

HOW TO ENHANCE GENERATOR PERFORMANCE

Using the right high performance capability (HPC) turbine oil can help airlines overcome maintenance challenges

By Ed Barnes

ED BARNES, FIELD ENGINEER FOR AVIATION Lubricants at ExxonMobil, talks about the top reasons for unplanned generator reliability issues and how HPC oils can help airlines overcome maintenance challenges.

In the demanding, competitive aviation marketplace, fleets are constantly seeking ways to boost revenue and keep downtime to a minimum. If severe enough, a single maintenance issue has the potential to delay or ground a flight, creating a financial burden for airlines and frustrating passengers eager to get to their next location.

Generator failure (i.e., integrated drive generators (IDG), variable frequency generators and variable frequency starter generators) is one important maintenance challenge faced by airlines.

Not surprisingly, generator maintenance and unplanned removals can be incredibly costly; however, using the right high performance capability (HPC) turbine oil can help airlines overcome these challenges.

Outlined below are key causes for unplanned generator removals and maintenance. Also included are benefits of HPC oils, underscoring how they can help promote reliability of essential aircraft components.

1. DIODE FAILURE

A diode, which is a semiconductor device allowing electricity to flow in one direction, can fail if a turbine oil does not have adequate electrical conductivity. The fluid friction between the rotating generator components and the lubricant can generate static electrical charges on different parts of the generator during operation. These electrical charges need a path to dissipate, either through the air around the generator — if the ambient humidity is high enough — or through the lubricant.

To dissipate through the lubricant, there must be adequate electrical conductivity. If the ambient



humidity is too low and the lubricant lacks sufficient conductivity, the charge will be strongly separated, which may result in a powerful electrical discharge that causes permanent damage to diodes in the generator control circuitry.

The risk of insufficient conductivity is the highest when oil is fresh and the temperature is below freezing. Also, it's important to note that there are significant differences in electrical conductivities between turbine oils. In fact, there are some turbine oils on the market that have low conductivity. In contrast, a modern HPC oil, like Mobil Jet™ Oil 387, offers higher electrical conductivity, which can minimize the risk of diode failures and delayed flights.

2. CORROSION AND FILTER PLUGGING

Turbine oils can be exposed to harsh conditions in a generator, such as extreme temperature ranges. On occasion, this can cause the lubricant's base oil to undergo oxidation. During oxidation, the fluid develops a high total acid number (TAN), causing corrosion and potentially, the failure of non-ferrous components in the generator.

IDG DIODE failures compromise generator control circuitry and sensors.
EXXONMOBIL

IDG HOUSINGS which show signs of corrosion. EXXONMOBIL



THE FLUOROCARBON elastomer specimen that became brittle with visible cracks vs. no cracks. EXXONMOBIL

In severe cases, this debris can even lead to filter plugging and differential pressure indication (DPI) alarms in the cockpit. Lubricant filters can also become plugged from copper chelation, a side effect that occurs when additives interact with bronze-wear metal particles, ultimately leading to the development of sludge.

Corrosion damage and blocked filters will necessitate expensive unscheduled maintenance, cancelled or delayed flights, and significant incremental costs to operators.

That said, certain HPC oils can provide excellent oxidation and thermal stability which helps protect generators from acidic corrosion and resist deterioration and deposit formation. Furthermore, with the right additive package, copper chelation can be avoided.

3. SEAL LEAKS

Some high thermal stability (HTS) oils can be aggressive on elastomer seals, causing swelling, brittleness, and cracking, and premature generator removal. Choosing one compatible to engine seals will help prolong seal life, which helps protect against oil leaks.

CONCLUDING THOUGHTS

As you've now learned, not all turbine oils are created equally. HPC oils can lower mean time between unplanned generator removals and can help maintain excellent performance, therefore, helping reduce costs for operators. To support your generator performance needs, consider using HPC oil to help maintain efficient fleet performance and keep your maintenance costs to a minimum. **AMT**



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