# Training Program:

## Electrical Equipment & Control Systems Commissioning, Testing & Start-Up

# 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 the correct operation plus accurate troubleshooting and subsequent repair of this equipment or system to ensure continued productivity.

The candidates are encouraged to raise queries both during and at any time after attending the seminar. They are also encouraged to bring with them any issues that they may have to this course.

# Who Should Attend?

This seminar is intended for Electrical Engineers, Electrical Supervisors and Electrical Technicians engaged in the commissioning, testing, start-up, troubleshooting, maintenance and repair of Electrical Equipment and Control Systems. Because the methods and examples are generic, personnel from all industries will benefit. Participants need no specific requirements other than good understanding of electricity and magnetism and some relevant experience

# Course Objectives:

**By the end of this course delegates will be able to:**

- 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

## Accreditation:

**BTS** attendance certificate will be issued to all attendees completing minimum of 80% of the total course duration.

## Course Outline

**The Technology of Electrical Equipment**

- Transformers
- Power supplies (UPS)
- Batteries
- Generators
- Switchgear
- Motor control centers (MCC)
- Disconnect switches
- Neutral ground resistors (NGR)
- Variable frequency speed drives (VFDVSD)
- Programmable logic controllers (PLC) and distributed control systems (DCS)
- Power monitoring
- Control relays timers switches
- Motor feeder protective devices
- Motors (AC and DC)

- Miscellaneous equipment - heaters, solenoid valves, electric valve actuators and signaling alarm devices

**Commissioning and Testing of Electrical Equipment**

- Methods
- Terminology
- Principles
- Special techniques

**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)
- Oscilloscopes
- 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
- Pand IDâ€™s , Logic and standard symbols

**The Development of a Job Plan**

- Identification of the troubleshooting step-by-step sequence
- Procedure preparation
- Documentation
- Follow-up, Safety considerations and training

**The Identification and Repair of Problems Failures**

- Common mode failures, Phase imbalance
- Contact pitting arcing

- Electronic component failure, Fusing
- Motor windings bearings brushes, Ballasts
- Excitation circuits, Battery cells, Inverters rectifiers
- Bushings, Switches, Control circuits, Ground faults

**A Review of Safety Requirements**

- Area classifications
- Electrical codes
- Safety information