

INTRODUCTION TO SUBSTATION DESIGN

December 4-5, 2017
Millennium Maxwell House Hotel Nashville
Nashville, TN

**Interested in bringing a
course to your location?**

Do you have 10 or more
people needing training?

We would love to help!

Call us at **303-770-8800**

or email conferences@euci.com

to discuss special pricing
and information.



TAG US #EUCIEvents
FOLLOW US @EUCIEvents



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

OVERVIEW

Substation design is a multidiscipline undertaking. The skills are learned from experience and take many years to perfect. The demand for experienced substation engineers is increasing. This combined with the aging and retiring of experienced substation engineers has made it vital for young and new substation engineers to become familiar with the fundamental aspects of design and construction.

This course is an introduction to substation design. The basic building block subjects are presented as an introductory overview. Information and examples are drawn from real world experience. Practical aspects will be emphasized and lessons learned from previous projects will be presented.

LEARNING OUTCOMES

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

- Bus configurations
- Electrical equipment
- Clearances and bus design
- Civil engineering interface
- Lightning protection
- Substation grounding
- Cable and raceway
- AC and DC systems
- Control and protection
- Control buildings

WHO SHOULD ATTEND

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



“Great overall view of substation applications.”

Engineer Trainee (Electrical), Western Area Power Administration

AGENDA

MONDAY, DECEMBER 4, 2017

7:30 - 8:00 am **Registration and Continental Breakfast**

8:00 am - 5:00 pm **Course Timing**

12:00 - 1:00 pm **Group Luncheon**

- **Introduction to Substations**
 - This session covers why substations are necessary. It describes substation types, uses, and locations. Reasons for substations and the decisions and drivers for substations will be explained. Substation systems are described, and the drawing package based on systems is introduced.
- **Bus Configurations**
 - The different high voltage bus configurations are explained in one-line format. The different configurations are examined based on reliability and cost. Further overview of typical advantages associated with each configuration will be discussed.
- **Electrical Equipment**
 - Different types of high voltage electrical equipment are shown and described. The ability to recognize the equipment allows the student to inspect substation installations, with one-line diagrams, and identify function. Further explanation is given of the functional differences between types equipment and discussion on properties affecting equipment quality.
- **Clearances and Spacings**
 - Electrical clearances, dangerous fault currents and unusual electrical forces are unique to substation installations. This session familiarizes the engineer with substation specific design criteria. This lesson covers how substations are physically configured to maintain adequate distance between energized parts.
- **Bus Design**
 - Wind, weight and magnetic forces can be extremely high during an electric disturbance. The substation buswork must be adequate to handle these requirements. The basics of bus design are described.
- **Civil/Electrical Engineering Interface**
 - Substations use foundations, steel structures and have grading and drainage. These are placed, with high voltage electrical equipment, into a very dangerous small area. Interface between electrical and civil disciplines is vital to provide a safe, reliable and cost-effective design. This session familiarizes civil engineers with substation specific requirements. It also covers information electrical engineers need to know about civil structures and foundations.
- **Lightning Protection**
 - Lightning strikes are often the leading cause of power outages. Designing the substation to mitigate direct strikes is discussed.
- **Substation Grounding**
 - Electrical systems use the earth as a current path. Substations must be designed for personnel safety during short circuit to earth conditions. History of substation grounding is discussed and practical methods of grounding design using modern computers are presented.
- **Cable and Raceway**
 - Low voltage power, control, and instrumentation cables all interconnect the substation electrical equipment and the essential service control building. Cable types and composition are presented. The method of routing these cables is also described.

AGENDA

TUESDAY, DECEMBER 5, 2017

7:30 - 8:00 am

Continental Breakfast

8:00 am - 12:00 pm

Course Timing

- **Control and Protection**
 - Controlling the electrical equipment and shutting down the high voltage electric system rapidly during a critical event is a fundamental portion of substation design. The relaying equipment and the systems used for this task are complex and involved. This session introduces the basic terminology and methodology used in control and protection design.
- **AC and DC Systems**
 - Low voltage AC powers electrical equipment and control building services. Low voltage DC provides emergency power for control and protection schemes and critical systems during power outages. How these systems are managed and designed is discussed.
- **Control Buildings**
 - Control buildings contain the control, protection, and essential services for the substation. Different types of buildings are presented.
- **Metering, SCADA and Automation**
 - Metering, SCADA, and automation are all detailed topics. This session introduces the fundamental definitions and uses of each with some examples of basic implementation.

INSTRUCTOR



Richard W. Childress, P. E.

Senior Substation Engineer, Leidos

Mr. Childress received a BS in electrical engineering from the University of Colorado in 1984 and a masters of engineering in 1986. He is a Power Delivery Engineer with over thirty years of experience.

He has successfully designed and constructed substation and transmission line projects for a variety of different clients throughout the world. His forte is supervision of multidiscipline project teams for Engineer, Procure and Construct (EPC) substation projects. His technical abilities include outdoor electrical design, control and relaying design, quality supervision, specification reviews and construction supervision. He is considered an expert in the field of substation design and is an engineering instructor. Mr. Childress is currently working for Leidos as a senior substation engineer.

REQUIREMENTS FOR SUCCESSFUL COMPLETION OF PROGRAM

Participants must sign in/out each day, be in attendance for the entirety of the course to be eligible for continuing education credit.

INSTRUCTIONAL METHODS

Case studies, PowerPoint presentations, and group discussion will be used in this event.

EVENT LOCATION

A room block has been reserved at the Millennium Maxwell House Hotel Nashville, 2025 Rosa L Parks Blvd, Nashville, TN 37228, for the nights of December 3-5, 2017. Room rates are US \$109, plus applicable tax. Call **1-615-259-4343** for reservations and mention the EUCI event to get the group rate. The cutoff date to receive the group rate is November 13, 2017 but as there are a limited number of rooms available at this rate, the room block may close sooner. ***Please make your reservations early.***

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.

REGISTER 3, SEND THE 4TH FREE

Any organization wishing to send multiple attendees to this course may send 1 FREE for every 3 delegates registered. Please note that all registrations must be made at the same time to qualify.

REGISTRATION
to register [CLICK HERE](#) or

Call: 201 871 0474
fax: 253 663 7224
email: register@pmaconference.com
web: <http://pmaconference.com/>
Mail: POB 2303 Falls Church Va 22042

Please make checks payable to: "PMA"

EVENT LOCATION

A room block has been reserved at the Millennium Maxwell House Hotel Nashville, 2025 Rosa L Parks Blvd, Nashville, TN 37228, for the nights of December 3-5, 2017. Room rates are US \$109, plus applicable tax. Call **1-615-259-4343** for reservations and mention the EUCI event to get the group rate. The cutoff date to receive the group rate is November 13, 2017 but as there are a limited number of rooms available at this rate, the room block may close sooner. ***Please make your reservations early.***

PLEASE REGISTER

- INTRODUCTION TO SUBSTATION DESIGN COURSE**
 DECEMBER 4-5, 2017: US \$1395
 EARLY BIRD on or before NOVEMBER 17, 2017: US \$1195

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

Print Name Job Title

Company

What name do you prefer on your name badge?

Address

City State/Province Zip/Postal Code Country

Phone Email

List any dietary or accessibility needs here

CREDIT CARD INFORMATION

Name on Card Billing Address

Account Number Billing City Billing State

Exp. Date Security Code (last 3 digits on the back of Visa and MC or 4 digits on front of AmEx) Billing Zip Code/Postal Code

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 November 3, 2017 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 at (201) 871-0474.