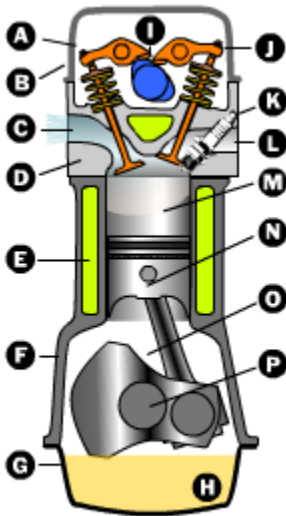


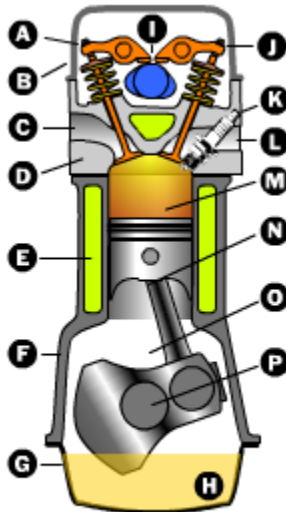
Engine Lubrication



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- A** Intake Valve, Rocker Arm & Spring
- B** Valve Cover
- C** Intake port
- D** Head
- E** Coolant
- F** Engine Block
- G** Oil Pan
- H** Oil Sump
- I** Camshaft
- J** Exhaust Valve, Rocker Arm & Spring
- K** Spark Plug
- L** Exhaust Port
- M** Piston
- N** Connecting Rod
- O** Rod Bearing
- P** Crankshaft

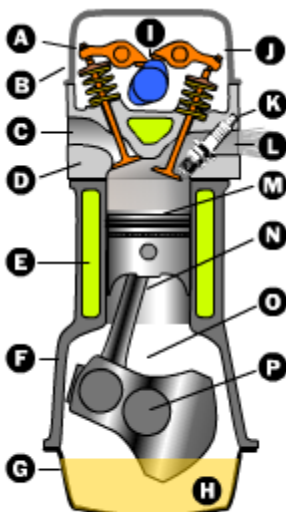
- 1** INTAKE
- 2** COMPRESSION
- 3** COMBUSTION
- 4** EXHAUST
- ▼ Spark
- Top Dead Center



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A general description of how the combustion engine works. The lubrication system, the cylinder, the piston, the piston rings, the cams / camshaft and the rod bearing.

Lubrication System

The engine lubrication system is designed to deliver clean oil at the correct temperature and pressure to every part of the engine. The oil is sucked out the sump into the pump, being the heart of the system, than forced through an oil filter and pressure feeded to the main bearings and to the oil pressure gauge. From the main bearings, the oil passes through feed-holes into drilled passages in the crankshaft and on to the big-end bearings of the connecting rod. The cylinder walls and piston-pin bearings are lubricated by oil fling dispersed by the rotating crankshaft. The excess being scraped off by the lower ring in the piston. A bleed or tributary from the main supply passage feeds each camshaft bearing. Another bleed supplies the timing chain or gears on the camshaft drive. The excess oil then drains back to the sump, where the heat is dispersed to the surrounding air.

Journal Bearings

If the crankshaft journals become worn the engine will have low oil pressure and throw oil all over the inside of the engine. The excessive splash will probably overwhelm the rings and cause the engine to use oil. Worn bearings surfaces can be restored by simply replacing the bearings inserts. In good maintained engines bearing wear occurs immediately after a cold start, because there's little or no oil film between the bearing and shaft. At the moment that sufficient oil is circulated through the system hydrodynamic lubrication manifests and stop the progress of bearing wear.

Piston rings - cylinder

Piston rings provide a sliding seal preventing leakage of the fuel/air mixture and exhaust from the combustion chamber into the oil sump during compression and combustion. Secondly they keep oil in the sump from leaking into the combustion area, where it would be burned and lost. Most cars that "burn oil" and have to have a quart added every 1,000 miles are burning it because the rings no longer seal properly.

Between the piston rings and the cylinder wall of a well maintained engine hydrodynamic lubrication prevails, essential for the lowest friction and wear. In the top and bottom dead centre where the piston stops to redirect, the film thickness becomes minimal and mixed lubrication may exist.

To realize a good head transfer from the piston to the cylinder, an optimal sealing and a minimum of oil burning, a minimal film thickness is desirable. The film thickness is kept minimal by a so called oil control ring. This ring is situated beyond the piston rings so that the surplus of oil is directly scraped downwards to the sump. The oil film left on the cylinder wall by the passage of this ring is available to lubricate the following ring. This process is repeated for successive rings. On the up stroke the first compression ring is lubricated by the oil left behind on the cylinder wall during the down stroke.

Leakage of the fuel/air mixture and exhaust from the combustion chamber into the oil sump result in oil degradation. This is the reason why, despite of frequent replenish of oil, oil change remain essential or even become more essential.