



FROM YOUR PARTNER IN ENERGY EDUCATION

BEST GLOBAL PRACTICES

Condition-Based Maintenance

Total Approach to Failure Prediction and Analysis



EXPERT COURSE TRAINER | **ROLLY ANGELES**

Condition-Based Maintenance

Total Approach to Failure Prediction and Analysis

COURSE OVERVIEW

This course shows the importance and benefits of a Condition-Based Maintenance (CBM) program. The benefits of such a program will be realized in greater equipment reliability and longevity while enhancing budgetary cost containment goals. Operations and Maintenance will make sound maintenance and operating decisions based on actual equipment performance rather than relying on the old standard of Time-Based maintenance intervals.

COURSE OBJECTIVES

At the end of the 2 days, the participants will be able to:

- Understand the applications of CBM and PdM Strategies
- Learn the basics about the most common types of CBM
- Learn why Condition-Based Maintenance is more cost effective than the traditional Preventive Maintenance?
- Determine the advantages and disadvantages on using CBM
- Grasp the importance of the P-F curve in performing Condition-Based Maintenance
- Appreciate how PdM/CBM can save on maintenance costs

WHO SHOULD ATTEND

- All Maintenance Professionals
- Lubrication Engineers and Technicians
- Facilities Managers
- Preventive, Predictive Maintenance and CBM Group
- Reliability Engineers and Managers
- Maintenance Schedulers and Planners
- Management and Decision Makers



EXPERT COURSE TRAINER

ROLLY ANGELES

Rolly Angeles is a seasoned international reliability and maintenance consultant with 28 years of solid experience in the field. He has conducted reliability and maintenance training programs in United Arab Emirates, India, Malaysia, Indonesia, Nigeria, Bangladesh and South Africa. A former TPM Senior Engineer at Amkor Technology Phils, he now carries a portfolio of reliability & maintenance training programs that include Maintenance Management courses on TPM, Lubrication, Tribology, Condition-Based Maintenance, RCM, RCFA, Planned Maintenance, World Class Maintenance Management, The 12 Disciplines, Maintenance KPI's and Indices, Oil Contamination Control, TPM Planned Maintenance and Autonomous Maintenance and many more.



ABOUT THE MERALCO POWER ACADEMY

Meralco Power Academy (MPA) is a premier training and energy education provider that leverages on MERALCO's 113 years of industry experience, expertise and network. Its array of technical programs lend industry practitioners a competitive edge through top of the line learning solutions which are delivered in a variety of methods. MPA provides the learning platforms and coalitions for leaders, decision makers, managers and advocates by facilitating technical exchanges on global innovations and technologies on power and energy.



COURSE OUTLINE

Condition-Based Maintenance

DAY 1

Module 1: Why is Preventive Maintenance limited?

- Traditional belief by most maintenance people
- Infant mortality, random and age-related Failures
- Understanding the 6 types of failure pattern
- Understand when Predictive Maintenance is feasible
- Comparing Preventive vs Predictive Maintenance

Module 2:

Understanding the Concept of Condition-Based Maintenance

- Predictive Maintenance defined
- Understanding the P-F interval
- Determining potential failure for equipment
- CBM as a maintenance strategy
- Benefits of a CBM program in your plant

Module 3: CBM through Oil Analysis

- Understanding how oil is being contaminated and its effects
- Does oil really wear out
- Ways to remove contamination in oil
- Understanding nominal and absolute filtration
- Efficiency and beta rating of filters
- Understanding the basics of oil analysis
- Different levels of oil analysis tests
- Level 1 of oil analysis test, checking oil for its health and cleanliness through particle counter
- What is the most important oil analysis instrument
- How a particle counter works
- Understanding ISO:4406:99 code

DAY 2

Module 4: CBM through Thermography

- Understanding the different lights in the Electromagnetic Spectrum
- Basic Principles of heat transfer, conduction, convection and radiation
- Understanding the principles of infrared
- Application of infrared thermography for non-industries
- Importance of Certification Levels
- Application of infrared thermography for industries

Module 5: CBM through Vibration Monitoring

- What is machine vibration
- Why monitor vibration and how to measure it
- Time waveform analysis
- Fast Fourier Transformation
- Mounting of Accelerometer and sensors
- Causes of rotating machinery failure such as - Unbalance, Misalignment, looseness, soft foot and bearing faults
- Collecting and analyzing data on vibration
- Applications and benefits of vibration monitoring

Module 6: CBM through Ultrasonic Monitoring

- Understanding the concept of sound
- Heterodyning, translating ultrasonic to the sonic range
- Application of Ultrasonic monitoring for industries

Module 7:

How to Start a Condition-Based Maintenance Strategy in your plant

- Roadmap of activities on starting a CBM strategy