



Australian Government

AURETR5034 Develop and apply electrical systems modification

Release 1

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Modification History

Release	Comment
Release 1	Replaces AURT576520A Develop and apply electrical systems modification Unit code updated to meet policy requirements Reference to OHS legislation replaced with new WHS legislation Licensing statement added to unit descriptor

Unit Descriptor

Unit descriptor	This unit covers the competence to develop, apply and validate significant modifications to existing electrical systems in order to sustain, vary or enhance performance. Licensing, legislative, regulatory or certification requirements may apply to this unit in some jurisdictions. Users are advised to check with the relevant regulatory authority.
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Application of the Unit

Application of the unit	This includes the preparation and application of specifications and processes complying with safety, legal and commercial obligations.
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Licensing/Regulatory Information

Not applicable.

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 required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or 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. Identify and confirm the modification requirement	<p>1.1. WHS requirements, including regulatory requirements, equipment and system isolation requirements and personal protection needs are observed throughout the work.</p> <p>1.2. Purpose and objectives of the modification are identified from an analysis of inputs and confirmed with the customer.</p> <p>1.3. Outline options for achieving the required purpose and objectives are identified, framed and presented to the customer prior to proceeding.</p> <p>1.4. Possible legal and safety impacts of the modification are considered and responded to in accordance with regulatory and enterprise obligations and practices.</p>
2. Develop and validate the modification specification	<p>2.1. Benchmark specifications for the existing electrical system are accessed and interpreted.</p> <p>2.2. Criteria to be used in the selection of the modification method and in the evaluation of the outcomes are identified and documented.</p> <p>2.3. Proposed modification method is selected following the identification, consideration and evaluation of the full range of available and relevant options.</p> <p>2.4. Selected option, including material choices and processes, is developed in detail and progressively validated against the established criteria.</p> <p>2.5. Modification specification is documented to industry and enterprise standards.</p>
3. Apply and test the modification specification	<p>3.1. Selected modification method and process is followed in accordance with the established specifications.</p> <p>3.2. Modification is completed using equipment, tooling and materials in accordance with accepted industry standards and practices.</p> <p>3.3. Tests and testing equipment are applied in accordance with regulatory requirements, manufacturer/component supplier specifications and modification specification.</p> <p>3.4. Test results and other diagnostic findings are verified, if necessary, by using reliable alternate or optional processes.</p> <p>3.5. Variations necessitated during the modification process or as a result of testing are incorporated into the modification specification.</p> <p>3.6. Information and detail related to the modification is documented and provided to the appropriate parties in accordance with regulatory and commercial obligations.</p>

ELEMENT	PERFORMANCE CRITERIA
4. Clean up work area and maintain equipment	4.1. Materials that can be reused is collected and stored. 4.2. Testing equipment and other support materials are cleaned, maintained and prepared ready for further use or stored in accordance with manufacturer/component supplier specifications and enterprise requirements. 4.3. Waste and scrap is removed following workplace procedures. 4.4. Unserviceable equipment is tagged and faults identified in accordance with workplace. 4.5. Equipment and work area are cleaned and inspected for serviceable condition in accordance with workplace procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

- collect, organise and understand legal and technical information related to contemporary automotive electrical systems modifications.
- communicate ideas and information to enable confirmation of work requirements and specifications, coordination of work with site supervisor, other workers and customers, reporting of work outcomes and completion of regulatory, commercial and vehicle information systems inputs.
- plan and organise activities, including the development and planning of modification processes, preparation and layout of the worksite and the obtaining of tooling, equipment, materials and testing equipment to avoid backtracking, workflow interruptions or wastage.
- work with others and in a team by recognising dependencies and using cooperative approaches to optimise workflow and productivity.
- use mathematical ideas and techniques to complete measurements, calculate specifications, calibrate and establish testing equipment and evaluate modification results against pre-established criteria.
- establish modification methods and processes which anticipate and allow for risks and avoid or minimise reworking and avoid wastage.
- use the full range of workplace technology related to electrical systems modification, including testing equipment, maintenance equipment, tooling, calculators and measuring devices and information management systems.

Required knowledge

- electrical theory covering voltage, current, resistance, power, magnetism and inductance including semi-conductors and electronic system applications.
- electrical theory covering the concepts and principles of electrical, electronic and pneumatic systems.
- detailed knowledge of electrical theory and operation covering automotive digital computers, networked vehicles, voltage, current, resistance, power, capacitance, electrostatics, magnetism, inductance and radio frequency.
- general knowledge of the types, functions, operation and limitations of the main automotive industry electrical systems.
- general knowledge of automotive digital computing systems.
- detailed knowledge of the types, functions, operation and limitations of diagnostic testing equipment.
- general knowledge of the methods and processes for documenting and reporting modification specifications and outcomes.

Evidence Guide

EVIDENCE GUIDE	
<p>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.</p>	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<ul style="list-style-type: none"> • Interpret work order and locate and apply information. • Apply safety requirements, including the isolation of equipment and use of personal protective equipment. • Follow work instructions, operating procedures and inspection processes to: <ul style="list-style-type: none"> • minimise the risk of injury to self and others • prevent damage and wastage of goods, equipment and products • maintain required production output and product quality. • Modify a significant electrical system or sub-system including: <ul style="list-style-type: none"> • the selection, development and documenting of success factors and evaluation criteria before undertaking the modification • the selection, development and validation of the modification methodology, processes and specification • the application of the modification specification, methodology and process • the documenting and reporting of the outcomes. • Work effectively with others. • Modify activities to cater for variations in workplace context and environment.
Context of, and specific resources for assessment	<p>Assessment may occur on the job or in a workplace simulated facility with process equipment, materials, work instructions and deadlines.</p> <p>Access to operational electrical systems required modification, testing equipment as stipulated in the Range Statement, technical information and a work environment.</p>
Method of assessment	<p>Assessment of this unit of competence is most likely to be project related and require portfolios or other forms of indirect evidence of process. Direct evidence will include certification of compliance of the final outcome/product or authorisation for use by a competent authority.</p> <p>Assessment must confirm the inference that competence is able not only to be satisfied under the particular circumstances, but is able to</p>

EVIDENCE GUIDE

	<p>be transferred to other projects.</p> <p>Competence in this unit may be assessed in conjunction with other functional units which together form part of the holistic work role.</p>
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Range Statement

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.

Electrical modifications	<p>Electrical modifications to be covered by this unit may include those to:</p> <ul style="list-style-type: none"> • vary the performance of DC motors to meet changes in operational requirements • vary the performance of alternators to meet changes in operational requirements • change the electrical sequenced operating order of electric over hydraulic systems • convert vehicle from ground to insulated return.
Inputs to the modification method and processes	<p>Inputs to the modification method and processes may be obtained from customer requirements, manufacturer/ component supplier specifications, outcomes of diagnostic processes or from regulatory, licensing, intellectual property legislation, safety requirements and Australian Design Rules.</p>
Unit context	<ul style="list-style-type: none"> • WHS requirements include legislation, vehicle industry regulations, safety management systems, hazardous substances and dangerous goods code and safe operating procedures. • Work is carried out in accordance with legislative obligations, Australian Design Rules, environmental legislation, health regulations, manual handling procedures and organisation insurance requirements. • Work requires individuals to demonstrate research, analytical, judgement and problem-solving skills in the diagnosis of faults.
Evaluation criteria	<ul style="list-style-type: none"> • Evaluation criteria, sometimes referred to as success factors, are to be established prior to a modification being undertaken and are to cover safety, functionality, survivability, maintainability, life cycle cost and aesthetics.
Isolation procedures	<p>Equipment isolation procedures are to be to industry and enterprise standards.</p>
Tests and testing equipment	<p>Tests and testing equipment is to include that to the modification being carried out but it should include computer-based diagnostic systems.</p>
Personal protective	<p>Personal protective equipment is to include that prescribed under</p>

RANGE STATEMENT	
equipment	legislation, regulations and enterprise policies and practices.
Information and procedures	<ul style="list-style-type: none"> • Workplace procedures relating to the use of tooling and equipment. • Workplace procedures relating to reporting and communication. • Manufacturer/component supplier specifications and application procedures for testing equipment and materials. • Manufacturer/component supplier specifications, schematics and operational procedures related to electrical systems modification. • Australian Design Rules. • Vehicle industry regulations. • Vehicle industry publications related to emerging transmission system technology and technology changes.

Unit Sector(s)

Unit sector	Technical
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Co-requisite units

Not applicable.

Competency field

Competency field	Technical - Electrical and Electronic
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