



Australian Government

AURTTM3007 Carry out grinding operations

Release 2

AURTTM3007 Carry out grinding operations

Modification History

Release	Comment
Release 2	Replaces AURTTM3007 Carry out grinding operations (Release 1) Reference to OHS legislation replaced with new WHS legislation

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes required to carry out grinding operations on a range of engine components to specific tolerances. It involves determining engine damage and the required repair action, and preparing and using grinding machines with machine engine components to specifications and workplace requirements.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at time of endorsement.</p>
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Application of the Unit

Application of the unit	<p>Work applies to determining repair requirements and grinding in an engine reconditioning process. Engine cylinder components to be machined may include those of light vehicles, heavy vehicles, agricultural and plant equipment, recreational vehicles and motorcycles.</p>
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Licensing/Regulatory Information

Refer to Unit Descriptor.

Pre-Requisites

Not applicable.

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

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 carry out grinding operations	1.1. <i>Workplace instructions</i> are used to determine job requirements, including method, process and equipment 1.2. <i>Information</i> is sourced, procedures and methods are analysed, and appropriate tooling options are selected for grinding engine components 1.3. <i>Tools and measuring equipment</i> are checked and prepared for operation 1.4. Safe operating procedures and <i>workplace health and safety (WHS)</i> and <i>environmental requirements</i> are observed throughout the work 1.5. <i>Measuring and calibration requirements</i> for grinding are determined
2. Grind engine components	2.1. Component is measured prior to grinding to determine depth of grind 2.2. Component is positioned in grinder and clamped 2.3. Grinding is carried out according to workplace procedures and without causing damage to components or system 2.4. Component is checked/measured with instruments to ensure compliance with specifications 2.5. Grinding operations are completed to specifications
3. Finalise grinding process	3.1. Components are thoroughly cleaned 3.2. Final inspection is made to ensure finished work complies with workplace requirements 3.3. Engine components are prepared for storage according to workplace requirements 3.4. Machined surfaces are treated with a protective coating to prevent rust if component is to be stored 3.5. 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:
 - select correct grinding wheel for the application
 - identify irregularities in the grinding process
 - set machining parameters to achieve job requirements and maximise tool life
 - use appropriate and sufficient clamping or mounting of the 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 and 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
- self-management skills to:
 - select and use appropriate equipment, materials, processes and procedures
 - follow workplace documentation, such as codes of practice and operating procedures
- technology skills to use communication devices and computerised equipment to:
 - search and gather supporting material
 - take, locate, download and view digital images

Required knowledge

- WHS regulations and requirements, equipment, material and personal safety requirements, including:
 - personal protective equipment (PPE) for using grinding machines and chemical cleaning and lubricating agents
 - hazards associated with rotating grinding machines
- manual-handling techniques relating to grinding crankshafts
- types, characteristics and limitations of crankshaft grinding machines, including:
 - hand-held grinding machines for oil hole dressing
 - types and grades of grinding wheels, including grit grades
- dismantling procedures of crankshafts, including:
 - numbering and removing counterweights
 - drive gears
 - oil seal sleeves and dowels
- inspection procedures, including:
 - identifying crankshaft material
 - identifying heat treatment process, including nitriding, tufftriding and induction hardening
 - identifying radius treatment, including deep fillet rolling, radius rolling and shot peening
 - checking alignment of crankshaft in vee-blocks
 - measuring journals against specifications and identifying damaged journals
- testing procedures of crankshaft, including:
 - crack testing coil shot and end shot
 - testing hardness of journals
- procedures for preparing the crankshaft grinding wheel, including:
 - wheel preparation, including selecting wheel to suit radius and journal width of crankshaft
 - dressing procedures of wheel, including:
 - types of diamonds for front and radius dressing
 - procedure for dressing the wheel to suit crankshaft radius
 - procedure for dressing front of wheel
- procedures for big-end grinding, including:
 - setting crankshaft rotation speed according to crankshaft material
 - setting crankshaft grinder wheelhead movement
 - measuring journal diameters and widths during grinding with constant measuring gauge
- procedures for adjusting the crankshaft grinder to suit main bearing journal grinding, including:
 - removing the crankshaft from the grinder
 - setting chuck offsets for main bearings and adjusting counter weights to suit
 - fitting the crankshaft in the correct direction of rotation and ensuring that

- critical surfaces are not damaged by the chuck
- setting datum in relation to rear flange and nose for main bearing grinding
- procedures for main bearing journal grinding, including:
 - setting crankshaft rotation speed according to crankshaft material
 - setting crankshaft grinder wheelhead movement
 - measuring journal diameters and widths during grinding with constant measuring gauge
- procedures for finishing journal grinding, including:
 - chamfering and dressing oil holes
 - finishing journals according to grade of belt and required finish
 - setting up and facing flange ends and seal areas
- final grinding inspections of crankshaft, including journal surface finish, taper, ovality, barrelling, hour-glass, grinding chatter and journal burning
- methods of correcting faults
- procedures for removing crankshaft from grinder and checking crankshaft for straightness in vee-blocks using dial indicator
- Australian standards relating to engine reconditioning

Evidence Guide

Evidence Guide	
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.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<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"> • observe safety procedures and requirements • select methods and techniques for grinding operations appropriate to the circumstances • complete preparatory activity in a systematic manner • grind a range of engine components according to workplace, manufacturer and component supplier requirements • complete work without damage to tools and equipment or injury to persons.

Evidence Guide	
<p>Context of, and specific resources for assessment</p>	<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"> • using standard workplace practices and procedures • following safety requirements • applying environmental constraints. <p>Assessment is to comply with relevant:</p> <ul style="list-style-type: none"> • regulatory requirements • Australian standards • industry codes of practice. <p>The following resources must be made available for the assessment of this unit:</p> <ul style="list-style-type: none"> • appropriate worksite • crankshafts and camshafts appropriate to the workplace, including in-line multi-cylinder engine blocks and vee-configuration multi-cylinder engine blocks • fixed and portable hand, air and power tools and equipment appropriate to grinding operations • specifications and work instructions.
<p>Method of assessment</p>	<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>

Evidence Guide	
	<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	
<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>	
<p><i>Workplace instructions</i> may include:</p>	<ul style="list-style-type: none"> • computer-generated instructions • verbal instructions • written instructions.
<p><i>Information</i> may include:</p>	<ul style="list-style-type: none"> • Australian standards • engineer's design specifications and instructions • instructions issued by authorised workplace or external persons • workplace specifications and requirements • regulatory and legislative requirements relating to the automotive industry, including Australian Design Rules • safe work procedures relating to the operation of machinery associated with grinding engine components • verbal, written and graphical instructions, signage, work schedules, plans, specifications, work bulletins, memos, material safety data sheets (MSDS), diagrams or sketches.
<p><i>Tools and measuring equipment</i> may include:</p>	<ul style="list-style-type: none"> • arbors • clamps • dial bore gauges • dial indicators • inside and outside micrometers.
<p><i>WHS requirements</i> may include:</p>	<ul style="list-style-type: none"> • operational risk assessment and treatments associated with: <ul style="list-style-type: none"> • electrical safety • machinery movement and operation • manual and mechanical lifting and shifting • toxic substances • working in proximity to others and site visitors • PPE required by legislation, regulations, codes of practice and workplace policies and procedures.
<p><i>Environmental</i></p>	<ul style="list-style-type: none"> • clean-up management

Range Statement	
<i>requirements</i> are to include:	<ul style="list-style-type: none"> • dust and noise minimisation • waste management.
<i>Measuring and calibration requirements</i> may include:	<ul style="list-style-type: none"> • determining journal diameters • determining sizes of grind.

Unit Sector(s)

Competency field	Mechanical Miscellaneous
Sector	Technical - Manufacture

Custom Content Section

Not applicable.