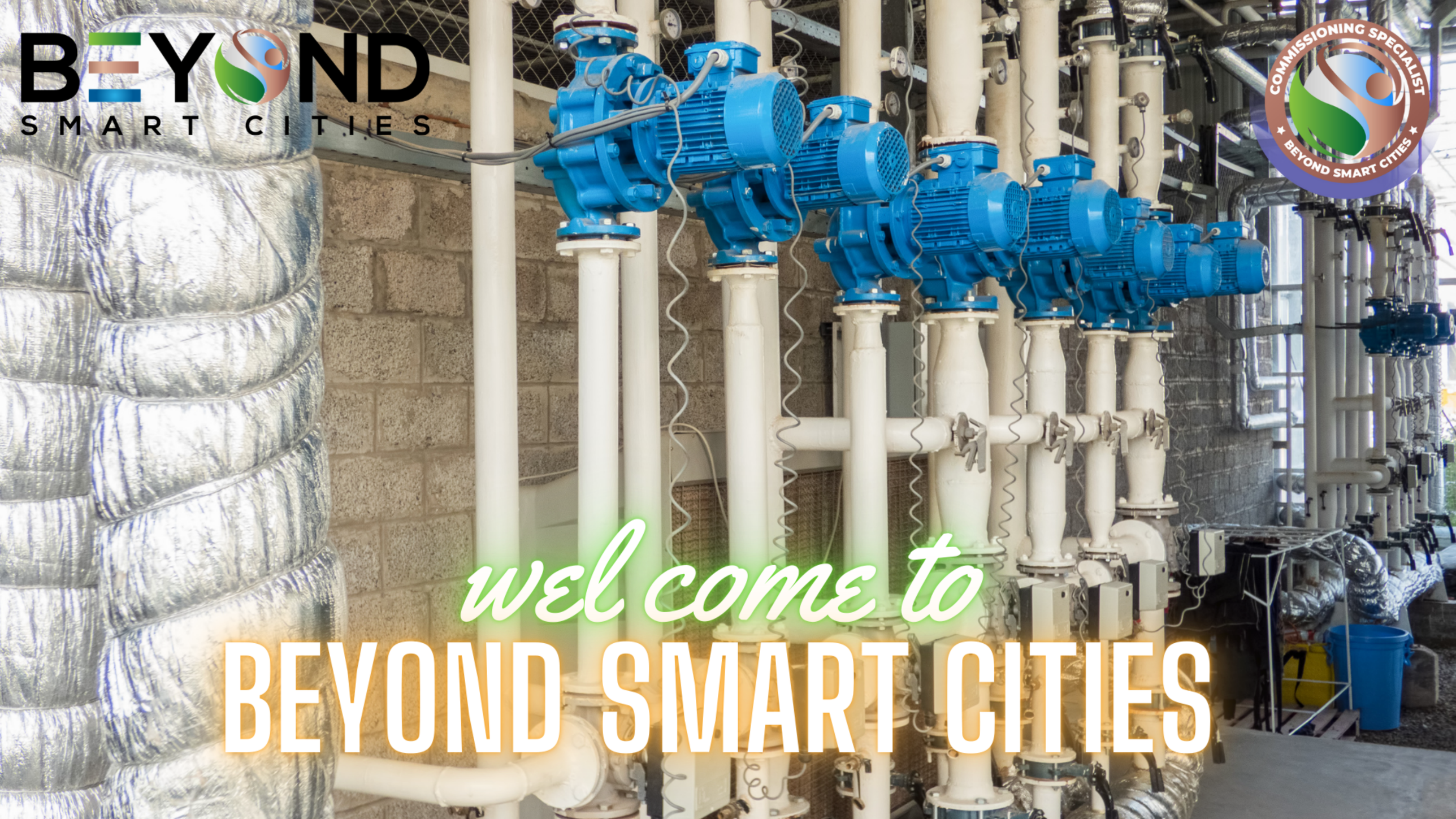
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CERTIFIED COMMISSIONING TECHNICIAN
CXT OVERVIEW
ONLINE TRAINING BY KRISHNAJI PAWAR
LEED AP(BD+C),GSAS CGP,GCP,ISO 14001
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MODULE 5

Commissioning Process Overview

KRISHNAJI PAWAR - CEO & FOUNDER

LEED AP(BD+C),GSAS CGP,GCP,ISO 14001

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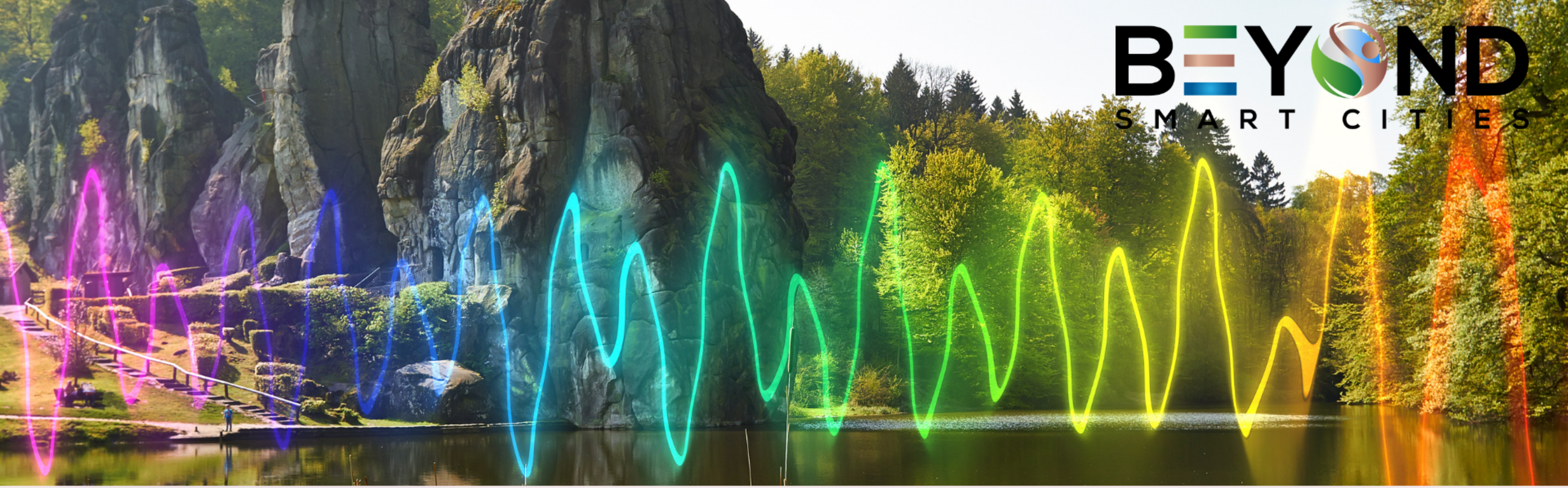

CERTIFIED COMMISSIONING TECHNICIAN CXT OVERVIEW

The process ensures that all commissioned systems and assemblies are planned, designed, installed, tested, operated, and maintained in line with the owner's project specifications through documentation and verification.

Learning Objectives

- Course Overview and Introduction
- Definition & History of Commissioning
- Why is building commissioning needed?
- Technical, communication, and CX skills
- Commissioning Process Overview
- CX Technicians (CxT) Responsibilities
- Specilist Certification in CX Services
- Cost and benefits of building CX
- CX Challenges and Emerging Issues
- Summary and Resources
- CxT Practice Exam: Test Your Knowledge!

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INTRODUCTION

- Building commissioning is a systematic process that ensures a facility's systems are designed, installed, tested, operated, and maintained according to the owner's operational requirements.
- It serves as a quality assurance mechanism, ensuring all building systems function as intended.
- It helps identify opportunities for reducing energy consumption and improving the overall energy profile of a building.
- Building commissioning processes improve indoor environmental quality (IEQ), reducing health issues, decreased productivity, and overall dissatisfaction among occupants.
- It facilitates regulatory compliance and certification, mitigating the risk of penalties and enhancing the building's marketability.
- It supports ongoing maintenance and operations by providing comprehensive documentation and a detailed understanding of the building systems.
- Building commissioning can adapt to future needs by including provisions for future modifications.

FIELD TESTING, ADJUSTING, AND BALANCING (TAB) IN HVAC SYSTEMS

- TAB is a systematic approach to measure airflow, adjust system components, and balance air and temperature distribution.
- It aims to ensure compliance, optimize performance, enhance comfort, and identify issues early.
- HVAC systems consist of Heating Equipment, Cooling Equipment, Ventilation Systems, and Controls.
- TAB process involves three phases: testing, adjusting, and balancing.
- Controls are integrated into the TAB process for maximizing system performance.
- Building Management Systems (BMS) provide centralized monitoring and control, utilizing data from sensors to optimize operation.
- Modern HVAC systems have sensors that continuously monitor parameters, providing valuable data for adjustments during TAB.
- TAB bridges system design and operational reality, ensuring optimal thermal comfort and indoor air quality.

BUILDING COMMISSIONING PROCESS

- The occupancy and operations phase involves ongoing evaluation and fine-tuning of building systems.
- The success of the NEBB commissioning process relies on stakeholder collaboration.
- The commissioning process is the integrated application of a set of engineering techniques and procedures to check, inspect, and test every operational component of the project—from individual functions such as instruments and equipment, up to more complex entities such as subsystems and systems.
- Commissioning Process: a quality focused process for enhancing the delivery of a project.
- The commissioning process is a team effort

BUILDING COMMISSIONING PROCESS

- Establishes standards and procedures for building system commissioning, especially in HVAC, building automation systems, and indoor environmental quality.
- The commissioning process is systematic to ensure optimal performance, energy efficiency, and occupant comfort.
- Key phases include pre-design, design, construction, occupancy, and operations.
- The pre-design phase establishes project goals, defining owner's requirements, performance metrics, and sustainability goals.
- The design phase involves collaboration with architects, engineers, and stakeholders to ensure design meets requirements.
- The construction phase involves inspections, observing construction activities, and functional testing.

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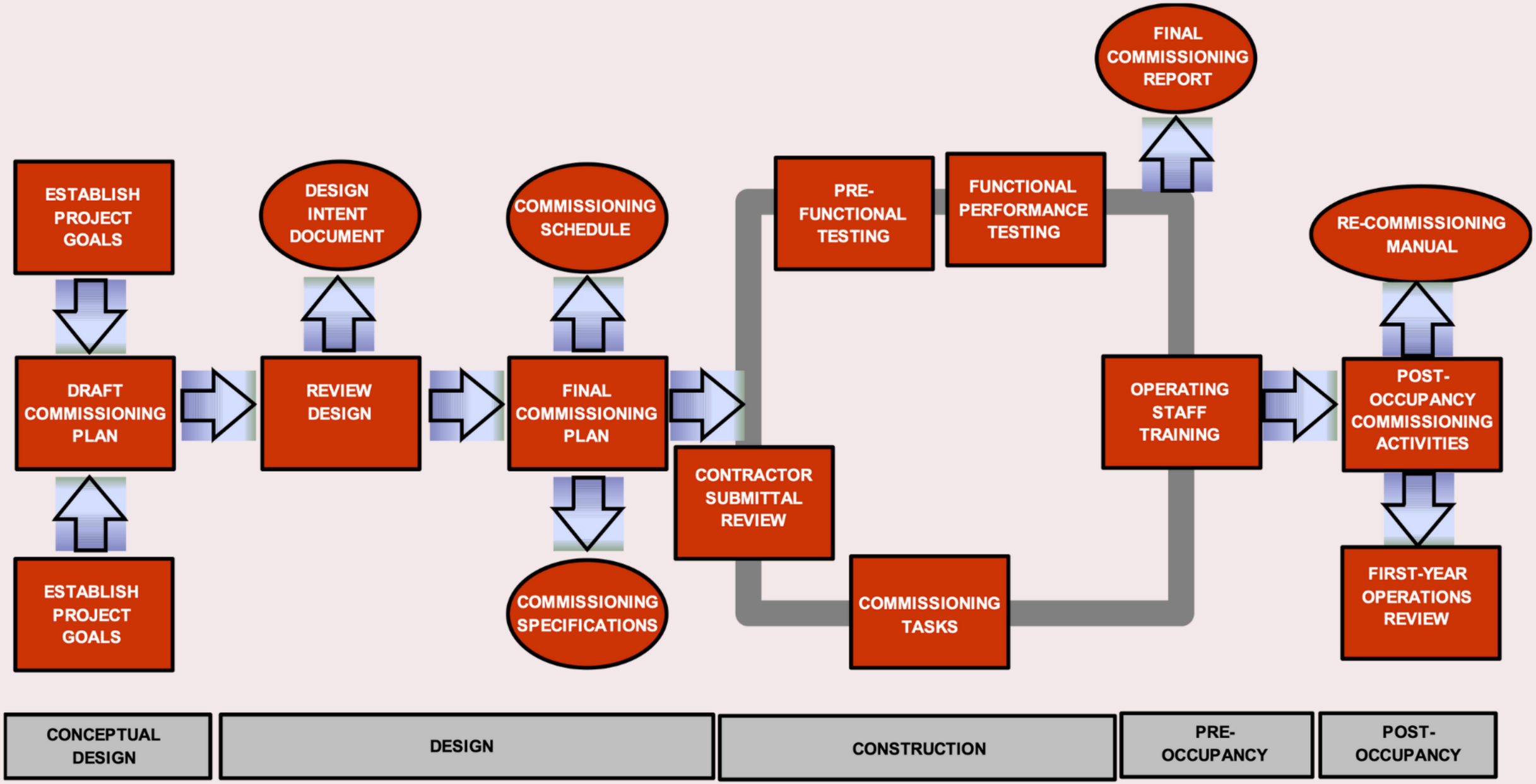
ESTABLISH PROJECT GOALS
DRAFT COMMISSIONING PLAN
ESTABLISH PROJECT GOALS
DESIGN INTENT DOCUMENT
REVIEW DESIGN
COMMISSIONING SCHEDULE
FINAL COMMISSIONING PLAN
COMMISSIONING SPECIFICATIONS
CONTRACTOR SUBMITTAL REVIEW
PRE-FUNCTIONAL TESTING
COMMISSIONING TASKS
FUNCTIONAL PERFORMANCE TESTING
FINAL COMMISSIONING REPORT
OPERATING STAFF TRAINING
RE-COMMISSIONING MANUAL
POST-OCCUPANCY COMMISSIONING ACTIVITIES
FIRST-YEAR OPERATIONS REVIEW
CONCEPTUAL DESIGN
DESIGN
CONSTRUCTION
PRE-OCCUPANCY
POST-OCCUPANCY

TAB VERIFICATION IN HVAC SYSTEMS

- TAB verification is a crucial process in HVAC systems to ensure system operation.
- It involves assessing airflow, temperature, and pressure differentials to confirm system functionality within specified tolerances.
- Understanding TAB verification requires knowledge of duct traverse calculations, system posturing for repeatability, verification of tolerances, and comparison of reported versus measured data.
- Duct traverse measures airflow within ducts, ensuring correct volume of air delivery to each outlet.
- To achieve repeatability, system stability, environmental control, and standardized measurement protocols are essential.
- To verify repeatability, acceptable tolerances based on industry standards are established.
- Re-measurement is necessary after initial measurement.
- Comparison of results from both measurements is necessary to determine if the difference falls within the established tolerance.
- Compliance determination involves comparing reported data with measured data obtained during the TAB process.
- Attention to detail and adherence to standardized practices are vital components of successful TAB verification.

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UNDERSTANDING HVAC SYSTEMS AND THEIR PRINCIPLES

- HVAC systems serve three primary functions: heating, cooling, and ventilation.
- Heating involves raising indoor air temperature to create a comfortable environment.
- Cooling systems remove heat from indoor air to lower the temperature.
- Ventilation ensures an adequate supply of fresh air while removing stale air and contaminants.
- Basic HVAC formulas are essential for system design, analysis, and troubleshooting.
- The National Environmental Balancing Bureau (NEBB) Formula Chart provides numerous formulas for heating, cooling loads, airflow, and system efficiency.
- These formulas allow HVAC professionals to design and size systems accurately, ensuring efficiency and comfort.
- The formulas can also be used to determine if airflow and load calculations align with manufacturer specifications.
- System balancing is essential after installation, allowing technicians to adjust dampers and registers to achieve desired airflow.

HVAC CONTROL SYSTEMS OVERVIEW

- Crucial for maintaining indoor air quality and comfort in residential, commercial, and industrial environments.
- Control mechanisms govern the operation of terminal units, air handling units (AHUs), pumps, and exhaust fans.
- Primary objectives include temperature regulation, humidity control, air quality management, and energy efficiency.
- Control modes include On/Off Control, Modulating Control, and PID Control.
- Terminal Units (TUs) condition air delivered to occupied spaces using damper controls.
- Air Handling Units (AHUs) distribute and condition air throughout a building.
- Pumps circulate water in hydronic systems using variable frequency drives (VFDs).
- Exhaust Fans (EFs) remove stale air from a space, ensuring proper ventilation.
- Access and manipulation of HVAC control systems are essential for testing and troubleshooting.
- Data logging and analysis are vital for identifying trends and anomalies in HVAC systems.
- Understanding HVAC control systems is essential for effective system design, installation, and maintenance.

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WHY COMMISSION BUILDING SYSTEMS?

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- The complexity of building systems has increased as a result of several developments.
- Stricter energy conservation regulations.
- The need for safer work environments necessitates advancements in office equipment and indoor air quality.
- Advanced phonic, image, video, and data communications technologies, as well as rapidly transforming research and teaching methodologies.

COMMON BENEFITS OF COMPREHENSIVE BUILDING SYSTEMS OR WHOLE BUILDING COMMISSIONING

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- Improved project designs
- Fewer change orders and additional claims
- Minimal negative impact from design changes
- Fewer Deficiencies at Substantial Completion:
- Well-managed start-up procedures
- Fewer project delays
- Shorter building turnover period
- Less Post-Occupancy Corrective Work
- Complete and useful building documentation
- More knowledgeable Operations and Maintenance (O&M) staff
- Enhanced Operations and Maintenance (O&M) Program
- Value-added construction quality
- More resilient building systems
- Better Indoor Environmental Quality (IEQ)
- Sustainable high-performance infrastructure
- Lower energy expenses:
- Fewer greenhouse gas emissions
- Compliance with Jurisdictional Requirements:

THE PROGRAM FOR OPTIMAL QUALITY ASSURANCE

- Starts with predesign, intensifies during design, peaks during construction, and ends with ongoing monitoring and trend-logging.
- Ensures highest quality and operational dependability of a facility.
- Helps develop and document facility project requirements.
- Assists design professionals in documenting design basis, selecting optimal design solutions, and preparing construction documents.
- Assists prime contractors, subcontractors, and vendors in choosing and installing components and systems.
- Validates facility performance through commissioning tests.
- Trains and provides documentation to ensure system sustainability.

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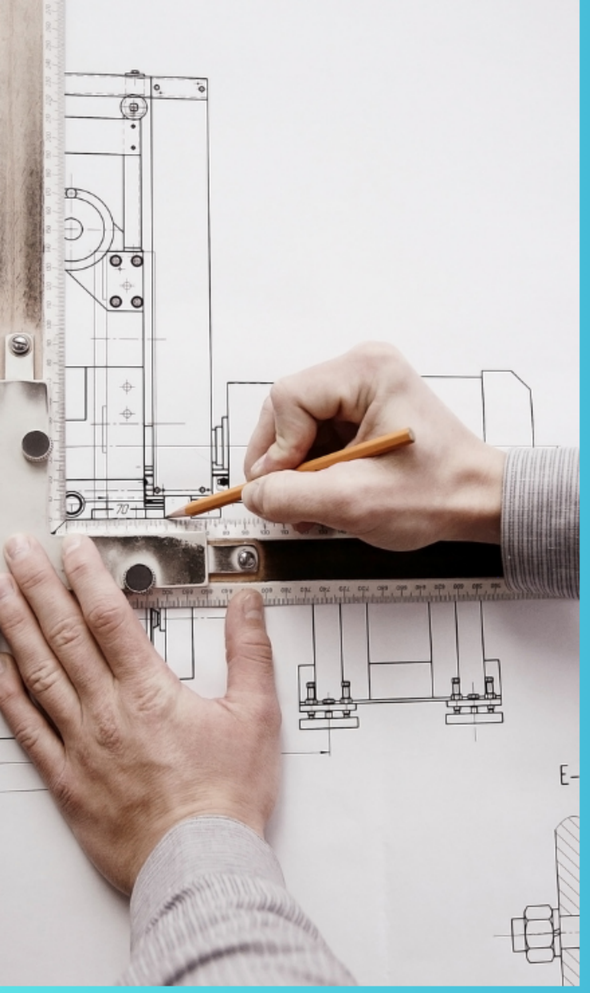
ADVANTAGES FOR THE OWNER



- Proper functioning of all building systems.
- Pre-occupancy fixation of design and construction flaws.
- Determination of system's operating efficiency before project completion.
- Reduced resource consumption and annual minimum utility costs.
- Extensive new system operation documentation for Operations staff.
- Improved sustainability and maintenance of facility.
- Better documentation for later occupancy changes.
- Documentation of design origins for design consultants.

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ADVANTAGES FOR DESIGN PROFESSIONALS

- Commissioning refines design principles, incorporating operating engineer experience.
- Refines construction specifications, making system reliability easier.
- Reduction of design errors through commissioning-focused reviews and rigorous testing.
- Cost-effectiveness of fixing unnecessary design or construction issues.
- Improvement in qualifications and reputation as design professionals gain experience through commissioning.

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ADDED VALUE FOR THE CONTRACTOR

- Initial testing starts mid-construction, requiring more scheduling and coordination.
- Reduces trade conflicts, improving efficiency.
- Promotes quality control, speeding up construction issues.
- Eliminates post-construction adjustments, saving time on unnecessary design or construction issues.
- Improves contractors' qualifications and reputation.

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WHEN DOES COMMISSIONING START?

- Commissioning should commence during facility predesign (programming).
- Delays in hiring commissioning authority can hinder the process.
- Addressing functional issues during predesign is crucial for meeting commissioning goals and owner needs.
- Advanced projects cannot be commissioned during design or construction.
- Commissioning can begin during later stages, requiring contract revisions.
- Early hiring of a qualified commissioning authority is recommended due to unfamiliarity with commissioning requirements.

WHICH PROJECTS SHOULD BE COMMISSIONED?

- All new facilities should be commissioned, based on health, safety, and liability risk.
- Facilities providing essential services, including hospitals, research labs, and potentially hazardous activities, should be fully commissioned.
- Resource allocation should minimize community and investment risk.
- The decision to commission depends on how much of the project, not which tactic should be commissioned.

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THANK YOU