

FOREIGN MATERIAL IN THE OIL SYSTEM

General

Rubber-like particles found in the oil screen are an indication of disintegrating oil seals or a faulty oil line. On all reciprocating engines, the oil system has an oil screen by-pass valve. This valve opens at any time the oil screen is clogged enough to restrict the oil flow, thereby allowing unscreened oil to flow through all oil passages on the engine.

Frequently, carbon tends to break loose from the interior of the engine in large pieces which have the outward appearance of metal. However, carbon can be distinguished from metal by placing the foreign material on a flat metal object and hitting it with a hammer. If the material is carbon, it will disintegrate when struck with a hammer, whereas metal will either remain intact or change shape, depending on the malleability of the metal.

Metal Particles

Metal particles on the engine oil screens or on the magnetic sump plugs are generally an indication of partial internal failure of the engine. However, due to the construction of aircraft oil systems, it is possible that metal particles may have collected in sludge in the oil system at the time of a previous engine failure; consequently, this must be taken into account when metal particles are found in the engine oil screens or on the magnetic sump plugs.

Before removing an engine for suspected internal failure as indicated by foreign material on the oil screens or oil sump plugs, collect all obtainable metal particles for analysis. In order to collect fine metal particles, it may be necessary to strain the oil through a cloth.

An oil soaked rag can very easily cause spontaneous combustion unless placed in a tightly closed container, such as a quart or pint can with a press-fit lid.

The serviceability of the engine will depend upon the quantity and the form of the metal. Granular metal particles, in any amount greater than a trace, require a very careful inspection of the engine, as the presence of these particles is usually an indication of an impending part failure.

Identification of Metal Particles

Metal particles found in an engine may be any of five kinds; steel, tin, aluminum, silver, and copper (or bronze). A visual inspection as to color and hardness will occasionally be sufficient to determine the kind of metal present.

When visual inspection does not positively identify the metal, the kind of metal present may be determined by a few simple tests performed with a permanent magnet, electric soldering iron, and approximately two ounces each of concentrated hydrochloric (muriatic) acid and concentrated nitric acid, as follows:

Exercise care in handling the acids.

STEEL PARTICLES — can be isolated by means of a permanent magnet. The presence of any amount of steel particles requires engine removal.

TIN PARTICLES — can be identified by their low melting point. The soldering iron should be cleaned, heated to about 26°C (500°F), and tinned with 50-50 solder (50% lead — 50% tin). Wipe off the excess solder. A tin particle dropped on the heated iron will melt and fuse with the solder. Exercise care to avoid excess overheating of the iron during this test. The presence of tin requires no action since tin is used only in plating engine parts, and its thickness not greater than .0005 inch.

ALUMINUM PARTICLES — may be identified by their reaction with hydrochloric acid. When a particle of aluminum is immersed into hydrochloric (muriatic) acid, it will "fizz" with a rapid emission of bubbles. The particles will gradually disintegrate and form a thick residue (aluminum chloride). The presence of