



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **UEPMNT313A Maintain Internal Combustion Engines**

**Release: 1**

## UEPMNT313A Maintain Internal Combustion Engines

### Modification History

Not Applicable

### Unit Descriptor

#### Unit Descriptor

1)

This unit deals with the skills and knowledge required to conduct maintenance and major overhauls of fixed or pad mounted internal combustion engines.

### Application of the Unit

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3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

#### License to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety.

### Licensing/Regulatory Information

Not Applicable

### Pre-Requisites

#### Prerequisite Unit(s)

2)

#### Competencies

2.1)

There are no prerequisite units.

## Employability Skills Information

Refer to the Evidence Guide

## Elements and Performance Criteria Pre-Content

5) Elements describe the essential outcomes of a competency standard unit. Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

## Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan and prepare for the work	<p>1.1 Work requirements are identified from request/work orders or equivalent and clarified/confirmed with appropriate parties or by site inspection</p> <p>1.2 Occupational Health and Safety standards, statutory requirements, relevant Australian standards, codes of practice, manufacturers' specifications, environmental requirements and enterprise procedures are identified, applied and monitored throughout the work procedure</p> <p>1.3 Resources required to satisfy the work plan are identified, obtained and inspected for compliance with the job specifications</p> <p>1.4 Relevant plans, drawings and texts are selected and interpreted in accordance with the work plan</p> <p>1.5 Correct size, type and quantity of materials/components are determined, obtained and inspected for compliance with the job specifications</p> <p>1.6 Work is planned in detail including sequencing and prioritising and considerations made, where appropriate, for the maintenance of plant</p>

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
	security and capacity in accordance with system/site requirements
	1.7 Coordination requirements, including requests for isolations where appropriate, are resolved with others involved, affected or required by the work
	1.8 Potential hazards are identified and prevention and/or control measures are selected in accordance with the work plan and site procedures
	1.9 Work area is prepared in accordance with work requirements and site procedures
	1.10 Where appropriate, the teams and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of on-the-job training
2 Assess engine condition	2.1 Engine is run and components are assessed visually and/or aurally to determine condition of engine under load in accordance with the work plan
	2.2 Engine condition is tested whilst under load using appropriate test equipment and procedures according to manufacturer specifications and the work plan
3 Remove auxiliary systems	3.1 Required isolations are confirmed where appropriate in accordance with enterprise/site procedures
	3.2 Auxiliary systems are removed, marked and labelled to facilitate replacement in accordance with the work plan
	3.3 Load device is uncoupled and removed in accordance with the work plan
4 Overhaul/maintain engine	4.1 Engine is systematically dismantled and component parts are clearly marked for identification in accordance with the work plan
	4.2 Engine components are examined and dimensional inspection is performed to

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
	determine conformance to manufacturer specifications
	4.3 Faulty components are replaced in accordance with manufacturer specifications
	4.4 Engine components are reassembled and necessary adjustments made in accordance with manufacturer specifications and enterprise requirements
5 Replace auxiliary systems	5.1 Load device is coupled in accordance with manufacturer specifications and enterprise requirements
	5.2 Auxiliary equipment is maintained as required in accordance with manufacturer specifications and the work plan
	5.3 Auxiliary equipment is aligned and installed in accordance with manufacturer specifications and the work plan
	5.4 Engine is started and function tested in accordance with manufacturer specifications and enterprise requirements
	5.5 Engine operating characteristics are monitored, recorded and adjustments made as required to obtain optimum performance in accordance with manufacturer specifications and enterprise requirements
	5.6 Where appropriate auxiliary equipment and/or components are overhauled in accordance with manufacturer specifications and enterprise requirements
6 Complete the work	6.1 Work is completed and appropriate personnel notified in accordance with site/enterprise requirements
	6.2 Work area is cleared of waste, cleaned, restored and secured in accordance with site/enterprise procedures
	6.3 Plant, tools and equipment are maintained and stored in accordance with site/enterprise

**ELEMENT****PERFORMANCE CRITERIA**

procedures

- 6.4 Work completion details are finalised in accordance with site/enterprise procedures

**Required Skills and Knowledge****REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining internal combustion engines.

The extent of the Essential Knowledge and Associated Skills required follows:

Evidence shall show that knowledge has been acquired for safe working practices of:

- Occupational Health and Safety standards
- Relevant plant and equipment
- Hand and portable power tools
- Precision measuring equipment
- Rigging and lifting
- Specialised tools and jigs
- Levelling and aligning
- Technical drawing and data
- Data recording techniques
- Diagnostic and testing techniques
- Gaskets and seals
- Bearings (radial and thrust)
- Diesel fuel injection systems
- Quality assurance/quality control
- Governor systems
- Hazardous materials
- Optical fibre scope equipment
- Non-destructive testing Couplings
- Valves
- Fluid power systems

## REQUIRED SKILLS AND KNOWLEDGE

- Pipe work
- Spare parts
- Torquing techniques
- Pumps (gear and centrifugal)
- Speed control mechanisms
- Balancing and vibration analysis
- Maintenance procedures
- Dismantling and reassembling techniques
- Communication principles

Specific skills needed to achieve the Performance Criteria:

- Apply Occupational Health and Safety standards
- Select resources Inspect and identify correct materials, tools and components
- Apply dismantling techniques to work requirements
- Apply re-assembly techniques to work requirements
- Apply repair techniques
- Apply maintenance techniques
- Observe isolation procedures
- Use hand and portable power tools
- Use precise measuring equipment
- Use rigging and lifting equipment
- Use specialised tools and jigs
- Level and align
- Use drawings and data
- Diagnose and test
- Manufacture gaskets and seals
- Inspect, scrape and blue-check bearings
- Identify hazardous materials
- Use optical fibre scope
- Apply torquing techniques
- Apply data recording techniques
- Communicate effectively.

## Evidence Guide

### EVIDENCE GUIDE

8) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

#### Overview of Assessment

##### 8.1)

Longitude competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace, however, it must be in accord with Industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment



## Guidelines of this Training Package.

### **Critical aspects of evidence required to demonstrate competency in this unit**

#### **8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines - UEP06". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
- Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in 6) Essential Knowledge and Associated Skills of this unit
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - The knowledge and application of relevant sections of: Occupational Health and Safety legislation; Statutory legislation; Enterprise/site safety procedures; Enterprise/site emergency procedures
  - Competence is demonstrated in the context of provision to employees of clear directions and information and work instructions
  - Evidence of knowledge of significant hazards in the workplace is required
  - Evidence of understanding of symbols used for Occupational Health and Safety signs is required
  - Competence may need to be assessed in conjunction with units relating to communication competencies, particularly those relating to information provision.
  - Dealing with an unplanned event by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this

unit.

Competency Standards should be assessed in the workplace or simulated workplace and under the normal range of workplace conditions.

Assessment of this unit will be supported with documentary evidence, by means of endorsement stating type and application of work.

In addition to the resources listed above in Context of assessment', evidence should show competency working, in limited spaces, with different types of plant and equipment as well as different structural/construction types and method and in a variety of environments.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed with allied competency standard units where listed.

Nil

**Key competencies 8.6)**

Evidence that particular key competencies have been achieved within this unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following example of application:  Explain ideas and actions, make suggestions for alternative actions and deal with contingencies and non-routine situations.	2
How can information be collected, analysed and organised?	Refer to the following example of application:  Information with regard to operations, faults and maintenance may be observed and monitored for analysis and organised into records and reports.	2
How are activities planned and organised?	Refer to the following example of application:  Planning the required activity, to include coordination and use of equipment, materials and tools to avoid backtracking and rework.	1
How is team work used within this competency?	Refer to the following example of application:  Share tasks and provide appropriate support to other team members in completion of work tasks to meet the team's goals.	2
How are mathematical ideas and techniques used?	Refer to the following example of application:  Calculation of time to complete tasks, estimation of distances, levels, loads and material requirements.	1
How are problem solving skills applied?	Refer to the following example of application:  Determine solutions which focus on long and short-term resolution of work task problems.	2

How is use of technology applied?	Refer to the following example of application:  Access, communicate, measure and record information with regard to operations and performance of plant and equipment.	1
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following example of application:  Completion of tasks within an acceptable timeframe and performance with some supervision.
2	Learning to learn in the workplace	Refer to the following example of application:  Comprehension and application of theoretical knowledge to well-developed skills.
3	Reflecting on the outcome and process of work task	Refer to the following example of application:  Focused on improvement in own and other team member's performance in the workplace.
4	Interacting and understanding of the context of the work task	Refer to the following example of application:  Working understanding of the processes and systems which apply to the workplace.
5	Planning and organising the meaningful work task	Refer to the following example of application:  Achieving work tasks in a timely manner and ensuring that the work team achieves its stated work goals.
6	Performing the work task in non-routine or contingent situations	Refer to the following example of application:  Seek advice and apply solutions to problems relevant to the workplace environment.

## Range Statement

### RANGE STATEMENT

7) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

Internal combustion engines may refer to medium speed diesels, high speed diesels, petrol engines, gas engines or dual fuel (gas/diesel) powered engines.

Engine auxiliary systems may include cooling systems, lubrication systems, fuel systems and induction and exhaust systems.

Engine components may include bearings (shell and white metal) pistons, cylinders, valves, cams, lifters, springs, timing gear, crankshaft, pumps, gaskets and seals, coolers, filters and governors.

Measuring equipment may include micrometers, verniers (internal/external) dial indicators, bore gauges, depth and height gauges and optical fibre scope.

Test equipment may include pressure and vacuum gauges, gas analysers, timing light, injector tester and dyno test equipment.

Running checks may include cylinder peak pressure, exhaust gas temperature, lube oil flow checks and fuel injection timing.

Maintenance may include repair, inspection, modification, overhaul, lubrication, servicing, diagnosing and test running.

Re-assembly techniques may include crankshaft deflections, advanced levelling and alignment.

Work completion details may include plant and maintenance records, job cards, check sheets, on device labelling updates and reporting and/or documenting equipment defects.

Work site environment may be affected by nearby plant or processes, e.g. chemical, heat, dust, noise, gas and oil.

Isolations can refer to electrical/mechanical or other appropriate processes.

Generic terms are used throughout this Training Package for vocational standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms are given in Volume 2, Part 1.

## Unit Sector(s)

Not Applicable

## Literacy and numeracy skills

### Literacy and numeracy skills 2.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 Literacy and Numeracy

Reading 3      Writing 3      Numeracy 3

## Competency Field

### Competency Field 4)

Maintenance