

FUNCTION OF THE LUBRICATION SYSTEM

The components that make up a piston engine are subjected to high loads, high temperatures, and high speeds. The component parts are generally made of metals, and as the moving parts of the engine slide against each other, there is a resistance to their movement. This is called **'Friction'**.

The friction will increase as the load, temperature and speed increases, the movement of the components also produces **'Wear'** which is the loss or destruction of the metal components. Both friction and wear can be reduced by preventing the moving surfaces coming into contact by separating them with a material/substance which has lower frictional properties than the component parts. This is referred to as a **'Lubricant'**.

A lubricant can come in many forms. Greases, Powders and some solid materials. However it is in the form of **'Oils'** with which this chapter will concentrate on. The oil can be forced between the moving parts, called **'Pressure Lubrication'** or the components can be **'Splash Lubricated'**.

The **'Primary'** task of the lubrication system of the engine is to **'Reduce Friction'** and component **'Wear'**, it also has a number of secondary functions. Of these perhaps the most important is the task of **'Cooling'**. The flow of oil through the engine helps to dissipate the heat away from the internal components of the engine.

As the oil flows through the engine it also carries away the by-products of the combustion process and **'Cleans'** the engine. The internal metal components are protected against **'Corrosion'** by the oil, which also acts a **'Hydraulic Medium'** reducing the shock loads between crankshaft and bearing and so reducing vibration. The oil can provide the power source for the operation of a hydraulic variable pitch propeller.

The oil system can be used to give an indication of the power being developed by the engine, and its condition. The oil system's use as an **'Indicating Medium'** is of great importance to the pilot as it can give an early warning of mechanical failure or loss of power.

It should be remembered that an increase in friction will cause an increase in Friction Horse Power, and therefore a reduction in the Brake Horse Power developed by the engine.

The **'Reduction in Friction and Wear'** by the lubricant is of prime importance, but the secondary functions of **'Cooling, Cleaning, Protection, Hydraulic and Indicating Mediums'** should not be ignored.

THE WET AND DRY SUMP LUBRICATING SYSTEMS

There are two lubrication systems in common use, these are the **'Wet Sump'** and **'Dry Sump'** systems. The system used is normally dependant on the power output of the engine, and role of the aircraft. The principle of lubrication of the engine is the same whichever system is used, the principle difference between the two systems being the method used to store the supply of oil.

Most light, non-aerobatic aircraft engines use the **'Wet Sump'** system. In this system the oil is stored in the bottom or sump of the engine. This simplifies construction but has number of disadvantages:

- a) Lubrication difficulties arise during manoeuvres. The oil enters the crankcase, is flung around by the revolving shafts with possible over-oiling of the engine, inverted flight being particularly hazardous.

Piston Engines Chapter 3 Lubrication Aircraft Spruce

Norman E. Borden, Walter J. Cake



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Sport Aviation ,1960 **Catalogues and Indexes of British** Great Britain. Her Majesty's Stationery Office,1974
The Continuing Study of Newspaper Reading Advertising Research Foundation,1944 Aircraft Engine Lubrication
Sinclair Refining Company. Aviation Sales Department,1944 **Aircraft Piston Engines** Herschel H. Smith,1981
Fundamentals of Aircraft Piston Engines Norman E. Borden,Walter J. Cake,1970 **Aviation Maintenance Technician**
Certification Series ,2015 **Lubricating Oils, Aircraft Piston Engine (Non-Dispersant Mineral Oil)** E-38 Aviation
Piston Engine Fuels and Lubricants,2005 This SAE Standard establishes the requirements for nondispersant mineral
lubricating oils to be used in four stroke cycle piston aircraft engines This document covers the same lubricating oil
requirements as the former military specification MIL L 6082 Users should consult their airframe or engine manufacturers
manuals for the latest listing of acceptable lubricants Lubricating Oil, Aircraft Piston Engine (Ashless Dispersant) E-38
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airframe or engine manufacturers manuals for the latest listing of acceptable lubricants This Standard was revised based on
the recommendations made at the 22 April 2010 SAE E 38 Aviation Piston Engine Fuels and Lubricants Committee meeting
The revision is part of the standard SAE five year review process and it includes both technical and editorial changes The
name of the preparing SAE committee has changed to E 38 and is now under the SAE Aerospace Council **Aircraft Piston**
Engines Herschel H. Smith,1986 **Aircraft Propulsion** C.Fayette Taylor,1971 *Aircraft Propulsion* Charles Fayette
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