EXTERMINATE LUBE PROBLEMS

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EXTERMINATE LUBE PROBLEMS

An enormous amount of productivity is lost because the correct oil or grease is not professionally installed at the right time. Lubrication is a critical responsibility but, in many organizations, effective techniques and the technicians who know and do them get little respect. Building the role of lubrication experts is a relatively low-cost way to materially improve reliability.

Studies have shown that 70% to 85% of equipment failures are self-induced, meaning that maintenance practices and processes are solely responsible for the failures.

A survey I conducted online shows that poor lubrication practices represent about 40% of maintenance related self-induced failures. In the same study, more than 80% of respondents indicated they consider lubrication to be a significant problem in their operation.

Lubrication plays a role in the operation of most equipment such as gear reducers, electric motors, chain drives, air compressors, bearings, and more, so it is obvious that doing it properly is key to the success of capital-intensive companies.

One of the main reason companies struggle with lubrication effectiveness is they over-rely on standard original equipment manufacturer (OEM) recommendations. Instead, lubrication activities should be driven by asset health and the true lubrication needs of the asset. The combination of the right lubrication activities and proper practices creates a significant opportunity to improve plant reliability.

Big Bad and Ugly

More than 200 maintenance professionals participated in a survey on lubrication and its impact on reliability. The results may shock you, or they may simply validate what you are seeing in your operation. It is clear that although some companies are doing things right when it comes to lubrication, most are not.

1. Do you consider lubrication to be a problem? Responses to this first question clearly show the significance of lubrication, with more than 80% saying it is a problem in their operation (Figure 1).
2. What percentage of your equipment downtime is related to lubrication? More than 18% of companies report that more than 20% of their equipment failures are directly related to lubrication problems (Figure 2). The first step in solving a problem is knowing you have a problem, and the next step is knowing how large the problem is.

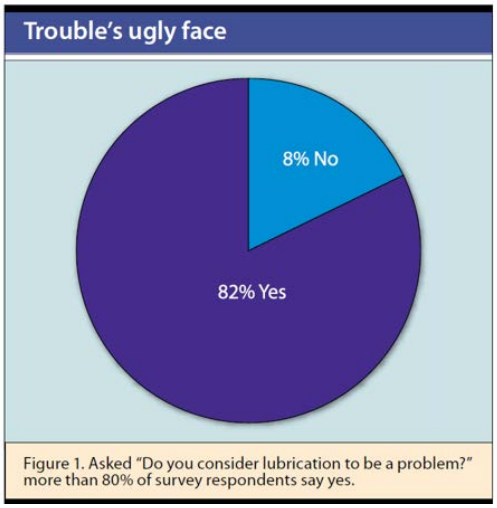

Figure 1

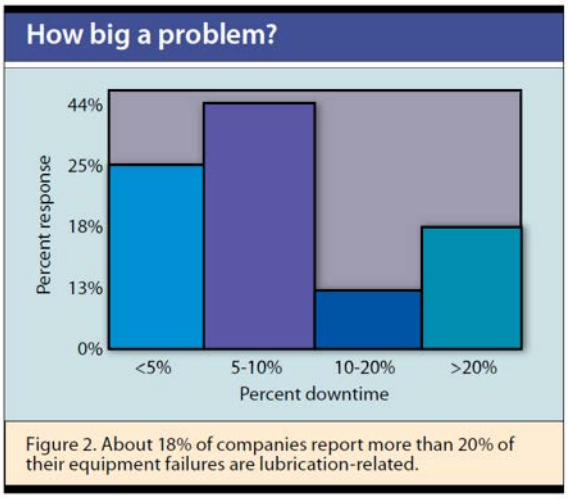

Figure 2

Companies tell me they don't have money to improve anything. If their total annual sales are $60 million, total downtime is 10% and 25% of downtime is due to improper lubrication, the lost opportunity cost due to lubrication is $1.5 million. With numbers like these, the money is there — it is just that no one in the operation knows it or can measure the losses.

In what area do you have the most lubrication problems? In a reactive environment, we do not focus on the real problems but on the problems that face us on a specific day. I used to work in that type of environment, but later transitioned to a very proactive environment. Based on my experience as a maintenance practitioner, I thought motors and gear reducers would be the biggest problems.

But, as one can see (Figure 3), respondents said bearings are the largest problem in most organizations, with gear reducers a distant second. Only about 3% reported motors as the biggest problem. It could be the motor rewind shops are not telling us the whole story — I visited a large motor rewind facility and was shown numerous motors that had failed as a result of either lubrication bypassing a sealed bearing or being pushed through the bearing and into the motor windings.

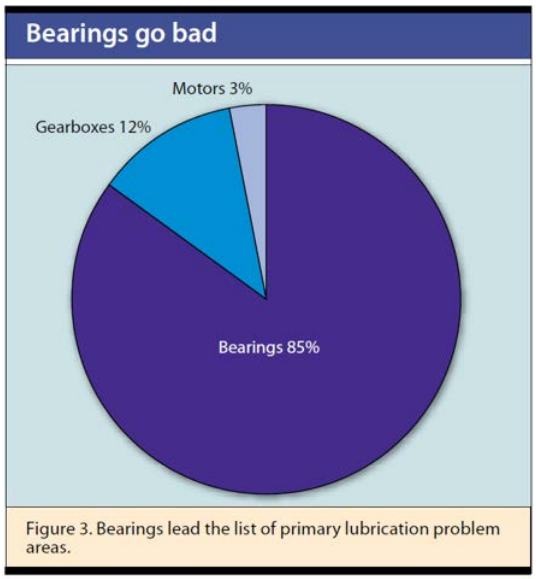

Figure 3

1. Do you have a person dedicated to lubrication?

I have seen lubricators do a great job and I have seen them do an unbelievably bad job. One thing I found consistent among those who did a bad job was they were all trained on the job by their predecessor. Formal training is the key to solving this problem.

Half the respondents said they have a dedicated person and half said they do not, but more than 80% have lubrication problems, so apparently having a person dedicated to lubrication does not ensure it is performed correctly. To perform their job to standard, lubricators must be trained to the prerequisites of the job and then held to that standard.

2. Do you have a well-defined lubrication program?

Having a well-defined lubrication program is key and the first step to ensuring success. Some 48% of respondents said they did; 52% said they did not. We saw that more than 30% of respondents said at least 10% of their equipment downtime is related to lubrication issues. It seems likely they do not have a well-defined lubrication program. Maybe it is time to invest in one.

2.At what skill level is your maintenance staff in lubrication?

More than 40% stated that the lubrication skill level of their maintenance staff is below three on a scale of one to 10 where 10 is highest (Figure 4). Part of the solution to the downtime issue is to train your people and make lubrication training an ongoing event.

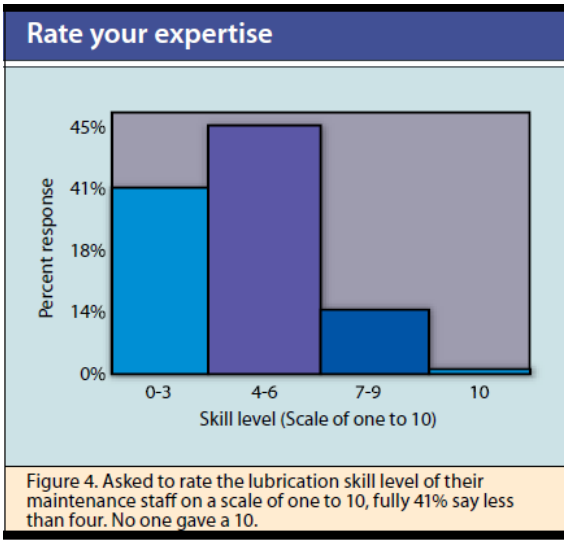

Figure 4. Asked to rate the lubrication skill level of their maintenance staff on a scale of one to 10, fully 41% say less than four. No one gave a 10.

Figure 4

Make lube expertise a specialty. The results of the survey point to three conclusions.

First, training is an issue. Most companies either do not look at lubrication training as important or they use what I call "check the box" lubrication training: if asked, "Do you train your people in lubrication?" they answer yes, but the training is not focused enough to change behavior.

Second, lubrication procedures have either not been developed or are not followed. You can have the best lubrication procedures in the world, but if no one follows them, they're useless. Management must ensure proper procedures are written, then ensure they are followed.

Third, it seems that organizations do not understand the relationships between lubrication and reliability.

Many failures attributed to normal wear or faulty components are actually caused by poor lubrication practices (Table 1).

Table 1: Cut 'em down at the roots

Bearings	
Problem	**Root cause**
Bearing failure due to contamination of grease with dirt, dust or silica	Failure to wipe grease fitting or the end of the grease gun nozzle clean
Bearing failure due to contamination of grease by dirt, dust or silica	Seal not holding due to over-lubrication
Bearing failure due to lubricant not providing barrier to prevent metal-to-metal contact	Wrong grease/oil or heat-reduced viscosity due to temperature rise beyond range of lubricant
Gear reducers	
Problem	**Root cause**
Failed bearings and damaged gear teeth due to contamination causing interference between gears, thus overloading bearings	Gear oil added to gearbox through a dirty funnel or dirty container or bucket
Failed bearings due to contamination of lubricant with dirt, dust or silica	Seal leaking due to over-pressurization of gear-box caused by blocked air intake on housing
Electric motors	
Problem	**Root cause**
Bearing failure due to contamination of the grease with dirt, dust or silica	Failure to wipe grease fitting or the end of the grease gun nozzle clean
Bearing failure due to contamination of the grease with dirt, dust or silica	Seal not holding due to over-lubrication
Windings failed because of grease buildup inside the motor	Relief plug not removed before introducing grease into zerk fitting
Windings failed because of grease buildup inside the motor	Sealed bearings – grease cannot enter the bearing

Table 1

EXTERMINATE LUBE PROBLEMS

In some cases, lubrication is blamed when storage or installation may actually be the root cause. You must look for the true root cause of any failure before coming to a conclusion or you'll end up treating a symptom and not the problem.

For example, lubrication is often blamed when bearings have failed due to improper storage. If bearings are allowed to lay open in a storeroom, are stored in an environment with vibration, or large bearings are not rotated on a scheduled basis, premature failure will occur.

Lubrication is also wrongly blamed for problems due to improper bearing installation.

Best practices for bearing installation include:

1. **Never handle bearings with bare hands.**
2. **Never rotate an un-lubricated bearing.**
3. **Always heat a bearing to the manufacturer's specification before installing to an interference fit.**
4. **Never drive a bearing on with a hammer.**

One must also follow the manufacturer's recommendations when installing a new or rebuilt gear reducer. For example, most manufacturers will tell you that the gear reducer must have the oil changed within 24 to 48 hours of operation. This removes foreign matter that may be in the gear reducer. I followed this process as a maintenance supervisor back in the 1980s and never had a gear reducer fail after installation those gear reducers operated without problems for many years.

Understanding lubrication is more than understanding how to follow procedures. It also requires understanding the fundamentals of storage and installation. Only then can you connect the fundamentals of lubrication to actual lubrication failures.

Get the job done So implementing effective lubrication practices is important. The

necessary steps depend on where you stand. **First, review the current lubrication practices.** If time-based preventive maintenance procedures are followed, consider whether or not the reliability of the equipment can be monitored based on condition instead of time.

Despite advances in understanding and technologies of predictive methods, reactive maintenance is the norm: too little too late. A "best in class" organization will monitor bearing condition based on oil sampling, heat gain, vibration analysis, current draw, ultrasonic and other predictive technologies.

An effective monitoring program will manage condition data with alarms set in a CMMS/EAM to tell maintenance when action is required. There are software programs that do just that. There will always be lubrication practices that require time based PMs, but consider implementing condition-based PMs.

I am not recommending you run out and implement a condition-monitoring program, but rather think about how you might improve the way you lubricate your equipment.

When you have considered and, if necessary, modified your lubrication practices, implement an effective training and monitoring program. The outline of an example program is given in the "Hit list" below (Figure 5).

Track performance of your lubrication program through agreed upon metrics. Possibilities include MTBF (root causes of failures will have to be determined to identify lubrication failures),production losses, maintenance costs associated with each problem piece of equipment, and replacement parts costs.

Start with a baseline of the metrics before you implement the program, and measure afterwards on a weekly basis. Trend the results and post without comment for four

Figure 5

weeks. After four weeks, allow your maintenance staff to comment on the results. See what is working and what is not and understand what a process problem is and not a people problem. People problems can be solved through training and enforcement of the standard. Keep everyone involved and interested with a Top Five list of lubrication failures. Post the top five problems of equipment that has failed due to lubrication issues. Post a chart of the metrics and have the maintenance staff identify on them what actions were taken to correct problems. **In short, preventing failures via proper lubrication depends on three things:**

1. Defining and documenting procedures with specifications.
2. Having the discipline to follow those procedures.
3. An educated staff is more able to understand the reasoning behind the procedures, and thus more likely to be proactive in following them.

My recommendation, take your best Maintenance Technician and make them a Lubrication Technician, send them to training in Lubrication Best Practices and bring the instructor back to their organization for a week to help implement a successful lube program.

Join me for "Best Maintenance Technician Practices Workshop" for more information send me an email at: rsmith@worldclassmaintenance.org