TECHNICAL
EDUCATION
ACADEMY

School of Engineering

COURSE PROGRAMME

000321

Electrical Motors: Technology, Operation & Maintenance

The Electrical Motors: Technology, Operation & Maintenance training programme, covers AC and DC motors troubleshooting, technology and maintenance.



Learn from the Best in the Business!

Course overview

Intermediate level

Why take this course

The Electrical Motors: Technology, Operation & Maintenance training programme, covers AC and DC motors troubleshooting, technology and maintenance. The skills and knowledge covered by this system will prove invaluable for industrial maintenance technicians or anyone working in a field that uses AC and/or DC motors. This system covers major topics like AC and DC motor failures, common methods of diagnosing these failures by using a multimeter and megger meter, and troubleshooting these failures.

Motor troubleshooting includes a motor connection box to practice hands-on skills such as troubleshooting faults in a DC motor and AC single-phase and three-phase motors, evaluating DC electric motor commutator and brush health, and using a multimeter to test an AC motor start/run capacitor.

The course covers a wide variety of areas where failures can occur within AC motors (bearing failure, start windings, centrifugal switch, thermal switch) and DC motors (couplings, brushes, armature, field winding, and power supply). This array of topics allows learners to gain confidence and competence when practicing applicable hands-on skills and to see how they translate to real-world situations.

The lectrical Motors: Technology, Operation & Maintenance training course covers common types of AC and DC motor failures and causes and builds by allowing learners to study how to test, diagnose, and troubleshoot these problems. Specific objectives include listing common failures of a three-phase AC motor’s stator windings, understanding common methods used to diagnose DC motor failures, and using a megger meter to test a DC electric motor armature.

Who it is for and how it helps

This course is valuable for anyone who works on motors, people who will benefit from attending this course include maintenance technicians, HVAC maintenance and repair technicians, energy management personnel, plant & facility maintenance technicians and anyone who needs cross-training on pumps and pump systems.

What you will learn

- Apply and gain an in-depth knowledge on electric motor maintenance and troubleshooting
- Specify protection requirements for motors and maintain electrical motors
- Identify the speed control requirements for motors and discuss the essentials of motors and drives
- Enumerate the main issues with testing of motors to prevent motor bearing failure
- Troubleshoot and fix faults on motors and drives
- Discuss interface control circuits of motors with PLC’s/DCS’s
- Reduce downtime on electrical motors and improve plant safety
- Develop plant throughput and reduce spares usage and requirements

Curriculum

Modules 01–05

01 Introduction, Overview & Discussion of Objectives

02 Fundamentals of Motor Technology and Construction

- Basic Principles of Rotating Electric Machines
- Fundamental Principles of Speed Control
- Efficiency, Torque, Inertia, Horsepower/Power Factor
- Torque-Speed Curves
- Induction/Synchronous/Wound Rotor Types
- Basic Construction and Physical Configuration, Windings
- Principles of Operation and Performance

03 Three Phase Ac Induction Motors

- Components
- Theory of Operation
- Induction Motor Design
- Duty Cycles
- Insulation and Cooling Requirements
- Starting Methods Selecting motors
- Types of Faults, Fault Finding and Testing of AC Machines
- Testing Instrumentation

04 Energy Losses and Efficiency of Three Phase AC Induction Motors

- Standards
- Types of Losses Tests for Measurement and Computation of Losses and Efficiency
- Dynamometers
- Principles of Load Application By Braking
- Torque Measurement Basics
- Types of Practical Dynamometers

05 Motor Failure Analysis

- Frequent Starts

Curriculum

Modules 05–07 · Module 05 — continued

- High Inertia
- Inadequate Cooling
- Congestion on Fan Cover
- Improper Spacing at End of Motor
- Incorrect Belt Alignment
- Solid Belt Guards
- Excessive Loading Causing Bearing Clearance Problems
- Insulation Failures
- Bearing Current Problems

06 Testing

- Insulation Life and Resistance
- Polarization Index
- DC Hipot
- DC Ramp Test
- AC Hipot
- Capacitance Test
- Dissipation Factor
- Partial Discharge
- Surge Test
- Mechanical Testing
- Online Testing

07 Bearing Failure Analysis

- Bearing Failures
- Grease and Greasing
- Belt Drive Aspects
- Balance
- Storage Issues
- Service Factor Loading
- Thermal Overload

Curriculum

Modules 07–10 · Module 07 — continued

- Time Constraints
- Early Relays and New Digital Relays
- Starting and Stalling Conditions
- Over Current / Overload
- Under-Voltage / Over-Voltage

08 Protection of Motors

- Under Frequency
- Pole Slip / Out of Step
- Loss of Excitation
- Inadvertent Energization
- Over Fluxing
- Stall Protection / Acceleration Time / Start Up Supervision /Time Between Starts
- Unbalanced Supply Voltages
- Negative Sequence Currents
- De-Rating Factors
- Earth Faults – Core Balance, Residual Stabilizing Resistors
- Calculation of Protective Relay Settings

09 Motor Control

- Power Circuit
- Control Circuit
- Full Online Voltage Starting
- Reduced Voltage Starting: Delta-Star, Resistance, Reactor, Autotransformer, Soft Start
- Braking
- Speed Control
- Reversing

10 Control System for AC Variable Speed Drives

- Overall Control System
- Power Supply for the Control System

Curriculum

Modules 10–12 · Module 10 — continued

- Dc Bus Charging System
- VSD Control Loops (Open Loop/Closed Loop)
- Vector Control
- Current Feedback in Ac Variable Speed Drives
- Speed Feedback from Motor

11 Installation And Fault Finding

- General Installation and Environmental Requirements
- Power Supply Connections and Earthing
- Where to Install Contactors in Power Circuit
- Installation of Ac Converters into Metal Enclosures

12 New Technologies

- New Technologies

Joining the programme

Contact the Academy and quote course code 000321 to confirm dates, delivery format, prices and enrolment terms.

Training for your team

Tell us your business goals, the roles and number of participants, and your preferred dates and location. This will help us discuss the right training option.

Preparing for the programme

The published programme does not specify any prerequisites. Contact us before enrolling to confirm how to prepare.

Discuss your training needs

mail@tecedu.org
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