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Williams Notaro & Associates, LLC

MECHANICAL, ELECTRICAL, PLUMBING & FIRE PROTECTION CONSULTING ENGINEERS

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Why Commission an HVAC System?

by An-Ping Hou, PE, CPD

HVAC System Commissioning is a thorough, systematic, documented process that incorporates independent design verification, system and component inspection, and operational testing to confirm that an HVAC system operates within the original design parameters.

Because of the time and cost associated with performing proper commissioning, it is not typically included in most projects. Why spend the time and money to "fix" a properly designed and constructed system? In theory, if the contractor installs the system in accordance with the contract documents, the system should perform as designed. While this should be true, most systems are placed into operation without ever verifying the capacity or confirming the operating efficiency. With rising energy costs and global attention to efficient design, commissioning offers an opportunity to both confirm that you "got what you paid for" and to optimize the system for the specific installation. In practice, completed HVAC systems that have not been commissioned usually do not operate at peak efficiency as they have not been fully tuned or calibrated.

Most projects rightfully include construction administration (CA) services from the engineer. If properly performed, the following CA services can identify installation issues that negatively impact the operation of the HVAC system:

- Reviewing submittals to detect errors before equipment is purchased.
- Attending construction meetings and performing site visits to identify incomplete tasks or deviations to be corrected.
- Reviewing the testing, adjusting, and balancing reports to confirm the system is providing the design air and water flow rates.
- Witnessing system demonstrations and training sessions to confirm the system functions in accordance with the sequence of operation.

While typical CA service improves the quality of a project, it does not provide sufficient evidence that the system operates efficiently and delivers the required capacity. This is the value of Commissioning.

The most common form of commissioning is "Basic Commissioning." Basic commissioning is performed only during the construction phase and requires the contractors to complete pre-function test checklists and perform detailed system performance verification testing in accordance with a commissioning specification. It also includes testing to confirm that each component provides the rated capacity at the specified efficiency. This process also proves that the system components interact correctly to achieve each specified mode of operation.

A more complete form of commissioning is "Total Building Commissioning." This process begins during the design phase of a project and continues through construction. To maintain objectivity, total building commissioning is usually performed by an independent commissioning agent.

The commissioning agent participates in the design process with the A/E team to establish system performance goals and standards. During the construction phase, the construction contractor will coordinate with the commissioning agent to define and plan the commissioning procedures and execute commissioning tests and inspections.

The total building commissioning process includes the MEP systems as well as commonly overlooked systems such as audio visual, communications, security, building envelope and fire protection systems. The commissioning agent documents the standards of performance for each system and verifies that what is designed and constructed meets those standards. Key commissioning documentation includes:

- Owner's Project Requirement Summary
- Design Criteria Description
- Design Review Comments
- Certification Documentation
- Submittal Review Comments
- Inspection Reports
- Test & Balancing Reports
- Construction Logs and RFIs
- Commissioning Reports
- Systems O&M Manuals
- Training Documentation
- Post Seasonal Testing

Commissioning is a valuable tool in maximizing the performance of a building's systems, and the process can be tailored to meet the needs of each project. Please call us to learn how you can benefit from commissioning.

An-Ping Hou, PE
Senior Mechanical Engineer

Mr. Hou is a senior mechanical engineer and project manager with Williams Notaro & Associates, LLC. He holds a MS in Mechanical Engineering from Kansas State University and a BS in Mechanical Engineering from Tatung Institute of Technology in Taiwan. He offers over 30 years of expertise in the design of mechanical systems for projects including airports, data centers, laboratories, and commercial building infrastructure upgrades. He is experienced in all phases of project development, design, and construction. In addition to holding his PE license in Virginia, Maryland, California, Colorado, Michigan, and Kansas, Mr. Hou is also Certified in Plumbing Design (CPD).

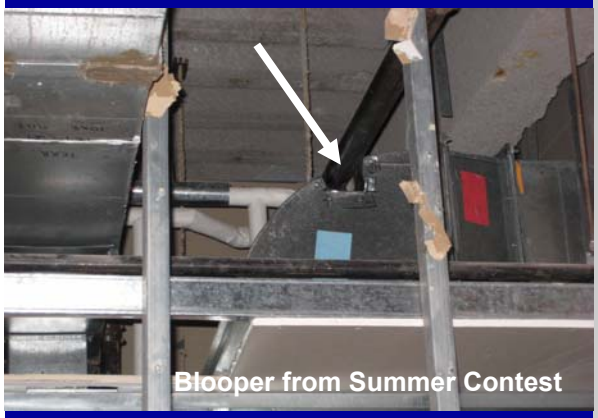
Win a $100 Gift Card ~ Enter at www.wnainc.com

Every season we feature a photo on our web site that illustrates the importance of including Construction Administration in the Engineering scope of work. Even small, seemingly unimportant installation deficiencies can cause poor system performance, increased maintenance, or reduced equipment longevity. Correctly identifying the installation blooper on our web site **www.wnainc.com** automatically enters you into winning a $100 gift card to a local restaurant or store. Our next drawing is November 10 so enter today.

Congratulations to Mr. Gary Le Francois, LEED® AP, Senior Vice President Director of Engineering, Mid Atlantic TRANSWESTERN. He correctly identified the installation blooper from our last contest, and graciously requested his $100 winnings be donated to the Special Olympics.

Special Olympics

What's Wrong With The Installation?



Blooper from Summer Contest

Coordination of all trades on a construction project is paramount to providing a quality installation. In this photo, newly installed ductwork was cut to fit "through" existing pipes. In this case, such unapproved modifications can lead to poor air distribution system performance including loss of efficiency from excessive leakage and increased system pressure drop, and the potential for comfort control problems as the system may not balance properly. Diligent site observation visits during the construction phase by the engineer can help prevent installations such as this. This blooper installation is real, and shows the importance of including Construction Administration in the Engineering scope of work.

In The News

Mike Nguyen, PE

Congratulations to **Mike Nguyen** for recently earning his registration as a **Professional Engineer** in Virginia. Mr. Nguyen is a mechanical engineer with Williams Notaro & Associates and holds a Bachelor of Science in Mechanical Engineering from Virginia Tech. He has performed numerous energy evaluations and design work for such clients as Beacon Capital Partners, Real Estate Capital Partners, Armed Forces Benefits Association, The Washington Post, and Pentagon Federal Credit Union.

Rupert Alfiler recently earned his **LEED® Accredited Professional** (AP) designation. Mr. Alfiler also holds his EIT designation and a Bachelor of Science in Mechanical Engineering from Virginia Tech. As a mechanical engineer, with WNA, he has performed mechanical and plumbing design work for such clients as AOL, C-SPAN, The MITRE Corporation, Navy Federal Credit Union, and the Inter-American Development Bank.

Rupert Alfiler, EIT, LEED® AP

FIFTY PERCENT (50%) OF WNA'S TECHNICAL STAFF ARE LICENSED PROFESSIONAL ENGINEERS. EIGHTY FIVE PERCENT (85%) OF OUR TECHNICAL STAFF HOLD CERTIFICATIONS OR DESIGNATIONS AS EIT AND/OR LEED® AP.

Did You Know?

Recently, Virginia, Maryland and the District of Columbia officially adopted the 2006 International Energy Conservation Code (IECC 2006). The new code has been simplified but it is also more stringent than the 2003 code. There are several changes, specifically in the Electrical Power and Lighting Systems section of the code (section 505), which will affect lighting design in interior renovations.

The main change in the 2006 IECC is a lower allowable watt density for offices, limiting the lighting to 1.0 watt per square foot, down from 1.1 watts per square foot in the 2003 code. Another change is that corridors and support areas will no longer be used as part of the calculation when using the partial building tenant area system to calculate the watt density. Also, hospitals will be separated from other clinical care facilities and each will have a different watt density requirement.

These changes will require the use of more energy efficient technologies, such as LED and T5 lamps, as it will become more difficult for designers to meet the Illuminating Engineering Society of North America (IESNA) recommended light levels at this new lower allowable watt density.

With this third version of the IECC, the lighting design will become an even more important component of a project, including increased scrutiny by the jurisdiction's plan reviewers and inspectors. Involving the electrical engineer at the beginning of the lighting design process will help ensure a compliant design and a smoother process.