



ADVANCED DIPLOMA OF MECHANICAL ENGINEERING TECHNOLOGY

MODULE DETAILS

Module 5: Rotating Equipment Balancing, Alignment, and Condition Monitoring

Nominal duration: 6 weeks (72 hours total time commitment)

This time commitment includes the preparation reading, attendance at each webinar (1 hour plus 15-30 minutes for discussion), the time necessary to complete the assignments, and further study.

MODULE PURPOSE

This module deals with precision maintenance for rotating machinery and associated applications, operations, maintenance and management issues. The focus is on the most up-to-date information and best practice. Towards the end of this module students will have developed the basic skills and ability to recognize and solve precision maintenance issues in a structured and confident manner in working towards improving the reliability and performance of rotating machinery.

After an introduction to the application of maintenance and costs of breakdowns, the important issue of vibration and vibration measurement is detailed. The important topic of balancing is then discussed, drawing on practical examples. Misalignment and other machinery faults are then covered. Other often-neglected areas of particle and chemical analysis, temperature monitoring and failure analysis are covered in simple, but practical detail.

PRE-REQUISITE MODULES/UNIT(S)

NONE

ASSESSMENT STRATEGY

To evaluate the achievement of the learning outcomes; written assignments, group projects and practical exercises are set.

SUMMARY OF LEARNING OUTCOMES

1. Examine and discuss the technical and financial implications of maintenance or the lack thereof
2. Examine and discuss the basics of mechanical vibration
3. Examine and discuss vibration measurement
4. Examine and discuss balancing
5. Examine and discuss alignment
6. Examine and discuss condition monitoring tasks



**ADVANCED DIPLOMA OF
MECHANICAL ENGINEERING TECHNOLOGY**

Learning Outcome 1	Examine and discuss the technical and financial implications of maintenance or the lack thereof
Assessment criteria	<ul style="list-style-type: none">1.1. Describe the mission of maintenance1.2. Discuss maintenance philosophies1.3. Describe the role of precision maintenance1.4. Discuss the cost implication of breakdowns
Learning Outcome 2	Examine and discuss the basics of mechanical vibration
Assessment criteria	<ul style="list-style-type: none">2.1. Examine and discuss the fundamentals of mechanical vibration, with emphasis on:<ul style="list-style-type: none">(a) Vibration waves(b) Overall vibration(c) Vibration spectrum(d) Natural and forcing frequencies
Learning Outcome 3	Examine and discuss vibration measurement
Assessment criteria	<ul style="list-style-type: none">3.1. Explain the basic operation of vibration sensors3.2. Outline vibration sensor selection and specification procedures3.3. Discuss the mounting of sensors3.4. Describe the use of spectrum analyzers and other measurement instrumentation
Learning Outcome 4	Examine and discuss balancing
Assessment criteria	<ul style="list-style-type: none">4.1. Discuss the identification of unbalance in rotating machinery4.2. Examine the practical aspects of balancing4.3. Demonstrate familiarity with balancing-related definitions4.4. Discuss the various methods of balancing4.5. Discuss the balancing of overhung rotors4.6. Outline the applicable balancing standards



**ADVANCED DIPLOMA OF
MECHANICAL ENGINEERING TECHNOLOGY**

Learning Outcome 5

Examine and discuss alignment

Assessment criteria

- 5.1 Describe methods for identifying and measuring misalignment
- 5.2 Discuss the various methods of alignment
- 5.3 Discuss permissible alignment tolerances

Learning Outcome 6

Examine and discuss condition monitoring tasks

Assessment criteria

- 6.1 Outline the Tighten, Lubricate and Clean (TLC) approach
- 6.2 Describe the various approaches to condition monitoring
- 6.3 Discuss the merits of failure analysis

Delivery Mode

A combination of asynchronous and synchronous e-learning delivery comprising a judicious mix of interactive online web conferencing, simulation (virtual labs) software, remote online labs, online videos, PowerPoint slides, notes, reading and study materials (in PDF, HTML and Word format) accessed through the Moodle Learning Management System (LMS).