



Australian Government

AURTTM003 Apply metal to rebuild engine components

Release: 1

AURTTM003 Apply metal to rebuild engine components

Modification History

Release	Comment
Release 1	New unit of competency.

Application

This unit describes the performance outcomes required to apply metal spray and hard chrome and weld materials, and perform the necessary machining to rebuild engine components. It involves preparing for the task, determining repair requirements, rebuilding engine components, bearing tunnels and connecting rods in engines, 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 undertake metal building procedures	1.1 Job requirements are determined from workplace instructions 1.2 Information is sourced, procedures and methods are analysed, and appropriate tools are selected for rebuilding engine components

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 Tools and <i>measuring equipment</i> are selected and checked for serviceability 1.4 Hazards associated with the work are identified and risks are managed 1.5 Engine component is prepared for appropriate metal application method according to workplace procedures and <i>safety and environmental requirements</i>
2. Apply metal to engine component	2.1 Metal application process is used to rebuild damaged engine component according to workplace procedures and safety requirements, and following machinery safe operating procedures 2.2 Engine component is measured to ensure compliance with specifications 2.3 Metal application process is completed in readiness for further repair according to workplace procedures and safety requirements, and following machinery safe operating procedures
3. Perform necessary machining to rebuild component	3.1 Machining is carried out according to workplace procedures and safety and environmental requirements, and following machinery safe operating procedures 3.2 Component is measured to ensure compliance with manufacturer specifications 3.3 Machining operations are completed according to manufacturer specifications, workplace procedures, and safety and environmental requirements, and following machinery safe operating procedures
4. Complete rebuild processes	4.1 Component surfaces are finished to manufacturer specifications and within allowable tolerances according to workplace procedures and safety and environmental requirements, and following machinery safe operating procedures 4.2 Final inspection is made to ensure finished work complies with workplace requirements 4.3 Bright surfaces are treated with rust prevention solution and engine component is prepared for further process or storage according to workplace procedures 4.4 Work area is cleaned, waste and non-recyclable materials are disposed of, and recyclable material is collected 4.5 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 rebuild machinery from operating manuals and signs.
Writing skills to:	legibly and accurately fill out workplace documentation to record measurements.
Numeracy skills to:	- interpret numerical information in manufacturer specifications, workshop literature, and machinery dials, gauges and computer readouts - use basic mathematical operations, including addition and subtraction, to: - convert metric dimensions to imperial, and imperial dimensions to metric - calculate tolerances and clearances - use metric and imperial precision measuring equipment.
Planning and organising skills to:	select best rebuild option for the work and sequence procedure to reduce time and material wastage.

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>Measuring equipment</i> must include:	- dial indicators - inside and outside metric and imperial micrometers.
<i>Safety and environmental requirements</i> must include:	- work health and safety (WHS) and occupational health and safety (OHS) requirements, including procedures: - selecting and using personal protective equipment (PPE) - safely operating welding, metal spraying and hard chroming machinery - environmental requirements, including procedures for trapping, storing and disposing of cooling and lubricating fluids released

	during the machining process.
--	-------------------------------

Unit Mapping Information

Equivalent to AURTTM3003 Apply metal to rebuild 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 AURTTM003 Apply metal to rebuild engine components

Modification History

Release	Comment
Release 1	New unit of competency.

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:

- repair a cast iron cylinder head
- repair a crack in an aluminium alloy cylinder head
- build up camshaft lobes or journals by welding, metal spraying and hard chroming, and machine to specifications
- build up crankshaft journals or thrust surfaces or bearing faces by welding, metal spraying and hard chroming, and machine to specifications.

Knowledge Evidence

Individuals must be able to demonstrate knowledge of:

- work health and safety (WHS) and occupational health and safety (OHS) requirements relating to applying metal to rebuild engine components, including procedures for :
 - selecting and using personal protective equipment (PPE)
 - safely operating welding, metal spraying and hard chroming machinery
- environmental requirements, including procedures for trapping, storing and disposing of cooling and lubricating fluids released during the machining process
- procedures for identifying existing heat treatment processes, including nitriding, Tufftriding and induction hardening
- specific welding procedures, including:
 - manual metal arc welding (MMAW)
 - gas metal arc welding (GMAW)
 - gas tungsten arc welding (GTAW)
 - flux core
 - metal spraying

- submerged arc
- procedures for hard chrome application
- repair operations for components, including:
 - crankshaft journals
 - camshaft journals and lobes
 - seal areas
 - crankshaft nose and keyway
 - pulley retaining thread damage
- crankshaft radius treatment, including:
 - shot peening
 - radius rolling
 - deep fillet radius rolling
- requirements of Australian standards relevant to engine reconditioning, including:
 - AS 4182 Automotive repairs – Code of practice for reconditioning reciprocating spark ignition engines
 - AS 4427 Automotive repairs – Code of practice for reconditioning reciprocating compression ignition engines
- post-repair operations, including rust protection of machined surfaces.

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 engine components 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:

- automotive repair workplace or simulated workplace
- workplace instructions
- manufacturer engine specifications
- multi-cylinder crankshafts, camshafts, and engine cylinder heads specified in the performance evidence
- hand, air and power tools, welding equipment and materials for rebuilding engine components
- precision measuring equipment, including:
 - dial indicators
 - inside and outside metric and imperial micrometers.

Links

Companion Volume implementation guides are found in VETNet -

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

Companion Volume implementation guides are found in VETNet -

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