

■ **PROFESSIONAL**
■ ■ **DEVELOPMENT**
■ ■ ■ **SEMINAR SERIES**



GENERAC® | **INDUSTRIAL POWER**

A SERIES OF SEMINARS FOR THE ENGINEERING COMMUNITY BASED UPON “REAL-WORLD” EXPERIENCES

Power systems are increasingly in demand for a variety of applications.

For many projects, the reliability of the power system is crucial to facility operations. Too often, generators are installed without a thorough understanding of system capability, functionality, reliability and site specific load requirements.

Generac’s Professional Development Seminar Series was designed specifically for practicing engineers who wish to expand their understanding of current technologies, sizing, codes & standards, switching technologies and reliable design characteristics surrounding power systems. If you are a design, sales or consulting engineer, this series is for you. It’s a joint effort of the Milwaukee School of Engineering (MSOE) and Generac Power Systems.

Participants who successfully complete an individual seminar and achieve a passing score on the associated final assessment will be awarded Professional Development Hours (PDH) and Continuing Education Units (CEU) as shown on the next page.

WHO SHOULD ATTEND?

These courses were developed for practicing design, sales and consulting engineers involved in specifying or installing generators.

COURSE DESIGN

These seminars are designed to be conducted over a 45 or 90-minute period. Ideally, they can be conducted as an early morning breakfast meeting or over an extended lunch hour. This minimizes the impact on individual productivity within your firm.

GENERAL SEMINAR CONTEXT

- Introductions
- Course outline
- Course material with exercises
- Online course assessment
(For CEU and PDH qualification)

DEVELOPMENT TEAM

The Professional Development Seminar Series was designed by engineers who are experts in the power generation field. Their goal is to provide you with a thorough understanding of the applications and advances associated with power systems.

PROFESSIONAL DEVELOPMENT SEMINAR SERIES: CURRICULUM ABSTRACTS

GPS – 300

Generator Sizing (Part 1)

(Course Length: 45 min, CEUs: 0.1, PDHs, 1.0)

Discusses various elements of generator sizing associated with powering an entire building while also exploring the impact motor starting has on generator size. Participants will learn how to use measurement and billing history data, size based on NEC® requirements, impacts of load sequencing, and the difference between instantaneous voltage dip and 90% sustained.

GPS – 305

Generator Sizing (Part 2)

(Course Length: 45 min, CEUs: 0.1, PDHs, 1.0)

Explores isolating loads onto a generator where the unique characteristics of the load become very important. Loads of particular interest are non-linear harmonic producing loads, uninterruptible power supplies (UPS), variable frequency drive (VFD), soft starters, and older technology electromechanical starters (wye/delta). For each of these loads, participants will learn the resulting load transient and harmonic issues and their impact on generator sizing.

GPS – 310

Generator Switching (Part 1)

(Course Length 45 min, CEUs: 0.1, PDHs, 1.0)

Genset Loads that are backed-up with generator power must be switched to and from the normal utility source. The switching device is typically an automatic transfer switch (ATS) that can be implemented with various technologies and design configurations. This module provides a detailed overview various ATS features and configurations: open transition, service entrance rated, bypass isolation, closed transition, and grid paralleling. The goal is informed decisions during equipment selection and specification.

GPS – 315

Generator Switching (Part 2)

(Course Length 45 min, CEUs: 0.1, PDHs, 1.0)

Automatic transfer switch (ATS) equipment can be specified in many various hardware configurations, operational modes, and performance criteria. This module will explore the application relevance of breaker vs. contactor, 2 vs. 3 position contactor mechanisms, 3 vs. 4 pole configurations, and 4-pole vs. overlapping neutral devices. Application fit of in-phase vs. delay-in-neutral operation with the impact of switching speed will be examined. ATS short circuit performance and other National Electric Code requirements are discussed in detail.

GPS – 320

Paralleling Concepts

(Course Length 45 min, CEUs: 0.1, PDHs, 1.0)

Explores what is necessary to parallel a generator to another source. We will explore various types of parallel operation: momentary closed transition, soft loading, base loading and peaking shaving with the grid, and generator to generator paralleling. The process of synchronizing, balancing power and system sequencing will be discussed in covered in detail.

GPS – 325

Paralleling Implementations

(Course Length 45 min, CEUs: 0.1, PDHs, 1.0)

Compares and contrast implementations utilizing different technologies. Primarily comparing the traditional switchgear implementations versus integrated paralleling and how various manufacturers implement integrated paralleling. This module will also explore how to implement medium voltage solutions using low voltage paralleling and transformers.

GPS – 330

Reliability Concepts

(Course Length 45 min, CEUs: 0.1, PDHs, 1.0)

Discusses various reliability concepts that are necessary to evaluate equipment choices and design options. This module explores real world expected reliability, the impact of all the stakeholders involved in the project including the impact the human error can have on system reliability. We will explore the entire reliability chain including the impact of equipment aging on overall system reliability.

GPS – 335

Reliability Implementation

(Course Length 45 min, CEUs: 0.1, PDHs, 1.0)

Examines how to design greater reliability into standby power systems. Reliability is a function of multiple factors including the power one line architecture, sizing and selection of core equipment, incorporating key reliability provisions, system testing, preventative maintain and end-user training. Implementing highly reliable back-up system requires a comprehensive approach.

GPS – 340

National Electrical Code® (Part 1)

(Course Length: 45 min, CEUs: 0.1, PDHs, 1.0)

Part 1 of our exploration of the National Electrical Code, investigates the code with a generator overview focus. The course examines ten questions that cover various topics: defining the generator and its cabling, generator sizing, start-up and transfer, transient limitations, alarming and instrumentation, signage, emergency shutdown, and output breakers.

GPS – 345

National Electrical Code® (Part 2)

(Course Length: 45 min, CEUs: 0.1, PDHs, 1.0)

Part 2 of our exploration of the National Electrical Code, scrutinizes the code with a focus on application and integration. The course examines ten questions that cover various topics: disconnect at point of entry, cabling, separation of circuits, selective coordination, grounding, fire pumps, transfer switches and docking stations.

GPS – 350

UL & NFPA Standards

(Course Length 45 min, CEUs: 0.1, PDHs, 1.0)

Introduces the various UL standards that directly impacts the genset (UL2200, UL142, UL2085) and supporting power switching (UL1008, UL891, UL1558). Various NFPA standards will be reviewed for how they impact various application and installation details for health care, life safety, and fire pumps. These standards include NFPA 20, 37, 54, 58, 99, and 101.

GPS – 355

NFPA 110

(Course Length 45 min, CEUs: 0.1, PDHs, 1.0)

Explores the requirements of NFPA 110, Emergency and Standby Power Systems. Available fuel options of natural and diesel are evaluated based on reliability and failure modes. Equipment placement is evaluated. Supporting systems of exhaust, cooling, starting and controls will be examined for compliance. Commissioning and operational testing requirements will be quantified.

GPS – 360

Generator Provisioning

(Course Length 45 min, CEUs: 0.1, PDHs, 1.0)

Examines engine-generator configurations and the selection of optional items like upsized alternators, enclosures, sub-base fuel tanks, various heating options, control options, etc. Options will be discussed based on code compliance and application requirements. Industry standard configurations will be compared with the needs for custom designed equipment and third party solution.

GPS – 365

Generator Installation

(Course Length 45 min, CEUs: 0.1, PDHs, 1.0)

Introduces good design practice guidelines for the installation of engine-generator sets based upon code requirements, site needs and application requirements. Installation will focus on both outdoor and indoor generator placement. Particular attention will be made to cooling system design options, exhaust piping, fuel transfer considerations, and sound attenuation options.

PROFESSIONAL DEVELOPMENT SEMINAR SERIES: CURRICULUM ABSTRACTS (CONT.)

GPS – 370

Engines

(Course Length 45 min, CEUs: 0.1, PDHs, 1.0)

Explores the operation and ratings associated with the generator engine. Topics will include how the engine actually operates, differences between diesel and natural gas engines, transient performance, power ratings and derates, mechanical and electronic injection technology, rich burn versus lean burn gas engine technology and emission ramifications of all the technologies.

GPS – 375

Alternators

(Course Length 45 min, CEUs: 0.1, PDHs, 1.0)

Discusses the operation and ratings associated with the genset alternator. Topics will include how the alternator actually operates, alternator construction, temperature rise, motor starting performance, alternator's sub-transient reactance impacts on non-linear load harmonic performance, key alternator spec sheet data, protection and leading power factor limitations.

GPS – 380

Controls (Single Generator)

(Course Length: 45 min, CEUs: 0.1, PDHs, 1.0)

Genset controls define the capability of the engine & alternator to meet the application specific needs and provide a simple customer interfacing experience. The engine must have controls that manage engine speed, fuel inlet, and emissions. The alternator must have voltage control. The entire system must be designed for maximum reliability while providing monitoring, data logging, remote communication, protection, and predictive maintenance.

GPS – 385

Controls (Parallel Generation)

(Course Length: 45 min, CEUs: 0.1, PDHs, 1.0)

When generators are paralleled together another layer of control needs to be added to the generator system. These additional controls manage synchronizing, load-sharing, protection, and load sequencing. These functions may be standalone as implemented in tradition paralleling gear or built into the generator for integrated paralleling solutions. No matter the implementation, the paralleling control functions should be designed to remove single point system failures for maximum system reliability.

GPS – 400

Genset Fuel (NG vs. Diesel)

(Course Length: 45 min, CEUs: 0.1, PDHs, 1.0)

Explores various aspects of generator fuel and the growth of natural gas generators in standby power applications. The discussion includes engine operational technologies, reliability of natural gas and onsite diesel, impacts of demand response programs on fuel choice, and total cost of ownership comparisons.

GPS – 410

Genset Natural Gas Piping Design

(Course Length: 45 min, CEUs: 0.1, PDHs, 1.0)

Discusses the various aspects of generator gas piping design that is needed to establish adequate gas flow with both minimum pressure drop and stable pressure. Participants will learn the guidelines for sizing the gas service, the correct size selection and type pressure regulators along with gas piping recommendations to minimize pressure drops and regulator drop.

GENERAC INDUSTRIAL POWER PROFESSIONAL DEVELOPMENT SEMINAR SERIES

A LEADER IN THE POWER GENERATION INDUSTRY

Generac is committed to innovation and outstanding service to meet the needs of a wide variety of customers. This commitment guided the creation of an educational program for the architectural and engineering communities.

Generac Industrial Power's Professional Development Seminar Series consists of 16 individual sessions. It offers architects and engineers valuable information regarding the theory and practice of power generation while incorporating proven learning methodologies. These sessions place an industry expert in direct contact with participants in a "Lunch and Learn" format and allow time to be used post class for independent completion of an online assessment. Credit for the class will be given in the form of an online certificate upon successful completion of the post-test and course survey.

HIGHLIGHTS OF THE PROGRAM:

- A Generac Industrial Distributor will come to your organization to conduct the session
- Continuing Education Units (CEU) and Professional Development Hours (PDH) are available upon successful completion of final assessment
- Learners are provided guides they can use to follow along and take notes
- An expert on-site during the training will answer questions

CUSTOMER PROMISE

Generac puts you, the customer, first to ensure your peace of mind by delivering a superior product and ownership experience.

JOINT DEVELOPMENT EFFORT WITH MILWAUKEE SCHOOL OF ENGINEERING

Working together, Generac Industrial Power and The Milwaukee School of Engineering (MSOE) identified the skills and knowledge required to successfully specify, apply, and install power generation systems. As a result, the two organizations designed and developed the Professional Development Seminar Series. MSOE was founded in 1903 on the basis of an educational philosophy that integrates two basic elements of learning; theory and practice. MSOE offers 18 bachelor's degrees and 11 master degrees in areas relating to engineering, business, nursing, and construction management. MSOE is well known for its close association with business and industry. In 2006, U.S. World News & World Report ranked MSOE among the top colleges in Engineering Programs and Engineering Specialties.

CONTINUING EDUCATION

The purpose of Continuing Education Units (CEU) and Professional Development Hours (PDH) is to provide a permanent record of the educational accomplishment of an individual who has attained certain competencies as a result of a significant non-credit educational experience. CEUs and PDHs provide evidence of completion of continuing education requirements established by various certification bodies and professional societies. One CEU is defined as 10 contact hours of student participation in an organized educational experience under responsible leadership, capable direction and qualified instruction, whereas one PDH is equal to one hour. Individual state licensing boards and other professional organizations have jurisdiction over whether to approve or disapprove the training so PDH and CEU qualification cannot be guaranteed by Generac. That said, the vast majority of states have supported PDSS training.

Requirements to be awarded Professional Development Seminar Series CEUs and PDHs:

- Participation in the full classroom session
- A passing score (80%) on the associated assessment

RESERVE YOUR DATE TODAY! **Courtesy of your Generac Distributor**

Fill out the form below and email your distributor or visit <http://www.generac.com/industrial/pdss>

CLASS INFORMATION

CHECK THE BOX(ES) your firm would like to attend

Class Name	Targeted Date Your Firm Would like to Attend
<input type="checkbox"/> GPS – 300 Generator Sizing (Part 1)	_____
<input type="checkbox"/> GPS – 305 Generator Sizing (Part 2)	_____
<input type="checkbox"/> GPS – 310 Generator Switching (Part 1)	_____
<input type="checkbox"/> GPS – 315 Generator Switching (Part 2)	_____
<input type="checkbox"/> GPS – 320 Paralleling Concepts	_____
<input type="checkbox"/> GPS – 325 Paralleling Implementations	_____
<input type="checkbox"/> GPS – 330 Reliability Concepts	_____
<input type="checkbox"/> GPS – 335 Reliability Implementation	_____
<input type="checkbox"/> GPS – 340 National Electrical Code® (Part 1)	_____
<input type="checkbox"/> GPS – 345 National Electrical Code® (Part 2)	_____
<input type="checkbox"/> GPS – 350 UL & NFPA Standards	_____
<input type="checkbox"/> GPS – 355 NFPA 110	_____
<input type="checkbox"/> GPS – 360 Generator Provisioning	_____
<input type="checkbox"/> GPS – 365 Generator Installation	_____
<input type="checkbox"/> GPS – 370 Engines	_____
<input type="checkbox"/> GPS – 375 Alternators	_____
<input type="checkbox"/> GPS – 380 Controls (Single Generator)	_____
<input type="checkbox"/> GPS – 385 Controls (Parallel Generation)	_____
<input type="checkbox"/> GPS – 400 Gen-Set Fuel (NG vs. Diesel)	_____
<input type="checkbox"/> GPS – 410 Genset Natural Gas Piping Design	_____

FIRM INFORMATION

Firm Name _____ Firm Web/URL _____

Address _____

City _____ State _____ Zip _____ Country _____

Contact Name _____ Contact Title _____

Contact E-mail _____ Contact Phone _____

If there are any associates that you would like us to invite, please list their names below:

Name: _____ Title: _____ E-mail: _____

Name: _____ Title: _____ E-mail: _____

Name: _____ Title: _____ E-mail: _____

Name: _____ Title: _____ E-mail: _____

THE PROFESSIONAL DEVELOPMENT SEMINAR SERIES IS PRESENTED BY...



Founded in 1959, Generac Power Systems is a leading manufacturer of diesel and gaseous-fueled, engine-driven power generation equipment, transfer switches, paralleling switchgear, and small engines for industrial, commercial, residential, communication, and recreational applications.



Founded in 1903, MSOE is a private, coeducational university located in downtown Milwaukee. The university offers undergraduate and graduate degrees in areas related to engineering, business, nursing, and construction management. Theory is brought to life for students through extensive integration of laboratory experimentation.



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