Training Title
VIBRATION ANALYSIS & PRACTICAL SOLUTIONS

Training Duration
5 Days

Training Venue and Dates

REF ME084	Vibration Analysis & Practical Solutions	5	23 – 27 June 2025	$6,500	London, UK

In any of the 4 or 5-star hotels. The exact venue will be informed soon.

Training Fees
- **$6,500 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 DESCRIPTION
This course provides a detailed examination of the detection, location, and diagnosis of faults in rotating and reciprocating machinery using vibration analysis. The basics and underlying physics of vibration signals are first examined. The acquisition and processing of signals is then reviewed followed by a discussion of machinery fault diagnosis using vibration analysis. The course concludes with a review of the other techniques of predictive maintenance such as oil and particle analysis, ultrasound, and infrared thermography with an introduction to automated machine condition monitoring.

TRAINING OBJECTIVES
Upon completing this course, participants will be able to:
- Understand the basics of vibration measurement
- Demonstrate the basics of signal analysis
- Understand measurement and the characteristics of vibration signals
- Understand how to use Data Acquisition Equipment for vibration signals
- Apply vibration analysis for different machinery faults
- Apply specific techniques for pumps, compressors, engines, turbines and motors
- Apply vibration-based fault detection and diagnostic techniques
- Diagnose machinery-related problems with vibration analysis techniques
- Apply advanced signal processing techniques and tools to Vibration analysis
- Detect, locate, and diagnose faults in rotating and reciprocating machinery using vibration analysis techniques
- Identify conditions of resonance and be able to rectify these problems

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- Understand the basic advantages of allied predictive techniques such as oil analysis, thermography, ultrasonics, and performance evaluation

WHO SHOULD ATTEND

Engineers, engineering supervisors, and managers responsible for designing or qualifying mechanical components, equipment, piping, and structures subjected to dynamic forces; those responsible for auditing, reviewing, or approving shock and vibration analysis tasks. Those with a few years of experience in vibration analysis as well as those who are new to the area will benefit.

TRAINING METHODOLOGY

A highly interactive combination of lecture and discussion sessions will be managed to maximize the amount and quality of information, knowledge, and experience transfer. The sessions will start by raising the most relevant questions and motivating everybody to find the right answers. The attendants will also be encouraged to raise more of their questions and to share developing the right answers using their analysis and experience
All attendees receive a course manual as a reference.

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

COURSE OVERVIEW

Enhance the knowledge level of a group of fresh Mechanical Engineers with reasonable background on vibration, its analysis & use as a diagnostic tool; imbalance, and basic balancing

DAILY OUTLINE IN DETAIL

The following topics will be covered in 5 days

Introduction

- Definition of Machinery Monitoring, Fault Diagnostics and Failure
- Maintenance Strategies and their application (pros and cons)
- Principles of Predictive Maintenance (including specific tasks)
- Periodic Monitoring versus Continuous Monitoring
- Various Techniques of Predictive Maintenance
- Vibration Analysis as a Key Technique

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Root-Mean-Square
VIBRATION DATA TYPES AND FORMATS

ANALYSIS TECHNIQUES
TRENDING
Broadband

Narrowband
Industrial Reference Data
Vibration monitoring overview
MACHINE-TRAIN MONITORING PARAMETERS
TRENDING ANALYSIS

Part 2 Machine vibration
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 the 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 (stonewalling)
Vibration problems with specific machinery types

Centrifugal pumps
    Hydraulic forces
        Cavitation
        Re-circulation
Vibration of reciprocating machines

Part 3 Non-Vibration-Based Techniques

- **Costs versus Benefits**
- **Visual Monitoring**
- **Performance Monitoring**
- **Oil Quality Analysis**
- **Wear Particle Analysis**
- **Acoustic Emission**
- **Thermography (thermal imaging)**

NOTE:
Pre & Post Tests will be conducted
Case Studies, Group Exercises, Group Discussions, Last Day Reviews and assessments will be carried out.