

TRIBOLOGIK® NEWSLETTER

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It's summer vacation time... at last!

Time to refill your batteries.

Relax, enjoy and take care...

But don't forget to come back!



Oil analysis for Aviation- Safety First

Aviation is a heavily regulated business, and for cause. A crashing plane is almost always a tragedy for passengers, crew members and their families. This is why the US Federal Aviation Administration (FAA), Transport Canada and other national aviation regulatory bodies are applying stringent maintenance rules to airlines and aircraft operators including chartered flights, helicopter and private aircraft operators.

Oil analysis is not mandatory in aviation but aircraft engine manufacturers, maintenance professionals and even the FAA and Transport Canada recommend oil analysis with a certified laboratory under certain circumstances.

In fact, Predictive Maintenance and Tribologik Laboratories are certified by some power plant manufacturers to perform oil analysis on their engines.

Monitoring Trends

In aviation, you must anticipate any potentially problematic situation and take all means to avoid it before it occurs. This is true for bad weather, severe turbulence, wind shear, icing and other situations including potential engine failure.

Jeff Simon, an A&P mechanic, pilot, and aircraft owner writes : "I am a strong believer in performing regular oil analysis because it is a great way to monitor trends in the health of your engine. That said, any single oil analysis report is of limited value. The trends matter most. For that reason, I recommend either doing oil analysis at every oil change, or not at all. After a few analysis reports, you will begin to see what is normal for your engine and what trends may be beginning to develop. For example, if you see dramatically rising levels of aluminum over several reports, you may have a problem with the engine's piston pin plugs. Another great benefit of oil analysis is that the analysis companies can be a wealth of information about the trends that you see. The reports will include notes from the technician, and you can always call to ask questions or discuss it in more detail." Source : Aircraft Owners and Pilots Association (AOPA) :

<http://www.aopa.org/News-and-Video/All-News/2013/March/1/Time-for-a-change-DIY-oil-changes>

Three Basic Tests

PMC/Tribologik® recommends three basic oil tests for airplanes and helicopters:

1. **Spectrometric Oil Analysis Program (SOAP):** “The Spectrometric Oil Analysis Program allows an oil sample to be analyzed and searched for the presence of minute metallic elements. Oil analysis increases safety by identifying an engine problem before engine failure. It also saves money by finding engine problems before they become large problems or complete engine failure. This procedure can be used for both turbine and reciprocating engines.”

The following examples of wear metals are associated with areas of the engine that could be lead to their source. Identifying the metal can help identify the engine components that are wearing or failing.

- **Iron**—wear from rings, shafts, gears, valve train, cylinder walls, and pistons in some engines.
- **Chromium**—primary sources are chromed parts (such as rings, liners, etc.) and some coolant additives.
- **Nickel**—secondary indicator of wear from certain types of bearings, shafts, valves, and valve guides.
- **Aluminum**—indicates wear of pistons, rod bearings, and certain types of bushings.
- **Lead**—mostly from tetraethyl lead contamination.
- **Copper**—wear from bearings, rocker arm bushings, wrist pin bushings, thrust washers, and other bronze or brass parts, and oil additive or antiseize compound.
- **Tin**—wear from bearings.
- **Silver**—wear of bearings that contain silver and, in some instances, a secondary indicator of oil cooler problems.
- **Titanium**—alloy in high-quality steel for gears and bearings.
- **Molybdenum**—gear or ring wear and used as an additive in some oils.
- **Phosphorous**—antirust agents, spark plugs, and combustion chamber deposits.

Source : FAA - Aviation Maintenance Technician Handbook–Powerplant(Volume 2, Chapter 6, Lubrication and Cooling Systems)

https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/media/FAA-H-8083-32-AMT-Powerplant-Vol-2.pdf

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Your Equipment's Best Friends

2. **Patch test (PT):** The Patch Test determines the level of solid particulate matter (metal and non metal) derived from the aviation filter by filtration method. The presence of contaminants will cause accelerated equipment wear.
3. **Chip test:** Chip analysis identifies alloy chips found in aircraft components. This test can locate the failure of gears, bearings and more, provided their alloy composition is known. The composition of chips found on magnetic plugs or through patch testing is identified using the ICP (inductively coupled plasma) method and are reported using SAE International's AMS (Aerospace Material Specification) number.

Additional tests and packages can also be recommended for aircraft engines, other components and other equipment such as ground equipment. These will be discussed in a further issue of this Newsletter.

For additional information, please contact your account manager.
