



Australian Government

Department of Education, Employment and Workplace Relations

AURM441393A Analyse and repair complex performance fuel systems

Release: 1

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor This unit covers the competence to inspect, analyse and repair complex fuel systems, associated components and refuelling equipment. This includes testing, determining repair and/or performance improvement strategies, conducting repairs, adjustments and post-repair checks.

Prerequisite Unit(s) AURE321171A Service and repair electronic spark ignition engine management systems
AURT203170B Service petrol fuel systems
AURT303166B Repair petrol fuel systems)

Unit Sector No sector assigned

ELEMENT

1. Identify and confirm the fault

PERFORMANCE CRITERIA

- 1.1 Controlling body rules, category rules, supplementary regulations and team requirements are used to determine task specifications including configuration, equipment, quality and quantities
- 1.2 Benchmark specifications for a correctly functioning complex fuel system are accessed and interpreted
- 1.3 OH&S requirements, including regulatory requirements, equipment and system isolation requirements and personal protection needs are observed throughout the work
- 1.4 The details of the fault are examined and available preliminary information is documented
- 1.5 The effects of the fault are identified and confirmed from direct and/or indirect evidence
- 1.6 Possible safety impacts of the fault are considered and responded to in accordance with regulatory and team obligations and practices

2. Prepare for fault analysis

- 2.1 Possible causes of the fault, including intermittent faults are identified from an analysis of technical support information and available on-board diagnostic systems

- 2.2 The most appropriate analysis process, including sequence, tests and testing equipment are developed and/or identified and selected from the range of available options
 - 2.3 Test equipment is obtained and prepared for the application in accordance with regulatory, manufacturer and team requirements
 - 2.4 Tooling and materials required to support the diagnostic process are identified, selected and prepared for use
- 3. Analyse the fault and determine repair/performance enhancement strategies
 - 3.1 The selected analysis process is followed in accordance with technical specifications and directions and/or the locally authorised method
 - 3.2 Test and testing equipment are applied in accordance with regulatory requirements and manufacturer/component supplier specifications
 - 3.3 Test results and other diagnostic findings are verified, if necessary by using reliable alternative or optional processes
 - 3.4 Authority is obtained to partly dismantle components, to permit an accurate inspection of analysed faults, if required
 - 3.5 Valid conclusions are drawn about the cause, and the direct and indirect consequences of the fault are drawn from available evidence and documented to team requirements
 - 3.6 Options for rectifying the fault/enhancing performance are identified from research of technical support information
 - 3.7 The most appropriate option is selected from an analysis of the options, the prevailing circumstances, regulatory requirements and team policies
 - 3.8 The selected repairs/modifications or adaptation of equipment are documented and communicated to appropriate persons including the analysis outcome and repair requirements
- 4. Conduct repairs/implement performance improvement strategies
 - 4.1 Repairs and adjustments to components/sub-assemblies are carried out in accordance with manufacturer/component supplier specifications for methods, equipment used and tolerances relative to the system

4.2 Post-repair checks and vehicle start-up are conducted

5. Clean up work area and finalise documentation

5.1 Test equipment and tooling is returned to be cleaned, maintained and prepared ready for further use or stored in accordance with manufacturer/component supplier specifications and team requirements

5.2 Surplus and unserviceable components are removed in accordance with team procedures

5.3 Problems with the work area or the operation of the equipment are identified and reported to appropriate persons

5.4 Recording of work/vehicle documentation is inspected for completeness

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.

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| Unit scope | <ul style="list-style-type: none">• Work includes the maintenance of complex fuel systems used in the motorsport/performance enhancement environment. It includes the operation and function of complex fuel system components and systems, conduct of tests and interpretation of test results in order to analyse faults within complex fuel systems, determining repair and/or performance improvement strategies, conducting repairs, adjustments and post-repair checks• A complex fuel system is defined as a specialised motorsport/performance system incorporating a configurable management/control system and may include a duplicate/backup supply system and injection or multiple carburetion configurations• Fuel systems must cover sub-systems and components including fuel cells, pumps, pressure and/or flow regulation, management/control system and injection or multiple carburetion components• Diagnosis is to cover that for module and parts replacement in related electrical, electronic, pneumatic control systems• Fuel system faults covered by this unit include, but are not limited to, rough running, under/overfuelling, misfiring, poor performance, contamination and leakage• Fuel system faults covered by this unit must include indirect faults caused by the influence of external systems which may or may not be faulty in their primary operation |
| Unit context | <ul style="list-style-type: none">• OH&S requirements include State/Territory and Commonwealth legislation, material safety management systems, controlling body requirements, manufacturer specifications and local safe operating procedures• Work is carried out in accordance with legislative obligations (including environmental requirements), health regulations, manual handling procedures and team insurance requirements• Work requires individuals to demonstrate analytical and organisational ability, judgement and problem-solving skills in the analysis and maintenance of complex fuel systems• 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

Tooling and equipment	• Tooling and equipment may include, but is not limited to, hand and power tooling, vacuum/pressure gauges, flow meters, exhaust analysers, multimeters, engine diagnostic computer hardware and software
Components	• Components may include, but is not limited to: • rollover valves • fuel cells • fuel lines • breathers • pickup pumps • main pumps • filters • fuel pots/surge tanks/collector tanks • pressure and temperature sensors • injectors • carburettors • hoses and fittings • refuelling equipment including churns/rigs, dry break valves, hoses and fittings
Personal protective equipment	• Personal protective equipment is to include that prescribed under manufacturer specifications, legislation, regulations and enterprise policies and practices
Information and procedures	• Controlling body rules, category rules and supplementary regulations • Team procedures relating to applying diagnosing and maintaining complex fuel systems • 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

- Interpret and apply team requirements, controlling body and category rules and supplementary regulations
- Apply safety requirements including the isolation of equipment and the use of personal protective equipment
- Follow task instructions, operating procedures and inspection processes to:
 - minimise the risk of injury to self or others
 - prevent damage to competition vehicle or equipment
 - achieve required outcomes within team time and quality standards
- Correctly analyse, repair and conduct post-repair checks on a minimum of three (3) fuel system faults (on more than one fuel system type) and involve:
 - rough running, under/over fuelling, misfiring, poor performance, contamination or leaks, where:
 - at least one fault having possible combination causes involved in the sub-systems (fuel cells, pumps, pressure and/or flow regulation, management/control system and injection or multiple carburetion components)
 - the scope of the faults necessitates the use of a range of testing equipment
- Work effectively with others
- Modify activities to cater for variations in workplace context and environment

Underpinning knowledge

- Workplace safety policies and procedures related to complex fuel systems
- Types, function, operations and limitations of complex fuel system and components
- Properties of fuels used in the motorsport industry including compatibility with fuel system components

- Complex fuel systems layouts
- Diagnosis and testing procedures and test instrument application
- Symptom and cause differentiation
- Repair and/or performance improvement strategies
- Removal, replacement and repair, adjustment and post-repair check procedures
- Diagnosis theory including concept, design and planning
- Record keeping procedures
- Procedures for reporting equipment faults and component defects
- Team guidelines regarding acceptable quality and tolerance levels
- Equipment safety requirements
- OH&S policies and procedures

Specific key competencies, underpinning and employability skills required to achieve the performance criteria

These include a number of processes that are learned throughout work and life, which are required in most jobs. Some of these are covered by the national key competencies, although others may be added. The details below highlight how these competencies are to be applied in the attainment of this unit.

Application of the key competencies in this unit are to satisfy the nominated level in which:

Level 1 - relates to working effectively within set conditions and processes;

Level 2 - relates to the management or facilitation of conditions or processes; and

Level 3 - relates to the design, development and evaluation of conditions or process.

How will the candidate apply the following key competency in this unit? The candidate will need to:

Collect, analyse and organise information

Collect, analyse, organise and understand information related to complex fuel system analysis and repair
(Level 2)

Communicate ideas and information

Communicate ideas and information to enable confirmation of work requirements, coordination of work with technical supervisors, other technicians and workers and reporting of

	work outcomes and problems (Level 2)
Plan and organise activities	Plan and organise activities including the preparation and layout of the work area and obtaining equipment and material to avoid backtracking, workflow interruptions or wastage (Level 2)
Work with others and in a team	Work with others and in a team by recognising dependencies and using cooperative approaches to optimise workflow and productivity (Level 2)
Use mathematical ideas and techniques	Use mathematical ideas and techniques to correctly interpret test results in order to determine required action for the maintenance of fuel systems (Level 2)
Solve problems	Use pre-checking and inspection techniques to anticipate maintenance and repair problems, avoid reworking and avoid wastage (Level 2)
Use technology	Use workplace technology related to complex fuel systems including tooling equipment, calculators and measuring devices (Level 2)
Resource implications	• Access to tooling, equipment and fuel systems as identified in the Range Statement including technical references or information
Method of assessment	• Assessment methods must confirm consistency of performance over time and in a range of workplace contexts • Assessment should be by direct observation of tasks and questioning on underpinning knowledge • Assessment should be conducted over time and may be in conjunction with assessment of other units of competence
Context of assessment	• Assessment may occur on the job or in a workplace simulated facility with process equipment, material,

work instructions and deadlines