Lubrication Process Design:
Do it Yourself or Have Us Do it For You – Just Do It!

Drew D. Troyer, CRE, CMRP
President & CEO
Noria Corporation
Lubrication Process Design:
Do it Yourself or Have Us Do it For You – Just Do It!

By Drew D. Troyer, CRE, CMRP
President & CEO
Noria Corporation

Most firms lose 5 to 15 percent of their annual maintenance budget to poor lubrication – a business process that is highly controllable with a bit of effort.

As one of three founding owners of Noria Corporation – a lubrication and reliability engineering service company, and the publisher of Machinery Lubrication and Reliable Plant magazines – I’ve seen a lot of lubrication practices in a lot of plants in a lot of industries around the world. We started Noria on the premise that the missing link standing between poor lubrication practices and good ones was knowledge. So, we focused our efforts on training lubrication technicians on the key principles of good lubrication process management – proper lubricant selection, storage and handling practices, lubrication and relubrication practices, contamination control, oil analysis for lube and machine condition monitoring, etc. I’m proud to say that our education programs are the best in the world. However, we discovered that while education is important, it wasn’t enough.

Frequently, managers who attended our training classes asked us to come in and assess their practices relative to the information they had just learned in class. We did this, but with a twist – we provided the audit of practices, but included plenty of supporting information about how to rectify the deficiencies. We provided our clients with a road map to lubrication success. Unfortunately, this too frequently came up short. The majority of our clients didn’t know where to start or how to go about the daunting business of cleaning up their lubrication practices. Just think of all the lubrication tasks carried out in a typical industrial plant – all of the oil changes, greasing bearings, checking and replacing filters and breathers, pulling samples, etc. There is a lot to it.

About five years ago, frustrated by the fact that, despite all the training and assessments we were conducting, actual lubrication practices weren’t changing much on the plant floor, I elected to take the organization in a different direction. Enter, Noria’s Lubrication Process Design (LPD), now the largest part of Noria’s business. LPD is a process whereby a Noria engineer defines a comprehensive strategy for completing every lubrication task on every lubrication point on every machine in a plant, organizing these lubrication maintenance plans into a database and delivering them to the client for incorporation into their work planning process.

At the inception of the LPD process, we knew that the meat of a lubrication procedure was the attribute variables, not the general guidelines of the procedure itself. For instance, there are only a few different ways to grease an electric motor; the general practices can be organized into a standard template. However, for each motor, there are some specifics that must be defined: how much grease to apply, how often to apply the grease, the type of grease to use, etc. Without the specific details about the application of the procedure, we’re not providing the lube tech or mechanic on the plant floor with the information he or she requires to get the job done.

I want to tell you about our latest chapter in the pursuit of Lubrication Excellence – the Do-It-Yourself (DIY) approach to Noria’s industry-standard LPD process, which enables you to optimize, clarify and
proceduralize your lubrication practices with much less investment and with a greater degree of internal ownership than the traditional service-based approach. I also want to tell you how you can leverage your lubrication know-how enterprise-wide to gain the most value for your organization, both in terms of reduced cost and increased reliability of your manufacturing equipment and processes. We'll start by reviewing the importance of procedure-based manufacturing, then provide an overview of the LPD process and discuss the DIY method. Finally, we'll discuss enterprise-level deployment of lubrication best practices.

Procedure-Based Manufacturing: Your Foundation for Excellence

In case you're wondering how important it is to develop clear lubrication procedures, consider a survey I conducted on the topic of what goes wrong in the plant. I asked readers of Reliable Plant magazine to tell me why failures occur in the factory, utilizing the high-level causal categories outlined in DOE standard NE-1004. Not surprisingly, the single-largest category reported was lack of procedures. The second-largest category was human error. Training came in fourth, following equipment problems.

Human error is caused by a multitude of things, but a lack of clear instructions leads the pack. In sum, failure to provide clear instructions to the team causes approximately 60 percent of all failures in a factory. Given the detailed nature of lubrication, it is even more likely that poor instruction is responsible for an even greater percentage of our lubrication problems.

![Figure 1](image-url) According to research, the lack of clear instructions is the primary reason for failure in a manufacturing plant.

Procedures represent the backbone of any manufacturing process. They are the mechanism by which we provide our team with clear instruction, reducing role ambiguity and reducing mistakes. Deming taught us that the key to quality and reliability is to minimize variability. Procedures minimize the variability in the way people complete their work. We need only look at industries where reliability is more than just a luxury to set us apart from our competition and improve profits. In the commercial aviation business, for example, procedures direct all operations and maintenance activities. Nothing gets done without a procedure, certified training to that procedure, a checklist and a signoff. Why? It's because failure simply isn't an option in that industry. Crashes are bad for business, and crashes occur due to operational mistakes and mistakes in assuring the integrity and reliability of the physical assets.

Procedures provide you with the following benefits:

1. Consistency of practice. Procedures provide the framework to ensure that the task gets done the right way every time.
2. Continuity of practice. When your staff turns over, tasks must be reassigned to another team member. The informal “tribal knowledge” method of knowledge transfer isn’t dependable. Procedures clarify the requirements irrespective of who receives the task assignment.

3. They define training and qualification requirements. Too often, we train people aimlessly. Training has two elements, knowledge-level training and task-level training. Knowledge training teaches a person how to think about a situation or problem. Task-level training teaches them how to act. Lubrication requires a little of both, but it is heavily weighted on the task side. Procedures actually define the training curriculum and qualification requirements for the assigned tasks.

4. They enable continuous improvement. By clearly defining the current lubrication policy, we create a solid foundation for continuous improvement. Too often, we stack new preventive maintenance (PM) tasks onto a policy – frequently the result of a knee-jerk reaction to a failure. By clearly defining our current policy, we’re better positioned to critically evaluate improvement opportunities.

Nowhere is the need for procedures more important than with lubrication. Let’s explore the LPD process and then explore the DIY approach we’ve pioneered.

**Lubrication Process Design (LPD)**

Lubrication Process Design is a fairly simple, but highly detailed process, which is described in Figure 2. We begin by building a hierarchy of equipment assets for which a lubrication policy is required; this is the scope of work. Typically, the hierarchy matches the organization’s existing CMMS or EAM system hierarchy. Then, the engineer must break the asset down to its components (e.g., motor, coupling, gearbox, etc.). Most lubrication activities occur at the component or sub-component level, so we need to build out the hierarchy at this level. Then, considering the operating and environmental context, the engineer selects the lubrication tasks required. We’ve built a library of standard lubrication templates from which to select. In general, tasks selected include:

- Lubricant selection in generic technical and associated brand terms
- Lubrication and relubrication tasks (e.g. oil changes, regreasing, top-ups, etc.)
- Contamination control (e.g. filter and breather inspections and change-outs, periodic decontamination, etc.)
- Oil analysis (e.g. sampling interval, sampling location, sampling method, test slate, targets and alarms, etc.)
- Lubricant storage and handling practices

![Figure 2. The Noria Lubrication Process Design (LPD)](image-url)
Then, again considering the operating context and environment, the engineer begins to define the attribute variables necessary to add meat to the skeleton provided by the template. The engineer defines lubricant type, lubrication interval, greasing quantity, sampling location, test slate, oil analysis targets, alarms and limits, etc. – the stuff required to add precision to the lubrication process. The attribute variables are merged with the templates to create customized lubrication practices which can be deployed in the organization’s work management processes. In addition to specific PM plans, the LPD process provides you with lubrication maintainability modifications required to make the new plans work. Usually, these are minor modifications – adding quick-connect fittings and sample valves, installing high-efficiency breathers or filters, etc.

Over the years, we’ve developed computer software systems to go along with the best-practice procedural templates. The software enables our lubrication engineers to quickly design a lubrication policy in an organized and systematic fashion. We developed our tools to increase the efficiency of our engineers, thus strengthening the value proposition to our clients, but also to ensure consistency of practice. We want all of our engineers to carry out their work in the same manner, reducing individual variability.

The DIY Approach to LPD
Recently, we’ve decided to start making these tools and the associated intellectual property available to our clients who prefer to complete the LPD themselves by utilizing their own technicians and engineers to do the work. For this option, we provide the tools and training required for clients to do the work our consultants presently do. Our consultants utilize an internal software package in the process of designing lubrication systems for our clients; it contains all of our procedural templates.

There are some pros and cons to the DIY approach.

The pros include:

1. **Labor cost reduction.** Because you’re utilizing your own team to complete the LPD, the price you pay to Noria is substantially less. You pay only for the technology, which also includes a route creation/execution module, and the associated intellectual property.

2. **Program ownership.** For some organizations, the policies take hold better when the work is done internally. Also, in the process of completing the LPD, your technicians get plenty of on-the-job training about lubrication best practices. They emerge from the process much more knowledgeable than when they enter.

3. **Internal support of change management.** A lubrication process is an organic thing. It must be modified to reflect changes in equipment, lubricant supplier, operating context, environment, etc. If your people are trained in the process of making these decisions, they are well positioned to use our tools to keep your policies up to date.

The cons include:

1. **Training people on the process requires a commitment.** Noria engineers must have years of experience before we unleash them to carry out LPD on their own unsupervised.

2. **Mistakes are made.** Lacking years of in-the-trenches experience and an entire support team (which is comprised of people who are arguably the best lubrication engineers in the world), your assigned lubrication engineers will make more mistakes – particularly in the area of making judgment calls.

3. **Lack of focus.** Frequently, when internal resources are employed for projects like this, it is one of the hats they wear. If management is tempted, these resources get “temporarily” pulled away. Sometimes they never make it back, and the project stalls. If they do make it back, they often require refresher training.
So, which alternative makes the most sense for your organization? If you have only one plant or just a few plants that are very different in type, and/or you have limited technical resources to deploy to such a project, it probably makes the most sense for you to engage Noria to complete the LPD process. You’ll likely never recoup the training investment required to pursue the DIY approach.

However, if you have a large number of plants with similar equipment and/or your organization suffers from the “not-invented-here” syndrome (be honest with yourselves), then the DIY approach makes the most sense. You’ll be able to leverage your trained internal resources and the work they complete across a wide asset base and increase the likelihood that your new lubrication policies will be embraced and executed. After all, you don’t get the benefits if you don’t execute the new policies.

Here’s what is required for you to deploy the DIY LPD:

1. **Acquire the tool kit.** The pricing is scope dependent so as not to penalize smaller plants or operations.

2. **Assign a technical expert.** This can be accomplished through a corporate initiative to develop an engineer (or engineers) to complete the process, at the plant level or some combination of the two.

3. **Get training on the use of the tool kit and the Lubrication Process Design process.** Our software is not an expert system. Too many lubrication policy decisions are judgment based for this to work effectively. The engineers must be taught how to decide what tasks are optimal, which method for accomplishing each task is appropriate (template selection) and methods for defining the variable aspects of the policy for each application using various formulas, look up tables, etc. They also need to be taught when to call us to support judgment calls.

4. **Secure a plan for ongoing support to review plans and policies and help with tough decisions or unique situations.**

Irrespective of whether we design your lubrication process and policies or equip you with the tools and the training to do it yourself, it’s a must-do activity. Lubrication is a cornerstone of mechanical reliability. Just decide which approach works best for you and execute!

**Enterprise-Level Deployment of Lubrication Excellence**

One of the most important aspects of the Noria LPD is that it is database driven, which gives you a great deal of flexibility and leverage. Flexibility in found in the fact that you can easily change your lubrication policies globally or locally. Leverage comes from the fact that you can repurpose your intellectual property enterprise-wide.

Change management is always necessary in a dynamic-state business process like lubrication. For instance, if you decide to change your lubricant supply from the ABC oil company to the XYX oil company, you have literally thousands or tens of thousands of changes in the work planning system. However, because your lubrication policies are housed in Noria’s LPD software, you can make local or global changes to any or all of the templates or any of the attribute variables with just a few keystrokes. This is a powerful capability.

Moreover, if you’re developing the lubrication policy for an API model X pump, why wouldn’t you apply that same policy to every API model X pump in every plant throughout the entire enterprise? Of course, you would. Noria’s LPD support software enables you to build up machine class templates that contain all of the assigned tasks, which can be assigned to any asset in the system that matches the profile. At that point, only the attribute variables need be modified to reflect the operating context and environment for the specific asset to which the machine template is being applied. In addition to standardizing practices, this enables you to standardize training, data collection and analysis, and continuous improvement. By repurposing your know-how, you leverage scale economies for knowledge management – engineer it once, apply it everywhere, but without losing the ability to modify the policy to reflect
minor variations in design, operation and/or operating context. You get to strike a balance between standardization and customization.

Conclusions
Lubrication is a foundational component of mechanical reliability. Failure to lubricate properly is a major cause of equipment failure, leading to high maintenance costs and poor reliability. We’ve developed the solution and made it flexible and adaptable enough to meet the needs of any equipment-asset-dependent company, whether your assets are fixed, mobile or some combination of the two. The Noria Lubrication Process Design balances standardization and customization, enabling you to build up standard lubrication plans for machine classes, but customize them to meet the requirements of any application. Engineering efficiency, management of change and control are all built in. You just need to decide whether you want Noria to design your lubrication policies for you or you want us to help you to do it yourself.

For more information contact Stacey McCauley at smccauley@noria.com or 662-890-9392.