



Australian Government

AURTTE005 Overhaul engines

Release: 1

AURTTE005 Overhaul engines

Modification History

Release	Comment
Release 1	New unit of competency.

Application

This unit describes the performance outcomes required to return an engine removed from its chassis to original manufacturer tolerances and clearances. It involves preparing for the task, dismantling and evaluating the engine, carrying out the overhaul procedures, reassembling and testing the engine, and completing workplace processes and documentation.

It applies to those working in the automotive service and repair industry on two and four-stroke spark ignition and four-stroke compression engines. The engines include those of agricultural machinery, heavy commercial vehicles, light vehicles, mobile plant machinery or motorcycles.

This unit does not apply to outdoor power equipment engines and marine outboard engines.

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

Competency Field

Mechanical Miscellaneous

Unit Sector

Technical - Engines

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 dismantle engine	1.1 Job requirements are determined from workplace instructions 1.2 Dismantling information is sourced and interpreted

Elements Elements describe the essential outcomes.	Performance Criteria 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.
	1.3 Dismantling options are analysed and those most appropriate to the circumstances are selected 1.4 Hazards associated with the work are identified and risks are managed 1.5 Dismantling tools and equipment are selected and checked for serviceability
2. Dismantle and evaluate engine and components	2.1 Engine and relevant components are dismantled in a logical sequence according to manufacturer and workplace procedures, and safety and environmental requirements , and without causing unnecessary damage to components or systems 2.2 Components are cleaned for evaluation according to workplace procedures and safety and environmental requirements 2.3 Components are measured and compared with manufacturer specifications and serviceability is determined 2.4 Component repair method is determined 2.5 Unserviceable parts are identified and replacement parts sourced
3. Carry out overhaul	3.1 Overhaul information is sourced and interpreted 3.2 Overhaul options are analysed and those most appropriate to the circumstances are selected 3.3 Overhaul tools and equipment are selected and checked for serviceability 3.4 Components are machined, repaired and replaced as required, and adjustments are carried out according to manufacturer specifications, workplace procedures, and safety and environmental requirements, and without causing damage to components or systems
4. Assemble engine and components	4.1 Engine is assembled according to manufacturer specifications, workplace procedures, and safety and environmental requirements 4.2 Tolerances and clearances are measured against manufacturer specifications and necessary adjustments are made 4.3 Assembly of engine is completed within workplace timeframes and without causing damage to other components or systems 4.4 Post-assembly testing is carried out according to workplace procedures and safety and environmental requirements, and any problems detected as having been introduced during the assembly process are rectified

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.
5. Complete work processes	5.1 Final inspection is made to ensure work is to workplace expectations and engine is presented ready for use or storage 5.2 Work area is cleaned, waste and non-recyclable materials are disposed of, and recyclable material is collected 5.3 Tools and equipment are checked and stored according to workplace procedures 5.4 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 sources of information for engines efficiently.
Reading skills to:	interpret and assess information from manufacturer and workshop literature when seeking engine specifications and procedures.
Writing skills to:	legibly and accurately fill out workplace documentation when reporting diagnostic findings, making repair recommendations, and recording parts and material used.
Oral communication skills to:	clarify instructions, report evaluation findings and make overhaul recommendations.
Numeracy skills to:	measure engine components and use basic mathematical operations, including addition, subtraction, multiplication and division, to calculate distances, areas, volumes, tolerances and deviations from manufacturer specifications.
Planning and organising skills to:	plan own work requirements and prioritise and sequence actions to achieve required outcomes and ensure tasks are completed within workplace timeframes.
Technology skills to:	- use precision measuring equipment, such as micrometers and dial bore gauges - use specialised engine overhaul equipment, such as: - hones

Skills	Description
	valve and valve seat cutting machinery.

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>Safety and environmental requirements</i> must include:	- work health and safety (WHS) and occupational health and safety (OHS) requirements, including procedures for using: - specialised engine overhaul tools, equipment and machinery - chemicals and toxic substances - manual and mechanical lifting equipment - environmental requirements, including procedures for trapping, storing and disposing of fluids released from engines.
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Unit Mapping Information

Equivalent to AURTTE4005 Overhaul engines and associated 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 AURTTE005 Overhaul engines

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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:

- overhaul two different multi-cylinder engines, including one engine with cylinder sleeves.

Knowledge Evidence

Individuals must be able to demonstrate knowledge of:

- work health and safety (WHS) and occupational health and safety (OHS) requirements relating to overhauling engines and associated components, including procedures for:
 - using personal protective equipment (PPE) when handling engines and using chemical cleaning agents
 - using slings, chains and other lifting equipment and machinery
 - using specialised equipment, including heating torches, ovens and presses
 - handling freezing substances, including liquid nitrogen
- environmental requirements, including procedures for trapping, storing and disposing of fluids released from engines
- types, characteristics and operating principles of engines and associated engine components
- engine overhaul procedures, including:
 - methods for cleaning and preparing engine for overhaul
 - engine dismantling procedures
 - engine and engine component inspection, measuring and evaluation procedures, including:
 - non-destructive testing procedures, including dye penetrant testing and magnetic particle testing
 - methods for measuring and calculating tolerances and clearances
 - engine and engine component repair and adjustment procedures, including:

- engine cylinder head and block machining
- engine crankshaft and camshaft grinding
- engine cylinder and engine sleeve fitting, boring and honing
- engine bearing tunnel and connecting rod repair
- engine component heat treating, straightening and reclamation
- engine component balancing
- engine assembly procedures, including procedures for tolerance measuring and calculating and adjusting components, including:
 - piston to connecting rod big-end alignment
 - big-end bearing to crankshaft journal clearance
 - big-end bearing crush with bearing blue
 - piston ring end gap, back clearance and side clearance
 - main bearing to crankshaft journal clearance
 - main bearing crush with bearing blue
 - semi-flanged thrust bearings to crankshaft clearance
 - finished camshaft bearings to camshaft clearance
 - camshafts and cam followers
 - camshaft end float
 - crankshaft end float
 - gear backlash
 - oil pump sealing and pick-up oil piping
- component assembly procedures and processes, including:
 - welsh plugs and oil gallery plugs
 - piston and connecting rod assemblies
 - big-end bearings
 - piston rings to pistons
 - main bearings and thrust washers
 - semi-flanged thrust bearings
 - crankshafts, including protection measures for crankshaft journals, bearings, rings and bores
 - finished camshaft bearings
 - camshafts and cam followers
 - timing gears
 - chains and tensioners
 - oil pumps, oil squirters and oil pump pick-ups
 - balance shafts
 - fitting ancillary components, including covers and seals, housings, diesel fuel injection pumps, oil coolers, crankshaft pulleys, flywheels and bell housings
- post-overhaul testing procedures for engines.

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 engines that they have worked on, 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:

- mechanical repair workplace or simulated workplace
- workplace instructions
- manufacturer engine specifications
- two different multi-cylinder engines requiring overhaul, including an engine with cylinder sleeves
- tools, equipment and materials appropriate for overhauling and adjusting engines.

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