

# Achieve Best-in-Class Lubrication

Six Small Budget Tips to Protect Your Equipment Assets



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## Six Budget Tips to Protect Your Equipment Assets

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Most maintenance professionals understand the importance of precision lubrication to overall equipment reliability, a fact borne out by a 2011 study by Machinery Lubrication magazine of close to 350 maintenance professionals. Of those surveyed, an overwhelming 99% of respondents agreed that lubrication is either critical or very important to equipment reliability. But when asked if their facility had achieved a level of performance that comes close to best-in-class lubrication, the responses were somewhat unexpected, with less than 1 in 3 indicating that they had achieved any degree of precision lubrication (Figure 1).

So how can we overcome these very real obstacles to best-in-class lubrication programs? Are there quick actions that busy maintenance professionals, struggling with limited financial and human resources, can use immediately to help build best-in-

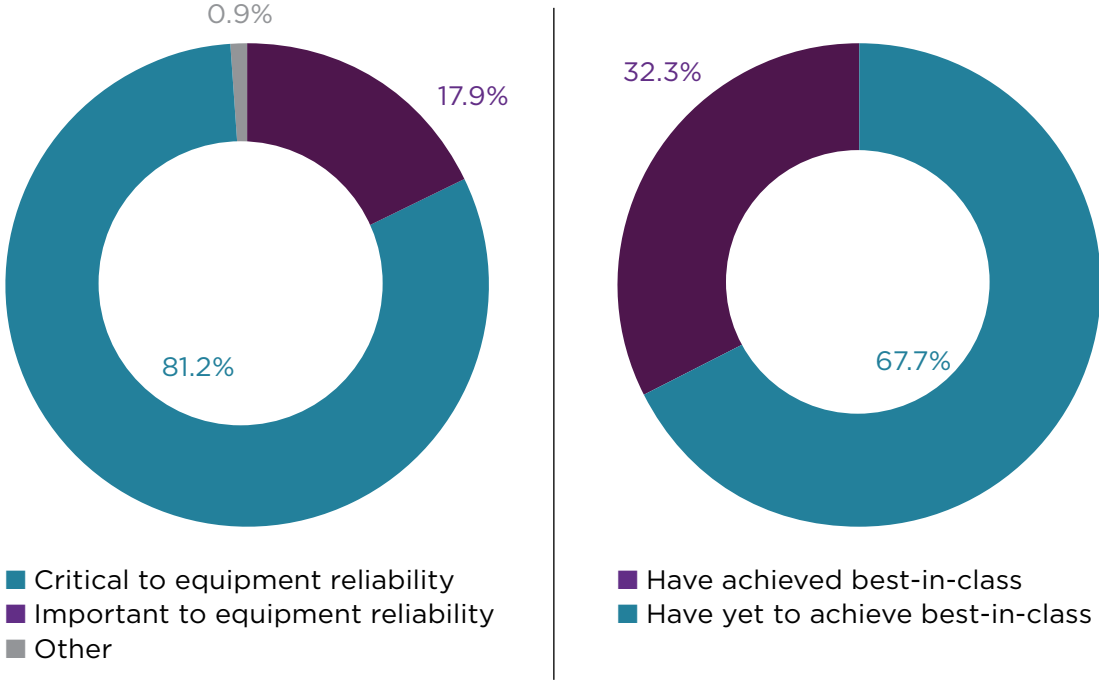


Figure 1. Less than 1 in 3 surveyed maintenance professionals claim to have achieved any degree of precision lubrication.

class lubrication practices that can evolve over the long haul?

It is more imperative than ever to protect both your equipment assets and your investment in lubricants. Even if equipment sits idly by, the need for continuous protection does not go away. Embrace your machines (and lubricants) as the workhorses they are. A little TLC goes a long way to help them work for you. Keep them running and they will do the same for your business.

**Tip #1: Maintain the attitude that lubrication is an important link in equipment reliability**

You have heard it before but it bears repeating: lubricant costs run only about 1-2% of a typical plant maintenance budget. However, poor lubrication practices cause you to spend 10 times that – or 10-20% of the budget. With the right mindset, you have the opportunity to positively impact lubricant life, equipment reliability, and the maintenance budget. This approach works best if the right attitude is set at the top of the organization and its importance is communicated downstream. Attitude costs nothing, yet means everything.

Machine Type		Particle Level Target
Hydraulics 1500-2500psi	With servo valves	15/13/11
	With proportional valves	16/14/12
	Variable volume piston pump	17/15/12
	With cartridge valves or fixed piston pump	17/16/13
	With vane pump	18/16/14
Gearbox		19/16/13
Paper Machine		18/14/11
Steam Turbine		18/14/11
Pumps		17/14/12

Table 1. Suggested target lubricant cleanliness levels, by equipment type.

**Tip #2: Develop realistic cleanliness targets on critical equipment**

There is no cost for knowing where you want to go and deciding how to get there. Work closely with OEMs and distributors to develop a program that achieves targeted cleanliness levels economically (Table 1).

Consolidate lubricants where you can without compromising performance. Certify your incoming oil. You may pay slightly more per gallon, but it is well worth the

cost to get your guaranteed cleanliness. At the minimum, reserve your right to test incoming oil. Equipment life is impacted dramatically if lubricants are not to specification. Maintain proper storage and handling procedures once lubricants are in house. If your company has the budget and is ready for the next step, a good practice is to filter all oils prior to adding to the system with the use of a filter cart.

Optimum cleanliness levels depend on component clearances, operating

volumes, and pressures. The more sensitive a component is to contamination, the cleaner the system should be. Notice that the more sensitive hydraulics with servo valves have a lower particle level to achieve than the less sensitive hydraulics with a vane pump. Similarly, pumps that typically operate at a higher RPM require a lower cleanliness level than a slower-moving gearbox.

### Tip #3: Keep contaminants out

Since lubrication cleanliness is the cornerstone of any successful lubricant program, seek out and implement ways to maintain good oil condition in a reservoir. Some inexpensive suggestions include installing:

- Desiccant breathers on tanks and reservoirs to keep water and particulates out
- Magnetic drain plugs to remove ferrous wear
- Baffles to allow oil to settle contaminants
- Sight glasses to monitor correct oil levels
- Temperature gauges to maintain oil in good condition

According to a 2013 joint study by the Society of Tribologists and Lubrication Engineers (STLE) and the National Research Council of Canada (NRCC),



Figure 2. Desiccant breathers on tanks and reservoirs help keep water and particulates out.

over 70% of equipment failures can be attributed to contamination. The best course of action is to minimize their introduction. Also, Des-Case service engineers estimate that the cost to remove contaminants is 5 to 10 times the cost to keep them out in the first place. Make it your job to “keep contaminants out” versus using heavy, expensive and laborious equipment to “get contaminants out”.

### Tip #4: Implement an oil analysis program on critical equipment and monitor carefully

Reliability studies consistently show that approximately 80% of asset failures are random. By keeping a watchful eye, you can catch lubrication related problems before they happen.

Shortcuts are not justified; sample frequently and trend data so you know what’s really going on with your equipment. A basic sampling will let you know how many and what size particles are in the oil, whether the oil has water contamination, and the viscosity of the oil. Often, it is not necessary to change the lubricants, but certain additives may be required. The routine cost of sampling lubricants is low compared to the costs for repairs and downtime.



Figure 3. Oil sight glasses and other visual oil analysis products allow for constant monitoring of what's happening inside equipment.

Also, oil sight glasses and other visual oil analysis products play a critical role in early detection of contamination and oil level problems, and allow for constant monitoring of what's happening inside equipment (Figure 3). The oil sight glass is a clear cylinder that installs in the drain port of the oil reservoir of pumps, gearboxes, bearing housings, and other pieces of equipment. The sight glass provides continuous fluid monitoring of the clarity, color, sediment, and water contamination in the oil. Des-Case offers models that accommodate both vertical and horizontal mountings, high temperature, large volume, and more to be used on virtually any piece of industrial equipment that has a drain or port.

#### **Tip #5: Develop a training plan on the importance of correct lubrication practices**

Whether beginning a lubrication improvement initiative, or just continuing to improve the existing program, all manufacturing organizations benefit from training and education. Knowledge is not only a prerequisite for engineering a world-class program, it is an essential part of executing and maintaining it.

The key to a successful training program is to define the proper training and certification or knowledge assessment level for each job function. All or part of the training curriculum can be developed and administered in-house, or from a number of reputable organizations that offer lubrication and oil analysis training courses ranging from short introductory courses to advanced levels. Many of the available multi-day courses are structured in accordance with the International Council for Machinery Lubrication (ICML, [www.lubecouncil.org](http://www.lubecouncil.org)) bodies of knowledge for Machinery Lubrication Technician (MLT) and Machine Lubricant Analyst (MLA).

As the appropriate courses are identified for each job function, it is important to note that lubrication technicians and mechanics are not the only functions that affect the quality of lubrication and reliability of lubricated machinery. Operators, managers, and the engineers who design equipment also play an important role in the success of a world-class lubrication program (Table 2).

**Mechanics.** In some organizations, all lubrication activities are performed by mechanics. In others, dedicated lube techs perform machinery lubrication tasks, while mechanics perform other functions such as installation and rebuilds. Even if mechanics do not perform lubrication tasks, they still play a large role in the

Job Function	Introductory Course 1/2-1-Day	MLT I 3-Day Machinery Lubrication	3-Day Oil Analysis
Mechanics	R	R	O
Lube Techs	R	R	R
PdM Techs R	R	O	R
Reliability Engineers	R	R	R
Maintenance Mgr/Supervisors	R	O	O
Operators	R	O	N/A
Operations Mgr	R	N/A	N/A
Engineering Mgr	R	O	N/A

R = Required    O = Optional    N/A = Not Applicable

Table 2. Example of appropriate lubrication courses for different job functions.

lubrication program. World-class programs require related tasks such as parts storage, new equipment commissioning, precision installation, and equipment modifications to be done correctly in order to facilitate lubrication best practices. Equipment modifications (installing sight glasses, sample ports, proper breathers, etc.) require that the mechanics have a good understanding of all lubrication issues.

**Lubrication Technicians.** It almost goes without saying that the technicians responsible for lubricating machines should have a high level of education in this area. Even if lubrication tasks and procedures are rigorously documented and accounted for, there is still no assurance of quality

with respect to following the procedures. To ensure that activities are performed to the desired standard, technicians must understand why they are supposed to perform a task in a certain way. When individuals understand and believe in the value of something, they are much more likely to do what's needed to be done.

**Predictive Maintenance (PdM) Technicians.** Many organizations utilize dedicated PdM techs to perform condition monitoring functions such as vibration and thermography. It is often recommended that oil analysis be assigned to this group rather than lubrication tasks. Whether or not this is the case, PdM technicians should still receive education in lubrication and oil

analysis so that they can understand the relationship between oil analysis and other condition monitoring technologies.

**Reliability Engineers.** Reliability engineers should be well educated in both oil analysis and machinery lubrication. Lubrication and oil analysis is a major component of proactive maintenance and should be included in the engineers' training curriculum.

**Maintenance Managers / Supervisors.**

It is often surprising, but quite common for maintenance managers or supervisors to send their employees to lubrication training courses, but not attend themselves. This is not a recipe for success. At the very least, managers should attend an introductory course or "awareness training" so that they can understand the good ideas their technicians propose to improve lubrication and reliability. In many of these cases, technicians and mechanics become discouraged by a lack of management support. A world-class program requires support from all levels.

**Operations / Engineering Management.**

All too often operations, engineering and maintenance are put at odds with one another by competing goals. Engineers often design machines for the cost or value or performance reasons, without



as much regard for the maintainability of the equipment. Operations sometimes run machines into the ground to meet production goals, creating nightmares for maintenance. It is essential for everyone to understand that their overall goals are aligned. Reliability is a team effort that requires dedication from the entire organization. Educating operations and engineering on the benefits of designing, operating, and maintaining equipment with considerations for lubrication quality is needed to achieve a world-class program.

**Tip #6: Create a project plan to execute your program**

Perhaps the biggest challenge to executing on precision lubrication comes from resourcing. Now more than ever before, plant teams are being asked to do more each day with fewer and fewer resources. As a result, even the most committed individual can get sidetracked when faced with a host of equally important tasks each vying for attention. The key to sustaining the improvement effort is to build a detailed “to-do list” in the form of a project plan that includes both major project items (re-design lubricant store room) as well as include specific actions items and tasks (Figure 4).

These items should be assigned to specific individuals, either from within the

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lubrication Training Program	Yellow		Yellow		Yellow		Yellow		Yellow			
Lubrication Audit	Red	Red	Red	Red								
Contamination Control Audit	Red	Red	Red	Red								
Oil Sampling Audit	Red	Red	Red	Red								
Lubrication Audit Implementation					Blue	Blue	Blue					
Lube Room Design & Implementation					Orange	Orange	Orange					
Lubrication PM Improvements								Green	Green	Green		
Lubrication Management Software Implementation										Purple	Purple	
Oil Analysis Program Implementation						Yellow	Yellow					
Lube Route Implementation (JDE)												Red
Oil Leakage Study								Blue	Blue			
Lubricant Purchasing Optimization					Orange	Orange						
Lubrication Performance Benchmarking							Green					Green

Figure 4. Example of a precision lubrication project plan.

organization or from outside resources such as contractors or vendors and should have an estimated “due-by-date” for completion so project progress can be tracked. In each case, project review meetings should be held on a monthly basis to review progress, identify roadblocks, and re-assign items and priorities for the coming month.

So how do you start to develop the specific action items and tasks that make up a detailed project plan? Surprisingly, the answer is relatively straight-forward. The first step is to evaluate and benchmark current performance in the ten key areas

of lubrication (Figure 5). Benchmarking not only helps to establish a starting point, but used correctly can provide a simple series of steps that can be used to close the gaps between current and preferred practice in each area.

Specific questions in the benchmark survey should be linked to action items so that the simple act of completing the benchmark survey naturally builds a targeted action item list. By prioritizing the action items created by benchmarking, a practical project implementation plan is naturally created that is guaranteed to bridge the gap to

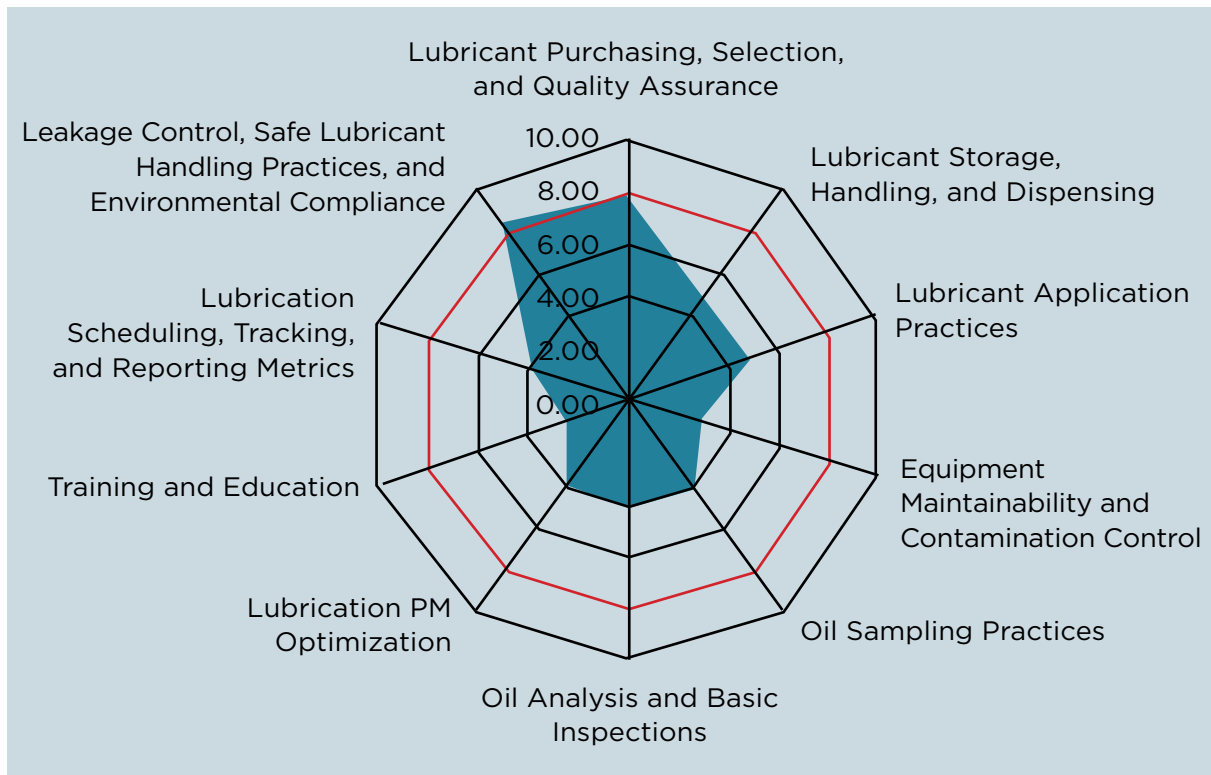


Figure 5. Start your lubrication project plan by benchmarking current performance in the ten key areas of lubrication.

best practice. By aligning major steps in the project plan to a return-on-investment analysis, a simple, concise business plan can be created.

**Conclusion**

Start small and focus on the simple stuff. Get the right attitude, start with clean oil, install desiccant breathers, analyze your oil, learn from the pros, and come up with a plan. If you don't take good care of your equipment, will you have immediate problems? Maybe not, but 18 months later, when production needs to ramp up quickly, you might not be prepared.

Preventing problems before they happen is more important now than ever before and smart companies realize there are more cost-efficient ways to save on maintenance than simply slashing the budget. Companies need to do more with less and the good news is that many improvements to filtration, storage, and handling procedures can be made with minimal cost, reducing the risk of costly failures. Companies that keep an eye on reliability will be better-equipped, stronger, and more profitable.

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