



GLUMAC
COMMISSIONING

TEST AND VERIFY **PERFORMANCE** THROUGH **COMMISSIONING**

GLUMAC DESIGN STRATEGIES



VERIFYING

GREEN BUILDINGS THAT WORK

GLUMAC COMMISSIONING

Testing, validation and documentation – as a quality assurance process – to confirm that the performance of facilities, systems, and assemblies change to meet defined objectives and criteria according to the owner's operational needs.

By definition, building commissioning means “proof” – validation that a facility, its systems and equipment operate as designed and constructed according to an owner's performance criteria. Commissioning also acts as a quality assurance process, offering third-party, documented confirmation focused on comfort, reliability, energy, and safety.

While traditionally applied to shipbuilding, the commissioning concept took hold within the building industry in the 1980s, as it became apparent high-

performance systems were not always delivered to owners in full working condition. Such design flaws and construction defects tend to accumulate over time, leading to equipment failure, poor indoor air quality, lower productivity levels, elevated energy use, among other problems. Commissioning provides a coordinated framework to optimize building performance through design reviews, cost controls, functional testing and operator training. A recent comprehensive study by the Lawrence Berkeley National Laboratory found that

Glumac performed LEED Fundamental and Enhanced Commissioning for the new **Levi's Stadium** in Santa Clara, California – home the NFL's San Francisco 49ers. The 68,500-seat facility is the first NFL stadium to be certified **LEED Gold**.





THE **GLUMAC COMMISSIONING** PROCESS – DETAILED, DOCUMENTED AND COMPREHENSIVE – FOCUSES ON DELIVERING EVERY OPERATIONAL ELEMENT OF A NEW BUILDING OR RETROFIT TO THE OWNER IN FULL WORKING CONDITION FROM HIGH-PERFORMANCE HVAC TO LIFE SAFETY SYSTEMS.

commissioned buildings reduce operating costs by as much as 20 percent compared to non-commissioned buildings.

NEW CONSTRUCTION: FROM START TO FINISH

Commissioning for new buildings generally follows a five-step process:

- During Pre-Design, the owner selects a commissioning (Cx) agent while collaborating on a preliminary scope and budget for the entire process. Glumac then conducts a workshop to develop the Owner's Project Requirements (OPR), a condensed collection of vital information about the project and, ultimately, the measure of a project's success or failure. A living document, the OPR is revised during the project as changes
- are made. In addition, the Cx agent develops an initial Commissioning Plan – also refined and revised as the project progresses.
- The Design phase follows, and involves the design team in developing a basis of design (BOD), which summarizes how the Owner's Project Requirements will be satisfied. Glumac reviews both the OPR and the BOD for compatibility. Next, the Cx agent thoroughly reviews the design documents against the OPR and includes Commissioning Specifications in the final construction documents.
- Upon completion of bid documents and with the construction team on board, the Construction Phase begins. Glumac's role is to verify building systems are installed according to the construction documents and perform functional tests to gauge their performance. By now, the Cx agent has become a familiar presence on site, conducting commissioning meetings,

Glumac performed fundamental and enhanced commissioning, as well as MEP design and peer review for **Amazon Headquarters** in Seattle, block 44 of Vulcan Real Estate's South Lake Union development.

performing site observations and attending construction meetings.

- Once Testing begins, Glumac witnesses and documents all functional testing. This documentation involves recording each deficiency, then tracking to resolution to ensure there are no outstanding commissioning issues at the project's completion.
- During the Warranty phase, Glumac works closely with the building operating staff for the first year – fine-tuning systems and resolving any warranty issues before they expire.

COMMISSIONING FOR EXISTING BUILDINGS

Glumac also works to address the shifting operational needs and increasing energy costs of existing buildings. In re-commissioning, the process focuses on returning previously-commissioned buildings and component systems back to their original performance levels. Retro-commissioning, on the other hand, looks at enhancing operations, often in combination with control systems and VFD installations: ideal for improving, maintaining or replacing older, inefficient systems and those experiencing equipment failures. Commissioning for existing buildings typically follows a four-step procedure:

- Planning begins with documentation of the building's current operating conditions – including an initial site walk, then developing the retro-commissioning plan and assembling the project team.
- During Investigation, the team conducts a thorough review of the facility documentation, focusing on original design documents and operation and maintenance manuals. With a full understanding of systems in place, the team performs diagnostic and functional testing according to the current operating conditions of the facility; the Cx agent then creates a "Master List of Findings" to document energy-efficiencies in the facility.
- Implementation involves putting prioritized measures into action using an Implementation Plan to organize the work in a thoughtful, efficient manner that benefits the facility.
- At the Hand-Off, the Cx agent educates building operating staff on the proper documentation and training required to operate and maintain the new implemented measures. The project wraps up with a Final Retro-Commissioning Report, reviewed with the team during the Project Close Out Meeting.



Commissioning spans the life cycle of a building's design, construction, and occupancy as a **quality assurance** and coordination process – integral to any systematic approach for garnering **energy savings** or emissions reductions.

THE COMMISSIONING PROCESS EXTENDS THROUGH THE LIFE OF A BUILDING

GLUMAC DESIGN STRATEGIES

PRE-DESIGN

DESIGN

CONSTRUCTION

TESTING

WARRANTY

PROCESS/TOOLS

The commissioning process relies on drawings and specifications to comprise a pre-functional installation checklist. Together, the commissioning agent and contractor document all completed tasks, such as controls, piping, and power before turning over the building and all of its systems to the owner. While the emphasis is on process, Glumac's tools of the trade include gauges and other instrumentation. In addition, Glumac's agents are continuing to adopt smart phones and tablets loaded with scanners and cloud-based forms as more efficient alternatives for on-site assessment and documentation. This greatly speeds up the documentation process, improves access to relevant data, and holds all parties much more accountable for meeting project goals.

Also supporting this process, Glumac follows LEED requirements as well as ASHRAE Guideline 0-2005, which ensures that "a successful total building commissioning process will carefully validate interfaces and possible interferences between all building systems."

Additional resources include the building

Commissioning Association's (bCxA) "Best Practices in Commissioning Existing Buildings" as well as guidelines from the AABC Commissioning Group (ACG) and the American Society for Healthcare Engineering (ASHE).

ADDITIONAL CONSIDERATIONS

Ultimately, commissioning functions as a risk management tool: to detect and correct potential problems early, to reduce contractor callbacks through testing and verification, (which benefits the owner and contractor), and to provide insurance for policymakers and funders that green initiatives meet previously defined targets. Today, commissioning is a prerequisite for all newly-constructed LEED certified projects.

Another emerging discipline, whole building commissioning, offers great potential for new and old facilities while looking beyond the performance of energy-using equipment. Glumac commissioning agents assess the building envelope and nearly every interior detail: from windows (sealed against rainwater) to carpet and paints (for VOCs), restroom fixtures, door closures, even foundation slabs (moisture testing). **G**

FOR FURTHER INFORMATION, PLEASE CONTACT US BY EMAIL VIA contactus@glumac.com.

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