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CXCT REFRESHER

ONLINE TRAINING BY KRISHNAJI PAWAR

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

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MODULE
3L2

Understand HVAC Control Systems

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HVAC control systems are essential for maintaining comfortable indoor environments in residential, commercial, and industrial settings. They play a crucial role in optimizing energy efficiency, ensuring occupant comfort, and maintaining air quality. HVAC control systems consist of sensors, controllers, actuators, and terminal units that work together to regulate temperature, humidity, and air quality.

Learning Objectives

- Course Overview and Introduction
- CCxT's Technical, Communication, and Commissioning Skills - Working knowledge of Procedural Standards
- HVAC Systems - Understand HVAC control systems
- Basics of field TAB verification, HVAC systems and controls
- CxT Responsibilities by Phase
- Pre-function tests include sheet checking and installation tests.
- Point-to-point calibrate MEP and sensor systems.
- Verify TAB pre-functional tests and CxT responsibilities



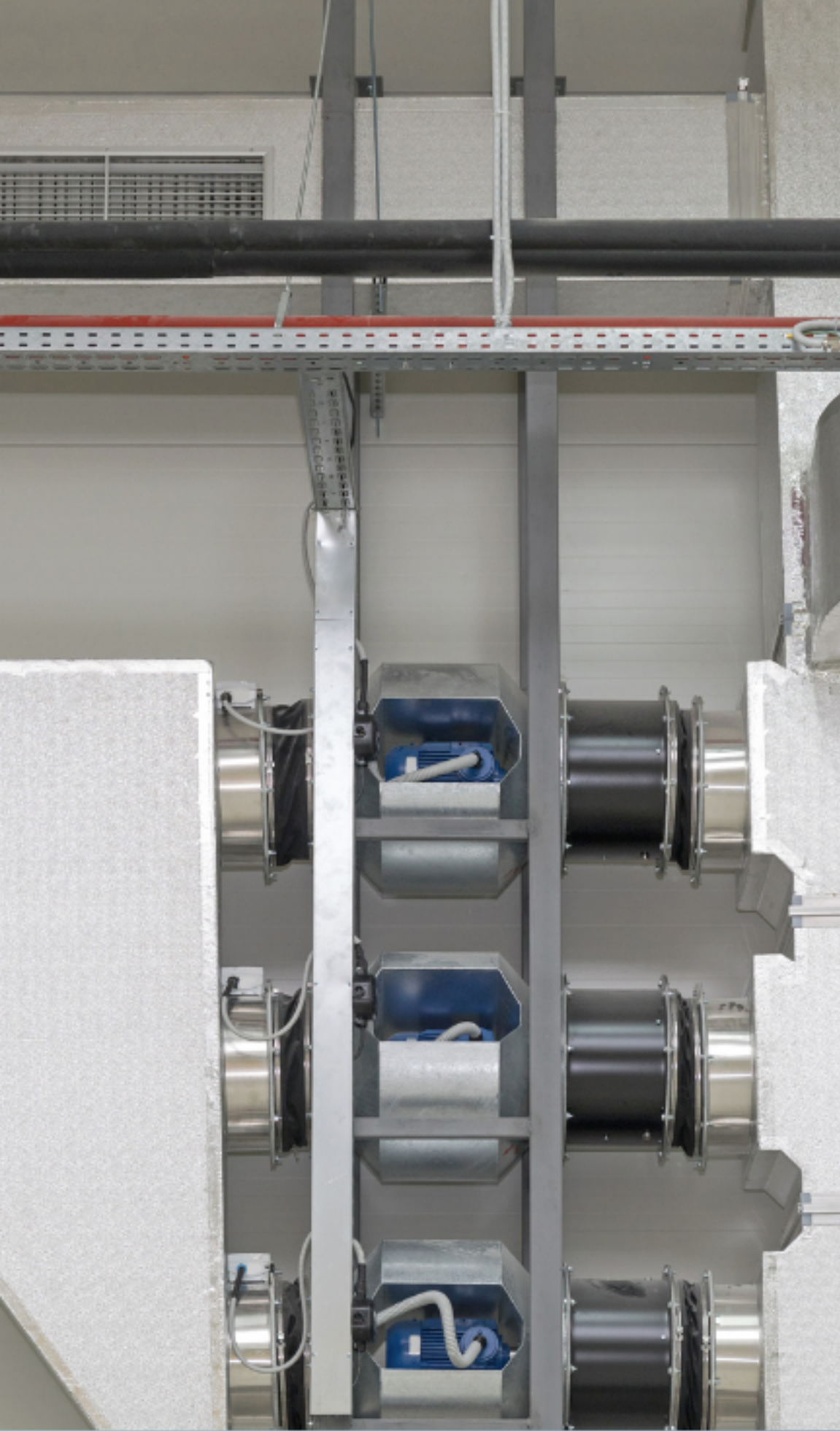
INTRODUCTION

Components of HVAC Control Systems

- Sensors: Measure air or surface temperature, humidity, pressure, and CO2 levels.
- Controllers: Process data from sensors and execute control algorithms.
- Actuators: Translate control signals into physical actions.
- Terminal Units: Deliver conditioned air to occupied spaces.
- Air Handling Units (AHUs): Condition and circulate air throughout a building.
- Pumps: Circulate water or refrigerant through HVAC systems.
- Exhaust Fans (EFs): Maintain indoor air quality by removing stale air.

COMMON CONTROL STRATEGIES

- On/Off Control: Operates equipment in a binary manner, leading to temperature fluctuations and energy waste.
- Proportional Control: Adjusts actuator's output based on the difference between the desired setpoint and the actual condition.
- Proportional-Integral-Derivative (PID) Control: Combines proportional, integral, and derivative actions to minimize error and improve system stability.



ACCESSING AND MANIPULATING HVAC CONTROL SYSTEMS

- System Access: Ensure proper access to the HVAC control system.
- System Posturing: Adjust control settings or configurations for testing.
- Example of System Manipulation: Access the Control Panel, adjust the Setpoint, monitor System Response, and evaluate Performance.



HVAC CONTROLS AND THEIR ROLE IN BUILDING SYSTEMS



- HVAC controls are a standard part of the heating, ventilation, and air conditioning (HVAC) system.
- The automatic temperature controls (ATC) system is the multitasking "brain" of the HVAC system.
- The building automation system (BAS) or building management system (BMS) enables real-time control and visibility of the entire HVAC system and individual components.
- If the facility lacks a BAS or BMS, HVAC controls can be considered part of a generalized building controls system.
- Some buildings may utilize an energy management system (EMS) to perform some of the functions of a BMS, focusing more narrowly on managing energy consumption.
- for HVAC controls manufacturers, suppliers, owners, occupants, end users, and CxPs.

HVAC CONTROLS AND THEIR ROLE IN BUILDING SYSTEMS +

- The Commissioning Provider (CxP) must confirm the intended functionality of new or existing controls and ensure they meet the Owner's Project Requirements (OPR) or Current Facility Requirements (CFR).
- HVAC controls enable the HVAC equipment to operate according to the owner's preferred sequence of operation (SOO).
- Communication between the controls and equipment and components is not one-way; they also receive feedback in the form of data from the equipment and components.
- DDC network communication often occurs over a local area network (LAN), web-based and cloud-based networks, and remote access capabilities include virtual private networks (VPNs).
- Security is a paramount concern



BUILDING SYSTEMS COMMISSIONING AND HVAC CONTROLS



- Building controls serve as a valuable tool during the commissioning process of building systems.
- They provide instantaneous data about HVAC equipment performance, aiding in testing and troubleshooting.
- Features like trending, queries, routines, archives, and alarms allow the CxP to verify the status of HVAC equipment.
- The Commissioning Plan (Cx Plan) should be developed and revised during the Project Initiation and Design Phases.
- HVAC controls can help achieve project energy efficiency goals and collect real-time feedback.

BUILDING SYSTEMS COMMISSIONING AND HVAC CONTROLS +

- Controls can be used to shed load during stress situations or regulate equipment operation during high electricity prices.
- The integration of HVAC controls with other building systems is crucial.
- The controls network offers visibility into the HVAC system and ancillary systems, providing insight into normal and abnormal system operation.



BUILDING SYSTEMS COMMISSIONING AND HVAC CONTROLS ++



- Integration of HVAC controls with other building systems provides valuable feedback for optimizing equipment schedules, identifying equipment failure, planning preventative maintenance, setting up alarms, and monitoring system performance.
- The controls network provides information about each piece of connected equipment, including internal parameters and settings.
- Data archiving and remote data storage enhance the operation of building systems connected to the HVAC controls network.



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THANK YOU

