The Oil Report

Sept. 2004

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

Spotlight on...
Landslide!

by Jim Stark

Imagine the awesome event of a landslide. There's no doubt it's a brutal force of nature. If you're unfortunate enough to be caught in one, you might not survive. A landslide is gravity pulling terra firma down a slope with such force that it takes all things, natural and manmade, with it. The very earth that supports us unmoors from its surroundings, changes shape, and becomes destructive. While it may not be obvious at first glance, this landslide can help us understand oil analysis.

Take a picture

Back to your mental image of the landslide: it starts off with a few pebbles rolling down a hill. Those pebbles strike others, and the dirt slide gains momentum. The process escalates and the mass of the movement increases. Larger rocks and patches of earth are dislodged, and the process continues until the whole hillside is involved, taking trees, boulders, and anything else in the way. Now stop: Take a mental picture of the landslide in full force. Step back and look at the frozen picture. Everything on the hillside that started off peacefully and at rest is in the process of roaring toward the bottom of the slope.

If you looked at your picture of the landslide from afar, you'd see a cloud of dust and dirt at the front edge of the sliding mass, and lingering far behind it. The dust cloud itself would actually hide much of the larger detail of rocks and trees crashing along the slope. Without looking at the larger debris contained in the mess, could you determine the makeup and extent of the landslide from the dust cloud alone? For the most part you could, and that's how oil analysis works.

Normal vs. abnormal

One of the limitations to oil analysis is that we can only tell you about the wear metals that we can see with the spectrometer, which are between about 1 and 15 microns in size. (How big is a micron? One-millionth of a meter. One inch contains 25,400 microns. The period in this sentence is about 615 microns.)

If you have a mechanical problem with your machine, the oil filter should collect the larger metallic particles (usually those larger than 40 microns). These are the boulders in the landslide. There is also a wide range of rocks and stones present in the landslide that don't become airborne. They still ride the slide to the bottom of the hill, but they don't hang suspended in the dirt cloud. These are the particles that fall out of suspension and don't make it to the lab with your oil sample.

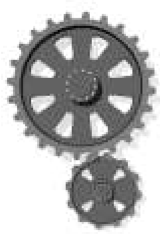
Ho Ho Ho!

If you're like us, you've noticed subtle (or not-so-subtle) Halloween displays popping up around town. And you know what comes next—the holiday season! Although it's early, we're bringing this up because we're not sure we will get another newsletter out before December rolls around.

BLACKSTONE LABORATORIES

So here's a thought—oil analysis as a gift! Although you've probably just been using Blackstone's analysis at work, we also do personal vehicles. For yourself or for someone who's hard to buy for, an oil analysis will make a great gift. Simply include payment for an extra sample when you send in your next one, or call us up an order one especially for that purpose. Be sure to let us know it's a gift when you order it. You can pay for it with a check or credit card, and we'll send you the kit, along with instructions on how to use it. If you would like someone else to get *you* an analysis for the holidays, find subtle ways to work it into the conversation: “Say, honey, you know what would be cheaper to get me than a new BMW? How about an oil analysis?”

Blackstone and the holidays—who knew gift buying could be so great?



Then there’s the dust cloud. We compare the “dust” we see in an oil sample to what is average for a particular type of machine. We expect all mechanical machines to produce wear in the course of normal operation. But there is normal wear, and there’s abnormal wear. When we find abnormal wear in your “dust cloud,” we may be looking at a potential landslide in that unit.

Avoiding the trees

Fortunately, we don’t have to wait for a landslide to occur before we can determine what’s going on. While the dust cloud accompanying the slide is a one-time occurrence, we can repeatedly analyze the oil from your equipment and see trends developing. One snapshot gives you a look at whether the dust we find appears normal or abnormal. But a series of snapshots gives us a clearer picture of the condition of the machine. By trending the results from one oil change to the next, we can see whether the dust cloud is growing or subsiding. If it’s growing, eventually there will be boulders and you’ll need to take action to save the unit.

Occasionally we are asked about the dust: How much is too much? In other words, when someone has a particular metal that’s reading high, they often want to know how high it needs to be before they change the oil or conclude the unit has a problem. The answer is, there’s no single answer.

Lots of things affect the amount of wear produced by a machine, including the type of equipment it is and the conditions it’s operated in. What’s more important than the level of wear is the wear *trend* that’s developing. A machine that’s operated constantly and in very dirty conditions is going to have different wear patterns than a piece of equipment that is operated infrequently. If the machine that’s used constantly in dirty conditions produces wear that is always high, and it always reads at about the same high levels from sample to sample, we’d probably consider it normal for that particular unit. If the rarely operated unit was producing low, steady wear, and then wear suddenly increased, we’d worry. That’s why it’s important to establish wear trends for a particular unit, and why we can’t always say, “Okay, when iron gets to X level, it’s a definite problem.”

Avoiding the full-on, catastrophic landslide is not hard to do if you practice routine oil analysis. To keep the boulders and trees out of your oil, pay attention to what you find when you change the oil. Some metals are normal in new machines, but once past about the break-in period, you should not be normally finding any metals that you can see. If you do find metal, it’s probably not too late to stop the slide — but it’s better to avoid it in the first place, if you can, through the trend analysis of your machine’s wear.

Report of the Month

What’s wrong with this sample from a Van Dorn injection molding unit? See the caption below for an explanation. Don’t look right away -- take a good look at the report first.

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

MI/HR ON OIL	36	UNIT/ LOCATION AVERAGES	35	30	40		UNIVERSAL AVERAGES
MI/HR ON UNIT	1024		988	953	923		
SAMPLE DATE	7/31/04		1/20/04	7/21/03	1/9/03		
ALUMINUM	1	0	**0**	0	0		0
CHROMIUM	1	0	0	0	0		0
IRON	37	36	24	38	32		20

COPPER	22	10	16	3	2		9
LEAD	3	2	1	1	2		1
TIN	0	1	0	1	1		1
MOLYBDENUM	0	0	0	0	0		0
NICKEL	0	0	0	0	0		0
POTASSIUM	0	0	0	0	0		0
BORON	0	0	0	0	0		0
SILICON	2	4	2	3	17		2
SODIUM	3	2	1	2	3		3
CALCIUM	43	45	22	20	54		71
MAGNESIUM	55	12	34	1	1		12
PHOSPHORUS	658	448	408	476	494		401
ZINC	305	320	580	228	270		378
BARIUM	16	20	10	12	33		18

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				46-53	>420	-	-	<0.1	<0.1
TESTED VALUES WERE				50.4	410	-	-	0.0	0.1

Iron read high for all the samples we did on this Van Dorn injection molding machine. For whatever reason, this machine produced more iron than most that we see. We did not consider it abnormal -- until things changed. When copper started reading high as well, the report turned cautionary and we urged them to take a closer look at this unit. As it turns out, the problem was a flawed steel shaft rotating in a bronze bushing.

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