Guide to Mitigating Lubricant Supply Chain Issues

Presented by Noria Corporation

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As supply chain issues continue to ripple across the lubricants market, many end-users struggle to get the right lubricants in stock for their equipment. It is not only lubricants themselves that are in short supply, but difficulties with packaging or additives have also contributed to the roller coaster effect. While it may be tempting to start stocking up on lubricants the way many people stocked up on toilet paper during the early days of the pandemic, beating supply chain problems is a lot more complicated than stockpiling extra oil and grease. Unlike toilet paper, lubricants can degrade significantly if stored for long periods of time.

Thankfully, there are other ways to combat supply line issues in lubrication. What follows are ways to optimize lubrication, reduce lube consumption and, in turn, lessen your reliance on increasingly unsteady supply lines. With a solid plan in place, you will have less surprises and last-second shortages to contend with in maintenance and operations.

Lubrication Consolidation and Optimization

Lubrication consolidation is a lubrication selection practice that, when properly implemented, allows a facility to keep stocked only the lubricants that are necessary for optimal on-site machine performance. The lubrication consolidation process is implemented through these steps:

1. Identify all lubricants in use. This must be done by surveying every piece of equipment in the facility. It is also important, during this step, to collect other pertinent data from the surveyed machines, including operational and environmental data.

2. Next, list the make and type of every lubricant in the lube room (and those placed randomly throughout the facility). Combine this with the list of lubes compiled in step 1 (the in-use lubricants), and you will have a complete list of the facility's lubricants.

3. The lube list, along with the machine data, can now be used to determine optimal lubricants, sampling methods, and inspection practices. This step is complex and requires many things to be considered, such as the lubricant's robustness (oxidation stability, film strength, demulsibility, etc.) versus volume of usage.

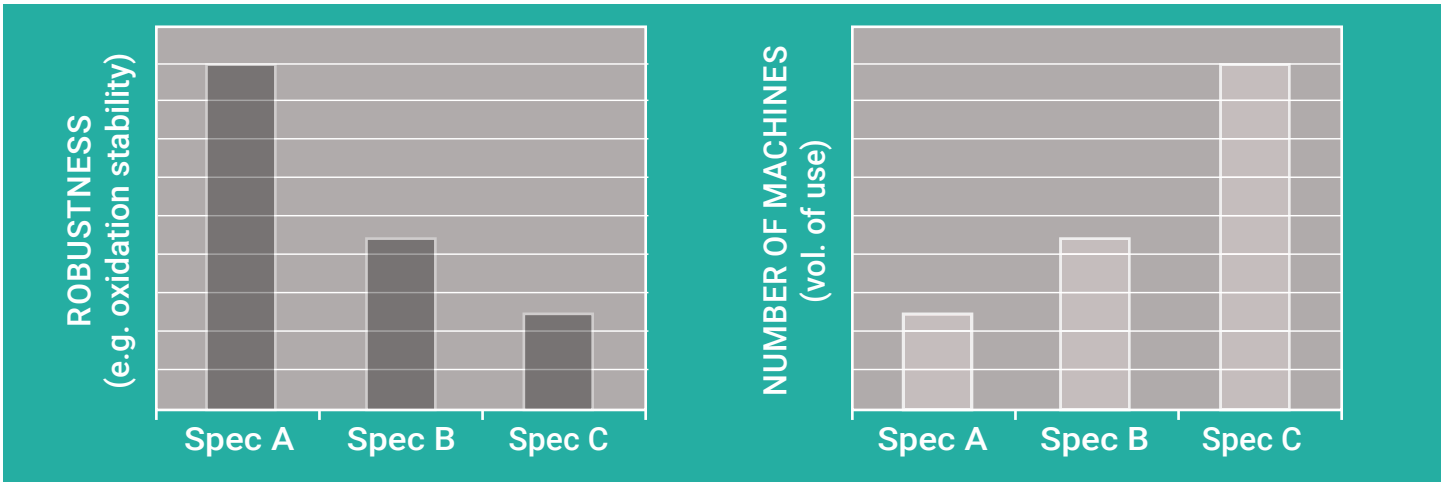

Figure 1. *Robustness vs. volume of usage.*

4. If it is found that new or different lubricants are needed to reach optimal machine performance (this is often the case), the next step is aligning the new lubricants with the ones in use. Compatibility must be ensured — a task made easier through the use of a Lubricant Identification System (LIS). These systems and their associated tags and labels account for and display important lubricant traits.

5. At this point, a pretty clear picture should have emerged regarding which lubricants are necessary to have on-hand and which aren't. It is now time to get rid of the unneeded lubricants. Doing this accomplishes two things: it clears up space in the lube storage room, and it provides protection against accidentally applying the wrong lubricant to a machine.

While the advice on lubrication optimization has long been "keep only the lube you need on hand," recent supply line issues have many lubrication professionals rethinking this approach. In these times, it may be advisable to keep more lubricants in stock than normal, although doing this could cause problems (discussed further below).

Lube Room

While a lot of attention is rightly placed on keeping operating lubricants in good condition, consideration for the cleanliness and maintained efficacy of stored lubricants is essential for lubricant optimization to be successful. As such, proper lubricant storage should be a top priority — the effort put forth to optimize lubrication selection is wasted if the lubricants become contaminated during storage.

In addition to being a place to store lubricants, a properly constructed lube room will also be a place to perform lubrication-related tasks like inspecting oil filters and cleaning top-up containers.

The size of a lube room will vary based on the needs of the facility, but some factors are constant: the lube room should be in a well-ventilated, climate-controlled space with solid walls and roofing. This environment must remain clean and tidy, and proper safety measures (first-aid kit, fire extinguisher, etc.) must be in place. The flooring should be sealed concrete with a non-skid finish, and the aisles, workstations, and equipment locations should be conspicuously marked. Speaking of workstations, the lube room should have a workbench and a computer station (for tasks and inventory management).

Beyond these basic requirements, most facilities will want to outfit their lube room with:

- Bulk oil containers with dispensing systems
- Storage racks for drums
- Storage racks or a cabinet for sealable and refillable containers
- Firesafe cabinets for small-quantity lubricants
- Filter carts
- Oil and grease transfer pumps
- Reclaimers
- Used oil and oily rag disposal receptacles

Along with the proper equipment, a lube room also needs to have proper policies, ensuring that best practices are followed. Policies and procedures should be in place for spills, wastage, and various problems that may occur. Again, in this area, organization is key.

Inventory Rotation

Implementing a first in, first out (FIFO) approach can ensure that lubricants are used before they reach their expiration date. It is very easy for a lubricant container to sit unseen in the back of the lube room, unnoticed for years.

This is another area where careful consideration must be made before buying more lubricants than required to beat supply-chain issues. Having too much lubricant on-hand increases the possibility of a lubricant spoiling before it is used. Implementing proper Key Performance Indicators (KPIs) can make it easier to track the inventory of lubricants and ensure new and old lubricants are being properly rotated in and out of the lube room.

KPIs can also help dial in the amount of lubricant required on hand. Measure the amount of lubricant that is being stored versus the amount going into machines every month. If thousands of gallons are being stored, but only a few hundred are being used every month, the amount of stored lubricant can be reduced.

Risk	Bulk Storage Tanks	Packaged Barrels
Cross-contamination (accidental mixed lubricant types)	High	Low
Ingress of environmental contamination during handling	Medium	Medium
Storage stability problems (lubricant degradation in storage)	Medium	Medium
Safety risk for handling	Low	Medium
Environmental spill risk	Medium	Low
Inventory aging problems (stale inventory)	Medium	High
Product waste (heels, unused inventory disposal, etc.)	Low	Medium
Handling costs	Low	High

Figure 2. *The container your lube is stored in makes a difference.*

Quality Control

All incoming lubricants need to be checked and approved before being sent to the production line. It is the responsibility of the supplier to deliver these materials in good condition, but it is the responsibility of the facility to make sure the lube is in good shape before it is submitted to a machine.

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When developing a quality control process, it is first necessary to list the goals of the program: what you aim to accomplish and the tests that you will use to verify success. Decide if the plan will be limited to physical inspections of delivered lubricants or if in-depth oil analysis will be used. Quality control processes usually cover the following factors:

- Receiving times: This is more a test of the supplier than the lubricant. Ensure that deliveries are arriving at the agreed-upon time. Consistency is key; a couple of late deliveries can be excused, but if it is a constant issue, it may be time to switch suppliers.
- Documents: You can request that your supplier provides a Quality Certificate or Certificate of Analysis when they deliver the lubricants. This document will contain information about the lubricant, like an analysis of additives and particle counts.
- Visual Inspection: There are several issues that can be detected with a quick visual inspection. Make sure the lube is delivered in the correct container and in the correct amounts. Check expiration dates and other details on the lubricant labels. Additionally, any transfer equipment should be checked for cleanliness and proper storage before use.
- Oil Analysis: Oil Analysis isn't always necessary, but it is a good idea, especially if receiving large amounts of lubricants. Some testing can be performed on-site, such as viscosity checks and particle counts, while more in-depth testing can be achieved by working with an independent laboratory.

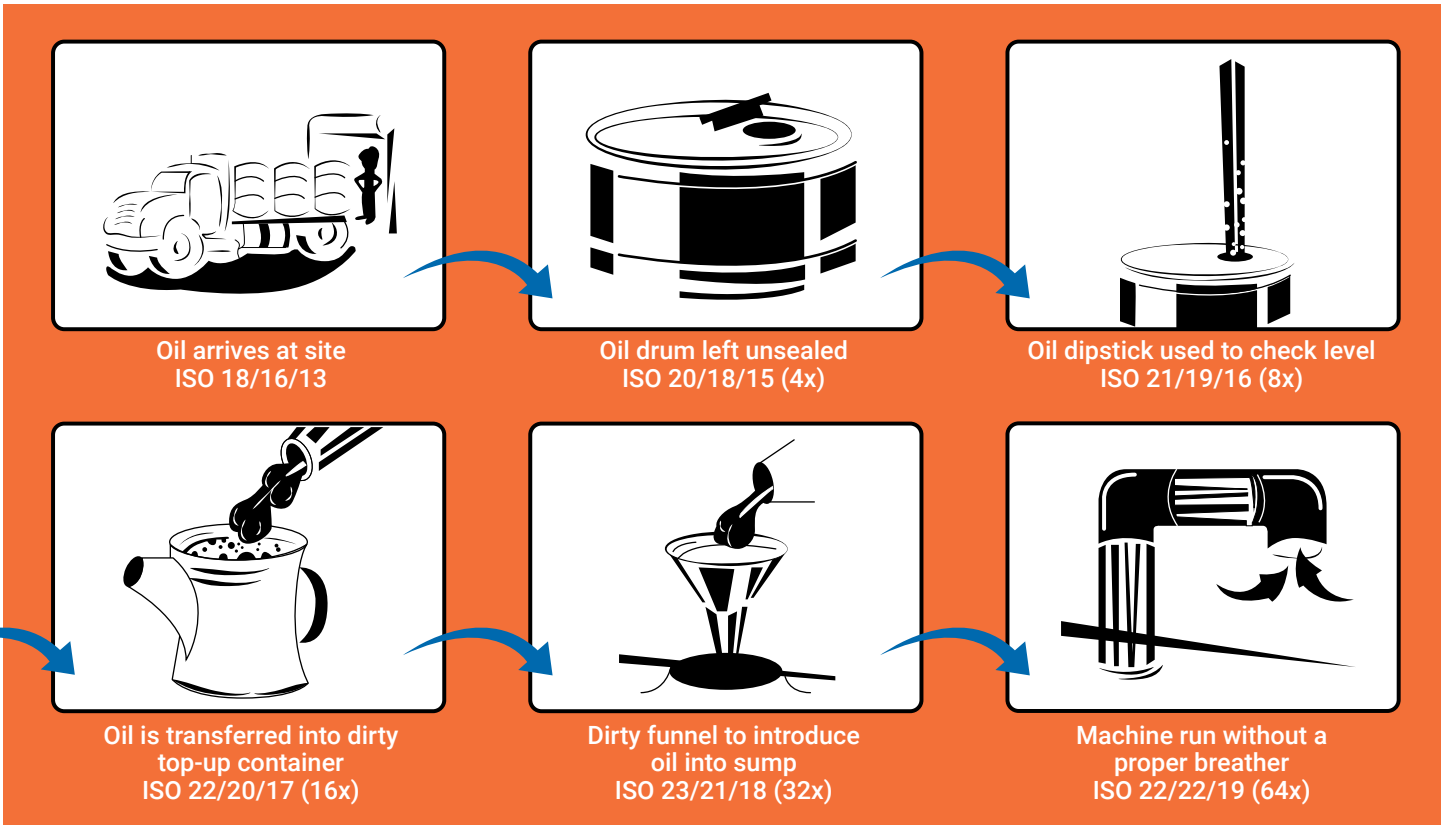

Figure 3. *Several of the ways a lubricant can become contaminated.*

The quality control process should also have a list of actions to take in the event that a delivered lube does not meet specifications. This list should be developed in collaboration with your lube supplier and should include an agreement regarding failed-lube replacement timeframes

Minimizing Lubricant Consumption

Once your lube room and oil lubricant selection are optimized, you can take further steps to reduce how much lubrication is used in your facility. One common mistake is over-greasing. Using too much grease is not only wasteful, but it can also damage machine components and hinder performance. Other practices can be implemented to maximize a lubricant's return:

Optimizing oil-change intervals

How often does your facility change machine lubricants? Are they changed based on a fixed schedule? If so, you are probably wasting lubricants. While interval-based oil changes are easy to schedule and implement, this tactic often causes oil that hasn't reached its full lifespan to be prematurely removed from a machine and discarded.

In order to optimize lubricant lifespans, condition-based monitoring practices must be implemented. Condition-based monitoring techniques involve frequent oil sampling and analysis; combined with careful tracking, the results of this analysis will reveal exactly when a lubricant has reached the end of its life, ensuring that it isn't removed too soon.

Condition-based monitoring also offers valuable alerts to potential issues occurring in a machine's lubricant system. Most issues that can arise in a lube will provide hints long before machine performance is affected or failure occurs, but these hints are only available if you frequently sample the oil and trend the data.

Protect Stored Lubricants

As discussed, maintaining a properly constructed lube room is a major step in protecting lubricants from degrading during storage. Lubricants stored outdoors are exposed to fluctuations in humidity and temperature, accelerating the degradation process.

While lubes stored in a lube room are automatically safer than those stored outdoors, further steps can be taken to extend storage life. Desiccant breathers attached to storage containers can combat moisture ingression. Maintaining a steady temperature can prevent temperature fluctuations that lead to thermal siphoning.

Product	Maximum Recommended Storage Tie (Months)
Lithium Greases	12
Calcium Complex Greases	6
Lubricating Oils	12
Emulsion-type Fire-resistant Fluids	6
Soluble Oils	6
Custom-blended Soluble Oils	3
Wax Emulsions	6

Figure 4. *Recommended storage times.*

Supplier Selection

Many lube suppliers today offer a variety of goods and services programs. The customer service a supplier provides is just as important as the quality of the product they deliver. It is important to work with your provider to understand exactly what they offer and how it will affect your facility.

The following steps can be helpful for an organization considering lubricant suppliers:

1. Assemble a team of stakeholders and technical advisors; this will be your representative group.
2. As a team, define the goals and objectives of the selection process. Collaborate to determine the most important criteria.
3. Meet with suppliers to discuss these criteria. Study the supplier proposal and cross-check their offerings with your list of needs. Rank the suppliers against one another.
4. Inform your selected supplier of your decision and begin formulating the supplier agreement.

When considering a supplier, some questions to ask include:

- Does the supplier have a comprehensive range of products?
- Is the supplier recommending the right lubricant?
- Are the supplier representatives knowledgeable, and do they understand the specific needs of my equipment?

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