VISCOSITY INDEX IMPROVERS

As a lubricant basestock is subjected to increasing temperatures it tends to lose its viscosity. In other words, it thins out. This leads to decreased engine protection and a higher likelihood of metal to metal contact. Therefore, if this viscosity loss can be minimized, the probability of unnecessary engine wear will be reduced.

This is where viscosity index (VI) improvers come in.

VI improvers are polymers that expand and contract with changes in temperature. At low temperatures they are very compact and affect the viscosity of a lubricant very little. But, at high temperatures these polymers "expand" into much larger long-chain polymers which significantly increase the viscosity of their host lubricant.

So, as the basestock loses viscosity with increases in temperature, VI improvers “fight back”
against the viscosity drop by increasing their size. The higher the molecular weight of the polymers used, the better the power of "thickening" within the lubricant. Unfortunately, an increase in molecular weight also leads to an inherent instability of the polymers themselves. They become much more prone to shearing within an engine.

As these polymers are sheared back to lower molecular weight molecules, their effectiveness as a VI improver decreases. Unfortunately, because petroleum basestocks are so prone to viscosity loss at high temperatures, high molecular weight polymers **must** be used. Since these polymers are more prone to shearing than lower molecular weight polymers, petroleum oils tend to shear back very quickly. In other words, they lose their ability to maintain their viscosity at high temperatures.

Synthetic basestocks, on the other hand, are much less prone to viscosity loss at high temperatures. Therefore, lower molecular weight polymers may be used as VI improvers.

These polymers are less prone to shearing, so they are effective for a much longer period of time than the VI improvers used in petroleum oils. In other words, synthetic oils do not quickly lose their ability to maintain viscosity at high temperatures as petroleum oils do.

In fact, some synthetic basestocks are so stable at high temperatures they need NO VI improvers at all. Obviously, these basestocks will maintain their high temperature viscosities for a very long time since there are no VI improvers to break down.