



# ELECTRICAL **GENERATORS** & STANDBY POWER SYSTEMS TRAINING

- SAN DIEGO, CA** ■ MAY 20-21, 2014
- LOS ANGELES, CA** ■ MAY 22-23, 2014
- SAN FRANCISCO, CA** ■ MAY 27-28, 2014
- SACRAMENTO, CA** ■ MAY 29-30, 2014



From portable electrical generators to standby power cogeneration units - from the facility manager to the maintenance technician - this backup power generation course is designed for anyone involved with electrical generation equipment in their plant or facility.

[www.electricityforum.com/usa/emergency-generator-training.html](http://www.electricityforum.com/usa/emergency-generator-training.html)

#### WHAT YOU WILL LEARN

Specific requirements and recommendations for the installation, operation and maintenance of backup power generation equipment Where to find critical information from professional sources such as the EGSA, IEEE, NFPA, NECA and NETA.

What backup system and emergency plan is best suited for your critical power system.

- How to read and understand vendor drawings and technical information for generators.
- How and when to successfully test onsite electrical generator equipment.
- How to work with parallel energy sources synchronizing procedures and load sharing.
- How to troubleshoot using a logical, systematic approach to isolate and repair generator problems.

#### BONUS FEATURES

- UPS Electrical Handbook - Value \$20 (details inside)
- \$100 Coupon Toward any Future 2014 Electricity Forum Event (Restrictions Apply)
- Forum Presentations in Paper Format
- Refreshments
- Lunch Provided

**2-DAY COURSE**

**\$699**

**ON-SITE TRAINING  
AVAILABLE  
FREE  
QUOTATION**

## COURSE DESCRIPTION

In today's industrial, commercial and institutional power systems environment, nothing can be taken for granted. Severe weather can cause power outages for a few seconds or several days. Explosions and fire can sever lines to your facility. Sometimes we simply experience blackouts because the utility power grid is overloaded. Critical power situations demand 100 per cent power, 100 per cent of the time. Whatever the cause, lack of electricity at your facility can be devastating, whether you are responsible for a power system in a hospital, a treatment plant providing water for your community, or a banking or telecommunications network facility which must deliver a service uninterrupted.

During this course, you will learn what you can do, and should do with standby electrical generators and emergency power generation systems, to make sure your facility will keep running even if the electricity to your plant or facility doesn't.

## PROGRAM OUTLINE

### DAY ONE

#### Theory of Backup Generators:

##### 1. Engine Cycles: Brayton and Otto: Inlet; Compression; Combustion; Exhaust

- Brayton Cycle explained
- OTTO cycle explained
- Inlet function and design
- Compression Function and design
- Combustion Function and design
- Exhaust Function and design

##### 2. Combustion-Burner Construction and Function

- Combustion construction and function
- Burner construction and function

##### 3. Compressors: Axial, Single Rotor; Multiple Stage; Centrifugal

- Type of Compressors
- Axial compressor Single Stage Construction and function
- Axial compressor Multiple Stage Construction and function
- Centrifugal Compressor

##### 4. Gas Turbines: Example: Brayton Model: Open and Closed Cycle

- Example of a gas turbine, Brayton Model
- Open and close Cycle of Brayton Model

##### 5. Power Turbines

- Two Spool Turbine
- Power Turbine Blade
- Power Turbine Inlet Compressor Burner and Nozzle

##### 6. Engines: Turbojet; Turboprop; Turbofan; Turbohaft; Ramjet

- Design Functions and parameters of Turbojet Engine
- Design Functions and parameters of Turboprop Engine
- Design Functions and parameters of Turbohaft Engine
- Design Functions and parameters of Turbojet Ramjet

##### 7. Governor Control, Block Diagram

- Governor Control loop Block diagram
- Fuel Modulation and Speed Control
- Vibration Amortization and Control

##### 8. Compressor Surge and Compressor Stall Condition

- Compressor Surge Condition explained
- Compressor Stall Condition explained

##### 9. Types of Excitation - Automatic Voltage Regulator

- Automatic voltage regulator functions; parameters; settings and alarms
- Static generator exciter-SCR based
- Rotating Engine with diode rectifier exciter

##### 10. Generator Controller Function Local and Remote Commands, Controller Settings And Alarms

- Implementation of NFPA 110 LEVEL 1 REQUIREMENTS
- IMPLEMENTATION OF NFPA 99 AND NEC REQUIREMENTS
- IMPLEMENTATION OF UL 508 AND NEC

##### 11. Trip Points, and Shut Down Conditions

- Emergency Stop
- High coolant temperature
- High Oil Temperature
- Controller Internal Fault
- Locked Rotor Fault
- Low Coolant Level
- Low oil Level
- Low oil pressure
- High Generator winding temperature
- Master switch error
- Overcrank
- Overspeed
- Generator overvoltage
- Generator undervoltage
- Generator overfrequency
- Generator underfrequency
- Coolant signal loss
- Oil pressure signal loss

## WHO SHOULD ATTEND

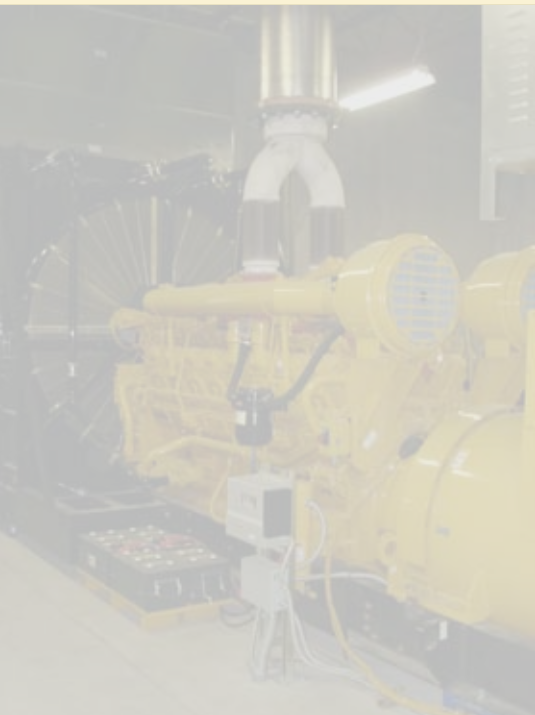
This course is designed for anyone involved with emergency onsite power generation systems or working in any facility where an emergency power supply is absolutely critical. In this seminar, students are invited to attend from a wide variety of industries, skill-levels, company sizes, and backgrounds. If you're not sure you'll fit in, or will benefit from this class, don't worry - you will - as long as you have an interest in onsite power generators or UPS systems! Students who will benefit from this course include:

All Electrical Maintenance Personnel in:

- Industrial Facilities and Manufacturing Plants
- Government Buildings
- Telecommunications and Banking Systems
- ISPs
- Commercial Office Buildings
- Hospitals and Critical Medical Facilities
- Waste Water Facilities
- Water Treatment Facilities
- Airports
- Pharmaceutical Labs
- Colleges and Universities

Including:

- Plant Electrical Engineers
- Electrical Maintenance Managers
- Electrical Maintenance Technicians
- Facility/Plant Managers
- Consulting Electrical Engineers
- Emergency Preparedness Compliance Officers
- Mechanics
- Building Engineers
- Multi-craft & Cross Training Personnel
- Any person needing a basic course in emergency power and standby electrical generators.



## 12. Power Transfer from Utility to Backup Generator and from Backup Generator to Utility, Auto and Manual

- Insolated neutral transfer (3 phase only)
- Neutral Transfer

## 13. Generator Protection: IEEE 242 & IEEE 37.102

- Requirements for Generator Protection: Short circuit; Unbalance Voltage; Reverse Power; Loss of Excitation

## 14. Generator Grounding and Bonding

- Solid grounding
- High Impedance grounding
- Safety Bonding requirements

## 15. Generator Requirements Having UPS Load

- Timing and Synchronization of the UPS frequency connected to a Backup generator
- Event Flow in case of a blackout

## 16. Generator Sizing; Installation and Testing Requirements

- Generator Load Characteristic-Static and Dynamic load to be considered
- Installation requirement, gas emission and safety
- Testing requirements according to IEEE 282-09

## DAY TWO

### 17. Example of a 750KVA/600V BACKUP GENERATOR:

- Example of a Detroit Diesel Generator Engine: 6 cylinder, in line 4 stroke Turbo-charged and intercooled
- Standard Accessories

### 18. Maintenance Activity related to the Engine:

- Replacement of dry type filter with service indicator
- Replacing Lube oil filter
- Replacing Flexible Fuel lines supply and return

- Maintaining: Battery; Charger; Fuel Injection System; Oil Sump and Drain; fuel pump

## 19. Alternator Ratings and Maximum temperatures

- Alternator rating and maximum temperature
- Alternator winding and grounding
- Alternator Bearings Maintenance
- Rotor Winding, brushless design

## 20. Generator Voltage Regulators

- Solid state, 0.25 per cent Regulation
- VOLT/HERTZ Operation; voltage stability and tuning
- Paralleling capability and drooping
- Var and PF control
- Monitoring Parameters:
- Electrical: Voltage; Currents; Frequency; Loading; Power Factor; Duty Level; Battery voltage
- Mechanical: Coolant Temperature; Level; Oil Pressure; Fuel used; Fuel Pressure; Fuel Temperature; Run time, etc

## 21. Operational and Maintenance Records

- Mandatory Testing of backup Generators, IEEE and NFPA
- Application example using service documentation and tuning software

## course instructor

Dr. Eduard Loiczli, P.Eng.  
Senior Electrical Engineer  
The Electricity Forum

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Standby Generators & Emergency Power Systems - Installation, Testing and Maintenance On-Site Training Course quotation directly for your company??  
[www.electricityforum.com/On-Site\\_Training\\_Requests/](http://www.electricityforum.com/On-Site_Training_Requests/)

Our on-site training courses are tailored to meet your company's specific requirements and conducted on your own premises for your employees.

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Electrical on-site training courses are best because they are delivered using the equipment your electrical technicians use every day. This maximizes the educational value of your electrical training investment.

For more information, contact:

Randy Hurst,  
President, The Electricity  
Forum

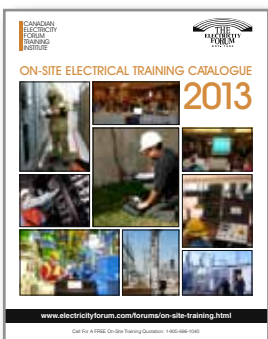
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**REGISTRATION FEES**

The registration fee to attend the two-day Standby Generators & Emergency Power Systems training course is \$699.00. The fee includes Course presentation materials, UPS Electrical Handbook in electronic format, refreshments. Lunch is included.

**WHEN & WHERE**

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

**ELECTRICAL GENERATORS & STANDBY  
EMERGENCY POWER SYSTEM TRAINING**

- San Diego, CA - May 20-21, 2014**  
Holiday Inn San Diego – Bayside  
4875 North Harbour Drive, San Diego, CA 92106  
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- Los Angeles, CA - May 22-23, 2014**  
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- San Francisco, CA - May 27-28, 2014**  
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