



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **AURM441976A Test engines using a dynamometer**

**Release: 1**

## **Modification History**

Not Available

## Unit Descriptor

**Unit Descriptor** This unit covers the competence to test engines using a dynamometer. This includes dynamometer set-up, testing, data logging and analysis, devising strategies for improvement and dynamometer shutdown procedures.

**Unit Sector** No sector assigned

## ELEMENT

## PERFORMANCE CRITERIA

- |                                      |   |
|--------------------------------------|---|
| 1. Prepare for dynamometer operation | <p>1.1 Team instructions, controlling body rules, category rules and component supplier specifications are used to determine job requirements including design, quality, material, equipment and specification</p> <p>1.2 OH&amp;S requirements, including regulatory requirements, equipment and system isolation requirements, extraction, fire hazard, fuel storage, scatter shields, noise regulations, environmental regulations and personal protection needs are observed throughout the work</p> <p>1.3 Outcomes of dynamometer testing are determined and documented</p> <p>1.4 Dynamometer is checked for calibration and serviceability and prepared for operation</p> <p>1.5 Engine is connected to dynamometer including ancillary systems and monitoring/control systems</p> <p>1.6 Exhaust extraction is connected and checked for serviceability</p> <p>1.7 Engine is prepared for dynamometer testing including checking oil and water levels and confirming engine tune and condition</p> |
| 2. Conduct dynamometer testing       | <p>2.1 Load and run sequence is determined including run-in period for new engines</p> <p>2.2 Correction factors are determined/calculated and applied to results</p> <p>2.3 Engine connections to the dynamometer are checked</p> <p>2.4 Selected dynamometer testing sequence is performed in accordance with technical specifications and directions and/or the locally authorised method</p> <p>2.5 Dynamometer test data is analysed and valid conclusions about engine and sub-system condition and performance are made</p> <p>2.6 Findings including recommendations for engine configuration and/or modifications to improve performance based on dynamometer data are reported to appropriate persons</p>   |

- 2.7 Approved modifications are tested with confirmation run/s
- 2.8 Data is presented to team members as information to complement engine/vehicle set-up
- 3. Clean up work area and log test results
  - 3.1 Dynamometer shutdown procedure is performed in accordance with manufacturer/component supplier requirements
  - 3.2 Engine is disconnected from dynamometer
  - 3.3 Dynamometer and associated tooling and equipment are cleaned and refurbished
  - 3.4 Operator maintenance of dynamometer is conducted
  - 3.5 Dynamometer test results are logged to create/add to engine history

## REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

### RANGE STATEMENT

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, if used 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.

- |                       |  |
|-----------------------|--|
| Unit scope            | <ul style="list-style-type: none"><li>• Work includes the use of dynamometers to test engine performance and the interpretation of dynamometer results in order to maximise engine performance for the motorsport/performance enhancement environment. This includes dynamometer set up, testing, use of software relevant to the dynamometer, data logging and analysis and dynamometer shutdown procedures</li><li>• Dynamometers include engine and chassis dynamometers. Dynamometers may include water or electrically loaded dynamometers</li><li>• Units of measurement must include metric and imperial units</li></ul>  |
| Unit context          | <ul style="list-style-type: none"><li>• OH&amp;S requirements include State/Territory and Commonwealth legislation, material safety management systems, controlling body requirements, manufacturer specifications and local safe operating procedures</li><li>• Work is carried out in accordance with legislative obligations (including environmental requirements), health regulations, manual handling procedures and team insurance requirements</li><li>• Work requires individuals to demonstrate discretion, judgement and problem-solving skills in the set-up and operation of machines</li><li>• Competence may be demonstrated in workplaces involved in the design, development, manufacture and maintenance of performance vehicles and/or performance vehicle components and assemblies used in motorsport</li></ul> |
| Tooling and equipment | <ul style="list-style-type: none"><li>• Tooling and equipment include, but may not be limited to, engine dynamometer or chassis dynamometer, hand and power tooling, engine compression test kit, vacuum/pressure gauges, flow meters, exhaust analysers, engine diagnostic computer hardware and software</li></ul>   |
| Personal              | <ul style="list-style-type: none"><li>• Personal protective equipment is to include that prescribed under</li></ul>  |

protective  
equipment

dynamometer manufacturer/component supplier specifications,  
legislation, regulations and enterprise policies and practices

Information  
and  
procedures

- Controlling body rules, category rules and supplementary regulations
- Team procedures relating to testing engines using a dynamometer
- Task instructions including worksheets, checklists, plans, drawings and designs
- Team procedures relating to reporting and communication
- Team procedures relating to the use of tooling and equipment
- Manufacturer/component supplier specifications and application procedures for test equipment and material
- Australian Design Rules (where applicable)

## 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.

Critical aspects of evidence	<ul style="list-style-type: none"><li>• Interpret and apply team requirements, controlling body and category rules and supplementary regulations</li><li>• Correctly apply and use safety equipment and personal protective equipment</li><li>• Follow task instructions, operating procedures and inspection processes to:<ul style="list-style-type: none"><li>• minimise the risk of injury to self or others</li><li>• prevent damage to competition vehicle or equipment</li><li>• achieve required outcomes within team time and quality standards</li></ul></li><li>• Correctly set up and operate an engine dynamometer to test a minimum of two (2) engines to complete the following:<ul style="list-style-type: none"><li>• determine engine performance</li><li>• analyse engine performance data</li><li>• assess effect of engine and sub-system modifications and present to team members as information to complement engine/vehicle set-up</li><li>• confirm effectiveness of engine and sub-system modifications</li></ul></li><li>• Work effectively with others</li><li>• Modify activities to cater for variations in workplace context and environment</li></ul>
Underpinning knowledge	<ul style="list-style-type: none"><li>• Engine performance and dynamometer terminology</li><li>• Preparation procedure for dynamometer testing</li><li>• Dynamometer operation and use of associated hardware and software</li><li>• Test environment correction factors</li><li>• Dynamometer data interpretation and analysis</li><li>• Operator dynamometer maintenance</li><li>• Procedures for reporting task completion</li><li>• OH&amp;S policies and procedures</li></ul>
Specific key competencies,	These include a number of processes that are learned

underpinning and employability skills required to achieve the performance criteria	<p>throughout work and life, which are required in most jobs. Some of these are covered by the national key competencies,</p> <p>although others may be added. The details below highlight how these competencies are to be applied in the attainment of this unit.</p> <p>Application of the key competencies in this unit are to satisfy the nominated level in which:</p> <p>Level 1 - relates to working effectively within set conditions and processes;</p> <p>Level 2 - relates to the management or facilitation of conditions or processes; and</p> <p>Level 3 - relates to the design, development and evaluation of conditions or process.</p> <p>How will the candidate apply the following key competency in this unit? The candidate will need to:</p>
Collect, analyse and organise information	<p>Collect, organise, understand and analyse information related to dynamometer test results, team requirements and safety procedures</p> <p>(Level 2)</p>
Communicate ideas and information	<p>Communicate ideas and information to enable confirmation of work requirements, coordination of work with technical supervisors, other technicians and team members and the reporting of work outcomes and problems</p> <p>(Level 2)</p>
Plan and organise activities	<p>Plan and organise activities including the preparation and layout of the work area and the obtaining of equipment and material to avoid backtracking, workflow interruptions or wastage</p> <p>(Level 2)</p>
Work with others and in a team	<p>Work with others and in a team by recognising dependencies and using cooperative approaches to optimise workflow and productivity</p> <p>(Level 2)</p>



Use mathematical ideas and techniques	Use mathematical ideas and techniques to correctly complete measurement of engine performance required for the team (Level 2)
Solve problems	Use dynamometer testing to solve problems with engine performance (Level 2)
Use technology	Use workplace technology related to dynamometers including tooling, equipment, calculators and measuring devices (Level 2)
Resource implications	<ul style="list-style-type: none"><li>• Access to tooling and equipment as identified in the Range Statement including engines, dynamometer and test equipment and technical references or information</li></ul>
Method of assessment	<ul style="list-style-type: none"><li>• Assessment methods must confirm consistency of performance over time and in a range of workplace contexts</li><li>• Assessment should be by direct observation of tasks and questioning on underpinning knowledge</li><li>• Assessment should be conducted over time and may be in conjunction with assessment of other units of competence</li></ul>
Context of assessment	<ul style="list-style-type: none"><li>• Assessment may occur on the job or in a workplace simulated facility with process equipment, material, work instructions and deadlines</li></ul>