



Australian Government

AURBTR103 Retrofit electric drivetrain systems to bicycles

Release: 1

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Modification History

Release	Comments
Release 1	This version first released with AUR Automotive Retail, Service and Repair Training Package Version 6.0

Application

This unit describes the skills and knowledge required to retrofit and modify bicycles with electric drivetrain systems. This unit involves preparing for the task, selecting the tooling, carrying out the retrofit and modification procedures, performing post-modification testing, and completing workplace processes and documentation.

The unit applies to those working in the bicycle industry, including those working in sales, service and repair.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Unit Sector

Bicycle Technical – Electrical and Electronics

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Prepare to retrofit system	1.1 Determine job requirements from workplace instructions 1.2 Access and interpret retrofit information, manufacturer specifications, and codes of practice 1.3 Analyse retrofit options and select those required by the circumstances 1.4 Identify hazards and manage risks associated with the work 1.5 Identify, select and check retrofit tools and equipment for serviceability
2. Dismantle system	2.1 Dismantle required components of bicycle according to manufacturer specifications, workplace procedures, and safety and environmental requirements, and without causing damage

ELEMENTS	PERFORMANCE CRITERIA
	to components or system 2.2 Recover all additional parts of bicycle not required for refit and store for customer
3. Retrofit system	3.1 Access and interpret technical information relating to electric drivetrain system and the donor bicycle being retrofitted 3.2 Carry out electric drivetrain system modification procedures according to manufacturer specifications, workplace procedures, and safety and environmental requirements 3.3 Test system for electrical and mechanical functionality according to manufacturer specifications, workplace procedures, and safety and environmental requirements 3.4 Calibrate computer control system according to local regulations, laws and manufacturer specifications and workplace procedures 3.5 Carry out post-modification testing according to workplace procedures and check test results to confirm system performance is operating to manufacturer specifications, resolve reported pre-modification issues, and confirm no other faults are present
4. Complete work processes	4.1 Make final inspection to ensure work meets workplace and customer specifications, and present components ready for use 4.2 Clean work area, dispose of waste and non-recyclable materials, and collect and store recyclable material 4.3 Completes workplace documentation according to workplace procedures

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

SKILL	DESCRIPTION
Learning	Locates required sources of information efficiently.
Numeracy	- Matches retrofit options and bicycle specification numbers to kit specifications, workplace instructions, bicycle and component part lists, and code of practice requirements - Interprets readings on digital and analogue testing equipment - Measures output and speed, uses basic mathematical

SKILL	DESCRIPTION
	- operations including addition and subtraction - Calculates deviations and tolerances from manufacturer specifications.
Oral communication	Listens to workplace instructions and asks questions to clarify job requirements.
Reading	- Interprets text, symbols and diagrams relating to retrofit and modification information from manufacturer specifications, and workplace instructions and procedures - Interprets key requirements of Australian automotive code of practice relating to retrofitting and modifying bicycles with and electric drivetrain.
Planning and organising	- Plans own work requirements - Prioritises actions to achieve required outcomes - Ensures tasks are completed within workplace timeframes.
Technology	Uses specialist bicycle tools and equipment in line with workplace procedures.

Unit Mapping Information

New unit.

Links

Companion Volume Implementation Guide is found on VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b4278d82-d487-4070-a8c4-78045ec695b1>

Assessment Requirements for AURBTR103 Retrofit electric drivetrain systems to bicycles

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Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- retrofit and modify three bicycles with different electric drivetrain systems in which the work must include one of each of the following types of electric drivetrains:
 - a rear wheel drive electric bicycle retrofit kit
 - a front wheel drive electric bicycle retrofit kit
 - a crank drive electric bicycle retrofit kit.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- methods to locate and interpret information required to retrofit electric drivetrain systems to bicycles, including:
 - information provided by customer and supervisors
 - manufacturer specifications and procedures or equivalent documentation
- workplace procedures required to retrofit electric drivetrain systems to bicycles:
 - establishing serviceability of tools and equipment
 - documentation procedures
 - housekeeping procedures, including:
 - examination of tools and equipment
 - storage of equipment
 - identification, tagging and isolation of faulty equipment
 - disposal of excess materials
 - recycling procedures
- work health and safety (WHS) requirements relating to retrofitting and modifying bicycles with electric drivetrain systems to include procedures for:
 - working with electric battery technologies and the different risks with each chemistry

- working with system lubricants
- selecting and using personal protective equipment (PPE)
- environmental requirements, including procedures for:
 - disposal of dangerous goods and battery technology
 - handling materials and battery recycling protocols
- key requirements of Australian automotive code of practice: calibration and power output restrictions of electric and pedelec bicycles
- application, purpose and operation of retrofit electric bicycle systems and components, including:
 - wheel drive and crank drive kits
 - different battery chemistry, including:
 - lithium ion
 - lithium ion polymer
 - lithium cobalt
 - lithium manganese
 - lead acid
- procedures for identifying and repairing wiring looms
- procedures for routing cables and positioning looms
- procedures for mounting equipment, including:
 - battery packs
 - crank sets
 - brake levers
 - control units
 - wiring harnesses
 - wheel sets
- procedures for retrofitting and modifying electric bicycles, including:
 - determining original system fitted to the bicycle, including drive type and battery chemistry
 - determining retrofit and modification options, including:
 - determining required system performance output
 - appropriate retrofit kit type
 - component replacement, including battery, harness and controller
 - procedures for removing and replacing existing system components
- procedures for testing bicycle electrical drivetrain kit, including:
 - testing electrical faults with a digital multimeter
 - calibrating system controller to applicable standards
 - ensuring maximum bicycle speed is set according to standards.

Assessment Conditions

Competency is to be assessed in the workplace or a simulated environment that accurately reflects performance in a real workplace setting.

Assessment must include direct observation of tasks.

Where assessment of competency includes third-party evidence, individuals must provide evidence that links them to the retrofit of electric drivetrain systems to bicycles.

Assessors must verify performance evidence through questioning on skills and knowledge to ensure correct interpretation and application.

The following resources must be made available:

- bicycle workplace or simulated workplace, including location to test bicycle electronic drivetrain systems
- workplace instructions detailing job requirements
- manufacturer fitting instructions and specifications
- PPE required to install and adjust electric drivetrain systems
- bicycle electric drivetrain systems
- three different bicycles requiring the installation and adjustment of electric drivetrain systems
- tools and equipment appropriate for installing and adjusting electric drivetrain systems.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

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