



Greased lightning

Champions of environmentally friendly and synthetic lubricants are becoming ever more vocal. But can these alternatives take over from mineral oils? Brian Wall reports

So-called environmentally friendly and synthetic lubricants have been available for some time now in ever growing ranges, tuned to the sheer diversity of industrial requirements. But, while the latter are now in widespread use, particularly for more demanding applications, are 'green' oils finding their way into mainstream usage on genuine cost/benefit grounds, as opposed to their environmental appeal?

The answer would seem to be a cautious 'yes'. Environmentally friendly lubricants based on renewable resources – such as rapeseed oil on the one hand, and synthetic esters on the other – are in increasingly common use. However, while benefits like biodegradability make them ideal for forestry and farming, manufacturing industry and the construction plant equipment sector have been slow to see ecological or economic benefits.

Use your loaf

Following its launch of the Foodlube range earlier this year, Rocol's Rapid Demulse 220 (which has NSF H1 registration) is proving a hit with maintenance engineers in the bakery industry – where it is helping to cut lubricant use by 80%.

Greatest benefits are being realised with Asser equipment, as well as other gearboxes that face water contamination problems. Assers are commonly used throughout the industry and operate in extremely challenging environments on applications such as dispensing jam, mallow and cake, before products are carried through to ovens. But frequent washdown, due to recipe changes or overfilling, often results in the Asser's gearbox oil becoming contaminated with water.

Rapid Demulse 220 is helping address this issue, thanks to its ability to separate oil and water. By fitting new drain plugs, maintenance engineers are now able to drain off water from Asser gearboxes, thus extending the service of the oil five-fold.

Brendan Kendrick, head of Rocol's maintenance lubricants division, says: "Rapid Demulse 220 is delivering tangible benefits for customers who can make significant savings on lubricant usage. The time-saving benefits that this product brings are also extremely important, giving maintenance engineers the opportunity to spend more time on other plant."

The product is designed for operation between -5 and 130°C, and comes in 20 litre and 200 litre packs. It is manufactured from FDA listed ingredients, free from animal-derived materials, nut oils, soya, dairy and genetically modified ingredients.

Green versus quality?

But that may soon change. As energy prices continue to rise, energy saving moves ever further up the business agenda – exacerbated by the Climate Change Levy, with charges of 0.43p per KWh meaning that companies need to reduce power consumption by 12% simply to stand still. Both environmentally friendly and synthetic lubricants may well be a key factor in helping businesses to achieve those cuts in the near future, without in any way compromising performance.

"Convincing manufacturing companies that 'green' is not a pseudonym for 'poor quality' has been one of the most difficult tasks," comments Richard Rogers, industrial product manager at Fuchs Lubricants (UK), a subsidiary of Fuchs Petrolub, the world's largest independent lubricant company. "However, as companies and individuals become more ecologically aware, and take the time to understand the technology behind lubricants

from renewable resources, more are becoming switched on to the economic benefits these products offer.”

Fuchs has been one of the pioneers developing a variety of lubricants from renewable resources since the late 1970s – and proving their value. One extensive UK user of its biodegradable Planto range, for example, is the Eden Project tourist attraction in Cornwall, which, during construction of its educational centre, converted a range of mobile plant to the Fuchs Plantosyn HVI 46 hydraulic fluid. Over a two-year period, despite the extremely dusty and dirty china clay environment and no hydraulic fluid changes, wear rates on moving parts were 10 times lower than equivalent equipment working on



conventional mineral hydraulic oils.

So much for hydraulic fluids; what about metalworking fluids? Is there a role for environmentally friendly and synthetic lubricants here? Coolants firm Master Chemical certainly thinks so. Its new Trim E925 cutting and grinding fluid concentrate is a hybrid, based on a blend of mineral oil and vegetable ester-based additives, which, in trials, has proven itself superior for machining high strength steels, stainless steels, titanium, aluminium and corrosion-resistant aerospace alloys.

Engineering fluids

Why? Vegetable ester technology gives the product extremely high levels of lubrication and excellent cutting performance, without the use of traditional additives. “It is extremely hard-water tolerant and produces little foam, even at high pressures,” explains Master Chemical’s Peter Blenkinsop. “It’s also good for health, safety and the environment, as well as manufacturing quality and productivity.”

So that’s another success, albeit with a different blend. What about the food and beverage industry? Well, if whisky distiller Glenmorangie in Broxburn,

ON A ROLL

More than 80% of all rolling bearings are lubricated with grease – and yet fully 40% of premature failures are caused by inadequate or incorrect selection of such lubricants. So, clearly, selecting the right grease for a bearing and the operating application is important. As Ian Pledger, of bearings manufacturer Schaeffler, says: “Not only will correct selection prolong the life of the bearing, enabling it to operate at full capacity, but it also ensures smoother running behaviour and improved operational safety,”

However, it’s not as simple as it sounds. We all accept that grease is basically a type of oil to which has been added a thickening agent, giving it a more viscous form. But there are many different combinations to match the range of bearing sizes and applications.

Pledger advises that initial selection should be based on two parameters: the ‘P/C’ ratio and ‘ndm’ value. P/C is a measure of the load ‘P’ on the bearing, in relation to the dynamic capacity ‘C’, calculated according to international standards and quoted by leading bearing manufacturers.


In general, if the P/C ratio is greater than 0.15, the bearing is regarded as heavily loaded and special lubricants, with extreme pressure additives, are required to increase the load carrying capacity of the bearing and to prevent metal-to-metal contact, which leads to wear and premature failure. Incidentally, it is also important to keep the P/C ratio above 0.02 as, below this value the bearing will generally skid, rather than roll – again resulting in premature bearing failure, due to increased friction. To avoid slippage with caged ball bearings, engineers should work on a P/C of 0.01, while for caged roller bearings a P/C of 0.02 is advised.

As for ‘ndm’, its value is calculated from the speed of the bearing ‘n’ in rpm and the bearing mean diameter ‘dm’ in millimetres – giving an indication of the relative speed of rotation to the physical size of the bearing. In general, if the ndm is below 400,000, then standard, general-purpose bearing greases can be used. For ndm values in excess of this, special greases are required, with relatively low base oil viscosities to reduce the heat generated by the bearing rotating at high speed.

Bear in mind that, with recent developments on both bearings and grease lubricants, it is quite possible to achieve ndm values up to 2,000,000. However, while grease lubrication is inherently simple, there are many bearing applications where oil is the only choice, since it can remove heat generated in the bearing due to load and speed. If you are using oil jet lubrication, ndm values up to 4,000,000 are achievable.

Schaeffler and others work with lubricant manufacturers to develop special greases for all sorts of rolling bearings. “We conduct a series of in-house tests on the lubricants to determine their service life, friction and wear characteristics,” explains Pledger. “Only the best-performing greases are then selected to undergo subsequent tests under simulated field conditions. If the grease fulfils Schaeffler’s stringent tests, it is decorated with the Arcanol seal of quality.”

Scotland, is anything to go by, biolubes are again making their mark. Glenmorangie’s world-renowned Single Highland Malt Whisky is produced under a TPM (total preventative maintenance) programme, using Petro-Canada’s Purity FG ‘plant tough, food safe’ lubricants and lubricant management package.

“Using Purity FG food safe lubricants is consistent with our commitment to our customer to supply nothing but the highest quality product,” says Chas McEwan, engineering manager for Glenmorangie. “We confidently ensure this by using the highest quality products in every aspect of our operation.” Which speaks volumes. 



Pointers

- Biodegradeable hydraulic fluids, used on mobile plant at the Eden Project, massively outperformed conventional equivalents
- Vegetable ester technology hugely improves cutting performance in fluids for metalworking
- Greases for bearings need to be selected carefully, according to the P/C ratio and specific ndm value
- Oils may be necessary for high speed bearings to meet thermal management specs