Changing HVAC Technologies affecting TAB and Cx

By: Ted Salkin, P.E. TAB & BSC CP

You may have noticed radical changes in HVAC design and construction on your projects in recent years. What is driving this revolution? Several factors are at play here. First, global influence: Asian and European HVAC technology has come to North America due to multi-national manufacturers and engineering design companies. Not to get political, but European countries have been “greener” and more energy efficient than us for many years, and therefore more innovative in this industry.

Other factors include: the explosion of IoT; dwindling skilled trade labor; high construction costs; decentralized heating & cooling sources; smaller equipment becoming more energy efficient.

Just consider the modern construction methods that are commonplace, such as BIM/Revit, lasers, prefab, tagging, and barcoding that improve shop and field efficiencies.

A fast growing trend is VRF (variable refrigerant flow) in large commercial buildings. This is basically a very big DX split system, but with many refrigerant components and air-side auxiliary equipment. DOAS units and Energy Recovery units provide the required preconditioned ventilation air. Multiple DX fan coils are used for zoning in lieu of VAV boxes.

Understanding Building Energy Usage

By: Roger Thies, P.E., LEED AP
Principal/Vice President State College
Barton Associates, Inc.

Winter is here, so let’s make sure your building and wallet are ready for it!

It’s important to understand how your monthly energy use is broken down by your building systems. The chart below represents a pretty typical breakdown for a building:

As you can see the biggest single consumer of utilities in a facility is in the Mechanical and Electrical systems, these systems account for approximately 73% of the total energy use in a building.

The implementation of energy conservation measures (ECM’s) in your MEP systems can help lower your annual utility bills and overall energy consumption. Here are some typical ECM’s that can make significant impact on your facility:

- Install High Efficiency Motors, ECM motors and variable frequency drive on applicable systems
- Retrofit existing fluorescent lighting systems with LED technology
- Replace old Exit signs with LED technology
- Add occupancy sensors to both HVAC and lighting systems
- Add daylighting control systems
- Modification to building management system to monitor and control occupancy schedules, building ventilation and setback temperatures
- Apply hot water reset schedules to your building’s heating hot water supply temperature based upon the outdoor temperature
Building Energy Usage

- Incorporate outdoor air and waterside economizers
- Adjust and limit your heating and cooling setpoints
- Add heat recovery devices to ventilation systems

While this list is far from complete, these ECM’s can be incorporated into your buildings mechanical and electrical systems with simple paybacks ranging for 0-8 years. If you would like to learn more about how to apply Energy Conservation Measures to your facility, please contact Roger Thies, PE at 814-237-2180 or rmt@ba-inc.com.

Thank you Roger and Barton Associates for use of this article.

MAEBA Presents William G. Eads, P.E. Award

At the Recertification Seminar on September 25, 2017, MAEBA presented the William G. Eads, P.E. Award for the first time since 2012. The MAEBA Board of Directors has voted to present this award to a balancer who has dedicated a great deal of time over the years to MAEBA and the industry. Vincent Del Vacchio of Keystone TAB Consultants, LLC was the 2017 award recipient.

Vince started his apprenticeship at W.M. Anderson in 1970 and then went on to work at Peabody & Wind. He joined Independent Balancing Company in 1980 and after 17 years, started his own company, Keystone Balancing & Commissioning Services in 1997. He currently runs Keystone TAB Consulting. Vince’s service to the industry goes way beyond his professional resume. He also spent over 10 years as an instructor in the Sheet Metal Workers Local #19 Training Center. He also served as an instructor for the Philadelphia area ASHRAE Advanced Duct Program and has been guest instructor for various programs given at the Iowa Energy Center in Ankeny, Iowa. Vince was recognized by his peers nationally in SMACNA when he was inducted into the prestigious SMACNA College of Fellows.

Vince served on the MAEBA Board of Directors from 1999 to 2015. He is a MAEBA Past President, Technical Committee Chairman and NEBB Practical Exam Proctor. He also served nationally on the NEBB Building Systems Commissioning Committee. Vince has been a longtime leader in the balancing industry and MAEBA wishes to congratulate and thank you for your dedication and service all these years.

Bill Eads was a Teacher, innovator, consultant, designer and engineer. These are just a few of the words that describe William G. Eads, P.E. But Bill’s accomplishments go far beyond words. He was the author of “Testing, Balancing and Adjusting of Environmental Systems” manual published in 1974 by SMANCA which became the standard for the industry. Today the successor to that original manual is published by the National Environmental Balancing Bureau (NEBB) as the “Procedurals Standards for Testing, Adjusting and Balancing of Environmental Systems”, now in its eighth edition. He was also the author of the original teaching Syllabus for NEBB on the subject of Testing and Balancing of Environmental Systems. He developed the curriculum of one of the first, Testing and Balancing Training programs and he also wrote numerous papers on Testing and Balancing. He went on to teach testing and balancing from 1968 (first class ever held) until 1983 in addition to making various presentations to national and local associations affiliated with the Industry.
MAEBA Recertification Seminar Recap

At the recent MAEBA Recertification Seminar in Atlantic City, NJ, the MAEBA Technical Committee chaired by Matthew Sano, had a full day of engaging topics. The day began with MAEBA President David Wood introducing Don Hill, NEBB President Elect who joined the seminar to give a National Update. The annual safety presentation was given by Greg Wharton and John Connolly (Safety Professionals) on NFPA 70E Arc Flash electrical safety. The morning continued with a presentation from the Facility Guidelines Institute (FGI) on Hospital Guidelines. David B. Uhaze and John Dombrowski, PE offered an interesting presentation.

MAEBA successfully started offering additional topics and shorter presentations through the use of breakout rooms. This year’s topics were Predictive Balancing presented by Jon Virkler and Jonathan Lofberg of Dwyer; Kitchen Hood Exhaust Systems by Jessica Harrington and John Stahel of Accurex Engineered Restaurant Systems, A Greenheck Co. and FGI Hospital Guidelines continued. The seminar ended with an interesting presentation by Mike Kelly on Cleanrooms Certification.

The MAEBA Board of Directors voted to start a Vendor Award in memory of Andrew Stadheim, who passed away suddenly in October 2016. Andy was a constant supporter and speaker at MAEBA seminars for years and through his company, Building Start, that support continues. The first Andrew Stadheim, P.E. Award went to Andy’s company, Building Start. Scott and Clark, Andy’s brothers, along with his parents Dave and Linda accepted the award. Andy proved to be a shrewd innovator in mobile technologies with the launch of Building Start (formerly Airnab), which NEBB firms know is an automated mobile platform for the documentation of installations and maintenance related to critical mechanical systems in commercial and residential buildings. Andy’s endearing and approachable personality somehow exceeded his success as an innovator and business executive. He had a smile for everyone, with an infectious, positive attitude and incredible generosity.

As in recent years, MAEBA held a Vendor Display during an extended lunch. We had a record number of vendors displaying this at this seminar.

Accurex Engineered Restaurant Systems
Ameritech Data Solutions
Belimo
Building Start
Dwyer Instruments
Field Inspections Plus (Clipboard)

General Aire Systems
Robert M. Hilberts, Inc.
Kanomax USA
Retrotec
TSI

A special thank you to Building Start, Kanomax USA and Retrotec for co-sponsoring the Dinner Reception on Sunday evening, September 24, 2017 at LandShark Restaurant.
On June 13th the General Building Contractors Association held a meeting in Philadelphia to discuss the importance of respirable crystalline silica in the workplace and what can be done to help minimize the exposure to workers.

Silica is a frequently found mineral used in various materials such as concrete, sand, stone and mortar. The mineral is also used to make products like glass brick and artificial stone. If at any time these surfaces are abrasively agitated by drilling, sawing or blasting, the area is now considered hazardous. If these small particles are inhaled (respirable), multiple diseases can be contracted such as silicosis, lung cancer, Chronic Obstructive Pulmonary (COPD) and kidney disease. All of these can be disabling or can lead to death. In order to prevent workers exposure of silica, OSHA has created a crystalline silica rule.

The crystalline silica rule requires that employers use engineering controls which include wetting down work stations where cutting, drilling, grinding and sawing are taking place. By doing so, this will help keep exposures at or below permissible exposure limits (PEL). The PEL limits workers’ exposure to 50 micrograms of silica per cubic meter over an eight-hour day. This level proposed will be the same for general industry and construction workplaces. OSHA also advises using vacuums as exhaust ventilation to keep dust containing silica from becoming airborne and entering workers’ lungs. Once this rule is fully implemented, OSHA expects to prevent up to 600 deaths a year from silica related diseases and to prevent more than 900 new cases of silicosis each year. The new standard for silica for construction began on June 23, 2017. On June 23, 2018, all employers will be required to follow sample analysis. The reason for the year difference is because OSHA expects most construction employers to implement the specified exposure control measures presented in Table 1 (information can be found at website below).

As you can see the proper precautions are being taken to prevent the exposure of silica. A couple of key points to remember; make sure that there is a competent person to oversee the program on site, have a written exposure control plan, provide employee training on potential health hazards of respirable crystalline silica (SDS on sites), and employers must offer medical examinations for any employee who wears a respirator for more than 30 days. Like anything else, communication amongst the multiple trades on job sites will be crucial in employee safety and compliance with this rule. For more information visit: www.osha.gov/silica/SilicaConstructionRegText.pdf. You can also contact me at (610) 828-4055 or gwharton@smca.org.
MAEBA Welcomes New President

On January 1, 2018 David Wood of Fisher Balancing Company, passed the gavel to the new MAEBA President, Clint Franks of Optimum Performance Balancing, LLC.

Dave has served as MAEBA President for the past two years and has graciously agreed to take on a new role as MAEBA Technical Committee Chairman, which he also served as a few years back. Dave has also served nationally as a NEBB Subject Matter Expert for the NEBB Exam Development Committee and is currently serving on the NEBB Testing, Adjusting and Balancing Committee.

Pictured Dave Wood accepting an appreciation gift from Clint Franks.

MAEBA would like to thank Dave for his dedication and leadership.

MAEBA has a strong national presence with Michael Kelly of Air Filtration Management, Inc. serving as Fume Hood Testing Committee Chairman, Ted Salkin, P.E. of NORESCO, serving as Compliance Chair on the NEBB Certification Board and Jeffrey Schools of Fisher Balancing Company as Vice President of the NEBB Board of Directors, NEBB Chapter Affairs Committee, NEBB Executive/Finance Committee and locally as a MAEBA Board of Director. All three also serve on the MAEBA Technical Committee.

Thank you to Dave and all the MAEBA Certified Professionals serving locally and nationally!

MAEBA in the Balance Newsletter

MAEBA will be adding an additional publication of this newsletter each year. This new edition will be sent out electronically. If you wish to receive the electronic edition please send your email address to tcasey@maebanet.org.

NEBB Annual Conference

Achieving Excellence in a Changing Environment: Processes, Standards, Certification

NEBB's 2018 Annual Conference is scheduled for April 26-28, 2018 in San Diego, CA at the Sheraton San Diego Hotel and Marina. Visit the NEBB website for further information.

www.NEBB.org

MAEBA in the Balance Newsletter Articles

If anyone is interested in writing a technical article or have an interesting job they would like to write on for the MAEBA in the Balance Newsletter, please submit the article to Trish Casey at tcasey@maebanet.org.
HVAC Technologies

We are working on a new project with over 300 indoor DX units connected to 70 VRF condensers, plus a full ducted ventilation system. That's a lot of equipment.

Ductless cassette style evaporator fan coil units are becoming more accepted within large VRF systems, and as standalone split systems in commercial buildings. The heat pump features of VRF can eliminate separate hydronic systems for reheat or perimeter heat. All the major U.S.-based HVAC manufacturers are now promoting VRF. Another European design influence is a shift to more hydronic cooling and heating systems, such as 4-pipe chilled beams, and even chilled floor and ceiling slabs. Consider how prevalent active chilled beams have become in many new buildings. You never heard of these 8 years ago.

Other newer design concepts include:

- Underfloor air distribution (UFAD) systems for open plan office buildings, with minimal ductwork, and requiring special balancing procedures.
- Using natural ventilation and air movement through large open areas and buildings, with minimal ductwork, piping and equipment; and conditioning the air only as needed.
- Combined heating and domestic hot water loop (typically residential buildings).
- Solar preheat systems for domestic hot water
- “Smart Pumps” and “Smart Fans” - eliminates separate VFDs; automatically adjusts flow or dP based on real-time load. EC motors with controller and sensors are built into pump/ fan.

What’s next on the HVAC horizon?

- PEX tubing for HVAC, replacing steel and copper pipe? Already PressFit piping systems are becoming more common in commercial construction – no brazing or welding.
- Very high-velocity ductwork systems? (smaller duct; high static fans)
- Prefabbed large mechanical rooms, assembled in sections onsite
- Wireless controls (Bluetooth; WiFi; NFC) for VAVs, zone sensors, etc.
- “Smart” diffusers and grilles? - wireless, with auto-balancing damper and airflow sensor
- HVAC equipment with real-time performance data output (airflow; water flow; pressure; etc.)
- BAS with Artificial Intelligence for automated diagnostics, adjustments, and ongoing commissioning
  (By the way, these last two are already available)

Are these threats or opportunities to TAB and Cx? Will there soon be fully automatic balanced and self-commissioning buildings? Could an engineer balance a building from a remote laptop? TAB and Cx technicians with modern IT and network engineering skills will be needed. Perhaps NEBB will develop new certifications in Building Systems connectivity and integration to deal with this growing demand.

What changes have you come across lately? Do you see any trends? Stay on top of these shifts with seminars, and industry journals and websites. In this digital era, changes are happening quickly, not the slow evolution of past decades. Don’t be left behind.

Mr. Salkin serves on the NEBB Certification Board and MAEBA Tech Committee, and is chair of the NEBB Compliance Committee. He can be contacted at tsalkin@noresco.com.
In 2017 MAEBA started a new program for suppliers called the **Associate Program**. Associates are vendors, manufacturers, distributors, or any business that provide professional services to MAEBA Certified Firms. As an Associate you can strengthen your ties to the contractors and potentially influence the purchasing decisions of balancing firms, sheet metal and mechanical contractors, and engineers.

**MAEBA would like to thank the vendors that joined the new program!**

**Associate Level - Partner**

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Calendar of Events

April 2-6, 2018
S&V Seminar - NEBB TEC, Gaithersburg, MD

April 23-24, 2018
BET Seminar - San Diego, CA

April 23-24, 2018
BSC CxCT Seminar - San Diego, CA

May 21-23, 2018
CPT CP Seminar - Vancouver, WA

June 4-5, 2018
FHT Seminar - Kansas City, MO

June 11-13, 2018
TAB CP Seminar - NEBB TEC, Gaithersburg, MD

April 18, 2018
MAEBA Semi-Annual Meeting
Radisson Hotel, Trevose PA

April 26-28, 2018
NEBB Annual Conference
Sheraton San Diego Hotel & Marina

September 23-24, 2018
MAEBA Recertification Seminar
Kalahari Resorts, Pocono Manor, PA