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 meaning the 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 falling in 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.

The Four Phases of a Lubrication Program:

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

Lubrication Program Development Phase

In the lubricant development phase this is where the "rubber meets the road" or the "sweat equity" of the program is developed. In this phase you will need to address the following areas:

- Develop an Equipment List
- Conduct Lubrication Survey
- Select Lubricants
- Consolidate Lubricants (If applicable)
- Develop a Lubrication Manual
- Purchase Necessary Lubrication Equipment
- Set Lubrication Preventive Maintenance (PM) Frequency

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 that you can pull this information can come from your Computerized Maintenance Management System (CMMS), Plant Maintenance Files, Piping & Instrument Diagram's and also a physical survey of the plant. The main output at a minimum from this process should be equipment identification name and number and process description.

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 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 and it is the basis upon which future steps to select lubricants and improve lubrication practices as well. Since a general knowledge of 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.

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 in the program. In some instances you may find that there are only a few pieces of equipment that use 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

The rationale of creating a lubrication manual is to have one place where all pertinent lubrication information gathered so far in the process can reside. After all the time and effort expended to locate and collect the data, it is worth while 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. A detailed lubrication manual at a minimum should have 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)

When purchasing the necessary equipment for your lubrication program we must remember that we want our lubricant in the right condition from one of the 5R’s as mentioned earlier. The process of 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 the lubricants that are used are deployed 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

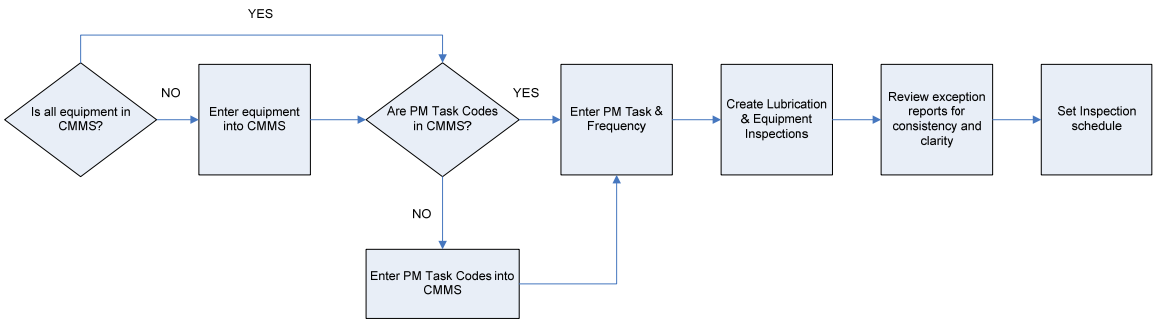
- Bulk lubricant storage containers
- Filter carts

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 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 it must go into the plant's Computerized Maintenance Management System (CMMS) or Enterprise Asset Management (EAM) system. Once in the CMMS or EAM we must ensure that the Preventive Maintenance (PM) and task frequencies are set. Once the frequencies have been set, create the lube routes. Review routes for clarity and consistency, if any changes need to be made ensure they are made and then set the inspection scheduler (ref. 1).



Ref. 1 Lubrication Implementation Flow Chart

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. By their very nature, lubricants are slippery because they are designed to minimize friction in machines. When a lubricant is accidentally spilled or leaked 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, lubricants, because they are for the most part a hydrocarbon derivative, and 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 are the following but not limited to:

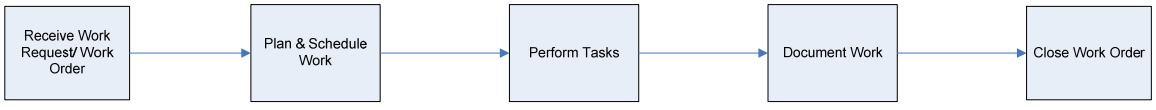
- MSDS (Material Safety Data Sheets) are available and are reviewed.
- Lock out procedures are followed
- Leaks are under control
- Spill response in place
- Handling practices maintain a safe environment
- Lubrication Equipment use is understood
- Sampling procedures are followed

The final piece to implementing a lubrication program is training of 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 there is an existence of procedures for all major tasks and functions within the lubrication program. If these documents do 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.

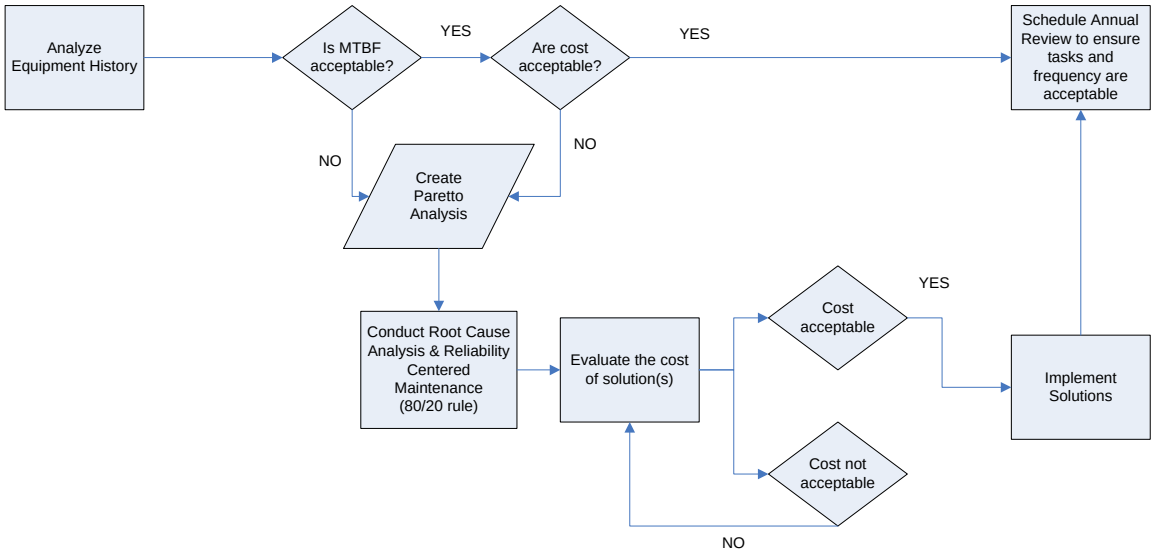
As work request and work orders are written we must ensure there is clarity in what work needs to be performed. All too often there is a lack of information delivered from the floor which can lead to poor planning & scheduling efforts. Once the work has been identified and scheduled for work and then executed comes the most important portion of this entire process; documenting the work performed. 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’s being utilized but the problem exists 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 EAM. In order to improve you program you must have good history.



Ref. 2 Basic Work Flow Process

Improving Lubrication Program Phase

After your lubrication program has been developed, implemented and managed for a specific 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 are 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 reliability goal for what the MTBT should be? Is your associated cost for maintaining your pieces of equipment acceptable? If any of these answers are no you must create a paretto analysis to determine your priority in what equipment needs to be looked at through failure and or cost. Once the paretto has been completed and the decision has been 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 are conducted and the cost to make the necessary recommendations is acceptable, adopt these changes and make the corrections or additions to the current PM process. After these are implemented you must come back and continually address these issues as they arise. If the costs are not acceptable you must go back to the drawing and develop a strategy to implement the change.



Ref. 3 Improvement Process Work Flow Chart

Other areas concerned with improving your lubrication program are your lubricant analysis program and having established goals and 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 posture 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 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. The key program element 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 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 presently stands, and where its focus needs to be. It must also be understood that Continuous Improvement is a living program, continually changing 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 falling into 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.

References:

-“Practical Lubrication for Industrial Facilities”, Heinz P. Bloch, P.E., the Fairmont Press, 2000.

-“The Practical Handbook of Machinery Lubrication”, L. “Tex” Leugner, Maintenance Technology International, 2005.