

NEW
TWO-DAY
CONTENT

UPS & BATTERY SYSTEMS

Design, Application, Testing
and Maintenance Methods
for Industrial, Commercial and
Institutional Facilities

LOS ANGELES, CA
OCTOBER 6-7, 2014

SAN FRANCISCO, CA
OCTOBER 8-9, 2014



WWW.ELECTRICITYFORUM.COM/USA/UPS-SYSTEM-TRAINING.HTML

YOU WILL LEARN:

- Understand the functionality of different UPS Types
- Size the UPS and battery bank for an application
- Recommend solution for a practical implementation
- Perform maintenance and parameter settings on a UPS
- Perform battery maintenance and results interpretation
- Design a complete UPS system and recommend the proper grounding solution

BONUS FEATURES

- Digital Our Power Quality/UPS Handbook Vol. 12
- \$100 Coupon Toward any Future 2014-15 Electricity Forum Event (Restrictions Apply)
- FREE Digital Magazine Subscription
- Forum Presentations in Paper Format
- 1.4 CEU Credits and Certificate of Completion

2-DAY COURSE

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Details Pg 3

ARE YOUR CRITICAL POWER APPLICATIONS safe??

This two-day technical course begins with a discussion of the need for UPS systems. It then covers the relative comparisons between various UPS topologies and their modes of operation. The batteries used for UPS systems are also covered. How a battery works, its maintenance, safety and testing are thoroughly discussed.

This two-day UPS system training course is designed to assist organizations to identify the many savings to be gained from proper UPS system design, application, testing and maintenance.

Some working knowledge of basic electrical engineering principles is required, although this will be reviewed at the beginning of the course. Real-life experience in working with batteries and UPS systems will enable the course to be placed in context.

WHO SHOULD ATTEND

- Industrial, Commercial, Institutional Electrical Engineers
- Electrical Maintenance Tradespeople & Technicians
- Instrumentation and Control Engineers
- Power System Protection and Control Engineers
- Consulting Electrical Engineers
- Building Service Designers
- Data Systems Planners and Managers
- Other electrical personnel involved in the maintenance industrial, commercial and institutional power systems

PROGRAM OUTLINE

DAY ONE

UPS System Design, Application, Testing and Maintenance

1. Introduction of UPS & Battery Systems

- UPS major function
- Battery bank structure and function

2. Legacy UPS

- Rotary UPS and their applications
- Line UPS advantage and disadvantage
- Ferro Resonant UPS, characteristics and performance

3. UPS main parts and function

- Structure of a UPS
- Interconnections of the main parts and Cabinets of the UPS
- Interconnection to the Battery Bank

4. Power Electronic Components

- Power Diodes
- Power thyristor-SCR
- IGBT-insulated Gate Bipolar transistor

5. Rectifier/Charger Structure and protection and control

- Full bridge and half bridge rectifier
- Forced commutation rectifier-ACTIVE FRONT END
- Input Filter and Transformer to the Rectifier/Charger

6. DC Bus protection and size

- DC Bus structure and construction
- DC Bus Filters
- Minimum Capacity required on the DC Bus to maintain Functionality

7. Battery CB and protection

- DC Circuit breaker types
- Connecting the DC Breaker to minimized ARC Flash
- Battery Links

8. Types of battery heat Hydrogen and ventilation requirements

- Types of Battery used in a UPS
- Internal versus external battery bank
- Battery Heat generation
- Lead Acid Battery Hydrogen generation

9. Lack start requirements for sizing an UPS base on Load Profile

- Calculation and estimation of a load profile
- Example of an battery bank calculation for a black start application
- ETAP example for UPS, Battery and Load Calculation

10. Physical Arrangement of the external battery bank

- Battery arrangement and battery link selections
- Requirements for bank separation for testing to minimize energy level

11. Testing and maintenance of the battery bank

- Testing and maintenance requirements of the battery bank
- Battery parameters reading for testing
- Predictive maintenance for Battery
- Preventing the Battery Aging

12. Constant Current versus constant voltage charging of a battery bank

- Charging the battery bank, using constant voltage
- Charging the battery bank using constant current
- ARC Flash protection
- Fire Protection for high Energy storage battery bank

DAY TWO

13. Inverter structure and protection

- IGBT based inverter construction
- Minimizing the leakage current of the inverter buss bars
- IGBT protection: ACTIVE and Passive Snubbers; Analog protection loops with HALL Effect Sensors

14. Legacy resonant inverters

- Design and Construction of the Resonant inverters
- Why resonant Inverters are obsolete

15. PWM inverters protection and control

- Type of PWM modulation used in the Control of the today inverters
- Elimination of Total Harmonic Distortion
- Output Filters and transformers



16. Internal Bypass Switch

- Requirements and credentials of the internal bypass switch
- Advantage and disadvantage of a solid state bypass switch-leakage current

17. Output Switch or Circuit breaker, advantage and disadvantage

18. Supplying the Bypass switch from an alternate bus

- Synchronization requirements for the bypass line
- Supplying the bypass from a Backup Generator

19. Requirements for UPS Control

- Charger Control and Parameters
- Inverter control and parameters
- Bypass Switch control and Parameters
- EMI possible problems, mitigation solutions and elimination

20. Dynamic and Step loads applied to the UPS output

- Ups behaviour with dynamic loads
- Four quadrant operation
- Internal Alarms and Faults

21. Cooling requirements

- Forced Cooling of the Inverter
- Enclosure cooling
- Maintenance requirements and FAN accessibility

22. Enclosure requirements of the UPS based on application and heat dissipation

- NEMA Standard requirement for UPS enclosure for different applications

23. Paralleling the output inverters for large application

- Conditions and solutions for paralleling UPS Outputs
- Synchronization of the UPS Outputs

- Current circulation between two UPS if the load is unbalanced

24. HMI and Log Files for typical UPS

- Internal parameters of the UPS typical settings, e.g. charging current; float voltage; equalize voltage; minimum battery voltage
- Local Annunciations and Alarms
- Remote annunciations and Alarms, interconnections with the LAN and BAS System
- Case study of an error detected by CPU and stored in the EEPROM of the UPS Control

25. Internal typical protection and external protection of the UPS

- IEEE requirements for internal and external protection of the UPS
- ETAP Modeling and Protection Coordination of the UPS

26. UPS grounding methods

- Grounding systems of the UPS
- Recommendations for grounding of an UPS to avoid malfunction

27. Maintenance requirements for UPS System and Battery Bank

- Battery Bank capacity test
- Temperature and aging factors

course instructor

Peter Ho, P. Eng.

Schneider Electric

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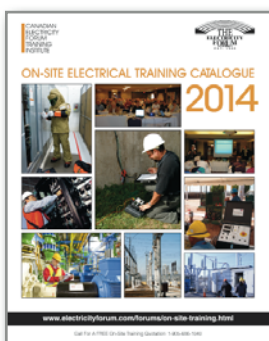
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WHEN & WHERE

(Please check the date/location where you want to attend the course)

UPS AND BATTERY SYSTEMSDESIGN, APPLICATION, TESTING AND
MAINTENANCE METHODS FOR INDUSTRIAL,
COMMERCIAL AND INSTITUTIONAL FACILITIES**Los Angeles, CA - October 6-7, 2014**Four Points by Sheraton LAX Airport Hotel
9750 Airport Blvd., Tel: 310-645-4600**San Francisco, CA - October 8-9, 2014**Holiday Inn Express San Francisco-Airport South
1250 Bayshore Hwy, Burlingame, CA
Tel: 650-347-2381**REGISTRATION FEES**The registration fee to attend the two-day UPS
And Battery Systems training course is**\$699.00.**The fee includes Course presentation materials,
refreshments and lunch.**ACT NOW!****Limited Seating! Register Today!**