

**Training Title**

**CONDITION MONITORING COURSE**

**Training Duration**

5 days

**Training Venue and Dates**

REF					
RM035	Condition Monitoring Course	5	06-10 May	\$4,250	Dubai, UAE

In any of the 5 star hotels. The exact venue will be intimated soon.

**Training Fees**

- 4,250 US\$ 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.

**COURSE DESCRIPTION**

This training program is designed to provide valuable information on machine condition monitoring as a tool for quickly identifying and correcting the root causes of machinery problems, achieving precise operation, and improving machinery performance. Special emphasis is given to trouble shooting, data interpretation, health assessment, and maintenance decision-making.

**COURSE OBJECTIVE**

- Principles and Introduction
- Inspection
- Vibration Measurement and analysis
- Other Monitoring Techniques
- Condition Monitoring, failure analysis

**WHAT YOU WILL LEARN:** [www.definettraining.com](http://www.definettraining.com)

- How to identify mechanical, electrical and stationary failure modes using PdM technologies  
How to strike the right balance between PM and PdM
- How to identify the Common Traps of each technology
- The principles of PdM and the reasons why it's so powerful
- Where the resources will come from: 3 different strategies to consider and the pros and cons of each
- How much PdM is enough – what you can learn from best practice organizations and benchmarks
- How to use LEAN tools to make your PdM program self-funding every step of the way – without increasing headcount
- Asset Health – what it is and how to measure it

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## WHO SHOULD ATTEND?

This training course is intended for maintenance engineering, planner, scheduler, supervisors and technician working in the field of Condition Monitoring, vibration, Preventive & predictive maintenance and for those wishing to specialize in this area, or as an update to the latest developments for those who already work in this area. Because the methods and examples are generic, personnel from all disciplines will benefit

## 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 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

### Principles and Introduction

Condition Monitoring

Scheduled predictive

Predictive Technologies

Putting It All Together

Predictive Maintenance

Data Collection

Instruments and Aids for Condition Monitoring and Troubleshooting

Types of measurement - Accuracy and Considerations

Accuracy and Considerations

### Part 1

Inspection

Inspection guide lines

Inspection Frequency

Safety Devices

Inspection Procedures

Rotating Equipment Condition Monitoring

(a) Rolling-Element Bearings

- (b) Hydrodynamic Radial Bearings
- (c) Hydrodynamic Thrust Bearings
- (d) Rotors
- (e) Oil Systems
- (f) Gearing
- (g) Gear-Tooth Couplings
- (h) Coupling Alignment
- (m) Gas Turbines

**Condition monitoring - methods and applications**

- 1.Vibration
- 2.Noise
- 3.Temperature
- 4.Oil
- 5.Visual – General
- 6.Seal Flowrate - Seal condition

**Shaft Alignment**

**Alignment tools and equipment**

**Dial indicators.**

**Face and Rim Methods**

**Procedure**

**The reverse indicator method**

**Procedure**

**Laser alignment**

**Laser alignment procedure**

**Part2**

**Inspection and measurement Devices**

- Temperature
- Temperature Measuring Sensors
- Machine Alignment (Laser)
- Vibration Meters
- Oil Analysis
- Ultrasonic Diagnostic Systems
- Belt and Pulley Alignment
- Tachometers
- Hygrometers and Psychrometers
- Temperature Switch, Controller or Monitor
- Gas Monitoring
- Flow and Level
- Liquid Analysis
- Sound Meters
- Ultrasonic Thickness
- Material Inspection

**Part 3**

**Vibration Measurement and analysis**

## VIBRATION ANALYSIS

### Introduction

Machine History

Machine Characteristics

### Data Acquisition

Vibration Amplitude versus Frequency Analysis

Importance of Tri-Axial Reading

The Machine Sketch

Machinery Vibration Signature

Supporting Information

### Obtaining Amplitude versus Frequency Data

Waterfall Diagram

### Amplitude/Phase versus Machine Rpm

### Data Interpretation

Identifying the Type of Rotor Unbalance

Determining Machinery Condition

### Controlling Normal Vibration

### Controlling Radiated Noise

### Special Techniques for Monitoring Bearing Condition

### Vibration Due To Plane (Journal) Bearings

Oil Whirl

Dry Whirl

### Vibration Due To Resonance

### Turbomachinery Problems

### Friction Induced (Hysteresis) Whirl

Aerodynamic Cross Coupling

Surging

Choking (Stone-Walling)

### Vibration Problems with Specific Machinery Types

Centrifugal Pumps

Hydraulic Forces

Cavitation

Re-Circulation

### Vibration of Reciprocating Machines

Gearbox Vibration

## Part 4

### Other Monitoring Techniques

### Condition Monitoring Technologies

- 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
- Fluoroscopy
- Endscope (Borescope) inspection

#### Machinery Diagnostics

- Seals
- Bearings
- Bearing Material
- Inspection Requirements
- Bearing Installation and Removal
- Pumps
- Failure modes
- Compressors
- Introduction
- Compressor failure modes
- Electric motors
- Types of DC Motors
- Types of Polyphase AC Motors

#### Part 5

Building failure analysis system

Abbreviations

Building a system for equipment condition indicating

- a) Equipment data
- b) Failure data
- c) Maintenance data
- d) Data format

Failure and maintenance notations

Failure descriptors

Failure causes

Method of detection

Maintenance activity

Data requirements for various applications

- Electric motors
- Equipment unit subdivision — Electric motors
- Failure modes — Electric motors15
- Taxonomy classification — Gas turbines
- Equipment unit subdivision — Gas turbine
- Equipment unit specific data — Gas turbines
- Failure modes — Gas turbines

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- Pumps
- Taxonomy classification — Pumps
- Equipment unit subdivision — Pumps
- Equipment boundary — Pumps
- Equipment unit specific data — Pumps
- Failure modes — Pumps
- Compressors
- Taxonomy classification — Compressors
- Equipment unit subdivision — Compressors
- Equipment unit specific data — Compressors
- Failure modes — Compressors

The machine life cycle

Standards Organizations

List of BS/ ISO condition monitoring standard

BS ISO 17359:

Computer application in machine condition monitoring

Case Studies Discussions, Last Day Review and Assessments will be carried out



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