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# HIGH-PERFORMANCE BUILDING DESIGN PROFESSIONAL - HBDP EXAM REFRESHER

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ONLINE TRAINING BY KRISHNAJI PAWAR

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MODULE  
**21B**

# Commissioning in Sustainable Construction

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# **HIGH-PERFORMANCE BUILDING DESIGN PROFESSIONAL - HBDP EXAM REFRESHER**

The commissioning process is defined as a systematic process that ensures that building systems are designed, installed, tested, operated, and maintained according to the operational requirements of the owner. Each phase plays a crucial role in ensuring that the commissioning objectives are met.

# Learning Objectives +

- Benchmarking with Performance Metrics
- Water Conservation
- Commissioning in Sustainable Construction
- Energy and Materials Use and Management
- Summary and Resources
- HBDP Practice Test V.4.1\_Test Your Knowledge!



## COMMISSIONING PROCESS

- Crucial phase in the lifecycle of a building project, involving planning, execution, and validation of systems.
- Particularly important in complex environments like hospitals, educational institutions, and large commercial buildings.
- Defined as a systematic process that ensures building systems are designed, installed, tested, operated, and maintained according to the owner's operational requirements.
- Pre-design phase: Collaborates with project stakeholders to establish clear objectives, defining scope, identifying KPIs, and outlining team roles.
- Construction phase: Conducts regular site visits and functional testing of systems.
- Acceptance phase: Involves comprehensive testing of all systems to confirm performance.
- After acceptance, the process continues with ongoing performance verification, operator training, and maintenance planning.
- Essential for enhanced efficiency, improved performance, reduced risk, and sustainability.

# INTEGRATING QUALITY CONTROL INTO THE DESIGN AND CONSTRUCTION COMMISSIONING PROCESS

## Understanding Quality Control

- Quality control refers to systematic processes and measures to ensure a product or service adheres to predetermined quality standards.
- In the construction industry, QC includes inspections, testing, and documentation to prevent defects and ensure the facility is fit for its intended use.

## The Design and Construction Commissioning Process

- The commissioning process in construction is a quality-focused approach that envelops the entire lifecycle of a project.
- It consists of several phases: Pre-Design Phase, Design Phase, Construction Phase, and Post-Construction Phase.



# INTEGRATING QUALITY CONTROL INTO EACH PHASE +

- Pre-Design Phase: Establishes clear project goals and objectives, involving stakeholders early on to outline quality expectations.
- Design Phase: Involves regular design reviews to assess compliance with quality standards and identify potential issues before construction begins.
- Construction Phase: Involves inspections and testing, documentation, and training and standards compliance.
- Post-Construction Phase: Conducts final inspections, client walkthroughs, and feedback loops to ensure the finished product matches design specifications and client expectations.



# QUALITY ASSURANCE IN DESIGN AND CONSTRUCTION COMMISSIONING PROCESSES

## Introduction to Quality Assurance in Commissioning

- Quality assurance (QA) is a systematic process that ensures products or services meet specified requirements and standards.
- In design and construction commissioning, QA plays a pivotal role in validating that systems and components function as intended before they are handed over to the client or end-user.

## Importance of Quality Assurance

- In construction and design, QA mitigates risks associated with subpar construction practices, design errors, or inadequate system performance.
- The QA process in commissioning includes planning and documentation, design review, construction oversight, functional testing, documentation and training, and post-occupancy evaluations.



# KEY ASPECTS OF QA PROCESS +



- Planning and Documentation: Establishes clear expectations and standards for the project.
- Design Review: Analyzes design documents to ensure compliance with established standards.
- Construction Oversight: Involves on-site inspections and regular reporting.
- Functional Testing: Verifies that systems operate as intended.
- Documentation and Training: Includes commissioning reports and O&M manuals.
- Post-Occupancy Evaluation: Involves feedback surveys and performance monitoring.

# EVALUATING POST-OCCUPANCY PERFORMANCE DURING COMMISSIONING PROCESSES

## Conceptual Framework

- Post-occupancy evaluation (POE) assesses the performance of a building post-occupancy.
- The objective is to align design intentions with occupant experiences, leading to improved building performance and satisfaction.

## Commissioning Process

- Comprises several phases: Pre-Design Phase, Design Phase, Construction Phase, Occupancy Phase, and Post-Occupancy Phase.
- Methods of Evaluation include surveys and questionnaires, physical measurements, Building Management System (BMS) data, and case studies.





# EVALUATING POST-OCCUPANCY PERFORMANCE DURING COMMISSIONING PROCESSES +

## Key Performance Indicators (KPIs)

- KPIs include Energy Consumption, Occupant Satisfaction Ratings, Indoor Environmental Quality (IEQ), and Maintenance Requests.



## Implications of Findings

- Feedback loop for design improvements: Insights from POE inform future design practices.
- Enhanced Facility Management: Understanding post-occupancy performance enables resource allocation, maintenance schedules, and occupant satisfaction.
- Sustainability Initiatives: Evaluating energy consumption and IEQ can guide sustainability strategies.

# DEVELOPING A FEEDBACK/CORRECTIVE ACTION METHODOLOGY DURING COMMISSIONING PROCESSES

## Importance of Feedback and Corrective Action

- Feedback provides insights into the performance of systems, identifying discrepancies between expected and actual performance.
- Corrective action refers to the steps taken to rectify identified issues.

## Developing the Methodology

- Establishing clear objectives: Ensure the HVAC system operates within specified temperature and humidity ranges.
- Defining Key Performance Indicators (KPIs): Establish KPIs to measure the effectiveness of commissioning activities.
- Implementing a feedback mechanism: Collect data from various stakeholders throughout the commissioning process through surveys, observational studies, and data logging.
- Analyzing feedback: Systematically analyze feedback to identify trends, issues, and areas for improvement.
- Developing corrective actions: Develop appropriate corrective actions based on the analysis, such as redesigning system components, retraining personnel, or adjusting operational protocols.
- Implementing corrective actions: Document and communicate corrective actions clearly to relevant stakeholders and monitor their effectiveness.
- Establishing a continuous improvement loop: Regularly revisit objectives, KPIs, feedback mechanisms, and corrective actions to ensure the commissioning process evolves with changing requirements and technologies.





# IMPLEMENTING CORRECTIVE ACTIONS: RECOMMISSIONING AND RETROCOMMISSIONING

- Corrective actions in building systems and energy management are crucial for optimizing performance, reducing energy consumption, and improving occupant comfort.
- Recommissioning and retrocommissioning are two primary methodologies for these actions.



## Recommissioning

- Recommissioning involves re-evaluating and adjusting a building's systems to align with original design specifications or updated operational goals.
- The process includes assessment, analysis, implementation of adjustments, and verification and documentation.
- Examples include recommissioning HVAC systems for improved airflow and temperature control in office areas and reducing energy waste in unused spaces.

## **RETROCOMMISSIONING +**

- **It focuses on improving the performance of existing buildings that were not previously commissioned or have degraded over time.**
- **The process includes an evaluation of the building's current operational conditions, identification of deficiencies, strategic improvements, and performance verification.**
- **Examples include retrocommissioning automated lighting controls for reducing energy consumption and enhancing occupant comfort in a commercial office building.**





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# THANK YOU

