

COVER STORY

Continuous Commissioning: Low Capital—Large Savings



By John Tenpenny

Building commissioning has emerged as the preferred method of ensuring that building systems are installed and operated to provide the performance envisioned by the designer. While most commissioning processes focus on bringing building operations to the original design intent, Continuous Commissioning is different. Continuous Commissioning focuses on optimizing HVAC system operation and control for the existing building conditions. Continuous Commissioning is an ongoing process to resolve operating problems, improve comfort, optimize energy use and identify retrofits for existing commercial buildings. Continuous Commissioning focuses on improving overall system control and operations for the building, as it is currently utilized, and on meeting existing facility needs.

According to researchers at Texas A&M University's Energy Systems Laboratory, the Continuous Commissioning process has been used extensively on the campus over the past 15 years and it is estimated that a total cost savings of (US) \$60 million has been achieved with an investment of approximately \$10 million in Continuous Commissioning and \$8 million in capital improvements.

The Continuous Commissioning process can be implemented through a two-step procedure. In the first phase, potential measures are identified, as well as the costs and projected savings of these measures. In the second phase:

- Energy and comfort baselines are established.
- Extensive and specific measures for improvements are identified and implemented.
- Changes are documented.
- Building staff are trained.
- Energy and comfort performance are tracked and verified for a minimum of one year.

"Commissioning of mechanical and electrical building services systems is becoming more prevalent in today's building industry," says Jeff Phinney, Field Consultant for MCW Custom Energy Solutions Ltd., a leading Energy Service Company (ESCO). "Control of energy consumption because

of rising energy costs has raised the market demand for LEED certified facilities whether they are for housing, education, institutions or industry. An expert experienced commissioning team is one important key to this process."

Our experience with new buildings we have and are presently designing to qualify for LEED certification provide many benefits when commissioning services are included. These include sequencing of controls to operate high end HVAC systems and associated electrical components. Proper installation requires commissioning personnel to have presence during construction and turnover. TAB (testing and balancing) technicians are an important part of the process to prove the design and balance of ventilation air exchange and piping system water flows in the building."

That is why it is crucial to establish baseline of building performance, says Terry Young, General Manager for the Solutions Group at McQuay, a leading HVAC equipment and services provider.

"When undertaking continuous commissioning owners should be able to create or obtain a baseline of building optimal energy usage for electrical, gas and water," he says. "Then you compare that building energy usage to typical profiles for similar buildings and then compare that against the established design criteria for the energy usage. Then you create recommendations for energy conservation

measures and create monthly, quarterly or annual reports to monitor that benchmark and create continuous benchmark comparisons. After that it's a matter of continued maintenance and operational servicing to ensure the building's energy profile is maintained."

According to Phinney, building owners are becoming smarter and realizing that if they don't commission and maintain their building systems they're going to have to replace them in 20 years. They also realize that if they put money into their building that it's going to pay them back.

"Most of the commitment for energy sustainability in buildings comes back to attitudes and perceptions more than it comes from technical issues," says Young. "It's just the way people approach the energy use in the building and how they react to creating an environment where everybody's mindsets are around sustainability and conserving energy.

"While sustainability and conservation are important goals, the implementation of those goals still comes down to cost issues. But when monetary gains are tied to that sustainable and green thinking, you raise awareness pretty quickly."

When dealing with existing buildings, Phinney says the first thing he does is find out from the building owner or manager what problems and issues they're having, because that usually points him in the right direction.

“Our building commissioning technicians will work with the existing operators to diagnose problem areas. Situations such as shortage or excess air flow and temperature variations (heating and cooling) will be corrected. They will provide guidance to the Owner’s operators in helping to verify maintenance manual information and lead them through equipment and controls sequencing to provide a thorough understanding of the Building Automation System (BAS). Where deemed necessary, false system loading will be simulated to

cause damper motors, valves and terminal air supply units to function as intended by the design prior to building turnover to Owners.”

The Continuous Commissioning process is a dynamic one because buildings and the people in them are dynamic. The desired baseline performance criteria needs to be re-evaluated on a regular (continual) basis, perhaps annually, to make sure that it is achievable under the current building loads, usage and schedules.

According to Young, over years of building


use that baseline or profile changes. “And it changes for a number of reasons, such as occupancy changes, building utilization or purpose, construction changes, or even a lack of maintenance. Or the original design intent changes and people tend to try to make the equipment do things it can’t or they don’t modify the equipment.

“Owners also have to ensure the equipment used in the building is commissioned correctly in the beginning. Over the years we’ve seen many times where buildings were never really properly commissioned from day one and that commissioning of equipment plays an important part in establishing that benchmark of a correctly operating building. They also need to make sure that the appropriate monitoring points for continuous performance data collection is part of the equipment. Many times this is an afterthought for owners.”

Phinney agrees. “Many problems originate from individual component testing while ignoring the requirement of proving the satisfactory operation of the total building’s system. Owners expect longevity in their building system in order to realize worthwhile return on their investment.”

Continuous Commissioning is not something a facilities operation group can undertake in their free time. It requires a commitment to defining the desired performance parameters to be monitored; funding the purchase and installation of the monitoring equipment; programming the monitoring/trending software; programming the software for automatically evaluating the data collected or assigning and training someone to manually review the data collected; and updating the system to maintain meaningful baseline performance requirements.

Phinney says he has noticed an uptake in business. “Many Owners are aware of commissioning services and realize it is economical to have them included on their project team,” he says. “Depending on the complexity and size of their building and whether it is new or existing, they are able to choose from three categories of commissioning agent: comprehensive commissioning; best practices commissioning and LEED enhanced commissioning.”

Because of the complexity of building systems and the constant focus on energy supply and sustainability, Continuous Commissioning is especially advantageous: It offers unique, easy-to-implement, and cost-effective solutions to reducing energy consumption in today’s commercial buildings. 



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