Student

Oil and grease - lubrication

What you will learn

When you have finished this module, you should

- ❑ Know why engines need oil
- ❑ Know about types of engine oil
- ❑ Choose the right oil for your engine
- ❑ Choose the right oil filter for your engine
- ❑ Change your engine oil and filter
- ❑ Know how to lubricate the controls

Things you need before you start

Materials

- Engine oil ❑
- Oil filter (if needed) ❑
- Grease (if needed) ❑
- Cleaning cloths ❑

Tools

- Spanner for fill and drain plugs ❑
- Filter wrench ❑
- Screwdrivers ❑
- Container to catch old oil ❑
- Grease gun ❑

Engine lubrication

Introduction

Engines need oil – lubrication – to let all the fast-moving parts move without friction or wear.

4-stroke engines have oil in the bottom of the engine (crankcase) that is splashed or pumped around the moving parts.

In 2-stroke engines, special 2-stroke oil is mixed with the petrol and it coats all the moving parts as the fuel goes through the crankcase to the inlet.

This section on engine oil is only for 4-stroke engines.

The right amount of oil is important for your engine.

Not enough oil and the engine parts will wear quickly, or get too hot and even seize or break.

Too much oil and it will get to places it shouldn't, make the engine smoke, or leak out.

An engine in good condition should not 'use' much oil.

Things about engine oil

Engine oil in the crankcase does two things:

- Oil puts a ‘cushion’ between the moving parts of the engine, so they can move past each other without wear
- Oil takes heat away from the moving parts

Engine oil has lots of chemical ‘additives’ to help it do its job better.

Gear oils and grease have other ‘additives’ to help them lubricate under heavier loads and conditions.

Oil Grades

Engine oil must be the right thickness for your engine when it is cold **and** when it is hot. Oils are made in different thickness to meet standards called SAE ratings.

An oil’s SAE rating is shown on the drum or bottle label. SAE 10 oil is very thin, SAE 50 is quite thick. Thick gear oil is SAE90.

There are also ‘multigrade’ oils with a grade such as SAE 10W-30. This means they change with temperature – they work like an SAE10 when they are cold (W = winter!) and as an SAE 30 oil when hot.

Engine oil is also given a ‘quality’ specification. Older engines may use an ‘SG’ oil. Modern engines usually need a higher specification oil such as ‘SJ’ or higher.

If you find an oil with a spec starting with ‘C’ (for example, CC or CF), the spec is for using the oil in Diesel engines.

This oil is rated as SAE 15W-40 and meets ‘SL’ specification.

For engines used in mowers or generators, car engine oil will be OK.

For outboards, it is best to use a *marine* engine oil of the right type.

Always use the grade and specification of oil recommended by the engine maker for your local conditions. Here is a guide:

Engine oils – a guide

Application	Viscosity rating	Specification
Mower, generator	SAE30 or SAE 25W-40	SG
Outboard	SAE30, SAE40 or SAE10W-30	SJ or higher

A typical small engine needs about 500ml of oil.

Check the oil level regularly, every time you use the engine – or at least every 5hrs of running.

Oil gets dirty and stops lubricating over time. After about 25 – 50 hours of running the engine the oil should be changed for new. The maintenance worksheet tells you how to do that.

Oil Filters

Oil filters are fitted to larger and high-power 4-stroke engines. Small 4-stroke sometimes do not have a filter. 2-strokes have no engine oil – so do not need them.

Oil filters collect small pieces of metal, chemicals and carbon from the oil. The pieces are very small, but they will wear the engine if they move about in the oil.

All the oil in the engine goes through the filter which traps the small pieces. The filter must be changed when the oil is changed.

Almost all oil filters are disposable, screw-on can filters on the side of the engine casing. They cannot be cleaned – replace with a new one when you change the oil.

Filters are made in a many sizes. You must get the right type and size for your engine.

Engine Controls

Metal controls, cables and levers need some lubrication or they will get stiff to use – and may seize, corrode or break.

Check with the engine maker's manual for any special parts or ways to lubricate and protect the controls on your engine.

Transmission and equipment lubrication

The equipment your engine is driving may also need to be lubricated in some way.

Gear boxes will need gear oil; gear cases on outboards will need special gear lubricants and greases on propeller shafts; chainsaws need bar oil.

Almost every type equipment has a different need for lubrication and its own way to do it.

Look at the separate course worksheet pages on maintenance of non-engine parts for help with your type of equipment.

Always follow the maker's recommendations for the oil/lubricant and how to use it.

Maintenance

Check engine oil levels

Check the oil level regularly. Every time you use the engine – or at least every 5 hours of running. Here are three common ways to check the level.

Before you check, stop the engine for at least 5 minutes – this gives time for the oil to drain back into the bottom of the engine. Put the engine level and in its normal operating position.

- *Dipstick* – usually in a tube with a cap. Remove dipstick, wipe it, and then put it back in. A label or sign on the dipstick will show how far to insert it – some have to screw the cap right in, others rest the cap on the top of the tube.
- Remove the dipstick and 'read' the oil level.
- If the level is below or near the empty mark, add new oil to bring it up to just below the full mark.

Very low – add oil

- *Filler or level plug* – usually near the base of the engine. Remove the plug and check. The correct level is just below the top – almost to overflowing. Add new oil if needed.

- *Sight glass*. Clean the outside of the glass if needed. Check oil level is between the marks on the glass.

If the oil level is too high – drain enough oil to bring the level down to the 'full' mark.

If you have to add oil often, there may be a leak or wear in the cylinder of your engine.

Oil change

Oil gets dirty and stops lubricating and cooling as well as it should, so the engine will wear more. Dirty oil needs to be changed for new oil at regular times.

Larger engines will also have an oil filter that needs to be changed.

A guide for recommended time for oil changes:

Engine	Change oil after	Change filter after
Small engines with no filter	25 hours	None
Engines with oil filter	50 hours	50 hours

You may need to change it more often if you use the equipment in very corrosive or dusty places.

Check your engine maker's recommendations.

Important note

Old oil and filters contain dirt and toxins that can damage our environment – and make it a mess. Find out how you can dispose of old oil and filters properly in your area – and then **do it**!

Changing the oil

- You will need a funnel, wide container or drain pan to catch the used oil, and a container like an old bottle or jug for the used oil until you dispose of it.
- Cover the ground to collect any drips.
- Run the engine for 2 to 3 minutes to get the oil warm - so it will drain out more easily. Stop the engine and remove the spark plug lead.
- If there is an oil drain plug, you can use this to drain the oil.
- Clean around the filler cap. The oil filler will either be plug near the bottom of the engine or at the top of a dipstick tube.
- Put the drain pan under the drain plug, remove the plug and let the oil flow out. Leave for 10minutes or until the oil drips stop.
- (For small mowers and generators with no drain plug) Tip mower on its side and drain the oil through the oil filler cap or plug.
- Wipe any drips on the engine.
- Replace the drain plug.
- Fill with the recommended oil for your engine. Add oil until just below full on the dipstick or at the top of the oil fill hole. DO NOT overfill.
- Replace the filler cap or plug.
- Replace the spark plug lead. Start and run the engine for a few minutes.
- Stop the engine, wait a few minutes, then recheck the oil level. Top it up if needed.
- Dispose of the used oil in an environmentally safe manner.

Oil filter change

Oil filters should be replaced at each oil change.

They are disposable, screw-on can filters on the side of the engine casing. They are made in many sizes. You will need the right filter for your engine.

Change the filter when you have drained the old oil, and before you refill.

- Unscrew the old filter from the engine

  Remember – it will be full of oil, so be ready to catch it!

  to unscrew the filter, turn it with:

  – strong hands!
  – a filter strap-wrench, or
  – drive a screw driver through the filter

Filter wrench

- Clean the engine side where the filter seats

- Dip your finger in engine oil and lubricate the rubber seal on the new filter

- Screw on the new filter. Turn it until it just meets the engine, then screw it about another half-turn. Use your hands only, don't use a wrench.

Grease

Grease is used to lubricate slow-moving parts of equipment such as shafts and bearings.

It is not used much on the actual engine – but may be used on the equipment that the engine drives.

Grease is:

- thick and goo-ey – it usually stays where you put it without running away
- made of Lithium or calcium elements mixed with soap
- made in different thicknesses for different jobs
- contains other chemicals to help with different jobs for example:

  high melting point greases for car wheel bearings that get hot

  marine greases that are waterproof.

Use the right grease for the job.

For instance. Outboard motor pivots, propeller shafts and steering need the right marine grease.

To apply grease

You may be able to take some things apart, clean them, coat with new grease and put them back together.

This works for controls and some simple tools. Outboard motor propellers also need greasing in this way to stop them seizing on the shaft through salt-water corrosion.

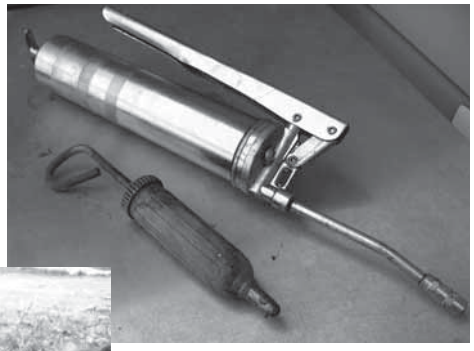
Most equipment that needs regular greasing has to have the grease forced into its joints under pressure.

The joints are fitted with a greasing point (nipple) that contains a valve. Here are two types:

Grease is pumped into the nipple with a grease gun.

Here are two grease guns. The larger one takes grease in a cartridge

Fit the gun to the nipple and pump until you can see new, clean grease coming out of the joint.



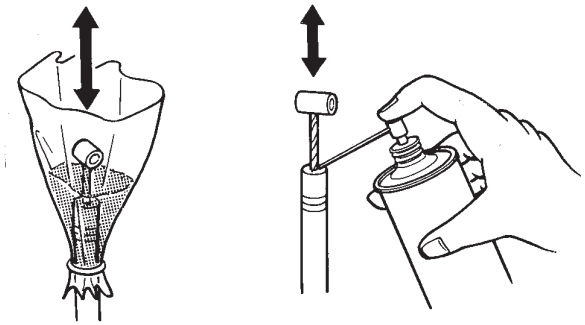
Grease usually comes in tins or plastic jars – or in cartridges that fit into larger grease guns without making a mess.

Lubricate the engine controls

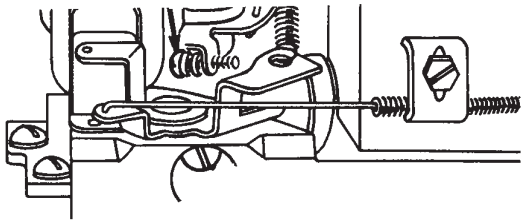
Check with the engine maker's manual for any special parts or ways to lubricate and protect the controls on your engine.

- Clean the ends of any cables and controls.
- Spray with WD40, CRC Marine or a similar spray lubrication. You can also use thin oil to lubricate the moving metal parts.

Only a small amount – Don't overdo it and use too much! Wipe off any extra oil or spray as it will quickly collect sand and dirt.



- Move the control or cable to help the oil get in.
- Don't use oil on plastic or nylon parts – it may soften, crack or damage them.



Transmission, gears and other equipment

The parts attached to your engine will also need maintenance and lubrication. Look at the separate worksheet for your type of equipment.

For example, look at the worksheet 'Outboard motor – Drive and controls' for maintenance and oil-change of the gear case or 'lower unit'.

Activity – lubrication

Find out and write down

What type of oil does your engine use?

What grade and specification of oil?

How much?

Where and how do you check the level?

How often should you change oil?

Does you engine have an oil filter?

What is the size/code or part numberof the filter?

How often should you change the oil filter?

Things to do

On your engine:

- ✔ Change the oil
- ✔ Change the oil filter if it has one.
- ✔ Clean and lubricate the controls
- ✔ Grease only grease points on your equipment