Troubleshooting Of Electrical Equipment and Control Systems Training

Description

Course Description

Accurate troubleshooting and subsequent repair of electrical equipment is necessary in today's sophisticated industrial environments to ensure continued efficient operation and productivity of the equipment. Delegates are encouraged to raise queries both during and at any time after attending the course. Delegates are also encouraged to bring any specific issues that they may wish to raise to this course.

Course Objectives

- To develop a structured approach to electrical troubleshooting using common terminology and to provide troubleshooting methods and solutions for various electrical equipment and control systems problems. To develop a better understanding of various test equipment used in electrical troubleshooting.
- To develop a better understanding of various electrical equipment and control systems design, functionality and failure modes.
- To better understand work practices, which allow for successful troubleshooting including job plans.
- To provide examples of successful troubleshooting techniques and 'hands on' experiences plus case studies and group problem solving exercises.
- To provide troubleshooting methods and solutions for various electrical equipment and control systems problems.

Course Outlines

THE TECHNOLOGY OF ELECTRICAL EQUIPMENT

Definitions and descriptions of electrical equipment used in industrial applications including:

Source Equipment – transformers

- power supplies (UPS)
- batteries
- generators

Switching Equipment – switchgear

- motor control centre (MCC)
- disconnects
- contactors
- overload relays
- starters
- neutral ground resistors (NGR)

Control Equipment – variable frequency drives (VFD)

- programmable logic controllers (PLC)
- distributed control systems (DCS)
- power monitoring and control
- relays and timers
- limit switches
- temperature switches
- pressure switches
- level switches
- speed switches
- vibration switches
- safety and shutdown switches
- motor/feeder protective devices

Load Equipment – motors (AC induction, asynchronous, DC)

- heaters
- solenoids
- valve actuators
- signaling and alarm devices

TROUBLESHOOTING APPLICABLE TO THE ABOVE LIST

- methods
- terminology
- principles
- special techniques

TEST EQUIPMENT

- digital volt meter (DVM)
- oscilloscope or oscillograph
- megger

- hi-pot tester
- frequency meter
- ammeter (inline, clamp-on)
- power meter (watt, VAR)
- current transformer
- specialised equipment

TYPICAL PROBLEMS/FAILURES

- common mode failures
- phase imbalance
- contact pitting/arcing
- electronic control component failure
- blown fusing
- damaged windings
- worn bearings
- damaged brushes
- burnt ballasts
- damaged excitation circuits
- battery cell failure
- inverter/rectifier failure
- high voltage bushing failure
- switch failure
- ground fault

TYPICAL TROUBLESHOOTING JOB PLAN DEVELOPMENT

- identify troubleshooting step sequence
- prepare procedures
- documentation
- follow-up
- regulatory requirements
- training

TYPICAL ELECTRICAL DRAWINGS AND SYMBOLS

- single line
- control wiring
- distribution
- symbols