DatacenterTrainingServices
A division of DatacenterDynamics

CDCDP™ Certified Data Centre Design Professional

Certified Data CentreDesign (CDCD™) Page 1

3-day course

Course Overview

This course, held over three days, is aimed at teaching best practice design principles for the design, construction and operation of computer rooms and data centers. It consists of a number of subsections that address the fundamental requirements of a successful design such as electrical power supply, air conditioning and data cabling.

Best practice is achieved by bringing together the requirements of British Building Regulations, Statutory Instruments, EC Directives and British and European standards. Several case studies are considered to see examples of good, and bad, practice in real situations. The unit is principally assessed by an ongoing design exercise that lead the students through all the steps needed to arrive at a baseline design of a modern data center.

All the Data Center Courses have been fully updated to take into account the requirements of the 2009 EU Code of Conduct on Data Centers Energy Efficiency.

1 Introduction
- TIA 942 and European standards
- TIA 942 spaces and hierarchical model
- Example projects and costings
- Size of market
- Intro to Uptime Model of Tiering

2 Facilities and location
- TIA 942 recommendations for location, size, heights, floor loading, lighting and raised floors
- Audits of designs
- Emergency lighting and signage
- Services and facilities

3 Raised floor design
- TIA 942 recommendations
- (PSA) Method of Building Performance Specification 'Platform Floors (Raised Access Floors)', MOB PF2 PS
- BS EN 12825:2001
- Calculating floor heights
- Ramps and the Disability Discrimination Act
- Earthing and bonding

4 Rack location
- TIA 942 and ASHRAE recommendations
- Hot aisle/cold aisle model
- 7-tile pitch model
- Underfloor plenum air distribution
- What makes a rack a server rack?
- 4-post and 2-post systems
- Using tools like Visio and Netzoom

5 Power supplies
- Some electrical principles, volts, amps, watts, kVA, power factor and three phase
- Electrical distribution codes
- Power density
- TIA 942 requirements
- TIA 942 Tiers
- The meaning of N, N+1 2(N+1) etc
- Estimating power requirements
- Uninterruptible Power Supply (UPS) options
- Power distribution to and in a rack
- Power Distribution Units

6 Cooling
- Basics of air conditioning principles
- Comfort vs. precision air conditioning
- TIA 942 requirements
- Fresh air and ventilation requirements
- Power consumption of air conditioning
- Air conditioning options
- Underfloor plenum approach
- Hot aisle/cold aisle model
- The limiting factors for free cooling of racks via floor vents
- Fan assisted floor vents and fan assisted racks
- Min and max throw distances for underfloor air
- Side to side cooling
- Upgrade paths
- Chilled water racks, CO2, Passive Air
- Testing
- TIA 942 Tiering for HVAC

7 Earthing
- Applicable standards
- The terminology of earthing, grounding and bonding
- Equipotential bonding
- Functional earths
- TIA 942 requirements
- The Signal Reference Grid (SRG)
- SRG spacing and connection

8 Cable containment
- Applicable standards
- Separation of power and data cables to EN 50174 and BS 6701 and TIA 942
- Types of conduit, trunking, tray etc available
- Fill rules
- Cable management in and to a rack
- Fire stopping
- Earthing and bonding

9 Fire design
- Fire detection and suppression requirements of TIA 942
- Pre-action sprinkler system
- Approved gaseous fire suppression chemicals (clean agent)
- Smoke detector selection
- Aspirating smoke detectors (VESDA)
- BS 5839 requirements for fire detection
- 'L' and 'M' categories
- Siting of fire/smoke detectors
- NFPA 75 requirements
- Cables for smoke detectors and alarm systems

10 Fire – cabling
- Fuel loads of different cable materials
- American building codes
- The riser and plenum grade of cable
- NFPA 262
- Limited Combustible cables
- European Directives
- The Construction Products Directive
- European fire tests and standards
- Insurance perspectives
- Comparing US and European specs
- Relative costs

11 Copper cabling components
- 10GBASE-T and CAT6A standards
- Manufacturers' offerings for CAT6A
- Screened v unscreened cables
- Horizontal, vertical and angled patchpanels

12 Optical cabling components
- Optical connectors, past and present
- Optical patch panels and accessories
- Types of optical cable, loose tube and tight buffered

13 Preterminated cabling
- Advantages and disadvantages of preterminating cables
- The MPO and MTP ribbon connector
- Some manufacturers' examples

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14 Optical systems
- The OM1, OM2, OM3, OS1 model
- The OF300, OF500 and OF2000 model
- Optical component loss and link power budgets
- Ethernet's cable requirements
- 10GBASE-xyz cable requirements
- 10GBASE-xyz transmission distances
- Premium fibres
- How many connectors allowed in a channel?
- 10GBASE-LRM
- ISO 11801:2002 requirements for optical systems

15 Cable system design
- The 2,3 and 4 connector model from ISO 11801
- Intelligent patching
- The hierarchical structure of a data center
- LAN and SAN layouts
- Differences between TIA 942 and EN 50173-5 terminology
- TIA 942 topology

16 Security, access control, CCTV and BMS
- Fire detection and monitoring
- Security and access control
- CCTV
- Building management systems
- TIA 942 requirements for security and monitoring
- IP networks that integrate security and monitoring
- Rack level monitoring systems

17 Project management issues
- Safety audits
- Health & safety issues
- Construction Design and Management regulations
- TIA 942 redundancy and Tiering in more details

18 Data Center Networks
- LAN, SAN, NAS, WAN
- Networking Protocols eg Ethernet, IP, FC, InfiniBand

75% Theory 25% Exercise

Qualification
BTEC Advanced Award in Practical Data Center Design
BICSI CECs: 21 RCDD, 21 ITS, 21 NTS
CNet Certificate

Who Should Attend
IT Managers, Project Managers, Facilities Managers
Designers and Consultants

Related Training
CDCDP™ - Certified Data Center Design Professional
CDCT™ - Certified Data Center Technician
Data Center Power
Data Center Cooling
Data Center Management
RCDD

Course Objectives
This three day course is aimed at teaching best practice design principles for the design, construction and operation of computer rooms and data centers. It consists of a number of subsections that address the fundamental requirements of a successful design

Prerequisites
Some knowledge of basic IT and electrical engineering skills

BTEC from Edexcel Bicsi™

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria for pass *To achieve each outcome a learner must demonstrate the ability to:*
1. Use and implement the concepts of data center design in terms of standards TIA 942 (Telecommunications Infrastructure Standard for Data Centers), European standards and the Uptime Institute's Tier Performance Standards.	Create a design of a data center that satisfies TIA 942, EN 50174, BS 6701and the Uptime Institute's Tier Performance Standards.
2. Describe the principles of and calculate heating, ventilating and air conditioning (HVAC) requirements and explain and calculate power supply principles and power requirements.	Give correct answers to Questions 1 to 45 of the end test compared to the model answers. Create a design of a data center including the calculation of HVAC and power supply requirements.
3. Explain structured cabling concepts, copper cabling components, optical cabling components and optical systems and cable system design.	Give correct answers to Questions 1 to 45 of the end test compared to the model answers. Create a design of a data center explaining the structured cabling installation and design requirements.