



## TECHNICAL BULLETIN

March 2015

### WHAT IS IN YOUR OIL AND WHY!

Firstly, there have been some questions lately about why Finished Lubricants have not fallen in price as we have all seen a significant fall in fuel pricing over the last 6 months. Both Petrol and Diesel are made from sweet or sour crude oil which is also the raw material for Group 1, Group 11 and Group 111 Lubricant Base Oils so it's a very fair question to ask.

However the only thing they share in common is that they start life from the same raw material. The process for Lubricant Base Oil is completely different to Fuel Oils. Base Oils for Lubricants can be Mineral, Semi-Synthetic or Synthetic.

These Base Oils are also only the starting point for Finished Lubricants which also must contain a significant amount of specialized additives to do the job required. These additive packs can be as much as 25% of the formulation and contribute considerably to the overall cost of the product.

I hope this explains it - the bottom line is that Fuel Oils are completely different to Finished Lubricants.

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### SO, LETS HAVE A LOOK AT WHAT THESE BASE OILS ARE AND HOW THEY PERFORM

In a five litre pack of motor oil approximately 4 litres is lubricant base oil the rest is additives. The American Petroleum Institute (API) classifies five different base oils as below.

**Group 1** - Conventional Solvent Refined Mineral Base Oil - These contain impurities including wax, sulphur and other undesirable properties. They have limited temperature and oxidation resistance and have the poorest performance of all the base oils.

**Group 11** - Hydrocracked Mineral Base Oil - These are very pure mineral oils and appear water clear they have superior temperature and oxidation resistance compared to solvent refined base oils. They don't contain the impurities of solvent refined base oils and easily outperform them.

**Group 111** - Synthetic Hydrocracked Base Oil - These are severely hydrocracked and are a step up from group 11 base oils. Produced from crude oil base stocks these must have a viscosity index of 120 + to be called synthetic. They are very pure, have good thermal stability and resist oxidation very well. They are lower cost alternative to traditional synthetic base oils.

**Group IV** - PAO (Poly-Alpha-Olefin) Synthetic Base Oil - These are manufactured by catalytic oligomerization of linear alpha olefins. They are man-made Hydrogenated (saturated) olefin Polymers. They are true synthetic base oils, very slippery, wax free and able to flow at very low temperatures. They have very high thermal stability and outstanding resistance to oxidation. PAO synthetic base oils are considered superior to group 111 synthetic hydrocracked base oils.

**Group V** - Ester Synthetic Base Oil - These Base Oils are produced from carboxylic acids and alcohols which are very common chemical building blocks. They are not very common in motor oil but are excellent at high temperature. They have a similar performance to PAO synthetics.

The second part of the equation is the Additives which are critical to all finished lubricants.

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## **ADDITIVES: WHAT ARE THEY CALLED AND WHAT DO THEY DO....**

**Anti Wear Agents** – These prevent wear due to seizure or scuffing of rubbing surfaces they are normally zinc, phosphorus or other materials.

**Detergents** – These lift any deposits from the surface of the engine and neutralize any acids, all modern engines have detergents.

**Dispersants** – These keep contaminants and sludge suspended in the oil which prevents deposits forming in the engine. We all know sludge kills motors so dispersants are very important.

**Extreme Pressure Additives** – These are designed to protect highly loaded gear applications from wear under high pressure. They are common in gear and differential lubricants.

**Friction Modifiers** – These reduce friction between metal surfaces they can be effective to reduce fuel consumption and are more common in low viscosity fuel efficient lubricants.

**Foam Depressants** – These stop foam forming by altering the surface tension of the oil and facilitating the separation of air bubbles from the oil phase.

**Oxidation Inhibitors** – These reduce the effects of oxygen and acids on the oil. They reduce oil thickening particularly at high temperatures. Oxidation shortens the life of the oil.

**Pour Point Depressants** – These help the oil flow at low temperatures by reducing the oil's tendency to crystallize.

**Rust and Corrosion Inhibitors** – The name says it all they prevent rust and corrosion from forming on metal surfaces.

**Viscosity Index Improvers** – Before we had these we only had mono grade oils. These make multigrade oils work. They are polymers that reduce the thinning out process at temperature.

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### **SUMMARY**

I hope this helps everyone understand the complex and balanced formulations that go into finished lubricants. They are constantly changing and improving with the goal of protecting your engine.

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**Thanks and stay tuned for a special offer.**

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