

## Practical Machinery Vibration Monitoring, Analysis & Predictive Maintenance

### Course general description:

This course provides a thorough review of a wide variety of causes of vibration from the point of view of an engineer that must identify the cause of vibration, determine if vibration is excessive, and correct the problem if it is. It provides a background on fundamental causes of vibration and how to identify source of vibration, rules of thumb and simplified methods for evaluating vibration severity, and methods of treatment together with the condition monitoring.

### Audience:

This course is designed engineers responsible for operating piping systems. However, designers of new piping systems will also find the broad coverage of potential vibration problems a time saving briefing on the variety of vibration problems that can occur in piping systems.

### Course objectives:

By the end of the training, participants will be able to:

Properly evaluate the variety of vibration problems that can occur in any system. The causes of vibration, where possible, are discussed with respect to very basic energy and momentum principles that enable the participant to understand what is happening within and to the mechanical system. Screening and simple vibration limits are provided. Many actual examples of typical plant piping vibration problems that the instructor has solved are reviewed to illustrate the concepts covered.

### Course duration:

5 days

### Course location:

Cairo-Dubai-Istanbul

### Course contents:

#### **Day-1**

- Pretest
- Safety Consideration
- Definitions – SI Units.
  - Basics of Vibration - What is Vibration?
  - What Causes It ?
  - Why Measure It ?
  - What Does The Transducer Measure ?
  - What Are "Vibration Characteristics" We Measure ?
  - Amplitude - Frequency - Phase.

#### **Day-2**

- Principles of Vibration Analysis
- Parameters for rotary machines
- Parameters for reciprocating machines
- Dynamic Analysis
- Static Analysis

**Extremely flexible foundation with foot vibration exceeding bearing housing vibration.**

**<http://ecmweb.com/motors/basic-motor-vibration-troubleshooting-tips>**

- Vibration Analysis Techniques
- Vibration Measuring and Instrumentation.

**Day-3**

- Predictive Maintenance
- Vibration Analysis Techniques
- Vibration Measuring and Instrumentation.
- Condition Monitoring
- Diagnosis of Rotating Machinery through Vibration Analysis

**Day-4**

- Shaft Vibration and Alignment
- Case Study: Generator Operation - Pump Vibration
- Compressors Vibration – Fan - Blower
- Reciprocating Internal Combustion Engines (ICE)
- Condition Based Monitoring and Predictive Maintenance
- Turbine Vibration (Hydraulic – Gas – Steam)
- Bearing Faults due to Vibration

**Day-5**

- Vibration of Gears, Pulleys and Belts
- Noise Hazards
- Generator and Pump Foundation Vibration
- Compressors Vibration – Fan – Blower Foundation Vibration
- Reciprocating Internal Combustion Engines (ICE)
- Turbine Vibration (Hydraulic – Gas – Steam) and foundation effect
- Vibration of Gears, Pulleys and Belts for different foundation
- Conclusion
- Posttest

**Methodology:**

- 50% lectures & concepts
- 10% Videos
- 10% Case studies
- 10% Exercises
- 10% Discussions
- 10% Software (if applicable or examples)

**Course code: (TEME033)**