



Lubricants are not all manufactured equal. With today's emissions-busting heavy-duty diesels, they must be crafted to meet tight performance criteria. Brian Tinham reports

Reaching the

Mineral or fully synthetic?

So which is best: mineral or synthetic base stock? Well, a lot depends on whether your fleet operates in North America or Europe. In the former, highly-refined mineral oils are considered top dog. Talk to European fleet engineers and the opposite is true, with fully-synthetic regarded as synonymous with quality.

Look at Exol Lubricants' latest Taurus Euro 5 10W/40 low SAPS formulation and Fuchs Lubricants' Titan Cargo MAXX 5W/30 XTL, zinc-free, extreme fuel-economy (claimed to cut fuel consumption by up to 1.8%) oil. Both proudly proclaim their fully synthetic heritage.

Exol's latest claims excellent thermal stability, low volatility, long-life, reduced oil consumption, better fuel efficiency and outstanding anti-wear and anti-corrosion. It is approved for Mercedes-Benz, Volvo, Renault and MAN trucks. Meanwhile, Fuchs says its lubricant was developed to cope with Euro 6 after-treatments and turbochargers. It also claims better cold starting (23% more pumpability), lower oil usage (27%) and reduced emissions. Approvals include MAN (M 3477), Mercedes-Benz (MB 228.51), Renault (RXD/RLD-2) and Volvo (VDS-3).

But turn to Petro-Canada and you'll be told of the virtues of "99.9% pure, crystal-clear" mineral oil, as used in its Duron UHP 10W/40 engine oil, formulated for European heavy-duty engines. Among the claims are better resistance to oxidative thickening, cleaner engines and extended drain intervals. It is also said to meet or exceed ACEA E6, E7 and E9, while surpassing major (unnamed) European OEM standards "by as much as 50%".

Technology changes everything and – particularly with the advent of today's even more sophisticated Euro 6 heavy-duty diesel engines – that includes the oils designed to help them run smoothly.

Much the same is true of vehicle transmissions. Indeed, behind the scenes, the major lubricant formulators have been working alongside engine, gearbox and truck manufacturers for years, primarily to optimise their formulations for performance – in terms of wear, corrosion, soot and deposit resistance – but also to improve fuel efficiency.

Richard Tucker, general manager of technology for fuels and lubricants at Shell Technology, describes the process as "co-engineering partnerships", with all parties looking at how to optimise the total system. And what that means, he says, is that, whereas once there was room for using generic oils, today that is much less the case. "If you want to get the most out of your vehicles – and that includes minimising maintenance, and maximising efficiency and longevity – you need to specify lubricants designed specifically for those vehicles," insists Tucker.

Convinced? Many may not be: after all, surely one low SAPS (sulphated ash phosphorous and sulphur) SAE 10W/40 synthetic oil is much the same as any other? So why would you pay a penny more per litre than you have to, certainly once your truck is out of

warranty? Well, no: lubricants – even those with similar specifications – are far from all the same. In fact, it turns out that buying on price alone is often a case of penny wise, pound foolish, with those managers brave enough to admit to it repenting their mistake when maintenance costs start to spiral.

“Enlightened fleet engineers are those who work with their suppliers to get lubricants that are optimal for their vehicles, but also their working practices,” comments Martin Mann, technical director with Millers Oils. And that applies to everything from power steering systems to transmissions and differentials, not just engines. “We worked with one large bus and coach operation, for example, and, by looking at how they maintain their vehicles and the available additive packages, we increased the drain interval on their transmissions up to 120,000km – more than double their previous practice.”

For Shell’s Tucker, though, getting this right starts with the OEMs (original equipment manufacturers).

parts



He cites Rimula R6 LME (low emissions, extended maintenance and fuel economy), one of its ‘top tier’ 5W/30 lubricants. “Our formulations team worked with Daimler on that, developing an additive package to meet the LME criteria, but one that was specifically also compatible with new after-treatment technologies. We installed some of their engines in our test facilities in Hamburg for early trials and then ran prototype oils in heavily-loaded vehicles in South Africa, using high-sulphur fuel, to get accelerated real-life testing.”

Proven fuel economy

That oil now meets Euro 4, 5 and 6 requirements; it is low SAPS; and Shell claims outstanding engine cleanliness and the longest drain interval for any 5W/30. There’s also a proven 2% fuel economy benefit, compared with 10W/40 oils. As Tucker says: “That’s a significant amount of fuel for anybody running a large fleet. And it shows the fuel economy that can be achieved over the entire lifetime of an oil.”

In fact, that 2% fuel saving was independently verified on supermarket chain Morrisons’ fleet of DAF trucks a couple of years ago, with controlled tests using 10 identical trucks and routes over 100,000km. Five of the DAFs used Rimula R6 LME and five a 10W/40 reference. Given the fuel savings and the excellent condition of the vehicles after the

Balancing act

Whereas low SAPS oils came to dominance five years ago, lubricant formulators are now moving beyond mere anti-wear and anti-oxidation properties. Shell’s Richard Tucker explains that it’s about selecting base oils, performance additives and viscosity modifiers (polymers that alter characteristics as a function of temperature) not only to optimise engine performance – by minimising friction, while maximising durability of the engine and the oil under various temperature, pressure and shear conditions – but also to do so in line with fuel efficiency.

“That’s the balancing act for today’s additive packages,” he says.

Tucker cites the need for protection against wear in everything from the valve train (where sliding and rolling are the issues), to pistons and liners (shear rates and temperatures) and engine bearings – especially the big end, which is subject to corrosion from acids that are an inevitable product of combustion. But he also points to the requirement for oil to prevent sludge build-up and deposits, particularly in components such as turbochargers and intercoolers – all the while also protecting against thickening over time (due to poorly controlled soot or oxidation) or thinning (as a result of excessive shear or fuel dilution).

As for the future, the lubricant industry is moving towards redefining viscosity downwards, in line with HTHS (high temperature, high shear) characteristics, such that oil specifications more closely replicate what actually happens inside heavy-duty diesel engines. “Momentum is building in the US, where the API [American Petroleum Institute] is working to replace the API CJ-4 specification.”

trial (no visible wear or deposits), Rimula R6 LME engine oil, Shell Spirax S6 AXME axle oil and Shell Spirax S6 GXME gear oil were subsequently rolled out across the entire fleet.

So what should you be specifying? The oil industry is clear: no one recommends contradicting the truck manufacturers’ specifications, particularly during warranty. That said, when vehicles move out of that protection, two points are worth making. First, many modern high-spec lubes lend themselves potentially to increasing oil drain intervals (as long as oil analysis is part of the process); and, secondly, if you’re running a mixed fleet, it may be worth going for a specially formulated lubricant that ticks all the boxes for your operation.

Either way, buying cheap oils that claim to meet the ASEA requirements is likely to be a false economy. So it’s worth talking to the experts. TE



Shell Technology's Richard Tucker: co-engineering partnerships are the way forward

