

**Oil is a liquid modern day society could scarcely live without. Roland Taylor takes a closer look at why.**

# Liquid gold

Massive fortunes have been made from it, wars fought over it and countries economies are based on it. What is it? Petroleum (crude oil) or, as some call it liquid gold.

This dark thick liquid which mainly contains hydrocarbons is found in sedimentary rocks in some of the most hostile locations around the globe. Through distillation processes, petrol, diesel, paraffin and lubricating oils are separated out and the residues produced include fuel oil, paraffin wax, asphalt and carbon wax.

These commodities have, over a number of

decades, shaped our lives and non-more so than in combustion engines for which they are the lifeblood - the petrol, diesel or paraffin to generate the power, and the oil to lubricate the components.

Engine oil has four main functions:

- Dissipation of heat
- Lubrication of moving parts
- Cleaning
- To Seal air from certain parts

By understanding how each of these functions plays its part, we are better equipped to recognise the importance of good maintenance procedures and, ultimately, how to get the best out of an engine both in performance and durability.

Dissipation of heat and lubrication of moving parts

In the case of a car engine, more than half a million explosions occur each hour. The temperature of exhaust gases reaches 1500 degrees and at 3000 rpms the valves open and close more than 25 times a second.

Water and air are used to help control temperature levels, but this is not the whole picture.

We all rub our hands in cold weather to warm them up.





When two surfaces move against each other friction is created which in turn produces heat. Without lubrication these surfaces would eventually weld together. This is exactly what happens when an engine seizes up. In some cases the heat is so intense that components melt.

The objective of oil is to form a film that keeps surfaces apart and enables them to glide smoothly against each other. This will help to eliminate friction as well as dissipating any heat build up. It is obvious therefore that any reduction in the oil film between surfaces will have a detrimental effect. Apart from the problems caused by heat, two surfaces that constantly rub against each other will quickly wear, thus drastically reducing their life expectancy.

#### **Cleaning**

At this point it is worth looking at a general formula for lubricating oil.

80% Oil  
20% Detergent (which includes; anti rust, foam and viscosity additives plus a friction modifier).

There are other factors that also need to be taken into account.

#### **Varnish**

The heat produced by the engine oxidises the oil to form a varnish coating that adheres to internal components. This fouls up oil passageways and restricts the flow of lubricant to crucial surfaces. Deposits can build up in the valve guides causing a drop in power and an increase in fuel consumption. Any oil starvation, even over a relatively short period, will usually result in expensive repairs or, in some cases, the need for a new engine.

#### **Sludge**

As a warm engine cools down at the end of a day's work, condensation forms inside it. We have all seen the water vapour signs next morning when it is started. During this non-operational period, water droplets mix with the crankcase oil and the by-products of combustion, sulphur, nitrogen and hydrocarbons. The nett result of all this activity is sludge - a substance that will quickly block oil ways and filters.

#### **Burning oil**

If an engine starts burning oil it is

a warning sign that needs immediate attention. One or more of the following could be responsible

#### **Valve seals**

These stop oil flowing down into the engine from the valve chamber. A seal failure will result in the lubricant entering the cylinder where it is burnt off.

#### **Worn valve guides**

These wear with age and the gap created between guide and valve stem increases allowing oil to pass into the combustion chamber.

#### **Pressurised crankcase**

The crankcase needs to breathe. If the system becomes blocked up with carbon or varnish then pressure builds up forcing oil into the fuel supply system.

#### **Worn piston rings**

Piston rings perform two functions:  
1. Seal the combustion chamber to maximise the power produced.  
2. Lubricate the cylinder walls.

If they are worn or broken they allow pressure to build up in the



crankcase and oil to enter the combustion area.

#### **What can you do to stop this all happening?**

Engine parts will wear and there is no way of stopping this, but you can slow it down with regular maintenance. Modern engines work at high temperatures and compression ratios producing large amounts of friction and heat. In its main task of controlling these two factors, oil evaporates and breaks down. For this reason it is essential that the correct levels are maintained and manufacturers' recommended oil changes are adhered to.

Something that is often overlooked is the fact that when oil is drained from an engine, not all the suspended impurities are flushed out and as much as 1/2 litre of dirty oil and sludge can be left behind. Immediately a new supply is added, it becomes contaminated. There are products available that can be used to flush the system and it may be worth using one occasionally.

Manufacturers will recommend suitable oils for their particular

engine and as a general rule, it does pay to buy the best quality. There are ranges of synthetic oils on the market, but it is recommended that you check with the power-unit supplier before using one of these.

The oil must be of the correct viscosity (thickness) and this will depend on the time of year.

Where an oil filter is fitted, this will require replacing at the intervals shown in the instruction manual.

Pull the dipstick and read the level every time the machine goes out and watch for any leakage signs both on the unit and on the floor where it has been standing overnight.

As was said at the beginning, oil is the lifeblood of an engine. If you starve it of oil you can expect problems. A few minutes taken to regularly check everything is okay can save the frustration plus cost of hours of remedial work later on.



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