



ADVANCED DIPLOMA OF MECHANICAL ENGINEERING TECHNOLOGY

MODULE DETAILS

Module 16: Machinery Safety

Nominal duration: 3 weeks (36 hours total time commitment)

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

MODULE PURPOSE

This module introduces machinery safety control techniques at a basic and practical level whilst following the best available international standards. It begins with an overview of machinery safety issues, introducing the concepts of hazard identification and risk reduction. Recent and far-reaching changes in international safety control standards are outlined along with explanations of SIL, PL and Safety Categories. Practical examples such as guard door interlocking applications, two-hand controls, muting, area protection of robot installations and motion detection are then discussed. More advanced concepts are outlined in the section that describes safety PLCs and safe networking principles as applicable to larger automation applications.

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 basic principles of machinery safety
2. Outline the design procedures for safety controls
3. Describe machinery protection devices and systems

Learning Outcome 1

Examine and discuss the basic principles of machinery safety

Assessment criteria

- 1.1 List the typical attributes of a machine
- 1.2 Illustrate the scope of machinery controls for a given example of a machine
- 1.3 List common machinery hazards and typical safety system solutions
- 1.4 Explain how the machinery safety standards would be applied to a given example of a machine and indicate relevant sources of information



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- 1.5 Identify hazards, and perform a risk assessment/risk reduction study on a given example of a machine
- 1.6 Summarize a machinery safety lifecycle plan using guidelines from EN and Australian standards

Learning Outcome 2

Outline the design procedures for safety controls

Assessment criteria

- 2.1 Explain reduction of risk by design, safeguarding and information
- 2.2 Outline the operating principles of sensors and protection devices commonly used in machinery protection
- 2.3 Discuss the basic tenets of the applicable standards viz. (a) ISO 13849 and (b) IEC 62061
- 2.4 Identify the necessary requirements of a safety control system to achieve (a) Safety Integrity Levels (SIL) and (b) Performance Levels (PL)
- 2.5 Answer a set of questions on safety certified PLCs and safety device networks

Learning Outcome 3

Describe machinery protection devices and systems

Assessment criteria

- 3.1 Illustrate, by example, the typical application of emergency protection devices on machines
- 3.2 Specify a safeguarding system using the standardized methods used to evaluate approach speeds, safety distances and stopping times

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).