



**Australian Government**

# **AURTTM3010 Heat treat, straighten and reclaim engine components**

**Release 2**

## AURTTM3010 Heat treat, straighten and reclaim engine components

### Modification History

| Release   | Comment                                                                                                                                                |
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| Release 2 | Replaces AURTTM3010 Heat treat, straighten and reclaim engine components (Release 1)<br>Reference to OHS legislation replaced with new WHS legislation |

### Unit Descriptor

|                 |                                                                                                                                                                                                                                                                                                      |
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| Unit descriptor | This unit describes the performance outcomes required to use industry-accepted methods to apply heat treatment and straightening techniques when reclaiming engine components.<br><br>No licensing, legislative, regulatory or certification requirements apply to this unit at time of endorsement. |
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### Application of the Unit

|                         |                                                                                                                                                                                                                                                                                       |
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| Application of the unit | Work applies to determining repair requirements and reclaiming engine components in an engine reconditioning process. Engine components to be reclaimed may include those of light vehicles, heavy vehicles, agricultural and plant equipment, recreational vehicles and motorcycles. |
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### Licensing/Regulatory Information

Refer to Unit Descriptor.

### Pre-Requisites

Not applicable.

## Employability Skills Information

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| <b>Employability skills</b> | This unit contains employability skills. |
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## Elements and Performance Criteria Pre-Content

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| 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. Prepare to undertake heat treatment procedures | <p>1.1. <b>Workplace instructions</b> are used to determine job requirements, including method, process and equipment</p> <p>1.2. <b>Information</b> is accessed, procedures and methods are analysed, and appropriate tooling options are selected for reclaiming engine components</p> <p>1.3. <b>Tools and measuring equipment</b> are checked and prepared for operation</p> <p>1.4. Safe operating procedures and <b>workplace health and safety (WHS)</b> and <b>environmental requirements</b> are observed throughout the work</p> <p>1.5. Engine component is <b>prepared</b> for heat treatment</p> |
| 2. Heat treat engine components for reclamation   | <p>2.1. Engine component specifications are accessed and interpreted from manufacturer and component supplier information to determine heat treatment method</p> <p>2.2. Heat treating methods are used to repair damaged or undersized <b>engine components</b></p> <p>2.3. <b>Reclamation method</b> is completed in readiness for further repair</p> <p>2.4. Work is completed without causing damage to components or system</p> <p>2.5. Components are measured against manufacturer and component supplier specifications and allowable tolerances</p>                                                  |
| 3. Straighten engine components for reclamation   | <p>3.1. Engine component specifications are accessed and interpreted from manufacturer and component supplier information to determine straightening method</p> <p>3.2. Components are mounted and clamped in straightening equipment</p> <p>3.3. Engine components are straightened using acceptable reconditioning methods to comply with Australian standards</p> <p>3.4. Work is completed without causing damage to components or system</p> <p>3.5. Components are measured against manufacturer and component supplier specifications and allowable tolerances</p>                                     |
| 4. Perform necessary                              | 4.1. Components are machined and finished to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| ELEMENT                         | PERFORMANCE CRITERIA                                                                                                                                                                               |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| machining to reclaim components | specifications in readiness for assembly                                                                                                                                                           |
| 5. Finalise repair processes    | 5.1. Surfaces are protected with a rust-prevention solution<br>5.2. Components are stored to workplace requirements<br>5.3. Workplace documentation is processed according to workplace procedures |

## Required Skills and Knowledge

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

### Required skills

- technical skills to:
  - prepare heat treatment and engine component straightening tools
  - use workplace technology relating to reclaiming engine components, including specialist reclamation tools and equipment, measuring equipment and computerised technology
  - apply techniques to prevent and rectify distortion
  - sharpen, shape and dress cutting and grinding tools
  - identify worn and damaged cutting and grinding tools
  - mount and position cutting and grinding tools
  - set machining parameters to achieve job requirements and maximise tool life
  - use appropriate and sufficient clamping and mounting of work piece
  - use coolant and lubricant correctly
  - measure to specified tolerances and dimensions
- communication skills to:
  - follow oral instructions
  - report deviations from specifications
  - interact with customers and team members
- literacy skills to:
  - read and interpret routine job instructions, specifications, drawings and standard operating procedures
  - identify and analyse technical information
  - understand quality procedures
- numeracy skills to use mathematical ideas and techniques to:
  - calculate time
  - assess tolerances
  - apply accurate measurements
  - calculate material requirements
  - establish quality checks
- problem-solving skills to:
  - locate, interpret and apply workplace policies and procedures, including manufacturer and component supplier procedures
  - identify and avoid planning and scheduling problems
  - prevent time and material wastage
  - organise work and plan processes
- planning and organising skills to:
  - make good use of time and resources

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| <ul style="list-style-type: none"><li>• set priorities</li><li>• monitor own performance</li><li>• self-management skills to:<ul style="list-style-type: none"><li>• manage risks and hazards associated with:<ul style="list-style-type: none"><li>• applying heat to engine components</li><li>• operating cutting and grinding machinery</li></ul></li><li>• optimise workflow and productivity</li></ul></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Required knowledge</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <ul style="list-style-type: none"><li>• WHS regulations and requirements, equipment, material and personal safety requirements, including personal protective equipment (PPE) for handling engine components and using specialised equipment, such as:<ul style="list-style-type: none"><li>• heating torches</li><li>• ovens</li><li>• presses</li><li>• straightening tools</li></ul></li><li>• types, characteristics, uses and limitations of reclamation techniques</li><li>• dangers of working with heating equipment</li><li>• effects of heat on different metals and heating procedures</li><li>• component straightening techniques</li><li>• hardening and tempering techniques, including:<ul style="list-style-type: none"><li>• thermal stress relieving to stabilise crankshafts</li><li>• applying tuffride and nitride</li></ul></li><li>• Australian standards relating to engine reconditioning</li></ul> |

## Evidence Guide

| <b>Evidence Guide</b>                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| 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. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Overview of assessment</b>                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b>                                                                                                                    | <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:</p> <ul style="list-style-type: none"> <li>• observe safety procedures and requirements</li> <li>• communicate effectively with others involved in or affected by the work</li> <li>• select methods and techniques appropriate to the circumstances</li> <li>• complete preparatory activity in a systematic manner</li> <li>• reclaim a range of engine components according to workplace, manufacturer and component supplier requirements</li> <li>• complete the reclamation of a range of engine components within workplace timeframes</li> <li>• complete work without damage to tools and equipment or injury to persons.</li> </ul> |
| <b>Context of, and specific resources for assessment</b>                                                                                                                                                               | <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"> <li>• using standard workplace practices and procedures</li> <li>• following safety requirements</li> <li>• applying environmental constraints.</li> </ul> <p>Assessment is to comply with relevant:</p> <ul style="list-style-type: none"> <li>• regulatory requirements</li> <li>• Australian standards</li> <li>• industry codes of practice.</li> </ul> <p>The following resources should be made available for the</p>                                                                                                                                                                       |

| <b>Evidence Guide</b>       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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|                             | <p>assessment of this unit:</p> <ul style="list-style-type: none"> <li>• appropriate worksite</li> <li>• crankshafts, camshafts, balance shafts and engine cylinder head assemblies</li> <li>• material relevant to reclaiming engine components</li> <li>• equipment and hand and power tools appropriate to reclaiming engine components</li> <li>• specifications and work instructions.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Method of assessment</b> | <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 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                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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| <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> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Workplace instructions</b> may include:                                                                                                                                                                                                                                                                                                                                                                                                                                   | <ul style="list-style-type: none"> <li>• computer-generated instructions</li> <li>• verbal instructions</li> <li>• written instructions.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Information</b> may include:                                                                                                                                                                                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>• Australian standards</li> <li>• engineer's design specifications and instructions</li> <li>• instructions issued by authorised workplace or external persons</li> <li>• workplace specifications and requirements</li> <li>• regulatory and legislative requirements relating to the automotive industry, including Australian Design Rules</li> <li>• safe work procedures relating to the heat treatment, straightening and reclaiming of engine components</li> <li>• verbal, written and graphical instructions, signage, work schedules, plans, specifications, work bulletins, memos, material safety data sheets (MSDS), diagrams or sketches.</li> </ul> |
| <b>Tools and measuring equipment</b> may include:                                                                                                                                                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>• clamps</li> <li>• dial indicators</li> <li>• hand and power tools</li> <li>• inside and outside micrometers</li> <li>• lifting equipment</li> <li>• magnetic chuck</li> <li>• milling machine</li> <li>• surface grinder</li> <li>• welding equipment.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>WHS requirements</b> may include:                                                                                                                                                                                                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• individual state or territory regulatory requirements</li> <li>• operational risk assessment and treatments associated with: <ul style="list-style-type: none"> <li>• electrical safety</li> <li>• machinery movement and operation</li> <li>• manual and mechanical lifting and shifting</li> <li>• toxic substances</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                     |

| <b>Range Statement</b>                            |                                                                                                                                                                                                                    |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                   | <ul style="list-style-type: none"> <li>• working in proximity to others and site visitors</li> <li>• PPE required by legislation, regulations, codes of practice and workplace policies and procedures.</li> </ul> |
| <b>Environmental requirements</b> are to include: | <ul style="list-style-type: none"> <li>• clean-up management</li> <li>• dust and noise minimisation</li> <li>• waste management.</li> </ul>                                                                        |
| <b>Preparation</b> may include:                   | <ul style="list-style-type: none"> <li>• cleaning the component using appropriate cleaning methods</li> <li>• fitting and clamping the component.</li> </ul>                                                       |
| <b>Engine components</b> may include:             | <ul style="list-style-type: none"> <li>• alloy and cast iron cylinder heads</li> <li>• balance shafts</li> <li>• camshafts</li> <li>• crankshafts</li> <li>• piston and connecting rod assemblies.</li> </ul>      |
| <b>Reclamation methods</b> will include:          | <ul style="list-style-type: none"> <li>• hardening and tempering engine components</li> <li>• machining engine components</li> <li>• straightening engine components.</li> </ul>                                   |

## Unit Sector(s)

|                         |                          |
|-------------------------|--------------------------|
| <b>Competency field</b> | Mechanical Miscellaneous |
| <b>Sector</b>           | Technical - Manufacture  |

## Custom Content Section

Not applicable.