



# Substation Automation Training

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## COURSE DATES AND TIMES

**Substation Automation Training**—This 12-hour live online instructor-led course introduces state-of-the-art substation automation technologies and their applications in new and retrofit substations.

This comprehensive training course introduces participants to the latest substation automation technologies and their applications in both new installations and retrofit projects. With the electric utility industry rapidly advancing toward smarter, more integrated systems, substation automation has emerged as a critical solution for improving efficiency, reliability, and data-driven decision-making.

A recent industry report reveals that over 80% of utilities are actively implementing substation automation and integration programs. These initiatives span various departments and enable operational insights, real-time monitoring, and enhanced control directly from the substation level.

Participants will explore key automation components, including Intelligent Electronic Devices (IEDs), IEC 61850 communication protocols, Human-Machine Interfaces (HMI), and modern SCADA systems. Special focus will be given to cybersecurity challenges—particularly the vulnerabilities of legacy versus new SCADA systems—and mitigation strategies.

This course covers the complete lifecycle of a substation automation project, from concept to commissioning. Attendees will review international case studies to understand how automation systems are specified, designed, integrated, tested, and deployed across diverse utility environments.

## Key Learning Outcomes

- ?? Understand the evolution of substation automation and its role in modern power systems
- ?? Learn the communication architectures and protocols (IEC 61850, DNP3, Modbus) used within substations

- ?? Analyze the functions and features of IEDs, HMIs, SCADA, and system gateways
- ?? Address cybersecurity risks in SCADA systems, with emphasis on securing legacy and modern installations
- ?? Explore system integration processes, including Factory Acceptance Testing (FAT) and Site Acceptance Testing (SAT)
- ?? Gain hands-on insight into global project examples and practical implementation strategies
- ?? Evaluate the levels of automation and integration applicable to new and existing substations
- ?? Discover how SCADA can be optimized for interoperability with enterprise-level systems

## Related Training Resources

To enhance your understanding of electrical infrastructure, see our related courses and guides:

- [Substation Training](#)
- [Electrical Substation Design Training](#)
- [Substation Grounding Training](#)
- [Substation Relay Protection Training](#)
- [Substation SCADA Monitoring Training](#)
- [Substation Maintenance Training](#)

### WHO SHOULD ATTEND

This Substation Automation training course is designed for engineering project managers, engineers, and technicians from utilities who have built or are considering building or retrofitting substations or distribution systems with SCADA and substation integration and automation equipment.

- Substation operation and planning Managers
- Transmission planning engineers
- Distribution planning engineers
- Substation Design Engineers
- Consulting Engineers
- Automation Engineers & technologists
- Substation network management engineers
- Substation operation/maintenance engineers & technologists

- Substation protection & control engineers & technologists

## STUDENTS RECEIVE

- 1.2 Continuing Education Unit (CEU) Credits (12 Professional Development Hours)
- Certificate of Course Completion
- FREE 100-Page Digital Electrical Testing And Maintenance Handbook (Value \$20)
- \$100 Coupon Toward Any Future Electricity Forum Event (Restrictions Apply)
- FREE Magazine Subscription (Value \$25.00)
- Course Materials In PDF Format

## COURSE OUTLINE

# Substation Automation Training Course Outline

## DAY ONE

### Introduction to ELSSI and SA

- What is an IED?
- What is ELSSI?
- Substation Integration and Automation Levels
- Integration versus Automation
- Communication Paths From Substation
- Enterprise Interoperability
- IEC 61850

### Substation Integration and Automation Technical Issues

- System Responsibilities
- Open Systems
- Substation Automation Applicability
- Benefits of Open System Approach
- System Architecture
- Data Acquisition and Control Level
- Information Infrastructure Level
- Substation Host Processor
- Substation Local Area Network
- Control Devices / User Interface
- Communication Interfaces
- One/Common Data Repository

- Reduction in databases

## **Protocol Standards Industry Activities**

- IEEE PES Substations Committee
- DNP User Group
- UCA and DNP Comparison

## **SCADA Systems Evolution and Overview**

- Evolution From 1830 to Present
- Uses of Supervisory Systems
- System Hardware
- System Software Functions

## **SCADA System Architectures**

- Data Acquisition, Supervisory Control and Data Exchange
- Historical Information System
- Power Applications (only those changed by RTOs/ISOs)
- User Interface
- Supporting Software
- Hardware Configurations

## **SCADA Integration with Other Systems**

- Functions Performed
- Interfacing Different Systems
- Principles of Systems Architecture

## **SCADA System Implementation and Maintenance**

- System Constraints
- Implementation Considerations

## **DAY TWO**

### **What Would Substation SCADA Look Like?**

- Distributed LAN Configuration
- Design Issues for Consideration
- Equipment Photographs

- SA Training Simulator (SATS)

## Substation Functions

- Automatic Load Restoration
- Adaptive Relaying
- Remote Controlled Fuse Saving
- Equipment Condition Monitoring

## Feeder Automation Equipment

- Fault Location, Isolation, and Service Restoration (FISR)
- Other Uses of Automated Switches
- System Components
- Communication Facilities
- Control Panels
- Feeder Automation Categories
- Manual
- Semi-Automatic
- Fully Automatic
- Feeder Automation Approaches
- Centralized
- Substation Centered
- Peer-to-Peer
- Training Simulator
- Practical Matters

## Feeder Automation Functions

- VAR Dispatch
- Voltage Control (Conservation Voltage Reduction)
- Integrated Volt VAR Control (IVVC) **Communications Issues**
- Communication Requirements
- Communication Technologies
- Future Trends
- Solution Providers

## Building the Business Case for Integration and Automation

- Evaluation Methodology
- Needs Analysis
- Benefit/Cost Analysis Methodology
- Sample Study Cases

## Summary

- Levels of Integration and Automation
- Communication Paths From Substation
- New Versus Existing Substations

- Protocol Fundamentals
- Protocol Considerations
- North American SA Projects
- Relevant Standards
- UCA International User Group (IEC 61850)

## **Review of expectations**

## **Questions and Answers**

## **COURSE TIMETABLE**

### **Both days:**

Start: 8:00 a.m.

Coffee Break: 10:00 a.m.

Lunch: 12:00 noon

Restart: 1:15 p.m.

Finish: 4:30 p.m.

Contact us Today for a FREE quotation to deliver this course at your company's location.

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