

Foundation First

The Building Blocks to Creating an Effective Plant Lubrication Program

by Paul Dufresne, CMRP, CPMM

"Men we are going to strive for perfection, knowing full well we will never achieve it, because nothing in life is perfect. But along the way we will find excellence and excellence we will have, I will not settle for just being good."

Vince Lombardi

The goal of every lubrication program should be to ensure that all equipment receives and maintains the proper levels of lubrication such that no equipment fails due to inadequate or improper lubrication. In order for this to happen, we must follow the 5R's of lubrication – right lubricant, right condition, right location, right amount, right frequency – are followed for each piece of equipment. Whether you are building a lubrication program from scratch or are improving on an existing one, the following four phases must be addressed in order to have an effective lubrication program that will meet your plant reliability goals.

- Lubrication Program Development
- Lubrication Program Implementation
- Lubrication Program Management
- Lubrication Program Improvement

Lubrication Program Development Phase

The lubricant development phase is where the rubber meets the road, or in other words, the sweat equity of the program is developed. In this phase you will need to accomplish all of the following tasks:

Develop an Equipment List – The purpose of creating an equipment list is to develop a preliminary list of equipment that will be included in the lubrication program. Before a plant can begin implementing a lubrication program, it is necessary to create or obtain a current list of all equipment that requires lubrication. This list should include all types of equipment requiring lubrication, not just the usual pumps, motors and compressors. Resources for this information include your Computerized Maintenance Management System (CMMS), Plant Maintenance Files, Piping & Instrument Diagrams and also a physical survey of the plant. At a minimum, the main output from this process should be equipment identification name, number and process description.

Conduct Lubrication Survey – The lubrication survey will consist of a detailed lubrication inspection of all plant equipment. Each machine will be studied and its related characteristics recorded. Obtaining this information is

time consuming, and it may take several days or weeks to complete a plant survey. The lubrication survey is the only way of obtaining an accurate picture of current lubrication practices. It is also the basis upon which future steps in improving the lubrication program are taken. Since a general knowledge about the design of a machine is required for making decisions about its lubrication requirements, it may be necessary to make frequent references to machine drawings and OEM manuals.

Select Lubricants – Once lubricants have been selected for each piece of equipment in the program, it is important to review the list and determine if there are any opportunities to reduce the total number of lubricants that will be used.

Consolidate Lubricants (If applicable) – In some instances, you may find that there are only a few pieces of equipment using a particular brand or grade of lubricant, and by allowing for a change in lubricant viscosity (as long as you do not compromise the design criteria of the equipment), it is possible to eliminate the use of the lubricant entirely. Reducing the number of lubricants has the following effect on the program:

- Reduces the number of lubricants that have to be purchased
- Reduces the number of lubricants that have to be stored
- Reduces the chance for mis-application and cross contamination
- Reduces the number of lubricants that have to be documented and controlled as part of environmental compliance

Develop a Lubrication Manual – The rationale behind creating a lubrication manual is to have all pertinent lubrication information gathered in one place. After all the time and effort expended to locate and collect the data, it is worthwhile to consolidate that information into an electronic lubrication manual so it can be easily referenced by all plant personnel over time. Also, by having an electronic lubrication manual your program can become a living organism. If any change needs to be made, like a change in supplier or consolidation, the changes can be

made with minor intrusion into the program. At a minimum, a detailed lubrication manual should include the following:

- Equipment number and Description
- Equipment Picture
- Lubricant section from the OEM manual
- Selected lubricant technical data sheet
- Selected lubricant Material Safety Data Sheet (MSDS)

Purchase Necessary Lubrication Equipment –

When purchasing the necessary equipment for your lubrication program, we must remember one of the 5R's mentioned earlier. That is, we want our lubricant in the right condition. Properly lubricating equipment involves the use of equipment to both store and apply lubricants at set intervals and as needed. In storing lubricants, we want to ensure that the lubricants are used in a First In, First Out manner. Remember all lubricants have a shelf life. When applying lubricants the following equipment is recommended (but not limited to):

- Storage racks
- Sealed plastic heavy duty oil dispensing containers
- Grease Guns
- Bulk lubricant storage containers
- Filter carts

Set Lubrication Preventive Maintenance (PM)

Frequency – Before entering the lubrication task into the Computerized Maintenance Management System (CMMS) or Enterprise Asset Management System (EAM), it is necessary to determine the frequency at which the lubrication tasks will be repeated. This information, along with the other data collected, will be input into the system and used to generate the service schedule. Services to be performed should include but not be limited to:

- Lubrication Inspection and Top-off
- Equipment visual inspection
- Equipment Temperature Readings
- Oil Sampling (as required)

Implementing Lubrication Program Phase

The second phase in building a lubrication program is the implementation phase. Once all the data has been collected and gathered in the development phase it must go somewhere.

If the information isn't already in the plant's Computerized Maintenance Management System (CMMS) or Enterprise Asset Management (EAM) system, it must be input into it. Once in the CMMS or EAM, we must ensure that the Preventive Maintenance (PM) and task frequencies are set. Once the frequencies have been

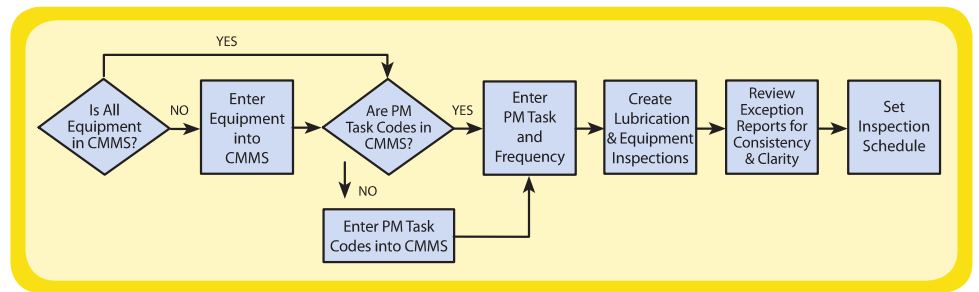


Figure 1 - Lubrication Implementation Flow Chart

set, create the lube routes. Review the routes for clarity and consistency. If any changes need to be made, ensure they are made and then set the inspection schedule (Figure 1).

Another key factor in implementing a program is to have your safety practices developed and in place. When it comes to lubrication safety, there are a number of unique aspects regarding the use and handling of lubricants. Because they are designed to minimize friction in machines, lubricants are slippery. When lubricant is accidentally spilled or leaks onto the operating floor or any other undesirable location, it can lead to a high-risk situation that must be immediately attended to in order to prevent personal injury.

In addition, because they are for the most part a hydrocarbon derivative, lubricants are flammable. The proper fire-hazard precautions should be taken. Finally, some lubricants can cause personnel health problems when the lubricant comes into contact with the skin.

Items for consideration for your safety practices include, but are not limited to, the following:

- MSDS (Material Safety Data Sheets) are available and are reviewed.
- Lock out procedures are followed
- Leaks are under control
- Spill response in place
- Handling practices maintain a safe environment
- Lubrication Equipment use is understood
- Sampling procedures are in place and followed

The final piece to implementing a lubrication program lies in training the individuals that will be performing the tasks at hand. All persons performing lubrication related work must be properly trained to ensure the effectiveness and the consistency of the program. Also, we must ensure that procedures for all major tasks and functions within

the lubrication program are in place and documented. If these documents exist, they must be reviewed and evaluated. When reviewing these documents and procedures, we must ensure that they support the maintenance strategy, address the purpose of the task and give clear guidance and direction to complete all tasks in a safe, effective and efficient manner.

Managing Lubrication Program Phase

Managing your lubrication program is the third phase in this journey. Large amounts of maintenance dollars and resources are often budgeted to develop and implement an initiative such as a lubrication program. Once the program is in place, however, insufficient attention might be provided to ensure that full benefit is continually received from the initial expenditure. Programs put in place to meet a requirement or management expectation, without established ownership and a guiding vision, can decay into a low value day-to-day chore.

As work requests and work orders are written, we must ensure there is clarity in what work needs to be performed. All too often there is a lack of information delivered from the floor, which can lead to poor planning & scheduling efforts. Once the work has been identified, scheduled for work and then executed, most important portion of this entire process, documenting the work performed, comes into play. Work history is one of the greatest struggles faced daily in the manufacturing world. In most facilities there are "pockets of excellence" within the organization. There may be multiple software programs being utilized, but the problem arises when the information collected does not get back to the main software system. All work information needs to be documented and available for review in the main CMMS or

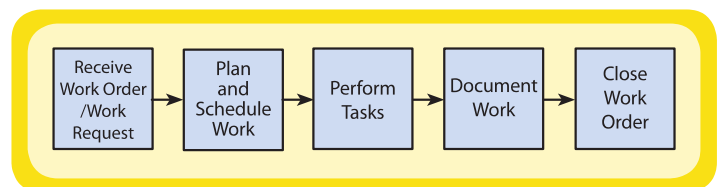


Figure 2 - Basic Work Flow Process

EAM. In order to improve your program you must have good history, which can be achieved by following the process in Figure 2.

Improving Lubrication Program Phase

After your lubrication program has been developed, implemented and managed for a certain amount of time, you must review your equipment history. In order to improve your program, you must identify, from detailed equipment history, where your lubrication issues occur within your facility. When assessing your equipment history, you must ask yourself, "Is the Mean Time Between Failure (MTBF) you have acceptable? Does your plant have a reliability goal for what the MTBF should be? Is your associated cost for maintaining your pieces of equipment acceptable?" If the answer to any of these questions is no, you must create a pareto analysis to determine your priority in what equipment needs to be evaluated through failure and/or cost. Once the pareto has been completed, the decision can be made to conduct a Root Cause Failure Analysis (RCFA) or go through the Reliability Centered Maintenance (RCM) Methodologies to determine if the current PM's are acceptable. Once these processes are conducted and the cost to make the neces-

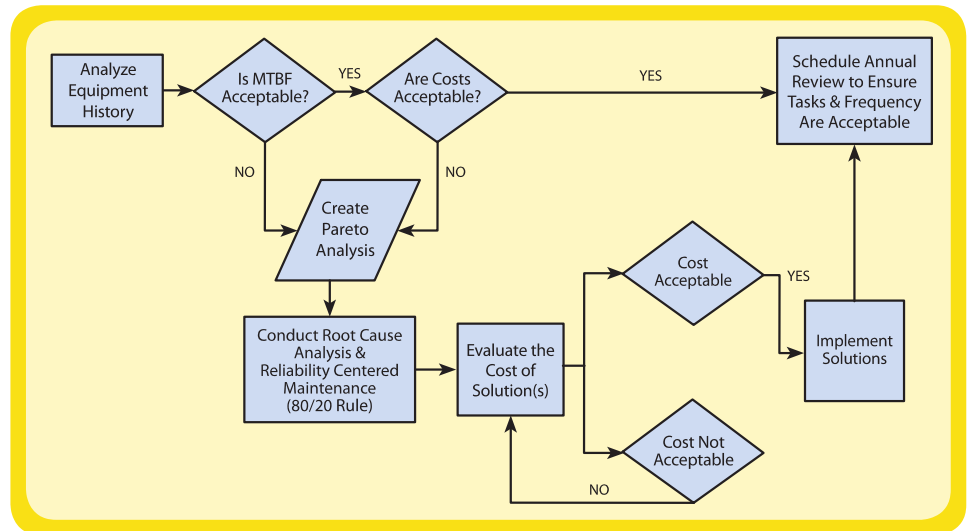


Figure 3 - Improvement Process Work Flow Chart

sary recommendations is deemed acceptable, adopt these changes and make the corrections or additions to the current PM process. After these changes are implemented you must come back later and continually address these issues as they arise. If the costs are not acceptable, you must go back to the drawing board to de-

velop a strategy to implement the change. The improvement process can be seen in Figure 3.

Other areas concerned with improving your lubrication program include both your lubricant analysis program and establishing goals and

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metrics used to track progress of the program.

Lubricant analysis is commonly used as a diagnostic tool in most facilities. However, many oil analysis programs frequently lack the proper setup and utilization of data that is needed to gain maximum benefit. All too often, an oil analysis result is provided to the customer in a hard-copy format with generic recommendations, and is usually filed, never to be looked at until time for an audit. In these situations, oil analysis provides little or no value to the organization and to the overall reliability of the facility.

The establishment of goals and metrics is key to improving a lubrication program. The selection of specific program goals and the development of key performance indicators, by which to measure the progress toward these goals, are both largely dependent on the maturity of the program. Unfortunately, the development of goals and metrics continues to be an area of weakness in many lubrication programs. Although most organizations have established corporate and plant-specific goals and metrics aimed at overall operating and maintenance improvements, few programs have established goals and metrics at the technology level.

This is a key program element that is required to ensure lubrication program excellence. It is also important to have a clear understanding of the current status of the program, and it is equally important to have both vision and focus on the continued improvements that can be made to the program to realize effective and efficient fulfillment of the lubrication needs of the organization.

Continuous improvement is an important element of a comprehensive lubrication program, but is often overlooked by many. It has often been stated that in order to get better, it is necessary to understand where you are. By using an appropriate audit or self-assessment process, an organization will have a roadmap to address and evaluate where it currently stands, and where its focus needs to be. It must also be understood that Continuous Improvement is needed to create a living program, which continually changes, to ensure both equipment reliability and ultimate cost effectiveness.

Conclusion

Increasing equipment reliability should be the goal of any plant lubrication program. Whether you are developing a program from scratch or improving an existing program, if you follow these four phases you have the ability to develop and create a "World Class" lubrication

program. Remember nothing will ever be perfect, but if you strive for perfection you will find excellence...and excellence in lubrication means the difference between inconsistency and reliability, poor plant availability and optimum overall equipment effectiveness.

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