

16.1 Functions of Lubricating Oil

- While the primary task is to reduce friction and wear between moving parts, the oil also
- performs several critical secondary functions:
- ☐ Cooling: It absorbs and carries heat away from hot components like pistons and bearings⁷⁸.
- ☐ Cleaning: It carries away contaminants like carbon, sludge, and metal particles, which are then removed by filters⁷⁹.
- ☐ Hydraulic Medium: It can be used to power components like variable-pitch propellers⁸⁰.
- ☐ Condition Indicator: Oil pressure and temperature gauges provide vital information about the engine's health⁸¹.

16.2 Lubrication System Types

- ☐ Wet Sump System: The oil is stored in the sump at the bottom of the engine. This is simple and common on light, non-aerobatic aircraft but can cause lubrication problems during maneuvers and makes oil cooling more difficult⁸²⁸²⁸²⁸².
- ☐ Dry Sump System: The oil is stored in a separate external tank, and oil is returned from the sump to the tank by a scavenge pump⁸³. This allows for a larger oil capacity, better cooling, and is suitable for aerobatic flight. The scavenge pump must have a larger capacity (25-50% more) than the pressure pump to prevent oil from accumulating in the sump⁸⁴.

16.3 System Components

- ☐ Oil Tank (Dry Sump): Contains the oil supply and includes a hot pot or inner compartment to allow a small portion of the oil to warm up quickly on startup⁸⁵.
- ☐ Pumps: Gear-type pumps are used. The pressure pump supplies oil to the engine, and the scavenge pump returns it to the tank⁸⁶⁸⁶⁸⁶⁸⁶.
- ☐ Filters: Coarse suction filters protect the pumps, while fine pressure filters remove small

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- contaminants from the oil before it enters the engine87878787.
- ☐ Pressure Relief Valve: Prevents excessive oil pressure by returning excess oil to the inlet side of the pump88.
- ☐ Oil Cooler: A radiator that uses ram air to cool the oil, preventing it from overheating89.

16.4 Oil Properties and Types

- ☐ Viscosity: The oil's resistance to flow. Viscosity decreases as temperature increases90909090.
- An oil's ability to maintain its properties over a range of temperatures is known as its Viscosity Index91.
- ☐ Hydraulicing: On radial or inverted engines, oil can drain into the lower cylinders after shutdown. If the engine is started in this condition, the incompressible oil can cause severe damage (a 'hydraulic lock')92. These engines must be turned by hand (pulling the propeller through) before starting to check for and clear any fluid93.

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