

Commissioning as Evidence in Litigation:

How Commissioning Results can
Substantiate Facility Deficiencies

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Synopsis

Commissioning of building systems (HVAC, Plumbing, Electrical, Elevators, Fire Protection) verifies that the systems are installed and operating in accord with the design intent and owners' requirements. However, what if commissioning, rather than solving problems, reveals a persistent pattern of poor workmanship, under-design, communication mishaps or misapplied technology? When the potential for litigation looms, the findings of the commissioning authority can represent a key element in the dispute. This article contains no legal advice, but rather provides crucial information regarding the methodology and verification of results throughout the commissioning process that must be examined when the findings of a commissioning authority become subject to the rigors of legal scrutiny either by the plaintiff's attorney or council for the defendant.

About the Author

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Ray Dodd, P.E. is the principal and senior consulting engineer at Facility Experts in Sandy, Utah. Mr. Dodd has been the owner of an HVAC service company, worked as a consulting engineer, acted as a commissioning authority, and directed the engineering group for a large national mechanical design/build company with over a billion dollars per year in annual sales. Overall, Mr. Dodd has over 35 years of experience in the design, construction, service and commissioning of commercial, industrial, institutional and high technology mechanical facilities systems. Mr. Dodd has been called upon as an expert witness and provides easy-to-understand analysis to non-technical participants. He is a graduate of Colorado State University in mechanical engineering and a registered professional engineer in Colorado and Utah. Ray can be contacted at: contact@facility-experts.net, 303-668-9851.

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Introduction

Building commissioning ensures that a building's systems are designed, installed, and tested to perform according to the design intent and the building owner's operational needs. Commissioning is a quality-assurance process that guarantees the building systems operate efficiently, meet the needs of the end user, and maintain occupant comfort. Enaging a commissioning authority also includes the promise that the initial costs of commissioning can be recovered through increased operating savings, improved staff performance, and avoidance of costly construction or warranty period problems.

Although the objective of commissioning is to verify that components and systems are installed and operating in accord with the design, sometimes functional testing, rather than solving problems, reveals a persistent pattern of poor workmanship, under-design, communication mishaps or mis-applied technology.

When the potential for litigation looms between owners, architects, engineers and contractors in under-performing building construction projects, the findings of the commissioning agent can represent a key element in the dispute. Effective deposition or cross-examination of the commissioning authority requires a basic knowledge of the methodology of commissioning.

Projects in Dispute and Commissioning

Litigation, after a building project is complete, is frequently considered if the systems do not perform as expected and the efforts to rectify those problems have been unsuccessful. Some reasons why a building is not performing up to expectations may be design errors, contractor errors, poor workmanship, miscommunication, misapplication of technology, equipment coordination problems, lack of start-up, or controls programming errors.

In a new building project, if a construction or performance deficiency is not rectified, the responsible contractor may have retainage withheld by the general contractor or owner. Traditionally, in the construction industry, retainage has been used by owners as a security device by holding back, or retaining, a certain percentage of progress payments made to contractors. The same device is frequently employed by contractors on progress payments made to subcontractors. The holdback is intended to provide an owner with a bank of funds to be used to finance completion or correction of a defaulting contractor's work. Retainage is usually held until completion of construction of the project and is then released along with the final payment to the contractor. If the findings of the commissioning authority are wholly or partially responsible for the withholding of contractor retainage, and the project develops into a dispute, the commissioning authority will need to be skillfully deposed, and if necessary cross-examined, to substantiate and defend their findings.

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Another situation that can lead to litigation is when a commissioning authority is asked to retro-commission a building that has significant occupant complaints and or high energy bills. If it is discovered that the building has significant performance deficiencies, the tenant may seek financial compensation for contract default, loss of productivity, and higher than expected energy costs. In response, the owner may decide to litigate the case to recover damages from the contractor and or engineers.

Finally, when a building is for sale and there is an interested buyer, the buyers' agents may require due diligence as part of the process to discover the true value and condition of the property. Due diligence (also known as *due care*) is the "effort made by a prudent or reasonable party to avoid harm to another party." Failure to make this effort may be considered negligence. Quite often a contract will specify that a party is required to provide due diligence. Due diligence is a term used for a number of scenarios involving the performance of a professional inspection and testing with a certain standard of care. If during the performance of due diligence, the commissioning authority discovers significant performance deficiencies, that discovery can impact the sales price of the property - if not the sale itself. Again, the owner may elect to initiate a lawsuit to recover the costs associated with the loss of value in the building or repair the deficiency. In that case, the findings of the commissioning authority would likely come under scrutiny by the opposing attorneys.

Discovery and Depositions Regarding the Commissioning Process

When a building project comes under dispute and both sides initiate a discovery process to assemble all the documents pertinent to the case, the findings and methodology of the commissioning agent are crucial to either document or challenge any deficiencies. For the plaintiff's attorney the effective use of a commissioning agent can enhance the case against the defendant, and for the defendant challenging the findings of the commissioning process can provide an opportunity to dispute any allegations of non-performance. During the discovery phase, attorneys from either side should interview the commissioning authority with the specific intent to discover:

- What are your qualifications?
- What were your findings?
- How were your measurements made?
- How did you come to your conclusions?

Qualifications

The attorney conducting the deposition or cross examination should present the question: *Why are you qualified as a commissioning authority?*

Extensive experience with the systems being commissioned either as a designer, (professional engineer or architect), builder or technical service person is desirable, in addition to commissioning experience. Ask the commissioning authority beforehand to produce a curriculum vitae/ professional resume documenting experience, expertise, and qualifications.

To date there is no nationally recognized certification for commissioning agents. However, several organizations do provide commissioning certification programs and validate the qualifications of commissioning providers. Several are listed below. These certifications are one way to present sufficient qualifications as a commissioning authority, and the elements of these programs may well be used as a standard of performance.

Organization: National Environmental Balancing Bureau (NEBB)
Certification Program: Systems Cx Administrator
Website: www.nebb.org

Organization: The Building Commissioning Association (BCA)
Certification Program: Certified Cx Professional (CxP)
Website: www.bcxa.org

Organization: Association of Energy Engineers (AEE)
Certification Program: Certified Building Cx Professional (CBCP)
Website: www.aeecenter.org

Organization: The Associated Air Balance Council (AABC) Commissioning Group (ACG)
Certification Program: Certified Commissioning Authority (CxA)
Website: www.aabchq.com

Methodology

As the deposing attorney inquire of the commissioning agent: “What methodology did you use to come to your findings?”

To interpret the answer requires being familiar with the commissioning community’s standard of care and professional standards. *Standard of care* is “the degree of prudence and caution required that a reasonable individual would be expected to exercise under such circumstances.” In other words, what would a professional commissioning authority do to identify the deficiencies in such a system? One resource for documenting accepted procedures in commissioning are the commissioning certification organizations listed in this article. In general, accepted standards of care suggest that the commissioning authority should execute the tasks listed below. Two lists are presented; one for new building projects and one for existing buildings executed during retro-commissioning:

New Buildings

- Review the original designs for completeness. Inspect the specifications for performance requirements that meet the owners design intent and engineering best practices.
- Review equipment submittals for conformance with design documents and specifications.
- Devise a commissioning plan outlining schedule, roles, and responsibilities.
- Provide pre-functional test plans (is the system ready to be tested?)
- Perform construction observations.
- Review start-up documentation noting its adherence to the manufacturer’s suggestions for service start-up.
- Review controls point-to-point documentation.
- Review test and balance reports.
- Devise functional test plans based on the controls sequence documentation and execute those test plans.

Existing Buildings, Retro-Commissioning:

- Interview the occupants, maintenance staff, builders, and designers.
- Review the as-built drawings for completeness and inspect the specifications for performance requirements that meet the owners design intent and engineering best practices.
- Review equipment submittals for conformance with design documents and specifications.
- Trend log (or data log) system points to monitor performance.
- Review start-up documentation noting its adherence to the manufacturer's suggestions for service start-up
- Review controls point-to-point documentation
- Review test and balance reports
- Devise functional test plans based on the controls sequence documentation and execute those test plans.

In complicated industrial or critical applications commissioning protocols are more stringent.

A competent commissioning agent, using accepted professional standards, will adhere to a standard commissioning methodology, along with documentation of the process, to defend the specifics of their findings.

Measurements

Another question the deposing or cross-examining attorney should ask is: "How did you make your measurements?"

If the commissioning agent has discovered the system performance to be in some way deficient by measuring temperature, pressure, voltage, amperage, wattage, humidity, air velocity, or employing infrared thermography, those measurements and the instruments that made them should be put under scrutiny.

If asked to defend their measurements three key areas the commissioning agent should be able to address are calibration, instrument use training, and the management of instruments.

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1. Calibration

Question the accuracy of the instrumentation that was used to test the systems. The commissioning authority should have an applied *metrology* protocol in place. Applied metrology, (the science of measurement), refers to the application of measurement science - ensuring the suitability of measurement instruments, their calibration, and quality control of measurements.

A core concept in metrology is traceability, defined as "...the property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards." Traceability is most often obtained by calibration, establishing the relation between the indication of a measuring instrument and the value of a measurement standard.

A well-established standard of traceability is having a NIST traceable calibration vendor check your sensors or equipment. NIST, The National Institute of Standards and Technology, is a federal technology agency that develops and promotes measurement, standards, and technology.

Calibration protocols have a cost associated with them. For example: Performing in-house calibration against a known reference (say an ice bath) is cost effective but will not produce a third-party certification of the accuracy of instruments. A more expensive option is having a NIST traceable calibration vendor check sensors or equipment against NIST traceable instruments. A NIST traceable calibration vendor will provide a certified NIST traceability document that can be produced in a deposition or trial. Even more rigorous, and expensive, would be having a NIST Accredited Calibration performed by a laboratory with NVLAP accreditation (National Voluntary Laboratory Accreditation Program).

2. Instrument Management Program

Besides the accuracy of their instruments, raise the issue of how their instruments are being managed. Is every measurement easily traced back to a specific instrument with a carefully documented history of calibration, service, and repair? Has the person operating the instrument received training on the use of the instrument and how to make proper and accurate measurements?

Measurements may be questionable unless the commissioning agent has an in-house instrumentation program that consists of an up-to-date database documenting the following:

- Equipment ID's
- Equipment checkout and tracking protocols

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- Calibration schedules, dates, and certificates
- Operator training certification
- Standard Testing procedures
- Incident reports (equipment that didn't work) and service records

Professional Standards

Finally, ask “How did you come to your conclusions? If the commissioning agent has discovered some deficiency in function, operation, or construction, they should be familiar with the building and engineering community’s standard of care and professional standards. In other words, *what professional standard is relevant to the issue?*”

To clarify this point, an example. I was once deposed in a case where the general contractor had installed a vapor barrier in a critical humidified space. The HVAC system couldn't keep up with the real humidification load because the vapor barrier had numerous open seams and unsealed penetrations. As an expert and mechanical engineer, my conclusion was that the vapor barrier was improperly installed. Upon hearing that statement, the attorney deposing me asked to see the standards of design and installation that governed the application of vapor barriers that I had based my conclusion on. Under cross examination, even the obvious (big holes in the vapor barrier) requires the precision found in any engineering discipline.

To defend their findings, the commissioning authority should be able to refer to any standard of design and installation that governs the application that is the subject of their conclusion. Below is a partial list of the source of standards as they relate to commercial, industrial, and institutional building projects:

ASHRAE –An international technical society organized to advance the engineering science of heating, ventilation, air-conditioning and refrigeration. Publishes technical transactions, standards, handbooks and guidelines.

SMACNA – An organization that publishes standards and manuals addressing all facets of the sheet metal and HVAC industry, from duct construction and installation.

NEBB – National Environmental Balancing Bureau (NEBB) is an international certification association for firms that perform testing, adjusting, and balancing (TAB) of heating, ventilating and air-conditioning systems in addition to building systems commissioning, sound and vibration measurement, and clean room performance certification. NEBB Procedural Standards provide guidelines for work to be performed.

NFPA–National Fire Protection Association (NFPA), an organization providing scientifically-based consensus codes and standards regarding fire protection, retardant materials, and smoke ventilation.

IBC– International Building Codes (IBC). Develops building code information, standards and resources for residential, commercial and institutional building construction regarding architectural, mechanical, plumbing, electrical, and fuel gas systems.

ANSI – The American National Standards Institute (ANSI) coordinates the development and use of voluntary consensus standards.

ASME – American Society of Mechanical Engineers produces codes and standards for boilers, pressure vessels and piping manufacture and installation.

Documentation

Finally, if a building project does not meet performance expectations after commissioning, either attorney may suggest that the commissioning agent is partially responsible for the failure of the building systems to operate efficiently, meet the needs of the end user, and maintain occupant comfort.

To defend against such allegations, a competent commissioning agent should be able to produce all agreements that pertain to scope of work, roles, responsibilities, and the resolution of deficiencies.

Accepted standards of practice suggest that the agent document in their commissioning specification(s) the scope of work of the commissioning authority, define the roles and responsibilities of all the participants in the commissioning process, and outline limits of liability when there is non-compliance by any of the participants in the commissioning process.

For example, was the commissioning authority invited to participate in the design process? How were those suggestions handled? Where the commissioning specifications referenced in all other specification sections that pertain to the work of the participants in the commissioning process? Where all the issues raised during functional testing resolved? If not, what does the specification, or the contract, state about the commissioning agent’s responsibility when a contractor is non-responsive to the list of issues they raised? What is their liability if a contractor is uncooperative during the process of commissioning?

Conclusion

Concerns about building performance, employee productivity, indoor air quality, energy consumption, and the rise in popularity of the LEED building certification programs are providing increasing opportunities for commissioning providers. With increased opportunity comes the increased risk that a commissioning provider may be involved in a project that results in a legal dispute. Because the findings of the commissioning agent can represent a key element in the dispute, effective use, or challenge of the findings of the commissioning agent during deposition or cross-examination requires a basic knowledge of the methodology of commissioning by the attorney.