

PREVENTIVE & PREDICTIVE MAINTENANCE OF ROTATING EQUIPMENTS



**MUE257
Mechanical &
Utility
Engineering**

COURSE TITLE**PREVENTIVE & PREDICTIVE MAINTENANCE OF ROTATING EQUIPMENTS****COURSE DATE/ VENUE**

26 – 30 October 2020

London, UK

COURSE REFERENCE

MUE257

COURSE DURATION

05 Days

DISCIPLINE

Mechanical & Utility Engineering

**COURSE 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.

COURSE OBJECTIVE

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

COURSE 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.

COURSE CONTENT

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
- Brittleness 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

Loop Oil 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

Ch 5 Applications and Case Studies

- Pumps
- Fans and Blowers
- Compressors
- Steam Turbines
- Gas Turbines



COURSE CERTIFICATE

TRAINIT ACADEMY will award an internationally recognized certificate(s) for each delegate on completion of training.

COURSE FEES

\$6,150 per Delegate. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

COURSE METHODOLOGY

The training course will be highly participatory and the course leader will present, guide and facilitate learning, using a range of methods including formal presentation,

discussions, sector-specific case studies and exercises. Above all, the course leader will make extensive use of real-life case examples in which he has been personally involved. 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.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Case studies & Practical Exercises
- 10% Role Play
- 10% Videos, Software or Simulators (as applicable) & General Discussions

