Training Title
VIBRATION ANALYSIS & PRACTICAL SOLUTIONS

Training Duration
5 Days

Training Venue and Dates

REF ME053	Vibration Analysis & Practical Solutions	5	31 January -04 February, 2021	$4,500	Dubai, UAE

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

Training Fees
- **4,500 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 OVERVIEW
Enhance the knowledge level of, a group of fresh Mechanical Engineers with reasonable background on vibration, it's analysis & use as diagnostic tool; imbalance and basic of balancing

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 is concluded by 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
- 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 motivate everybody finding the right answers. The attendants will also be encouraged to raise more of their own questions and to share developing the right answers using their own analysis and experience
All attendees receive a course manual as a reference.

DAILY OUTLINE IN DETAIL
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

Part 1 THEORY: INTRODUCTION TO VIBRATION ANALYSIS
Chapter 1 introduction
Chapter 2vibration analysis applications

Chapter 3 vibration analysis overview

Theoretical vibration profiles
Actual vibration profiles
Time domain
Vibration measuring equipment
Transducer
Portable vibration analyzer

Chapter 4

Vibration sources

Rotating machinery
Rotor imbalance
Flow instability and operating conditions
Mechanical motion and forces
Reciprocating and/or linear-motion machinery
Sources of vibration

Chapter 5

Vibration theory

Periodic motion
Harmonic motion
Measurable parameters
Frequency
Amplitude
Maximum Vibration Measurement
Displacement
Velocity
Acceleration

Measurement Classifications

Broadband or Overall

Narrowband

Component

Common Elements of Curves
Peak-to- Peak
Zero-to-Peak
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 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

DMCT/OL/9/18(Rev3Dt:23/9/18)

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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 Review &Assessments will be carried out.

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