# Automotive and Mechanical Technologies

| LEVEL 2 | 15 TCE CREDIT POINTS |
|---|---|
| COURSE CODE | AMT215116 |
| COURSE SPAN | 2016 — 2025 |
| READING AND WRITING STANDARD | NO |
| MATHEMATICS STANDARD | NO |
| COMPUTERS AND INTERNET STANDARD | NO |

This course is current for 2023.

## Automotive and mechanical systems impact on many technological innovations in areas as diverse as transport, agriculture, civil construction, mining and recreation

The related industry areas are some of the world's largest and dynamic. The study of mechanical and automotive components and systems provides an introduction to the study of mechanical engineering. Automotive and Mechanical Technologies focuses on understanding how and why mechanical vehicles, plant and equipment work. Through practical activities learners use specialist tools and equipment to identify mechanical faults and complete system maintenance, repairs and adjustments. Learners complete practical challenges and develop technical knowledge and skills in a structured workshop setting. They apply problem solving skills and technical knowledge to maintain and repair automotive and mechanical systems and consider their impacts on society and the environment.

### Course Description

Automotive and Mechanical Technologies is a workshop based course which develops an understanding of automotive and mechanical components and systems. Specialist tools and equipment, technical knowledge and problem solving skills are used to maintain, service and repair systems and develop an understanding of automotive and mechanical systems and subsystems. Learners consider the social and environmental impacts of these systems. Safe work practices and relevant technical data and knowledge are applied in practical settings to identify and repair faults, maintain and adjust automotive and mechanical systems and complete a project.

The course provides opportunities to contextualise learning in a range of automotive and mechanical settings such as agricultural or marine operations, recreational vehicles, personal transport, maritime and motorcycles.

### Rationale

Automotive and mechanical systems impact on many technological innovations in areas as diverse as transport, agriculture, civil construction, mining and recreation. The related industry areas are some of the world’s largest and dynamic. The study of mechanical and automotive components and systems provides an introduction to the study of mechanical engineering.

Automotive and Mechanical Technologies focuses on understanding how and why mechanical vehicles, plant and equipment work. Through practical activities learners use specialist tools and equipment to identify mechanical faults and complete system maintenance, repairs and adjustments. Learners complete practical challenges and develop technical knowledge and skills in a structured workshop setting. They apply problem solving skills and technical knowledge to maintain and repair automotive and mechanical systems and consider their impacts on society and the environment.

## Learning Outcomes

On successful completion of this course, learners will be able to:

1. identify and use tools and equipment to safely dismantle, assemble, service and undertake simple minor repairs of mechanical components and systems
2. outline functions and operations of components and essential automotive and mechanical systems*
3. use knowledge of mechanical components and systems when working on automotive or mechanical problems
4. test, repair and optimise automotive and mechanical systems using an engineering design process
5. plan, organise and complete automotive and mechanical projects
6. identify social, economic and environmental impacts of automotive and mechanical equipment, components and systems
7. locate, use and communicate technical information when addressing automotive and mechanical problems.

* See Essential Mechanical Systems in the Course Content section (under ***Area 1***: ***Mechanical and automotive components and systems***).

## Pathways

Automotive and Mechanical Technologies develops knowledge and skills useful to a wide variety of learners including those with an interest in vocational pathways in which mechanical knowledge and problem solving is integral such as automotive, agricultural or motorsport areas. It prepares learners for tertiary studies in mechanical engineering, mechatronics and applied science in conjunction with senior secondary learning in pre-tertiary level mathematics and physics.

Automotive and Mechanical Technologies is of relevance to learners pursuing future vocational training and employment opportunities including those undertaking Australian School Based Apprenticeships (ASbAs) in the automotive area.

**Resource Requirements**

Automotive and Mechanical Technologies requires specific tools and equipment and an automotive workshop.

The workshop must have adequate storage for tools and on-going projects, and bench spaces for learner work areas. Hand washing facilities must be available.

The required resources include:

Personal protective equipment will include:

- protective clothing and footwear
- ear muffs
- safety glasses
- barrier cream.

Tools and equipment will include:

- common mechanical tools (e.g. spanners, pliers, sockets, screwdrivers)
- basic vehicle lifting equipment
- engine and driveline assembly tools
- measuring equipment as specified in the course
- trolley jacks and stands
- access to engines and automotive systems as specified in the course.

Materials will include:

- oil and lubrication products
- gasket materials and sealants
- coolant
- replacement parts
- cleaners and solvents
- seals and gaskets.

Technical information:

- online information
- workshop manuals
- material safety data sheets.

**Course Size And Complexity**

This course has a complexity level of 2.

At Level 2, the learner is expected to carry out tasks and activities that involve a range of knowledge and skills, including some basic theoretical and/or technical knowledge and skills. Limited judgement is required, such as making an appropriate selection from a range of given rules, guidelines or procedures. VET competencies at this level are often those characteristic of an AQF Certificate II.

This course has a size value of 15.

## Relationship With Vocational Education And Training (VET) Programs

Vocational education and training (VET) programs from the Automotive Industry Retail, Service and Repair training package which are offered in the senior secondary sector emphasise the development of competence relevant to vocational and workplace settings, especially in relation to the dismantling and assembling of automotive components.

The Automotive and Mechanical Technologies course does not seek to develop industry recognised level of competence required for workplaces. The course uses approaches fundamental to the Technologies learning area by developing 'systems thinking' and 'design thinking' through the use of the engineering design process as established in the 'engineering principles and systems' context of *Australian Curriculum: Design and Technologies* F-10. Learners develop an understanding of the social, economic and environmental impacts of automotive and mechanical systems and develop project management skills to plan and implement a practical project. Therefore there is a greater focus on developing an understanding of the function and operation of mechanical components and systems and the interactions between the various systems.

## Course Delivery

A safety induction must be completed prior to any other content.

Core Knowledge and Skills must be covered prior to other content areas and are further developed throughout the five content areas.

The knowledge and skills in the five content areas are highly interrelated and an integrated delivery of these areas is recommended, through a combination of practical and theoretical activities.

It is recommended that the Project is not attempted until all of the core and content areas have been completed.

Practical work will account for approximately 75% of design time, with the remaining 25% dedicated to theory, research, recording and reporting.

## Course Content

### OVERVIEW

The course consists of three (3) **compulsory** core areas of knowledge and skills in:

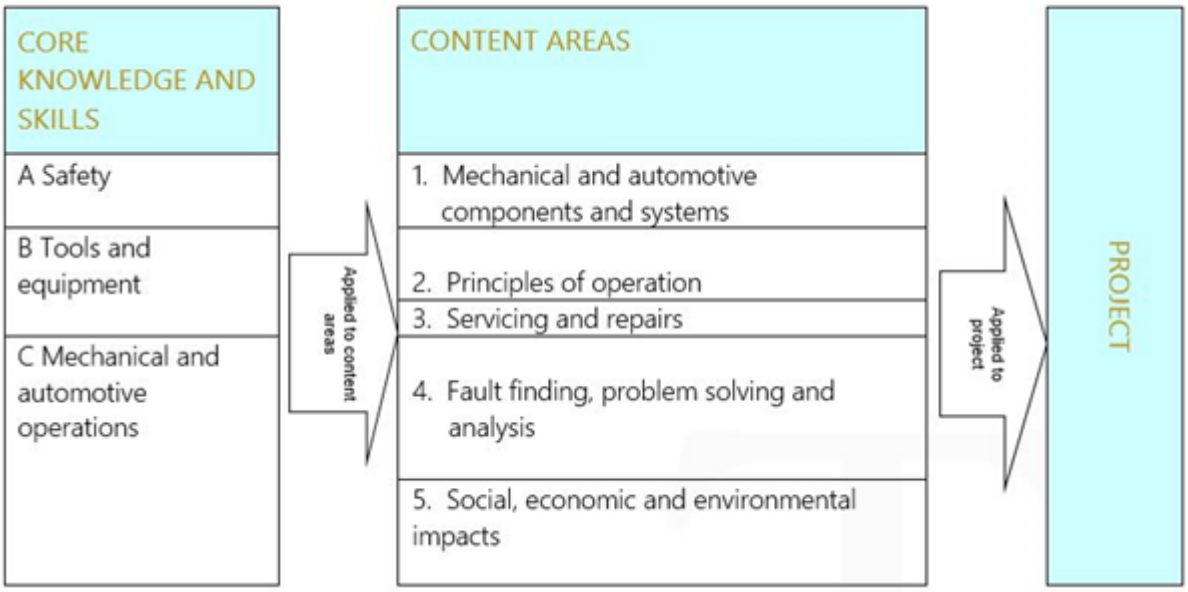
- Safety
- Tools and equipment
- Mechanical and automotive operations.

These core areas of knowledge and skills are applied to five (5) **compulsory** content areas:

- Mechanical and automotive components and systems
- Principles of operation
- Servicing and repairs
- Fault finding, problem solving and analysis
- Social, economic and environmental impacts.

**AND** also ONE (1) **compulsory** Project. Practical work is an integral part of the course as a whole.

### DIAGRAMMATICAL OVERVIEW OF COURSE STRUCTURE




### DETAILS OF COURSE CONTENT

### CORE KNOWLEDGE AND SKILLS (SUGGESTED 40% OF DELIVERY TIME)

Through studying an overview of systems in automotive and mechanical equipment, learners develop an understanding of essential mechanical and automotive principles. They develop skills to check and maintain the safe operation of automotive vehicles or mechanical engines, select appropriate tools and equipment and apply safe workshop practices.

***A. Safety***
**A safety induction must be completed prior to any other content.**

Identification of hazards:

- rotating equipment
- electrical/electronics
- environmental

- chemical including using materials, safety data sheets
- pressure (liquids, air and gases)
- fire, e.g. fuel, solvent, electrical
- physical, e.g. manual handling, noise, dust, stored energy.

Application:

- hierarchy of control (elimination, substitution, isolation, engineering controls and administrative means, personal protective equipment)
- tool selection
- processes and procedures
- storage
- risk management
- energy sources
- fire control
- environment
    - dust
    - fumes
    - waste
    - noise
    - movement
    - barriers
- manual handling techniques
- duty of care to self and others
- tagging and isolation procedures.

***B. Tools and equipment***

Identify and safely maintain, use and store the following tools and equipment including:

- measuring/marking-out tools, e.g. verniers, multi-meters, code reader, feeler and pressure gauges
- holding devices, e.g. bench vices, G-clamps
- hand tools, e.g. sockets, hacksaws, spanners
- diagnostic equipment e.g. pressure gauges, multi-meters, computerised diagnostic equipment
- power/air tools, e.g. electric drills, air duster guns, impact wrenches, air ratchets
- workshop equipment, e.g. floor jacks, safety stands, hoists and lifting equipment, oxy-acetylene equipment.

Undertake workshop housekeeping including:

- guards and attachments
- storage
- clean-up
- environment management.

***C. Mechanical and automotive operations***

Mechanical principles including:

- transfer of motion
- cranks and cams
- levers (first, second and third)
- linkages (bell cranks)
- pulley systems
- sprockets and chain.

Petrol engine types and configurations and operations:

- single cylinder engines – 2 stroke
- single cylinder engines – 4 stroke
- multi-cylinder engines.

Overview of automotive and mechanical systems:

- engine mechanics – relationship between cranks, cams and valves
- ignition – battery and magneto
- fuel – carburettor and electronic fuel injection
- cooling – liquid and air
- braking – identifying parts of drum and disc
- transmission driveline – drive shaft, chain and sprockets, belt, gears, clutch
- lubrication – oils and additives
- electrical.

**CONTENT AREAS (SUGGESTED 40% OF DELIVERY TIME)**

In the first four content areas, learners develop an understanding of how mechanical systems and subsystems in an engine work independently and how they interact to perform their specific purpose. Through practical activities relating to maintenance and repair, learners explore how automotive and mechanical components, parts, equipment, and systems function, operate and interact. They develop skills in identifying faults, problem solving and mechanical analysis using an engineering design process.

Learners develop an understanding of the social, economic and environmental impact of mechanical and automotive technologies.

***Area 1*: *Mechanical and automotive components and systems***
**Essential mechanical systems**

Each of the essential mechanical systems must be covered.

Learners identify interactions between the each of the essential mechanical systems.

*Engine Types*

Learners need to have worked on three (3) different types of engines by the completion of the course including:

- single cylinder engines – 2 stroke
- single cylinder engines – 4 stroke
- multi-cylinder engines.

Identify engine types and related components:

- dismantle and reassemble components
- use basic fault-finding techniques and perform routine maintenance.

*Ignition systems*

Identify the components of an ignition system and conduct basic routine maintenance:

- battery
- ignition switching components (e.g. distributor, crank angle sensors)
- ignition coil
- spark plugs.

*Fuel systems*

Identify features and the principles of fuel systems and carry out basic repairs:

- carburettor system
- fuel injection system.

*Cooling systems*

Outline the function of a basic cooling system and components, conduct basic routine maintenance and use basic fault-finding techniques:

- operation of the cooling system
- air and liquid
- components
    - radiator
    - water pump
    - water jackets
    - radiator hoses
    - thermostat
    - fan
    - coolant.

*Transmission systems*

Identify features of a transmission:

- purpose of transmission
- types of transmission
    - clutches
    - chain and sprocket
    - belt and pulley
    - gears.

*Electrical systems*

Identify the components of an electrical system, construct a simple circuit, conduct basic routine maintenance and use fault-finding techniques and tools:

- electrical circuit diagrams
- electrical symbols
- construction of a circuit
- engine electrical
    - starting
    - charging
- overview of systems for lighting.

*Engine management systems*

Identify components in:

- fuel management
- air management
- ignition management
- identification of sensors and actuators.

**Optional systems**

The following systems may be covered depending on the Project topics selected by learners.

*Braking systems*

Identify and discuss the principles of braking systems and conduct visual inspection and propose basic maintenance:

- drum brakes
- disc brakes.

*Intake and exhaust systems*

Identify the features of intake and exhaust systems and carry out basic repairs:

- types of air cleaners
- components of an exhaust system.

*Drive line systems*

Identify the features of drive systems:

- front-wheel drive
- rear-wheel drive.

*Suspension systems*

Identify and discuss the features of vehicle suspension systems and conduct visual inspection:

- leaf springs
- coil springs
- shock absorbers
- linkages, bushes.

*Steering systems*

Identify the components of a steering system and conduct visual inspection components of a steering system.

***Area 2*: *Principles of operation***

Underpinning scientific, mathematical and mechanical principles in the operation of vehicles, plant and equipment.

## *Petrol engine types, configurations and operations*

- single cylinder engines – 2 stroke
- single cylinder engines – 4 stroke
- multi-cylinder engines.

*Mathematical information*

- measurement
    - units
    - metric units
    - measuring tools
        - multi-meter (e.g. voltage, resistance and amps)
        - scan tools (e.g. oscilloscope, code reader)
        - pressure measurement (e.g. radiator, compression, fuel)
    - volume

- ratios
    - compression
    - fuel-to-oil
- data
    - interpretation, e.g. graphs, charts, reading of diagnostic tool measurements
    - comparison
- pressure – taking readings and making judgements
- tolerances – making adjustments and determining level of wear.

*Scientific principles*

In addition to those listed in the Core Knowledge and Skills:

- reciprocating and rotary motion
- forces – torque, tensile, compression
- transmission of electrical and mechanical power
- energy conversion, e.g. chemical to mechanical, mechanical to heat, heat into mechanical energy
- motion
- friction and lubrication
- pressure, atmospheric, hydraulic and pneumatic.

***Area 3*: *Servicing and repairs***

*Skills and processes*

Learners develop mechanical and automotive servicing and repair skills and processes involved in:

- the service, maintenance and repair operations of engine and systems to undertake maintenance, service and testing
- applying safe work practices and workshop management as introduced in the core
- using tools and computer-assisted technology to diagnose faults, repair equipment and source databases
- use specific methodologies and performance tests to identify faults and undertake repair and maintenance procedures.

*Observation and diagnostic equipment*

Learners use observation and diagnostic equipment to:

- analyse mechanical condition of engines
- determine the serviceability of components
- measure the performance of systems
- complete maintenance schedules
- determine repair procedures.

*Fault finding tests*

Undertake common fault finding tests including:

- mechanical compression tests
- scan tool and code reading
- fuel and pressure testing
- electrical testing
- multimeter.

***Area 4*: *Fault finding, problem solving and analysis***

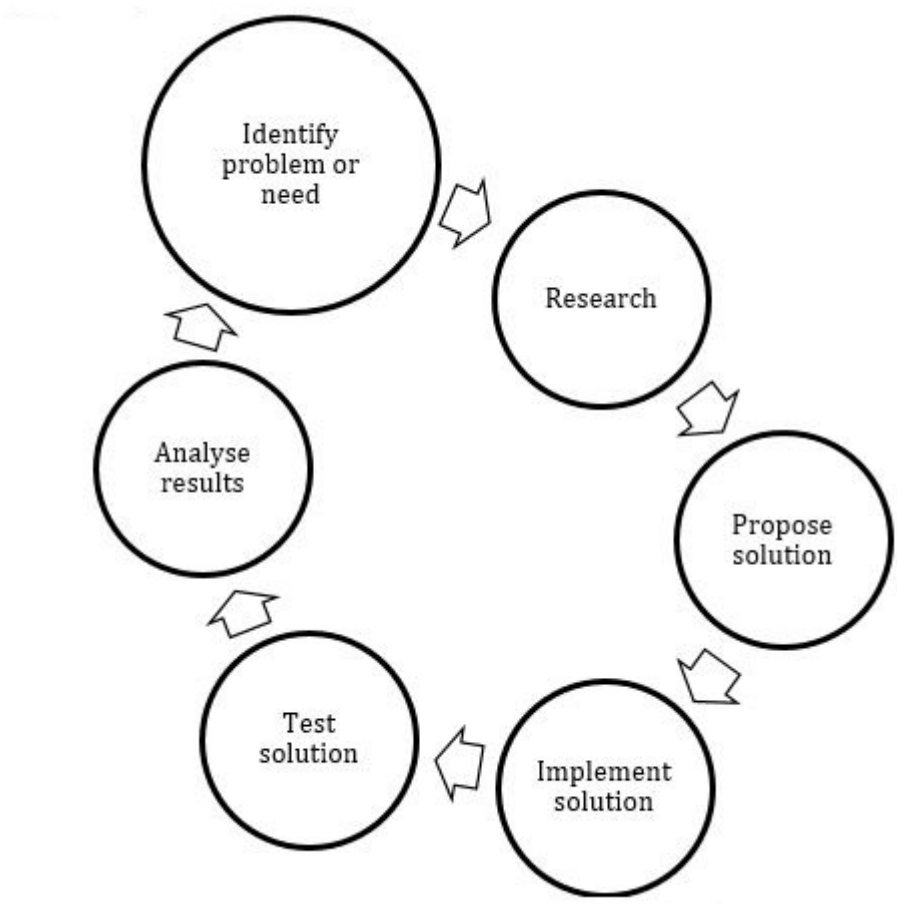
Using Core Knowledge and Skills and other content areas, learners conduct investigations or diagnostic tests to solve mechanical problems. Learners use the Engineering Design Process to support their problem solving.

The Engineering Design Process includes the following stages in which learners:

- identify a problem or need
- research solutions
- propose solution(s)
- implement solution
- test solutions
- analyse results.

The process, as illustrated on the following page in Figure 1, represents the stages used when problem-solving in mechanical and automotive workshops, as well as in managing and developing a project. The process is iterative in that learners need to continuously re-evaluate their progress and make necessary modifications after having revisited an earlier stage or activity. Through a process of evaluation at each stage, learners solve problems through a series of cognitive and physical activities.

Figure 1: Engineering Design Process




Source: Department of Education (2015)

***Area 5*: *Social, economic and environmental impacts***

Learners describe the impacts of automotive and mechanical equipment.

Links may be made with one or more relevant contexts such as agriculture, maritime, motorsports, four wheel drive vehicles, personal mobility vehicles, cycling, motorcycles or heavy transport systems.

*Social impacts*

- social role of mechanical systems:
    - personal mobility

    - freedom of movement – elderly or pre-licence users
    - recreation, fitness and sports competition – e.g. sporting clubs, bike trails
- importance of consumer safety regulations for design:
    - minimum safety standards
    - seat belts
    - child restraints
    - airbags
    - roll bars and safety cages.

*Economic impacts*

- role of mechanical and automotive industries in supporting a broad range of sectors
- career pathways:
    - relevant skills, knowledge and attributes required for work in sectors
    - consumer and employer expectations of workers
- cost of repairs, accidents and compliance with safety requirements.

*Environmental impacts*

- recycling/reusing components and waste disposal
- emissions and energy consumption including use of alternative fuels and hybrid technologies
- personal transportation (e.g. cycles, scooters) and impact on traffic systems, user health, wellbeing and safety
- disposal of cars and other mechanical equipment.

**PROJECT (SUGGESTED 20% OF DELIVERY TIME)**

The Project will apply the skills and knowledge covered in the core and content areas of the course which repairs, develops or enhances a mechanical or automotive system.

The project comprises three parts:

- Project Proposal (written)
- Project (practical task)
- Project Journal (written).

It is recommended that learners personalise their choice of project by selecting a task which:

- links with individual context, vocational and/or personal interests
- provides services for a community based project, and/or
- forms the basis of an entry into a competition or exhibition.

The project may be a single major project or it can comprise several smaller projects. It may be completed by small collaborative teams.

*Project Proposal*

The Project Proposal **must** be written and completed prior to project work beginning.

It must contain the following sections:

- an outline of how the course content will be used
- overview of the initial steps in an engineering design process to identify:
    - a problem or need including consideration of factors influencing the design, planning, production and use of a system, such as:
        - function
        - user needs and requirements
        - appropriate materials and components
        - safety
        - minimisation of waste and energy use
    - research sources e.g. forums, technical manuals and bulletins

    - testing processes
    - a timeline and estimated costing
    - outline of roles if working as a team.

All projects must be approved by the provider prior to commencement.

*Project*

Learners will use the Engineering Design Process to undertake the practical work on automotive or mechanical system(s) as outlined in the project proposal.

Possible projects include, but are not limited to:

- reconditioning of a single or multicylinder motor
- service and adjustment of an automotive sub-system
- installing aftermarket components in automotive systems e.g. reversing cameras, audio systems
- 10,000 km service with supporting paper work of parts and labour costs
- service and adjustment of a bicycle or components
- reconditioning of an item of powered outdoor equipment
- servicing and adjustment of a piece of outdoor powered equipment
- production of special tools or devices to test and check automotive systems
- production of tools for alignment or removal of powered equipment components or systems
- production of service tools for the repair and adjustment of bicycles
- dismantling and re-assembling of automotive body components
- design and construction of entries to competitions such as the Human Powered Vehicle, Solar Car Challenge or similar competitions.

*Project Journal*

The Project Journal must reflect the steps in the engineering design process undertaken including:

- research
- design of system, repairs or servicing plan
- adjustments, modifications or repairs of system to ensure optimal performance including:
    - calculations relating to function and performance
    - findings of diagnostic testing
- final testing
- evaluation.

The journal will contain relevant graphical (diagrams, photos and/or flow charts) and written content as well as a daily log to support explanations.

**Work Requirements**

Practical work ***must*** include:

- dismantling and re-assembling mechanical components to service and repair mechanical systems
- undertaking basic fault finding processes
- the Project (see page 11).

Written work ***must*** include a

- Project Proposal (see page 11) and
- Project Journal (see above).

Each written component must contain all sections outlined in the course document.

## Assessment

Criterion-based assessment is a form of outcomes assessment that identifies the extent of learner achievement at an appropriate end-point of study. Although assessment – as part of the learning program – is continuous, much of it is formative, and is done to help learners identify what they need to do to attain the maximum benefit from their study of the course. Therefore, assessment for summative reporting to TASC will focus on what both teacher and learner understand to reflect end-point achievement.

The standard of achievement each learner attains on each criterion is recorded as a rating 'A', 'B', or 'C', according to the outcomes specified in the standards section of the course.

A 't' notation must be used where a learner demonstrates any achievement against a criterion less than the standard specified for the 'C' rating.

A 'z' notation is to be used where a learner provides no evidence of achievement at all.

Providers offering this course must participate in quality assurance processes specified by TASC to ensure provider validity and comparability of standards across all awards. To learn more, see TASC's quality assurance processes and assessment information.

Internal assessment of all criteria will be made by the provider. Providers will report the learner's rating for each criterion to TASC.

## Quality Assurance Process

The following processes will be facilitated by TASC to ensure there is:

- a match between the standards of achievement specified in the course and the skills and knowledge demonstrated by learners
- community confidence in the integrity and meaning of the qualification.

**Process** – TASC will verify that the provider's course delivery and assessment standards meet the course requirements and community expectations for fairness, integrity and validity of qualifications that TASC issues. This will involve checking:

- learner attendance records; and
- course delivery plans (the sequence of course delivery/tasks and when assessments take place):
    - assessment instruments and rubrics (the 'rules' or marking guide used to judge achievement)
    - class records of assessment
    - examples of learner work that demonstrate the use of the marking guide
    - samples of current learner's work, including that related to any work requirements articulated in the course document.

This process may also include interviews with past and present learners. It will be scheduled by TASC using a risk-based approach.

## Criteria

The assessment for Automotive and Mechanical Technologies Level 2 will be based on the degree to which the learner can:

1. identify and use tools and equipment to safely complete mechanical activities
2. outline functions and operations of mechanical components and systems
3. apply knowledge of automotive and mechanical components and systems when working on mechanical problems
4. test, repair and optimise automotive and mechanical systems using an engineering design process
5. plan, organise and complete automotive and mechanical projects and activities
6. identify social, economic and environmental impacts of automotive and mechanical equipment, components and systems
7. locate, use and communicate technical information related to automotive and mechanical problems

**Standards**

## Criterion 1: identify and use tools and equipment to safely complete mechanical activities

The learner:

| Rating A | Rating B | Rating C |
|---|---|---|
| selects and safely uses appropriate tools and equipment to dissemble, re-assemble and adjust mechanical systems and monitors safety of self and others | selects and safely uses appropriate tools and equipment to dissemble, re-assemble and adjust mechanical systems | identifies and safely uses tools and equipment to dissemble, re-assemble and adjust mechanical systems in a given context |
| identifies and reports hazards, and acts with a level of awareness of the safety of self and others to apply health and safety procedures, including using appropriate personal protective equipment (PPE) | identifies hazards, and determines and applies health and safety procedures, including using appropriate personal protective equipment (PPE) | complies with health and safety procedures including using appropriate personal protective equipment (PPE) |
| closely follows workplace procedures for cleaning and storing tools, equipment and materials as part of practical routines. | follows workplace procedures for cleaning and storing tools, equipment and materials as part of practical routines. | undertakes workplace procedures for cleaning and storing tools, equipment and materials as directed. |

## Criterion 2: outline functions and operations of mechanical components and systems

The learner:

| Rating A | Rating B | Rating C |
|---|---|---|
| explains principles of operation of mechanical systems | describes principles of operation of mechanical systems | identifies a limited range of principles of operation of mechanical systems |
| describes function of essential mechanical systems* and their parts in a range of contexts | outlines function of essential mechanical systems* and their parts | outlines function of essential mechanical systems* and their parts in a given context |
| uses correct names of components in essential mechanical systems*, and accurately explains their functions | identifies components in essential mechanical systems* by name and – where applicable – describes some of their functions | identifies common components by name and – where applicable – outlines their function |
| describes inter-relationship between the essential mechanical systems* in engines. | outlines inter-relationship between most of the essential mechanical systems* in engines. | identifies inter-relationship between a limited range of systems in engines. |

* Essential mechanical systems include: engine types, ignition, fuel, cooling, transmission, electrical and engine management.

## Criterion 3: apply knowledge of automotive and mechanical components and systems when working on mechanical problems

The learner:

| Rating A | Rating B | Rating C |
|---|---|---|
| plans and conducts routine maintenance on essential mechanical systems* by devising a logical sequence of activities based on inspection and research | plans and conducts routine maintenance on all essential mechanical systems* following prescribed steps | conducts routine maintenance on at least five (5) essential mechanical systems* following prescribed steps |

| | | |
|---|---|---|
| explains interaction between components in a system whilst undertaking practical work | describes interaction between components in a system whilst undertaking practical work | lists interactions between components whilst undertaking practical work |
| systematically dismantles and reassembles a variety of mechanical components in all essential mechanical systems* | dismantles and reassembles mechanical components in all essential mechanical systems* | dismantles and reassembles a mechanical components in at least five (5) essential mechanical systems* |
| accurately records service and repair actions using appropriate mechanical terminology and reference to the purpose of the work. | records service and repair actions using appropriate mechanical terminology and reference to purpose of the work. | records service and repair actions using limited mechanical terminology. |

* Essential mechanical systems include: engine types, ignition, fuel, cooling, transmission, electrical and engine management.

## Criterion 4: test, repair and optimise automotive and mechanical systems using an engineering design process

The learner:

| Rating A | Rating B | Rating C |
|---|---|---|
| lists and uses a range of fault-finding techniques to identify problems for a wide range of the essential mechanical systems* | lists and uses basic fault-finding techniques to identify problems for a range of essential mechanical systems* | uses basic fault-finding techniques to identify problems in essential mechanical systems* as directed |
| selects and uses a range of diagnostic tools and equipment to test parameters, describes the meaning of instrument readings and predicts subsequent servicing or repair work | uses diagnostic tools and equipment to test parameters and describes the meaning of instrument readings | uses given diagnostic tools and equipment to test parameters |
| identifies the presence of faults, and undertakes appropriate test procedures to locate them. The test procedures applied may, or may not, locate the fault. | identifies the presence of faults and undertakes a given procedure to locate them. The test procedure applied may, or may not, locate the fault. | identifies the presence of faults and undertakes a given procedure to locate them as directed |
| undertakes repairs, servicing or adjustments to systems based on methodical and accurate identification of potential problem(s) and fault(s) | undertakes repairs, servicing or adjustments to systems based on identification of problem(s) and fault(s) | undertakes repairs, servicing or adjustments to systems as directed |
| systematically tests the operation of a system to measure the effectiveness of repair, service or adjustment actions and devise a plan for future actions. | tests the operation of a system and determines the effectiveness of repair, service or adjustment actions. | tests the operation of a system after completing repair, service or adjustment actions. |

* Essential mechanical systems include: engine types, ignition, fuel, cooling, transmission, electrical and engine management.

## Criterion 5: plan, organise and complete automotive and mechanical projects and activities

The learner:

| Rating A | Rating B | Rating C |
|---|---|---|
| selects and uses appropriate workshop procedures for correctly undertaking mechanical work | selects and uses appropriate workshop procedures from a given range when undertaking mechanical work | adheres to workshop procedures for undertaking mechanical work as directed |
| performs sub-tasks and monitors own | performs sub-tasks and monitors their | performs sub-tasks to contribute |

| | | |
|---|---|---|
| contribution and guides others to the successful completion of group practical tasks | contribute to the successful completion of group practical tasks | to the completion of group practical tasks |
| provides a detailed written proposal for completion of a practical project which includes all required sections | provides a written proposal for completion of a practical project which includes all required sections | finishes a written proposal for completion of a practical project, as directed |
| devises a realistic timeline when planning a project and effectively monitors and adjusts own progress to meet targets and milestones during implementation | devises a timeline when planning a project and monitors own progress in relation to the timeline during implementation | devises a timeline when planning a project and compares actual progress with timeline during implementation |
| orally and in writing reflects on progress towards meeting goals, evaluates progress and plans future actions | orally and in writing reflects on progress towards meeting goals and articulates ways in which goals can be met in the future | orally and in writing reflects on progress towards meeting goals in a constructive manner |
| considers, selects and uses strategies to manage and complete activities within established timelines. | selects and uses strategies to perform tasks within established timelines. | uses strategies as directed to perform tasks within established timelines. |

## Criterion 6: identify social, economic and environmental impacts of automotive and mechanical equipment, components and systems

The learner:

| Rating A | Rating B | Rating C |
|---|---|---|
| describes social, economic and environmental benefits and concerns in using mechanical equipment, components and systems | outlines social, economic and environmental benefits and concerns in using mechanical equipment, components and systems | identifies some social, economic and environmental benefits and concerns in using mechanical equipment, components and systems |
| describes a range of industry sectors where mechanical and automotive knowledge are required and outlines possible career pathways | outlines industry sectors where mechanical and automotive knowledge are required and states possible career pathways | lists a limited range of industry sectors where mechanical and automotive knowledge are required |
| describes relevant skills, knowledge and attributes required for work in the mechanical or automotive sector, including a range of consumer and employer expectations | outlines relevant skills, knowledge and attributes required for work in the mechanical or automotive sector, including consumer and employer expectations | identifies relevant skills, knowledge and attributes required for work in the mechanical or automotive sector |
| assesses relevant social, economic and environmental factors* when undertaking the engineering design process. | discusses social, economic and environmental factors* when undertaking the engineering design process. | identifies some related social, economic and environmental factors* when undertaking the engineering design process. |

* ‘Social, economic and environmental factors’ include, but are not limited to, factors such as minimisation of waste and energy use, reduction of emissions, improvement of safety, cost of repairs and vehicle durability.

## Criterion 7: locate, use and communicate technical information related to automotive and mechanical problems

The learner:

| Rating A | Rating B | Rating C |
|---|---|---|
| collects and records appropriate measurements using correct units | collects and records appropriate measurements using units | collects measurements using units and records as directed |

| | | |
|---|---|---|
| accurately reads and uses measurements to create a range of graphs, tables and other measurement tools to gather or display information | reads and uses measurements, graphs and tables to gather or display information | reads and uses information from measurements and simple graphs and tables |
| selects, uses and applies appropriate mathematical concepts and techniques to model or predict the behaviour of a mechanical repair | uses appropriate mathematical concepts and techniques to model or predict the behaviour of a mechanical repair | follows instructions to use mathematical concepts to model or predict the behaviour of a mechanical repair in a given context |
| locates and interprets technical information from relevant sources to propose solutions to mechanical problems | locates and uses technical information from relevant sources to propose solutions to mechanical problems | locates technical information from relevant sources to related mechanical problems as directed |
| consistently uses appropriate referencing/citation methods | uses some appropriate referencing/citation methods | uses basic referencing/citation methods as directed |
| selects and communicates appropriate data or information in a broad range of appropriate formats*. | selects and communicates appropriate data or information in a variety of appropriate formats*. | communicates data or information using given formats*. |

* 'Formats' include:

- service records, tables, graphs, short paragraphs of text during delivery of Core Knowledge and Skills and Content Areas
- work logs, diagrams, timelines, costing and dot point and short paragraph descriptions under each of the specified sections in the Project Proposal and Project Journal.

**Qualifications Available**

Automotive and Mechanical Technologies Level 2 (with the award of):

EXCEPTIONAL ACHIEVEMENT

HIGH ACHIEVEMENT

COMMENDABLE ACHIEVEMENT

SATISFACTORY ACHIEVEMENT

PRELIMINARY ACHIEVEMENT

## Award Requirements

The final award will be determined by the Office of Tasmanian Assessment, Standards and Certification from 7 ratings.

The minimum requirements for an award in Automotive and Mechanical Technologies Level 2 are as follows:

EXCEPTIONAL ACHIEVEMENT (EA)
5 ‘A’ ratings, 2 ‘B’ ratings

HIGH ACHIEVEMENT (HA)
3 ‘A’ ratings, 3 ‘B’ ratings, 1 ‘C’ rating

COMMENDABLE ACHIEVEMENT (CA)
4 ‘B’ ratings, 2 ‘C’ ratings

SATISFACTORY ACHIEVEMENT (SA)
6 'C' ratings

PRELIMINARY ACHIEVEMENT (PA)
4 ‘C’ ratings

A learner who otherwise achieves the ratings for a CA (Commendable Achievement) or SA (Satisfactory Achievement) award but who fails to show any evidence of achievement in one or more criteria (‘z’ notation) will be issued with a PA (Preliminary Achievement) award.

## Course Evaluation

The Department of Education’s Curriculum Services will develop and regularly revise the curriculum. This evaluation will be informed by the experience of the course’s implementation, delivery and assessment.

In addition, stakeholders may request Curriculum Services to review a particular aspect of an accredited course.

Requests for amendments to an accredited course will be forwarded by Curriculum Services to the Office of TASC for formal consideration.

Such requests for amendment will be considered in terms of the likely improvements to the outcomes for learners, possible consequences for delivery and assessment of the course, and alignment with Australian Curriculum materials.

A course is formally analysed prior to the expiry of its accreditation as part of the process to develop specifications to guide the development of any replacement course.

## Course Developer

The Department of Education acknowledges the significant leadership of John Duncombe and Alistair Mearns in the development of this course.

## Expectations Defined By National Standards

There are no statements of national standards relevant to this course.

## Accreditation

The accreditation period for this course is from 1 January 2016 until 31 December 2025.

## Version History

Version 1 – Accredited on 15 June 2015 for use from 1 January 2016 to 31 December 2020.

Version 1.a - Accreditation renewed on 13 July 2020 for the period 1 January 2021 to 31 December 2021 (no amendments made).

Version 1.b - Renewal of Accreditation on 14 July 2021 for the period 31 December 2021 until 31 December 2025, without amendments.

## Appendix

### GLOSSARY

| Term | Explanation |
|---|---|
| Administrative controls | processes and procedures that contribute to a safe and efficient working environment, often implemented as part of a risk-management process. Examples include codes of behaviour, job descriptions, workplace guidelines, responsibilities and expectations, inductions, training, documentation, ongoing monitoring and review. |
| Apply | use or employ knowledge and skills in a particular situation |
| Assess | make a judgement about, to rate, weigh up, to form an opinion |
| Basic | essential or elementary |
| Clear | easy to understand, fully intelligible, without ambiguity; explicit |
| Coherent | orderly, logical and internally consistent relation of parts |
| Communicate | convey information about, clearly reveal or make known |
| Compare | estimate, measure or note how things are similar or dissimilar |
| Consider | formed after careful thought |
| Describe | recount, comment on, and provide an account of characteristics or features |
| Detailed | meticulous, specific, precise |
| Develop | construct, elaborate or expand on an opinion or idea |
| Discuss | talk or write about a topic, taking into account different issues and ideas |
| Effective | producing a deep or vivid impression; striking |
| Evaluate | appraise, measure, examine and judge the merit, significance or value of something |
| Explain | provide additional information that demonstrates understanding and reasoning; present a meaning with clarity, precision, completeness, and with due regard to the order of statements in the explanation |
| Identify | name, list and establish or indicate who or what something is |
| Interpret | explain the meaning of information or actions |

| Term | Explanation |
|---|---|
| Obvious | easily seen or recognised, predicable |
| Organise | systematically order and arrange |
| Outline | give the main features or aspects of |
| Process | a system of rules or principles for conducting activities |
| Problem | a question proposed for solution |
| Project | in the Technologies learning area, a project is a set of activities undertaken by learners to address specified content, involving understanding the nature of a problem, situation or need; creating, designing and producing a solution to the project task; and documenting the process. Project work has a benefit, purpose and use; a user or audience who can provide feedback on the success of the solution; limitations to work within; and a real-world technologies context influenced by social, ethical and environmental issues. |
| Project management | in the Technologies learning area, project management means the responsibility for planning, organising, controlling resources, monitoring timelines and activities and completing a project to achieve a goal that meets identified criteria for judging success |
| Provided | given |
| Range | a number of different things of the same general type; breadth |
| Relevant | applicable and pertinent |
| Select | choose in preference to another or others |
| Simple | easy to understand and deal with; involving few elements, components or steps; obvious data or outcomes; may concern a single or basic aspect; limited or no relationships |
| Statement | a sentence or assertion |
| Systematic | methodical, organised and logical |
| Systems thinking | a holistic approach to the identification and solving of problems where parts and components of a system, their interactions and interrelationships are analysed individually to see how they influence the functioning of the whole system. This approach enables learners to understand systems and work with complexity, uncertainty and risk. |

PDF generated on: 2023-06-09 02:32:23 AEST
https://www.tasc.tas.gov.au/