

Course: A Practical Approach to Small Engine Repairs

Guided Learning Hours: 24 hours

Pre-requisite: None

Abstract

This unit was designed to provide training for the maintenance and repair of small internal combustion engines. These engines are commonly used in portable power equipment such as lawn movers, leaf blowers, weed wackers and power washers. Emphasis will be placed on small engine diagnosis, servicing, and troubleshooting.

To ensure that the learner fully understands the concepts relating to small engine repairs, the course content was structured to maximize the contact hours allocated for practical work. Currently 80% of the course involves hands on, practical training.

This unit will focus on the basic principles of engine theory, cooling and lubrication systems, fuel systems and ignition systems. Practical activities will involve routine maintenance checks incorporating inspection and replacement of worn components and troubleshooting common operational problems.

Target Audience

This course is ideally suited for homeowners, landscapers or anyone who wants to learn the basics of routine maintenance, repair and troubleshooting of small engines.

Learning outcomes

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

1. Explain the basic principles of operation of a common small gas engine
2. Inspect and carry out repairs on a small engine fuel system
3. Inspect and carry out repairs on a small engine lubricating and cooling system
4. Inspect and carry out repairs on a small engine ignition system

Course Content

1. Explain the basic principles of operation of a common small gas engine

Tools and Safety: Basic hand tools and measuring equipment (micrometer, feeler gauge, compression gauge), Basic power tools, Fire triangle, Fire classes, Personal protective equipment, Good housekeeping practices.

Engine Fundamentals: Introduction to small engine terminology and operation theory; Engine components (Block, crankshaft, camshaft, piston, cylinder head, connecting rod); Operation of a two-stroke and four-stroke engine, Basic construction and features of a two-stroke engine, Basic construction and features of a four-stroke engine,

2. Inspect and carry out repairs on a small engine fuel system

Principles of Engine Operation: Gasoline fundamentals, Gasoline reference fuels, Air/Fuel mixtures.

Fuel system: Components (Fuel tank, fuel lines, fuel pump, filters, carburetor, manifold, air cleaner),

Carburetors: Types of carburetors (Gravity feed, Suction feed, Diaphragm type), Operator of a carburetor, Issues (Vapor lock, icing, flooding, over rich and lean mixtures, restrictive air flow, air leaks)

Fuel Pumps/Fuel filters: Operating principles, Testing procedures, Types of filters (In-line, ceramic, bronze), Air cleaner servicing (Types: Dry, wet, oil)

Maintenance of Fuel systems: Inspecting, servicing/replacing fuel filter, Inspecting, servicing/replacing air filter, Carburetor servicing (inspecting, cleaning adjusting).

3. Inspect and carry out repairs on a small engine lubricating and cooling system

Lubrication System: Overview and layout; Types of lubricating oils and their properties (Viscosity, pour point, flash point), Purpose of lubricating oils (Cooling, cleaning, sealing), Types of lubrication systems, Types of oil pumps.

Maintenance of lubricating system: Checking oil levels, lubrication selection, filter removal and replacement, lubricant refilling, waste disposal.

Cooling System: Purpose of engine cooling (Dissipate heat caused by combustion, maintain efficient engine operating temperature, prevent part failure); Types of cooling systems; Principles of operation.

Maintenance of cooling systems: Cleaning and servicing of blower housing, cooling fins, shroud and fans.

4. Inspect and carry out repairs on a small engine ignition system

Ignition System: Function of the ignition system; Components of the ignition system

Maintenance of the ignition system: Inspecting and replacing the spark plug; Checking ignition using a spark tester; Checking for spark miss; Checking the stop switch.

Assessment Criteria

In order to achieve Learning Outcome...	The Learner must...
1 Explain the basic principles of operation of a common small gas engine	1.1 Identify and demonstrate the safe use of various hand tools and measuring equipment used in small engine servicing and repairs. 1.2 Identify the various engine components and state their function. 1.3 Describe the operation of a two-stroke engine. 1.4 Describe the operation of a four-stroke engine.
2 Inspect and carry out repairs on a small engine fuel system	2.1 Identify and explain the function of the major components of the fuel system. 2.2 Identify the various types of carburetors and describe their operation. 2.3 Perform various maintenance tasks relating to the fuel systems.
3 Inspect and carry out repairs on a small engine lubricating and cooling system	3.1 Identify and state the function of various components related to the lubrication system. 3.2 Select the correct type of lubricant for a particular application and equipment model. 3.3 Demonstrate the ability to check oil levels. 3.4 Demonstrate the ability to safely change the oil and filter. 3.5 Identify and state the function of various components related to the cooling system. 3.6 Perform various maintenance tasks relating to the lubricating and cooling systems.
4 Inspect and carry out repairs on a small engine ignition system	3.7 Identify and state the function of various components related to the ignition system. 3.8 Perform various maintenance tasks relating to the ignition system.

Essential Learning Resources:

Learners will have access to a fully equipped workshop to carry out the various maintenance tasks.

Textbooks and Manuals

1. Owner's manuals (various models)