The Oil Report

July 2003

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

Welcome to The Oil Report!

This is the first edition of the industrial version of The Oil Report, Blackstone Laboratories' new newsletter. We plan to publish this newsletter three times per year. The next edition will be published electronically.

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If we have your e-mail address on file, you will receive the newsletter automatically. If we don't, please send it to us with your next sample! For those without e-mail, this will also be available on our website, at www.blackstone-labs.com. We hope you enjoy this newsletter!

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 be better? Can we freely pick and choose a viscosity outside an equipment manufacturer's recommendations? Would another viscosity oil improve operations or serve up headaches?

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 judge the thickness of the oil.

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. Industrial oil is generally described as an ISO grade, though we work with some factories that still specify their oil as G-90, meaning SAE 90W gear lube, or W-30, meaning SAE 30W engine weight waylube. We use SUS and can express that viscosity in any range that promotes a clear understanding. No matter what you call it, the number given simply defines the thickness of the oil at the standard temperature. Our reports provide you with a normal SUS range for your oil type, and if the oil's viscosity falls within that range, the viscosity is normal for that sample.

Straight Weight vs. Multi-Grade

Engine oil commonly used today are multi-viscosity, though we find few of these oil types in industrial machines. The only difference between a straight-weight oil and a multi-viscosity oil is an additive called a viscosity improver (VI). A VI reduces the oil's tendency to thin at higher temperatures. At operating temperature, a straight weight performs just as well as a multi-viscosity oil. The reason straight-weight oil is used in industrial environments is that the machine experiences little temperature variation, so the tendency of oil to change thickness with temperature is not a big concern.

Common Industrial Oils

The types of oil in use vary by the type of industry, but generally are labeled as hydraulics, spindle oils, lube and waylube oils, compressor oils, etc. The oils used in industrial settings are often specified by equipment manufacturers, though staying with those recommendations often pose a problem, due to the great variety of oil types present in inventory. So, can you pick and choose another oil type or grade to use? The answer is yes, and most people do so successfully. The only sticking point is warranty considerations. Some of the larger equipment manufacturers specify not only a certain viscosity and type of oil for use, but a certain brand as well. We disagree with this practice, though your relationship with a machine maker is a consideration that has to be dealt with when making the decision about what oil to purchase. The trend today is to simplify the entire oil program and have as few oil types and grades on the premises as possible.

Switching Viscosities

A hydraulic is one of the simplest oils in use in industrial operations. The customary additive group present in hydraulic oils today was established decades ago and has varied little since. Hydraulics can be called AW, R&O, or other names, depending on the oil company you are dealing with. They are all basically the same oil with a similar additive group. The ISO grade for hydraulics ranges from 32 to 150 in various types of operations. We know of no type of machine requiring a certain hydraulic oil that would develop a problem with a switch to one grade higher or lower in the ISO grade range. Even though a machine maker might specify an ISO grade 46 oil, chances are very good that you can use a 32 or 68 grade without incident.

The same is true of gear lubes and waylubes. There are many ISO grades for these types of oil on the market, but we see the same types of machines from different plants using a wide variety of lube oils with different viscosities, and they all tend to result in about the same wear characteristics and have the same useful life span. You can simplify your lube oil purchasing and maintenance by choosing a particular type and grade of oil, then trying it in all lube oil environments. We suggest using oil analysis while you are in the experimenting stage. Once you set standards and the experimenting is done, you are left with a simplified oil program that should result in significant cost reduction. We find that 70% of industrial oils are changed needlessly, and many of them aren't changed often enough (resulting in expensive machine failures and downtime).

Spindle oils, like those used in centrifugal compressors, are very thin (in viscosity) oils with little or no additive in them. These are normally used in high-speed operations, and we would not suggest straying far from the manufacturer's recommendations when this type of oil is required.

There are many types of specialty oils in use in factories for special types of compressors, heat transfer operations, and machines operating in fire hazard areas. If you are maintaining one of these types of machines, you are probably stuck with using the oil that was recommended for that operation.

Changes in Viscosity

Industrial oil is one of the simplest forms of oil. These oils operate in fairly constant temperatures, so they will hold their viscosity indefinitely unless they become contaminated. A viscosity shift will suggest a contamination problem (from moisture, a solvent, or another contaminant), rather than an oil problem. Oil contamination from other oil reservoirs is a common cause of a viscosity shift in industrial oil.

Whether or not you can switch viscosities depends on the type of machine you're operating, the manufacturer's recommendation, and whatever warranty concerns you're facing. Understanding viscosity can

Have You Heard?

Terry Dyson
on SpeedTalk.com

Although he won't be talking specifically about industrial 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.

help you determine what's best for your industrial machines.

Report of the Month

The Report of the Month highlights an interesting or troubled machine. See if you can figure out what was wrong with this vacuum pump before reading the caption below.

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

Elements in Parts Per Million

			UNIT/ LOCATION AVERAGES					UNIVERSAL AVERAGES
MI/HR ON OIL	300		700	400				
MI/HR ON UNIT	1400		1100	400				
SAMPLE DATE	09/05/02		06/05/02	01/08/02				
ALUMINUM	7	4	**1**	2				0
CHROMIUM	118	72	25	117				0
IRON	2607	1391	**175**	**481**				3
COPPER	63	33	13	10				2
LEAD	3	2	**1**	**0**				0
TIN	0	1	1	0				0
MOLYBDENUM	12	8	3	9				0
NICKEL	61	37	13	72				0
POTASSIUM	0	0	0	0				0
BORON	0	0	0	0				0
SILICON	394	244	93	38				6
SODIUM	3	2	0	0				5
CALCIUM	4	3	1	2				1002
MAGNESIUM	3	2	0	2				9
PHOSPHORUS	719	665	612	512				438
ZINC	40	22	3	5				483
BARIUM	0	0	0	0				74

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				51-62	>430	-	-	<0.0	0.1
TESTED VALUES WERE				60.2	BOIL	-	-	POS	2.0

The first analysis was done as a preventive check because this was a new and expensive pump. The results were not favorable, so the client decided to run an oil analysis with each oil change. The bearings failed around the time of the June 2002 sample. The client showed the manufacturer the analysis and failed machine, and the manufacturer corrected the problem. The client continued to monitor the oil, and the final analysis shown here showed a continuing problem with the bearings. This time a cooling line had clogged, the bearing temperature increased dramatically, and the vibration analyzer failed due to the heat. The client secured the pump, changed the oil, and replaced the vibration analyzer. The final analysis also shows moisture contamination and heat damage to the oil (note insolubles).

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