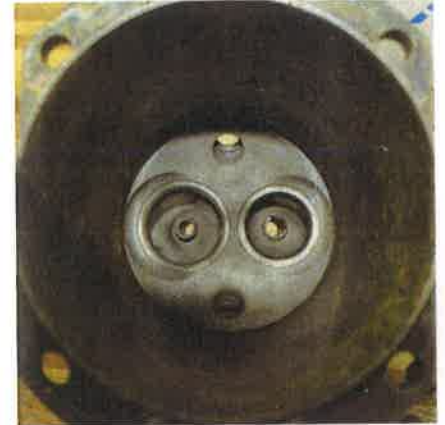


Corrosion Can Be Costly

GO FLYING, AND CHANGE THE OIL REGULARLY



Most metals will either rust or corrode. Rust results from oxidization, while corrosion is a galvanic process. Corrosion is caused by the electrical interaction between dissimilar metals or fluids, and usually concerns pilots and maintenance personnel more than rust.

Some common beliefs held by pilots concerned about the health of their engines need clarification. For example, many are comforted by the fallacy that when their engine is idle, the engine oil coating the metal parts at rest will protect them from corrosion. It is known, however, that within a few days, corrosion can occur even while a coating of oil remains on the parts. In fact, the oil itself can cause corrosion.

Philip Burchinshaw and Jason Crowell, of Aerotec Engines, recently delivered a

seminar on the topic at COPA Flight 57, on Prince Edward Island. Attendees left with a better appreciation of the forces at work against their engines.

Corrosion is caused by acids created from sulphur and chlorine compounds released during heat and combustion.

TRY AND FLY THE AIRCRAFT FOR AT LEAST ONE HOUR A WEEK

Burning a pound of fuel produces about a pound of moisture, most of which goes out the exhaust stacks. But some of it blows by the oil rings to the crankcase, where it mixes in with the oil. Engine oil exposed to heat promotes oxidization. Air will carry

acid and moisture through the engine.

Some engines are at higher risk than others. Age is a factor. So are weather and proximity to the ocean. Engine operation, frequency of oil changes and, most importantly, whether the engine is used regularly, are major factors in corrosion risk. Long-term storage requires proper pickling and protection.

Corrosion and rust will shorten the life of any engine. Measuring a rate of corrosion is nearly impossible. It can stop, then start up again, depending on factors such as the type of surface being impacted. The most vulnerable parts are cylinders, pistons, rings, valves and guides, cam shafts and lifters.

Your engine is attacked not only by internal gases and acids, but also by environmental corrosion and rust. Gaskets, engine mounts and seals suffer just by being ex-



posed to air and the passage of time. Metals will corrode or rust over time without some attempt to protect them. Alodine, zinc chromate primer, enamel paint, and even 50-weight engine oils can help prevent deterioration of metals and/or seals, whether synthetic or natural.

Experience and knowledge of the effects of corrosives, caused by both the environment and engine by-products, have led to various measures to counteract their effects. One simple measure is to "fly the airplane." New and overhauled engines benefit from flying some 50 hours with mineral oil in the sump. Over that period of time, a varnish builds up on internal parts that protects against corrosion.

Centri-Lube camshafts use precisely drilled holes on the cam lobe, which allow oil flowing through the camshaft to reach the surface of the lobe. Centrifugal force

drives the oil through the small orifices to the surface of the lobe, where the cam followers "hydro-plane" on the thin film. This technology protects the surface of the lobes from wear and exposure to moisture in that portion of the engine casing, which is normally lubricated by oil splashing from the sump, driven by the spinning crankshaft.

Parker Lube provides a protective coating on a new camshaft's lobes and bearings during the break-in process. This will normally wear off in the middle of the lobe, but the sides of the lobes are still afforded a line of defence.

"Try and fly the aircraft for at least one hour a week," said Burchinshaw. "Get the engine temperature to at least 180 degrees F for 30 minutes." This purges moisture from the oil through the breather. "Less than 30 minutes can result in increased vapor and acids in the oil."

Corrosion plays havoc with internal engine parts and the best prevention is to regularly fly the aircraft.

Crowell said running the engine lean prevents unburned fuel from creating corrosive chemicals. Sump-only preheaters should be avoided, he said. They tend to vaporize moisture in the oil, allowing it to condense around cooler parts of the engine. "Use Inhibiting Oil (2F) during winter breaks," Crowell recommends. "You can still fly with it in the engine for 50 hours."

Crowell advises engine owners to do the math, because corrosion is expensive. "If an engine overhaul cost \$30,000 with a 2,000 hour TBO, the cost is \$15 per hour," he said. "Shorten the life of that engine by 500 hours, and you have lost \$7,500."

More at www.aerotechengines.ca.

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