The Oil Report

July 2003

"Oil the News That's Fit to Print!"

More About The Oil Report!

We had a great response to our first newsletter! Thanks to everyone who passed it along to a friend. One thing we neglected to mention is that there are different versions of this newsletter -- one each for gas/diesel engines, one for aircraft engines, and one for industrial machines. So, if you pass this along to someone who wants to be included on our distribution list, they need to let us know which version they'd like to receive.

BLACKSTONE LABORATORIES

In future issues, we are hoping to fill this space with interesting facts about oil or good websites we can recommend. If you have a favorite, please let us know so we can pass the word along.

Spotlight on...

Viscosity

by Jim Stark

As a young man growing up, I was part of a large family with parents who tolerated funny business at the dinner table aboue as well as they tolerated nonsense in church. We kids all had a generous sense of humor, so it was hard to keep a straight face when someone would ask that the butter be passed at dinner. The asker knew to keep his or her thumb out of the way, because the passer would inevitably try to jam the butter into it. This would be done silently, of course, and the resulting contagious giggle soon turned to muffled hilarily that was shared by everyone except by parents. Eyes cast downward, we kids would suffer silently as we were about to burst with laughter.

It can be just as hard to surpress hilarity now that I'm an adult. Reading the information manual for a new single-engine airplane made by a domestic aircraft manufacturer, I was seriouls tickled by this statement: "Prior to starting on cold mornings, it is advisable to pull the propeller through several times by by hand to 'break loose' or 'limber' the oil, thus conserving battery energy."

Limber up the oil?

Aircraft oil tends to have so much tradition and folklore surrounding it that it's almost endearing. One of the most misunderstood oil topics is viscosity.

Technically, viscosity is defined as resistance to flow. Commonly, though, we think of it as oil's thickness. To be more specific, it is the thickness of oil at a given temperature. The plot thickens (pun intended!).

The viscosity of an oil could be reported at any temperature, but to standardize things, most laboratories report either a low temp (100F or 40C) or a high temp (212F or 100C) and stick with either Fahrenheit or Celsius. The standardized temperature reading allows us to compare apples to apples for judging the thickness of the oil. At Blackstone we report the viscosity at 210F.

An apple is an apple, no matter what language you use to describe it. In the same respect, there are many ways to describe viscosity: SAE Engine, SUS (Seybolt Universal Seconds), cSt (Centistokes), ISO grade, etc. We use SUS. No matter what you call it, the number given defines the thickness of the oil at the standard high temperature.

Straight Weight vs. Multi-Grade

Engine oil can be either straight weight or a multi-grade viscosity. Originally, all oils were straight weights. Relatively few straight weights are

manufactured today for gas or diesel engines, since the manufacturers generally recommend multi-grades. Using a stright-weight in an anricraft engine is more common. At operating temperature, a straight-weight performs just as well as a multi-viscosity oil. The straight-weight is just a simpler form of oil.

The difference between multi-grades and straight-weight oils is simply the addition of a viscosity-improving (VI) additive. The most common grade of aircraft oil in use today are the 15W/50 and 20W/50. These oils are 20W oils blended with a VI additive that should leave them reading in the SAE 50 weight viscosity range when at a higher (210F) temperature. The advantage to the multi-weight is, when cold-starting the engine, the multi-viscosity oil has the thickness of the lower of the two numbers to allow the engine to spin over more easily.

Whether using a straight-weight or multi-grade oil, the need to "limber up" the oil is pure fiction. The oil is ready to go as it stands. We can understand that the molasses served with your pancakes may need a good limbering up before pouring, but your oil is not molasses. Thickening is a normal function of temperature. Trying to "limber it up" may make you feel better, but in reality, only heat will cause it to be more limber.

Which Viscosity to Use?

Engine owners often stray from manufacturer's recommendations regarding the viscosity of oil. The engine builders dyno-test their engines using a specific viscosity oil, so when you use the viscosity they recommend, you are working with a known result. Going to another viscosity is an experiment, but it's usually a harmless one. For the sake of efficiency, you want to run the lightest grade oil in your engine possible, within limits. The heavier oils provide more bearing film, and using an oil that's too light can cause the bearing metals to increase. If the oil is to heavy, the cylinder wear can increase. The trick is to find the right viscosity for your particular engine, which most easily done by following the manufacturer's recommendation.

Changes in Viscosity

Adding anything foreign to your oil can change its viscosity, which is why we don't recommend after-market additives. Other changes to viscosity can result from contamination. Moisture and excess fuel can both cause the viscosity to increase or decrease, depending on the contaminant and how long it has been present in the oil. When your oil's viscosity comes back as either lower or higher than the "Should Be" range, something is causing it. The key is to find out what it is and then correct the problem.

If you want to try a different viscosity oil than what the manufacturer recommends, you might want to use oil analysis while you are experimenting. Your wear data doesn't lie!

Have You Heard?

Terry Dyson
on SpeedTalk.com

Although he won't be talking specifically about aircraft oil, you may want to check out Terry Dyson's interview on SpeedTalk.com, coming up Friday, July 11, 2003. Terry is known as an "oil guru" who has been in the oil business for more than 25 years. His interview will cover a wide-ranging array of topics, including engine oil, oil additives, cleaners, oil filters, oil pumps and pans, other lubes, and ways to improve engine performance and longevity. From synthetics to sludge, Terry's got your answers! Listen to the streaming audio at www.speedtalk.com

Report of the Month

The Report of the Month highlights an interesting or troubled engine. See if you can figure out what was wrong with this Lycoming O-360 before reading the caption below.

(To learn where the various elements might be coming from, click here.)

MI/HR ON OIL	61	UNIT/ LOCATION AVERAGES	50	45	50	48	UNIVERSAL AVERAGES
MI/HR ON UNIT	1930		1771	1721	1676	1626	
SAMPLE DATE	06/03/03		03/31/03	02/15/03	12/04/02	11/27/02	

Elements in Parts Per Million

ALUMINUM	30	10	**10**	6	3	3	5
CHROMIUM	180	50	60	4	3	2	4
IRON	59	37	**56**	**23**	**25**	22	26
COPPER	3	3	3	3	2	3	5
LEAD	6691	5499	**5841**	**5513**	**5092**	4382	4490
TIN1	0	0	0	1	0	1	0
MOLYBDENUM	0	1	0	1	0	0	0
NICKEL	3	3	3	3	2	2	2
POTASSIUM	0	0	0	0	0	0	0
BORON	0	0	1	1	0	0	0
SILICON	7	5	4	4	4	4	5
SODIUM	1	0	0	0	0	0	1
CALCIUM	1	1	1	1	1	1	4
MAGNESIUM	0	0	0	0	0	0	0
PHOSPHORUS	228	215	196	205	215	230	529
ZINC	2	2	2	2	2	2	6
BARIUM	0	0	0	0	0	0	0

Properties

TEST	cST VISCOSITY @ 40 C	SUS VISCOSITY@ 100 C	cST VISCOSITY@ 100 C	SUS VISCOSITY @ 210 F	FLASHPOINT IN F	FUEL %	ANTI-FREEZE %	WATER %	INSOLUBLES %
VALUES SHOULD BE				86-105	>460	<1.0	-	<0.0	0.6
TESTED VALUES WERE				99.8	515	<0.5	-	0.0	0.8

The high iron and aluminum are from a broken ring (note chromium) that was gouging the cylinder wall and piston. The increased blow-by showed up in the high insolubles and lead. The owner was notified of the problem after the 3/31 sample. In between that sample and the most recent one in June, the engine lost compression in one cylinder. When we called the owner after seeing the 6/3 sample, he already knew of the problem.

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