

Generator Excitation Systems Training

Description

Course Description

The successful operation of any Generating Systems ultimately depends on how well the inspection, testing, maintenance and troubleshooting functions are carried out. Well-developed procedures and planning will in the long run result in reduced costs, equipment down time, parts requirements and troubleshooting complexity. Delegates are encouraged to participate by active involvement in group discussions, practical exercises and sharing experiences.

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Course Objectives

Following the attendance at this course, participants will return to their respective departments equipped with new or refreshed skills to ensure that electrical generating equipment and it's control systems are inspected, tested, maintained and when necessary repaired using well planned troubleshooting procedures in a fashion that ensures reduced costs and/or down time plus identified faults or problems are repaired and the underlying causes are identified and eliminated to reduce further failures. On successful completion of this course, participants will have:

- A better understanding of generator principles
- A better understanding of troubleshooting procedures as applied to generating equipment
- 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

Course Outlines

Definitions

- Generator systems (AC) and equipment
- Generator systems (DC) and equipment
- Operation, inspection, testing, control, maintenance and troubleshooting
- Control systems

Interpretation and Use of Drawings

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

Maintenance Planning

- Developing schedules and procedures
- Define operation requirements for parts and labor
- Define maintenance requirements for parts and labor
- Regular, preventative, predictive and emergency maintenance

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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 Technology of Generators

- Principles of electrical generation (AC, DC and Emergency)
- Power supplies (battery chargers, rectifiers, inverters)
- Batteries
- Generator Drivers (gas/steam/water turbine, diesel/gas engine)
- Governors (control systems)
- Programmable logic controllers (PLC)
- Synchronization
- Power grid and network considerations

The Technology of Generators

- Increasing or decreasing the voltage (transformers)

- Neutral ground resistors (NGR)
- Switchgear
- Motor control centers (MCC)
- Disconnect switches
- Power monitoring
- Control relays/timers/switches
- Generator protective devices

Inspection and Testing of Generators

- Methods
- Terminology
- Principles
- Special techniques
- NEC check lists

Troubleshooting of Generators

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

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The Development of a Job Plan

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

A Review of Safety Requirements

- Area classifications
- NEC electrical codes
- Safety information

The Identification and Repair of Problems/Failures

- Common mode failures
- Phase imbalance
- Contact pitting/arcing
- Electronic component failure
- Fusing
- Generator windings/bearings/brushes
- Excitation circuits

- Battery cells
- Inverters/rectifiers/battery chargers
- Bushings
- Switches
- Control circuits
- Ground faults

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