Written by Ray Thibault, CLS, OMA I & II, Contributing Editor
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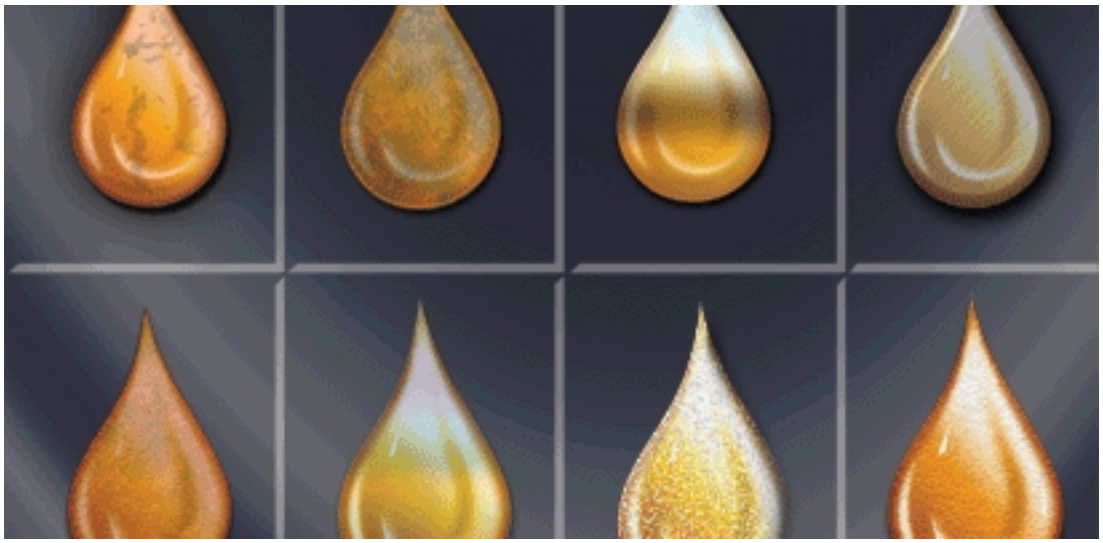

Want to establish a new lubrication program or improve an existing one? Managers of world-class programs consider these two activities to be key factors in their success.

Editor's Note: This article continues a discussion that began in a feature entitled "Key Factors In A World-Class Lubrication Program," published in the March/April 2010 issue of LMT.

Equipment reliability is compromised by poor lubrication practices every day. Training can only go so far. Companies also need to revisit the way they manage their lubricants, including the number of products they may be using.

The lube survey

All lubrication activities revolve around the lube survey. Still, it's surprising to see how many companies have either never done a survey or never updated an old one.

A lube survey can be a long, tedious process. It must be done correctly and reported in a manner that will be useful. Specialized stand-alone software can be purchased from lubricant suppliers, but if an existing PM tool such as CMMS is available, it should be utilized.

While the survey should be conducted with the help of the lubricant supplier, lubrication champions and lubricators with knowledge of the plant and equipment need to guide the process. This is a joint team effort—*all parties should be aware of their responsibilities.*

There are several ways to conduct a survey. The most common method for large plants is to survey area-by-area. In smaller plants, the process flow through the plant can be utilized. Each piece of equipment lubricated in the plant needs to be visited and recorded on preprinted forms that have been designed (and furnished) by the lubricant supplier to meet the plant's needs. The information can then be transferred to an Excel or Access spreadsheet, which then can be incorporated in the company's PM program.

Conducting the survey with the lubricant supplier recording the data is an excellent opportunity to discuss problem areas that should be noted on the form. The actual data compiled on the lube survey is what you feel you need to adequately reflect the key factors in lubricating your equipment.

Each plant is unique, so it's important to work with your lubricant supplier to design a system that will reflect all the information necessary to properly lubricate the site's equipment. An example of a data reporting system is shown in Table I.

Table I. Typical Lube Survey Data Reporting System

ID #	MFR	Lubricated Component	Recommended Lubricant	Sump Capacity (Gallons)	Check Frequency	Lubrication Frequency	Oil Change Interval	Oil Analysis Frequency	Comments
11	Hartig	Main Hydraulic	Rando HD 46	171	2X/week	AN (As Needed)	Oil Analysis Determined	Quarterly	
		Hunker Hydraulic	Rando HD 46	50	2X/week	AN	OA	Quarterly	
		Hydraulic Pump Motor Bearings	Starplex 2			6 Months			Had used Ronex MP
		Extruder Gearbox	Meropa 220		2X/week	AN	Yearly		Had used GX 80W-90
		Gearbox Motor Bearings	Starplex 2			6 Months			Had used Ronex MP
		Press Bushings	Multifak EP 0		2X/week	AN			Trabon Lubricator
		Guide Rolls	Spindura 10			Weekly			Had used Spinesstic 10

Table I (Click For Full Size)

Table I reflects the minimum amount of information to be included in the lube survey; additional categories can be added to fit a plant's needs. The following data, in some form, is mandatory:

- **Asset/Equipment Number:** This data is crucial. It differentiates and identifies equipment in your PM system and allows you to go back and check the maintenance history.

- **Manufacturer:** This allows users to go back in the system to get information from the OEM manual, if available.
- **Equipment Description:** This is how lubricators and maintenance personnel refer to the equipment as identified in the system.
- **Lubricated Component/Lube Points:** Since there are usually multiple lube points on a machine, this information field is important to ensure that the correct lubricant is used on the right component. (Table I describes different components for the same machine, many of which use a different lubricant.)
- **Recommended Lubricant:** The previous lubricant is used as a guide if switching to a new lubricant. Most lubricant companies have cross-out lists with their equivalent to a competitive product. (Many a lube survey will show that the wrong lubricant has been used for years. This occurs because the wrong lubricant was originally used and had been crossed out incorrectly over the years by different suppliers.) When in doubt, check the OEM manual. This is not needed on every piece of equipment, but should be done on critical equipment. If you're still unsure, contact the OEM directly. (Many OEM manuals are simply out of date.) The responsibility for correct selection, however, lies with the lubricant supplier.

- **PM Frequencies:** These apply to lubricant checks, addition, change and oil analysis. After the survey is complete, users should work with the lube supplier to establish optimum PM intervals. Check to see how frequencies have worked in the past— *espe cially on machines that have had lubrication problems.*
PM frequencies also have to be practical, based on manpower in the plant.

- **Comments:** The comment field is a place where the team can note significant observations. It's important to point out anything unusual with the equipment that should be noted on the survey for future improvement action. Comments such as "machine runs hot," "oil is cloudy," "dirty containers used to transfer oil," etc., can be helpful.

RememberA lube survey is a requirement for improving your lubrication program. This document is a foundation from which all other lubrication work activities build. Your plant’s lubrication champion needs to coordinate and work closely with your lube supplier to initiate the survey—and follow up with recommended actions when it is completed. The survey then needs to be properly integrated in your PM program and updated on a timely basis.

Consolidation
The Pareto Principle applies to lubrication, just like it does to many other activities. Normally, 80% of your equipment is lubricated by 20% of your lubricants. This leaves plenty of room to consolidate the number of products used—*which can offer significant savings in manpower, storage and administrative costs while minimizing addition of the wrong lubricant.*
The lube survey provides the information necessary to consolidate the number of products used. Here are some tips for consolidation based on lubricant types and equipment:

Grease...

Your greatest consolidation opportunity usually lies with grease. Many plants have far more greases than they need. (FYI: Some using 20 or more grease types have been able to consolidate to five or less and realize better equipment performance.) Tables II and III suggest grease types to use by application.

Table II. 80% of Applications

Application	Grease Type
General Purpose	Li Complex EP (ISO VG 150/220)
Electric Motor	Polyurea (ISO VG ~100)
Couplings	High-Speed Coupling Grease

Table III. 20% of Applications

High Temperature	Clay or Polyurea
Food Grade	Aluminum or Calcium Complex

The most common grease thickener type is lithium complex. This grease type can be used in different applications by varying the base-oil viscosity. Minimization of different thickener types will reduce compatibility problems that occur when too many grease types are available. (It's easy to add the wrong grease.)

Centrifugal pumps...

With centrifugal pumps, OEMs typically recommend R&O oils, with ISO VG ranging from 32-68. In some cases, AW hydraulic oils have been recommended. Except in very cold climates, an ISO 68 is usually a good compromise for year-round use. In cold climates, an ISO 32 may be used for centrifugal pumps.

Hydraulics...

Most common hydraulic oils are antiwear with ISO VG of 32, 46 and 68. (Some companies have consolidated to ISO 46 for their systems.) Always consult the OEM before consolidating to one grade. Hydraulic systems typically should run between 13 cSt and 54 cSt at the operating temperature. The optimum is between 25-36 cSt. The normal operating temperature for

hydraulic systems is between 110 F and 120 F, and usually doesn't exceed 140 F.

As an example, let's assume that we need to consider two operating temperatures in our hydraulic systems, one being 110 F and the other 130 F. Which hydraulic oil—*ISO 32, 46 or 68, with a viscosity index of 98*
—will meet both requirements and stay within the optimum of 25-36 cSt? The correct answer: The ISO 46 hydraulic oil with a viscosity of 44.2 cSt best fits the optimum viscosity at those two temperatures. The viscosity at 110 F is 38 cSt; at 130 F, the viscosity is 24.4 cSt—making the ISO 46 fit better than the grades of 32 and 68. Given these conditions, ISO 46 would be the best choice for consolidation purposes. However, before consolidating to one hydraulic oil (of which ISO 46 is the most common), consult with the OEM and your lubricant supplier.
(Note: This example doesn't apply to hydraulic pumps exposed to cold temperatures. Both vane and axial piston pumps need a viscosity < 860 cSt for proper startup. Typically, high V.I. oils would be used for mobile equipment during cold startup conditions.)

Gear oils...
Viscosity selection for gear oils is based on the speed of the pinion. For parallel, right-angle and intersecting shafts, the most common ISO viscosity grades are 150, 220 and 320. For worm and hypoid gears, the most common viscosity grade is 460, with ISO 680 in slow-speed, heavily loaded worm gears. The most common viscosity grade for non-worm and hypoid gears is 220. When consolidating, be sure to have the minimum viscosity. It is better to be one grade higher than lower. Too high a viscosity results in additional energy usage and heat generation—*but it protects the gears from metal-to-metal contact.*

Synthetics like PAOs allow, in many cases, consolidation to a lower ISO grade with the same protection. As an example, consider a hot-running parallel shaft gear lubricated with an ISO 320 mineral oil at 180 F. Using an ISO 220 PAO will give nearly the same viscosity at the operating temperature (and usually result in lower energy and a cooler-running gearbox).

Remember…Consolidation can help you realize cost savings through minimization of lubricants. Consolidation also reduces the risk of adding the wrong lubricant. While it naturally follows a lube survey, it should be practiced continuously.

Coming up
Many companies have adopted lubrication best practices with great success. An upcoming article will focus on a large manufacturing company that began building a world-class program 10 years ago. It's still reaping the benefits.

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Contributing Editor Ray Thibault is based in Cypress (Houston), TX. An STLE-Certified Lubrication Specialist and Oil Monitoring Analyst, he conducts extensive training in a number of industries. Telephone: (281) 257-1526; e-mail: rlthibault@msn.com.

Correction

On page 12 of Ray's May/June 2010 LMT article "The Case Of The Crucial Spare," the following statement was made: "After matching the SEM results with the component metallurgy, the investigators concluded that the wear came from the inboard cover (bronze) and the deflector (grey cast)—components that have only a minor impact on pump performance."

Unfortunately, the metallurgical designations were inadvertently transposed in this published statement, making parts of it incorrect. The statement should instead have reflected the fact that "the wear came from the inboard cover (grey cast) and the deflector (bronze)..." The author regrets any confusion this error may have caused.