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Even I Can Understand That! Equipment Lubrication Made Simple

Paul Llewellyn

My company recently hosted a Top Performers Meeting to which we invited our top ten lubrication consultants from the previous year to a getaway destination for relaxation, fun, fellowship, good eats and roundtable discussions.

During a roundtable discussion on lubrication best practices, Dave Piangerelli, owner of Lubrication Technologies, Inc. of West Springfield, Mass., mentioned that lubricating equipment was a difficult task. I made the mistake of asking, "What's so difficult about lubricating equipment?"

The floodgates opened, answers spilling forth from all of the participants. I listened, but it was like trying to sip water from a fire hose. This is some of what I heard: polyalphaolefin (PAO), polyalkylene glycol (PAG), diesters, polyol esters, group I, group II, ball bearings, tapered roller bearings, environmental conditions, speeds, loads, temperatures, food grade, non-food grade, helical gears, herringbone gears, pins and bushings, hydraulic pressures, pneumatic actuation, cubic feet per minute (CFM), rotary screw compressors, blowers, exhaust fans, viscosities, elastohydrodynamic lubrication, combustion engines, pulverizers, ball mills, open gears, automatic lubrication systems, My response to all of this: "Ahhhhhhh ... make it stop!"

The flow of information seemed endless. I thought to myself, "Wow, this is what maintenance and operation personnel must feel like every day. They must be overwhelmed! How in the world do they sort through all of it and still protect the 'rights' of the equipment (right lubricant, right place, right time, right amount, right quality, right personnel)?"

To make matters worse, there are fewer and fewer of these personnel, forcing them to take on more responsibility. They cannot afford to make a mistake. Cost per downtime hour is outrageous in manufacturing. The pressure on lubrication technicians must be intense.

Embrace the information overflow

I found myself pondering ways that we could help these overloaded lubrication technicians. How can we take the abundance of information and the potential confusion related to equipment lubrication and wrap our arms around it – not to contain it but to embrace it and turn it into a positive? How can we use all of the information to increase production output while decreasing downtime? How can we turn this equipment lubrication monster into a money-maker?

First, let us look at what we are trying to accomplish with a lubricant. At its most microscopic layer, no matter the piece of equipment, we are simply trying to separate two opposing moving metal surfaces with a very thin layer of oil. When I say thin, I mean two to seven microns thin. Remember, the smallest size we can see with the naked eye is forty microns.

Start with viscosity

If viscosity is the most important variable when selecting a lubricant, how do we know what viscosity oil to choose? Should we just use the OEM-recommended oil?

Think of the tolerance between the opposing moving pieces of metal as a gap that needs to

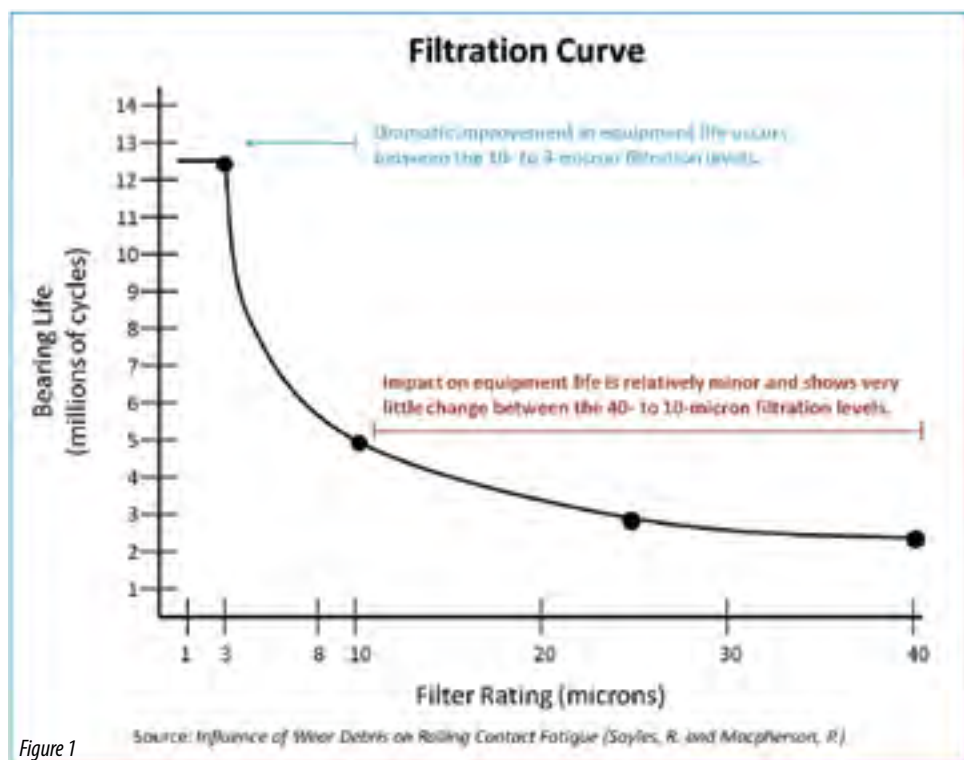


Figure 1

be filled. If the tolerance is tight like in an engine, it needs a thinner viscosity oil to fill the void. If the tolerance is loose like in a gearbox, it needs a thicker viscosity oil to fill the gap.

Can it really be that simple? Unfortunately, no. There are many other variables to consider, such as contamination and its effect on surface separation.

Don't forget contamination

Leading bearing manufacturers tell us that 60% to 80% of all bearing-related failures are contamination-related. For the sake of this article, we will consider contamination to be particulate ingress of some kind, although water ingress is equally as detrimental.

Figure 1, which is based on a helicopter gearbox test, shows that the roller bearings only had marginal lifecycle increases when the oil was filtered of particles ranging from forty microns down to ten microns. A twenty-five micron rating is where filtration starts and finishes on most standard systems with an in-line filter. These results indicate that standard lubricant filtration will not effectively increase the life of the equipment that we depend on to make a profit.

For improved cleanliness that significantly impacts equipment lifespan, we need to take the oil offline, slow it way down, clean and condition it with quality filtration equipment, and then put it back in-line to perform its designed function. Look at the dramatic improvement in bearing life when we make it a point to improve the filtration below the ten micron level. When we improve from ten to three micron cleanliness levels, we go from five million to twelve million cycles of improvement – a more than twofold increase in bearing life.

At this point, the world of separating two opposing moving metal surfaces with a thin film of oil and the world of contamination come together. This is also the point where we can take what some people think of as a difficult task and turn equipment lubrication into a thing called making money.

Proper lubrication + contamination control = profits

It makes sense. If we can limit the number and size of particulates that enter our oil reservoirs to as small as or smaller than the film of oil we are counting on to run interference between two opposing moving metal parts, then we can accomplish the following:

- Lengthen lifespan of parts, equipment and lubricant
- Increase time between failures/increase production
- Reduce friction, heat and wear
- Reduce energy consumption
- Reduce oil temperatures
- Increase oil change intervals/decrease waste oil/decrease new oil purchases
- Increase profits.

know, but bear with me for a moment. If your lube room is a contamination nightmare with drums being stored on bare concrete, bung-holes left open or filled with dirty rags, open top galvanized transfer containers with an inch of who-knows-what oil in the bottom, and dirty funnels lying about, then you are destined for failure. You might not fail with the Man upstairs, but you certainly will experience failure with the life of your oil and, more importantly, with the equipment that you rely on to make a profit.

(See Figures 2 and 3.)



Figure 2



Figure 3

It's up to you

So, make it a personal decision to be responsible for the protection of the equipment assets that your company relies on to make a profit, as well as the protection of the lifeblood of those assets – the lubricant. If you do, your reward will be increased uptime and an improved bottom line.

Remember, you are the one paying for the cost of failure – not the machine supplier, not the oil supplier, not the bearing supplier, not the filter supplier and not the analysis laboratory. All of these suppliers would love to sell you more stuff; trust me. Ultimately, it is up to you to decide what is best for your company. When you do decide, know that there are certified lubricant suppliers ready and able to assist you with the implementation of a comprehensive reliability program.

If you do not already have in place a lubrication reliability program playing a major role at your facility, there is no better time than the present. The old saying holds true: "Pay me now or pay me later," or said another way: "Don't pay for the cost of reliability with the consequences of unreliability."

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