

SUBSTATIONS FOR NON-ENGINEERS

September 14-15, 2020
Online | Central Time

RELATED EVENT:

**INTRODUCTION TO
SUBSTATION DESIGN**
September 15-16, 2020 | Online

EUCI ONLINE COURSE

EUCI is pleased to offer this virtual course on its online interactive platform. Enjoy a valuable learning experience with a smaller impact on your time and budget. Attendees will gain new knowledge, skills, and hands-on experience in just one day from their remote location.

“

“I came to this conference with very little knowledge of substations but will be taking away a significant amount from it. The speakers were all extremely informative and executed their presentations eloquently.”

Administrative Assistant, New River Electrical



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EUCI is authorized by IACET to offer 1.2 CEUs for the course

OVERVIEW

This course will provide non-technical individuals with the basic understanding of substations and what they mean to the overall power grid. The course will cover a wide range of topics involved in the design, construction, operation and maintenance of substations and switchyards. It will also cover important safety topics to be considered. The intention is that after this course, people who are not substation design engineers will gain a familiarity and confidence to oversee various aspects of a substation and allow them to more effectively manage their responsibilities as they pertain to substation projects.

LEARNING OUTCOMES

- Get introduced to the electric utility grid system including microgrids and substation types and differences
- Review basic substation drawings and diagrams
- Review the function and purpose of all major substation components and equipment
- Discuss what digital substations means and the components of them
- Review related topics such as: distribution equipment, renewable energy interconnects, energy storage and power quality solutions
- List the causes and remedies for substation faults
- Review station security through physical and cyber overviews
- Expand on managing substation construction projects including the process, schedules, groups and tasks
- Review safety in substations



"I highly recommend this course for project managers who are designing/building substations and recommend they take it before they start design!"

Federal Project Director, NNSA



"EUCI courses have three fundamental characteristics: substance, substance, and substance. Time and money well spent."

Assistant GM-Power Supply, Burbank Water and Power



I have a better understanding of substations than anticipated. I am a lot more confident in my abilities to manage a substation project."

Project Coordinator, Lubbock Power & Light

AGENDA

MONDAY, SEPTEMBER 14, 2020 - CENTRAL TIME

8:45 – 9:00 am

Login

9:00 am – 4:30 pm

Course Timing

12:30 – 1:15 pm

Group Luncheon

Power System Elements, Sources & Loads

- Review a few key contributors to the power industry
- Review the basic elements of the power system
- Review concepts such as voltage, current, frequency & power
- Understand the differences between AC/DC
- Understand the sources and loads

Purpose of Substations & Switchyards

- The purpose of substations and the difference between a substation and a switchyard
- Differentiate between sources and loads
- Why voltage conversion is a critical part of the utility network
- Difference between phasing and phase rotation and how to apply this
- Different types of substation configurations
- The pros/cons of each configuration
- Understand the concepts of reliability as applied to different types of substations
- Identify zones of protection
- Define breaker failure

Substation Equipment

- Understand the function of various substation equipment items
- Determine the important ratings and application of these items
- The most frequent errors to watch out for
- How to apply the equipment in a substation

Site Considerations

- Factors to be considered in site selection and development
- The purpose of Topographic Surveys and Geotechnical Reports
- Understand grading considerations for new substation site locations

Civil-Structural Considerations

- Basic information to produce a civil/structural design package
- Understand how to read the drawings
- Have a basic understanding of the major design issues and how they affect the design of the substation structures

Physical Components

- Understand the breakdown of the substation physical components
- Have a basic understanding of the main design concerns and approaches

AGENDA

TUESDAY, SEPTEMBER 15, 2020 - CENTRAL TIME

8:45 – 9:00 am

Login

9:00 am – 12:00 pm

Course Timing

Protection & control (PC) Components

- The components of a P&C system in a substation
- How the terms dependability and security are applied to protective relaying
- Major types of relaying in a substation
- The function of different systems (control, relaying and metering) in a substation control enclosure

SCADA Communications

- Terminology used to identify substation SCADA components
- The purpose of Control, Alarm and Metering SCADA points
- The purpose of the Points List
- Telecommunication requirements/considerations

Safety in Substations and Switchyards

- Safety regulations
- Personal safety considerations
- Electrical safety awareness
- Equipment precautions
- Chemical safety considerations
- Danger and hazard awareness
- Safety planning examples

Managing Substation Construction Projects

- Follow a substation project timeline
- Understand a substation project construction sequence
- Elements of managing a substation project schedule
- Know some of the construction equipment and tooling used in a substation construction project
- Elements of quality management on a substation construction project

“

“Good course for the entry level personnel, helps you understand the concept of what a substation does and its purpose.”

Project Manager,
Newkirk Electric

“

“This class was well thought out and put together with a lot of detailed information to help understand more about substations. I would highly recommend this class to all who seek further education on the basics of substation design and operations.”

Sr. Civil Engineer, Kiewit

COURSE INSTRUCTORS



Jan Risla

Project Manager, POWER Engineers, Inc.

Jan Risla is a Senior Project Manager at POWER Engineers with over 30 years' experience in the power delivery industry. Mr. Risla is highly skilled in all phases of electrical project design, construction and commissioning. His professional experience includes personal responsibility for design and/or construction of 23 power plants, 47 substations, more than 120 miles of overhead line and more than 60 miles of high-voltage underground cable installations.



Chris Pierce

Senior Project Engineer, POWER Engineers, Inc.

Chris graduated with his BSEE from Ohio University in 2005 and obtained his MBA from Ohio State in 2010 while working for American Electric Power. He has worked for POWER Engineers for 5 years and has also spent time in his career working for AEP and ABB in a myriad of roles. Chris is currently the Substation Department Manager in Denver, CO and is a registered Professional Engineer in Ohio.



Sam Moss

Civil/Structural Lead, POWER Engineers, Inc.

Sam Moss is a professional civil engineer with comprehensive experience in design and project engineering for a variety of project types. He is knowledgeable in building codes, seismic design and industrial facilities and has specialized expertise in the design of steel, masonry and concrete structures. Specific design experience includes seismic restraint of equipment, control building design, pipe support analysis and monorail evaluations. As a civil/structural lead for POWER, he is responsible for material selection, load determination, analysis, seismic considerations, code compliance, calculations, specifications, project tracking and documentation. He holds a bachelor's in civil engineering and a master's in engineering management from Portland State University.



"Training was awesome! Will recommend to other managers/supervisors. Very well organized. Location was great, food was good!"

Construction Manager,
Saulsbury



"EUCI's Fundamentals of Substations class is intuitive and straight forward. The speakers are credibly insightful and approachable if you have any comments or questions. I'd highly recommend this course for anyone who needs to work in and/or around substations. Whether you're a "green" employee or seasoned veteran, this course is beneficial to all."

Power Estimator, Henkels & McCoy

IACET CREDITS



EUCI has been accredited as an Authorized Provider by the International Association for Continuing Education and Training (IACET). In obtaining this accreditation, EUCI has demonstrated that it complies with the ANSI/IACET Standard which is recognized internationally as a standard of good practice. As a result of their Authorized Provider status, EUCI is authorized to offer IACET CEUs for its programs that qualify under the ANSI/IACET Standard.

EUCI is authorized by IACET to offer 1.0 CEUs for the course.

INSTRUCTIONAL METHODS

Case studies and PowerPoint presentations will be used in this course.

ONLINE COURSE DELIVERY & PARTICIPATION DETAILS

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REQUIREMENTS FOR SUCCESSFUL COMPLETION

You must be logged in for the entire presentation and send in the evaluation after the online course is completed.

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PO Box 2303
Falls Church VA 22042
201 871 0474
Fax 253 663 7224
register@pmaconference.com

BUNDLE PRICE: SUBSTATIONS FOR NON-ENGINEERS AND INTRODUCTION TO SUBSTATION DESIGN COURSES:

SEPTEMBER 14-16, 2020: \$2195 (Single Connection)

PACK OF 5 CONNECTIONS: US \$9,875

PACK OF 10 CONNECTIONS: US \$16,460

SUBSTATIONS FOR NON-ENGINEERS COURSE ONLY:

SEPTEMBER 14-15, 2020: US \$1195 (Single Connection)

PACK OF 5 CONNECTIONS: US \$5,375

PACK OF 10 CONNECTIONS: US \$8,965

Online Course Delivery & Participation Details

See page 6 for information

How did you hear about this event? (direct e-mail, colleague, speaker(s), etc.)

Print Name

Job Title

Company

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City

State/Province

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Country

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CREDIT CARD INFORMATION

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OR Enclosed is a check for \$ _____ to cover _____ registrations.

Substitutions & Cancellations

Your registration may be transferred to a member of your organization up to 24 hours in advance of the event. Cancellations must be received on or before July 17, 2020 in order to be refunded and will be subject to a US \$195.00 processing fee per registrant. No refunds will be made after this date. Cancellations received after this date will create a credit of the tuition (less processing fee) good toward any other EUCI event. This credit will be good for six months from the cancellation date. In the event of non-attendance, all registration fees will be forfeited. In case of course cancellation, EUCI's liability is limited to refund of the event registration fee only. For more information regarding administrative policies, such as complaints and refunds, please contact our offices. EUCI reserves the right to alter this program without prior notice.

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“

“This course was a perfect next step for an electrical engineer working in the utility sector. Learning about substation design methodology and terminology has provided a baseline and logical next step in building my professional skillset.”

Electrical Engineer II, City of Boulder

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OVERVIEW

Transmission to distribution substation designs vary in complexity, proportional to their rating (MVA) and application. A variety of engineering disciplines are involved including civil, mechanical, electrical power and communications. Design philosophies are influenced by a utility's contingency strategy, space limitations, aesthetic requirements, work rules, maintenance practices, and other factors.

This course will provide an overview of design methods with given specific conditions and a one-line diagram for a typical T to D substation. Discussion concerning substation device options provide attendees with the information to make intelligent choices regarding design features. The class creates a forum for comparing best practices for substation design, maintenance, and the operation of these facilities.

LEARNING OUTCOMES

A comprehensive introduction to the following substation components will be discussed:

- Review the various types of substations
- List substation reliability/redundancy considerations
- Review substation specific conditions and one-line diagrams
- Review site selection criteria and components
- Determine the keys to initial substation layouts
- Get an overview on civil engineering considerations including: concrete foundations, steel structures, and liquid containment
- Review substation components and ratings including: power transformers, voltage regulators, voltage regulating controls, overcurrent protective devices of fuses and circuit breakers, overvoltage protection
- List the purposes, uses for and types of protection & control
- Get introduced to metal enclosed substations
- Get introduced to modular substations

WHO SHOULD ATTEND

- New or moderately experienced substation engineers
- New power distribution engineers
- Substation design managers and supervisors



“EUCI set you up with an extensive framework and encourages all participants to dive deeper in to individual topics for further personal development and understanding.”

Engineer, Prairie Land Electric Cooperative

AGENDA

TUESDAY, SEPTEMBER 15, 2020 - CENTRAL TIME

12:45 – 1:00 pm

Login

1:00 – 5:00 pm

Course Timing

Course Overview - Welcome, Introductions & Course Scope

- Types of Substations
 - o Course focus on transmission to distribution open frame bus work substations
- Substation Reliability/Redundancy Considerations
 - o Alternative power source for served load
 - Robustness of distribution feeders
 - Redundancy within the substation
- Review of Substation Specific tions
 - o One line diagram

Site Selection

- Meets the Estimated Required Area
- Access to Transmission Line
- Access to Transportation
 - o Roads, railroad, barge, etc.
- Elevation – Proximity to Floodplain
- Proximity to Ocean (Salt Water)
- Soil Conditions

Initial Substation Layout

- Determine Entry (Primary) and Exits (Secondary)
 - o Handling power line congestion
 - Overhead vs. underground
- Required Clearances Within Substations
 - o Per NESC 2017 Sections 10 -19
- Space Requirements (Vertical/Horizontal)
 - o Substation devices (transformers, breakers, etc.)
 - o Operation of heavy lifting equipment

Civil Engineering Considerations

- Concrete Foundations for Substation Devices
- Steel Structures Supporting:
 - o Bus work
 - o Miscellaneous devices (PTs, CTs, Disconnect Switches, Surge Arresters, etc.)
- Liquid Containment



“It gave me an insight of what we are using at our present company and what other technology is on the market and the benefits. It was very informative.”

Trainee Engineer, Belize Electricity Ltd.

AGENDA

WEDNESDAY, SEPTEMBER 16, 2020 - CENTRAL TIME

8:45 – 9:00 am

Login

9:00 am – 4:30 pm

Course Timing

12:30 – 1:15 pm

Lunch Break

Substation Components and Rating

- Power Transformer (3) Design Considerations
 - o Rating (ONAN, ONAF.....)
 - o With/without load tap changer
 - o Winding configurations
 - o Dielectric fluid
- Voltage Regulators
 - o Bus vs. discreet feeder regulation
 - o Voltage regulator ratings
- Voltage Regulating Controls for LTC & VRs
 - o Settings & features
- Overcurrent Protective Devices
 - o Fuses
 - Power fuses
 - Current limiting fuses
 - o Power circuit breakers
 - Design considerations:
 - Interrupting medium
 - o Oil, air, SF6, vacuum
 - Dielectric medium
 - o Oil, air, SF6, solid dielectric
 - Driving mechanisms
 - o Hydraulic
 - o Motor operators
 - o Magnetic actuators
 - Maintenance requirements
 - o Automatic circuit reclosers
 - o Ratings
- Overvoltage Protection
 - o Coordination of arresters w/equipment insulation ratings
 - o Station & heavy-duty class arresters

“

“Be ready to laugh with Jerry’s ‘Dad’ jokes that helps to keep the class engaged with material that at often times can be very technical.”

Interconnection
Engineer, SPower

“

“Great overall view of substation applications.”

Engineer Trainee (Electrical), Western Area Power Administration

AGENDA

WEDNESDAY, SEPTEMBER 16, 2020 - CENTRAL TIME (CONTINUED)

Protection & Control

- Station Power
 - o Aux power
 - Station batteries vs. control cabinet batteries
- Sensors
 - o PTs and CTs
- Metering
 - o Protective relay
 - Overcurrent protection (phase & ground)
 - o Differential relaying
 - Transformer
 - Substation
- Remote/Supervisory Control
 - o Communication protocols within intelligent devices
 - o Gateway computers
- Control Houses

Introduction to Metal Enclosed Substation

- Where Space is at a Premium
 - o No exposed bus work
 - o Rack out breakers

Introduction to Modular Substations

- Small KVA Requirements
- Delivered as a Complete Unit



“Be ready to laugh with Jerry’s ‘Dad’ jokes that helps to keep the class engaged with material that at often times can be very technical.”

Interconnection
Engineer, SPower

INSTRUCTORS

Anthony Centore, PE

Director of Engineering Services, Pike Engineering

Tony holds a BS in Electrical Engineering from the University of Pittsburgh School of Engineering, a BS in Physics from California University of Pennsylvania, an MBA from Robert Morris College, and is a registered professional engineer in multiple states. His 30 year career spans the power space that includes large power transformer design and manufacturing, heavy industry, large melting furnaces controls and power systems to include static var compensation, utility generation station power systems and controls, and utility substation and transmission design.



Jerry Josken

Senior Consultant, Pike Engineering

Jerry holds a BS in Electrical Engineering Technology from the Milwaukee School of Engineering and a MBA from North Central College. During his 30+ year career with Eaton’s Cooper Power Systems Jerry served in a variety of engineering capacities. Past leadership positions include Chair of IEEE Rural Electric Power Conference (2012) and GLEMS Distribution Equipment /Controls (2013-2014). Presently, Jerry coordinates Pike Engineering Professional Development Programs.

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REQUIREMENTS FOR SUCCESSFUL COMPLETION

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COURSE RECORDING

A recording of this program will be available for three days from either the end of the program (or three days from the date of purchase, if you purchase the recording after the session ends). It is presented in four-hour sessions and can be watched an unlimited number of times for three days (for the registrant). There is no additional cost beyond the registration fee.

PLEASE SELECT

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