

SUCCESS STORIES

Water Treatment



We succeeded, what is next?

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Back in the fourth quarter of 2019, the SDT team assisted with the implementation of the LUBExpert (parallel to Condition Monitoring implementation) in a wastewater facility in SE Europe, with primary target of improving lubrication practice on 180 assets (more or less 700 bearings).

This task might sound simple and straightforward, still it highly depended on the many real condition facts. A relatively small team was working on several improvements at the same time: Condition Monitoring (CM) and Lubrication. A small team, in this case, means: two technicians engaged in CM activities, one grease technician and the maintenance manager playing the role of reliability engineer, lube manager, CM engineer as well as many others. Certainly, it was not an easy task for the team, and certainly it was not as it should have been, but that was the reality and what was approved by decision makers.

Obviously, that was one of those situations when management gives you less than you need to succeed, promising to give you more once you succeed. Catch-22, but it is something we face often, making the process more challenging and rewarding.

To make it happen, our grease technician was trained to the level of LUBExpert Strategist, understanding **Why** the job needs to be done, **What** needs to be done and **How**, and being able to perform entire setup, execution and reporting. Proper selection of lubricants, controlled purchase process, proper storage, cleanliness... all was included in the process, of course. Once started, the gained experience resulted in growing confidence, increased work efficiency, well organized work orders and smooth execution. Once a grease guy, now a LUBExpert Strategist.

However, there was another aspect of implementation that was highly important for the success of the entire program. Do more than required with less than needed.

The critical point of implementation was the proper positioning of each department (CM and Lube) and interdepartmental cooperation, considering available resources. The approach taken (knowing the LUBExpert's capabilities) was to break down departmental barriers and silos and organize it more like an army formation:

- first line of defense – grease bearings right and eliminate major cause of failures;
- scouting – frequent data collection and trending, share data and locate anomalies;
- light calvary – collect dynamic (TWF, FFT) data for analytic purposes;
- heavy artillery – deeper analysis, problem definition, root cause definition (and elimination).

Lots of work and lots of tasks for a small team.

As usual, Pareto's 80:20, fits in from all angles. 80% of problems come from 20% of activities, 20% of problems require 80% of available time to be analyzed ... and so on.

Although it may sound ambitious, we assigned the first two tasks to our Lube team/technician:

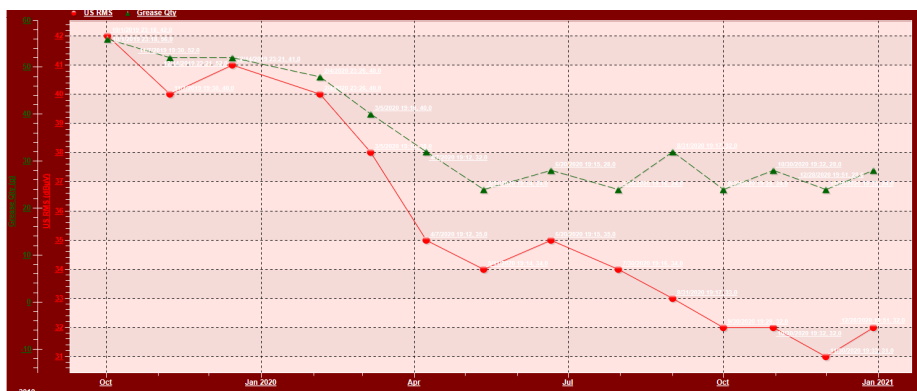
- First line of defense – Lubrication department job, surely
- Scouting – CM job, normally

Some call it too much of a burden, others think it is impossible, we see it as part of the LUBExpert strategy. Whoever is taking care of Lubrication, has his hands-on assets more frequently than anyone else in the Reliability team, and has the most interactive relationship with the asset. The LUBExpert Specialist (in this case also Strategist) collects data for Lubrication purposes, has an opportunity to monitor and trend data before and after replenishment condition, possess the data collected and analyzed during replenishment.

Knowing that, the LUBExpert Strategy easily takes care of the first two tasks, bringing huge benefit to the CM team by giving them the most valuable data, and consequently time! More available time for deeper analysis, problem definition, root cause search.

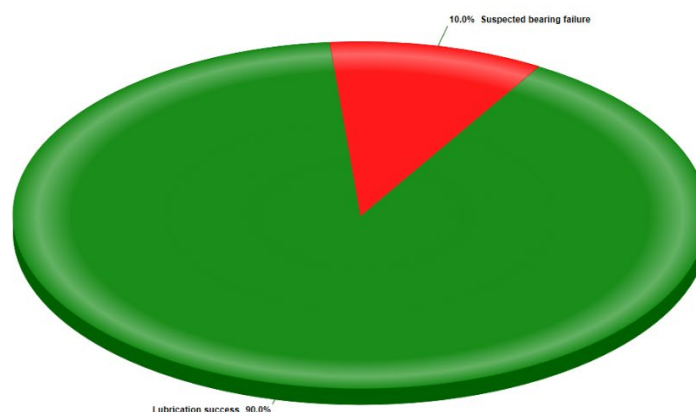
At the end of the first year of the LUBExpert program implementation:

- Lube technician took care of 35 – 40 bearings per day (per shift)
 - That includes work task preparation, data collection, on-site analysis based on triggered alarms, LUBExpert guided grease replenishment, data overview and possible strategy corrections, and reporting.
- All bearings showed an excellent response (as one in the picture 1 below), operating at the minimum friction and wear level:



Picture 1

- Process statistics (as shown in picture 2) showed high level of performance, correct lubrication practice and strategy settings, as well as additional observations and condition assessments:



Picture 2

- Q4 2020 compared to Q4 2019 shows significant decrease of bearings related failures in rotating assets;
- Q4 2020 shows no Lubrication related failures, except for the ones inherited from previous period;
- Full traceability and detailed data about each process achieved;
- Data shows that most of the previously used interval and quantity plans were incorrect;
- LUBExpert Strategy was successfully implemented.

In addition:

- The Lube technician delivered 12 500 Ultrasound readings to CM team, including static trend graphs, triggered alarms, before and after grease replenishment values, all relevant events, all taken actions;
- The Lube technician delivered 18 “Suspected bearing failure” warnings to CM team;
- The Lube technician delivered 10 “Safety risk” warnings to everyone’s attention.

The first year of implemented program can now be safely declared as successful. As usual, once you succeed, there comes the question: “What’s next?”

For the Lube team, “next” equals expanding the program to the entire plant and sustaining top performance.

For the CM team, “next” equals covering more assets, covering more failure modes, digging deeper into analysis to define a root cause, suggesting corrections to get rid of the root cause, and suggesting improvements.

So, first, we need to look at the accomplished results and assigned tasks, once again emphasizing the necessity to remove departmental division and silos mindset and conclude that both tasks are actually one. The question that we really needed to answer was: “How can the Lube team further assist the CM team to accomplish more with less or the same resources?”

Again, more work on the Lube tech’s shoulders?

Not really, the answer is: LUBExpert Dynamic.

LUBExpert Dynamic is equipped with an additional feature that collects Dynamic data (TWF, FFT) while performing usual LUBExpert work. No additional time needed, no additional training needed, no additional efforts, only additional benefits. Those benefits are exactly what the CM team needs to accomplish.

Now, out of four army style operating segments, we can add one more to the Lube team without creating any additional stress on our Lube tech, but freeing huge amount of time for our CM team:

- First line of defense – Lubrication department’s job, for sure
- Scouting – CM’s job, normally
- light calvary – collect dynamic (TWF, FFT) data for analytic purposes.

What does it mean for the Lube tech during his daily work? Absolutely nothing.

Dynamic data is collected in the background.

Remember this from above?

- The Lube technician delivered 12 500 Ultrasound readings to the CM team, including static trend graphs, triggered alarms, before and after grease replenishment values, all relevant events, all taken actions.

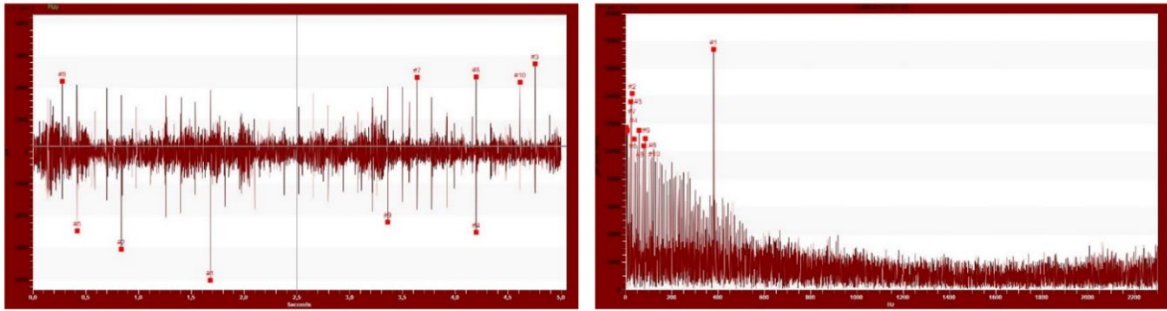
Now add the same amount of Time Waveform and Spectra, that normally requires the work of an additional technician.

One more task off the shoulders of the CM team and a huge opportunity for them to increase coverage, dig deeper and have more time for analysis and problem solving.

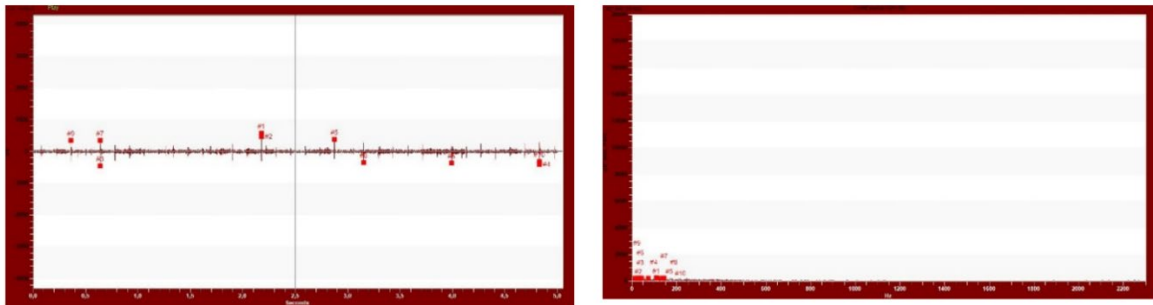
Each Condition Monitoring team knows exactly how big this benefit is and how it improves CM efficiency.

Here is what it looks like in the first week of implementation. Bearing successfully greased with declared condition as “Suspected bearing failure”, TWF and Spectra collected before and after grease replenishment (picture 3):

Before grease replenishment



After grease replenishment



Picture 3

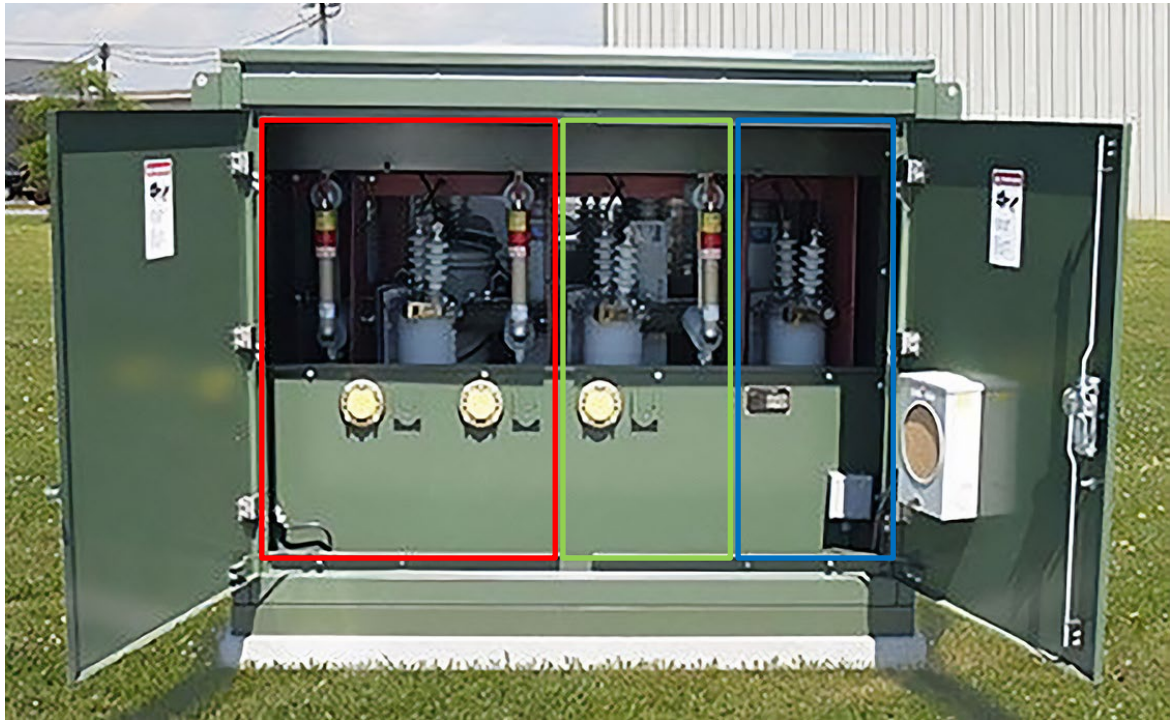
Lubrication as part of Condition Monitoring? Well, shouldn't it be that way?

The first line of defense has just become a Maginot line.

Pad Mounted Transformer

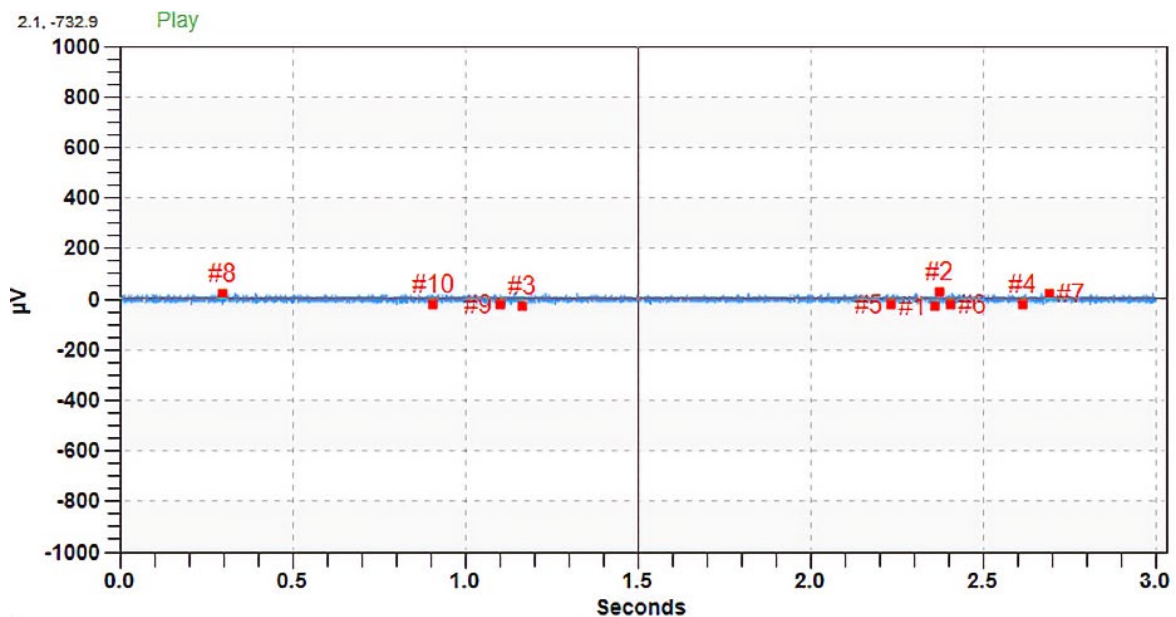
Author: SDT Ultrasound Solutions

A hydro company in Ontario, Canada used a parabolic dish to check the insulators within an electrical distribution panel after complaints of a smell in the area.

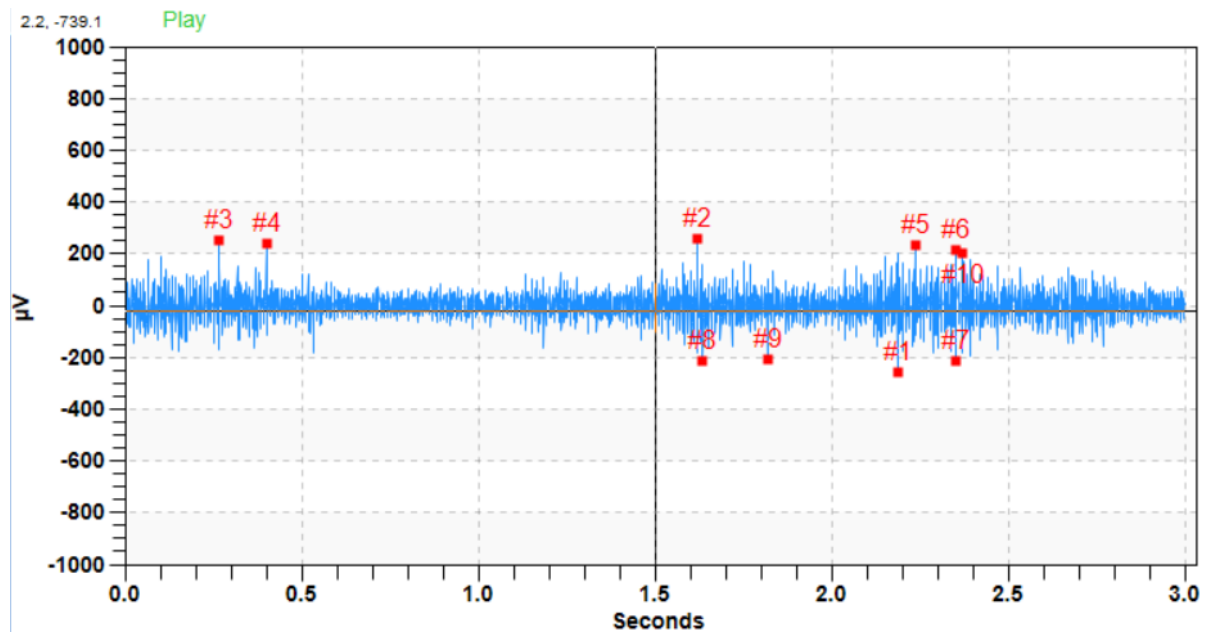


Scanning across the insulators very quickly identified the problem.

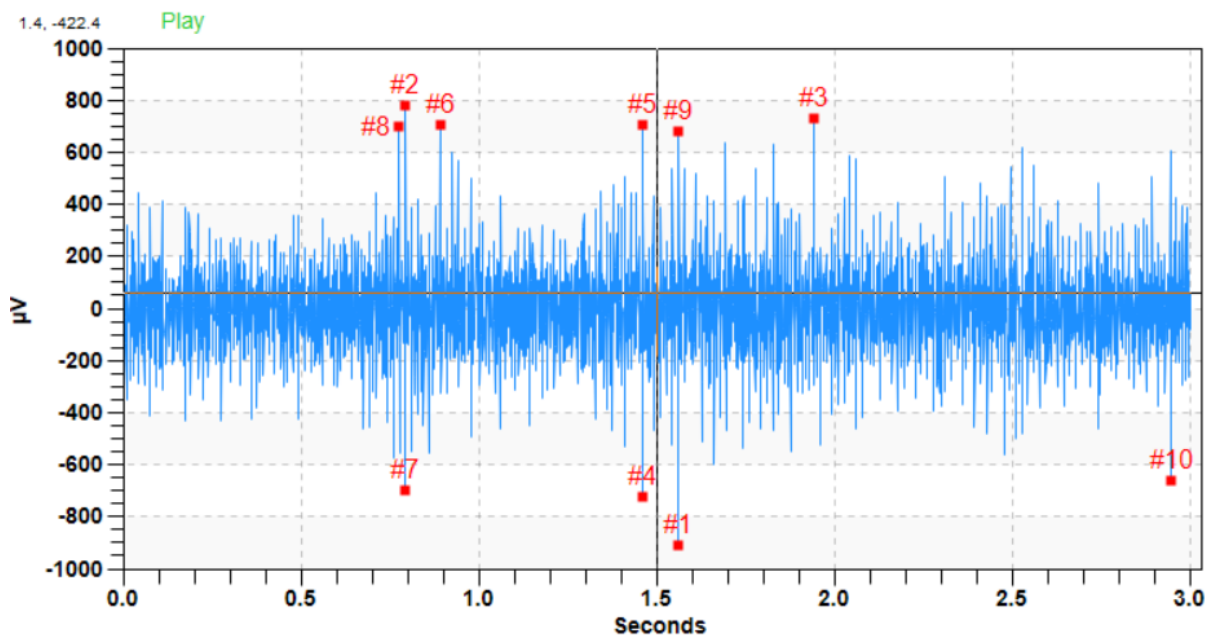
Left Insulators: TWF



Middle Insulators: TWF

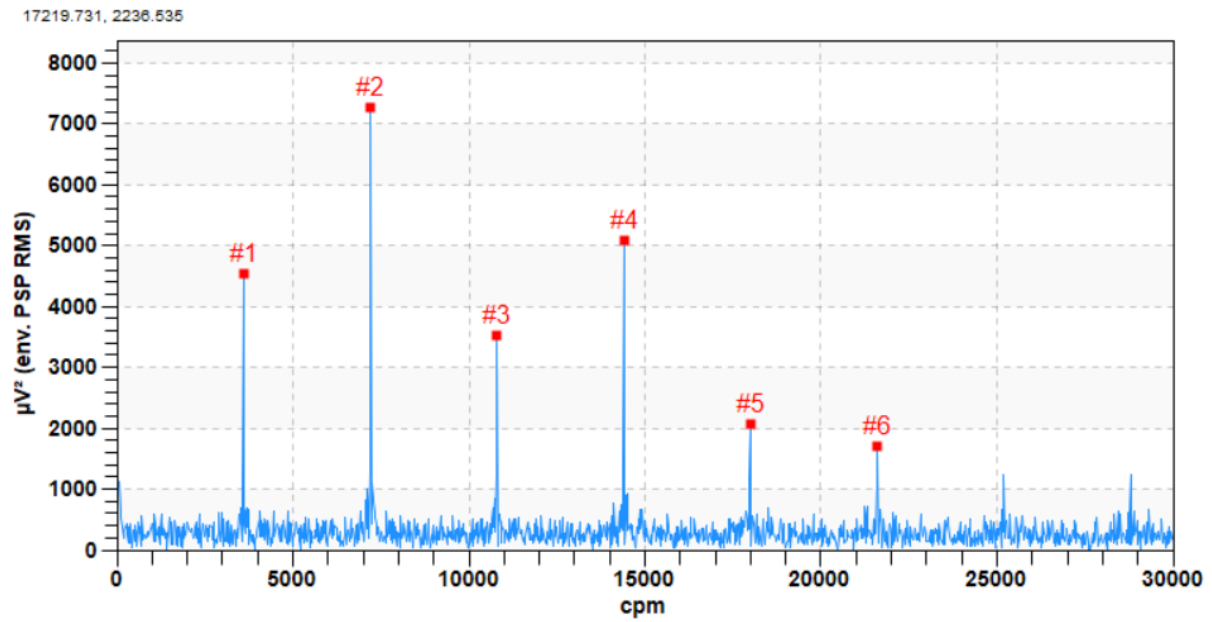


Right Insulators: TWF



The time waveforms have been scaled identically. Ultrasound was present throughout the whole cabinet, but the source of the problem produced the loudest ultrasound. Corona was present.

The FFT below clearly showed the signals being produced at harmonics of 3 600 CPM or 60 Hz which is the electrical frequency used in North America.



^ Highest Peaks

- ☐ Sorted by energy
☒ Sorted by frequency

#1	3600 cpm	4549.849 μV^2
#2	7200 cpm	7281.741 μV^2
#3	10800 cpm	3511.992 μV^2
#4	14400 cpm	5084.532 μV^2
#5	18000 cpm	2075.444 μV^2
#6	21600 cpm	1694.252 μV^2
#7	32400 cpm	1650.708 μV^2
#8	36000 cpm	1864.178 μV^2
#9	39600 cpm	1832.176 μV^2
#10	43200 cpm	1846.715 μV^2