Training Title

MACHINERY FAILURE ANALYSIS, PREVENTION AND TROUBLESHOOTING

Training Duration

5 days

Training Venue and Dates

REF RM021	Machinery Failure Analysis, Prevention and Troubleshooting	5	11-15 April 2021	$4,500	Dubai, UAE

In any of the 5 star hotel. The exact venue will be informed once finalized.

Training Fees

- **4,500US$ per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Buffet Lunch**

Training Certificate

Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.

TRAINING OVERVIEW

TRAINING DESCRIPTION

The course presents understanding of equipment failure characteristics. To achieve an optimal maintenance program that meets specified safety, environmental, and economic goals. Participants will learn to preserve equipment functions by identifying appropriate predictive maintenance (PdM) tasks, failure finding tasks and other actions that protect against failure or mitigate the consequences of failure

This course present a systematic approach to fault diagnosis and failure prevention in a broad range of machinery used in many industries. The key routes to preventive maintenance are demonstrated through both overview and the study of examples in different failure analysis and a sequential approach to machinery trouble-shooting and problem solving

Failure analysis, Troubleshooting and Predictive & Planned Maintenance techniques, including vibration analysis, oil analysis, and others techniques are discussed in the course with a view to optimising the maintenance engineering effort while maximising production

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This course provides the fundamentals of PdM and condition monitoring applicable to plants, facilities and manufacturing lines. Predictive Maintenance & Condition Monitoring will provide Participants with a framework to make the right decisions on what equipment needs condition monitoring, what technologies to use to meet their needs and how to measure the effectiveness of their decisions

TRAINING OBJECTIVES

Participants will learn how to collect, analyze and interpret failure statistics and will also gain an understanding of FMECA.
Participants will be instructed in condition monitoring methods and will be taught how vibration analysis can be used to detect, locate, severity assess and diagnose a range of common faults in machines

Upon the successful completion of this course the participant shall be able to:

- **understand the principles of failure analysis in process plant**
- **An understanding of Machine Failure Analysis and Troubleshooting techniques**
- **learn about machinery troubleshooting in pumps, centrifugal compressors, , gas turbines and electric motors**
- **Describe the Benefits of a PdM & Condition Monitoring Program**
- **Identify What Equipment to Monitor**
- **Predict What Maintenance Needs to be done and When**
- **An understanding of a range of Planned & Predictive Maintenance Technologies**
- **Knowledge of the potential contribution of each these technologies to maintenance efficiency**
- **Guidelines indicating how these technologies can interact with and support each other**

WHO SHOULD ATTEND

- **This seminar is directed towards Supervisors, Team Leaders and Managers in Maintenance, Engineering and Production. The seminar will also benefit anyone who wishes to update themselves on Predictive Maintenance Technologies and Failure Analysis techniques, as well as those who have to judge the suitability of these technologies for their needs, and learn how to implement them for the benefit of their organizations**

TRAINING METHODOLOGY:

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will

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start by raising the most relevant questions, and motivate everybody find the right answers. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course. Very useful Course Materials will be given.

- **30% Lectures**
- **30% Workshops and work presentation**
- **20% Group Work& Practical Exercises**
- **20% Videos& General Discussions**

DAILY OUTLINE

Module 1

Failure Analysis techniques
Equipment failure
Six patterns of component failure rate over life
Controlling introduced failure
Failure rate bathtub curve
Where to start: equipment criticality or risk

Failure analysis tools
Failure Mode & Effects Analysis
Reliability Centered Maintenance
Computer Maintenance Management Systems
Failure analysis - closing the loop
Root cause failure analysis (rcfa

Building a system for equipment condition indicating

- **Equipment data**
- **Failure data**
- **Maintenance data**
- **Data format**

Module 2

Failure and maintenance notations
Failure descriptors
Failure causes
Method of detection
Maintenance activity

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Data requirements for various applications
Electrical motor
Gas turbines
Pumps
Compressors

Module 3

The Basic Concept of Predictive Maintenance
The Top 6 Benefits of Predictive Maintenance
Establishing a Predictive Maintenance Program
Goals, objectives, and benefits
Functional requirements
Selling predictive maintenance programs
Selecting a predictive maintenance
System
Database development
Getting started
The optimum predictive maintenance Program
How to Choose the Right PdM Technologies
Four Reasons Why PdM Doesn't Work
Are You Collecting The Right Data?

World-Class Maintenance

Module 4

Predictive Maintenance – PdM
Scheduled predictive
Predictive Technologies
Condition Monitoring Technologies
Vibration Analysis
General Analysis Method
IR Thermography
Ultrasonic Leak Detection
Oil and Wear Particle Analysis
Oil Analysis
Motor Circuit
Surface Flaw Detection
Liquid Penetration
Magnetic Particle

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Sub-Surface Flaw Detection
Ultrasonic Thickness (Auto/Manual)
Eddy Current
Radiography
Endscope (Borescope) inspection

Module 5

Vibration analysis
Introduction
Data acquisition
Data interpretation
Vibration due to plane (journal) bearings
Vibration due to resonance
Turbomachinery problems
Vibration problems with specific machinery types
Gearbox vibration

Condition Monitoring
Condition Monitoring
The machine life cycle
Standards Organizations
List of BS/ ISO condition monitoring standard
BS ISO 17359
Computer application in machine condition monitoring

NOTE:
Pre & Post Tests will be conducted
Post tests will be with minimum pass marks
Case Studies, Individual & Group Exercises, Project works (making in to groups), Role plays, Group Discussions, Last Day Review & Assessments will be carried out as applicable.

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