Content Community Connection

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Power System Training

Course details: https://electricityforum.com/electrical-training/power-system-training

COURSE DATES AND TIMES

Our Power System Training Course offers students a comprehensive look into how to design a proper functioning electric power industrial distribution system that is vital to safety, maintenance, troubleshooting and the efficient operation of a modern industrial plant.

A robust and well designed power distribution system includes high voltage utility tie circuit breakers, main transformers, medium voltage switchgear, distribution transformers, motor control centers, electric motors, variable speed drives, etc. Our in-depth course is designed to demonstrate all aspects of proper industrial power system design, including system planning, equipment selection, specification and application, system grounding, protection and conformity with electrical code requirements, etc. Typical one-line and relaying diagrams will be discussed for various applications.

COURSE OBJECTIVES

Learn industrial power systems design principals, planning and analysis. Our Power System Training Course is designed for electrical power engineers to review, reinforce and refresh their knowledge of power system design, operation and troubleshooting.

Advance your knowledge and skills in system planning, equipment selection, specification and application. Learn and understand important aspects of power distribution system design steps. Improve your knowledge of how to operate your industrial power system efficiently, securely and safely.

These Power System Training Course will provide a systematic approach to design of a new Electrical Power System or retrofit an obsolete system, encompassing distribution, transformers, MCC, panel boards, lighting loads and manufacturing plant electrical system.

Our Power System Training Course Will Teach Students How To:

- Design electrical power systems more efficiently Better select and size power system components Understand the fundamentals of short circuit studies Understand the basics of coordination studies Calculate overcurrent device settings Understand power system design and analysis

- Provide the optimum sizing of the Electrical System for a specific Application to obtain maximum performance and reliability
- Select the best electrical equipment for retrofitting an old system
- Design electrical power systems more efficiently
- Better select and size power system components
- Understand the fundamentals of short circuit studies
- Understand the basics of coordination studies
- Calculate overcurrent device settings
- Understand power system design and analysis

WHO SHOULD ATTEND

Electrical Engineers, technicians and technologists in the industrial,commercial, and institutions, consulting electrical engineers, and electric utilities who involved in power system design. This course is also appropriate for power system operation and maintenance personnel who require knowledge of electrical system design techniques.

STUDENTS RECEIVE

- This Course Includes Our Latest Electrical Handbook!! (Value $20)
- **$100 Coupon** Toward any Future Electricity Forum Event (Restrictions Apply)
- 1.2 Continuing Education Unit (CEU) Credits (12 Professional Development Hours)
- **FREE** Magazine Subscription (Value $50.00)
- Forum Presentations in Paper Format

COURSE OUTLINE

Power System Training Course

DAY ONE

Session 1: Introduction to Industrial/Commercial/Institutional Power Systems

- Power System Fundamentals
- Power Flow from Generation to industrial power system
- Electrical Equipment Ratings
- Sustainability of the power flow in today's industrial Environment
- Adapting the power system for future requirements
- Codes and standards for Industrial/Commercial/Institutional electrical power systems

Session 2: Major Equipment and Components of an Industrial Power System

- Writing a design requirement for major electrical power equipment
- Example of switchgear configurations for different power and voltage levels
- Customer owned substation design requirements
- Industrial substation design considerations and selection of configuration based on reliability
- Electrical power availability for different design topologies
- How to select and size an electrical power generator
- Major considerations for selection of power transformers
- Properly sizing and selecting circuit breakers and switchgear

Session 3: Major implication of the evolution of the Solid State Technology on Equipment Selection

Session 4: Industrial Electrical Substation Structures and Arrangements

- Major Substation Components
- Typical One line of a Substation
- Selecting the required configuration to achieve the design requirements performance parameters
- Operability, Maintainability, Constructability of a New Substation
- Procedures to maintain the Power Equipment
- OEM Maintenance Requirements, example of a circuit breaker

Session 5: Typical Maintenance issues

- Power Factor Correction Units
- Protection, Monitoring and Control Systems
- Substation Grounding Key Points and Considerations
- Power cables key point for selection and installation

DAY TWO

Session 6: Electrical System Design for Industrial/Commercial/Institutional Buildings

- Low Voltage Main Input Feeder to facilities
- Major Building loads: HVAC Units; illumination; fire protection and detection and process power
- Spare capacity and calculations required before detailed design start
- Separating static and dynamic loads: MCC; Distribution Panels and Switchgear
- Tap changers to compensate for low power factor
- Power Factor Compensation requirements to eliminate voltage sags
- Providing Backup power for critical loads
- Backup Generators; UPS Systems; Static Switches and Power Conditioning

- Using VFD for low inrush and how to minimize equipment stress
- ATS assessment and considerations; 3 or 4 Line ATS
- Surge Protection for sensitive electronic equipment
- Selecting Motor Control Centers and Distribution Panels for correct loads
- Creating artificial Neutrals if required
- Selecting proper transformers for the load type
- Fire Alarm Systems - electrical power requirements
- IT LAN and Communication System Backup Power requirements
- Building Automation System Monitoring and Control
- Arc flash ratings for major electrical distribution panels
- Building Grounding and lightning protection
- Avoiding grounding loops
- Standards and Codes applicable to building electrical systems

Session 7: Protection and Monitoring of the Backup Generator Units

- Backup generation systems overview
- Typical protection for electrical power generators
- Control of Electrical Power Generators, the AVR System, Isochronous and Drooping
- Governor Control Units, selection and design recommendations
- Integrated Protection of electrical power generators
- Characteristics of electrical generators under stress and step load condition
- Vibration Monitoring, avoiding resonant effects
- SCADA systems for large transmission networks
- Grounding considerations for generator units

Session 8: Electrical Loads

- Static and Dynamic Loads, e.g. Electrical Motors
- Short circuit rating and terminology
- Balanced fault calculation
- Overcurrent coordination fundamentals
- Protective devices time/current characteristics and protective relays

Session 9: Unbalanced Systems and what harm may cause in Major Electrical Equipment

- Considerations for loads with high inrush power and non-linear magnetic cores
- UPS loads feed from backup generators via ATS - Case study
- How to avid current circulation due to grounding loops
- Bonding need to be assess, may help or may not
- What helps in electrical systems to avoid EMI
- Case Study of a high EMI illumination system

Session 10: Tools to consider for the Selection and configuration of Electrical Power Systems

- Analytical approach of a Power System design
- Available power system design software, category, classification and level of trust
- Requirements of the software design tools for an application
- Standards incorporated in software tools
- Data validation for modeling a power system
- Output Validation of a Simulation using Software Tools
- Example of a power system calculation
- Grounding and grounding interconnections
- Power Flow - structural design correlation
- Testing, calibration and instrumentation considerations

COURSE TIMETABLE

Both days:
Start: 8:00 a.m.
Coffee Break: 10:00 a.m.
Lunch: 12:00 noon
Restart: 1:15 p.m.
Finish: 4:30 p.m.