



مركز الوقت للتدريب  
Time Training Center

**MECHANICAL VIBRATION: CAUSES,  
EFFECTS, ANALYSIS & PREVENTION  
TECHNIQUES COURSE**



## Introduction

This course provides a deep dive into the causes, consequences, and control of mechanical vibrations in rotating equipment. Designed for engineers, maintenance teams, and reliability professionals, it equips participants with the analytical tools and technical skills needed to identify vibration issues early and implement effective corrective actions. Through a mix of theory, diagnostics, and real-world case studies, the course enhances the ability to increase equipment uptime, reduce failure rates, and ensure safer, more reliable plant operations.

## Learning Objectives

- Identify common causes and effects of mechanical vibration
- Use diagnostic tools to detect and analyse vibration signatures
- Interpret frequency spectra and waveform patterns
- Apply proven techniques for vibration control and prevention
- Improve machine reliability and reduce downtime

## Course Details

Mode of Training	Classroom or Online
Duration	5 Days

## Who Should Attend?

- Mechanical and maintenance engineers
- Vibration analysts and reliability technicians
- Rotating equipment specialists
- Plant managers and operations supervisors

## Certificate(s)

Participants who complete a minimum of 80% of the total training hours will receive a **Certificate of Completion** issued by **Time Training Center**. This certificate reflects their active participation and commitment to professional development in the relevant field.



## Course Outline

### Module 1: Fundamentals of Mechanical Vibrations

- Introduction to vibration phenomena
- Causes and sources of mechanical vibrations
- Classification of vibratory systems (SDOF, MDOF, continuous systems)
- Free and forced vibrations (damped and undamped)
- Resonance, amplification, and critical speeds

### Module 2: Vibration Measurement and Analysis Techniques

- Vibration sensors and instrumentation (accelerometers, vibrometers, LVDTs)
- Time-domain and frequency-domain analysis
- Signal processing and spectral analysis
- Experimental modal analysis basics
- Vibration testing methods (impact hammer, electrodynamic shaker)

### Module 3: Effects and Impacts of Vibrations

- Effects on structural integrity and machinery life
- Fatigue failures and resonance-related breakdowns
- Human exposure to vibrations: Health and safety considerations
- Vibrations in rotating machinery and shafts

### Module 4: Preventive Techniques and Vibration Control

- Vibration isolation and damping strategies
- Design and use of dynamic vibration absorbers
- Selection of damping materials and optimization methods
- Introduction to active vibration control systems
- Case studies on vibration mitigation in real-world scenarios

### Module 5: Troubleshooting and Practical Applications

- Diagnostic approaches using vibration signatures
- Failure analysis and predictive maintenance strategies
- Hands-on workshops: Building simple vibration models
- Troubleshooting common vibration problems in mechanical systems



## Methodology

We employ a comprehensive and applied learning strategy, integrating theory with real-world implementation:

- ❖ **Conceptual Learning:** Expert-led sessions on catalytic theory and engineering principles
- ❖ **Interactive Workshops:** Group exercises, presentations, and technical discussion forums
- ❖ **Case-Based Learning:** Industry-specific examples and troubleshooting scenarios
- ❖ **Technology Integration:** Digital tools, simulations, and catalyst modeling applications
- ❖ **Assessment:** Pre-tests, post-tests, and Competence Validation Exams for Certified courses to ensure knowledge transfer and skills validation

***Note: Instructors may adjust the training approach to fit technical requirements or participant engagement levels.***

## Instructors

Our instructors are experienced mechanical and reliability engineers with over a decade of expertise in vibration diagnostics, condition monitoring, and asset integrity. They bring real-world field experience across power generation, oil & gas, and heavy industry sectors, and are certified in vibration analysis and reliability-centred maintenance. Trainer profiles will be provided upon request.

## About Time Training Center

Time Training Center is a leading professional training institute in Abu Dhabi that provides students and professionals with quality education and skill development programs. Time Training Center is accredited by the Abu Dhabi Center for Technical Vocational Education & Training (ACTVET) with a specialization in Computer and Management Training programs and certified by QA QC with ISO 9001:2015.

Operating in Abu Dhabi for over 3 decades, Time Training Center has established brand value as a high-quality Management & Technical Training Center in Abu Dhabi. We have also secured strong loyalty from corporate companies and associations with our holistic and practical teaching approach.

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