



KROON-OIL MAGAZINE
EDITION 9 - 2008



LUBEVISION®

IN THIS EDITION

> SPONSORING
SPONSORING PIEPERS RALLY TEAM

> PRODUCT UPDATE
SPECIALSYNTH MSP 5W40, PRESTEZA MSP 5W30, HELAR SP 5W30

> MARINE/YACHTING
ATLANTIC RANGE

> VISITING
VAN DER WIEL DRACHTEN (NL)

> TECH-CORNER
PVO, PURE VEGETABLE OILS - THE EXPERIENCES



Dear LUBEVISION reader

During the early part of the New Year one looks at the future and often has new plans, the best intentions and shows optimism. In this first edition of Lubevision in 2008, we confirm these thoughts with our own objectives: our development plans, the introduction of new products, additions to and improvements in the services to our customers, in short: we stay on the move! And supported by a healthy increase of 21% in our turnover during 2007 we have every reason to be optimistic!

During the early part of 2008, we will concentrate our efforts to improve our information systems. As you can see, Lubevision underwent a restyling, the colour schemes and lay out are now fully in accordance with our Kroon-Oil house style. Shortly we will introduce a new and improved website, which will be even more customer friendly and easier to use with more information at your disposal. Interesting for our Dutch customers is that one will shortly be able to find the complete and correct lubricants recommendations for all cars by using the Dutch number plate details. Technical and product information will be clearly displayed per market segment and you are continuously provided with the most up-to-date information.

made and are in the process of making some changes and improvements. We extended our packing range with a full colour 60 litres drum. The same Kroon-Oil top products that we deliver in our unique full colour 208 litres barrel will now also be delivered in this full colour drum. In addition we will introduce at the end of the 1st quarter, a complete new Kroon-Oil Aerosol and Pump Spray packing line. This will result in a visual identical packing range for these products and the range of all other Kroon-Oil products in small packs.

We also visited Van der Wiel, who is active and successful in the transport and recycling business. We inform you about developments in the field of water sports/yachting and the role Kroon-Oil plays with their special ATLANTIC range of products. The report of the activities of Pieper Rallysport and the article about the experiences with pure vegetable oils used as a fuel for Diesel engines, also make interesting reading.

I take this opportunity to wish all our readers a healthy and successful business year and of course lots of enjoyment by reading LUBEVISION.

Leon Ten Hove,

Chief Editor

On the packaging side we have already

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IN THIS EDITION:

SPONSORING:

Page 3

Piepers Rallysport team

EXHIBITION

Page 4

Automechanika 2008 -
Frankfurt

PRODUCT UPDATE:

Page 5

Specialsynth MSP 5W-40,
Presteza MSP 5W-30
Helar SP 5W-30

MARINE/YACHTING

Page 6 and 7

Kroon-Oil Atlantic range

VISITING:

Page 8 and 9

Van der Wiel, Drachten (NL)

TECH-CORNER:

Page 10 and 11

Pure vegetable oils
as fuel, the experiences

KROON-OIL IS SPONSORING PRAUTOTYPE 002

"Prautotype 002 is a showcase of what Holland has to offer in the field of automotive engineering. The car is built in accordance with four criteria (entrepreneurship, innovative applications, distinctive design and environmental friendliness) and is meant to inspire the Dutch public and show what our country is capable of. That's why important enterprises are closely involved in this project"

<http://www.rtl.nl/automotor/prautotype2>

rtl7

SPONSORING

Piepers Rallysport CIVIC TYPE-R



ENGINE: HONDA MUGEN
HP: 260 PK
TRANSMISSION: SEQUENTIAL
WEIGHT: 1090 KG
CLASS: R3

For many years the Piepers Rallysport Team has been active and as early as the rally season of 2001, Marcel Piepers and navigator Erik de Wild have made regular appearances at national and international rally events.

(Photo above: practising with the Italian version of Honda Civic Type-R during the Barneveld (NL) rally.)

During the past few years they successfully participated in various rallies in a Honda Civic Type-R (editor: previous model). Since the team won many rallies, they succeeded in becoming National Champion in class N3 in 2006. After this triumph, the team entered the World Championship rally in Sweden in 2007 to prove that they could not only win on roads in The Netherlands, but also in winter conditions in Sweden with lots of ice and snow. But the Team wanted more and plans were made for 2008. For that reason they sold their car and they invested in a new Honda Civic Type-R R3, a unique rally car.

It has taken the Team the best part of a year and numerous visits to Italy where the car was being prepared in a Honda Motor sports workshop not far from Milan, to get her fully prepared and delivered to The Netherlands. The financial implications of what happened in Italy had to be discussed with their sponsors. Kroon-Oil has been a partner and sponsor of Piepers Rallysport for many years and this has given an excellent opportunity for Kroon-Oil to test their products under the most arduous conditions, in snow and ice, under more moderate climatic conditions and under extremely high temperatures in an engine which has to give top performance for extended periods of time. Since the results of using Kroon-Oil products in the rally cars have been excellent, both Piepers Rallysport and Kroon-Oil are interested to continue their association in 2008. In addition it was decided to develop some special lubricants for this unique rally car, all in close contact and cooperation between Kroon-Oil and Piepers Rallysport. During the coming season the Honda rally car will be executed with Kroon-Oil logos.

The Honda Civic is classified as an R3 car, which means cars with an engine capacity of up to 2000 cc. Although the car looks very similar to the "normal" Honda Civic, the rally version has a large air intake on the roof and white 17" rims, with a set of enormous brakes behind them. Mugen, a firm, which also prepares the engines for the Honda F1 team, has prepared the engine of the car. This ensures that the Team has an engine delivering top performance with 260 horsepowers. The engine is connected to a sequential gearbox. This combination, a special suspension system and a total weight of only 1090 KG, all supported by the Honda Motor Sports expertise make the car and the Piepers Rallysport team potential winners in their class in the 2008 rally season. To achieve this result the Team will enter in 8 rallies for The Dutch Championship. However they will not hesitate to also enter in other events in Europe, including the possibility to enter into a World Rally Championship rally.

The activities and results can best be followed on the Piepers Rallysport website: www.piepersrallysport.nl



> AUTOMECHANIKA FRANKFURT 2008

Automechanika is one of the most important international meeting places for decision makers from the automobile sector. Visitors can be sure of finding leading suppliers of workshop equipment, maintenance products, automotive parts and accessories. The fair is unparalleled in terms of size and internationality and an important source of impulses for the latest technologies. Everything that keeps the future of the automobile industry on the move will be exhibited.

Of course Kroon-Oil is present, with an even larger stand and thus more surface to welcome you and to display our products.

You are invited at our stand: Hall 9.1, Walkway A, Stand 66, to discuss our mutual business opportunities and to benefit from our experience, advice and attractive sales promotions.

In the following edition of Lubevision you can read more interesting news about the fair and our present.



Recently some important Kroon-Oil formulations have been updated and up-graded. Accordingly, the products meet the latest requirements of the mid and low SAPS formulations. With these products you meet the most important specifications for new engines with extended oil change intervals and soot filter systems.



SPECIALSYNTH MSP 5W-40



Specialsynth MSP 5W-40 has been fully upgraded. As a result of the special mid SAPS formulation, this product is extremely suitable for use in the latest generation petrol and Diesel engines, with or without soot filter. Specialsynth MSP 5W-40 is also suitable for use in combination with extended oil change periods, provided the car manufacturer supports this.

PRODUCT SPECIFICATIONS:
ACEA A3/B4/C3 (WAS: A3/B3)
API SM/CF (WAS SL/CF)
VW 500.00/505.01/505.00
MB 229.51 (WAS MB 229.1)
PORSCHE BMW LL-04 (WAS LL-98)
FORD M2C917-A

SPECIALSYNTH MSP 5W-40 is available in 1 litre (31257) and 5 litres (31256) and in large packs.

PRESTEZA MSP 5W-30

Presteza MSP 5W-30 is a fuel-efficient synthetic motor oil, specially developed for the latest generation passenger cars, which have been fitted with a soot filter and / or a catalyst. As a result of the special mid SAPS formulation the life cycle of both soot filter and catalyst will be extended. Presteza MSP 5W-30 is suitable for use in petrol and Diesel engines both in passenger cars and vans. In those cases where the manufacturer stipulates this, the oil can be used for extended oil change intervals. Since the oil meets the mid SAPS requirements of Mercedes (MB 229.51) and BMW (BMW LL-04), this product is extremely suitable for use in the latest models of Mercedes and BMW, which have been fitted with a soot filter. Presteza MSP 5W-30 is also suitable for use in all engines, where an ACEA C3 engine oil is prescribed.

PRODUCT SPECIFICATIONS:
ACEA A3/B4, C3 - API SM/CF
VW 502.00/505.00 - MB 229.51 (WAS MB 229.31) - BMW LL-04

PRESTEZA MSP 5W-30 is available in 1 litre (33228) and 5 litres (33229) and in large packs.



HELAR SP 5W-30 LL-03

Helar SP 5W-30 LL-03 is a universal synthetic low SAPS motor oil, specially developed for passenger cars and vans of the Volkswagen, Audi, Skoda and Seat concern. Helar SP 5W-30 LL-03 is suitable for use in both petrol and Diesel engines with or without pump spray technology. The product is also suitable for extended oil change periods and Diesel engines fitted with a soot filter. Helar SP 5W-30 LL-03 also meets the requirements of Mercedes Benz MB 229.51 and is therefore also suitable for use in the latest models of Mercedes equipped with a soot filter.

PRODUCT SPECIFICATIONS:
ACEA A3/B4
VW 504.00/507.00
MB 229.51 (NEW SPECIFICATION)

HELAR SP 5W-30 LL-03 is available in 1 litre (33094) and 5 litres (33088) and in large packs.



**FOR FULL DETAILS WHERE THESE PRODUCTS CAN BE USED, PLEASE VISIT OUR WEBSITE:
WWW.KROON-OIL.COM**

> MARINE-YACHTING

A large part of The Netherlands consists of water. This is one of the reasons why lots of people in our country find recreation on the water. Whether that is in a sailing boat, a motor yacht, a water scooter, a speedboat or in a rubber dinghy with outboard motor, every body likes to recreate trouble free on the water.



Due to our busy lifestyle, the amount of time available for this type of recreation is limited, and of course when we have spare time, we want to benefit to the maximum, without having to worry about our equipment. This also means that we want to rely on the quality and correct application of lubricants used. To meet the demand for high quality lubricants specifically designed for use in water sports / yachting, Kroon-Oil introduced a range of marine lubricants, under the name: ATLANTIC. On the next pages we highlight a number of points, new developments in this segment of the market and we present the products of our ATLANTIC LINE.

TWO-STROKE OUTBOARD ENGINES - OUTBOARD TC-W3

Lubricants specifically designed for use in water sport / yachting are still in an early stage of development. Up to now lubricants were used, which came from the automotive markets. The only exception was the water-cooled two-stroke outboard engine. Due to the low temperature of the cooling water (cooling water is surface water pumped through the engine), the operating temperatures of the engine are considerably lower than in air-cooled two-stroke engines or water-cooled two-stroke engines used on the road. For this reason special ash free oils were developed to avoid the building up of carbon deposits in water-cooled two-stroke engines. Excessive carbon deposits in two-stroke engines affect the engine performance and results in detonation during the combustion process. Therefore the National Marine Manufacturers Association (NMMA) decided many years ago to introduce the TC-W3 specification. Kroon-Oil OUTBOARD TC-W3 is a two-stroke engine oil, which meets this TC-W3 specification. It is one of the first Kroon-Oil products especially for use in water sport / yachting.

OUTBOARD TC-W3 is available in 1 litre (00217) and in large packs.

TO INTRODUCE THE KROON-OIL ATLANTIC LINE WE OFFER A BALANCED ASSORTMENT MARINE PRODUCTS, PLACED IN AN ATTRACTIVE METAL DISPLAY. PLEASE CONTACT OUR SALES DEPARTMENT FOR MORE INFORMATION.

ATLANTIC LINE



DFI TWO-STROKE ENGINES - ATLANTIC DFI

Emission requirements in the automotive market are constantly in the news, but also in the recreational marine market we cannot ignore this problem and quite rightly so: on average, the pollution caused by one outboard engine is equivalent to the pollution of 348 motor car engines. With the modern Direct Fuel Injection two-stroke outboard engines, the so called DFI engines, the combustion process is much better to control and with or without a catalyst, this is the route that the OEM's follow to make the recreational marine market a cleaner emission market. The operating temperatures of DFI engines are considerably higher than those of conventional two-stroke outboard engines. One reason is that DFI engines lack the cooling effect of the evaporation of the fuel that reduces the operating temperature in the conventional two-stroke engine. Due to these high operating temperatures in the DFI engines the chances of the building up of carbon deposits increases again and this can cause piston ring sticking. For the new generation DFI engines, a new generation ash free two-stroke oils is required with strong detergent properties to minimise the chances of the building up of carbon deposits on critical engine parts. Kroon-Oil will shortly introduce a new generation DFI two-stroke oil, as part of the ATLANTIC LINE. This product will be introduced next to the existing ash free Outboard TC-W3. The reason is that it is not entirely clear how the older generation two-stroke engines will react to the new generation DFI two-stroke engine oils.

FOUR-STROKE INBOARD AND OUTBOARD ENGINES - ATLANTIC 25W-40 AND ATLANTIC 10W-30

In the recreational marine market, it was only in 2004 that special motor oils for four-stroke inboard and outboard engines (hereafter called: marine engines) were introduced. In August 2004 the NMMA has introduced the international specification: FC-W. As mentioned above, up to recently all such engines were lubricated with automotive lubricants. However, the development of a new generation automotive motor oils, (i.e. much thinner fuel efficient motor oils whether with low HTHS values or not) was reason for OEM's of marine engines to get more and more concerned about the degree of protection of their engines with these new motor oils. Their concern was aggravated by the fact that marine engines are subject to corrosion due to contact with water and the fact that marine engines often run for long periods of time at high speeds, under high loads. The operating temperatures are often lower due to the lower temperatures of the cooling water and this may cause fuel dilution. For these reasons it is essential to use oil of the correct viscosity and with maximum protection against wear and corrosion. The new generation automotive engine oils often fall short on these essential requirements. The FC-W specification as laid down by the NMMA takes these marine engine requirements of course into account. That was for us a reason to introduce two new ATLANTIC LINE engine oils: ATLANTIC 4-Stroke 10W-30 and ATLANTIC 4-Stroke 25W-40. Both these ATLANTIC oils were specially developed to meet the NMMA FC-W specification. For this reason both are extremely suitable for use in modern, high performance, high-speed marine engines under heavy loads. ATLANTIC 4-Stroke 10W-30 is available in 1 litre (33435) and ATLANTIC 4-Stroke 25W-40 is available in 5 litres (33421). Both are also available in large packs.

STERN TUBE GREASE - ATLANTIC SHIPPING GREASE

The oldest lubricant used in the field of water sport, originally developed for the professional shipping business, is the well-known stern tube grease. A very straight forward grease with as a main property its water resistancy. Both in the recreational and professional marine market the stern tube grease is used less and less, because ship builders have moved over to water lubricated bearings. In addition it becomes a more common practice to make use of Sail-drive and Z-drive systems, in which stern tube grease isn't used. This was a reason for us to have a critical look at our product. In addition to stern tubes, there are a lot more components on board that need lubrication, such as trawl winches, chain pulley blocks and hinges. In particular in the professional marine trade there is a requirement for high quality universal grease with good water resistant and adhesion properties, and excellent "Extreme Pressure" qualities. In view of these requirements we have upgraded our Stern tube grease to a grease of higher quality and accordingly it has become a multi purpose grease qualified for the professional and the recreational marine business. To highlight the universal nature of this new grease, we have decided to change the name to ATLANTIC SHIPPING GREASE. Accordingly it becomes clear that we are referring to both the old and the new grease. ATLANTIC SHIPPING GREASE will shortly become available in the same packs as before under the same part numbers.

KROON-OIL OIL FOR TAIL PIECES BACK ON THE SHELF - ATLANTIC GEAR OIL 75W-90

Finally we wish to pay attention to our Atlantic Gear Oil. In contrast with the specifications for transmission oils in the automotive market, there are still no laid down specifications for marine gear oils. Accordingly marine transmissions are most often lubricated with automotive transmission oils. The peculiarity of the marine application is that the filling point is often extremely small and filling from an automotive 1 litre pack is a time consuming process with a lot of spillage. For that reason oils for tail pieces, marine transmissions and Z-drive systems are often sold in special tubes, which fit more easily in the filling hole of the tail piece. Because of the continuous demand for this type of oil, we have recently included in our range of marine lubricants Kroon-Oil Atlantic Gear Oil 75W-90. This product is based on the synthetic SAE 75W-90 transmission oil with API GL-4/5 specification with special attention for the "wet" circumstances under which the transmission systems in marine applications have to operate. ATLANTIC GEAR OIL 75W-90 is a blue coloured lubricant and is available in tubes of 500 ml (33523).

> VISITING

VAN DER WIEL- DRACHTEN FROM TRANSPORT TO FUEL



The “Meerpaal” in Drachten (NL) is the home base and the nerve centre of a many-branched organisation with some 300 employees. In the office building, which consists of three interconnected parts, we had a good heart-to-heart and informal talk with Mr. Klaas van der Wiel, director of transport and Gerard Nanninga, the workshop manager.

THE BEGINNING

The history of the company begins more than 50 years ago. They started with two GMC trucks, which were driven by Klaas his father and uncle to collect milk from the farmers. The business expanded rapidly. Towards the end of the fifties, the Philips Electronics concern started to build factories in Drachten and surroundings. For the employees of Philips new houses had to be built and the contract to supply and deliver sand for these housing projects was given to Van der Wiel. Towards the end of the sixties new interesting and promising projects developed for Van der Wiel. Due to the flourishing economy in the region, it was decided to build a new industrial estate in Drachten and the start was made with closing off the Lauwerszee on the north coast of The Netherlands. Also in these projects Van der Wiel got involved and next to the transport division, a separate contracting division of the company was established. Towards the end of the seventies a lot of land consolidation took place in the region, which meant that large pieces of land were given a different destination and again this gave lots of transport and soil supply opportunities to

Van der Wiel. In 1980, De Vries in Joure (NL) was taken over, which brought Van der Wiel in contact with the waste collection and waste recycling industry. This added another division to Van der Wiel's activities.

SHORT LINES OF COMMUNICATION AND AN OPEN CULTURE

Klaas describes the company as “open, informal and honest” and during our meeting it becomes more and more clear what he means with these words. About results and projects he is not secretive and during our tour over the extended premises the employees in the canteen wave at Klaas and he comments: “ I know them all by name, at least their Christian name”. It is striking that a company of this size does not have a Works Council, like most similarly sized companies in The Netherlands have. Without a Works Council the communication is more direct is Klaas his argument. “If there is a problem within the company, I insist that they come to me directly and we always solve the problem”. He tells us an interesting anecdote about an enormous long-term project. The municipality wanted to transform a piece of undeveloped land into a nature reserve, but they were concerned about the high development costs. Van der Wiel asked:

“We have full faith in Kroon-Oil, since we receive excellent service and advice and we have no complaints. Also in the oil sampling of our trucks that run on PVO, we get all the support we need. ”

“high costs? You can make money with this project!” Indeed when the plans were worked out, it turned out that large quantities of soil had to be dug up, which could subsequently be sold by the municipality. This was a typical example of a win-win situation and both the municipality and Van der Wiel were pleased. They sealed the deal with a handshake. Of course the deal had to be officially formalized on paper, but the way in which the deal was negotiated in principle, marks the honest and open way in which business is conducted.

ALTERNATIVE SOURCES OF ENERGY

Once, during a holiday in Switzerland, Klaas his father saw an installation where biogas was produced, at that time still in its infancy. This alternative source of energy remained always in his mind and after the acquisition of the waste recycling activities of De Vries, Joure (a Dutch company) it was inevitable that a test should be conducted to make biogas from waste materials. This has resulted in more projects. The production of Pure Vegetable Oil (PVO)* is one



Klaas van der Wiel
“SHORT LINES OF COMMUNICATION AND AN OPEN CULTURE”

of the most recent developments. Van der Wiel has recently built a factory, where this alternative fuel is produced. The annual production of Rape Seed Oil is already 30 million litres. A number of container trucks of Van der Wiel run on PVO with extremely good results. Over the years Van der Wiel has grown into a worldwide operating and leading company with

activities in Europe, Brazil, Malaysia and China. The activities consist of transport, project development, construction business, sand reclamation and alternative sources of energy, such as biogas and PVO. The transport fleet consists of 80 company owned trucks and an additional 200 trucks, which are hired as and when required. The maintenance of the fleet is done in-house, in a well-equipped workshop, which is run by Gerard Nanninga, whose father was the previous workshop manager!

COOPERATION WITH KROON-OIL

The association with Kroon-Oil started at the time that the transport activities of Van der Wiel were rapidly expanding. About the cooperation Klaas jokingly says: “We only know Lambert” (editor: Sales Supervisor of Kroon-Oil). However Klaas is quick to add: We have full faith in Kroon-Oil, since we receive excellent service and advice and we have no complaints. Also in the oil sampling of our trucks that run on PVO, we get all the support we need. The large range of products and the efficient service that we receive are major reasons why we exclusively do business with Kroon-Oil. Kroon-Oil also has short lines of communication and knows the business and their customers, entirely in line with the way we do business”.

THE FUTURE

About the future, Klaas is very clear: “We have no fixed long term philosophy, in our world you have to keep your eyes and ears constantly open. Today we do things that we had not anticipated some 10 years ago. One thing I am certain about is that our logistical and service activities will further increase. For instance, if it proves that transporting goods by ship is more efficient, we will have to consider investing in vessels. In addition, the increased attention for the environment will be a reason for us to also focus on alternative energy sources. Methods to produce “climate neutral” and the reuse of materials will become more and more important”. We are particularly proud that Van der Wiel with all its different divisions has absolute faith in the knowledge and experience of Kroon-Oil with regards lubrication in all aspects. As lubricants manufacturer and supplier there is no greater compliment that one can get!

* We refer to the comprehensive article on PVO fuels in the TECH CORNER section of this LUBEVISION, on page 10 and 11.



> TECH CORNER

PVO a benefit for the environment, and also for engine and engine oil?



The idea of driving on Pure Vegetable Oil (shortened as PVO) is of course not new. While writing this story, memories of an article in a Dutch car magazine of many years ago come to mind. I remember a photograph of a Mercedes 190 Diesel in front of a beautiful yellow rapeseed field. The Mercedes 190 (at the time of the article that car was a standard Mercedes model) had been specially prepared to run on rapeseed oil. Key words and comments in the article were: the car drives well, the smell of chips is noticeable, good for use by farmers and the car is "CO2 neutral" (although that quality was described differently). In the years thereafter I never heard anything more, since OEM's were not interested in this development the issue was not pursued. Even today car and truck manufacturers exercise restraint, however Governments (environment) and the transport sector (looking for a cheaper alternative for Diesel fuel) once again pay full attention to PVO.

WHAT IS PVO?

As the name already indicates, PVO is based on pure vegetable oils. In principle PVO can serve as a substitute for fossil Diesel fuel. The finished product is obtained by cold pressing of oleaginous plants such as sunflower seeds, Soya or rapeseed. No chemical reactions take place and as a result the production is a very simple mechanical process. A disadvantage of PVO is that the quality is not constant and is largely dependant on type of base material, climatic conditions and the composition of the soil on which the seeds are grown. However there is one great advantage: the energy source is a renewable, i.e. a fuel that can be reproduced time and time again, which is not the case with fossil fuels.

DRIVING A CAR THAT RUNS ON PVO

Up to now, engine manufacturers do not support driving a car on PVO. Manufacturers even stipulate that the guarantee will lapse as soon as the engine is running on PVO. Despite all that, PVO enjoys an increasing interest from the market. PVO is relatively easy to produce, using this product means a considerable reduction in CO2

emissions and at least up to 2010 no excise duties will be levied on PVO's in the Netherlands. The product is therefore good for the environment and a suitable alternative for Diesel fuel, of which the prices are growing. Are there only advantages or is there a snag somewhere? Of course, there are problems, which will have to be solved, before one can change over to PVO and let us be honest, if there were no snags, many more would have changed over to PVO's already. First of all there are the hardware considerations. To run a truck on PVO, a number of adaptations to the vehicle are necessary. The higher viscosity of PVO and the low Cetane Number result in poor starting ability compared with fossil Diesel fuels if no adaptations are made. In addition the combustion process is far from optimal, since the much thicker (more viscous) PVO is much harder to atomise by the injectors, which have been designed for use with much thinner fossil fuels. The result is that incomplete combustion is possible, which will cause internal engine contamination and increased emission levels. Soot and unburned PVO particles will deposit on valves, injectors, pistons, piston rings and cylinder walls.

To make a Diesel engine run satisfactorily on PVO, the best

thing is to adapt the motor management system as well as the complete fuel system. Injectors should be made suitable for optimum atomization of PVO and the motor management should be reprogrammed to allow for longer injection periods, particularly during cold starts. Also the moment of injection should be optimised for running on PVO and accordingly reduce the internal contamination to the minimum. To achieve these adaptations full cooperation with the engine manufacturer is absolutely essential. Regretfully, as mentioned above, the manufacturers are not (yet) very enthusiastic to cooperate in this field. There are too many question marks with regards life expectancy and emission levels and cooperation is not granted. To make progress and to achieve that engines run reasonably well on PVO an alternative had to be developed by using the two-fuel-tank-system. The vehicle is equipped with a second fuel tank, a special fuel pump for the PVO plus a heat exchanger to heat up the PVO and with this reduce the viscosity of the PVO, a regulating unit and additional (thicker) fuel pipes. After this dual fuel system is installed, the engine is started on fossil Diesel fuel and as soon as the PVO has been heated to 60° C, the governing unit automatically changes the fuel to PVO. A disadvantage of this system is that the driver should not forget to switch back to Diesel fuel before the engine is switched off, otherwise the restarting of the engine on the following day becomes a protracted process. However to remind the driver, he is warned by an alarm, when he forgets to change over to Diesel fuel at the end of his journey, before he switches the engine off.

PVO AND ENGINE OIL

Purely looking at the driveability, fuel consumption and engine performance, the dual fuel system seems to work reasonably to very well in practice. Our customer, Van der Wiel in Drachten (NL) (editor: see article on page 8 and 9) has converted 8 (DAF, Scania and Volvo) trucks to PVO and these trucks run 24 hours per day for container transport. Van der Wiel's experiences are for the most part positive, but there are comments. The DAF's and Volvo's run more or less without problems on PVO, although the running properties of the Volvo engines are noticeably less when running on PVO. The Scania's also run well on PVO, but the electronic system detects from time to time "technical malfunctioning". The motor management draws attention to a problem in the fuel system, which results in failsafe mode or even stalls. After re-setting the motor management, the problem is subsequently solved for a shorter or longer period of time.

Not just praise for PVO, and in addition there is some concern about the possible consequences for the motor oil. Due to the lower volatility of the PVO in combination with the less effective injection pattern, there is a great chance that unburned PVO particles find their way into the

sump. This will result in the well-known fuel dilution aggravated by the fact that PVO is much less volatile and does not easily evaporate, while in the sump. For this reason many OEM's are concerned that the viscosity of the engine oil will accordingly reduce due to this fuel dilution and adversely affects the lubricating properties of the engine oil, with the risk of wear of the most critical parts in the engine. Another source of concern is the reduced oxidation stability of the PVO. On the one hand the dispergent properties of the motor oil are taken to the test and this increases the chances of sludge formation. On the other hand fuel dilution reduces the lubricating properties of the engine oil. So far all these assumptions are based on theory, since experiences in the field are still limited. For that reason it is not yet very clear what oil change periods should apply for engines, which run on PVO's and whether or not special motor oils should be developed with higher or different performance levels for engines running on PVO's. To be on the safe side, it is recommended to considerably reduce the oil change periods for PVO run engines and also to take samples and carry out analyses at regular intervals.

The motor oils of the trucks of Van der Wiel, which run on PVO are changed every 30.000 kilometres (editor: Armado Synth 10W-40). In addition, an oil sample of the oil, which has just been changed, is taken and tested in the Kroon-Oil laboratories. The first indications of these tests are that the negative impact, when using PVO's are limited. If we analyse the percentage soot that was found in the PVO run oil samples, first indications are that they are lower than samples of Diesel fuel run engines, although those Diesel samples were taken after the oil had been longer in use, we still consider the values extremely low, considering that the engines had run on average around 700.000 kilometres. The viscosity of the oils also remained well and the percentages of metal parts, an indication of the amount of wear in the engine, were low. Occasionally we came across a sample with a Total Base Number (TBN), at the low end of the scale. (Editor: The TBN gives an indication of the resistance against acidification). This indicates that the objections against a change over to PVO's are not entirely unjustified. It also indicates that we will still have a long way to go before PVO and other fuel alternatives such as bio-diesel become universally accepted. In the end, government directives and European rules very often influence the developments in this field.



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