Synthetic oils

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Synthetic lubricants were first synthesized, or man-made, in significant quantities as replacements for mineral lubricants (and fuels) by German scientists in the late 1930s and early 1940s because of their lack of sufficient quantities of crude for their (primarily military) needs.

A significant factor in its gain in popularity was the ability of synthetic-based lubricants to remain fluid in the sub-zero temperatures of the Eastern front in wintertime, temperatures which caused petroleum-based lubricants to solidify owing to their higher wax content. T

he use of synthetic lubricants widened through the 1950s and 1960s owing to a property at the other end of the temperature spectrum, the ability to lubricate aviation engines at temperatures that caused mineral-based lubricants to break down. In the mid-1970s, synthetic motor oils were formulated and commercially applied for the first time in automotive applications. The same SAE system for designating motor oil viscosity also applies to synthetic oils. A common problem encountered when people began switching to synthetic oils was leakage. Owners of cars, especially older and vintage automobiles, found that their cars, that did not leak using conventional oils, suddenly had leaks all over with the synthetic oils. This remains to be a problem today, although it has encouraged many vintage car owners to investigate newer technology oil seals for their engines so that they can take advantage of the properties of synthetic oils. Synthetic oil makers have not addressed the leakage problem in a forthright manner, and this has caused suspicion by many consumers that synthetic oils are merely another overpriced oil scam.

Synthetic oils are derived from either Group III, Group IV, or some Group V bases. Synthetics include classes of lubricants like synthetic esters as well as "others" like GTL (Methane Gas-to-Liquid) (Group V) and polyalpha-olefins (Group IV). Higher purity and therefore better property control theoretically means synthetic oil has better mechanical properties at extremes of high and low temperatures. The molecules are made large and "soft" enough to retain good viscosity at higher temperatures, yet branched molecular structures interfere with solidification and therefore allow flow at lower temperatures. Thus, although the viscosity still decreases as temperature increases, these synthetic motor oils have a higher viscosity index over the traditional petroleum base. Their specially designed properties allow a wider temperature range at higher and lower temperatures and often include a lower pour point. With their improved viscosity index, synthetic oils need lower levels of viscosity index improvers, which are the oil components most vulnerable to thermal and mechanical degradation as the oil ages, and thus they do not degrade as quickly as traditional motor oils. However, they still fill up with particulate matter, although the matter better suspends within the oil, and the oil filter still fills and clogs up over time. So, periodic oil and filter changes should still be done with synthetic oil; but some synthetic oil suppliers suggest that the intervals between oil changes can be longer, sometimes as long as 16,000-24,000 km (10,000–15,000 mi) primarily due to reduced degradation by oxidation.

Tests show that fully synthetic oil is superior in extreme service conditions to conventional oil, and may perform better for longer under standard conditions. But in the vast majority of vehicle applications, mineral oil based lubricants, fortified with additives and with the benefit of over a century of development, continues to be the predominant lubricant for most internal combustion engine applications.