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10 WAYS TO IMPROVE YOUR LUBRICATION RELIABILITY PROGRAMME

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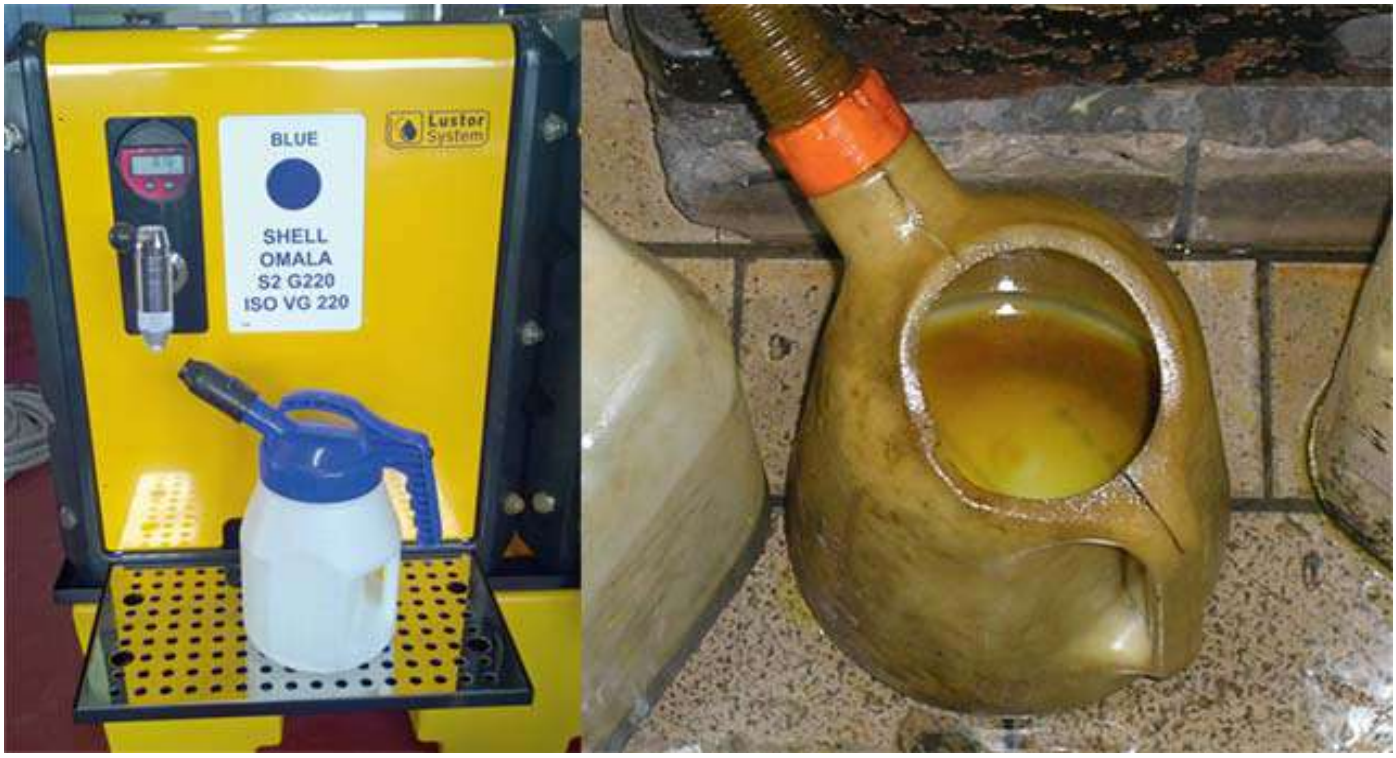
Key factor of a World Class Maintenance Organization is the Lubricant Management. While Lubrication has for long time been seen as “another-job-to-do”, today a modern Lubrication Reliability Programme is the only answer. Here are 10 ways to start a Programme, or improve upon an existing one.



Left: The good practice. Right: The less recommended practice.

It has been said many times before: while the bearing is the heart of your (rotating) machine, the lubricant is considered to be the blood. The health of your blood is as *life threatening* as the quality of the lubricant, whether they be oils or greases. Bad lubricant quality is extremely harmful for the reliability of machine components.

Quality does not only relate to type or brand, but to many more intrinsic aspects we will discuss later. Of course it all starts with the correct machine – lubricant combination in the design stage, but this we will not address in this article. Lubricant quality in the Lubrication Reliability Programme is a matter of managing the selected lubricants in the best possible *way* bearing in mind the 6 *Lubrication Rights*:

1. The Right Type

2. The Right Time

3. The Right Quantity

4. The Right Place

5. The Right Way

6. The Right Condition

It has been proven many times by independent organizations that bad lubrication is responsible for over 60 percent of bearing and machine failures: here asset maintainers have sinned against one or more of the 6 Lubrication Rights. Turning the bad practices into a Lubrication Reliability attitude will have a direct impact on fundamental machine health.

Aside from bearings, *best lube practices* should be applied to gear technology, hydraulics or basically all lubrication-related technologies. It is time for a maintenance culture change with an important Return-On-Investment.

The six lubrication rights:

Silent Phase in Bearing Life Time – Time to Start Lubrication Reliability

In a bearing service life we have 3 phases: the Silent phase, Prediction phase and Breakdown phase. The initial silent phase is that part of the lifetime where wear and eventual damage can occur due to inadequate lubrication or contaminated lubricants (6R's).

Or adversely, when lubrication is managed the proper way, internal wear can be reduced significantly and bearing life maximized. It is during this phase that prevention is most effective. We call it *silent phase* because at this point in the component lifetime no predictive techniques are yet able to capture any potential failures.

At a certain moment in time – point of no return – initial wear or damage is detectable by predictive methods (vibration, temperature, oil analysis, visual or ultrasonic inspections). It is now too late to maximize the bearing life and the lifetime is now set beyond return. During the prediction phase it is only possible to **monitor** wear and damage by measuring anomalies via – commonly called – Condition Monitoring. One can understand that CM is changing the quality of lubrication yet only measures its level.

Eventually the CM techniques will detect that a failure will occur. If in time, repair or replacement can be planned and implemented. Conclusion: It is imperative that Lubrication Reliability should be implemented at the start of the silent phase.

Lubrication Reliability is a combination of managing best practices, tools and strategies. In order to understand and implement it in an efficient way, we will explode LR in 10 separate components.

1. Assess Before All

To start a new LR strategy (or just implement one or more of its components) it is crucial to assess the actual lubrication management situation. Evaluation and benchmarking will disclose actual flaws in the organization and stress out the weak points in the fields of: strategies, CMMS, cleanliness & contamination control, lube supply, expertise and others. Actual status is categorized from Basic Level evolving to Best in Class.

2. Plan, Manage and Organise

No maintenance organisation today should manage its activities without modern software tools like CMMS, or ERP. Unfortunately no general management software is able to address lubrication in its full right. Lubrication is a very specialized field of maintenance and thus dedicated Lubrication Management Software is best suited.

The key is that the tool needs to address the specific needs of a lubricator and its management: component database, routing, lubricant data and many others. Ideal LMS integrates lubrication activities with inspection data, condition-monitoring data like vibration analysis and oil sample data.

3. Identification and Inspection

Lubrication points without proper identification are a perfect source for errors and can have dramatic consequences: the wrong oil or grease in a machine can cause sudden breakdown. Sometimes even small quantity cross-contamination can result in catastrophic failure. It does not take huge investments to well identify or colour-code lubricants, dispensing equipment and lube points on machinery to avoid malicious cross-contamination.

While identification is imperative, lubricant inspection should be a continuous worry. It happens every day that machine components like gearboxes run dry of oil or grease. Oil Levels are overseen, are too dirty to inspect, or are not even included in the technician's inspection route.

Worse still, no oil level indicator is installed on the machine, making inspection impossible without opening the machine or draining it. What is needed is an inspection culture: installation of oil levels on all machinery inducing regular monitoring.

4. Lubricant Storage by Cleanliness Control

Did you know that ten ppm of water in a bearing lubricant will halve the bearings lifetime. This is the relative amount of two drops of water in a glass of great Belgian beer? Seriously!

Did you know that contamination is the cause of more than 30 percent of lubrication-related bearing failures?

Did you know that new oils commonly have a higher contamination level than recommended by the machine supplier?

Cleanliness control of new and stored lubricants is a focus in the programme. As it is a basic issue, with small investments but huge return. It's all about improving the quality of new lubricants and protecting these lubes from environmental contamination like moisture, dirt, chemicals and so on.

Today many innovative solutions are available to properly store and condition lubes: the best have dedicated tanks with pumps and filters for online filtering, proper identification and have protections like desiccant breathers. Systems that do not work in this way are just bad practice.

5. Oil Dispensing Is an Art

No, it is a question of using the right tools for the job. Oil cans need to have these basic requirements: fully sealed, translucent for inspection, colour-coded and identified and adapted to the application and fluids, preferably made of plastic to avoid rusting.

Forbidden are open steel cans or bottles, funnels or similar that attract contamination instead of keeping dirt and moisture out! Unfortunately we see these bad practices and dirt collectors in use every day.

6. Grease Lubrication

Greases are difficult to clean up once contaminated. Therefore it's recommended to use techniques that avoid uncleanliness during storage and application: the lesser transfer of bulk grease the better. The use of cartridges or automatic lubrication systems is preferred.

In case bulk is used from drum, apply the right follower plate, cover and pump. Lubrication Reliability is also about using best practice techniques to apply grease: digital volume meters or ultrasonic grease pumps are suitable to control applied volume. Too much grease is as catastrophic as not enough grease.

7. Control Contamination

Now once lubricants are applied to the machine the same strategy should be implemented: avoid further contamination and if possible decrease existing contaminant levels. In first instance we recommend protection systems like desiccant breathers on key machinery and machinery that operate in a dirty industrial environment (dust, humidity). These systems are designed to collect as much dust (with filters of 0.5 to 2 µ) and moisture as possible.

Secondly filtration of lubricant on the machine might be needed in case of high contamination levels. Some online filtration units can be installed permanently, other are only suitable for water removal.

8. Measure Quality by Oil Analysis

Lubricant condition can be detected by means of oil analysis. In an LR programme we recommend setting up a full Oil Analysis programme. There is no sense in a *once-and-again* philosophy as trending results are more crucial than the unique result.

An oil analysis programme is an indispensable part of the Lubrication Reliability strategy as it is the best way to continuously monitor lubricant quality and thus machine condition.

9. Environmental Control

It is nearly impossible to keep lubricants clean if the lube room is messy or machines dirty. We recommend a *cleanroom regime* for all lubricant environments. All *dirt-creating* products like sand or sawdust used to clean oil spills should be banned.

10. Feed the Brain and Train

No Lubrication Reliability programme should start with a group of people not having the right skills and training. No need for PHD's in tribology, but technicians, reliability engineers, foremen and managers will have to be educated at their level.

Plenty of good training programmes are available out there. A very good way to motivate and appraise Lubrication Reliability co-workers is to certify them in organisations like ICML Lube council (ref: www.lubecouncil.org).

Mission Impossible? No!

Implementing the 10 key factors of Lubrication Reliability in one go is an impossible mission. Gradually taken step-by-step and well planned in time: it is well feasible.

Remember, Lubrication Reliability is not a project, it is a continuously evolving programme, or should we say culture, in which cleanliness control should be a continuous strive for excellence. Automatically, machine and component reliability follows. Many industries have proven it in the past; the door is now open for your plant.

In cleanliness control it is recommended to keep track of your efforts: with regular oil analysis for contamination levels by ISO4406 (standard test by which contamination particles are counted and coded into or a 2 or 3 digit code). This KPI will guide you from an initial cleanliness level to the desired one. Filter rating is selected in function of targets and applications

For example hydraulic fluids can have a desired IS04406 level of 14/12 while a gearbox lubricant might be ISO4406 20/17. With a Cleanliness Improvement programme that decreases the ISO level of “new” oil from 22/19 to a super clean oil with ISO 13/10, the lifetime of hydraulics or diesel engines will be extended by a factor of 10 or more (ref. Noria)

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