

DCT DATA CENTER ESSENTIALS

Power & Cooling

Course Code: DCT-DC-ECP

Duration: 1 Day

Data Center Essentials

Overview:

Data centers play such significant roles in our business and personal lives, yet not many people really know what they are. Often referred to as “the cloud” where our data is stored and processed, they are much more than this; they power the internet giving us the ability to pay bills online, access our emails, obtain money from ATM machines, watch movies, communicate around the world and to carry on what is now considered a normal, fiercely technological lifestyle.

This program has been designed to help de-mystify the complex world of data centers. It provides an overview of what data centers are, what they do and why we need them. Key aspects relating to basic design and design philosophies are also examined and the essential considerations of data center management such as operational processes, energy management and facility management are explored along with their relationships to overall business strategy.

Target Audience:

This program has been designed for individuals who are either new to the data centre sector (technicians with limited experience or exposure to data centre facilities) or for those who sell products and services to the data centre sector.

Objectives:

- Different factors drive the need for a data center:
- Driving factors for a data center
- Data center standards
- Data center availability models and cons

Pre-requisite

- There are no specific pre-requisites for this program however some awareness of the data centre industry would be advantageous.

Course Outline

MANAGING A DATA CENTER

For a data center to be effective and efficient in its operations, management is key, consider:

- Regulations, best practices, and operational processes
- Change management processes -MAC's.
- Efficient & efficient energy management
- Commissioning & decommissioning processes
- Information Technology & physical security management

FACTORS ENHANCING DEPENDABILITY OF A DATA CENTER

- Ability to be relied upon
- Ability to be available as and when needed.
- Duplication of components
- Classification of data center - Tier levels

MAIN COMPONENTS OF DATA CENTER

- I.T components
- Power components
- Cooling components
- Auxiliary components – fire, security, BAS

DATA CENTER ACTIVE EQUIPMENTS SPACES

- Data center spaces
- Recommended Layouts
- Space cleaning
- Approach to commissioning

MANAGING DATA CENTER SUPPORTING SPACES

- Cooling system spaces
- Power system spaces
- Fire protection spaces
- Network infrastructure spaces
- General offices & security spaces

MANAGING DATA CENTER SECURITY, SAFETY, NETWORK & I.T

- Safety precaution measures
- Managing Security
- Managing Fire protection
- Managing network
- Managing I.T infrastructure

DCT DATA CENTER ESSENTIALS

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Course Code: DCT-DC-ECP

Data Center Power

Duration: 2 Days

Overview:

The DCT Data Center Power course dives more deeply into the electrical and power systems and components that support data centers. With data centers using about 5% of the world's energy and growing, these power systems are ever-expanding and improving. The Course covers the many aspects of the most typical electrical systems and equipment for data centers, including terminology, standards, acronyms, operation, efficiency, and more.

Target Audience:

- Architects
- Engineering design professionals
- Facilities operations
- Contractors
- Technicians
- Electrical engineers, technicians, operators

Objectives:

- Introduction to data center electrical and power systems.
- Redundancy concepts for electrical distribution and equipment.
- Understanding of electrical equipment, systems, and controls
- How differing priorities and data center types change the electrical design

Pre-requisite

- Basic understanding of data centers, layouts, and common terms.

Course Outline (Includes DCT Essentials)

1. Introduction to Data Center
2. Data center Power Requirements
3. Power units - VA, W and VAR - Power Triangle
4. DC and AC systems power supply systems
5. Power flow in Data Center and Mission Critical Systems
6. Sizing of Data Center Power & Critical Systems
7. Electrical Codes and Standards for Data Centers
8. Power Topologies - single phase vs three phase
9. & AC and DC Power Supply
10. Sources of Electrical Power - Gensets, Utility, Solar, Nuclear etc
11. Electrical Conductors, Cables, Cable trays and conduits
12. Types of Cables and Conductors
13. Sizing of Data Center cables and conductors
14. Cables trays and cable trunkings
15. Cable conduits - PVC and Metallic
16. Power Protection Devices
17. Circuit breakers, Fuses, Relays, Isolators, Switches sizing
18. Voltage Regulation and Stabilization devices
19. Line diagrams and electrical power layout drawings
20. Lightning Arrestor
21. Power Distribution
22. Power Distribution in data center
23. Switch room Switch gear and devices
24. Distribution Panels and Boards
25. Critical vs Raw power distribution standards
26. Floor vs Overhead Power Distribution
27. Rack Power Distribution - PDUs
28. EPO Guidelines and Layout
29. Transformers
30. ATS and MBS systems
31. Power factor correction systems & Surge Suppression systems
32. PUE
33. Data Center energy efficiency and power efficiency
34. Measuring, Monitoring & Routine Checks
35. Trends in Data Center Power Systems
36. Standby Power Systems
37. UPS systems

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Course Outline (Includes DCT Essentials)

- 37. UPS systems
- 38. What is a UPS system?
- 39. Types of UPS system
- 40. Sizing of UPS systems
- 41. UPS Components: Batteries , UPS Room, SNMP etc
- 42. UPS Configurations - Parallel and Eco Modes
- 43. Redundancy Systems and Topologies N, N+1, 2(N+1)
- 44. Generators
- 45. Generators room specifications
- 46. Fuel Management
- 47. Earthing, and Grounding Bonding
- 48. Lighting
- 49. Operation and Maintenance of Power Equipments
- 50. Electrical system maintenance on the following - UPS, Batteries, PDUs, Transformers, Switchboards, Switchgears,
- 51. SNMP and IoT in DC Maintenance

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Data Center Cooling

Duration: 2 Days

Overview

The DCT Data Center Cooling course, covers the mechanical cooling systems that support data centers and prevent them from overheating. As the data center power and density has increased every year, the need to remove the heat generated has become a more important factor for the design and operation of the facility.

Target Audience:

- Architects
- Engineering design professionals
- Facilities operations
- Contractors
- Technicians
- Mechanical engineers

Objectives:

- Introduction to data center cooling and mechanical systems.
- Redundancy concepts for mechanical and cooling systems.
- Understanding of mechanical & plumbing systems and control.
- How differing priorities, locations, and more change the cooling design.

Pre-requisite

- Basic understanding of data centers, layouts, and common terms.

Course Outline (Includes DCT Essentials)

- Introduction: Concepts, definitions
- The need for cooling
- Heat Transfer
- Heat gains
- Temperature and humidity requirements
- Ventilation rates
- Air quality
- Cooling loads
- HVAC equipment
- Data center cooling systems
- Basics of how cooling systems work
- operating conditions - the typical mechanical terms, cooling operations, and redundancy levels
- Air cooling solutions - air cooling and operating parameters for typical datacenters
- Computational Fluid Dynamics - what it is, how these tools are used, and what to look for when analyzing a data center flow model
- Types of Datacenter cooling systems
- Air Cooling
- Direct Liquid Cooling
- Cooling Equipment types
- Direct Expansion Systems relationship
- Chiller based cooling
- Air management and control systems
- Raised Floor cooling
- Non-raised floor cooling
- Aisle containment
- Hot aisle
- Cold aisle
- Operating the data center cooling systems
- Reliability and Risk mitigation
- Recommendations and Best practices
- Measuring, monitoring, and routine checks
- HVAC efficiency and Power Usage Effectiveness (PUE) relationship