

# Jet Engine Oil System

## Part Two

### Introduction

The main engine shafts are supported by bearings in certain strategic places, depending on the number of (1, 2 or 3) and the load on the shafts, as well as the length of the engine. Main shaft bearings, and other bearings and gears are gathered inside engine oil sumps. Each rotating shaft must have at least one thrust bearing; balls. Oil sumps are a part of the oil circuit and the oil must remain inside the oil circuit. Leakage outside the oil system could pollute the air bleeds or result in an engine fire.

Two, three, four or more oil sumps are needed, distributed along the main shaft line. Each oil sump is pressurized and sealed to make sure the oil is retained within the oil circuit. The pressure inside the oil sump must always be lower than the pressure outside the sump.

On the basic diagram shown, the sump is sealed by labyrinth type seals and surrounded by a dry cavity. Pressurizing air is bled from core engine compressors and is injected between two labyrinth seals into the dry cavity: then it flows across the oil seals preventing oil seepage past the oil seals.

Air mixes with part of the oil inside the oil sump cavity, making an oil mist. Therefore, the vent air which carries oil droplets has to be discharged overboard through a rotating air/oil separator, located in the oil sump or in the accessory gearbox. The vent tube must remain wide open to avoid leaks due to too low  $\Delta P$  through the oil seals.

The double wall around the sump generally applies to sumps located in hot areas, typically mid-sumps. Some designs do not use double walls particularly when carbon seals are used: these type designs use a small drain cavity.

In many applications, oil that crosses the oil seal is collected and routed by a tube to an aircraft drain collector that is inspected from time to time and is used as a seal monitoring tool.

### Key Facts

All bearings and gears require lubrication and are enclosed inside of sumps, sealed by labyrinth or carbon seals. To be leak free, the pressure must always remain lower inside than outside the sumps.

