



Changing oils

DRAINING AND replenishing the engine oil and changing the oil filter on a regular basis is one of the most effective and cheapest maintenance actions you can perform on any petrol fired piston engine.

It does not really matter if the engine is in your car, aeroplane or helicopter. Frequent oil changes and filter servicing are essential to ensure the piston engine continues to operate reliably.

There are quite a few reasons for changing your engine oil and servicing the oil filter at the recommended time in service frequencies or at least twice a year, even if you do not fly the number of hours nominated on your maintenance release for the "oil change".

Combustion by-products: While piston rings do a very good job of sealing the combustion chamber while the engine is running, they are not perfect, and cannot prevent some of the nasty by-products of combustion getting into the oil. These by-products are quite un-likable contaminants, such as carbon, sulphur, and acid. These keep on building up in the oil while the engine operates.

Then, when the engine is stationary, in the darkness of the sump, chemical warfare ensues night and day. The oil can hold out only for so long against this onslaught, hence a typical six-month calendar change period.

Again, some of the "nasties" settle as sludge and some stay in suspension, ready for the next run. Newer oils do tend to keep the solids in suspension, which means the inside of the engine might stay "cleaner", but the oil gets "dirtier", and because it can only hold so much – needs to be changed.

Unburnt fuel: Some unburnt fuel may run past the piston rings and down into the oil

sump when the engine is started, especially if excessive priming is used. Un-burnt fuel will also find its way into the oil after shutdown, when the heat of the engine boils the fuel in the fuel injection system, causing fuel to dribble from the injectors, often in quite large quantities.

Every time you run the engine, the oil will heat up and evaporate the volatile parts of this fuel, but some of the chemicals designed to be consumed while controlling combustion will be left behind, contaminating the engine oil.

Water in the oil: Air-cooled piston engines accumulate water internally when airborne moisture comes into the stationary engine via exhaust and induction systems and crankcase vents.

Moisture in the crankcase condenses and collects on the internal steel and aluminium surfaces, and then drains into the sump. Condensation occurs after engine shutdown and during ambient temperature fluctuations, especially in a humid climate.

Operating the engine will boil off most of the water. Flying your aircraft is better than running the engine on the ground. If you fly only a couple of hours a month, condensate in your engine may necessitate an oil change more frequently than every six months or so.

Heat: Engine oil is designed to (among other things) reduce friction and transfer heat inside the engine. The oil is given a very hard time, especially where it comes close to the flames of combustion while lubricating items such as the engine valves, and pistons.

The engine oil, containing varying degrees of the previously mentioned contamination depending on its age and time in service, gets baked on the exhaust valve stems

and guides and in the piston ring gaps. This process gradually builds up a varnish or coating, and thus decreases the running clearances between the valve stems and the valve guides and the piston rings and the piston grooves. This ultimately causes binding or sticking and other associated failures. Thinking in barbeque terms, the old oil has a lot more "body" to offer to this basting process.

Filters: All engines have a filtration system of some kind. Some are fitted with a plain gauze strainer screen that will trap larger pieces of carbon and metal, removing them from general oil circulation. Typical maintenance recommendations for these engines include an oil change every 25 hours time in service or six months, whichever comes first.

Some engines are also fitted with disposable micronic paper element filter, which will remove more solids from the oil than a plain gauze screen. The recommended maintenance for engines fitted with these filters typically includes an oil change every 50 hours time in service, or six months, whichever comes first. Notice, however, that the calendar time usually remains the same.

Combustion by-products, unburnt fuel and water combine to contaminate the oil. Modern engine oils are formulated to hold contaminants in suspension, but there is a limit to how much they can hold, and how long they can battle contaminants before losing their design ability to reduce friction, transfer heat, and keep the engine "clean" inside.

Using the engine manufacturers approved oils and adhering to the applicable oil change and filter servicing requirements saves money and helps ensure reliable engine operation.