

1. Module details

Module name

Servicing Hand Power Tools

Suggested structured learning time

A learner possessing the prerequisite skills and knowledge should achieve the module purpose in 36 to 40 hours.

Module code

NUE148

Field of Education code

031313

2. Module purpose

This module provides the knowledge and skills to maintain, service, fault find, repair and safety test hand power tools.

Learners will gain an understanding of the principles of operation of hand power tools and their operating environment.

It covers safety, construction and operation, maintenance, servicing, testing, fault finding and repair of hand power tools.

3. Learning pathway

Intended use in the structured learning program

This module IS intended to supplement extensive workplace exposure to hand power tools servicing work. In particular it applies to testing hand power tools to ensure they comply with requirements and are safe to use. Therefore before undertaking this module an apprentice should have a clear understanding and experience of:

- servicing and fault finding single and three phase motors and their associated circuits, applicable to appliance, refrigeration and air conditioning applications.
- the basic operation of various domestic applications.
- servicing and fault finding appliance timers and controllers.
- earthing systems, circuit protection and isolation devices used to protect both persons and electrical appliances against damage.

Recommended prerequisites

For the most effective learning this module should be undertaken only after modules in Appliance Motors and Circuits; Timers and Controllers; Appliance Circuit Protection and Safety Testing have been completed.

4. Relationship to competency standards

This module provides part of the underpinning knowledge and skills in the 'Evidence Guide' of specific units of competency in the National Electrotechnology Training Package and provides similar support, where mapped, to equivalent units in the National Metals and Engineering Competency Standards. For details refer to the module to unit maps, available from EEQSBA.

5. Content

Summary of content

1. Safety
 - Statutory requirements
 - Codes, Acts and Regulations
 - Potential hazards
 - Safety devices
2. Types, construction and operation
 - Knowledge of types, purpose and function
 - Drills
 - Pistol
 - Hammer
 - Cordless
 - Screw driver
 - Circular saws
 - Mitre saws
 - Routers
 - Sanders
 - Grinders
 - Planers
 - Cut off machines
 - Heat guns, etc
 - Rating plate information
 - Interpretation of manufacturers' specifications
 - Insulation types - single and double insulation

- 3. Service, test, fault find and repair
 - Tag testing
 - Safety tests
 - Fault diagnosis by visual inspection
 - Fault diagnosis by circuitry inspection
 - Fault diagnosis by test operation
 - Fault identification by test equipment
 - Circuit resistance meter
 - Insulation resistance meter
 - High voltage test
 - Growler
 - Cutting blades and discs
 - Timber cutting blades
 - Cold metal cutting blades
 - Diamond blades
 - Abrasive discs
 - Dismantle, repair, reassemble and test
 - Respect for customers premises
- 4. New hand power tool technology
 - SJS grinders
 - Portable cold metal cutting
 - Self illumination machines
 - Anti vibration systems
 - Cordless technologies
 - Batteries (NiMH)
 - Impact drivers
 - Planetary gearboxes
 - Charging systems

6. Assessment strategy

Assessment methods

Assessment should be progressive reflecting a holistic approach to ensure the module is met. To assist in ensuring validity, reliability and fairness assessment instruments should include practical exercises, assignments and written tests consisting of item types, such as multiple choice, short answer and problem solving.

Conditions of assessment

Normally learning and assessment will take place in a formal learning environment.

7. Learning outcome details

Learning outcome 1

Identify dangers and observe safety procedures associated with hand power tools.

Assessment criteria

- 1.1 Identify the relevant Statutory Requirements, Codes, Acts and Regulations associated with hand power tools.
- 1.2 Carry out electrical safety checks.
- 1.3 Identify and recommend corrective measures of potentially hazardous situations, including:
 - Exposed blades
 - Material clamping
 - Incorrect accessories
 - Ergonomics
 - Personal safety equipment

Learning outcome 2

Describe the construction and operation of hand power tools.

Assessment criteria

- 2.1 Describe the construction and principle of operation of:
 - Drills
 - Pistol
 - Hammer
 - Cordless
 - Screw driver
 - Circular saws
 - Mitre saws
 - Routers
 - Sanders
 - Grinders
 - Planers
 - Cut off machines
 - Heat guns, etc
- 2.2 Identify and describe the construction of hand power tool cutting blades and discs.
- 2.3 Identify the typical information provided on the rating plate of a hand power tool.
- 2.4 Use manufacturers' specifications to interpret operating requirements of various hand power tools.

Learning outcome 3

2.5 Describe the difference between single and double insulation.

Use appropriate resources to service, test fault find and repair hand power tools.

Assessment criteria

3.1 Use manufacturers' data and appropriate test equipment and tools to service, fault find and repair typical hand power tools, including:

- Mechanical
 - Component wear
 - Bearings
 - Brushes
 - Commutator
 - Armature
 - Universal
 - Induction
 - Spindles
 - Gears
 - Chucks
 - Speed control damage
 - Safety guards
 - Casing
- Electrical
 - High voltage tests
 - Shorts or grounds
 - Resistance
 - Growler test
 - Open circuits
 - Resistance
 - Visual
 - Speed control
 - Brushes
 - Hand power tool safety switches
- C-Tick approval

Learning outcome 4

Describe the application and operating principles of the latest types of hand power tools.

Assessment criteria	4.1 Describe the operation of new technology in hand power tools.
8. Delivery of the module	
Delivery strategy	Delivery strategies must be suitable for learning both theoretical and practical aspects described in the module purpose. It is considered that the most effective method to achieve this is by integration of theory and practice where students learn by experimentation, research and reports. It is recommended that learning and assessment be facilitated in a holistic manner that may require a learning outcome sequence other than that indicated in the module.
Resource requirements	Resources should be sufficient for students to carry out exercises on an individual basis. Useful references include: Rosenberg, R., <i>Electric Motor Repair</i> , (Latest edition), CBS College Publishing New York, USA. Standards Australia, Standards New Zealand: <i>AS/NZS 3760 (Latest edition) In-service Safety Inspection and Testing of Electrical Equipment</i> <i>AS/NZS 4836 (Latest edition) Safe Working Practice on Low-voltage Electrical Installations</i> WorkCover NSW, <i>WorkCover Code of Practice - Low Voltage Electrical Work Local electricity distributor and authority regulations</i> Where this module is used in an approved Traineeship or Apprenticeship program learners should be advised to obtain, where available, respective EE-Oz Training Standards ¹ User Guides (these outline in detail what training and work performance the Learner is required to undertake for the program).
Occupational health and safety requirements	A safe and healthy environment will be provided for learners and teachers. Safety procedures for the particular learning facilities shall be followed as part of the learning / teaching activity and assessment.

¹ EE-Oz Training Standards – ElectroComms and EnergyUtilities Industry Skills Council Ltd formally EEQSBA