

Equipment: The Manufacturing World Runs on a Film

By Terry Harris

The manufacturing world runs on a film. This film is called lubrication. Manufacturing and the entire world operate on a film of lubricant. This term has been used for years, and it's more than just a mere reliability phrase. It's the reality of the way equipment keeps functioning day after day. The knowledge of this area of reliability is the one that most people understand the least.

We all change the oil in our vehicles every 3,000 miles, and if we do this function at this interval, we can operate our vehicles for 150,000 miles or more. But could we operate them for 500,000 miles with more knowledge of lubrication? Some trucking companies who have changed their lubrication programs are getting close to 1,000,000 miles before an engine rebuild. The standard 10 years ago was a rebuild every 250,000 miles. Could our equipment in our manufacturing plants operate for 3 to 5 times longer if we had more knowledge of lubrication? The answer is yes! The knowledge to be acquired is immense.

I am sometimes asked, "Is there one thing I can do in reliability that pays the biggest dividend for the investment?" My answer is always a "Lubrication Excellence Program." Some of the things we don't know in doing preventive maintenance (PM) work and lubricating our equipment actually reduces the life of our valuable assets. When I was growing up at home I had the duty of changing the oil in the tractors and the family car. We had a funnel on the shelf in the garage, and we kept that same funnel until I turned 17 years old. Then I bought a new one at Kmart that had a flexible extension on the bottom...the newest thing in home technology at the time. Not as technical as

Brownian Technology, but for the farm boy, great stuff.

Back to my original funnel, it was the same funnel for 17 years in the garage with the same old shop rag stuffed in it to keep the dust out. I must have used that funnel a 100 times along with the steel spout that I pushed into a metal-top oilcan. If that wasn't around it was the screwdriver and punch a couple of holes in the can and dump it in. How much dust and dirt was in that funnel and shop rag that I dumped into the engines on each change? When I asked my dad about this a few years ago he said, "No big deal, the oil filter takes all that stuff out".

Well here are the facts on lubrication. The oil film on rotating parts, depending upon load on the equipment, is 1 to 5 microns. Common dust and dirt in your house is 40 microns. Fine talcum powder is 20 microns. Red blood cells are 5 microns. So what happens in our lubrication practices when we put 40-80 microns particles into rotating equipment such as bearings, gears, and other high tolerance parts? The equipment components grind these particles into very small pieces, and while doing so, it wears out the equipment components. It's like putting boulders into the equipment and using the precision surfaces of the bearings and gears to grind them up.

Well what about my dad's theory that the filter will take them out. Up until 6 years ago there was not an automotive filter on the shelf at most stores that would even take out any particles under 40 microns. Some were out that would filter down to 25 microns but not 25 absolute. Are there filters that can filter to 5 microns available for your car today? Yes, but not easy purchased. Are they using them on trucks that are getting close to 1,000,000 miles? Very likely.



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Lubrication excellence programs are designed around filtering all oils down to 5 or 10 microns absolute. This even includes new oils, which we all assume are clean, but are far from it. I have tested new oils from the drum and found 40 micron particles in the oil sample. Lubrication excellence programs are designed to keep the oils and greases at this 5-micron level throughout the facility. This takes special equipment and some specialized training for everyone.

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Lubrication programs outline oil-testing procedures for oil products that are already being used in our rotating equipment and how to filter out the contaminants. If you think about a hydraulic pump application, these pumps run continuously and maintain a constant pressure. The oil continuously circulates through the pump and back to the reservoir. In an application where the oil is dirty, you are circulating dirt through the pump and wearing it out prematurely. The difference between filtering the oil with a 10-micron absolute filter and using a standard 40-micron nominal filter is that the particles circulated through the pump components are reduced by 3000 lbs of dirt per year. This is just on a small sized hydraulic system.

On plant systems that are greased with grease guns, every time grease is pumped into the zirk

fitting, dirt particles that have accumulated since the last grease application are pushed in too. Over the course of a year, when greasing every week, you add up to 2000 particles to the component. When the bearing fails after two years, and you open and see the black grease, it's black because of the metal from the bearing that has been ground up into the grease. I have seen bearing caps pulled at plants with lube excellence programs, and the grease is the same color as when it was new.

Other factors that affect lubricants are heat and moisture. Controlling the temperature of the lubricants and equipment add years to the lubricants life. Keeping moisture out of lubricants also adds years to the life of equipment. These two items alone can be a 3 to 5 time life improvement. Lubrication storage areas should be temperature and humidity controlled.

These comments are just the basics of a Lubrication Excellence program. The entire process takes months of training and procedures. But most importantly it is a total cultural change and takes dedication from all levels of the operation to achieve. CROWN has the resources to provide this service to any type of process operation. ☞



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