



Australian Government

AURTTM002 Repair bearing tunnels and connecting rods in engines

Release: 1

AURTTM002 Repair bearing tunnels and connecting rods in engines

Modification History

Release	Comment
Release 1	New unit of competency.

Application

This unit describes the performance outcomes required to repair bearing tunnels and connecting rods in engines. It involves preparing for the task, line boring and honing engine bearing tunnels, repairing connecting rods to specifications and workplace requirements 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

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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.

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1. Determine line boring requirements	1.1 Job requirements are determined from workplace instructions 1.2 Engine block is cleaned and main bearing bolt holes are crack tested according to workplace procedures and safety requirements 1.3 Information is sourced and repair options are analysed and those most appropriate to the circumstances are selected 1.4 Required tools and measuring equipment are checked and prepared for operation according to manufacturer specifications and workplace procedures 1.5 Hazards associated with the work are identified and risks are managed
2. Prepare engine and line boring machine	2.1 Engine is measured and calibration requirements for line boring are determined 2.2 Engine block or cylinder head is prepared for line boring according to workplace procedures and safety and environmental requirements 2.3 Line boring machine is prepared to accept cylinder engine block or cylinder head according to manufacturer specifications and workplace procedures 2.4 Engine block or cylinder head is positioned and clamped according to manufacturer specifications and workplace procedures
3. Line bore engine bearing tunnels	3.1 Tool is set and locked and a test cut is taken according to workplace procedures and safety requirements, and following machinery safe operating procedures 3.2 Engine tunnels are line bored at correct speeds and feed rates according to workplace procedures and safety requirements, and following machinery safe operating procedures 3.3 Line boring tool sharpness is checked and maintained throughout boring operation according to manufacturer specifications and workplace procedures 3.4 Engine block thrust faces and seal diameter are machined to original size 3.5 Tunnels are measured to ensure compliance with manufacturer specifications 3.6 Line boring operations are completed according to required specifications and honing allowances , workplace procedures and safety requirements, and following machinery safe operating procedures
4. Prepare to hone	4.1 Line-bored engine block or cylinder head is cleaned of residue and

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engine bearing tunnels	swarf according to workplace procedures and safety requirements 4.2 Tools and equipment for honing are selected and checked for serviceability 4.3 Measuring and calibration requirements for honing are determined 4.4 Honing machine is prepared to accept engine block or cylinder head according to manufacturer specifications and workplace procedures 4.5 Engine block or cylinder head is positioned and securely clamped, and required hone stroke is set according to manufacturer specifications and workplace procedures 4.6 Hone stones are selected and speed is set to achieve required finish
5. Hone engine bearing tunnels	5.1 Tunnels are honed at correct speed and rate to required finish according to workplace procedures and safety requirements, and following machinery safe operating procedures 5.2 Components are measured to ensure compliance with manufacturer specifications 5.3 Honing operations are completed to required tunnel to journal clearance according to workplace procedures and safety requirements, and following machinery safe operating procedures
6. Prepare to repair connecting rods	6.1 Connecting rods are <i>cleaned and checked for serviceability</i> according to workplace procedures and safety requirements 6.2 Connecting rods are checked for straightness and straightened as required according to workplace procedures and safety requirements, and following machinery safe operating procedures 6.3 Connecting rod boring machine is prepared to accept connecting rod 6.4 Connecting rod is positioned ready for honing, and securely clamped if machining
7. Repair connecting rod	7.1 Connecting rod little ends and big ends are resized according to workplace procedures and safety requirements, and following machinery safe operating procedures 7.2 Components are measured to ensure compliance with manufacturer specifications
8. Complete repair process	8.1 Engine block or cylinder head is thoroughly cleaned of residual honing oil according to workplace procedures 8.2 Final inspection is made to ensure finished work complies with workplace requirements 8.3 Bright surfaces are treated with rust prevention solution and engine

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	block or cylinder head is prepared for further process or storage according to workplace procedures 8.4 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:	- interpret engine component specifications from manufacturer and workshop literature - interpret machinery safe operating procedures 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 and gauges - use basic mathematical operations, including addition and subtraction, to: - convert metric dimensions to imperial, and imperial dimensions to metric - calculate tolerances and clearances - interpret numerical measurements on metric and precision measuring equipment.
Planning and organising skills to:	select best tooling 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>Calibration requirements</i> must include:	- determining depths of cuts and required honing allowances - determining tunnel to journal clearance.
<i>Preparing engine block or cylinder head</i> must include:	- removing main bearing caps from engine block - machining bearing cap and engine block parting faces - fitting bearing caps to required tensions.
<i>Safety and environmental requirements</i> must include:	- work health and safety (WHS), and occupational health and safety (OHS) requirements, including: - procedures for: - selecting and using personal protective equipment (PPE), including safety glasses, ear protection and safety footwear - using hand tools and lifting equipment - operational risk assessment and treatments associated with: - electrical safety of line boring and honing machinery - line boring and honing machinery movement and operation - environmental requirements, including procedures for trapping, storing and disposing of cooling and lubricating fluids released during machining process.
<i>Preparing line boring machine</i> must include:	- sharpening and shaping cutting tools - identifying worn and damaged cutting tools - mounting and positioning cutting tools - correctly using clamps, jigs and rails.
<i>Positioning and clamping</i> must include:	- setting work piece into line boring machine and aligning work piece to centre line of boring bar - using appropriate and sufficient clamping of work piece.
<i>Setting and locking tool</i> must include:	- setting tool to required diameter - locking tool according to manufacturer specifications.
<i>Line boring at correct speeds and feed rates</i> must include:	- using coolant and lubricant correctly - setting machining parameters to achieve job requirements and maximise tool life - setting speed and feed rates for tunnel material and diameter.
<i>Specifications and honing allowances</i> must include:	consideration of speed and feed and nose radius of boring tool.

<i>Cleaning and checking for serviceability</i> must include:	• crack testing connecting rod • measuring little end and big end size • checking big end fitment in connecting rod.
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Unit Mapping Information

Equivalent to AURTTM3002 Repair bearing tunnels and connecting rods in engines

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 AURTTM002 Repair bearing tunnels and connecting rods in 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:

- set up the following multi-cylinder engine configurations on a line boring machine:
 - a V configured engine
 - an in-line configured engine
- line bore the main bearing tunnels of a cylinder block, including each of the following:
 - relocating a main bearing cap
 - fitting a semi-finished main bearing cap
 - sleeving a main bearing tunnel
- repair camshaft bearing tunnels of an overhead camshaft cylinder head
- repair full set of connecting rods
- repair one connecting rod with a stepped parting face.

Knowledge Evidence

Individuals must be able to demonstrate knowledge of:

- work health and safety (WHS), and occupational health and safety (OHS) requirements relating to repairing bearing tunnels and connecting rods in engines, including:
 - procedures for:
 - selecting and using personal protective equipment (PPE), including safety glasses, ear protection and safety footwear
 - using hand tools and lifting equipment
 - operational risk assessment and treatments associated with:
 - electrical safety of line boring and honing machinery
 - line boring and honing machinery movement and operation

- environmental requirements, including procedures for trapping, storing and disposing of cooling and lubricating fluids released during machining process
- types, characteristics and limitations of line boring and honing machines, including:
 - types and grades of boring tools
 - types and grades of honing stones
- tool sharpening and dressing methods, including:
 - maintaining sharpness of tools throughout boring operations
 - dressing procedures for stones
- line boring methods and procedures, including:
 - preparing line borer to accept engine block or cylinder head
 - setting engine block or cylinder head into line boring machine and aligning to centre line of boring bar
 - setting line boring tool to correct diameter and locking boring tool
 - welding and relocating main bearing caps
 - machining top and bottom of bearing caps
 - machining parting faces of cylinder head camshaft bearing
 - line boring cylinder head camshaft tunnels
 - line boring damaged tunnels to oversize to accept sleeving operation
 - machining parting faces of cylinder block
 - line boring cylinder block tunnels to accept oversized back bearings
 - line boring tunnels to leave a honing allowance
 - line boring rear main bearing areas and thrust bearing diameters to original size
 - machining and squaring thrust faces in engine blocks
 - line boring semi-finished camshaft bearings
- line honing methods and procedures, including:
 - procedures for setting diameter of honing stone
 - rotational and oscillating speeds of honing bar
- connecting rod repair methods and procedures, including:
 - removing rod eye bush and measuring rod eye bore
 - checking alignment of connecting rod and straightening connecting rod
 - boring rod eye for oversized bush
 - removing cap bolts and nuts and machining parting faces on connecting rod and big end cap, including cracked rods
 - resizing big end for standard and oversize back bearings
 - fitting new little end bushes and pin boring little ends
 - types and application of cleaning and lubricating agents
- 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 bearing tunnels and connecting rods in engines that they have repaired, 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
- 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
- multi-cylinder engine blocks and cylinder heads specified in the performance evidence
- engine line boring and honing machines
- precision measuring equipment, including:
 - dial bore gauges
 - dial indicators
 - inside and outside metric and imperial micrometers.

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