



Australian Government

AURTTM005 Balance rotating and reciprocating engine components

Release: 1

AURTTM005 Balance rotating and reciprocating engine components

Modification History

Release	Comment
Release 1	New unit of competency.

Application

This unit describes the performance outcomes required to balance rotating and reciprocating engine components. It involves preparing for the task, determining and performing the balancing requirements for the engine component in an engine reconditioning process, and completing workplace processes and documentation.

It applies to those working in the automotive service and repair industry. The engine components include those in vehicles from all sectors of the industry.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Competency Field

Mechanical Miscellaneous

Unit Sector

Technical - Manufacture

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.
1. Prepare to balance rotating and reciprocating engine component	1.1 Job requirements are determined from workplace instructions 1.2 Methods of balancing component are sourced and interpreted from manufacturer literature and workplace procedures 1.3 Tools and measuring equipment are selected and checked for

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.
	serviceability 1.4 Hazards associated with the work are identified and risks are managed 1.5 Engine component is <i>prepared</i> for balancing operations and balancing machine is prepared to accept component according to <i>safety requirements</i>
2. Balance rotating and reciprocating engine component	2.1 Component is mounted and engaged with machine according to workplace procedures and safety requirements, and following machinery safe operating procedures 2.2 Rotating and reciprocating engine components are balanced in line with workplace requirements and according to workplace procedures, safety requirements, and machinery safe operating procedures, and without causing damage to components or system
3. Complete balancing processes	3.1 Final inspection is made to ensure work is to workplace requirements 3.2 Component is cleaned and presented ready for use or stored according to workplace procedures 3.3 Work area is cleaned, waste and non-recyclable materials are disposed of, and recyclable material is collected 3.4 Workplace documentation is processed according to workplace procedures

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance and are not explicit in the performance criteria.

Skills	Description
Learning skills to:	locate appropriate sources of information efficiently.
Reading skills to:	- identify and interpret engine component specifications from workshop literature - interpret safe operating procedures for engine component balancing machinery from operating manuals.
Writing skills to:	legibly and accurately fill out workplace documentation when recording measurements.

Skills	Description
Oral communication skills to:	clarify instructions.
Numeracy skills to:	- interpret numerical information in manufacturer specifications, workshop manuals, and machinery dials and gauges - use basic mathematical operations, including addition, subtraction, division and multiplication to: - convert metric dimensions to imperial, and imperial dimensions to metric - weigh engine components to determine weight to be removed or added.
Digital literacy skills to:	navigate and operate computerised balancing machinery.
Problem solving skills to:	determine the most appropriate balancing method for the situation.
Technology skills to:	use metric and imperial precision measuring equipment.

Range of Conditions

This section specifies work environments and conditions that may affect performance.

Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included. Bold italicised wording, if used in the performance criteria, is detailed below.

<i>Preparing</i> must include:	- procedures for chemically cleaning components without damage - checking all components to ensure no further machining is required.
<i>Safety requirements</i> must include:	- work health and safety (WHS) and occupational health and safety (OHS) requirements, including operational risk assessment and treatments associated with: - electrical safety of balancing equipment and machinery - equipment and machinery movement and operation.

Unit Mapping Information

Equivalent to AURTTM3005 Balance rotating and reciprocating engine components

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b4278d82-d487-4070-a8c4-78045ec695b1>

Assessment Requirements for AURTTM005 Balance rotating and reciprocating engine components

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Performance Evidence

Before competency can be determined, individuals must demonstrate they can perform the following according to the standards defined in this unit's elements, performance criteria, range of conditions and foundation skills:

- balance one four or six cylinder in-line engine crankshaft assembly, including:
 - front pulley
 - crankshaft and flywheel and pressure plate (manual transmission) or drive plate (automatic transmission)
- balance one V8 engine crankshaft assembly, including:
 - front pulley
 - crankshaft and flywheel and pressure plate (manual transmission) or drive plate (automatic transmission)
- balance one piston and connecting rod assembly
- during the above work, perform each of the following methods of adding or removing weight from engine components:
 - drilling
 - welding
 - machining.

Knowledge Evidence

Individuals must be able to demonstrate knowledge of:

- work health and safety (WHS) and occupational health and safety (OHS) requirements relating to balancing rotating and reciprocating engine components, including operational risk assessment and treatments associated with:
 - electrical safety of balancing equipment and machinery
 - equipment and machinery movement and operation

- operating principles of component balancing, including:
 - dynamic balance
 - internally and externally balanced engines
 - reciprocating mass
 - rotating mass
 - sources of torsional vibration
 - gas pressure
 - purpose of counterweights, torsional vibration dampeners, and balance shafts in balancing
 - difference between in-line engine balance, flat plane and V type engine balance, including the effect of the number and angle of cylinders
- balancing procedures and techniques, including:
 - in-line engines, flat plane crankshafts and V type engines
 - protecting crank pins from damage from bob-weight clamping
 - protecting main bearing journals from damage from balancing machine cradle rollers or V block
 - weight matching the pistons and rod ends
 - methods of calculating bob-weight values for V type and in-line engines, including:
 - rotating mass with oil allowance
 - reciprocating mass
 - effect of number of cylinders and V angle on the total calculation
 - mounting bob-weights on crankshafts of V type engines
 - balancing internally balanced engines
 - balancing externally balanced engines
- procedures for adding and removing metal to the crankshaft, including:
 - drilling and finishing to remove weight
 - welding to add weight
 - machining or drilling and adding heavy metal.

Assessment Conditions

Assessors must satisfy NVR/AQTF assessor requirements.

Competency is to be assessed in the workplace or a simulated environment that accurately reflects performance in a real workplace setting.

Assessment must include direct observation of tasks.

Where assessment of competency includes third-party evidence, individuals must provide evidence that links them to the rotating and reciprocating engine components that they have balanced, e.g. repair orders.

Assessors must verify performance evidence through questioning on skills and knowledge to ensure correct interpretation and application.

The following resources must be made available:

- automotive repair workplace or simulated workplace
- workplace instructions
- manufacturer engine specifications
- material relevant to balancing rotating and reciprocating engine components
- multi-cylinder crankshafts, flywheels and piston and connecting rod assemblies specified in the performance evidence and requiring balancing
- precision measuring equipment, including:
 - dial indicators
 - inside and outside metric and imperial micrometers
 - scales in 0.1 gram graduations
- finishing machine
- hand, air and power tools appropriate to balancing rotating and reciprocating engine components.

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