

# **PREVENTIVE & PREDICTIVE MAINTENANCE OF ROTATING EQUIPMENT**



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**TRAINING TITLE**

PREVENTIVE & PREDICTIVE MAINTENANCE OF ROTATING EQUIPMENT

**VENUE**

Dubai, UAE

**DURATION**

5 Days

**DATES**

20 – 24 June 2021

**PRICE**

US\$4,000 per attendee including training material/handouts, morning/afternoon coffee breaks and Lunch buffet.

**TRAINING INTRODUCTION**

This is a five-day course on Rotary Machinery Preventive and Predictive Maintenance. Different maintenance strategies will be discussed; elements of each maintenance strategy, their advantages and disadvantages will be explored. The selection of the appropriate strategy that fit the mode of failure and results in the minimum time between repair and that leads to least down time and maintenance cost is one of the maintenance engineer duty that must be mastered. Tools and measurements involved in each maintenance strategy must also be recognized and deeply understood. To apply the above techniques effectively on the Rotary Machinery, one should be aware of their failure modes, and methods of troubleshooting. The above will applied on different type of Rotary Machinery like pumps, compressors, and Turbines.

**TRAINING OBJECTIVES**

**Upon successful completion of this course, the delegates will be able to:**

- ✓ Apply the latest techniques and procedures of excellence in maintenance and reliability management and establish the environment for improvement
- ✓ Recognize the aspects of maintenance today through the various types of maintenance including maintenance strategy development and productive maintenance

- ✓ Apply maintenance business model, maintenance organization, and business elements and identify the different equipment failure patterns and the reasons why equipment fails
- ✓ Determine the process of developing maintenance objectives in accordance to the business plan, R&M policy and maintenance strategy, discuss the significance of equipment plans in maintenance planning and identify several equipment plans development, approaches and plan options
- ✓ Employ the methods of preventive maintenance and condition monitoring such as vibration monitoring, equipment monitoring frequency and infrared thermography
- ✓ Implement the procedure of work selection in accordance with work screening procedure, work request requirements, prioritization systems and cost benefits
- ✓ Carryout various strategies of work planning and scheduling by identifying the planning effectiveness, planners and staffing, routine maintenance planning and use of various planning tools and specify the different proven turnaround practices in accordance with success factors and management practices
- ✓ Recognize the purpose of work execution & job completion and characterize its advantages and disadvantages, implement the methods of maintenance quality assurance and continuous improvement and employ the method of Root Cause Failure Analysis (RCFA)
- ✓ Apply the various stewardship and performance metrics such as performance work management, KPIs, maintenance effectiveness metrics and work force utilization metrics
- ✓ Distinguish the factors of human reliability through classification of human error and human reliability analysis, familiarize the different reliability tools using life cycle cost analysis and life data analysis and discuss the key elements of reliability engineering and how to manage assets in projects

## **TRAINING AUDIENCE**

Engineers, technicians and managers responsible for selection, installation, machinery failure analysis, troubleshooting and maintenance of different rotary machines like pumps, compressors, fans, blowers, steam turbines, gas turbines will benefit from this course.

## **TRAINING OUTLINE**

**The following topics will be covered in the course over five working days**

### **Ch 1 Maintenance Strategies**

#### **Maintenance Strategies**

- Corrective Maintenance

- Breakdown Maintenance

- Preventive Maintenance

- Predictive Maintenance

- Corrective Maintenance

Effective Preventive Maintenance

Planning & Scheduling

Mode of Failures

Coordination with Production

Opportunity Preventive Maintenance Activities

Predictive Maintenance Techniques

Vibration monitoring

Thermography

Tribology

Visual inspections

Ultrasonics

Process Parameters

## **Ch 2 Causes of Machinery Failure**

### **Improper Specifications**

Improper Sizing

Material Deterioration

Overstressing

Material Corrosion

Overheating

Fatigue Failure

Brittlement Failure

Misalignment

Cold versus Hot Alignment

Alignment Tolerances

Imbalance

Causes of Imbalance

Level of Balancing

Vibration due to Imbalance

Off-design Operation

Range of Acceptable Operation

Limits of Operation

Controlling Systems

Lubrication Systems

Bearings

Seals

Control Systems

Installation Problems

## Piping Stresses

### **Ch 3 Root Cause and Troubleshooting**

- Failure Consequences

- Failure Modes

- Age-related Failure

- Failure which are not age-related

The Failure Process

- The Six Failure Patterns

- Technical History Data

- Failure Finding Task

### **Ch 4 Failure Prevention**

- Proper Specifications

- Codes and Standards

- Proper Operation

- Protective and Safety Devices

- Proper Training

Monitoring Systems

- Maintenance Planning

### **Ch5 Applications and Case Studies**

- Pumps

- Fans and Blowers

- Compressors

- Steam Turbines

- Gas Turbines

## **TRAINING CERTIFICATE**

**MAESTRO CONSULTANTS** Certificate of Completion for delegates who attend and complete the training course

## **METHODOLOGY**

Our courses are highly interactive, typically taking a case study approach that we have found to be an effective method of fostering discussions and transferring knowledge. Participants will learn by active participation during the program through the use of individual exercises, questionnaires, team exercises, training videos and discussions of “real life” issues in their organizations.

The material has been designed to enable delegates to apply all of the material with immediate effect back in the workplace.