Advanced School Modules

Understanding generator systems begins with understanding the alternator, commonly called the generator. This module presents the construction of the generator and its subsystems, operational theory and how to develop a maintenance and prevention plan. (3.5 Hrs)

GENERATOR SET AND CRITICAL POWER SYSTEM CONTROL SYSTEMS

Once the Alternator is combined with a Reciprocating Internal Combustion Engine (RICE) and becomes a generator set, automation is required for safe and reliable operation. This module will examine the control systems of the modern generator set, from the prime mover throttle to the kilowatt output, to maximize operational functionality and flexibility of the complete generator set. Various Control Theories and Modes of Operation, including PID theory for closed loop control systems, the effects of power system faults, the roles of the Dedicated Purpose Controllers, and the Programmable Logic Controller, Base Load, Peak Shaving, Load Management, Grid Support, and Fuel Optimization will be discussed in detail. The module wraps up with a look at industry trends and the effects on the future of the power generator business. We will discuss the Smart Grid and the importance RICE Distributed Generation will be in the grid in the future.

GENERATOR AND SYSTEM PROTECTION

The effects of a catastrophic electrical fault can cause loss of life and cost millions of dollars in damaged equipment and forced outages. During this two part series on protective systems, the student will be presented information on common electrical problems and the solutions most commonly used to minimize or protect equipment from damage. Circuit Breakers, Protective Relays, Current Transformers, and other equipment used to control power systems will be discussed. Positive Sequence, Negative Sequence, and Zero Sequence voltages and currents will be defined, and their importance to the art and science of protective relay application, discussed. Ground Fault Detection and Protection will be discussed and applied to generator protection as well as system protection. We will study commonly utilized protective relays for protection of the engine, the generator, and the complete power system. (3 Hrs)

ADVANCED AUTOMATIC VOLTAGE REGULATORS (AVRs)

This session will provide an understanding of some of the more complex issues associated with controlling the voltage of a generator. It takes the student past the basic understanding of the AVR and into the actual application and commissioning of voltage regulators. Topics include basic automatic voltage regulator function, stability, and response; paralleling generators, load rejection, and their effects on generator set sizing and performance; selecting the right engine and generator for the application and what type of fuels should be recommended; environmental variables; noise and sound attenuation and the associated impact on cost; selecting the right location for the set; and specific installation considerations and requirements, start up and service, and national code relevance and compliance. (3 Hrs)

2. Mechanical Noise covers sources of mechanical noise and their noise signatures; fundamentals of enclosures; and methods of noise reduction and control.

3. Engine Exhaust Noise covers characteristics of raw engine exhaust noise; silencer types and styles; insertion loss performance; design and validation of exhaust systems.

4. Airflow Generated Noise covers characteristics of fan and air exhaust noise and the concept of volume flow, velocity and pressure differential.

5. System Review covers the effects of noise from multiple sources; responsibility for compliance; writing proper noise control specifications and noise measuring techniques. (2 Hrs)

COMMUNICATIONS

This module will include in-depth examination of data communication techniques in modern reciprocating engine powered generator sets. The session will cover generator level data derived from the Generator Set Control, and also engine level data derived from the Engine Control Unit (ECU). Modern communication will be covered, including the hardware variants of RS232, RS485 and TCP/IP. The ECU segment, J1939 CANbus will be discussed. Remote communications techniques, including cellular, satellite, and Ethernet TCP/IP will also be covered. Safety risks and benefits of network-connected generators will also be reviewed. (3 Hrs)

ADVANCED GENERATOR SYSTEMS: SIZING TO SERVICE

This session addresses specific considerations in sizing and installing power systems from the perspective of a design professional or advanced sales and service personnel. Topics include determining a customer’s power requirements; an in-depth explanation of load types; characteristics and sizing; and their effects on generator set sizing and performance; selecting the right engine and generator for the application and what type of fuel should be recommended; environmental variables; noise and sound abatement and the associated impact on cost; selecting the right location for the set; and specific installation considerations and requirements, start up and service, and national code relevance and compliance. (3 Hrs)

The Noise Control module covers a broad and in-depth overview of important sound-related issues and concepts. The module is presented in 5 Sections;

1. Basic Acoustics covers logarithmic nature of hearing and the decibel; the weighting curve; relative loudness and power vs. sound pressure; noise behavior vs. frequency; predicting the effects of distance and reflection of sound; and how to apply the inverse square law.

NOTICE: EGSA reserves the right to change the content, sequencing and any other aspect of the EGSA George Rowley School of On-Site Power Generation at any time and without notice.

Where is the school held?
Schools are held at the individual hotels listed in the brochure. Each attendee is responsible for making his/her hotel reservations to attend a Reciprocating engine powered generator set. You are not required to stay at the hotel; however EGSA negotiates lower rates and added benefits (such as free internet or parking) with the hotels.

What do I need to bring with me to the school?

What do I need to wear to the school?
EGSA George Rowley School of On-Site Power Generation is classroom based schools. The attendees will not physically interact with any equipment while attending the school so business casual is encouraged. We also suggest that you bring a jacket in case the classroom temperature varies.

What is included with my registration fee?

Who are your Instructors?
Instructors for the EGSA George Rowley School of On-Site Power Generation come from these leading firms:

• ABB Inc.
• Advanced Power Systems
• ASCO Power Technologies by Schneider Electric
• Basler Electric Co.
• Caterpillar, Inc.
• Chelsea Metal Co.
• Generac Power Systems, Inc.
• Gitz Industries
• Governor Control Systems, Inc.
• MTU Onsite Energy Corp.
• Omninetrix, LLC
• Orstate Power, Inc.
• PowerSecure International, Inc.
• Power Telematics, Inc.
• Pritchett Brown, LLC
• Stored Energy Systems (SENS)