



## Commissioning, Testing and Startup Of Electrical Systems Training

### Description

#### Introduction:

The safe and efficient operation of modern electrical equipment and control systems requires the successful testing, start-up and commissioning of this equipment, or system, to ensure correct operation, plus;

- Accurate troubleshooting
- Subsequent repair of this equipment, or system
- Ensuring continued productivity

#### Objectives:

- A better understanding of commissioning procedures
- A better understanding of troubleshooting procedures
- An improved capability in the use of test equipment
- A better understanding of failure modes and failure analysis
- A refreshed awareness of electrical safety concerns

#### The Course:

### The Technology of Electrical Equipment

- Transformers – Power supplies (UPS) – Batteries
- Generators – Switchgear – Disconnect switches
- Neutral ground resistors (NGR)
- Motor control centers (MCC) – Variable frequency/speed drives (VFD/VSD)
- Programmable logic controllers (PLC) – Distributed control systems (DCS)
- Power monitoring
- Control relays/timers/switches – Motor/feeder protective devices
- Miscellaneous equipment – Heaters, solenoid valves, electric valve actuators and signalling/alarm devices

## **Commissioning and Testing of Electrical Equipment**

- Methods
- Principles – Special techniques
- NEC check lists

## **Troubleshooting of Electrical Equipment**

- Methods – Terminology – Principles
- Special techniques
- Case studies/examples
- Single line drawings
- Group exercises

## **The Use of Test Equipment**

- Digital voltmeter (DVM)
- Megger
- Frequency meter
- Temperature probes/pyrometers
- Ammeters, Power meters
- Load banks
- Digital hydrometers
- Cable fault locators

## **The Interpretation and Use of Drawings**

- Single-line electrical drawings
- Control schematics
- Wiring lists
- P&ID's
- Logic and standard symbols

## **The Development of a Job Plan**

- Identification of the troubleshooting step-by-step sequence
- Procedure preparation

- Follow-up
- Safety considerations and training

### **The Identification and Repair of Problems/Failures**

- Common mode failures, Phase imbalance
- Electronic component failure, Fusing
- Fusing
- Motor windings/bearings/brushes
- Excitation circuits
- Battery cells, Inverters/rectifiers
- Inverters/rectifiers
- Bushings – Switches
- Control circuits
- Ground faults

### **A review of Safety Requirements**

- Area classifications
- NEC electrical codes, Safety Information

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