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Combined Distribution Automation Course AND CYMDIST Workshop

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

https://www.electricityforum.com/onsite-training-rfq

This 4-Day Smart Distribution Network course combines our 2-Day Distribution Automation course WITH a 2-day Distribution Networks Analysis Workshop Using CYMDIST, which provides students with a practical understanding of energy consumption, power distribution systems operation and control, the technical challenges that power utilities currently face to accommodate distributed generation in their distribution networks, and the most recent interconnection requirement standards of distributed generation in North America. The course also provides participants with the required knowledge to understand, assess, and analyze the technical and economical needs of adopting Distribution Automation technologies to mitigate such technical challenges and enhance the operation and reliability of power distribution systems.

This course covers topics related to the transformation of power distribution systems from their conventional structure with unidirectional power flow towards smart distribution grids.

2-DAY DISTRIBUTION AUTOMATION COURSE

www.electricityforum.com/electrical-training/distribution-automation

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2-DAY WORKSHOP COMPONENT

www.electricityforum.com/electrical-training/cymdist-workshop

The deployment of distributed generation, energy storage, and electric vehicle charging technologies is creating a paradigm shift of the way distribution networks are planned, operated, and analyzed. Distribution system engineers are now required to perform wide variety of complicated studies ranging from planning analyses to expert simulations supporting operations, including interconnection assessments for emerging technologies such as distributed generation, energy storage, and charging stations of electric vehicles.

This 2-Day Software Workshop provides participants with hands-on training using CYME distribution system software tool (CYMDIST) in order to analyze evolving distribution systems. CYMDIST is a powerful tool used by most power utilities and consultant firms in Canada and worldwide to model power distribution systems. The software is superior in addressing the simulation needs for capacity, contingency, power quality, protection, reliability, and optimization analyses in evolving distribution systems.

This 2-Day Workshop explores how to implement the fundamentals laid out in our Smart Distribution Automation Course (www.electricityforum.com/electrical-training/distribution-automation

) fundamentals using EATON CYMDIST software.

CYMDIST is the distribution system analysis base package of the CYME software. It bundles all the modeling and analysis tools required to perform various types of simulations involved in electric distribution system planning. The calculation engines support balanced or unbalanced distribution models that are built with any combination of phases and operated in radial, looped or meshed configurations.

The following analyses are included in the CYMDIST package:

- Unbalanced Load Flow
- Load Allocation And Estimation
- Fault Analysis
  - Short-Circuit/Fault Flow
  - Fault Locator
  - Series And Simultaneous Fault
  - Voltage Sag
- Load Balancing
- Optimal Capacitor Placement And Sizing
- Motor Starting
- Batch Analysis

Accurate modeling and representation

The modeling capabilities of the network editor of the CYME software include the detailed representation of all portions of a distribution network, including the MV primary system, the LV secondary system (radial or meshed) as well as the subtransmission system.

STUDENTS RECEIVE

2-Day Distribution Automation Course Learning Outcomes

After participating in this course, participants will be able to:

- Analyze Load Profile And Energy Consumption Of Residential, Commercial, And Industrial Loads
- Recognize The Modelling And Performance Analysis Of Power Distribution Systems
- Quantify The Technical Merits Of Implementing Distribution Automation Solutions For Volt/Var Control, Outage Management And System Reliability, Demand Response, And Integration Of Distributed Generation And Microgrids
- Being Familiarized With The Most Recent Standards For Interconnection Requirements Of DG In IEEE And North America
- Identify Technical Interconnection Challenges For Distributed Generation In Power Distribution Systems
- Hands-On Training With Commercial Software Tools To Study And Analyze Practical Aspects Of Distribution Systems Performance Taking Into Account Distributed Generation And Distribution Automation

2-Day Distribution Automation Workshop Learning Outcomes

The 2-Day orkshop is designed to help participants using the software effectively. After participating in this course, participants will be able to:

- Learn How To Collect And Assemble Distribution Network Data E.G., Single Line Diagram And Equipment Specifications
- Build The Model Of Distribution Systems Using The Software GUI
- Explore The Functionalities And Studies That Can Be Conducted Using CYMDIST
- Conduct Several Planning Analyses, Interconnection Assessment, And Design Studies In Evolving Power Distribution Systems With Distributed Generation
- Learn How To Analyze And Interpret The Simulation Results Obtained From The Software

COURSE OUTLINE

DAY ONE

1. Legacy of Smart Distribution Networks

- Distribution Substations
- Radial Distribution Feeders
- Map Of Distribution Feeders
- Electrical Characteristics Of Distribution Feeders
- Distributed Generation And Energy Storage Systems
- Electric Vehicles
- Smart Meters, Two Ways Communication, And Intelligent Control
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2. Load Characteristics and Matrices

- Individual Customer Load
- Residential, Commercial, And Industrial Loads
- Customer Class
- Peak And Average Demand
- Load Factor
- Load Profile Analysis
- Tariff And Charges (Time Of Use And Electricity Market)
- Distribution Transformer Loading
- Diversified And Maximum Diversified Demand
- Load Duration Curve
- Maximum Non-Coincident Demand

- Diversity, Demand, And Utilization Factors
- Load Diversity

3. Load Models

- Constant Real And Reactive Power Loads
- Constant Impedance Loads
- Constant Current Loads
- Combination Loads
- Two-Phase And Single-Phase Loads
- Shunt Capacitors
- Three-Phase Induction Motor

4. Distribution Feeder and Transformer Models

- Exact Line Segment Model
- Approximate Line Segment Model
- The Delta-Ground Wye Step-Down Transformer Connection
- The Underground Wye-Grounded Wye Connection
- The Delta-Delta Connection
- The Open Wye-Open Delta Connection

5. Distribution Systems Analysis

- Service Entrance Requirement For New Customers
- Voltage Drop Calculations
- Power Loss Calculations
- Distribution Power Flow (DPF) Analysis
- Short Circuit And Arc Flash Analysis
- Customer Reliability Indices

6. Framework of Distribution Automation in Smart Grids

- Traditional Substation Automation
- Intelligent Electronic Devices (IEDs)
- Remote Terminal Units (RTUs)
- Advanced Metering And Information Technologies (AMI)
- Interoperable Communication Networks (IEC 61850)

7. DA Application #1: Integrated Voltage and Reactive Power Control (IVVC)

- Volt/Var Control Devices
- Substation Load Tap Changers
- Line Voltage Regulators
- Shunt Capacitors
- Local And Remote Control Of Volt/Var Devices
- Volt/Var Optimization (VVO)
- Conservation Voltage Reduction (CVR)
- Automated Power Factor Correction

DAY TWO

8. DA Application #2: Fault Detection, Isolation, and Load Restoration (FDIR)

- Fault Detection Mechanisms
- Isolation Of Faults
- Software Applications For Outage Management
- Automated And Optimized Service Restoration

9. DA Application #3: Demand Response (DR)

- Dispatchable Loads
- Load Management
- Peak Shifting
- Peak Shaving And Reduction Of Peak Demand
- Applications Of Energy Storage Technologies In Demand Response

10. Distributed Generation Technologies

- Wind Turbines
- Solar Panels
- Fuel Cell
- Micro-Hydro
- Micro-Turbine
- Small Modular Reactors (SMR)
- Operation Characteristics Of DG Technologies

11. Grid Interface Technologies of DGs

- Power Electronic Converters
- Voltage Source Versus Current Source Inverters
- Control And Protection Mechanisms
- Contribution To Short Circuit Current
- Synchronous Machines
- Permanent Magnet And Self-Excited
- Control And Protection Mechanisms
- Contribution To Short Circuit Current
- Induction Machines
- Variable And Fixed Speed Technologies

- Control And Protection Mechanisms
- Contribution To Short Circuit Current

12. Integration Challenges of DGs with power grids

- Impacts Of DG Integration On The Protection Coordination
- Islanding Detection
- Impacts Of DG Integration On Voltage Regulation And System Losses
- Impacts Of DG Integration On Power Quality (Harmonics, Voltage Flickers, Sags, Swells)
- Impacts Of DG Integration On The System Reliability

13. Utilities Technical Interconnection Requirements of DGs (IEEE, Hydro One, LDCs)

- General Requirements (Safety, PCC, Grounding)
- Performance Requirements (Power Quality, Disturbances, Resonance)
- Protection Requirements
- Operating Requirements
- Telecommunication Requirements
- Reporting And Metering Requirements

14. Distribution Automation for Successful DG Integration and Deployment of Microgrids

- Mitigation Of Voltage Regulation Challenges
- Islanding Detection
- Applications Of DA To Enhance Outage Management With DG Interconnection
- What Is Microgrid?
- Differences Between Microgrids And Conventional Power Grids
- Microgrids Operation And Control: Grid-Connected And Islanded

- Distribution Systems Reliability Assessments With Consideration Of Microgrids
- Energy Management Design For Microgrids
- Techno-Economic Analysis For Microgrid Projects

CYMDIST Workshop (OPTIONAL)

By attending the workshop day, participants will have hands-on training to use commercial software tools such as EATON CYMDIST Distribution Automation Software in order to conduct the following studies:

DAY THREE

1. Distribution Power Flow (DPF) Analysis

- Single Line Diagram of Balanced and Unbalanced Distribution Systems
- Build the Model using the Graphical User Interface (Network Editor)
- Define the Input Parameters of Each Component
- Run the Simulation and conduct the following analysis:
- Voltage drop
- Feeders loading
- Power Losses
- Unbalanced Factor
- Abnormal conditions

2. Volt/Var Optimization

- Single Line Diagram of the test system
- Define the Input and Control Parameters of Volt/Var Devices
- Run the VoltVar Simulation Model

- Obtain the optimal configuration(s) of LTCs, Shunt Capacitors, and Line Regulators to:
- Reduce the System Losses
- Improve the Voltage Profile
- Peak Shaving
- Optimal Allocation of Line Voltage Regulators
- Optimal Capacitor Placement and Sizing

3. Distributed Generation Studies

- Integration Capacity Analysis
- Calculate the maximum capacity of DG that can be Installed at Each Point
- DG Impact Evaluation
- Voltage Rise
- Reverse Power Flow
- System Losses

DAY FOUR

4. Network Configuration Optimization

- Reconfigure a Radial Distribution Network to an Optimal Topology Through:
- Load Transfers
- DG Transfers
- Objectives are loss reduction, balancing of feeders lengths, and mitigate violations
- Find the Optimal Switching Plan for Power Restoration

5. Reliability Assessment Studies

- Compute Reliability Indices for the Overall Systems and Individual Customers:
- Determine the Optimal Allocation of Automatic Reclosers

- Study the Impacts of Contingencies on the Distribution System

6. Harmonic and Transient Stability Analysis

- Evaluate the impacts of non-linear loads and DGs on the System Harmonics
- Find Mitigation Methods to Harmonic Issues in Distribution Systems
- Simulate the Dynamic Behaviour of Distribution Systems with DG under the Following Events
- Fault application
- Large motor starting
- Islanding

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