



## Machinery Failure, Vibration and Predictive Maintenance Training

### Description

#### 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 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

#### Objectives

At the end of this course participants will have:

- 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

A practical approach to developing an action plan to utilise these technologies in their own areas of responsibility, fitting them into the overall maintenance strategy, and measuring benefits.

#### The Contents

##### Day 1 – Understanding Failures

- Machine Failure Analysis
- Wear and tribology
- Fatigue mechanisms

- Plain, tilt-pad and anti-friction bearing and seal failures

## Day 2 – Avoiding Failures

- Trouble shooting techniques
- Statistical analysis of machinery failures

## Day 3 – 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
  - Basic Failure Mechanisms with examples

## Day 4 – 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

## Day 5 – Control Mechanisms

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