



Australian Government

AURBTY002 Design and build bicycle frames

Release: 1

AURBTY002 Design and build bicycle frames

Modification History

Release	Comment
Release 1	New unit of competency.

Application

This unit describes the performance outcomes required to design and build a bicycle frame. It involves preparing for the work, selecting and using specialist tools and equipment, identifying different frame materials and components, determining rider measurements, assembling the bicycle frame to customer specifications, and completing workplace processes and documentation.

It applies to those working in the bicycle retail, service and repair industry.

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

Competency Field

Bicycle

Unit Sector

Technical - Chassis and Frame

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.
1. Identify frame requirements and prepare to design and build bicycle frame	1.1 Job requirements are determined from workplace instructions 1.2 <i>Customer requirements</i> are discussed and confirmed 1.3 Physical attributes of rider and his or her riding style are assessed using sizing cycle, observation and measurements 1.4 Bicycle frame design principles and design are researched and

Elements Elements describe the essential outcomes.	Performance Criteria Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.
	component specifications checked 1.5 Work plan and build instructions are prepared to use materials and time efficiently and minimise waste
2. Design bicycle frame	2.1 Frame is designed to meet customer measurements and requirements, using a bicycle computer-aided design (CAD) program or other means 2.2 Frame tubing requirements are specified in terms of diameter and wall thickness to meet durability and user requirements 2.3 Required parts and materials and their availability are determined 2.4 Frame costs are documented and customer approval is obtained 2.5 Order is placed with suppliers for frame materials, parts and components
3. Prepare for frame building	3.1 Frame building methods and sequence, and access to required tools and equipment, are planned 3.2 Parts are laid out and checked for damaged or missing components 3.3 Fabrication tooling and jig set-up are selected and checked for serviceability 3.4 Welding, brazing or bonding equipment and materials are set up
4. Build bicycle frame	4.1 Tools and equipment, including personal protective equipment (PPE), are selected and checked for serviceability 4.2 Frame building activities are carried out according to design drawing, work plan, and safety and environmental requirements 4.3 Hazards associated with the work are identified and risks are managed 4.4 Design drawing angles, measurements and frame alignment are checked throughout the building process and adjustments are made as required
5. Paint and finish frame	5.1 Frame is prepared for painting and finishing 5.2 Paint or finish is prepared and applied according to job and customer requirements and workplace instructions 5.3 Safety and environmental requirements, including the use of PPE and adequate ventilation during frame painting, are followed 5.4 Visible paint defects are removed or repainted according to workplace procedures and quality requirements
6. Complete work processes	6.1 Final inspection is made to ensure work meets workplace expectations and bicycle is presented ready for use

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.
	6.2 Work area is cleaned, waste and non-recyclable materials are disposed of, and recyclable material is collected and stored 6.3 Tools and equipment are checked, reported if faulty, and stored according to workplace procedures 6.4 Workplace documentation is processed according to workplace procedures

Foundation Skills

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

Skills	Description
Learning skills to:	research information to maintain and update knowledge of bicycle frame designs.
Writing skills to:	legibly and accurately fill out workplace documentation, including design specifications.
Oral communication skills to:	ask questions to clarify instructions and requirements, including with customers and suppliers.
Numeracy skills to:	- identify and take customer measurements - identify and interpret codes and serial numbers relating to component specifications - use and interpret sizing cycle electronic measurement equipment - use basic mathematical operations to calculate: - specifications from drawing measurements - costs of repair.
Self-management skills to:	select and use appropriate equipment, frame materials, CAD drawings and processes to design and build bicycle frames.
Problem solving skills to:	apply research information to job requirements.
Technology skills to:	- use bicycle CAD drawing and computer system - use specialist tools and equipment in line with workplace procedures.

Range of Conditions

This section specifies work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included. Bold italicised wording, if used in the performance criteria, is detailed below.

<i>Customer requirements</i> must include:	- intended use of bicycle - preferred design - required construction methods and finish - two of the following frame materials: - steel - titanium - composite - aluminium.
<i>Frame building methods</i> must include:	- bicycle CAD drawings - tube cutting, mitreing and preparation - welding - brazing - bonding - using frame jig - controlling distortion and misalignment - painting and surface finishing.
<i>Safety and environmental requirements</i> must include:	- work health and safety (WHS) and occupational health and safety (OHS) requirements, including procedures for: - manually handling bicycle frames - identifying workplace hazards - using PPE - environmental requirements, including procedures for disposing of waste materials.

Unit Mapping Information

Equivalent to AURBTY4002 Design and build bicycle frames

Links

Companion Volume implementation guides are found in VETNet - <https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b4278d82-d487-4070-a8c4-78045ec695b1>

Assessment Requirements for AURBTY002 Design and build bicycle frames

Modification History

Release	Comment
Release 1	New unit of competency.

Performance Evidence

Before competency can be determined, individuals must demonstrate they can perform the following according to the standard defined in this unit's elements, performance criteria, range of conditions and foundation skills:

- design and build two different bicycle frames to customer specifications, in which the frames must involve two of the following materials:
 - steel
 - titanium
 - composite
 - aluminium.

Knowledge Evidence

Individuals must be able to demonstrate knowledge of:

- work health and safety (WHS) and occupational health and safety (OHS) requirements relating to building bicycle frames, including procedures for:
 - manually handling bicycle frames
 - identifying workplace hazards
 - using personal protective equipment (PPE)
- environmental requirements, including procedures for disposing of waste materials
- sources of information on bicycle frame design and components
- mechanical principles and requirements of bicycle frame systems and their relationship to braking, wheels, drivetrain and steering systems
- types of bicycle frames and their system components
- types and features of materials used in bicycle frames, including:
 - steel
 - titanium

- composite
- aluminium
- types and use of tools and equipment used to design and build bicycle frames
- procedures for sourcing bicycle parts and materials
- techniques for designing and building bicycle frames, including:
 - application of frame design principles
 - bicycle computer-aided design (CAD) drawing
 - using measurements of customer physical attributes, including:
 - height
 - body shape and weight distribution
 - length of arms and legs
 - using measurements to design a bicycle frame to meet customer requirements, including:
 - head tube length and angle
 - bottom bracket drop
 - seat tube length and angle
 - top tube length
 - saddle setback
 - chain stay length
 - fork rake or offset
 - fork trail and bicycle stability
 - frame construction procedures and techniques, including:
 - component specifications
 - painted, anodised, natural state or polished frame surface
 - welding and bonding techniques
- causes of frame failures and design alternatives to reduce failure.

Assessment Conditions

Assessors must satisfy NVR/AQTF assessor requirements.

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 bicycle frames they have designed and built, e.g. build orders.

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
- workplace instructions detailing job requirements and build instructions

- customer build requirements
- relevant technical information and bicycle frame component specifications
- PPE required to build a bicycle frame
- bicycle CAD or other design tools
- bicycle sizing measuring equipment
- bicycle parts and components to build two different bicycle frames specified in the performance evidence
- access to suppliers of bicycle parts
- tools and equipment appropriate for designing and building bicycle frames.

Links

Companion Volume implementation guides are found in VETNet -

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

Companion Volume implementation guides are found in VETNet -

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