

Training Title VIBRATION ANALYSIS & PRACTICAL SOLUTIONS

<u>Training Duration</u> 5 Days

Training Venue and Dates

ME053			29 Jan 02 Feb.		
	Vibration Analysis & Practical Solutions	5	2024	\$5,500	Dubai, UAE

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

Training Fees

• \$5,500 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 to find 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

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

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

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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 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:

<u>Pre & Post Tests will be conducted.</u> <u>Case Studies, Group Exercises, Group Discussions, Last Day Review & Assessments will</u> <u>be carried out.</u>



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