



Australian Government

Department of Education, Employment and Workplace Relations

AURTTE3001 Apply knowledge of engine science

Release: 1

AURTTE3001 Apply knowledge of engine science

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit describes the performance outcomes required to apply knowledge of engine components and systems. No licensing, legislative, regulatory or certification requirements apply to this unit at time of endorsement.
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Application of the Unit

Application of the unit	Work applies to everyday engine reconditioning activities and is carried out according to award provisions.
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Licensing/Regulatory Information

Refer to Unit Descriptor.

Pre-Requisites

Not applicable.

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Apply relevant information of engine construction and operation to work activities	1.1. <i>Components</i> of an engine are identified during reconditioning activities 1.2. Functions of engine components are identified during reconditioning activities 1.3. <i>Relationships</i> between engine components are identified during reconditioning activities 1.4. Engine configurations are identified during reconditioning activities
2. Apply relevant information of engine diagnosis to work activities	2.1. Using knowledge of engine diagnosis, causes of engine component wear or failure are identified during reconditioning activities

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills

- technical skills to use diagnostic equipment
- literacy skills to read and interpret written technical information
- learning skills to identify sources of information, assistance and expert knowledge to expand knowledge, skills and understanding
- numeracy skills to use mathematical ideas and techniques to calculate distances, areas, volumes, power and torque
- problem-solving skills to seek information and assistance as required to solve problems
- self-management skills to:
 - follow workplace documentation, such as codes of practice and operating procedures
 - select and use appropriate equipment, materials, processes and procedures

Required knowledge

- classifications of engines, including:
 - internal and external combustion
 - rotary and reciprocating engines
 - spark ignition and compression ignition engines
 - engine cylinder arrangements
- engine configurations, including:
 - inline engines, vee-type engines and slant cylinder engines
 - opposed cylinder engines
- camshaft and valve locations, including:
 - overhead cam (OHC)
 - overhead valve (OHV)
- engine operating principles, including:
 - combustion, including:
 - air-fuel ratios and flame propagation
 - direct and indirect fuel injection
 - detonation and pre-ignition
 - two-stroke and four-stroke cycles
- engine measurement and performance, including:
 - bore and stroke, including:
 - oversquare and undersquare engines
 - crank throw
 - swept volume and engine volume

- compression ratio
- engine efficiency, including volumetric efficiency, thermal efficiency and mechanical efficiency
- torque and horsepower, including brake horsepower
- construction and operation of petrol engines, including:
 - basic metallurgy relating to engines
 - identification of metric and imperial threads
 - engine components, including cylinder blocks, cylinders, pistons, cylinder heads, combustion chambers, inlet and exhaust manifolds, spark plugs, connecting rods, crankshafts, piston rings, gudgeon pins, camshafts, cams and flywheels
- combustion chambers, including:
 - L-head, bath-tub, wedge, trapezoidal, hemispherical and heron-type shapes
 - multiple valve designs
- construction and operation of diesel engines, including:
 - direct and indirect injection
 - swirl chambers
 - pre-combustion chambers
- engine diagnosis, including:
 - wet and dry compression tests
 - cylinder leakage tests
 - cylinder power balance tests
 - vacuum tests
 - oil pressure tests
 - sources of fluid leaks
 - exhaust smoke diagnosis
- engine noise diagnosis, including identifying:
 - common engine noises
 - common abnormal combustion noises

Evidence Guide

Evidence Guide	
The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>The evidence required to demonstrate competency in this unit must be relevant to workplace operations and satisfy all of the requirements of the performance criteria and required skills and knowledge.</p> <p>A person who demonstrates competency in this unit must be able to demonstrate knowledge of:</p> <ul style="list-style-type: none"> • engine components • engine layouts • operating principles of a range of engine types • common diagnosis procedures.
Context of, and specific resources for assessment	<p>Competency is to be assessed in the workplace or a simulated workplace environment that accurately reflects performance in a real workplace setting. Performance is demonstrated consistently over a period of time and in a suitable range of contexts.</p> <p>Assessment is to occur:</p> <ul style="list-style-type: none"> • using standard workplace practices and procedures • following safety requirements • applying environmental constraints. <p>Assessment is to comply with relevant:</p> <ul style="list-style-type: none"> • regulatory requirements • Australian standards • industry codes of practice. <p>The following resources must be made available for the assessment of this unit:</p> <ul style="list-style-type: none"> • appropriate worksite • a range of engine types and configurations.
Method of assessment	<p>Assessment must satisfy the endorsed Assessment Guidelines of this Training Package.</p> <p>Assessment methods must confirm consistency and accuracy of performance (over time and in a range of</p>

Evidence Guide	
	<p>workplace relevant contexts) together with application of required skills and knowledge.</p> <p>Assessment methods must be by direct observation of tasks and include questioning on required skills and knowledge to ensure its correct interpretation and application.</p> <p>Assessment must confirm that competency is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.</p> <p>Competence in this unit may be assessed in conjunction with other units which together form part of a holistic work role.</p> <p>Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.</p> <p>Assessment processes and techniques must be culturally sensitive and appropriate to the language and literacy capacity of the candidate and the work being performed.</p>

Range Statement

Range Statement	
<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
<i>Components</i> may include	<ul style="list-style-type: none"> • components of a rotary engine • components of a spark ignition or compression ignition engine.
<i>Relationships</i> may include	<ul style="list-style-type: none"> • where a component has an effect on another component, such as piston to connecting rod to crankshaft to flywheel.

Unit Sector(s)

Competency field	Mechanical Miscellaneous
Sector	Technical - Engines

Custom Content Section

Not applicable.