

ROLE OF THIRD PARTY BUILDING COMMISSIONING (Cx)



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LEAD Consultancy & Engineering Services Private Limited (LCES) is the leading Green Building Service consultant having qualified professionals with vast experience and expertise in the areas of HVAC Design, Energy Efficiency & Green Building Rating Systems. Based in Bengaluru, India, LCES has been set up with an objective of providing 'Consultancy Services on Green Concepts' to the building sector. LCES is playing a pivotal role in the Indian green building movement by providing turn key green building solutions to several buildings in India and also serving countries abroad.

Building Commissioning has become a hot trend in the Indian construction Industry with the introduction of LEED Green Building Rating System. This mandate has been put forth by the US Green Building Council (USGBC) through Leadership in Energy Environmental Design (LEED) rating program. Project seeking for LEED Green building Certification (IGBC or USGBC), it is mandate to undergo "fundamental commissioning of the building energy systems", and can obtain an additional point for the performance of "enhanced commissioning". Regardless of whether LEED certification is pursued, commissioning offers tremendous tangible benefits to the tune of 10 to 15% reduction in operating cost and intangibles like reliability and functional performance of most systems installed in the building.

According to the American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE), ***“Commissioning is the process of ensuring that systems are designed, installed, functionally tested, and capable of being operated and maintained to perform in conformity with***

the design intent". Those systems could be any system within the building from mechanical to Electrical, Electronics, and in some cases the building envelope. In short, commissioning helps ensure that you are actually getting what you pay for and systems are working exactly as it was designed.

The benefits of commissioning are well documented as far as energy savings are concerned. The owner, developer, operator community realizes the operation and maintenance benefits, where the operation costs are reduced up to 15%.

Building commissioning typically involves four distinct "phases" for new construction:

- Pre design
- Design
- Construction
- Operation

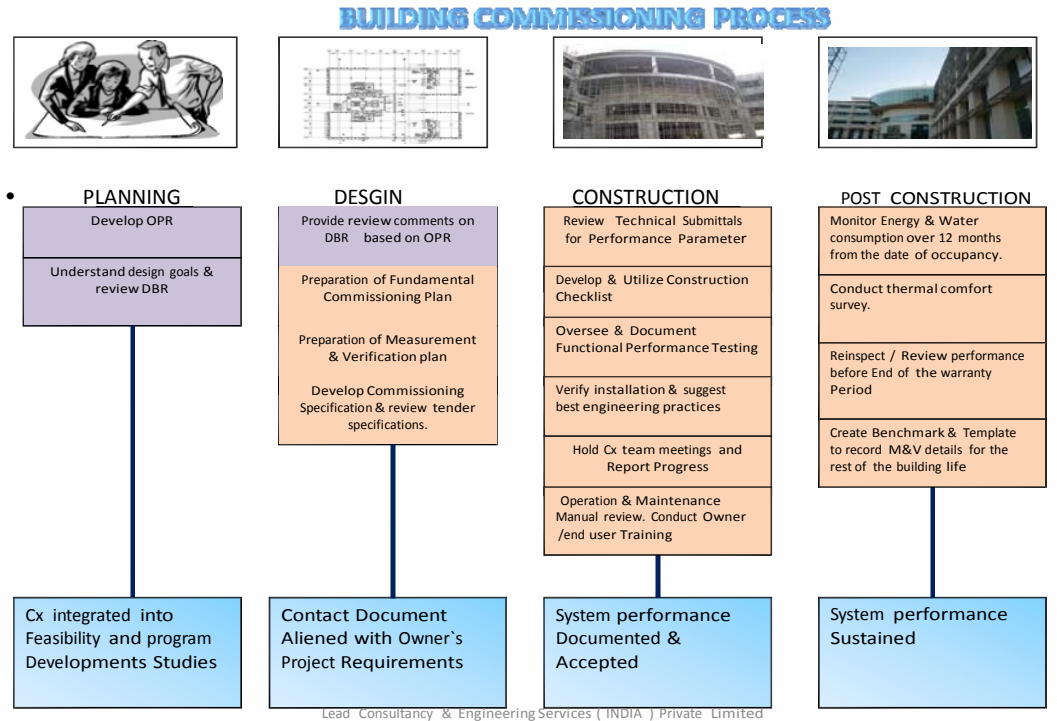


Table – 1 Building Commissioning Process

Goals of Building Commissioning:

The objective of commissioning is to confirm and document that the construction team fulfils the functional and performance requirements of the owner, occupants, and operators.

To deliver a facility that operates as it was intended.

To provide a facility that meets the needs of the building owner and occupants.

To provide appropriate training for facility operators on the operation and maintenance of the building systems.

Handling of Warranty

Expected Deliverables from Building Commissioning team:

- 1) Commissioning plan & commissioning process and team member's role & responsibilities.
- 2) A diagnostic and functional test plan detailing how each test will be accomplished and noting expected performance parameters.
- 3) A list of findings and potential improvements during the design and construction phase activities.
- 4) A training plan recommending specific topics and training schedules for entire team.
- 5) At the completion of the project, a final commissioning report detailing the entire commissioning provider's findings and recommendations including copies of all functional performance testing data.
- 6) A systems concepts and operations manual which gives a description of each system with specific information about how to optimally operate and control the system during all modes of operation such as during fire, power outage, shutdown, etc., including special instructions for energy efficient operation and re commissioning.
- 7) Energy savings and benefits
- 8) Re commissioning procedure, if any

The order for the commissioning process to have a successful and positive outcome, the roles and responsibilities of the project team must be clear from the project's inception.

The commissioning provider should be involved throughout the project from the pre design through the warranty phase. Their primary role during the overall design phase is to develop detailed commissioning specifications and review design to ensure it meets the owner's objectives. During construction, the commissioning provider develops and coordinates the execution of a testing plan, which includes observing and documenting all system's performance to ensure that systems are functioning in accordance with the design objectives and the contract documents.

The commissioning provider should provide "Owners Project Requirement (OPR)", is also known as "Design Intent" , and the Design Brief Report (DBR) documents help the commissioning authority to properly review a set of plans and understand what is being built and why and how the space is going to be utilized. The commissioning authority then reviews the design documents to make sure the owner's project requirements have been executed.

The production of these documents is typically overlooked but they are required documentation if you intend to have your facility LEED certified. In any case, it is always good practice to get your design and construction team to clarify and stay focused on what the real requirements of the

project. Sometimes the end goal gets lost or compromised with the endless meetings and long project durations.

Commissioning Today

Commissioning has evolved over the years. The systems in today's buildings are far more complex and intricate. Where the design professionals and manufacturers have responded to the enhanced technology, the ownership and development community has not yet. The building that once took 18 months to build 10 years ago now takes 24 as more systems are interconnected and more coordination needs to be accomplished above the false ceiling and in some cases below the floor.

There are many people involved in a construction team and they all have their own core responsibilities. Keeping them focused on their strengths will produce a better produce. The designers are good at designing, contractors are good at installation and construction managers are good at managing the process and the schedule. Why would any of these people be able to commission a facility well if that is not their specialty or focus?

The best person to perform commissioning activities is an independent commissioning provider who has no conflicts of interest on the project. The argument can be made that the design engineer and/or the contractor are better able to execute the commissioning process, but someone commissioning their own work is less likely to acknowledge the problems.

The commissioning would not be successful without tracking the performance of the building. Well defined M&V plan as per International Protocol for Monitoring and Verification (IPMVP), would assist operation team to track the performance of the building throughout its life time.

What is M&V?

M&V (Monitoring and Verification) is the capability to track the performance of a piece of equipment, a mechanical system, or an entire building. Ideally, this tracking allows for adjustments that reduce resource use and operating costs. M&V is most often used to track energy consumption, and this can also be applied to water use, indoor environmental quality, and a range of other metrics. Monitoring energy systems can identify problems that might otherwise have gone unnoticed as well as opportunities for greater efficiency even when systems are operating as intended.

The industry standard for M&V internationally, is the International Performance Measurement and Verification Protocol (IPMVP). The most obvious benefit of M&V is reducing utility consumption, which in turn reducing the utility cost. M&V simply allows a user to compare the performance of a particular system or building to the performance of the same system or building at an earlier time, to the performance of other systems or buildings. M&V creates benchmark for energy use for the building that is going to come up in future.

We give below photos demonstrates implementation of commissioning process and impact on equipment performance, which are self explanatory

Observation No 1: Flexible duct support.

Before:



After:



Observation No 2 Gap between plenum & duct joints.

Before:



After



Observation No 3 Flexible ducts not clamped

Before:



After:



Observation No 4: For DCV system dampers are installed.

Before:



After:



Observation No 5: Heavy dust over Fresh Air VCD.

Before:



After:



Observation No 6: Gap observed between bolt head & flange bolt hole.

Before:



After:



Observation No 7: VAV is resting on duct connections & not on support bolts.

Before:



After:

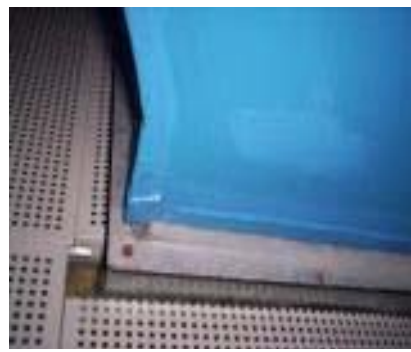


Observation No 8: Heavy gap observed in SA duct near plenum .Loss of energy & dehumidified air.

Before:



After:



Observation No 9: Grommet Size & CHW pipe OD is not matching.

Before:



After:



Observation No 10: Precision Air Conditioner Outdoor unit condenser coil corroded.

Before:



After:



Observation No 11: AHU Protection from dust & moisture.

Before:



After:



Observation No 12: Sag observed in support used for ducts.

Before:



After:

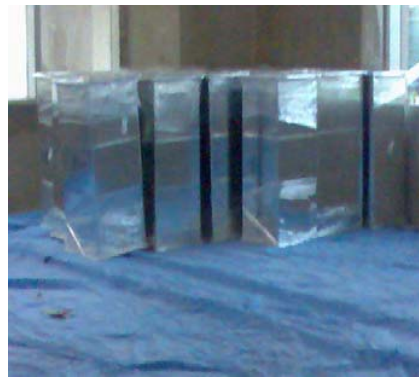


Observation No 13: Open end of the ducts not closed

Before:



After:



Observation No 14: Cooling coils of AHU

Before:



After:



Observation No 15: Duct assembly is carried out in dusty & moisture ambiance.

Before:



After:



Conclusion:

Commissioning by Third Party Agency has many benefits to owners and developers. A properly commissioned building can result in

Fewer change orders during the construction process

Fewer call backs for warranty work

Long term tenant satisfaction

Lower energy bills

Avoided equipment replacement costs

Improved profit margin for building owners

Properly trained operational staff

Less maintenance problems

Fast recovery of shutdowns due to equipment failure

Easy to handle Operations and Maintenance