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NEWSLETTER

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Synthetic Lubricants

We often get questions on the difference between the various types of lubricating oils: mineral-based, synthetic-based and bio-based oil.

We will deal with mineral and bio based oils in subsequent issues. A symplistic explanation is that mineral oils are refined petroleum products whereas bio-based oils (most being vegetable oils), are extracted from various crops such as soya, corn, canola, etc. A fourth type of oil, namely re-refined oil is also considered as base oil. However, in this article will be focusing solely on synthetic oil.

Synthetic Lubricants

Synthetic base oils are produced through chemical synthesis. They are used in as many applications as mineral based oils : industrial processes, heavy-duty engines, hydraulics, transmissions, gearboxes, metal working, etc . Most of them offer better biodegradability than mineral oils and are considered non toxic. Prices however are higher due to higher production costs.They are more expensive to dispose of in an environmentally friendly manner.

There are four main types of synthetic oils: polyalphaolefins (PAO), polyalkylene-glycols (PAG), ester oils and silicone oils.

Polyalphaolefins (PAO)

Polyalphaolefins (PAO) are similar to and compatible with paraffinic mineral oils. They are widely used in semi-synthetic oils, i.e. : containing a percentage of mineral oil. They are prepared essentially from pure alphaolefins, in order to obtain different viscosities.

PAOs have a high viscosity index, low volatility, good flow properties, a low temperature pour points and high thermal oxidative stability, which means extended oil life as well as reduced toxicity. However, they have limited biodegradability even if they are considered nontoxic. They are particularly found in compressor, hydraulic and engine oils.

The inconvenient of these oils is their limited miscibility and ability to dissolve certain additives, and consequently their limited biodegradability.

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Polyalkylene-glycols (PAG)

Polyalkylene-glycols (PAG) are derived from petroleum synthesized substances and prepared by polymerization of ethylene or propylene oxide. They are used in many applications where petroleum oil-based products do not provide the desired performance. They are fire-resistant and will not harm workers or the environment. Being HFC compatible, they are also used in conditioning systems (HFCs have replaced CFCs as being friendly to the ozone layer). Ethylene oxide based PAGs are soluble in water. They are not compatible with mineral oils, their additives, polyalphaolefins and esters.

Ester Oils

Synthetic esters such as diesters, polyolesters (POEs) and phosphate esters are also considered nontoxic and biodegradable. They offer an environmental friendly alternative to conventional mineral-based oils due to improved energy effectiveness, reduced part wear and biodegradability rate.

POEs offer a longer lifetime, a wide range of viscosity indexes, and oxidation stability. They can be used in most field applications but are specifically effective in compressors (refrigerant systems and air conditioning), high-temperature gas turbines, bearings, gears, oil mist, aircraft engines, hydraulics and heat exchange systems.

Silicones

Silicone oils have a high viscosity index and are mainly used in hydraulics. They are not flammable, which makes them excellent electrical insulators. Their thermal stability and good heat transfer properties make them useful in heating baths (oil baths) or as refrigerants in freeze-dryers. They are also used in dashpots, wet type transformers, diffusion pumps and oil-filled heaters. Their inconvenient is their incompatibility with mineral oils.

Some silicone oils, such as simethicone, are potential anti-foaming agents, so they can't be used in processes where foam is desired, such as in the manufacture of polyurethane foam.

For more information and details on test frequency and prices, contact your technical representative.

WEBINAR – Manage your Oil Analysis Program using the Tribologik® web site

By **Nicholas Reich**
Date : Friday April 25, 2014
Time :

- **Ontario, Manitoba : 12:00 PM, Toronto time**
- **Saskatchewan, Alberta : 10:00 AM, Calgary time**

Duration : 30 minutes

Reserve now with Nicholas : nreich@tribologik.com