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CERTIFIED HVAC DESIGNER
CHD OVERVIEW
ONLINE PROFESSIONAL COURSES LED BY THE WORLD'S TOP SPECIALISTS
ONLINE TRAINING BY KRISHNAJI PAWAR
LEED AP(BD+C),GSAS CGP,GCP,ISO 14001
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MODULE 4A

HVAC System Concepts and Process

KRISHNAJI PAWAR - CEO & FOUNDER

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

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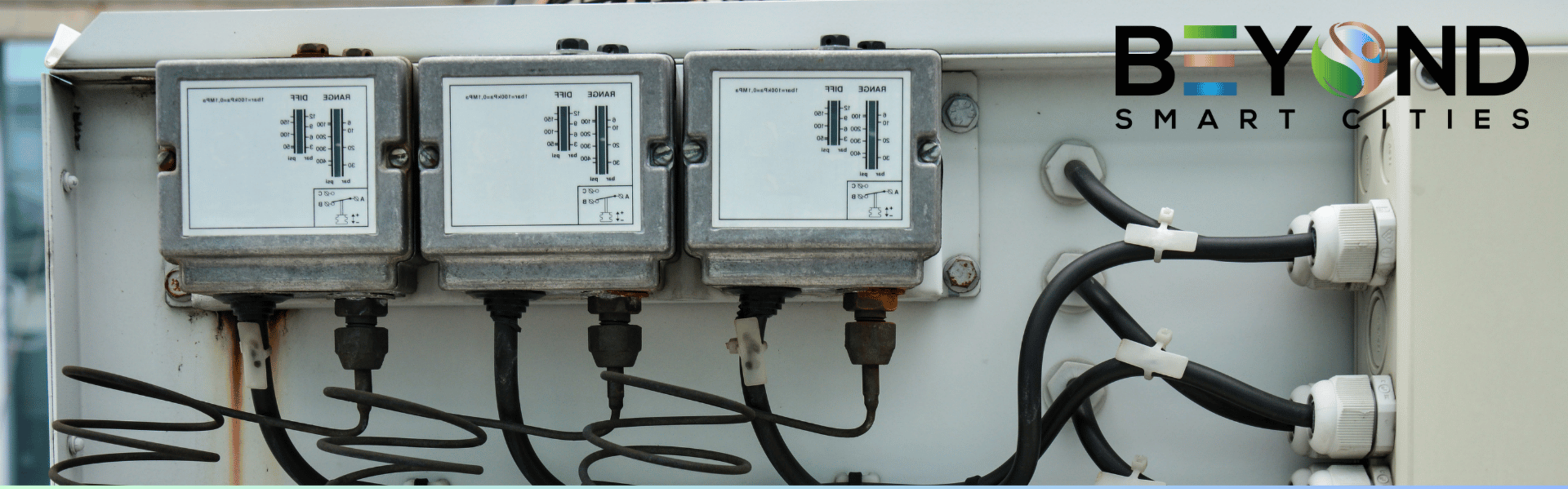

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CERTIFIED HVAC DESIGNER CHD OVERVIEW

HVAC system designers must determine how their net heating and cooling requirements will be met by selecting one or more systems for a building. HVAC systems can be divided into primary systems, which provide heating or cooling media, and secondary systems, which satisfy individual space heating and cooling requirements.

Learning Objectives

- Introduction
- HVAC Fundamentals
- The Air-Conditioning Process
- HVAC System Concepts and Process
- HVAC Systems Design
- Engineering, Economics, and Design Decision-Making
- Certified HVAC Designer (CHD) Specialty Certification
- Summary and Resources
- Certified HVAC Designer - CHD Practice Test V.4.1

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INTRODUCTION

- HVAC systems control temperature, humidity, and air quality to ensure occupant health and well-being.
- Heating is achieved through a furnace or boiler burning fuel, distributed throughout the building using ducts or pipes.
- Ventilation involves the exchange of indoor and outdoor air to maintain air quality and remove pollutants.
- Systems can be simple or complex, ranging from natural to mechanical.
- Air conditioning is responsible for cooling indoor spaces during hot weather.
- Refrigerants absorb heat from indoor air and release it to the outside, cooled air is distributed throughout the building.
- Air conditioning systems also dehumidify the air by removing excess moisture.
- Proper maintenance and regular inspections are crucial for the longevity and effectiveness of HVAC systems.

HVAC SYSTEM DESIGN OVERVIEW

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- The primary objective of HVAC system designers is to determine how net heating and cooling requirements will be met.
- HVAC systems are divided into two categories: Primary systems and Secondary systems.
- Primary systems provide primary heating or cooling media, such as boilers and refrigeration machines.
- Secondary systems satisfy individual space heating and/or cooling requirements, including air-handling units, duct systems, heating and cooling coils, fan coil units, and radiators.
- Secondary HVAC systems must be designed to offset peak heating and cooling loads.
- The system's "part-load" performance is equally important as its "peak-load" performance.

HVAC DESIGN PROCESS: OWNER'S PROJECT REQUIREMENTS

- The Owner's Project Requirements (OPR) guide the HVAC designer in understanding the specific needs and expectations of the building owner or operator.
- The OPR includes information like desired indoor air quality, temperature and humidity levels, occupancy schedules, energy efficiency goals, and any special requirements or constraints.
- The HVAC designer meets with the building owner or operator to discuss their needs and preferences, asking detailed questions and clarifying any ambiguous or conflicting requirements.

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HVAC DESIGN PROCESS: OWNER'S PROJECT REQUIREMENTS +

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- The designer selects appropriate HVAC equipment and systems to meet the identified requirements, including heating and cooling equipment, ventilation systems, and energy-saving technologies.
- The designer refers back to the OPR throughout the design process to ensure all aspects of the HVAC system align with the owner's expectations.
- Effective communication and attention to detail are key to a successful HVAC design.

DESIGN SIMULATION SOFTWARE ELEMENTS

- Design simulation software requires a user interface, a method of creating or receiving 3D geometry, and an engine.
- A graphical user interface (GUI) is the look and feel of the software, allowing the simulator to input and change parameters.
- GUIs detect thermal zones and material properties from 3D software and can locate grids of sensors within base 3D geometry.
- GUIs suggest design alternatives based on climates, typologies, and simulation results, but are not a substitute for architectural skill, knowledge, and research.

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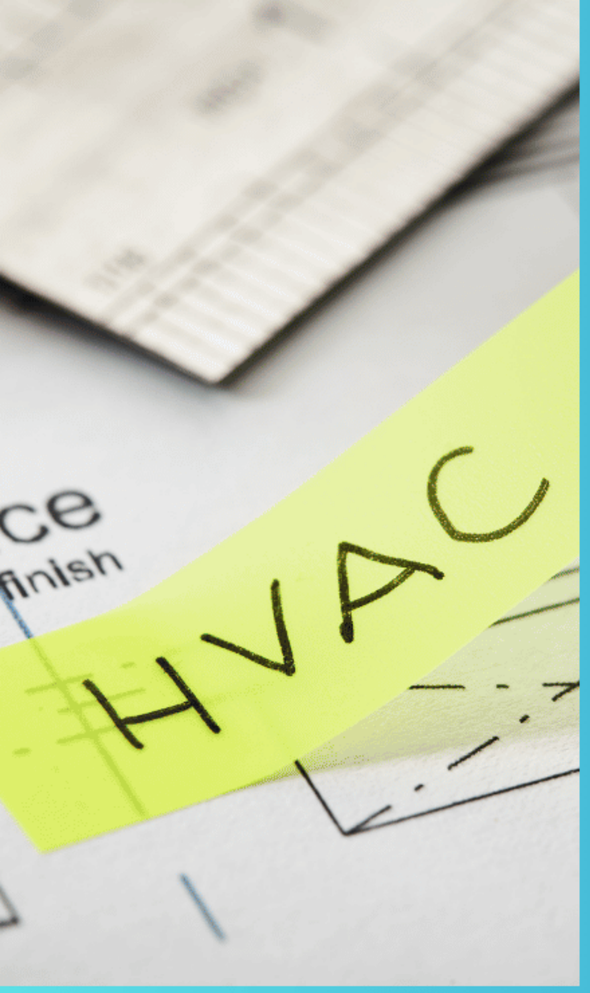
HVAC DESIGN AND COMPLIANCE

- Importance of adhering to codes and standards in HVAC design.
- International Mechanical Code (IMC) sets minimum requirements for HVAC systems.
- ASHRAE and NFPA provide guidelines for HVAC design, energy efficiency, and fire safety.
- ASHRAE Standard 90.1 outlines energy efficiency requirements for HVAC systems.
- Detailed construction documents specify all components, materials, and installation requirements.
- Compliance ensures safe, efficient, and reliable systems.
- Ensures projects meet regulatory requirements and provide comfort and safety for building occupants.

Key ASHRAE Standards

Standard	Topic	Partners
90.1	Energy Conservation Except Low-Rise Residential	IES
189.1	High Performance Green Building Design	USBGC, IES
55	Thermal Comfort	
62.1	Ventilation & IAQ	
180	HVAC System Maintenance	

ASHRAE'S ROLE IN BUILDING DESIGN AND CONSTRUCTION



- ASHRAE is a professional organization that sets standards for the design and construction of HVAC systems.
- ASHRAE 90.1 provides minimum requirements for energy-efficient building design, covering building envelope, lighting systems, HVAC systems, and water heating systems.
- Buildings designed with ASHRAE 90.1 should be well-insulated and airtight, and energy-efficient lighting and HVAC equipment should be selected.
- ASHRAE 62.1 sets minimum ventilation requirements for indoor air quality, ensuring a healthy indoor environment and preventing the buildup of pollutants and contaminants.
- Adherence to ASHRAE standards ensures the highest level of quality in building design, making buildings comfortable, energy-efficient, and safe for occupants.

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CONTACT US

+91 6363032722

info@beyondsmartcities.in

learn.beyondsmartcities.in

#55,HMR Layout ,Bengaluru ,India

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