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

Most of us have only a vague understanding of viscosity. We tend to choose an oil with a viscosity that we believe is correct for our particular engine, but would another viscosity improve or reduce the life of the engine? Can we freely pick and choose a viscosity outside the manufacturer's recommendations?

Technically, viscosity is defined as resistance to flow. Commonly, though, we think of it as an 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, since most gas- or diesel-engine manufacturers recommend multi-grades. At operating temperature, a straight-weight performs just as well as a multi-viscosity oil, and there is nothing wrong with using a straight weight. It's just a simpler form of oil. Some diesel fleets still use straight weights, as do about half of the piston aircraft operators.

The difference between multi-grades and straight-weight oils is simply the addition of a viscosity-improving (VI) additive. The most common grade of automotive oil in use today is the 5W/30, which is a mineral oil refined to the SAE 5 weight viscosity range containing the usual cleaning and anti-wear additives, then blended with a VI additive that should leave it reading in the SAE 30 weight viscosity range when at a higher temperature. The advantage to the multi-weight is, when starting the engine, the multi-viscosity oil has the thickness of an SAE 5 weight, which allows the engine to spin over more easily.

New TBN Machine

In an effort to improve data accuracy, Blackstone has invested in a new TBN (Total Base Number) machine. The old mathod we used relied on a color change to determine the end point of the TBN. The new method uses a pH meter to determine the end point. What does this mean to you? With our new method, the results should be more repeatable and consistent than ever before. if you want a TBN with your oil sample, just let us know. The cost will remain $10 for the TBN. To learn more about TBNs, click here.

Have You Heard?

Terry Dyson on SpeedTalk.com

If you're interested in 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

The most common diesel-use oil is 15W/40. It is an SAE 15 weight with a VI additive that leaves it the thickness of an SAE 40 weight at operating temperature. What makes a oil suitable for diesel engines (rather than gas engines) is the level of additives used. Diesels require heavier levels of dispersant and anti-wear additives. These heavier additive levels are objectionable for automotive engines since they may interfere with emission controls mandated by the EPA or affect your fuel mileage.

Which Viscosity to Use?

Engine owners often stray from manufacturer's recommendations regarding the viscosity of oil. The engine builder 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. We are seeing that trend for newer engines, for which the recommended grade is getting progressively lighter. The common 10W/30 has become a 5W/30, and some manufacturers even recommend 5W/20 oil. On the other hand, we can't see (in oil analysis) where it hurts anything to run heavier 10W/30s or even 10W/40s in modern automotive engines. The heavier oils provide more bearing film, and that's important at the lower end. If you oil is too light, the bearing metals can increase. The trick is to find the right viscosity for your particular engine, which is why we suggest following the manufacturer's recommendation.

Changes in Viscosity

Adding anything foreign to your oil can change its viscosity. Some types of after-market additives cause a quite high viscosity to appear at operating temperature. While an additive might improve bearing wear, it can cause poorer upper-end wear. We don't recommend any type of after-market additives. Other changes to viscosity can result from contamination. Moisture and fuel can both cause the viscosity to increase or decrease, depending on the contaminant and how long it has been present in the oil. Excessive soot or antifreeze often increase an oil's viscosity. Exposure to excessive heat (leaving the oil in place too long, engine overheating) can also increase viscosity. 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 repair your engine or adjust your driving habits accordingly, and to correct the viscosity and optimize your engine's efficiency.

If you decide to use 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!

Report of the Month

The Report of the Month highlights an interesting or troubled engine. See if you can figure out what's wrong with this Mack E-7 460 before reading the caption below.

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

Elements in Parts Per Million

MI/HR ON OIL	20,874	UNIT/ LOCATION AVERAGES	20,245	18,898	21,336	20,016	UNIVERSAL AVERAGES
MI/HR ON UNIT	385,646		364,772	344,527	330,629	309,293	
SAMPLE DATE	3/11/03		10/11/02	9/22/02	7/26/02	5/18/02	
ALUMINUM	2	2	**3**	3	2	1	3
CHROMIUM	2	2	40	32	3	1	1
IRON	68	90	**332**	**118**	**82**	51	85
COPPER	6	9	33	12	8	5	29
LEAD	7	13	**53**	**29**	**10**	8	16
TIN	0	1	3	0	0	0	2
MOLYBDENUM	2	6	11	14	0	1	19
NICKEL	0	0	1	0	0	0	0
POTASSIUM	0	1	0	3	2	0	1
BORON	0	8	12	15	5	6	84
SILICON	4	4	61	36	4	3	15
SODIUM	7	5	8	3	10	4	12
CALCIUM	3153	3561	3953	3589	3696	3414	2818
MAGNESIUM	10	19	32	36	7	8	110
PHOSPHORUS	1151	1085	1177	1086	996	998	1015
ZINC	1255	1332	1523	1369	1276	1235	1242
BARIUM	0	1	1	1	1	1	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				68-78	>405	<2.0	0.0	<0.05	0.8
TESTED VALUES WERE				67.8	370	<3.5	0.0	0.0	1.0

The question is, what's *not* wrong with this engine? Between the October 2002 sample and the most current one, the owner had to replace the rings (chrome), heads and injectors (fuel and silicon), and the rod bearings. The main bearings were okay. You can see the improvement in wear metals in the most recent sample, which was taken after the repairs.

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