

Is Blowby Killing Your Cam?

Vance Atkinson recently forwarded an article from July - August 1994 TBO Advisor that applies to all engine operators. The full article is excellent and well worth reading. I suggest you do it as I can only cover the highlights here.

Chevron Oil Company researchers, McGeehan and Yamaguchi found an unexpected link between blowby and cam wear. It's called nitric acid.

It seems the old belief that organic acids being the nasty stuff in worn out oil is not true. The acids in the oil don't necessarily produce their harm by accelerating corrosion either.

Linking together research dating back as far as 62 years, the McGeehan-Yamaguchi team proved that nitric acid formed in the crankcase does not cause cam damage by corrosion but speculated that the damage is caused by abrasion. *"The nitric acid simply dissolved the martensitic matrix of the metal, liberating iron carbide particles from the case-hardened surface which then caused classic two-body abrasion."*

The researchers found:

"1. Blowby is directly involved in valve train wear.

2. Blowby condensates are highly acidic (PH=2), and high in nitrates.

3. The nitric acid production in blowby is favored by lean mixtures.

4. Wear on cam lobes and followers is caused by abrasion.

5. When blowby is low, cam wear is low.

6. Zinc dithiophosphates can protect against cam wear but only if present in the right amounts and replenished frequently."

Blowby is commonly found in aircraft engines due to: operation at high power settings, long periods of operation at lean mixtures, loose parts tolerances needed for air cooled engines. Many operators who use AV-1 oil are now using extended oil change times. These factors plus the common large inactivity periods sets the stage for high acid levels.

The researchers listed several steps to take to protect your valve train parts, however.

Know the blowby condition of your engine. If compression checks show below 70/80 and the leak is mostly by the rings then you have high blowby conditions. You may test the engine to see by measuring crankcase pressure during engine operation. (See p. 4 CSA Oct 1991). An alternate method is to attach an airspeed indicator to the dip stick tube and ground run the engine at as high an RPM as prudent. Airspeeds above 90 mph indicate a high blowby engine

that should be operated with shorter oil drain intervals and use richer mixtures to prolong cam life.

The leaner you set your mixture and the more blowby you have determines the oil change interval. AD oil have enough alkalinity from additives to protect your engine for the first 10-20 hours. When these have been neutralized you will see a sharp rise in nitric acid. *"For most engines, oil drain intervals of more than 50 hours should be unthinkable. An interval of 25 hours is infinitely safer."*

If you have a high blowby engine, lean well to the rich side of peak EGT. Lean mixtures increase nitric acid production

Use an anti-scuff agent, like Lycoming LW-16702, at each oil change (it must be replenished regularly) or use Aeroshell Multigrade which has the agent in it. The McGeehan-Yamaguchi team found the additive to be useful in fighting cam wear in acidic conditions.

In addition to the above, it seems devices that take crankcase breather fumes/oil and return it to the crankcase would also increase acidity of the oil. If the vented oil were not "recycled" you would replace it with new oil, having a PH that would help neutralize the older more acidic oil.