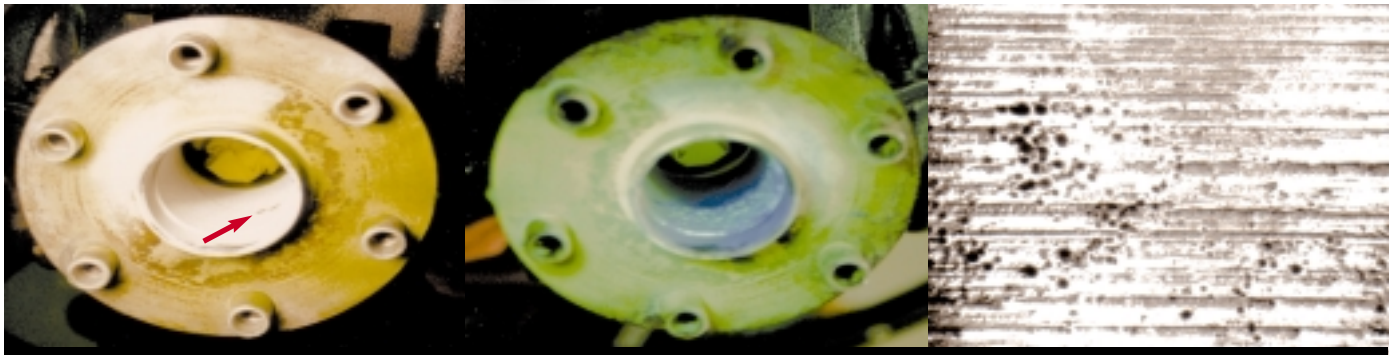
Sludge attack



Dye-penetrant inspection of crankshaft front bore shows a crack (arrowed left); the crack and associated corrosion is evident under fluorescent light; low power magnification of corrosion in the front bore – also shows manufacturing machining marks (right).

A single engine prop loss and a twin's failure to feather could have one terrible thing in common – a deadly build-up of sludge.

Les Lyons

THE SIMPLE task of changing your engine oil at intervals that will minimise sludge build-up will not only help ensure the good health of your engine, it could one day save your life.

In early 1994, a Piper PA-28 Warrior operating under visual flight rules in the UK, suffered a crankshaft fracture and resultant loss of the propeller in flight. The event resulted from oil sludge initiated corrosion inside the crankshaft front bore. Luckily the pilot was able to land the aircraft with no injuries.

Having a propeller fall off in front of your eyes is one thing, not being able to feather the prop on a failed engine in a twin can be just as frightening.

For most multi-engine aircraft, including a number of light twins, the ability to feather the propeller can be the difference between the pilot selecting an alternative airport and carrying out a single engine landing or selecting the best place to crash.

The most common reason for a piston engine aircraft propeller not feathering is oil sludge. Engine oil sludge builds up inside the propeller hub to a level where the feathering mechanism cannot overcome the sludge build up. Carrying out a feathering check at every aircraft periodic inspection, and not just a fine to coarse pitch change check during the post periodic inspection engine run, will provide reasonable assurance that the propeller will feather when you need it most.

Sump of sludge: Unlike car engines, the piston rings in an aircraft piston engine can rotate. This results in the ring gaps aligning and combustion by-products contaminating the engine oil in far greater quantities than in a car engine.

Combustion by-products combine with water accumulating in the sump through condensation. The resulting mixture of combustion by-products, water and oil is highly corrosive. Where the oil flow is terminated, such as a dead end inside a crankshaft or in the propeller dome, the combustion by-products, water and oil mixture can result in sludge build-up.

To prevent sludge build-up, change the engine oil at intervals published by the engine manufacturer, both in engine operating hours and calendar time. For example:

• Teledyne Continental Motors (TCM) engines - TCM requires engine oil to be changed at an engine time in service ranging from 25-75 hours. However, the calendar period is six months. That is, for a TCM-powered aircraft, the engine oil should be changed at least twice a year (TCM Service Bulletin M87-12 Revision 1).

• Textron Lycoming engines – Lycoming specifies that engine oil be changed at an engine time-in-service of 25 or 50 hours. However, the calendar period is four months. So for a Lycoming powered aircraft, the engine oil should be changed at least three times a year (Lycoming Mandatory Service Bulletin 480D).

Oil sludge build up in an engine or propeller hub is not only a sign of inadequate maintenance. Sludge inside an engine and in a feathering propeller can be a killer.

Extending the oil change interval beyond the manufacturer's published period, or worse, only changing your engine oil at the annual inspection may one day cost much more than an oil change.

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