What Are Synthetic Lubricants? *

In the 1930s, Dr. Hermann Zorn of Germany was searching for a lubricant with the properties of natural oils derived from crude oil but without the undesirable properties (high pour points, tendency to gum or gel in combustion engines, low oxidation resistance at higher temperatures, etc.).

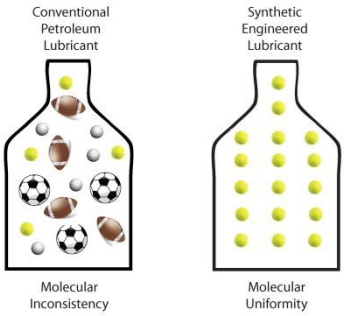
Because of the increasing scarcity of crude oil, the first real-world trial for these lubricants came during World War II when both Germany and U.S. forces began using synthetic base oil in aircraft engines. They noticed the synthetics made engine starts much easier in colder climates and significantly decreased soot deposits that would build up in oil radiators when using conventional lubricants.

Mineral based lubricants are refined from crude oil. Crude oil contains millions of different kinds of molecules, many of which are similar in weight but dissimilar in structure. Refining the crude oil is a process of physically separating light from heavy oil fractions.

Synthetic lubricants are not refined. They are produced by chemical synthesis. They are **pure** because they are derived from pure chemicals and contain no contaminants..

With regard to their chemical purity, think of the analogy of a container of balls. **Mineral oil** would be like having the container filled with many different balls of different shapes and sizes, such as footballs, baseballs, tennis balls, ping-pong balls, soccer balls, golf balls, etc. Mineral oils contain thousands, if not millions, of different chemical structures (molecules).

Synthetic oil would be the equivalent of having the container filled with just one type of ball (tennis balls). Every structure in the container of synthetic oil is almost identical to the structure beside it.



The main service difficulties within mineral oils are:

- The presence of waxes, which can result in poor flow properties at low temperature.
- Poor oxidation stability at continuously high temperatures, which can lead to sludge and acid buildup.
- The significant change in viscosity as the temperature changes, which can cause the base oil to thin excessively at high temperature.
- A practical maximum high-temperature application limit of about 125 degrees C (250 degrees F) above which the base oil oxidizes very rapidly. It is desired to keep mineral oil based lubricants within the operating range of 40 to 65 degrees C (100 to 150 degrees F).

The main advantages of synthetic oils are:

- Their ability to outperform mineral oils at high operating temperatures (above 185 degrees F) and, at low operating temperatures (below 0 degrees F).
- Because of their molecular uniformity, they excel at:
  - Reducing friction
  - Improving fuel efficiency
  - Reduced heat
  - Reduced component wear
- Higher oil film strength
- Extended warranties by some equipment manufacturers
- Lower engine hydrocarbon emissions
- Extended drain intervals
- Natural detergency
- Higher viscosity index which extends their service life.

* Source: Various articles from Machinery Lubrication Magazine– machinerylubrication.com