Training Title:
VIBRATION ANALYSIS & CONDITION MONITORING

Training Duration:
5 Days

Training Venue and Dates

ME053	Vibration Analysis & Condition Monitoring	5	01-05 July 2024	$5,500	Dubai, UAE

In any of the 5 star hotel. Exact venue will be informed soon.

Training Fees
- **$5,500 per participant for Public Training including Course Materials/Handouts, Tea/Coffee, Refreshments & International Buffet Lunch**

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

TRAINING OVERVIEW
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. Hereafter the important issue of rectifying faults that have been identified using vibration analysis is covered. The course is concluded by a review of the other techniques of predictive maintenance such as oil and particle analysis, ultrasound and infrared thermography. The latest approaches and equipment used together with current research techniques in vibration analysis are also highlighted in the course.

TRAINING OBJECTIVES

- **Calibrate & maintain VMS, TMS & CMS Systems and carry out machinery failure analysis & condition monitoring**
- **Understand the basics of vibration measurement**
- **Demonstrate the basics of signal analysis**
- **Understand measurement and the characteristics of vibration signals**
- **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**
- **Apply allied predictive techniques such as oil analysis, thermography, ultrasonics and performance evaluation**

WHO SHOULD ATTEND?

- **Foreman / Snr Foreman / Supervisor / Engineer**
- **Instrumentation and Control Engineers**
- **Maintenance Engineers**
- **Control Technicians**
- **Electrical Engineers**
- **Electricians**
- **Maintenance Engineers and technicians**

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 to find the right answers. The delegates will also be encouraged to raise their own questions and to share in the development of the right answers using their own analysis and experiences.

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

TRAINING OUTCOME

- **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.**
- **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.**
- **Apply allied predictive techniques such as oil analysis, thermography, ultrasonics and performance evaluation Discussions and Last Day Assessments will be carried out.**

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

DAILY COURSE OUTLINE

DAY 1
- **VIBRATION ANALYSIS**
- **Introduction about condition monitoring systems**
- **Thermography**
- **Oil analysis**
- **Ultrasound**
- **Industrial video scope system**
- **Motor view**
- **Vibration**

DAY 2
- **What Is Vibration And How Can It Be Used To Evaluate Machinery Condition ?**
- **Introduction**
- **What Is Vibration Frequency And How Does It Relate To A Time Wave Form ?**
- **What Is Vibration Displacement?**
- **What Is Vibration Velocity?**
- **What Is Vibration Acceleration?**
- **What Is Vibration Phase?**
- **What Is the Vibration Spectrum?**
- **Difference between RMS, Peak and Peak-Peak Vibration Amplitude?**
- **When To Use Displacement, Velocity or Acceleration?**
- **Is Too Much Vibration?**
- **What Is Overall Vibration?**
- **Understanding Phase and Its Application?**
- **How to Make Phase Measurements?**
- **Using Phase Analysis in Vibration Diagnostics?**

DAY 3
- **Overview of Vibration Transducer and How to Properly Select Them**
- **Introduction**
- **Types Of Vibration Transducers and Their Optimum Applications**
- **Accelerometers**
- **Velocity Pickups**
- **Noncontact Eddy Current Displacement Probes**
- **Shaft Contact Displacement Probes**
- **Shaft Sticks**
- **Shaft Riders**
- **Selection Criteria**
- **Mounting of Transducer**
- **Transducer Mounting Application**

DAY 4

- **Proven Method for Specifying Spectral Band Levels and Frequencies Using today's Predictive Maintenance Software System**
- **Brief Review Problems Detectable by Vibration Analysis**
- **Specification of Overall Vibration Alarm Bands for Various Machine Types**
- **How to Specify Spectral Alarm Bands for Various Machine Types and Configurations**
- **Examples of Various Machines with Spectral Alarm Bands Specified for Them**
- **Common Pitfalls in Everyday Vibration Measurements**
- **Introduction**
- **Choosing Measurements Location**
- **Machine and Point Identification**
- **Measurement Parameters**
- **Instrument Selection, Setup, And Condition**
- **Measurements Techniques**
- **Transducer Mounting and Probes**
- **Effect of Transducer Mounting on Vibration Measurements**
- **Digital Signal Processing**
- **Introduction**
- **Related Time waveform Length and Frequency Band Width to Sampling Rate and Sample Size**
- **Choose The Correct Analysis Window for Each Vibration Analysis Opportunity**
- **Recognize Limitation of Digital Signal Processing**

DAY 5

- **Introduction to Vibration Signature Analysis and How to Diagnose Machine Operating Condition.**
- **Mass Unbalance**
- **Eccentric Rotors**
- **Bent Shaft**
- **Misalignment**
- **Mechanical Looseness**
- **Practical Case study**
- **Tracking Of Rolling Element Bearings Failure Stage Using Vibration Signature Analysis**
- **Journal Bearings Failure**
- **Gear Problem Detection**
- **Electrical Problem Detection**
- **Belt Drive Problem**
- **Resonance Problem**
- **Hydraulic And Aerodynamic Forces Problem**
- **Rubbing**
- **Practical case study**

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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