

What Owners Need to Know about Commissioning Buildings

By Michael English, Building Commissioning Association Past-President

Millions of dollars are often spent in the construction of a new building. Advanced technologies for construction management, engineering design, and fabrication and installation are being applied to design and build buildings and manage the construction process. It is becoming standard for high-tech equipment, controls, and communications systems to be put into the building to provide power, lighting, comfort, communications, security, and life-safety protection. And some owners decide to go even further, expending the effort to make the building perform up to a green standard by the U.S. Green Buildings Council's LEED rating system. Commissioning is a relatively new process in the buildings industry that helps ensure that new buildings are properly designed, constructed, and prepared for occupancy, operations, and maintenance. Existing buildings also can undergo a commissioning process called "retrocommissioning."

What is Commissioning?

Commissioning involves investigations that yield findings towards improving building operations and maintenance and tuning up building systems so they use less energy with greater efficacy. While there are some standards and many guidelines there is no universally accepted definition of commissioning, and the level and quality of commissioning services vary widely throughout the industry. It is more often the scope of commissioning that is debated, not the definition. Among the primary missions of the Building Commissioning Association (BCA) is to help stabilize the commissioning field by promulgating commissioning best-practices and raising awareness among building owners of the need for commissioning and how to procure quality commissioning services.

Any type and size of building can be commissioned, and a common question is whether every building should be commissioned. And if the building is to be commissioned, what will the scope be? The short answer is that it depends on building size and complexity, but size and complexity are not always related. The fact is that all buildings need to work well and unless they are commissioned, they probably will not.

Commissioning Providers

Firms that provide commissioning services include independent third-party commissioning providers (a firm that focuses only on commissioning), contractors, consulting engineers, design-build firms, manufacturers, and more. There is varying opinion as to whether third-party commissioning providers are needed on all projects, but there is an obvious need to avoid a "foxes watching the hen house" situation if individuals involved on the construction team should lead a commissioning effort.

Value of Commissioning Market

Commissioning is a rapidly growing market. A study conducted by FMI, a consulting firm for the construction industry, indicates the commissioning market for new buildings

increased from \$114 million in 2001 to \$806 million in 2004, a growth of more than 600 percent. Yet commissioning still makes us less than one percent of the total construction market (\$390 billion). FMI forecasts that the commissioning market will grow another 65% in the next three years to become a \$1.3 billion segment of the construction industry.

These figures are interesting, but the study did not address the scope of commissioning. A closer look is required to tell precisely how these commissioning dollars are being spent.

You Get What You Pay For

The BCA, which has more than 530 member firms and individuals, maintains a list of 13 “attributes of commissioning” considered to be so fundamental to effective building commissioning that all members agree in writing to adhere to them whenever they serve as a project’s commissioning authority. The attributes cover everything from the knowledge and skills requirements of a commissioning authority to the way to conduct business. The BCA website has the attributes available to members and non-members alike on its website at www.bcx.org in the About BCA section.

With the scope and quality of commissioning varying widely throughout the industry, the BCA also has established what a typical commissioning scope should include, which they call the “Valuable Elements of Building Commissioning” and can also be found on the website.

The BCA has also formalized many commissioning practices into template documents that owners and providers can use on projects, including language for requests for proposals (RFPs), commissioning-services contracts, and checklists and test procedures for commissioning providers. These documents are available to BCA members on the BCA website.

Cost-Benefit Study

Most owners want to know what the bottom line of commissioning is. How much does it cost? Do the costs yield benefits that make commissioning a sound investment? Answers to these questions, like anything having to do with buildings, depend on the particular situation at hand. However, commissioning has now been around long enough for some reasonably credible statistics to emerge.

A major study of commissioning costs and benefits was published in 2004 that included 224 buildings and 175 commissioning projects of both existing buildings and new construction. These projects represented a total commissioning investment of \$17 million and were implemented by 18 commissioning providers.

The study looked at commissioning benefits from energy and non-energy perspectives. Examples of the many non-energy benefits of commissioning and retrocommissioning included reduced change orders resulting from early detection of problems during design and construction, and the correction of premature equipment breakdown.

The authors of the study concluded that:

“Commissioning is one of the most cost-effective means of improving energy efficiency in commercial buildings. While not a panacea, it can play a major and strategically important role in achieving national energy-savings goals. If the results

observed across the sample in this study are representative of the practice and potential of commissioning more broadly, significant energy savings could be achieved nationally. Specifically, if the median project performance were to be achieved over the entire commercial-buildings stock (essentially, an economic potential, not adjusted for partial penetration rates), the full cost-effective potential would amount to 15 percent of the \$120 billion annual energy bill for the sector (as of 2002). This translates into savings of \$18 billion annually among existing commercial buildings. In practice, the fraction of the full stock ultimately reached will depend on the effectiveness of public and private efforts to build the market for this emerging service.”

Conclusion

Commissioning is needed as a quality assurance measure for today’s complex building designs and equipment and fast-paced construction timeline. The economic ramifications for delayed occupancy and the early detection of design and installation faults alone can provide economic justification for many if not most commissioning projects. Energy savings can also reduce the payback period of commissioning investments, but should not be looked upon as the sole reason to commission or retrocommission a building. Improving building operations and maintenance through improved documentation of systems and procedures, and by training building operators and managers will further improve return on investment for commissioning and improve the economic performance of a building.

Finally, if a building is pursuing a LEED certification for new construction or an existing building, commissioning is probably going to be required. Owners should look at the latest version of LEED released by the USGBC to learn about significant, anticipated changes to commissioning requirements.

References

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Commissioning...Delivering the Promise, Presentation by Scott Stutman and Michael C. English, PE, LEED AP, CCP to the National Conference on Building Commissioning, May 4, 2005.

Building Commissioning, Testing, Adjusting, and Balancing, Draft Report, July 15, 2005, FMI.

“The Cost-Effectiveness of Commissioning,” Evan Mills, Hannah Friedman, Tehesia Powell, Norman Bourassa, David Claridge, Tudi Haasl, Mary Ann Piette, published in *HPAC Fastrack* eNewsletter, June 2005, available at <http://www.hpac.com/fastrack/0605/mills0605.html>

Full report available:

The Cost-Effectiveness of Commercial-Buildings Commissioning, by Evan Mills, Hannah Friedman, Tehesia Powell, Norman Bourassa, David Claridge, Tudi Haasl, Mary Ann

Piette, published by Lawrence Berkeley National Laboratory, Report 56637, December 15, 2004, available at <http://eetd.lbl.gov/emills/PUBS/Cx-Costs-Benefits.html>

Additional resources:

The Building Commissioning Handbook, Second Edition, by John a. Heinz, PE and Richard B. Casault, PE, published by The Association of Higher Education Facilities Officers and the Building Commissioning Association. Available at www.bcxa.org.

The California Commissioning Collaborative's online library of resources for owners and providers, www.cacx.org.

Commissioning Great Buildings, whitepaper published for building owners by the Building Commissioning Association, February 25. Available at www.bcxa.org in the Resources section.