

## 3 Reasons Why Lube Oils Fail

I've been asked recently if it were possible to just clean (filter) an oil, re-additize it and put it back in service. This begs an even better question – why do we have to change oil in the first place? There are several reasons for having to drain and refill a reservoir. The major players are contamination, degradation of the base oil and the loss of specific properties provided by additives.

### Contamination

Contamination can be thought of as anything entering the lubricant that is not intended to be there. It can be anything and everything. Examples of external sources are dirt, water and process-related liquids or materials. If these contaminants cannot be removed from the system by means of filtration, dehydration, etc., a more drastic approach will need to be implemented (i.e., an oil change).

A form of contamination that's often forgotten about is from internal sources. Machine wear and oil degradation byproducts must be treated the same as the external sources.

So what happens if we leave the contamination in the system? This depends on what contaminant has infected the system. In nearly every case, these contaminants will decrease the life expectancy of the asset when left unchecked.

### Oil Degradation

Oil degradation, specifically oxidation, is another thing that will trigger an oil change. Oxidation occurs when atmospheric oxygen combines with hydrocarbon molecules and undergoes a chemical change. This chemical change results in the catastrophic and permanent change to a different chemical make-up for the oil molecule. The rate at which the oil molecules react with the oxygen depends on a number of factors, but the most prevalent is temperature.

Like many other chemical reactions, oxidation rates increase exponentially with increasing temperature, as governed by the Arrhenius equation. A good rule of thumb to use is that oil oxidation doubles for every 10 degrees Celsius above 75 degrees Celsius. Another way to look at it is that for every 10 degrees Celsius the temperature is increased, you halve the life of the oil.

So what happens if you let the oil degrade? The eventual breakdown of the molecules is inevitable. It can be prolonged by keeping the oil clean, cool and dry, but it will eventually happen. When it does, the byproducts of the reaction are harmful for machine health.

First to form are carboxylic acids. These acids are relatively weak, but they can start to corrode machine surfaces if left in a system for a great deal of time. Left unchecked, the now heavily oxidized oil will start to form sludge and varnish. This sludge and varnish can cause filter plugging, blockage of critical oil clearances, valve stiction and many other precursors to machinery failure.

## Additive Depletion

Many additives are consumed or chemically depleted while performing their function. This means that when they are used, they are done. There's no coming back. After being totally consumed, the additive can no longer provide the special property it was imparting on the base oil. The lubricant's performance then suffers, and again the oil must be changed.

No more additives left in reserve? Detergents, dispersants, viscosity improvers and anti-scuff and corrosion inhibitors are just a few of the many additives oil companies are blending into lubricants to complement and enhance the performance of the base oil. Each one of these additives has a finite life, and when they reach the end of that life, you can forget about any advantage they helped provide. Some machines rely heavily on this advantage, and when it goes, so does the life expectancy of the machine.

These three factors are why we change oil. No matter what you do, eventually you will have to change it. However, the cleaner, cooler and drier it is kept, the longer you will be able to go between those changes.

[Machinery Lubrication \(8/2011\)](#)

## About the Author



### [Jeremy Wright](#)

Jeremy Wright is a Senior Technical Consultant for Noria Corporation.

**Click link to go to original website page - <http://www.machinerylubrication.com/Read/28526/why-lube-oils-fail>**

[Jeremy Wright](#), Noria Corporation

Tags: [contamination control](#)