



Mechanical Engineering

Machinery Failure, Vibration & Predictive Maintenance

Course Introduction

Machines deteriorate as they get older so we can expect a certain amount of performance falloff and general deterioration of the machine. If we understand the failure mechanisms that are in place we can identify which parameters best indicate the deterioration of the machine.

Failure analysis and Predictive Maintenance techniques, including vibration analysis, are discussed in the training course with a view to optimising the maintenance engineering effort while maximising production. Other techniques that will be addressed include infrared thermography, passive ultrasonics, tribology and performance monitoring.

Target Audience

- Automotive Engineer
- Boiler Engineer
- Ceramics Engineer
- Equipment Engineer
- High-Pressure Engineer
- Marine Engineer
- Mechanical Design Engineer
- Mechanical Engineer
- Naval Architect
- Pipeline Engineer
- Power Engineer
- Rotating Equipment Engineer
- Senior Mechanical Engineer
- Turbine Engineer
- Validation Engineer

Learning Objectives

- An understanding of Machine Failure Analysis techniques
- An understanding of a range of Predictive Maintenance Technologies
- Knowledge of the potential contribution of each these technologies to maintenance efficiency
- Guidelines indicating how these technologies can interact with and support each other
- Hints and Tips for practical application of these technologies so as to achieve the best results

Course Outline

• 01 DAY ONE

Understanding Failures

- Machine Failure Analysis
- Wear and Tribology
- Fatigue Mechanisms
- Plain, Tilt-pad and Anti-friction Bearing and Seal Failures

• 02 DAY TWO

Reliability Fundamentals and Methods for Avoiding Failures

- Fundamentals of Reliability of Machinery
- Reliability Determination and Assessment Methods
- Statistical Analysis of Machinery Failures
- Workshop and Case Study

• 03 DAY THREE

Understanding Predictive Maintenance

- Predictive Maintenance Concepts
- Introduction
- Maintenance Strategies

- Predictive Maintenance – Background and History
- Predictive Maintenance Technologies – An Overview
- Potential Failure Analysis – Deciding which Technologies to Apply

Vibration Analysis

- Introduction to Vibration Analysis
- Frequency Analysis and the Fast Fourier Transform
- Vibration Transducers o Basic Failure Mechanisms with Examples

• 04 DAY FOUR

Using Predictive Maintenance

- Vibration Standards and Alarm Levels
- Vibration Diagnostics
- Amplitude Demodulation – a.k.a 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

• 05 DAY FIVE

Control Mechanisms

- Managing Predictive Maintenance
- Performance and Efficiency Monitoring
- Managing the Predictive Maintenance effort
- Cost Analysis o Reporting Techniques
- Integrating Predictive Maintenance into the Maintenance Plan

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
April 7, 2025	April 11, 2025	5 days	4950.00 \$	Netherlands - Amsterdam
Aug. 4, 2025	Aug. 8, 2025	5 days	2150.00 \$	Virtual - Online
Nov. 17, 2025	Nov. 21, 2025	5 days	4250.00 \$	UAE - Dubai