

# The NEBB Professional

*September, 2010*

## Turning 40 in Florida

Running Like a  
Cadillac

Boland Celebrates 50

News from the Industry

The Official Magazine  
of the National Environmental Balancing Bureau



ALNOR IS EXCITED TO  
ANNOUNCE THE NEXT  
GENERATION OF

## Analog Balometer® Capture Hoods!



Since 1919, Alnor has provided rugged and reliable analog instrumentation to HVAC technicians, and the tradition continues with the new Analog Balancing Tool (ABT) Balometer.

The ABT series Balometer utilizes a low current analog meter with a large, easy to read scale. Fast meter response combined with smooth needle movement allows for quick and accurate flow measurements from supply diffusers and return grilles. For more information visit [www.alnor.com](http://www.alnor.com)



## On The Inside

LEED Commissioning .....	10
Runs Like A Cadillac .....	6
TAB and BIM .....	15
Going Green Legally .....	5
Pressure Independent Valves and Challenges .....	12
Turning 50 .....	18
Ultrasonic Flow Meters .....	8

## The NEBB Professional

**Publications Manager**  
Karen D. Groppe, PCM

*The NEBB Professional is a quarterly magazine published by the National Environmental Balancing Bureau, 8575 Grovemont Circle, Gaithersburg, Maryland 20877-4121, 301-977-3698, [www.nebb.org](http://www.nebb.org).*

# EVERGREEN TELEMETRY

[www.EvergreenTelemetry.com](http://www.EvergreenTelemetry.com)

Wireless Technology for  
**TAB Productivity**  
Miniature Interface for Hands-Free Operation

Press "S" (store) on thumbswitch to record specific temperatures to be transferred.



*Can the tech who is adjusting the damper see the flowhood meter results directly instead of listening for the shouts of the guy holding the hood? **YES!***

*Can the weight of the flowhood be reduced so there is less strain when lifting and it is easier to place and hold steady? **YES!***

*Can the tech store time-stamped readings in 500 data sets and later upload up to 20,000 readings to a PC spreadsheet? **YES!***

**TAB KITS  
PRICED FROM  
\$1,350**  
includes  
Wrist Reporter,  
Dongle, and  
Thumbswitch

For more information, contact us at:  
Suite 478

3217 East Shea Blvd.,  
Phoenix, AZ 85028-3365 Tel 480.206.4744 Fax 602.889.0854  
[info@evergreentelemetry.com](mailto:info@evergreentelemetry.com)

**In Split Screen Mode, the Wrist Reporter™ displays 4 different meters and/or sensors at the same time.**

- Show 3 Supply Airflows and 1 Return Airflow.
- Show Mixed Air and Return Air and Outside Air and Room Ambient Temperature.



**Wireless TAB kit for "Hands-Free" measurements.**

- A) The ADM Dongle** transmits readings in real-time!
- B) The Wrist Reporter™** displays and stores ADM readings.
- C) The Thumbswitch** lets the user store readings without reaching to touch an instrument.



# From the NEBB President



First I would like to thank you for the privilege of serving as your President this year. I am looking forward to seeing you at to our Annual Conference in Bonita Springs, Florida.

This year's editions of *The NEBB Professional* featured several articles highlighting many of the innovative men that formed NEBB. These men took part in the early development of an organization that has grown into the top certification organization in our industry. Our meeting will celebrate 40 years of committed service to our members and the commencement of the next 40 years of integrity.

This year's conference will feature an extra day of technical sessions to expand on your educative experience. You will have the pleasure of hearing from some of the leading experts in our industry during these captivating specialized sessions.

The conference officially begins on Wednesday with the 13<sup>th</sup> annual Golf Tournament at Raptor Bay Golf Club on the grounds of the resort. We will also have a fishing tournament this year with the boats leaving out from the docks located adjacent to the resort. Wednesday will come to a festive end at NEBB's 40<sup>th</sup> birthday party—a great place to rekindle acquaintances and establish new friendships with fellow NEBB members.

The Board of Directors began a strategic planning process in 2007 that culminated last year. Implementation of the plan began this year with several changes taking place. Numerous tactical cooperative alliances with other industry organizations have been strengthened or started. I, and members of the EFC, met with representatives of ASHRAE, ASHE, MCAA, USGBC, AIA, IFMA and RSES this year to strengthen NEBB's position as the technical experts in our disciplines. The Annual Conference will include discussions on how each of these relationships can assist you as you build your business and personal professional aptitude.

NEBB's new Executive Vice President, Mr. Steven Johnson will join us for this exciting week in Florida. Steve was hired at the Mid-year Meeting and reported to NEBB on May 17, 2010. He is a graduate of the US Naval Academy, a retired naval officer and Professional Engineer. Be sure to welcome Steve, and his wife Karen, to their first NEBB Annual Conference. Steve has added greatly to the NEBB leadership in his short time with the organization.

Our gathering will not only increase your knowledge, but also provide an opportunity to relax along the beach. Don't forget to come early, bring your swimsuits and suntan lotion to enjoy an extra day unwinding with your family and friends. Feel the sand in toes as you hunt for seashells, or settle down by one of the pools and read a good book. Shopping, touring, crafting, or resting, you will be able to find it all at this year's NEBB meeting!

See you there!

  
Stephen R. Wiggins



# Going Green Legally

*David Funderburk*

In light of the worldwide concerns over global warming, air pollution and environmental conservation, it is no surprise that consumers have a growing interest in building “green”. Whether Plaintiff attorneys will have a growing interest in “green” litigation remains to be seen. So far, there has not been an onslaught of “green” lawsuits.

With the marketplace for green buildings expected to grow to \$40 billion by year’s end, there is a rapidly growing demand for architects and engineers to design and/or build green construction. Notably, architects and engineers are not the only group looking to jump into the green building revolution. Insurance companies are now developing and marketing coverage for “green” buildings. Property owners can buy insurance that will pay the costs of returning damaged property to its previous “green certified” condition and cover the cost of a professional certified by Leadership in Energy and Environmental Design (LEED) to supervise the repairs. Where there is insurance available, Plaintiff attorneys are not far behind. Test and balance contractors should be aware of the pitfalls surrounding green construction and knowing what the green legal landscape looks like is a must to protect your business.

Assume a contractor named Green Bricks negotiates a contract to build a LEED-accredited building. Green Bricks represents to the developer that it has the experience and expertise to design a condominium complex that will achieve platinum status. Construction begins, problems occur and completion is delayed. You know the story. Additionally, Green Bricks fails to use recycled materials in construction and heating and cooling costs are higher than represented by the architect to the owner/developer during

the design phase. As a result of these errors and misrepresentations, the building may be LEED-certified but it does not achieve the platinum status promised. The developer files suit and damages are sought based on fraud, misrepresentation and negligence, loss of use and loss of profits.

Since the HVAC system is oftentimes at the core of a building failure and integral in any sort of “green” representations made to the owner. As a result, the mechanical engineer, controls contractor and TAB contractor seem to be likely targets in any “green” litigation.

Unlike negligence, claims of contractual breach, misrepresentation and fraud are not covered by your insuring agreement. As the TAB contractor, you may have faced these allegations before. As the TAB contractor, the allegations levelled against you may be characterized as fraud or misrepresentation in failing to properly prepare your report, preparing a misleading report or failing to prepare the report at all. Since the air balancer never actually installs anything or, for that matter, fails to install something like a mason, window contractor or roofer would, you are often faced with allegations that your insurance company simply will not cover because the allegations or claims are not covered by the insuring agreement. Unless the Plaintiff’s attorney pleads into coverage, the contractors are left without insurance to defend them in litigation.

A contractor promising to construct a “green” building or a “green” HVAC system may find itself bearing the costs of a defense should litigation result from the failure to meet the contract terms. Nebulous claims of damages like loss of platinum status or high utility costs are simply not property damages as outlined in your insuring agreement. If Plaintiff lawyers see any potential green in “green” litigation, we can expect lawsuits to be filed in the next decade and you should make sure your insuring agreement covers your company for “loss of use” and inquire whether adding an endorsement for “green” construction would be costly and how much additional expense it would be to help protect yourself and your company.



# Runs Like A Cadillac

Stephen Archer

NEBB Marketing Committee



“Runs like a Cadillac.” Have you ever heard or used that phrase? Lawnmowers, weed eaters, trucks, sedans, boats, airplanes. Everything seems to run like a Cadillac or is the Cadillac in its classification. I have never heard of an engineering firm, TAB firm, or Commissioning firm referred to as “the Cadillac.”

Suppose you decide that it is time to purchase a new lawnmower for your home. Is there really a difference between lawnmowers? Have you recently investigated how many different brands and models are available? Which one do you choose? First, let’s look at the engines. The engine is the lifeline behind the working machine. You want an engine that is strong, dependable, reliable, and reasonably priced. Sound and vibration may matter to you. Also, emissions & cleanliness may matter to you. Do you pick a Briggs or a Honda? Maybe you pick an Ariens, Sears Craftsman, or some other brand. Perhaps the engine doesn’t matter to you. Maybe it is the work output that you desire. Quantity of grass cut may be more important than quality of the cut. The speed of travel may be the most desirable feature. Whatever the case, we can all agree that there is a difference in the products and what the consumers wants.

There are lots of examples that I could use to illustrate my point of difference in quality and establishment of value. What does this have to do with you? Simple. Features and benefits. Most consumers buy based on features and benefits or brand recognition. A few consumers buy based on price alone because they either don’t know the difference or they think that it doesn’t matter. What are you doing to sell or promote your features and benefits or brand?

Do you know how many times I have heard the phrase “yea, but my firm does it right.”

Congratulations Mr. Doing it Right. You have cornered the market on performing quality work. You are the only one. One of a kind. Everyone else in your market place is doing it wrong. Good luck selling this benefit to the marketplace. What do you think your competition is saying? Do you think they are telling their customers that “we don’t do it right but we are cheap!” Unfortunately, some of you do.



In the simplest of terms, I sell hours. I suppose that most of you reading this article are also selling hours. Yes, we are selling the world’s oldest commodity bundled up into a neat little 60 minute package called an hour. Unfortunately, every firm and company has one. However, I categorically believe that everyone’s hour is different. Some of your hours may be better than mine while some of your hours are worse. I doubt that any of them are the same. So the problem here is how do I sell my hour over yours?

Barnes and Noble has a whole section dedicated to selling and the sales process. You can spend a fortune in money on seminars. All of these sources are going to tell you what you already know. People buy from people and you can typically smell a rat from a mile away.

1. Do you value your customers as much as you need their business?
2. Do you care about your customer's profitability?
3. Have you given your customers what they paid for and did your customers pay for what they received?
4. Do you treat others as you want them to treat you?
5. What have you sacrificed?
6. When was the last time you told a customer "thank you" and meant it?
7. When was the last time you performed a job for free with no expectation of anything in return?
8. What are you doing to train the people in your organization?
9. Do your customers enjoy working with you or do they tolerate you?
10. Are your customers fortunate to have you or are you fortunate to have them?

I hope that these questions cause you to pause and reflect on you and your organization. I think of our lawnmower illustration above and the importance of selecting the "right" engine. Is NEBB our engine? NEBB provides the heart and soul behind our organizations. The Procedural Standards, reputation, certification programs, and training programs are the best in the industry. There is not another certification entity that is better. Does that mean that NEBB is the Cadillac? You decide. All I know is that NEBB has helped put us in position to perform our job. With that comes a responsibility to deliver the highest quality job that meets or exceeds NEBB's standards. NEBB doesn't tell us how to run our businesses. They don't tell us how to or guarantee us that we will make money. Could you imagine performing your job without the procedural standards and knowledge you learned through NEBB?

How do you sell your hour? Well, a good place to start is recognizing that you need to sell your hour. If at first you don't succeed, try again. You probably are not going to have instant results. Be humble and show what you can do rather than tell customers how great you are. Word of mouth trumps your self promotion schtick. Do you have friends in the industry or have you made a career of making enemies? Remember, it is never too late to try and mend those fences.

How many of you have a problem account? They are either a problem because of something you did or because of something someone else did before you. Most people run and hide from their problems. They would rather go mow their lawn than deal with a problem. If you are truly "doing it right," go help a customer that is having pain and show them your firm's capabilities. In return, you will have the opportunity to purchase your Cadillac.

2010 Annual  
Conference  
Registration  
Closes on  
October 1, 2010

Register at  
[www.nebb.org](http://www.nebb.org)



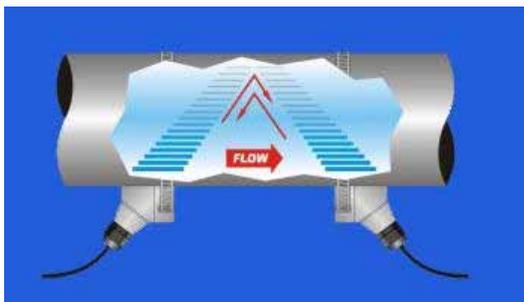
# Ultrasonic Flow Meters for Balancing and BTU Measurement

*Brent Baird*

Ultrasonic transit time flow meters are becoming an ever popular tool for the balancer in the HVAC and energy management marketplace. Gone are the days of having to use an invasive differential pressure pitot tube technology to measure the liquid flow rates in a hydronic piping system. Today's non-contact flow meter technologies have become common place in the instrument inventory of companies who offer balancing and commissioning. But this wasn't always the case.

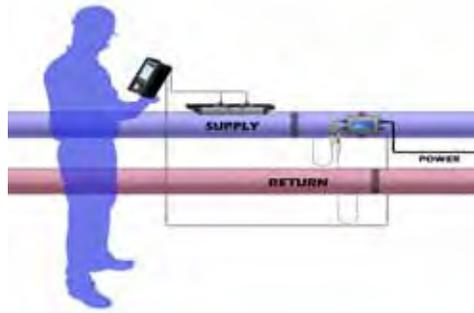
The technology of the clamp-on ultrasonic flow meter has come a long way. Back in the mid 70's, the first of this type of meter appeared in the marketplace. Initially, this clamp-on flow meter technology was revered as the cure all flow meter to replace all inline liquid flow meters. However, reality eventually kicked in when it didn't work on every application and people actually began to read the specifications and acknowledge its limitations. Thus began the confusion about all the different flavors of ultrasonic flow meters.

First out of the chute was the ultrasonic doppler flow meter, which was limited to applications with suspended solids and only a few pipe materials. The clamp-on ultrasonic transit time flow meter soon followed, but it too had a host of limitations in those early years. By the 90's the market had established that the doppler flow meter was for slurry and dirty liquid applications, and the ultrasonic transit time flow meter was for clean liquid applications. Then, enter confusion in the marketplace again! The doppler manufactures counter maneuver to address their shortcomings by introducing a clean liquid ultrasonic doppler. Thought dopplers require suspended solids or slurry-like applications? Well, yes and no. The new clean liquid series reflected off of suspended solids or the turbulent flow that one might find after a 90° elbow. Although the accuracies were marginal, it was far easier than using the big and bulky transit time flow meters of time. So again, confusion set in as to what ultrasonic flow meter to use, especially for the HVAC industry. The clean liquid doppler faded out by the end of the 90's when two of the leading manufacturers sold out to larger companies and eventually dropped the clean liquid doppler series in lieu of the more precision transit time flow meters. Now, at the turn-of-the-century, the balance has been restored and once again ultrasonic doppler flow meters are limited to solid bearing or slurry liquid applications and ultrasonic transit time flow meters operate on clean liquid applications and liquids with a few percent of suspended solids. Transit time technology continues to evolve, reducing cost of manufacturing and packaging, making it suitable for portable applications and ideal for handheld instrumentation or balancer and commissioning use.



Since the theme of this article is transit time, we should review how the technology operates. Ultrasonic transit time flow meters utilize two transducers which function as both transmitters and receivers. They operate by transmitting and receiving frequency modulated bursts of sound energy between each other. The burst is first transmitted in the direction of the fluid flow and then against the fluid flow. Because sound energy in a moving liquid is carried faster when it travels

downstream than it does when it travels upstream, a differential in the times of flight will occur. The accurate measurement of this differential is what allows the flow rate to be calculated. The pipe mounted transducers are connected by cables back to a wall-mounted (for dedicated applications) or portable handheld flow meter for display, transmission or logging of flow.



windows, and are generally more conscientious about what they use when they are paying the bill.

So, how do BTU meters work? BTU's are calculated by multiplying the temperature difference ( $f\Delta T$ ) between the supply and return lines by the

flow rate (gpm) through these lines.

As you can imagine, the people who do balancing and commissioning are very interested in non-contact portable flow measurement. Not every application has access to taps or pressure ports on the hydronic system. Needless to say, non-contact clamp-on ultrasonic flow meters are the logical choice for quick and easy flow data collection.

To complete a survey of flow and temperature, it is necessary to monitor flow on the supply line, temperature one on the supply line and temperature two on the return line. In this example for a metal pipe application, we'll use a non-contact ultrasonic flow meter to monitor the supply line, and 2 strap-on thousand ohms RTD's wands to monitor the supply line and the return line. The temperature sensors go through a temperature transmitter which sends a 4-20 mA signal back to the ultrasonic flow meter (portable in this case) which collects all information on its onboard data logger. Although it depends on the brand, most new loggers collect the data in separate channels. For example, flow, temperature one, temperature two, and calculated BTU. This data is collected and stored in the logger or on an SD card and can be easily retrieved at your convenience.

Ultrasonic transit time flow meters have had great success and found a permanent home in the energy and HVAC market, so it wasn't long before they also became associated with temperature. In the past, temperature was monitored separately from flow. Both types of data were collected and dumped into an old excel spreadsheet to calculate BTU. Now, several of the newer ultrasonic transit time meters offer multiple channel inputs of temperature. These flow meters can do the BTU calculation for you, or the separate data points can be collected for later analysis. In this case, it appears the Europeans are way out in front of the United States in efficiently combining the measurement of energy and water use. Hence, the term "BTU," the energy measurement unit meaning British Thermal Unit. A BTU is the amount of heat energy it takes to raise the temperature of 1 pound of water by 1°F at sea level.

These flow and temperature surveys provide key information and insights into facilities operations, and have frequently resulted in request to leave behind a dedicated flow/temp/BTU meter for continual monitoring. The dedicated versions of this technology offer less data logging options, but instead focus more on process control features with alarms / relays and communication with compatible outputs to the facilities building automation system. Typical outputs include 4-20 mA, RS485, Modbus RTU, 0-1,000 Hz, 10/100 Base-T, EtherNet, BACnet/IP, and Modbus TCP/IP.

Why measure BTUs? As always, it all comes down to enhancing efficiencies, ergo saving money. You can bill for actual energy use (facilities, departments, apartments, condominiums, dormitories, offices, stores, etc.) and make people responsible and accountable for their overall energy use. This increases efficiency, and savings can be as much as 40% when the economic onus is put on the end user. Energy users tend to lower thermostats, fix leaks, close

Ultrasonic flow meters have evolved considerably since the mid 70's and have many new features and options to enhance their use. Temperature or BTU monitoring are only just the beginning, so keep an eye on this technology.



# LEED Commissioning- Close, But No Cigar

*Jim Huber*

*NEBB Board of Directors*

When you work for a commissioning company, you see a lot of funny things, and you get a lot of funny phone calls. One of my favorites is "hey, do you guys do LEED commissioning?" A few years ago, I used to take a few minutes out of



my busy day to explain to the caller that yes, we provide commissioning services, and yes, we also provide those services for projects that are trying to achieve LEED certification, but there really is no such thing as "LEED Commissioning".

Today, I just answer "yes". I'm getting older, and my remaining time on earth is precious to me.

You know what LEED is- a green building rating system used for rating new and existing commercial, institutional, and even residential buildings. Every day it seems that additional rating systems are being added to the mix. The LEED rating system was developed by the USGBC (United States Green Building Council), with input from all sectors of the building industry. It is a performance based system where credits are earned in each of five environmental categories. There are specific requirements that must be performed on every project (prerequisites), and optional credits available for the owner to choose from with the final certification level based on the total credits earned. (If you aren't familiar with LEED, you can get all of the information from the USGBC website- [www.usgbc.org](http://www.usgbc.org).)

As the green building industry has grown and changed, so has LEED. With each new version, improvements have been made. I've had many interesting discussions with people about the different components of the system, but it's been my experience that the building industry as a whole agrees that LEED is good. In fact, the past few years have seen many LEED strategies adopted into local building codes, and in many cases the local jurisdictions require LEED certification for new buildings. That's a good thing, and a bad thing. The good thing is that as LEED requirements have become more popular, the associated costs have come down. Designers, contractors,

vendors, and owners are more familiar with the requirements. Material costs have come down, and information is more available. What could possibly be bad?

The phone call, that's what.

One of the prerequisites for LEED rated commercial buildings is fundamental commissioning. There are also available credits for enhanced commissioning, worth one credit in the previous versions of LEED but now worth two in the current version. The fundamental commissioning prerequisite requires the following systems to be commissioned:

- HVAC and refrigeration systems (and associated controls)
- Lighting and daylighting controls
- Domestic hot water systems
- Renewable energy systems (wind, solar, etc.)

These energy related systems are a minimum requirement. Owners are encouraged to also commission other building systems, including any water-using systems, building envelope systems, fire and life safety, and any and all other systems deemed appropriate.

The enhanced commissioning requirement adds the following tasks to the fundamental commissioning requirements:

- The commissioning authority (CxA) must be hired prior to the start of the construction documents phase to lead, review and oversee the completion of all commissioning process activities.
- The commissioning authority must conduct at least one commissioning design review of the OPR, BOD, and design documents.
- The CxA must review the contractor submittals for the system being commissioned as to performance with the OPR and BOD, concurrent with the A/E reviews.
- The CxA must develop a systems manual for the systems that have been commissioned.
- The CxA must verify that the requirements for training operating personnel and occupants have been completed.
- The CxA must be involved in a building operation review 10 months after the date of substantial completion.

One of the areas in the commissioning requirements for LEED projects that need improvement is the line of demarcation between who performs the fundamental and who performs the enhanced commissioning tasks if the project is attempting to obtain the enhanced Cx credit. There is a disturbing trend in LEED projects recently where the MEP firm will try to do the fundamental Cx, and a third party commissioning firm will be hired to handle the enhanced Cx. Plain and simple, this is a bad idea. Our firm will not accept any project under these terms. For any facility to be commissioned to a high standard, the CxA must have total ownership of the commissioning process. When different firms are performing different tasks, one of two things *will* happen. Either the owner is paying two firms to perform duplicate tasks, or the two firms will be operating independently of each other on some level. For example, how can I, as the CxA of record, tell an owner that I know all of the systems in his facility have been properly commissioned if my firm did not perform or witness the work? In fact, the USGBC has addressed this question in previous publications and credit interpretation requests. As clarified in LEED-NC v2.2 EAc3

CIR ruling dated 9/10/2007, *one party (the independent Commissioning Authority) must lead and oversee all commissioning efforts relating to both fundamental and enhanced commissioning. While this does allow for some limited division of the tasks required by this credit, there must be one independent Commissioning Authority leading and overseeing all LEED commissioning efforts.* Per the USGBC document "Who Can Be the Commissioning Authority": The "all" in the Enhanced Cx Requirement 1 means if one is seeking the Enhanced Cx credit, the same CxA overseeing the Enhanced Cx tasks must also oversee the Fundamental Commissioning tasks. In my opinion, this oversight rarely occurs at a suitable level. By allowing the CxA that is performing the enhanced Cx to "oversee" the fundamental commissioning tasks, the USGBC has created a loophole that can and is being exploited.

Let's get back to that phone call. More often than not, the guy on the other end of the line is not the building owner. It might be a contractor, developer, construction manager, architect or engineer, but it isn't the person that needs to be making the call. USGBC allows the commissioning authority to be contracted through the design firm (for fundamental commissioning, the authority can even be an employee of the design firm, as long as he is independent of the design team). In a perfect world, we'd all like to think that there is no conflict here, but the reality is that there is. The trend in many LEED projects is for the CxA to be hired directly by the architect, as is the rest of the design team. For the commissioning authority to be effective, he or she must serve as the owner's advocate. It is difficult to do that when the checks are being signed by someone else. Architects are not bad people; I even have some friends who are architects. Heck, put yourself in their shoes for a minute. Would you want to be the one to have to pay someone to ask you endless questions about the documents you just spent weeks putting together? To add insult to injury, the architect's client (the owner) is seeing those questions and issues. One architect recently told me that he was tired of paying me to create more work for him and his team. I can't fault him for feeling that way, but this a

*Continued on Page 22*



# Pressure Independent Valves and the Challenges TAB Technicians Face

*Julio Londono*

Pressure Independent Valves (PI valves) are becoming more prevalent in buildings. Designers predict that by 2015 this technology will be standard in most chilled water applications, and will grow in hot water systems. The biggest benefit of PI valves, and the reason of their fast growth in the marketplace, is energy and installation savings. PI valves perform a continual balancing function at all times. This continual balancing optimizes the use of the water pumps and maximizes chillers performance by reducing the negative effects of low delta T. The PI Valves provide a constant flow regardless of the pressure variations on the system there is no need to install an additional balancing valve, this not only saves on material installation but also on balancing and verification costs. The lack of a balancing valve creates some challenges for the TAB technician. These challenges can be overcome by understanding how PI valves work.

There are two types of PI valves, mechanic and electronic. Mechanical valves use a spring-diaphragm pressure regulator and the electronic valves use a flow meter in conjunction with a smart actuator. The load the spring and diaphragm. On the electronic types the minimum DP guarantees the minimum water flow required by the sensor. If the valves are working below the minimum DP the pressure regulator mechanism is inoperable, and the valve will behave as pressure dependant, in this case the flow readings are not accurate. There is also a maximum differential pressure, normally of 50 psi. If this value is exceeded, on the mechanical valves there will be an extra stress to the diaphragm which can harm the regulator. With the electronic valves this causes the flow reading to be out of range; providing an inaccurate control.

When verifying a system with PI valves one of the first tasks of the TAB technician is to verify that the PI valves are operating between the differential



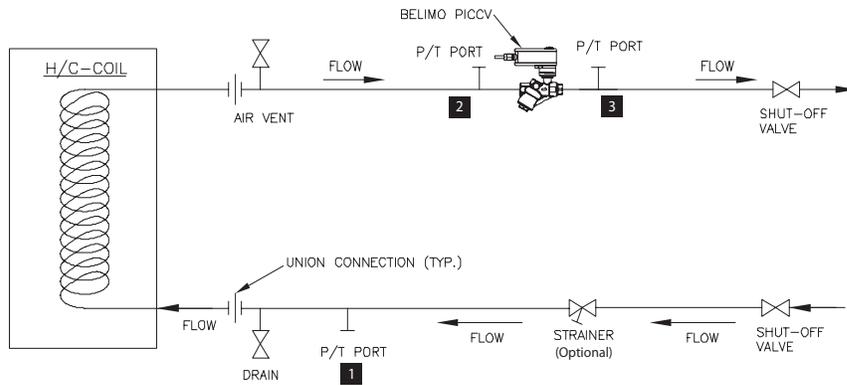
**ULTRASONIC  
FLOW METERS**

**RENTAL & SALES**

- ✓ NEXT DAY DELIVERY
- ✓ EASY TO USE
- ✓ FREE TRAINING
- ✓ FREE SUPPORT

**Instruments  
Direct** INC.

PH: 1(888)722-5543  
WWW.INSTRUMENTSDIRECT.COM



pressure range. If the valves are working below the required minimum DP the flow readings become unstable. Some reports about PI valves not controlling properly are caused by this low DP. The most common cause of low DP is low pump speed. This is more noticeable on the valves furthest away from the pump. Another reason can include air on the system or fully open bypass valves. Once the minimum DP is obtained in all the valves, there is no need to modify the pump speed. All the valves will provide the rated flow regardless of the pressure in the system. TAB technician can focus only on verifying the flow on the valves and not worry about tweaking the valve and pump speed. This is the biggest benefit of a pressure independent system.

In a pressure dependant system, the typical arrangement consists of a balancing valve in series with a pressure dependant control valve (globe valve, characterized control valve, zone valve, etc). Normally the balancing valves have a calibrated orifice or venturi that allows the TAB technician to measure differential

pressure and obtain flow. The flow is obtained either by calculating the DP and the device's Cv, or by using flow/DP tables provided by the manufacturer. In a system with PI valves this option is no longer available. Flow needs to be verified using other methods.

There are three indirect methods of verifying flow at the unit level, air delta T, water delta T and coil pressure drop. The delta temperature method, the Air Handling Unit needs to be working under supply air and entering water design conditions. The design conditions will need to be verified and be based on the project documents. It is very important to verify the entering water temperature, supply air temperature and supply air flow rate are stable before taking any measurement, this guarantees its accuracy. Once the design conditions are verified, and if using the water delta T method, the leaving water temperature is measured. This reading should correspond to the design value, if not; the valve flow should be adjusted. The proper flow is achieved when the design leaving water temperature is measured. The air delta T method uses the same

procedure but the flow is verified by measuring the discharge air temperature.

The coil pressure drop method consists of measuring differential pressure or pressure drop across the coil, but in this case there is no need to verify air and water design conditions. It is similar to the venturi method but uses the coil as a calibrated device> The flow is calculated using the pressure drop vs. flow curves provided by the coil manufacturer. This method is preferred over the delta temperature, it is practical and the most accurate. This is why the PI valves and coil manufacturers recommend the installation of PT ports on each side of the coil, ports 1 and 2 on the following graphic, to allow easier commissioning and verification.

It is also recommended to install a third PT port at the outlet of the PI valve (port 3 on the graphic). The purpose of this port is to verify the valve and ensure that it is working under the recommended differential pressure range.

Some PI valves are built with integrated PT ports; these ports will have the same function as ports 2 and 3 on the graphic. Their only purpose is to verify the valve operation and not flow. Compared to a calibrated orifice or a venturi that has defined geometries designed specifically for the purpose of obtaining accurate pressure readings, a PI valve body is not suitable to perform flow calculations using pressure drop.

*Continued*

The reason is the complex geometry of the valve with multiple moving parts, including the regulator. The regulator moves when there is change in pressure, plus turbulences inside the valve body making the measurements change constantly. The results are inaccurate measurements that are out of the accepted tolerances. The misconception of using the integrated PT ports to obtain flow; has lead to some frustration in the field. Because of this, manufacturers have decided not include PT ports on their PI valves to avoid any confusion. Recommendations installation of external PT ports instead as stated in the graphic.

Before using any of these methods the TAB technician should be familiar with the NEBB and/or TABB recommended water balancing procedures.

A technology that is becoming very popular is ultrasonic flow meters. The price has decreased considerably; these sensors offer the best results in measuring water flow and do not require any calculation. They are the easiest to use, and provide the fastest set-up per unit. The labor savings due to easier setup and reliability pays for the investment in a very short period of time.

Industry has seen similar changes on the air side when VAV air systems became more sophisticated with pressure independent VAV boxes that use air flow sensors. Today balancing a pressure independent VAV air system requires some advanced technology that relies heavily on electronic instruments. Even

though the technology is advanced it doesn't mean that it is complicated or expensive. Today, electronic air balancing devices are the standard in the industry. The evolution of these instruments has led to the adoption of even more advanced electronic devices. Some even use computers to display and process as well as collected data information. With the development of specialized control components on the water verification devices development will follow a similar trend to the air instruments.

As with any new technology time is necessary to learn that PI valves are not the exception, but once the operation is understood it is very easy to realize the benefits of PI valves. These benefits are more significant to the TAB technician for easier verification and time savings compared to balancing regular pressure dependant valves.

## Duct Leakage Testing

### ORIFLOW LLC

DUCT LEAKAGE TEST EQUIPMENT

We have always been GREEN

- |                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>All our leakage testers include:</p> <ul style="list-style-type: none"> <li>- powerful blower</li> <li>- industrial orifice tube</li> <li>- 3-inch ID orifice plate (S304)</li> <li>- 12.5 feet of flexible duct</li> <li>- 20 feet of pressure tubing</li> <li>- low maintenance gauges</li> <li>- calibration certificate</li> <li>- NIST traceability</li> <li>- inlet slide gate damper</li> </ul> | <p>Why buy from ORIFLOW?</p> <ul style="list-style-type: none"> <li>- Customer Service 7 days/week</li> <li>- Technical Support 7 days/week</li> <li>- Interchangeable orifice plates for multiple flow ranges</li> <li>- Highest quality testers</li> <li>- Member of ASHRAE</li> <li>- We keep up on ANSI/ASHRAE Standards 90.1, 62.1 and others</li> </ul> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



Magnehelic Gauges    Digital Gauges    NEW 1500 cfm/16 in. wg.

Technical Support from Professional Engineer on staff 7 days/week

**20 years of experience!**

www.oriflow.com (323) 230-7589 sales@oriflow.com



# TAB and BIM

Andy Stadheim

## What is BIM?

BIM is a generic term referring to a digital medium and format used to share building data.

Similar to BAS,

or Building

Automation

System being

a generic

term used to

refer to the

controls of a

building.

Much like BAS

systems can

have "open"

and "closed"

systems, BIM

can also be

an open or a

closed system for data interchange.

**Building Information Modeling (BIM)** is the process of generating and managing building data during its life cycle <C:\Documents and Settings\Andy Stadheim\My Documents\Master\Airnab\SPEECH\>

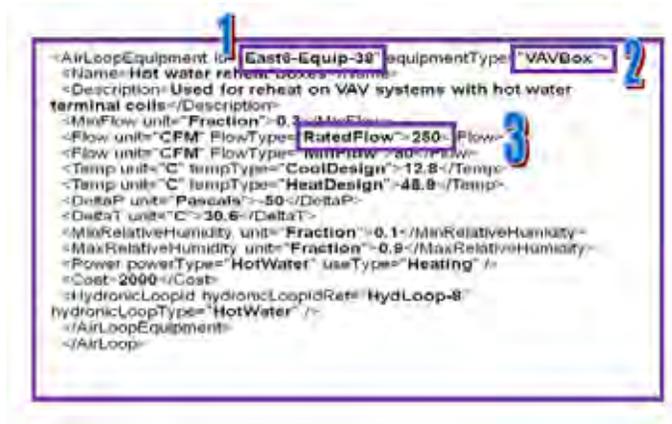
["cite\\_note-0"](#). Typically it uses three-dimensional, real-time, dynamic building modeling software to increase productivity in building design and construction. The process produces the Building Information Model (also abbreviated BIM), which encompasses building geometry, spatial relationships, geographic information, and **quantities and properties of building components**.<sup>1</sup>

To a TAB contractor, the quantities and properties of equipment on a project are the equivalent of a digital equipment schedule complete with equipment names, locations and "properties" like Design CFM for the diffusers in a building.

## Types of BIM

With BIM, a published standard such as COBIE (IFC's) or gbXML would be considered an "open" system for sharing the data. Often times you may find custom bridges being used to import or export data to or from a system that is not compliant with either COBIE or gbXML. Systems that do not use these file formats would generally be referred to as custom or closed

systems, unless they openly publish their data sets.



From the example gbXML file in Figure #1, you can see the key points for setting up a project:

1. The Equipment Name / ID
2. The Equipment Type (ie. Air Handling Unit, RTU, VAV Box etc)
3. Equipment parameters, in this case "Design CFM"

A complete BIM file for an entire project obviously repeats this level of detailed data for each and every equipment object in the entire system. You will also likely be harvesting multiple data points from each object. In this VAV example most contractors would most likely make use of minimum flow as well.

## The BIM life cycle

### BIM during Project Setup- "IMPORT"

Picture a brand new hospital with over 1,500 VAV boxes and more than 3,000 registers/diffusers that need to be balanced. Imagine how long it would take to perform the take off and project setup on a project of this size. Can you do it in 40 hours? How about 80 hours? What if it took you even longer? Let's now imagine that you received this project as a BIM compliant file you can **import** into your TAB software tool. What if importing this file allowed you to automatically setup the entire project? What if every single piece of equipment and every single Design CFM value was automatically imported and setup, including tagging the room numbers that the diffusers are located in? This type of BIM automation has an immediate impact on the bottom line profitability of a TAB company.



**BIM during the Testing and Balancing process-  
"DOCUMENT + AUDIT"**

Now imagine, recording every airflow value you check in the field during your testing process and having it tied back to the original diffuser as seen on the print along with a user name and time stamp of who took that reading. This detailed time stamping for each value tested gives a full chronological audit trail of when and how the system was tested. It will also be possible to then export that data back to the original BIM file and have actual CFM's displayed on the blueprint next to design CFM values.

**BIM during the Project closeout and hand over to the building owner- "EXPORT"**

The tangible result of a Test and Balance project is the TAB Report. As BIM becomes more wide spread, building owners will be looking for the TAB contractor to provide them with a BIM report. The BIM report will allow building owners to directly incorporate the TAB results into their own maintenance management program. Data points such as Actual CFM, Volts, Belt sizes and Air filter sizes can be automatically pulled

into a digital system versus "static" data locked in a TAB report.

**When and where will you see BIM?**

LEED and green projects are the most common projects you will initially see BIM on. These projects make extensive use of BIM on the skin and shell of the building and to perform energy consumption calculations. Due to the focus on energy calculations, in many cases, the numbering scheme will not be carried down to the diffuser level yet, but it should still allow

you to pull in the design CFMs as well as the Air Handling Unit or VAV boxes that serve the diffusers along with room numbers.

Hospitals and Labs where mandatory annual or monthly inspections are required to validate systems are compliant and meet safety requirements. BIM + TAB will give facilities with higher risk like these more visibility and capability to document their systems to meet compliance standards. BIM challenges for TAB Is the Design Engineer using a BIM compliant software tool?



**Getting ready for a busy summer?**

**Find out how AiRNAB can:**

- Increase technician productivity
- Easily create punch lists
- Eliminate paper
- Eliminate redundant data entry
- Print reports immediately
- Wirelessly interface with Alnor & Shortridge meters

**Call (888) 524-7622 ext 1 today!**

**GREEN. ACCURATE. FAST.**

© 2008 AiRNAB, LLC™ . All rights Reserved.



Is the Design Engineer using unique naming and/or numbering on each and every system component? i.e. VAV boxes, grilles / diffusers, balance valves,

Have unique tags been applied on the equipment to be tested in the field? (Not required, but adds value, especially when dealing with hospital OR and TB rooms, lab bio-safety cabinets, fumehoods etc.)

The BIM file needs to be appended with any addendum changes that occur.

BIM Value to a TAB contractor

The most obvious value will be time savings in reduced project setup. Manually taking off data from a print and entering the design CFM's into your forms or software program will be a thing of the past. If you are still only using paper forms, you will still have a manual process, Software programs will continue to make more and more use of this data to automatically setup a job. The cost savings will vary from job to job based on the size of the project. But the key factor is when BIM is standard in all CAD drawings, you will realize this cost savings on every single job you perform.

A secondary BIM value, and somewhat indirect for the TAB contractor, is the value it presents to the building owner. This can be an up sell to the building owner that you use a digital system that carries the original CAD objects through the TAB process and allows you to share the field data such as Make, Model, Measured Volts, Amps and filter data directly with a building owners maintenance management platform. In some cases, a custom import may be used to integrate the data to a third party system that does not natively support a BIM standard.

What's next for BIM and TAB?

BIM is not something that is going to just magically happen overnight. The standards are still being defined for more of the trade level data, such as TAB.

The general concept of using and sharing data digitally, within a construction project, is absolutely here to stay. Some of your first exposures to BIM may be painful, especially if you are not using software tools that can make use of the BIM data, but even if you are, some BIM data sets may be incomplete, wrong or not well organized.

But as more trades adapt BIM and as more building owners demand and specify BIM compliant testing on their buildings, we will see a silent wave of BIM data everywhere moving into the standard life cycle of a smart building. BIM is the realization of smarter buildings and capturing the very instructions and results that allowed the building to be built in a common, digital data format. Where the "Setup and takeoff" of course is based on the process to setup a TAB project will still be labor intensive as long as it relies on the use of blueprints and specifications to create the testing sheets for the equipment on the job, as well as record the design CFM and other test parameters to be verified. With BIM, the time required to setup and takeoff a TAB project will be negligible, regardless of the size of the project!

BIM can provide the most complete handoff of test and balance information and results to a building owner. In time, it's likely that building owners will value the Test and Balance BIM dataset more than a static TAB report.

"With BIM, the time required to setup and takeoff a TAB project will be negligible, regardless of the size of the project!"

1 [http://en.wikipedia.org/wiki/Building\\_Information\\_Modeling](http://en.wikipedia.org/wiki/Building_Information_Modeling)





# Events You Don't Want to Miss At The 2010 NEBB Annual Conference

## Conference Registration

NEBB has made it simple to register on-line. Just go to our website, [www.nebb.org](http://www.nebb.org), and click on the annual meeting button. Conference registration and hotel registration are located on [www.nebb.org](http://www.nebb.org).

Registration will close on October 1, 2010. If you have any questions about registration, please contact the NEBB registrar at [nebb@courtesyassoc.com](mailto:nebb@courtesyassoc.com) or by telephone at 202-367-1173.

## Wednesday, November 3rd

### **1<sup>st</sup> Annual Fishing Tournament presented by Belimo and InstrumentsDirect**

**8:00 AM-12 NOON**

**\$180 per fisherman**

**Departing from the Hyatt Marina**

Ahoy mates! Join us for the 1<sup>st</sup> Annual NEBB Fishing Tournament. Enjoy a day on the open seas with a crew and captain (along with bait and tackle) as you try to catch the biggest fish in the Gulf! Guests will be provided snacks, beverages and breakfast. Limited availability.

### **13<sup>th</sup> Annual Golf Tournament Presented by TSI**

**8:30 AM Shotgun Start**

**Raptor Bay Golf Club**

**\$160 per golfer**



Fore! Join us for a round of golf at the picturesque Raptor Bay Golf Club located on the Hyatt Regency at Coconut Point premises. Registration fees include box lunch, golf shirt and 2 sleeves of golf balls.

**Happy Birthday NEBB (formerly known as the General Session)**

5:00 PM to 7:00 PM

Celebrate the great leaders and pioneers of NEBB at the Happy Birthday, NEBB celebration! Join your fellow NEBB Certified Professionals and Chapter Coordinators for a session full of celebration, insight and special awards.

**NEBB's 40<sup>th</sup> Birthday Party (formerly known as The Get Acquainted Party)**

7:00 PM to 10:00 PM

Celebrate 40 years of delivering excellence in the built environment! Join your friends and colleagues for food, drink and birthday cake! NEBB's birthday celebration will be held at the Hyatt Regency's terrace following the birthday celebration. This event is sponsored by FEBC, AirNAB, and Shortridge Instruments.

## Thursday, November 4<sup>th</sup>

**Opening Session**

11:00 AM to 12:15 PM

Join President Steve Wiggins as we kick off the 2010 NEBB Annual Conference. President Wiggins will take a look back at the past year's success and plans for the future. In addition, industry representatives will address the audience to share how NEBB Certified Professionals can work with their organization's professionals.

## Friday, November 5<sup>th</sup>

**Town Hall Meeting**

8:15 AM-8:45 AM

Many changes happened within NEBB in 2010. Here is your chance to pose your questions to the NEBB Board of Directors. Immediately following breakfast, members of the Board will be on hand to answer questions. In order to address all questions, please email your question and your contact information for the Town Hall Meeting to Karen@nebb.org. This meeting will be conducted with a moderator.



# Turning 50



For the past 50 years, Boland has maintained a strong presence in the Washington, D.C., metropolitan marketplace as the largest provider of comfort solutions in the area. Boland is proud to be celebrating their 50<sup>th</sup> anniversary this year and they ask: "How's that for sustainability?" As one of NEBB's largest certified firms, Boland is a family-owned business with over 300 professionals active in the community and HVAC industry. Boland associates provide and install systems integrated into your facility to increase long-term reliability, minimize environmental impact and maximize return on

investment throughout the entire life cycle of the building.

Boland's customer service approach is built on total comfort solutions which begin in the boiler room with service engineer education to ensure performance of the entire building system. This approach of focusing on the whole building is what makes Boland an industry leader and is one of the reasons why they decided to become a NEBB Certified Firm.

According to Lou Boland, Executive Vice President, " Becoming NEBB certified in building system commissioning and sound & vibration

was a natural progression for our service engineers.

Commissioning and retro-commissioning helps open the doors with our clients to find their true problems with a building. Once we can diagnose the issues through retro-commissioning, we can then offer solutions to improve the performance of the building. We can only achieve these solutions and be respected by our clients through our NEBB certification."



Allen King, one of Boland's NEBB Certified Professionals, summed it up by saying, "Sometimes the customer needs a CP to point out to them what they need. For instance, what is required of a firm when the building systems are being balanced? Maybe that customer needs more than just TAB; he could also use the services of the CP in sound and vibration. With a multi-tenant building, each tenant may

have differing noise criteria requirements. The CP can help the client understand where their noise levels are, where the levels need to be and can help them get the most from their investment."





According to Allen King, “Being a CP gives me a completely different view of the HVAC industry. I started as a serviceman repairing systems. Now I do not have to rely on someone else to visit the job if I think that a system problem is being caused by too much or too little air or water flow. I can prove it myself.”

A NEBB Certified Professional brings a level of confidence and knowledge to a job site for both the client and the solution provider. King elaborates, “When there is a problem with a new system, I am able to point out these issues to the design engineer who will trust that I am correct with the information that I am providing. Being a CP allows me to get a complete overall view of the building and its systems—how the systems are integrated together and work as one. Plus, I am helping to assure a building owner that he is getting a product worth the investment that has been made in that building.”

When you ask the team at Boland who their clients are, they will tell you that they are located anywhere from the Washington Monument to the two sports

tell you is that they are the largest Trane franchise for the Trane brand of Ingersoll Rand. Boland associates serve more than 2000 building owners in the Washington, D.C., area and this does not include new equipment sales, parts, or rental equipment.

NEBB Certified Firms have been the clear leaders in their marketplace—either through innovation, service or knowledge—but usually all three apply to NEBB Certified Firms. Boland is no different in providing unique customer solutions by sharing their knowledge. Originally a Trane commercial equipment supplier, Boland continues to add services to meet the demands of modern technology and changes in regulations. What sets Boland aside from the competition is its talented associates. Through an extensive in-house training program, Boland associates are encouraged to further their professional development. Boland is so committed to education and training of its associates that in their Gaithersburg, Maryland headquarters building there is a 120-seat business center. This state-of-the-art facility provides regular training classes for Boland clients—including such topics as VAV training, CFC Certification and a basic HVAC Clinic. The Louis J. Boland Business Center demonstrates the commitment Boland has to educating their associates and their clients.

The future for Boland is bright. The company may not have a national reach, but its regional presence remains strong, and great growth potential is on the horizon. With their NEBB certification, along with their diversity and commitment to providing high performance building solutions, Boland will continue to be one of the leaders in the Washington, D.C., marketplace.

Happy 50<sup>th</sup> Anniversary, Boland!



## *Close, But No Cigar Continued*

problem that needs to be addressed. Now put yourself in my shoes for a minute. I know that if I want this architect to ever hire me again, I need to find a way to make it look he isn't missing any of the owner's requirements (written or otherwise), while still ensuring the owner gets the product and service he deserves from my firm. On some projects, that's not too difficult, but on many it is absolutely impossible. One of the greatest improvements in the last two versions of LEED is that the CxA is required to report his findings directly to the owner, but the conflict will always be present if the owner is not the person paying the bill, and the guy who is, doesn't want you making more work for him. There is an obvious and easy fix for this problem. The LEED requirements should be changed so that the CxA is either an employee of, or contracted directly by, the owner. The owner has already hired an architect; hiring one more consultant is not going to be a problem for him. The lines of communication can now be "unfiltered". In my opinion, this has always been the intent of the USGBC, but in the real world it just doesn't happen.

There are other benefits to this contractual arrangement. LEED requires the owner to create the OPR (Owner's Project Requirements) document. My experience is that often times this is not created by the owner, but is instead created by a member of the design team or LEED champion with the owner's input. The CxA must review this document, and often times the OPR is not sufficient to allow the CxA to properly commission the building. I've seen OPR documents that were nothing more than bullet points listed on a single sheet of letterhead. In order for the CxA to perform their job properly, we often ask questions that owner's don't

think of and often don't know how to answer. "Average sound levels", "industry standard light levels", and similar descriptions usually mean nothing to the owner and are difficult for the CxA to quantify. Unfiltered access to the owner allows us to speak freely and ensure that the OPR is truly a reflection of the owner's needs. I was recently told by an architect that "the owner did not specify any sound levels, so they don't matter." Really? Was he asked? Maybe it does matter, but the owner just doesn't know how to convey what it is he expects. This is a great example of where an independent commissioning authority adds value to the project, but that value might not be obtained due to contractual conflicts.

There have been several modifications to the commissioning requirements for LEED over the years, and with each modification the commissioning requirements have improved. There is one critical requirement that still needs to be addressed: there is no standard, there are no specific requirements. While both the fundamental and enhanced commissioning requirements can have an adequate scope of work, there is still a lot of leeway as to how this scope is to be performed. There is an old business adage: "take your toughest problem, give it to your laziest guy, and he'll show you the quickest way to get it done". As with any industry, there is always a push to find ways to do things faster, easier, and cheaper. That has never been more prevalent in the commissioning industry than it is today. A lot of people might not be happy with this statement, but the most "watered down" commissioning projects I see are projects that are requiring commissioning only for the purposes of LEED certification. In

fact, there is a very prominent, LEED certified facility in Washington, DC that has hired our firm to perform retro-commissioning. I pointed out to the owner that he has a LEED facility, and therefore it must have been previously commissioned. This would technically make our efforts a re-commissioning process. He grinned, and when I asked him for a copy of the original commissioning report, he stated "the commissioning work was never completed so we never received a report. The project was too rushed at the end for the commissioning firm to complete their work". Our firm recently became involved in another LEED project that has numerous humidity problems (inside levels have been measured in excess of 80% RH continuously). Without going into the particulars of that project, suffice it to say that the cause of the problems in that facility should never have occurred in a properly commissioned facility.

I should point out that the firm I work for is not only engaged in commissioning, but also retro commissioning, energy auditing, energy modeling, LEED coordination/consulting, sound and vibration, cleanroom certification, and testing and balancing. As such, we have the opportunity to witness projects through various phases of development, construction, and turnover. We also witness projects from various points of view since our contracts can be held by numerous entities, from owners, members of the design team, and even contractors. It amazes me how many LEED projects are commissioned, yet the CxA never steps foot on the project until the ceilings are up and the carpet is down. How does this happen? LEED has very specific and well written requirements for OPR and BOD

documentation, but not for the testing documentation. It is my belief that commissioning activities should always be performed by a third party, but this is not always cost effective. Many commissioning firms allow the installing contractors to develop much of the commissioning documentation (installation checklists, start-up sheets, etc.). This has led to the use of more and more generic checklists, where "not applicable" fills more spaces on the form than the actual project information does. The contractors fill in the sheets, and the CxA verifies that the sheets have been completed. This does not mean that the CxA verifies that what is on the sheets is correct, and in most cases they don't. Some authorities spot check the installations, but many just put them in a 3-ring binder and assume they are correct. The problem with this approach is that human beings tend to be creatures of habit. We all know that many items on a construction project are not installed to specifications, because many specifications are considered to be "boiler plate", especially when it comes to installation requirements. The first 50' of piping might be specified to have spring isolation hangers, but if the contractor considers that to be a "boiler plate" specification, he will install them the way he does on every project. In his mind, these hangers are installed per specifications, and that is what he will indicate on his checklist. Serviceability means completely different things to the person who installs it and the person who needs to access it one year later. A contractor might consider that equipment is accessible if light fixtures can be moved to gain access to a control panel, but as an owner's advocate, I certainly don't. Point-to-point testing for the control systems is usually

documented by the installing contractor. I can't remember one time that I have not found a mis-wired point, or improperly mapped graphic, even after the contractors have reportedly completed their point to point testing documentation. These types of conditions should not be present in a commissioned facility. The LEED installation inspection recommendation should be changed to require the CxA to field verify the installation documentation if this work was not performed by the CxA. At a minimum, there should be a minimum specified sampling rate and failure rate.

When the commissioned systems are functionally tested (systems performance testing), LEED recommends that every sequence should be tested in accordance with the procedures outlined in the commissioning plan, but there is no requirement for this. I have watched commissioning authorities perform all of their functional testing from the BAS workstation, and this after never having verified that the BAS was reporting properly. Most facilities that employ DDC controls also have PID control loops in the facility. The PID loop may be controlling a valve or actuator, but these loops are rarely tested by the CxA. If a sequence calls for a valve to modulate, the CxA might verify that the valve modulates, but that doesn't ensure that the loop is properly tuned. Just because a control valve modulates, doesn't ensure that the control valve isn't "hunting". The LEED systems performance recommendation should be changed to require every sequence to be tested. It should also specify, at a minimum, sampling rates for all of the systems and equipment included in the fundamental commissioning prerequisite.

The USGBC's commissioning recommendations for LEED buildings are very well intended. Let me be clear, there are many improperly commissioned facilities that are not LEED certified. Unfortunately, there has been a lessening of the commissioning industry's standards in recent years that has been further pressured by the economic troubles in our country and throughout the world. Construction budgets and margins are smaller than ever, and those conditions are creating lesser quality, the very thing that commissioning should be preventing. The commissioning industry needs to come together as a whole to help resolve these problems, because LEED certification should require that buildings are properly commissioned, and that can only be done through the enactment of more stringent commissioning (and testing) requirements.

I've laid out several changes that can be implemented to ensure that LEED certified buildings receive the same standard of care that other buildings receive, and I urge the industry to enact and embrace those changes as soon as possible. Allowing a qualified CxA to have unfiltered access to the owner, and enacting stringent commissioning requirements are paramount to improving the commissioning quality of LEED certified facilities.

Hey, somebody get that phone!



PRST STD  
U.S. POSTAGE  
**PAID**  
SUBURBAN, MD  
PERMIT No. 2800

Endorsed by: **NEBB**

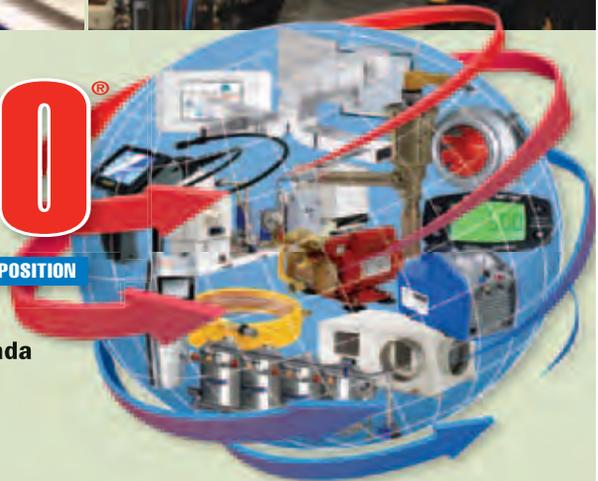
# TEST DRIVE *What's* **NEW!**



# AHR EXPO<sup>®</sup>

INTERNATIONAL AIR-CONDITIONING • HEATING • REFRIGERATING EXPOSITION

**January 31 - February 2, 2011**  
Las Vegas Convention Center, Las Vegas, Nevada



***You'll See,  
Learn and  
Accomplish  
More at the  
World's Largest  
HVAC&R  
Marketplace***

**Demo the Latest Products for All Your HVAC&R Applications:**

Choose from over 1,800 leading Manufacturers from around the world showcasing thousands of the newest systems, equipment, components and tools to help you work more efficiently, more profitably.

**Get Behind the Wheel of Today's Most Innovative Technologies:**

If it exists, you'll find it here! From Sustainable Building and Alternative Energy Technologies including Solar, Geothermal...to advanced Automation, Controls & Networking; Hydronic & Radiant Heating Solutions; Business & Design Software; and more.

**Map Out Your Road to Success:**

Learn about the latest efficiency standards, government incentive programs, LEED and other industry initiatives, state-of-the-art solutions, and much more in over 100 New Product Technology Presentations, Workshops, Seminars and Short Courses.

FREE Show Registration, Hotel and Travel Discounts and Show Information: [www.ahrexpo.com](http://www.ahrexpo.com)