

Practical

# DISTRIBUTION & SUBSTATION AUTOMATION (incl. COMMUNICATIONS)

for Electrical Power Systems



## WHAT YOU WILL LEARN:

- Fundamental principles of distribution and substation automation, specifically on protection, control and communication issues
- Important steps in designing, installing and managing a substation automation project
- Typical techniques in troubleshooting distribution and substation automation systems
- To avoid pitfalls and costly mistakes when implementing a substation automation system
- To identify and diagnose shortcomings of any existing substation automation system
- How to increase the reliability and performance of your electrical protection system
- How to critically appraise the different products and systems available for distribution and substation automation
- The most effective approaches to maintaining a substation automation system

## WHO SHOULD ATTEND:

- Engineers and Managers responsible for planning and justifying substation automation
- Project Engineers responsible for implementing a substation automation project
- Communications Engineers working in the power industry
- Technicians and Operators installing and working with substation automation systems

and generally...

- Electrical Engineers
- Protection Engineers
- Electrical Technicians
- Power System Engineers
- Design Engineers
- Control and Instrumentation Engineers



*Technology Training that Works*

## THE WORKSHOP

Distribution and Substation Automation offers you a multitude of benefits including:

- Increased function and reliability of electrical protection
- Advanced disturbance and event recording capabilities aiding in detailed electrical fault analyses
- Display of real-time substation information in a central control centre
- Remote switching and advanced supervisory control over the power network
- Increased integrity and safety of the electrical power network, including advanced interlocking functions
- Advanced automation functions eg intelligent load shedding

This workshop is designed to familiarise you with all aspects of distribution and substation automation. The different levels of substation integration and automation are outlined and discussed. The components and architecture of the typical distribution and substation automation system are detailed. The different approaches promoted by the different substation automation vendors are identified and detailed and the advantages of each are outlined. The characteristics and operation of the Intelligent Electronic Devices (IEDs) are examined. A practical checklist is then provided of the optimum way to implement this technology to your next project.

## ON-SITE TRAINING

- ✓ **SAVE** over 50% by having an IDC workshop presented at your premises.
- ✓ Customise the training to **YOUR** workplace.
- ✓ Have the training delivered when and where you need it.

Contact us for a **FREE** proposal.

## THE PROGRAM

### DAY ONE

#### INTRODUCTION

- Definition and Application of Power System Automation and the importance of data communications in the modern electrical environment
- Clarification of concepts of substation and distribution automation
- Overview of workshop
- Fundamental concepts

#### OVERVIEW OF PROTECTION AND POWER DISTRIBUTION NETWORKS

- Fundamentals of Power distribution
- Fundamentals of protection
- Development of protection relays
- Multi-function relays

#### POWER SYSTEM AUTOMATION

- Description and history of Power System Automation
- Local intelligence in substations: advanced protection, monitoring, metering, control and information regarding the electrical network
- Capabilities of modern intelligent relays (IEDs)

#### REMOTE SUBSTATION ACCESS

- Conventional telemetry systems
- Limitations of PLCs and RTUs in a substation environment

#### DISTRIBUTION AUTOMATION

- Customer Site Automation Functions
  - Automatic Meter Reading
  - Demand Side Management
  - Remote Connect and Disconnect
- Feeder Automation Functions
  - Fault location, isolation and service restoration
  - VAr Dispatch
  - Voltage dispatch
- Master Station
  - Approaches
  - Integration with corporate system

#### INTELLIGENT ELECTRONIC DEVICES (IEDS)

- Description of IEDs
- Modern Intelligent Relay
- Functionality of modern Relays
- Differences in manufacturer's approaches and equipment
- Installation and Commissioning
- Interfacing to communications systems
- Troubleshooting

#### DATA COMMUNICATIONS FOR THE ELECTRICAL INDUSTRY

- Basics of Data Communication, including different techniques and media access methods
- Physical media, including Radio and Satellite communication
- Different Communication Protocols used for Substations
- Discussion of most important protocols used in the electrical industry (DNP3, 60870.5, UCA)
- Communication requirements for substations
- Wireless Communications
- Suitability of different Protocols for substation communications
- Standardisation of communication in substations: Goals and Status

### DAY TWO

#### SCADA FOR SUBSTATION MONITORING AND CONTROL

- Requirements of SCADA for Electrical Networks (Central control station)
- Hardware and support requirements
- Software and Configuration

#### COMPARISON OF POWER SYSTEM AUTOMATION SYSTEMS

- Types of Power System Automation systems, including different communication architectures
- Advantages and Disadvantages of different types
- RTUs and PLCs in substations vs IEDs

#### LEADING MANUFACTURERS' SYSTEMS

- Overview of the leading manufacturers' systems and products, including development plans
- Choice and emphasis of different manufacturers on various concepts and communication protocols
- Advantages and Disadvantages of various systems

#### TROUBLESHOOTING

- IED/PLC/RTU level hardware and software problems
- Communications system - hardware (RS-232/RS-485/Fibre/Ethernet)
- Communications System (Protocol level)
- Overall system operation - traffic levels

#### PRACTICAL CONSIDERATIONS

- Benefits of a Power System Automation System
- Capital expenditure and maintenance costs
- Cost savings
- Evaluating your requirements
- Choosing a system and supplier

#### CONCLUSION

- The Internet and Power Systems Automation
- Electrical Communications Security (incl. Firewalls)

#### PRACTICAL DEMONSTRATION & EXERCISES

- Demonstration of a Power System Automation System at work
- Construction of a simple Power Automation communications network
- Design of distribution automation System