

**Training Title**

**BENTLEY NEVADA COURSE: PREVENTIVE MAINTENANCE & CONDITION MONITORING, RBI, RCA, RCM METHODOLOGIES**

**Training Duration**

5 days

**Training Venue and Dates**

|              |  |   |                       |         |            |
|--------------|--|---|-----------------------|---------|------------|
| REF<br>MI072 | Bentley Nevada Course:<br>Preventive Maintenance &<br>Condition Monitoring, Rbi, Rca,<br>Rcm Methodologies | 5 | 26 – 30 August<br>'18 | \$4,250 | Dubai, UAE |
|--------------|--|---|-----------------------|---------|------------|

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

**Training Fees**

- 4,250 US\$ per participant includes Training Materials/Handouts, Tea/Coffee breaks, Refreshments and International Buffet Lunch.

**Training Certificate**

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

**COURSE OVERVIEW**

Maintenance of machinery and assets is a complex process in any industry regardless of its scope. Complexity of maintenance emerges from the variability of maintenance tasks, the impossibility of expecting most of the failures and hence the repair requests, and the variety and limitation of resources to be applied.

This course provides the basics and applications of maintenance techniques such as *Preventive Maintenance & Condition Monitoring, RBI, RCA, RCM* required for any successful maintenance program. The main purpose of this training course is to provide the trainees with the effective ways for good understanding and consequent control of maintenance process.

**TRAINING OBJECTIVES**

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- List the maintenance types
- Explain the main concepts of preventive maintenance
- Discuss the techniques of condition monitoring.
- Learn the basic concepts of vibration.
- List the various instruments to measure vibration.
- Explain the steps of machinery vibration analysis.
- Discuss the functions of Risk-Based Inspection
- Explain the applications of Reliability centered Maintenance (RCM)
- Explain the procedure applied in Root Cause Analysis (RCA)

**WHO SHOULD ATTEND?**

- Engineers
- Senior Engineers
- Supervisors

**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

**COURSE OUTLINE**

**Day 1**

Techniques

Equipment Failure

How Equipment Fails

Six patterns of component failure rate over life

Causes of failure

Failure Rate Bathtub Curve

Failure Rate Changes over operational life Stages

Where to Start: Equipment Criticality Or Risk

Reliability Centered Maintenance (RCM) Overview

Failure Analysis - Closing The Loop

Root Cause Failure Analysis (RCFA)

Failure Hierarchies

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**FMEA & FMECA**

Introduction

Purpose and objectives of the analysis

Failure modes and effects analysis

General considerations

Preliminary tasks

Benefits of FMEA

Summary of procedures for FMEA

Building a system for equipment condition indicating

a) Equipment data

b) Failure data

- c) Maintenance data
- d) Data format



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Failure and maintenance notations  
Failure descriptors  
Failure causes  
Method of detection

**Day2**

Preventive maintenance methodologies  
PM planning and scheduling  
Set up the PM plan  
Strategic Reliability  
Reliability Engineering  
Reliability basics  
Reliability prediction  
Reliability assessment  
Life cycle assessment  
FMEA & FMECA  
Principles of RBI (risk based inspection),  
RCA (root cause analysis)  
Reliability Maintenance  
Strategies  
CBM, RBM, RCM & PdM  
CMMS  
Maintenance roles & responsibilities

**Day 3**

**USING PREDICTIVE MAINTENANCE.**

Vibration Analysis  
Introduction to Vibration Analysis  
Frequency Analysis and the Fast Fourier Transform  
Vibration Transducers  
Basic Failure Mechanisms with examples  
Vibration Standards and Alarm Levels  
Vibration Diagnostics  
Amplitude Demodulation – aka Enveloping, SSE, HFD, Peak-Vue  
Vibration on Rolling Element Bearings  
Resonance – identification & cure

**Other Predictive Maintenance Techniques**

Infrared Thermography  
Thermographic applications  
Passive Ultrasonics - contact and non-contact  
Ultrasonic Applications  
Tribology – oil analysis

**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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