

EGSA George Rowley School of On-Site Power Generation

Basic School

The Basic School is geared for those that need an understating of the theory and application of the mechanical and electrical components within a generator system, starting with Basic Electricity. Many sales, marketing, management, applications engineers, engine technicians and administrative personnel have benefitted from this course.

Basic School Modules

INTRODUCTION TO ON-SITE POWER SYSTEMS

Online Module, a pre-requisite, included with registration. This 30 minute broad overview should be taken by registered attendees prior to the classroom school. It covers the main reasons for on-site power demand, the main components of a generator set and the process by which most generator sets are purchased. It is especially useful to component suppliers and those who are new to the industry. (.5 Hr)

BASIC ELECTRICITY

This module will review fundamental electrical concepts and provide students who have little or no knowledge of electricity, electrical and magnetic circuit concepts and how they're applied to power generation. Covers resistance, impedance, Ohm's Law, AC and DC circuits, rectification, Faraday's Law, magnetism, electromagnetism, electromagnetic induction, different load types, linear and non-linear loads, capacitance, reactance, real and apparent power, power factor and load banking. (3.5 Hrs)

PRIME MOVERS

This session provides information on the basic types of prime movers found in On-Site Generator applications, and then focuses on reciprocating internal combustion engines. Students will gain an understanding of the two and four-stroke cycles that are the basis of engine operation. Further topics include spark-ignited (gaseous) and compression-ignited (diesel) engines and their internal components; fuel, lubrication, cooling and exhaust systems; engine ratings; mechanical to electrical power and fuel consumption calculations. (4 Hrs)

INTRODUCTION TO GENERATORS/ALTERNATORS

This module is an introduction to the general design and functions of rotating AC electric generators. Major topics covered include electrical safety; types of electric generating systems; definitions and descriptions of the wound components of an AC generator, including discussions of generator fields and armatures; the generation and frequency of the AC voltage wave form; exciters and excitation support systems. The instructor will also cover types and criteria of AC generators; design, including discussions of armature design features; generated harmonics and the methods of connection of both three-phase and single-phase armatures. (2 Hrs)

STARTING SYSTEMS

This module provides an overview of electrical start systems; general electrical sizing parameters; environmental considerations, and battery technologies commonly deployed to start engines or turbines. Topics include: parameters required to size electrical start systems; the effect of environmental conditions on battery performance and life; features, benefits and modes of failure of traditional battery technologies; dual battery starting systems with best battery selectors; and installation, maintenance and replacement best practices. (2 Hrs)

INTRODUCTION TO AUTOMATIC VOLTAGE REGULATORS

This section of the program covers the basic theory of operation for the voltage regulator, and its application and selection, for a synchronous generating system. It also includes a discussion of special regulator applications and the use of excitation accessories and control devices for improved performance and protection. (2 Hrs)

Basic School Schedule

	Day 1	Day 2	Day 3	Day 4
8 - 9 a.m.				Generator Set Systems: Putting the Pieces Together (2 hrs)
9 - 10 a.m.	Introduction to On-Site Power Systems (.5 hr)	Introduction to Generators/Alternators (2 hrs)	Introduction to Transfer Switches (2 hrs)	
10 - 11 a.m.	Basic Electricity (3.5 hrs)	Starting Systems (2 hrs)	Load Bank Fundamentals (2 hrs)	Understanding Bid and Specification Documents (2 hrs)
11 a.m. - Noon				
Noon - 1 p.m.	Lunch	Lunch	Lunch	
1 - 2 p.m.		Introduction to Automatic Voltage Regulators (2 hrs)		
2 - 3 p.m.	Prime Movers (4 hrs)		Generator Set Instrumentation (2 hr)	
3 - 4 p.m.		Introduction to Governors/Speed & Load Controls (2 hrs)	Codes and Standards (2 hrs)	
4 - 5 p.m.				

control. Although not obsolete, mechanical governors have given way to either the electro-hydraulic or the all-electric governor, depending on the size of the set. In addition to covering basic engine governing, this session also covers electronic isochronous load sharing and automatic synchronizing. Utility paralleling, with its special considerations, is also covered. (2 Hrs)

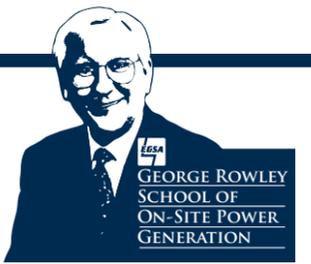
INTRODUCTION TO GOVERNORS/SPEED & LOAD CONTROLS

Today's generator sets demand the best in frequency

control. Although not obsolete, mechanical governors have given way to either the electro-hydraulic or the all-electric governor, depending on the size of the set. In addition to covering basic engine governing, this session also covers electronic isochronous load sharing and automatic synchronizing. Utility paralleling, with its special considerations, is also covered. (2 Hrs)

Who was George Rowley?

Education has always been a key area of focus for our Association. George Rowley took the helm of EGSA's Education Program as its Director in 2001. With a Masters Degree in Education, and a background in Healthcare, he adapted very quickly to the power generation industry. He once said in a letter to members: "I didn't know a volt from a watt when I first came onboard!" Through his collaboration with the Education Committee as well as other members, he was able to develop and take our education program to unforeseen levels. It is through this hard work and dedication that EGSA's education program took shape resulting in the 2-tiered program that now bears his name.



INTRODUCTION TO TRANSFER SWITCHES

This module provides an overview of the definition and purpose of manual and automatic transfer switches, typical installations, applicable codes and standards and where they are applied in the on-site power system. The module will cover general reliable design concepts, operation, ratings and various switching configurations including Bypass-Isolation Switches. (2 Hrs)

LOAD BANK FUNDAMENTALS

Load Banks are a critical component for proper, reliable power system operation. This training session will expose the student to the different types of load banks, their applications, and will detail how a load bank tests a power source. This training module will also address the important topics of load bank safety and best practices. (2 Hrs)

GENERATOR SYSTEM INSTRUMENTATION

This module will define and describe the instrumentation required to monitor and control the operation of On-Site Power Systems. (2 Hrs)

CODES AND STANDARDS

On-Site Power systems and their installation must meet various codes and standards. This module reviews the codes related to these systems. You will learn the background for these standards as well as requirements for when and where they are needed, how generators must be installed, tested and maintained. Typical standards covered are issued by

NFPA (National Fire Prevention Association), IEEE (Institute of Electrical and Electronic Engineers), UL (Underwriters Laboratories), ISO (International Standards Association) and others. (2 Hr)

GENERATOR SET SYSTEMS: PUTTING THE PIECES TOGETHER

This session addresses practical, environmental and economic considerations in sizing and installing power systems from the perspective of sales and service personnel. Topics include determining a customer's power requirements; basic load characteristics and their effects on generator set sizing; selecting the right engine and generator for the application and the types of fuel recommended and available; the accessories that should be included; selecting the right location for the set. Special emphasis will be placed on Installation, Testing and Commissioning of the system. (2 Hrs)

UNDERSTANDING BID AND SPECIFICATION DOCUMENTS

This session is designed for students with a solid understanding of on-site power systems that seek a basic understanding of the specification and bid process as it relates to the industry. Class work includes analyzing a sample set of plans and specifications. With these documents, students learn the roles of the individuals and companies that influence the design process. In addition, students will learn to identify the various documents, codes and standards used by engineers, contractors and others. (2 Hrs)

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.

CEU Program

SERIOUS EDUCATION

EGSA takes your education, and your career success, very seriously. That's why we offer a Continuing Education Unit (CEU) Program for students of EGSA's George Rowley School of On-Site Power Generation.

With our CEU program, you have a way to demonstrate what you learned while attending the EGSA schools. Likewise, your employer will have the satisfaction of knowing that this investment in training has been money well spent.

THE VALUE OF CEUs

CEUs are tangible evidence of the knowledge you gained while attending the school. You can take pride in your accomplishment and in your increased value in the marketplace. Plus, CEUs demonstrate that you are serious about growing in our industry!

WHAT EXACTLY IS A CEU?

In compliance with internationally recognized criteria and standards, one (1) EGSA CEU is equal to ten (10) contact hours of participation in an organized continuing education experience under responsible sponsorship, capable direction and qualified instruction. Applying these standards to the current number of contact hours in our Basic and Advanced Schools, the following is true:

School Number of CEUs*
 Basic Power School.....2.8
 Advanced Power School3.2

HOW DO I RECEIVE EGSA CEUs?

Apply for CEUs when you register for a Rowley School. A CEU checkbox appears on the school registration form. After you pay the \$50 CEU fee, attend the school, and achieve a passing score on a test consisting of multiple choice and True/False questions, we will mail CEU Certificates directly to you.

LEARNING OUTCOMES

"Learning Outcomes" for each portion of the school have been developed. Learning Outcomes are directly related to the test items, and they give you specific and detailed information about what you are expected to learn. You complete the test at your convenience and, when finished, mail it to EGSA.

WHERE CAN I LEARN MORE?

You'll be given complete details about the CEU Program when you attend a Rowley School. In the meantime, visit our web site at EGSA.org where you can download EGSA's CEU Learning Outcomes, program requirements and procedures. If you have a specific question, or need more information, contact EGSA at (561) 750-5575 or e-mail us at e-mail@EGSA.org.

**Changes in the School may result in a change to the number of CEUs awarded. While not likely, EGSA reserves the right to change the content, sequencing and other aspects of the EGSA George Rowley School of On-Site Power Generation at any time and without notice.*