

Unit 18: Maintenance Engineering

Unit code	K/615/1492
Unit level	4
Credit value	15

Introduction

Plant and equipment are one of the biggest assets for any business, costing huge sums of money to replace when things go wrong. Without regular maintenance business owners could see an increase in costly breakdowns, often incurring downtime and significant loss of earnings. Inspection and maintenance are therefore vital to detect and prevent any potential equipment issues or faults that would prevent operation at optimum efficiency. Good maintenance proves itself on a day-to-day basis.

This unit introduces students to the importance of equipment maintenance programmes, the benefits that well-maintained equipment brings to an organisation and the risk factors it faces if maintenance programmes and processes are not considered or implemented. Topics included in this unit are: statutory regulations, organisational safety requirements, maintenance strategies, safe working and maintenance techniques.

On successful completion of this unit students will be able to explain the importance of compliance with statutory regulations associated with asset maintenance, illustrate maintenance techniques adopted by the industry, work safely whilst performing maintenance tasks in an industrial environment and identify inspection and maintenance techniques.

Learning Outcomes

By the end of this unit students will be able to:

1. Analyse the impact of relevant statutory regulations and organisational safety requirements on the industrial workplace.
2. Differentiate between the merits and use of different types of maintenance strategies in an industrial workplace.
3. Illustrate competence in working safely by correctly identifying the hazards and risks associated with maintenance techniques.
4. Apply effective inspection and maintenance techniques relative to a particular specialisation e.g. mechanical or electrical.

Essential Content

LO1 Analyse the impact of relevant statutory regulations and organisational safety requirements on the industrial workplace

Statutory regulations:

The responsibility of employers and employees with regard to statutory regulations in the workplace, including: HASWA 1974, MHSWR 1999, PUWER 1998, COSHH, LOLER 1998, Working at Height Regulations, Manual Handling Operations Regulations 1992, PPE at Work Regulations 1992, Confined Spaces Regulations 1997, Electricity at Work Regulations 1989, Control of Noise, at Work Regulations 2005, RIDDOR 1995, CDM Regulations 2015, ACoP HSE Guidance Notes and Safety Signs

Organisational safety requirements:

The responsibility of the employee with regard to organisational safety requirements such as the role of the HSE and the power of inspectors, right of inspection, improvement notices and prohibition notice

LO2 Differentiate between the merits and use of different types of maintenance strategies in an industrial workplace

Maintenance strategies:

Definition of, and need for, maintenance

Component failure, bathtub curve

Equipment design life and periodic maintenance (e.g. belt adjustment, lubrication etc.)

Reactive, preventive, predictive and reliability centred maintenance

Comparison of the presented maintenance programmes

LO3 Illustrate competence in working safely by correctly identifying the hazards and risks associated with maintenance techniques

Working safely:

Life-saving rules for employee safety, such as safety devices and guards, lock out, tag out, electrical work, arc flash, fall protection and permit required confined space working

Development and implementation of safe schemes of work

Lone working

Permit to work (PTW)

Emergency Procedures

Hazard identification and assessment of risk associated with identified hazard

Use of control measures (ERIC SP)

Production of a Risk Assessment & Method Statement for a maintenance procedure

LO4 Apply effective inspection and maintenance techniques relative to a particular specialisation, such as electrical or mechanical

Maintenance techniques:

Importance of isolation and making safe before undertaking maintenance

Adherence to PTW process and shift changeover procedures

In-service (live) preventative maintenance e.g. thermographic survey, partial discharge inspection

Compliance with manufacturer's recommended inspection and maintenance procedures, using manufacturer's data as case studies

Look, listen and feel philosophy. Visual inspections

Measurements: electrical and mechanical. Mechanical operations test

Functional tests e.g. exercise switching mechanisms

Recording data and maintenance records

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
<p>L01 Analyse the impact of relevant statutory regulations and organisational safety requirements in the industrial workplace</p>		<p>D1 Determine the likely consequences of non-adherence to relevant health and safety legislation by employers and employees</p> <p>D2 Critically analyse the potential impact of a workplace inspection by a Health and Safety Executive inspector</p>
<p>P1 Describe the key features of health and safety regulations in the workplace</p> <p>P2 Explain the role of the Health and Safety Executive in health and safety in the workplace</p>	<p>M1 Analyse the consequences of employers not abiding by health and safety legislation and regulations in the workplace</p>	
<p>L02 Differentiate between the merits and use of different types of maintenance strategies in an industrial workplace</p>		<p>D3 Illustrate the most appropriate maintenance system in an industrial workplace</p> <p>D4 Assess the likely consequences of not completing a maintenance regime in an industrial workplace</p>
<p>P3 Describe the methods used to complete engineering maintenance in an industrial workplace</p> <p>P4 Discuss the advantages and disadvantages of different strategies to complete maintenance in an industrial workplace</p>	<p>M2 Explain the importance of carrying out engineering maintenance in an industrial workplace</p>	

Pass	Merit	Distinction
LO3 Illustrate competence in working safely by correctly identifying the hazards and risks associated with maintenance techniques		D5 Analyse, using actual workplace procedures, the methods used to deal with identified hazards in accordance with statutory legal requirements and workplace policies and recommend improvements
<p>P5 Describe methods used to identify risks and their associated hazards</p> <p>P6 Carry out a risk assessment on a typical maintenance technique</p>	<p>M3 Discuss the importance of completing risk assessments</p> <p>M4 Explain how control measures are used to prevent accidents</p> <p>M5 Complete a method statement for a typical maintenance technique</p>	
LO4 Apply effective inspection and maintenance techniques relative to a particular specialisation such as mechanical or electrical		D6 Justify appropriate inspection and maintenance techniques across industrial plant assets
P7 Apply effective inspection and maintenance techniques in an industrial or simulated environment, recording the appropriate sequence of procedures	M6 Analyse the effectiveness of these inspection and maintenance techniques in plant asset management	

Recommended Resources

Textbooks

MOBLEY, K. (2014) *Maintenance Engineering Handbook*. 8th Ed. McGraw Hill.

RICHARDSON, D.C. (2013) *Plant Equipment and Maintenance Engineering Handbook*. McGraw Hill.

Websites

<http://www.soe.org.uk/> SOE Society of Operations Engineers
IplantE
(General Reference)

<http://www.imeche.org/> The Institution of Mechanical Engineers
(General Reference)

Links

This unit links to the following related units:

Unit 30: Operations and Plant Management

Unit 4: Managing a Professional Engineering Project