises when tested as a single zone. We don’t need to place fans at the first floor, fans on the roof, and booster fans throughout the structure. If space allows on a high-rise the fans can be centrally located and as long as there is a sufficient air path the induced pressures seen at the level where the fans are located will occur almost simultaneously at the highest floor on a typical -rise that has a leakage rate within design expectations high.

The equipment has improved both at the fan and the control gauges, especially the gauges. The software packages running the tests are more reliable and user friendly.

More and more General Contractors understand the test and are embracing the concepts of building tighter buildings.

Now the “Bad News” and unfortunately it is bad. Every protocol out there, be it NEBB, ABAA or the USACE Protocol for testing buildings calls and uses the word “shall” for Architects to provide a set of air barrier drawings showing the air barrier location in plan view, elevation view, the appropriate details to provide the continuity of the air barrier throughout the intended test zone,



and to provide the square footage calculation of the envelope, all six sides, floor, walls and roof. Where all of this is part of the code here in Washington State, more than not, these drawings do not exist.

As we near the date in Washington State where this test is not only required for C of O, but is now mandated that you have to pass the test, what is going to happen when the test fails?

I’ve been approached with this question from several entities including the Title 24 group in California who are thinking of following Washington State in making the air barrier test a code requirement. My question is who are you going to fine? The Architect that did not meet the code requirements and failed to include an air barrier design? The plan reviewer that permitted drawings that were not code compliant? The Mechanical Design team that did not question the design in order to properly engineer the mechanical systems? The owner’s Commissioning agent that failed to catch the mistake in their plan review? The General Contractor that built the building without an air barrier system? And what about the building owner?

So my response is instead of fining everyone and paying lawyers to sort it all out, why not reward the team for passing and simply enforce the code? ●

About the Author

Mr. Emory is a graduate of Montana State University and holds a Bachelor of Science degree in Mechanical Engineering. He joined Neudorfer Engineers Inc. in 2003. He serves Neudorfer Engineers as the lead engineer for building enclosure testing and as the lead engineer for thermal imaging services. He is currently on the NEBB Board of Directors holding the position of NEBB Treasurer.



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YPN

Young Professionals Network

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Contest: Quarterly Winners



Was It Worth It?

The Young Professionals Network

By Jonathen Lloyd and Donald Pittser

As a younger professional in today's marketplace, getting a solid footing to kick start or carry on in your career can be a challenge to say the least. The opportunity came across my path to venture into the unknown with a new NEBB strategy, at the time we had no title. I love getting involved and I had nothing to lose so I started a journey that would pave the way for the foreseeable future. A group of five guys from across America and myself in Australia, with guidance from Jean-Paul Leblanc and Cynthia Hereth, The NEBB Young Professionals Network (YPN) was off and running. Since its inception, we have seen nothing but growth and with the tethers being formed in this network, we are actively conversing with members or affiliates spanning the globe.

The "where to from here" vanished almost as soon as it was uttered and the YPN laid down a solid foundation. This NEBB initiative was extremely well thought out and the desire to have the younger professional integrated into the organization, through direct mentorship with the immediate past president as the YPN chair, was a stroke of



*...“where to
from here”
vanished almost
as soon as it was
uttered...*

genius! It has been an honour to watch this group grow, not only in number but professionally. It became clear very early on that NEBB is determined to create a sustainable environment for newer members with the full support of Tiffany Suite, our EVP, The Board of Directors and the Executive finance Committee. This group has flourished under their guidance.

Having a network to seek guidance from has been paramount to my current successes within NEBB & NEBB Australia. My career has taken a positive shift as well. Knowing and understanding my role as a TAB CP has broadened and my professional connections have increased exponentially! Don Hill encouraged us, as a group, to cross pollinate and there is now active involvement in the various committees as voting and corresponding members. Each YPN Chair person has a unique and incredible impact on this group and every year we say farewell to a fantastic leader and welcome the next.

I was told that often we see the same people year in year out volunteering due to var-

ious reasons. My testimony is, picking up a towel and serving was the greatest step I have taken in my career to date. I am deeply engrained within NEBB and only have vision forward in the full knowledge that I will represent myself, NEBB and the YPN to the highest degree. If you are not sure where to start, NEBB's YPN is the perfect place to watch your career take off.

Jonathen Lloyd
Director, NEBB TAB CP
Lloyd's Air & Hydronic TAB
NEBB National TAB Committee Voting Member

When I first heard of the YPN, I immediately thought it was a great idea. I remember being a young professional and searching for involvement in NEBB. I got involved on the chapter level with Rocky Mountain NEBB in 2002 as the Treasurer and Board Member at the age of 34. I rose through the chapter level officers to President in 2008-2009. I was asked to join the NEBB National TAB Committee as a voting member for the 2005-2006 term. My four years serving on the NEBB National TAB Committee 2005-2009 brought me a new group of mentors and friends for life. I can see the same energy and excitement in the YPN's as I had back when I was "the kid" on the TAB Committee. As the youngster, I was pushing for online testing, Digital TAB Reports, Digital NEBB Stamps, Digital Signatures and web-based TAB Reports. These things are common now-a-days. iPads on the projects in the field for TAB Reports and reviewing mechanical drawings have replaced paper prints and clipboards of TAB Report forms.



I can see the same energy and excitement in the YPN's as I had back when I was "the kid" on the TAB Committee.

I attended the YPN's presentation "Utilizing Technology to Achieve Excellence" technical session at the NEBB Conference in 2018 in San Diego. I was thoroughly impressed and met the young men presenting the session as well as other YPNers. I recruited one of the speakers, Jonathen Lloyd, a YPN member, to join the NEBB National TAB Committee as an unofficial volunteer for 2018. His effort and the excitement he showed led me to believe he would be a good National TAB Committee Member. Thankfully, the NEBB Board of Directors approved Jonathen as our first YPN and first Australian to serve the NEBB National TAB Committee as a Voting Member for the 2018-2019 term. His continued passion and many hours of volunteering led me to recruit two more YPNers, Josh Whitley and Nick Muscolino. They now serve the NEBB National TAB Committee as Corresponding Members for the 2019-2020 term. Mixing the new ideas and technologies into the TAB Committee is a welcome advancement for our TAB Committee projects.

I am very pleased to see the NEBB Board of Directors has voted to move the YPN Committee from an ad-hoc committee to a Standing Committee. I believe this will serve NEBB well presently and in the future. Getting our YPN members involved on the NEBB Chapter level is important. We need to groom and mentor the YPN members for our future while we keep our minds open to their cutting-edge technology ideas and opinions. ●

Donald Pittser
President, NEBB CP TAB, Cx, SV
JEDI Balancing
NEBB National TAB Committee Chair



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2020 NEBB Conference Schedule at a Glance

TIME	SUNDAY - AUGUST 16
1:00 pm – 5:00 pm	Annual Conference Pre-Registration Open
	MONDAY - AUGUST 17
7:00 am – 5:00 pm	Annual Conference Registration Open
8:00 am – 5:00 pm	NEBB Exam Day
8:00 am – 5:00 pm	Closed Committee Meetings
6:00 pm – 10:00 pm	NEBB Volunteer Appreciation Dinner
	TUESDAY - AUGUST 18
7:00 am – 5:30 pm	Annual Conference Registration Open
8:30 am – 3:00 pm	NEBB 23rd Annual Golf Tournament
10:00 am – 1:00 pm	Guest Event (Greenbrier Bunker Tour and Lunch)
1:00 pm – 5:00 pm	Exhibit Hall Open
3:30 pm – 4:30 pm	NEBB Past Presidents' Meeting
5:30 pm – 6:45 pm	Opening Session: Welcome and Keynote Presentation
	Keynote Speaker: Scott Bloom
7:00 pm – 10:00 pm	Get Acquainted Reception
	WEDNESDAY - AUGUST 19
7:00 am – 8:00 am	Breakfast
7:00 am – 5:00 pm	Annual Conference Registration Open
7:00 am – 5:00 pm	Exhibit Hall Open
8:00 am – 9:00 am	TAB Teach the Examiner Session
8:00 am – 3:30 pm	Technical Track Sessions
	TECHNICAL TRACK SESSIONS
8:00 am – 9:30 am	Track 1: BSC and TAB – Matt Nelson
	Track 2: CPT and IAQ – Ghassan Elkhatab
	Track 3: Business and Leadership Practices – Young Professionals Network
9:45 am – 11:15 am	Track 1: BSC and TAB – #1 TAB Committee
	Track 2: CPT and IAQ – Luis Chinchilla
	Track 3: Business and Leadership Practices – Jonathan Strausbaugh
11:15 am – 12:15 pm	NETWORKING LUNCHEON



2020 NEBB Annual Conference

A Clear Vision to the Forefront of a Changing Environment

2020 NEBB Conference Schedule at a Glance (con't)

TIME	WEDNESDAY - AUGUST 19 (continued)
12:15 pm – 1:45 pm	TECHNICAL TRACK SESSIONS Track 1: BSC and TAB – #2 TAB Committee Track 2: CPT and IAQ – James Barrette Track 3: Business and Leadership Practices – Derek Hedrick
2:00 pm – 3:30 pm	Track 1: BSC and TAB – Mark Terzigni Track 2: CPT and IAQ – Nicholas Pearce Track 3: Business and Leadership Practices – Derek Hedrick
	THURSDAY - AUGUST 20
7:00 am – 8:00 am	Breakfast
7:00 am – 2:00 pm	Annual Conference Registration Open
7:00 am – 5:00 pm	Exhibit Hall Open
8:00 am – 4:00 pm	Chapter Coordinators Meeting
8:00 am – 1:45 pm	Technical Track Sessions
8:00 am – 9:30 am	TECHNICAL TRACK SESSIONS Track 1: BSC and TAB – Jim Bochat and Steve R. Wiggins Track 2: CPT and IAQ – Peter Maguire Track 3: Business and Leadership Practices – Chapter Affairs Committee
9:45 am – 11:15 am	Track 1: BSC and TAB – Panel Discussion – Various CPs Track 2: CPT and IAQ – Matt Lemieux Track 3: Business and Leadership Practices – Jennifer Donahue
11:15 am – 12:15 pm	NETWORKING LUNCHEON
12:15 pm – 1:45 pm	TECHNICAL TRACK SESSIONS Track 1: BSC and TAB – Phil Emory Track 2: CPT and IAQ – Don Hill Track 3: Business and Leadership Practices – Young Professional Network
2:00 pm – 3:30 pm	NEBB Town Hall and Business Meeting
3:30 pm – 5:00 pm	Vendor Reception and Prize Giveaway
5:00 pm – 6:30 pm	Closing Session Keynote Speaker: Charles Marshall
	FRIDAY - AUGUST 21
8:00 am – 12:00 pm	Board of Directors Meeting – OPEN
12:00 pm – 5:00 pm	Board of Directors Meeting – CLOSED

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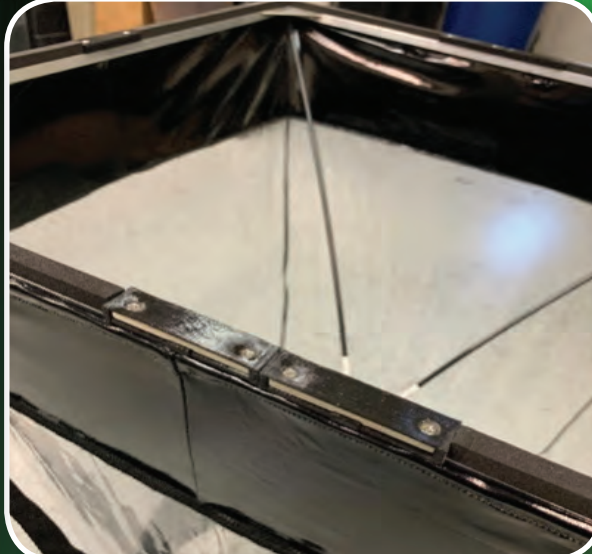


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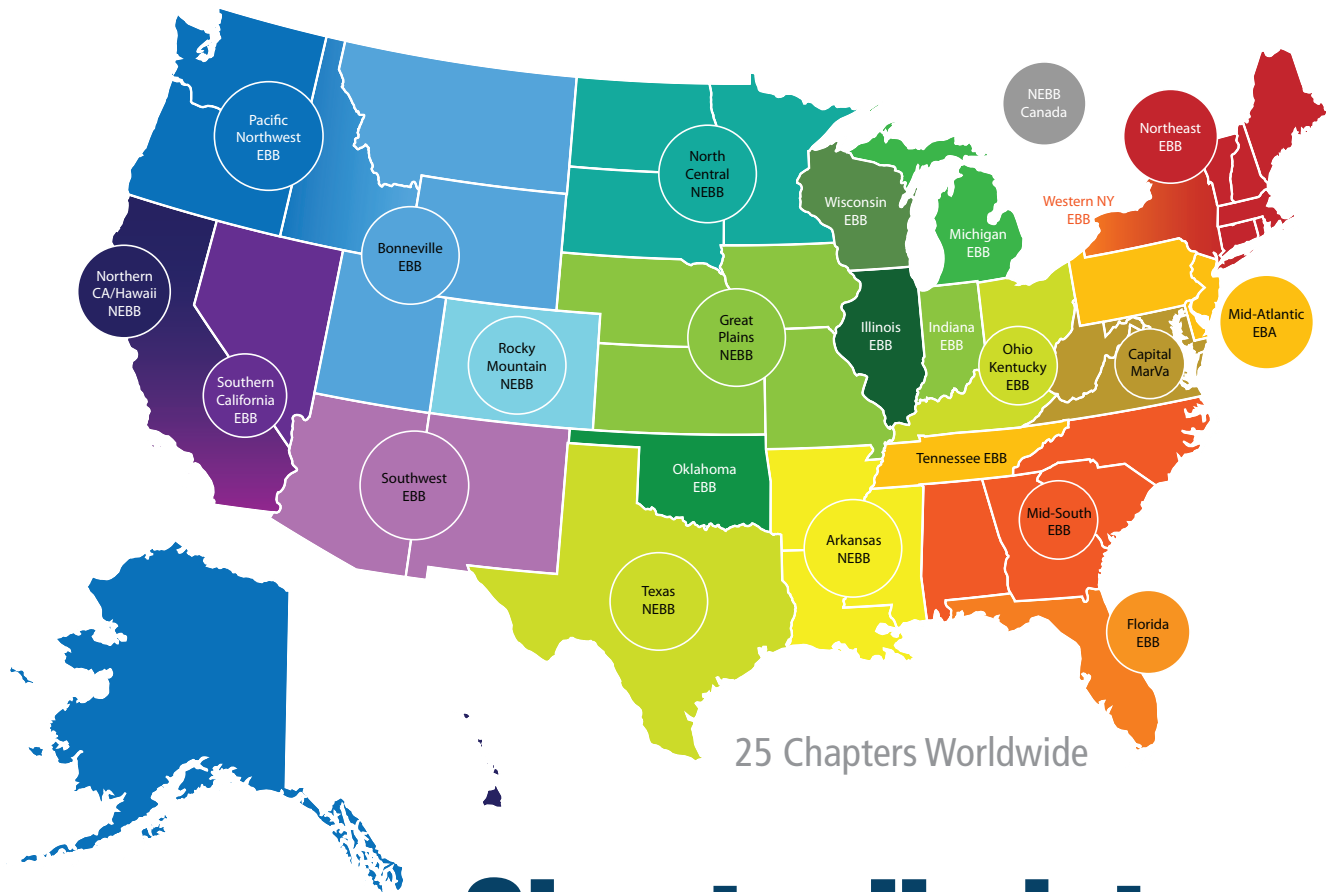
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Chapter Updates

Florida EBB

Terry Wichlenski, Chapter Coordinator

The Florida EBB has changed its 39th Recertification Seminar & Annual Chapter Meeting from April 30 to a later date due to the coronavirus. We are still working on the new dates with the Omni Champions Gate Hotel in Orlando, so please contact Febbcoordinator@gmail.com for more details.

Our next NEBB TAB Practical Exam will be June 6th at either our Largo or Deerfield Beach Test Site. For additional information, please contact Terry, FEBB Chapter Coordinator, at Febbcoordinator@gmail.com or 727-240-4254.

MAEBA

Trish Casey, Chapter Coordinator

MAEBA will be holding its Annual Recertification Seminar from September 20-21, 2020 at the Eden Resort in Lancaster, PA. Come join the MAEBA Chapter beginning with a dinner reception at the resort Sunday evening, followed by a full day of great educational topics and vendor displays.

Some of the topics being presented this year include *ECM Driven Pumps* by John Boyle, Vice President of Engineering of R.D. Bitzer Co., Inc.; *Cyber Crime and Security - The impact that cyber intrusion can have on your business* by Derek Hedrick of Ameritech Data Solutions; and *Building Enclosure Testing (BET)* by Phil Emory, NEBB Board of Director and Senior Project Manager of Neudorfer Engineers, Inc.

More information on the resort can be found at:
www.edenresort.com



All are welcome to join the MAEBA Chapter!

For more information, go to the MAEBA website this summer: www.maebanet.org

North Central NEBB

Ashley Lang, Chapter Coordinator

North Central NEBB held its General Membership meeting on March 12, 2020. Items discussed included ideas for our 2020 seminar speakers, topics, and vendors. A list of past seminar speakers, topics, and vendors was compiled and will be reviewed. Recommendations for this year's seminar on speakers, vendors, and topics will be given to this year's co-chair to start pulling together the Chapter's recertification meeting. The Recertification Seminar will be taking place on October 8, 2020 at the Doubletree in Roseville, Minnesota.

Rocky Mountain NEBB

Stuart McGregor, Chapter Coordinator

The Rocky Mountain NEBB Chapter's recertification meeting in conjunction with Rocky Mountain ASHRAE has been rescheduled for Friday, June 19, 2020.

Mid-South EBB Chapter (MEBB)

Ginger Slaick, Chapter Coordinator

MEBB will host the 2020 Recertification Seminar and Vendor Expo September 19th-20th at the Battle House Renaissance Hotel & Spa in Mobile, AL. Details of the technical/business sessions to be offered this year are forthcoming as the agenda continues to be finalized. MEBB is, however, pleased to announce a field trip has been planned again this year. Attendees will be given a behind the scenes tour and presentation of Gulf Quest National Maritime Museum offering an up-close view of the unique design system used at the facility.

The Vendor Expo is a vital part of the two-day event, providing Certified Professionals, Technicians, and others in attendance the opportunity to interact directly with industry representatives. During this time, attendees learn about the latest technology available as well as information on the various instruments, software, and products offered by the vendors. MEBB appreciates the continued support of the vendors and looks forward to another successful event.

For additional information on attending the 2020 MEBB Recertification Seminar and Vendor Expo or how to become a valued vendor, please contact MEBB at 678-407-2754 or gslaick@midsouthebb.com.



SoCal EBB

Jim Rosier, Chapter Coordinator

The SoCal EBB Annual Meeting has been rescheduled for Friday, November 6, 2020 from 7:00 a.m. to 3:00 p.m. at the Diamond Bar Golf Course in Diamond Bar, California. For more details or registration information, contact the Chapter at 714-998-6322.

Tennessee EBB

William Bailey, Chapter Coordinator

The Tennessee EBB has scheduled its recertification meeting for Friday, July 24, 2020 from 7:15 a.m. to 3:45 p.m. in Memphis, Tennessee. TEBB President Roger Wehby will open the session, followed by speakers such as Brent J. Baird of Instruments Direct Inc. presenting *Ultra-Sonic Flow Meters, Energy Monitoring for TAB and Commissioning*; Alex Lee (PE) and Stephen Greer (PE) with Bernhard TME present-

ing *Three Ways to Improve Your Commissioning Process*; and Greg Allen, Engineer II at Greenheck Applications presenting *Power Roof Ventilators*. The Mid-Year 2020 TEBB Meeting will conclude the event. The selected date may change or get postponed if virus sanctions are not lifted by that time.

Texas NEBB

Sandee Morgan, Chapter Coordinator

The Texas NEBB Annual Meeting and Recertification Seminar has been rescheduled for Thursday, September 24, 2020 and the technician training will follow on Friday, September 25, 2020. Our location at the DoubleTree Dallas Love Field will remain the same. Some of the topics being presented include: *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; and *Fluid Dynamics* by Nick White of ND White Engineering. ●



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NEBB 2020 Technical Seminars Schedule



September 2020

Cleanroom Performance Testing Seminar

September 21-23, 2020

(All Day Event)

NEBB TEC, Gaithersburg, MD

Registration Deadline: September 7, 2020

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

Sound & Vibration Measurement

September 28 - October 2, 2020

(All Day Event)

Total Dynamic, Deerfield Beach, FL

Registration Deadline: September 14, 2020

NEBB's Sound and Vibration Seminar is designed to prepare professionals from all disciplines in the correct methods to properly perform consistent, repeatable readings to meet sound and/or vibration specifications for projects.

October 2020

Retro-Commissioning of Existing Buildings (RCx)

October 12-15, 2020

(All Day Event)

NEBB TEC, Gaithersburg, MD

Registration Deadline: September 28, 2020

Technical RCx-EB is the technical process of improving building systems by inspecting, testing, analyzing, calibrating, repairing, adjusting and optimizing building systems. The RCx process allows for the training of operators for improving building performance covering such items as: building systems, energy-utilizing equipment, and operating schedules as well as optimization of these elements for maximum efficiency. The seminar will cover the main content domains in the RCx-EB Body of Knowledge (included in the RCx-EB CP Candidate Handbook Appendix).

Testing, Adjusting, and Balancing (TAB)

October 18-21, 2020

(All Day Event)

IMI Facilities, Roswell, GA

Registration Deadline: October 4, 2020

This seminar will cover engineering principles, charts, diagrams, problem solving and techniques, along with reviewing HVAC principles involved with TAB work and HVAC testing. The course will cover the requirements of the NEBB TAB PS and will address what constitutes a NEBB TAB.

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