ASSETMATRIX RELIABILITY

Electrical Motor Diagnostics

This training includes Motor Circuit Analysis (MCA), conducted when the winding is De-Energized, and Electrical Signature Analysis (ESA), conducted when the winding is energized.

The principles learned during this training can also be applied to testing generators, transformers, and other electrical equipment.

5 Days (3 days for ESA, 2 days for MCA)

Lagos

These options are available to all candidates at Asset Matrix Reliability Center!

ESA (Energized) only

2 Days Course

Info:

Our two-day **Electrical Signature Analysis (ESA)** course provides the expert training needed to evaluate diverse motor systems and boost plant uptime. By mastering waveform analysis, you will learn to identify both mechanical and electrical issues early, allowing for optimized maintenance and fewer unplanned outages. Gain the practical experience necessary to enhance your predictive maintenance program and manage asset health proactively. **Register today to stop reacting to failures and start predicting them.**

Includes:

Course materials (Workbook and Pattern Recognition)

Upon Completion of this course, participants should be able to:

Electrical Signature Analysis Motor Diagnostic (ESA):

• Understand how to integrate ESA into a new or existing predictive maintenance programs (PdM) to identify & evaluate developing faults or existing faults

• Identify which electrical machines ESA can be performed on

• Understand the safety precautions associated with collecting ESA data

• Take data using the ATPOL Series (II & III) analyzer both locally and remotely on AC motors

• Create the ESA data base and upload from the ATPOL Series (II & III) to the host computer

• Describe the major components and purpose of these components in AC squirrel cage induction motors

• Explain how AC three phase power creates a rotating magnetic field and develops torque

• Calculate shaft rotating speed based on measure value of volt, current and name plate power and speed

• Describe the stages of rolling element bearing failure

• Explain the importance of spectral band width, center frequency and how to calculate bandwidth and center frequency in a frequency spectrum

• Change the spectral resolution in both the high and low frequency spectrum

• List which electrical & mechanical faults appear in the low frequency spectrum

• List which electrical & mechanical faults appear in the high frequency spectrum

• Explain the benefits of using the logarithmic display in the ESA spectral displays

• Change the resolution in both the high and low frequency

• Explain the types of signal modulation and they present themselves in the electrical spectrum

• Describe how to determine if a fault is the result of incoming power or an actual fault in the motor or driven machine

• Be able to create sideband and harmonic markers in the voltage and current spectra to accurately determine faults in the motor system

• Organize a motor system's important operating characteristics and customize each data set to each specific machine

• To create the files necessary to auto populate each machine's data sets with the machine detail's necessary for custom and automatic analysis on newly collected data.

• Explain the dynamic forces that occur with mechanical anomalies on the rotor such as unbalance, misalignment, eccentric rotor, bent shaft, etc.

• Identify which faults can be automatically analyzed using ESA

• Understand the limits and guidelines that are used in fault detection for various faults

• Using available tools, verify automatic analysis generate automatic analysis report

• Define the various failure stages associated with rolling element bearing and identify which failure stage a bearing is currently experiencing

• Describe the causes of static eccentricity, and how to identify this fault in ESA

• List the most common faults associated with squirrel cage rotor

• Determine the severity condition of rotor bars degradation using ESA

• Ability to set classify motors based on critically and establish testing intervals

MCA™ (De-Energized) only

3 Days Course

Info:

Stop motor failures in their tracks with our intensive **MCA training program**. Over three days, you will learn how to evaluate the electrical integrity of your motors to catch loose connections and winding faults before they trigger a breakdown. This course equips you with the tools to boost system reliability, cut maintenance costs, and maximize the lifespan of your equipment. **Don't wait for a crisis—enroll today to master de-energized motor testing.**

Includes:

Course materials (Workbook, Motor Circuit Analysis Manual and Pattern Recognition)

Upon Completion of this course, participants should be able to:

Motor Circuit Analysis Training Course (MCA)

• Understand why most winding insulation degradation goes undetected until catastrophic failure occurs

• Describe the main types of failures associated with AC Motors

• Develop a basic understanding of how the chemical makeup of the electrical insulations can affect its response to injected low voltage signals

• Understand the basic laws & principles of Electro-magnetism

• Review the basic physics principles such as the Oersted's & Faraday's law, combined with the theory of relativity & Maxwell's equation & other atomic & electrical laws that have led to the development our modern electrical machinery & learn how these principles combine to affect the electrical response of signals injected to the machines winding system

• Describe how changes in the insulation systems affect the R, L, Z, and I/F of the winding system

• Explain how Joule's Law, Ohms Law, and Faraday's Law affect the various measurement used in MCA

• Identify the components in the winding system; factors that determine Resistance (R), Inductance (L), Capacitance (C), and Impedance (I/F)

• Use the AT7™ to establish a machines condition using static testing & to manually measure R, L, Z, Fi and I/F

• List the different types of AC Motors, identify their components and describe the purpose of each component

• Understand how the major components are assembled and how different configurations affect motor operation, efficiency, and response to low voltage injected signals

• Review how the rotating magnetic field and torque are developed in an AC induction motor

• Understand how motor shaft speed is affected by Voltage, Current, Nameplate Speed and Rated Power

• Learn how electrical insulation fails & the various failure stages & how to use MCA™ to identify the failure stages

• Review the various techniques available to identify electrical insulation failures in winding systems

• Familiarize themselves with the various measurements and guidelines associated with MCA™

• Use MCA™ measurements to evaluate a motor's winding insulation condition

• Learn how to recognize when to correct MCA™ readings caused by "Rotor Position"

• Learn how to verify & correct for winding insulation alarms caused by "Rotor Position"

• Understand the most common faults associated squirrel cage motors

• Learn how to perform a dynamic test using the AT7™

• Learn to perform, interpret & evaluate an AC squirrel cage induction motor's winding & rotor condition using the AT7™ DYN test

• Learn how to set-up & operate the MCA™ Basic software

• Understand how to connect AT7™ to host computer, upload MCA™ tests stored in an AT7™ to MCA Basic software input buffer

• Learn how to map data from input buffer to permanent machine data base

• Learn how to create & print reports from the MCA Basic™ software.

Contact us on reliability@assetmatrixenergy.com to discuss your needs and arrange your session.
