



*Oils...  
Mineral or  
Synthetic?*

**Which is best...?**

There is no simple answer to this question of course as there are many different types of both Mineral oils and Synthetics as well as an even larger range of potential applications.

If however we consider these two simple descriptions...Mineral and Synthetic, in the majority of applications Synthetic oils will out perform the Mineral oils, however the cost of the Synthetics will also be higher. In some cases, the cost of the Synthetic oil can be several hundred times the cost of a basic mineral oil...however in some applications the synthetic is the only choice for ultimate performance and reliability.

In order to understand what we are talking about we should quickly outline the different types of oil available...

- **Vegetable oils (or animal oils)**
- **Mineral oils (Natural Hydrocarbon)**
- **Synthetic Hydrocarbon**
- **Synthetic Non Hydrocarbon**

These can be further subdivided and taking each in turn we can compare their merits as lubricating oils

**Vegetable Oils** are cheap and biodegradable however they are naturally variable in quality, there is a limited range and they are unsuitable for extreme temperatures. They are also chemically unstable.

**Mineral oils (Hydrocarbon)** are derived from Crude oil. They are relatively cheap, have moderate chemical stability, they are available in many different grades however they are also unsuitable for extreme temperatures. They are also less biodegradable.

**Synthetic Hydrocarbons**

**Polyalphaolefins , PAOs**—synthetically produced Mineral oil without the impurities, higher temperature resistance, less lacquer and can use the same additives as Mineral oil.

**Poly alkeylene Glycols, PAGs**—Can be oil & water soluble or neither, they have a very low lacquer, higher temperature resistance however additives are generally less effective

**Esters, Diesters, Triesters & Polyol Esters**  
Higher temperature resistance than PAGs or PAOs however they also more expensive. Polyol Esters are more expensive than Triesters which are more expensive than Diesters. Temperature capability rises with price. Polyol Esters are also biodegradable.

**Synthetic, Non Hydrocarbon oils**—these are generally Silicones, Fluorosilicones and Fluorinated oils or PFPEs.

**Silicones** have a wide operating temperature range and are generally compatible with most non silicone based materials. They are expensive.

**Fluorosilicones** have an even wider temperature range and are even more expensive.

**Fluorocarbons (PFPEs)** - far and away the ultimate performance oil with respect to chemical & thermal stability with the widest operating temperature range, they are compatible with almost all materials and resistant to all factors that degrade most oils. They are the most expensive however the performance is unequalled in most applications.

In order to choose the most suitable oil for an application we must consider many factors including the operating temperature range, speed of movement, loads and dynamics of the application and the environment around the application, eg. are there any chemicals, solvents acids etc. Health and safety and environmental factors should also be considered, sometimes lubrication intervals can be increased dramatically by using a synthetic oil... therefore proving very cost effective in use.