LUBETECH
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REDUCED EMISSIONS AND EXTENDED DRAIN INTERVALS – A NEW DEVELOPMENT?

We are all aware of the advances in lubricant and engine technology which have resulted in substantial improvements in emission levels and engine longevity, together with extended lubricant drain intervals. Tighter engineering tolerances, improved materials of construction, the introduction of engine management systems to better control the combustion process are all factors which have resulted in cleaner-running engines, with the consequently reduced contamination of the lubricant. However, and possibly as a direct result of the reduced lubricant contamination levels, the process of the filtration of engine oil gas has been largely unchanged for decades, in contrast to the technical advances in lubricants and engine design. Last November, an article in the 'Economist' described an accessory which claimed to dramatically reduce emission levels from diesels and increase lubricant operating life by a factor of 6, obviously an issue of extreme interest to lubricant marketers. Although the article itself appeared to contain factual errors and inconsistencies, understandable as it was written by a non-technical journalist for a non-specialist publication, there appeared to be sufficient merit in the claims made for the device to warrant further attention.

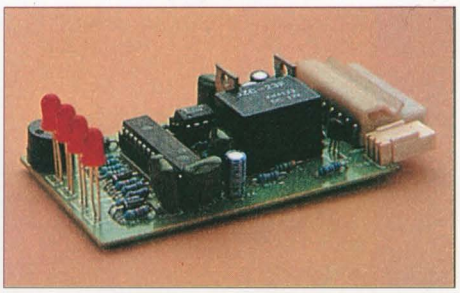
The device, known as the 'Pinmore Electronic Oil Recycler', now marketed through Platinum EOR, is a by-pass oil treatment unit which can be added to any engine and which complements the normal filtration system. Lubricant flow through the device is limited to around 1/3 litre per minute in contrast to the normal 40-50 litres per minute for a conventional full-flow filter. It consists of a 5 micron filter (as opposed to the more conventional 25 micron filter used in full-flow filters) together with a heated chamber containing a plate evaporation system. The oil feed is pre-heated to 120/125 deg. C; the released vapours from the plate evaporator contain water and light hydrocarbons. These are fed back into the combustion chamber in a similar manner to a positive crankcase ventilation system. However, in this case, removal of light ends from the engine oil is far more exhaustive due to the design of the device.

The device has been evaluated by Professor Gordon Andrews, of the Department of Fuel and Energy, Leeds University, and lubricant analyses have been carried out by Dr. Mervyn Jones, of Swansea University. It has been trailled by bus operators in London and Liverpool, who have confirmed apparent extensions to engine longevity in vehicles fitted with the device, and who are extending the numbers of buses so fitted.

Apart from the need to overcome problems associated with fuel dilution, it is unclear as to why else the device was originally developed since there seems to be little in the literature to describe the theoretical justification for the design. It is suspected that the associated marked reductions in emission levels were an unexpected bonus, and could considerably outweigh the original benefits of the device, in view of the current controls on exhaust emission levels. This is supported by statements from Professor Andrews to the effect that they have not as yet developed a satisfactory explanation as to why the device appears to work as well as it does. However, on the basis of the information obtained from carefully-controlled laboratory engine tests carried out by Professor Andrews, the evidence appears to confirm the emission reductions claimed.

The typical emission pattern from a diesel engine filled with fresh oil, but without the device, is that the emission levels are comparatively high at the beginning of the trial, falling to a minimum after some 50 hours running, after which they begin to rise steadily up to the end of the test period at 120 hours. The initial high emission rates are attributed to a loss of lubricant light ends, since it is claimed that the lubricants can contribute significantly to emission levels. However, this is much less the case in a modern low-emission engine. When fitted with the device, the initial high emissions are significantly lower, again falling to a minimum at some 50 hours. At this point, there is however a pronounced increase in emission levels up to values which can exceed the initial levels, but then, and in contrast to the findings without the device, the emissions then steadily declined, continuing to do so up to the end of the test period at 130 hours.

This 'hump' in the emission levels at 50 hours was subsequently seen to be a characteristic in all tests associated with the device, and has as yet not been satisfactorily explained. It is thought to be indicative of a cleaning out of combustion chamber deposits, with subsequently improved combustion conditions. The improvement in combustion performance would understandably result in a reduction in emissions and improved fuel efficiency. The fact that these effects are observed in practice adds weight to the improved



combustion theory, since the insulation effect of deposits leads to increased combustion temperatures resulting in higher NOx levels. Deposits also tend to absorb fuel, which is subsequently desorbed too late to burn efficiently.

As to why the lubricant life is extended is also not clear. Comprehensive analyses of oil samples from two series of extended trials in two Merseyside Transport buses show little evidence of any consistent change in lubricant composition or characteristics. The trials extended to nearly 40,000 miles, and involved a Cummins L10 and a Gardner 6LXB. The only trend observed was the expected increase in wear element content. However, combustion by-products such as acidic compounds are generated on a continuous basis, and would eventually overcome the inherent basicity of the lubricant, unless a purpose-designed extended drain lubricant were in use.

One may well ask why the light ends, etc., burn so much more efficiently following extraction by the Pinmore device and re-injection into the combustion chamber compared with the normal migration route into the combustion chamber.

The theory which has been proposed by Dr. Andrews is that the light ends, when stripped from the lubricant in this fashion and fed back in with the combustion air, burn much more efficiently and without the production of particulates which occurs when combustion takes place at the cylinder wall. We understand these tests are still continuing, and we await the results of long term trials with interest. Also, although it is possible that the device may well extend the useful life of old and out-dated engines, we would be interested in seeing the results of trials carried out in conjunction with modern low-emission engines.

When used with an older engine, we would suggest that the Pinmore-equipped engine would benefit even more from a purpose-designed lubricant.

Further details may be obtained from the BLF Secretariat.

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