**Training Title**

# MACHINERY FAILURE ANALYSIS, PREVENTION, AND TROUBLESHOOTING

**Training Duration**

**5 days**

**Training Venue and Dates**

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|---|---|---|---|---|---|
| REF RM021 | Machinery Failure Analysis, Prevention and Troubleshooting | 5 | 14-18 April 2025 | $5,500 | Dubai, UAE |

**In any of the 4 or 5-star hotel. The exact venue will be informed once finalized.**

**Training Fees**

- **$5,500 per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Lunch**

**Training Certificate**

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

**TRAINING OVERVIEW**

**TRAINING DESCRIPTION**

**The course presents an 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 (Pd.M.) tasks, failure finding tasks and other actions that protect against failure or mitigate the consequences of failure.**

**This course presents 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 troubleshooting and problem solving.**

**Failure analysis, Troubleshooting and Predictive & Planned Maintenance techniques, including vibration analysis, oil analysis, and other techniques are discussed in the course with a view to optimizing the maintenance engineering effort while maximizing production.**

**This course provides the fundamentals of Pd.M. 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**



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## 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 start by raising the most relevant questions and motivating 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**



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**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**
**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 Pd.M. Technologies**
**Four Reasons Why Pd.M. Doesn't Work**
**Are You Collecting the Right Data?**
**World-Class Maintenance**

## Module 4





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**Predictive Maintenance – Pd.M.**
**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**
**Sub-Surface Flaw Detection**
**Ultrasonic Thickness (Auto/Manual)**
**Eddy Current**
**Radiography**
**Endoscope (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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