FAIRREPORT

A special edition of DEUTZ LIVE magazine

DEUTZ®

Technology
From the field to the engine

The quality of the technology is crucial

Expertise
Impressive solutions for farmers

A strong future with 80 years of experience

Innovation
Talented loader

ACHINERY +++ AGRICULTURAL MACHINERY +++ AGRICUL

Bio-engines set for launch

Alternative drives

From the field to the engine

The days of the internal combustion engine are far from numbered: the increasing effectiveness of emission controls and the use of alternative fuels promise it a long-term perspective

Photo: Fotolia

Among engine manufacturers, development work in the coming years is set to particularly focus on further optimising fuel combustion and on efficiently purifying exhaust gas. Hand-in-hand with these activities goes the use of alternative fuels. The likelihood of future scarcity and the associated increased cost of petroleum-based fuels is driving a search for alternatives. And this is where one major advantage of internal combustion engines becomes apparent – they can be powered by many different types of fuel, from petrol and diesel to hydrogen. Biodiesel (mostly in the form of rape methyl ester – RME), a fuel made from rape oil, is one of the main alternatives for the diesel engine and favourable tax laws mean it is being increasingly used by German farmers. A diesel engine can be converted to run on biodiesel at relatively low cost, and DEUTZ has been offering customers this option for some years. The benefit of this so-called biodiesel lies in the – to some degree – significant reduction in emissions of particles, hydrocarbons and carbon monoxide. However, this positive effect is partly offset by the slight increase in emissions of nitrogen oxides and greater consumption.

DEUTZ is the world's first manufacturer to launch hightech engines – DEUTZ Natural Fuel Engines® – which can burn pure rape oil (correspondent to DIN V 51605) while at the same time complying with the current emission thresholds under Stage III *(page 10)*.

One engine, many fuels

Besides fuels based on vegetable oils – soy is used rather than rape in the USA – the proportion of synthetically produced fuels is also set to increase substantially. Here, a distinction is made between fuels based on natural gas (gas-to-liquid, or GTL, fuels = synfuel) and those based on biomass (biomass-to-liquid, or BTL, fuels = sunfuel). The non-fossil sunfuel has the great advantage that, when it combusts, no additional carbon dioxide is discharged into the atmosphere.

The internal combustion engine lives on

The debate about alternative fuels, particularly those based on biomass, often tends to overlook the issue of its availability for a mass market. Renewable raw materials – i.e. products generated through agriculture and forestry which are not used as food – are already being produced on 13 per cent of Germany's agricultural land. However, biofuels are a low-cost, sustainable solution for certain sectors and certain applications. Of the alternatives to our current concept of the combustion engine – hydrogen as a clean fuel, the hybrid drive or the fuel cell – only the hybrid drive is offering some interesting options, even today. The division of labour between the internal combustion engine and the electric engine has particular benefits in applications with a high proportion of partial load operation.

But it will be a little time yet before the fuel cell, touted in recent years as the ideal candidate for replacing the internal combustion engine, can be deployed on a large scale in vehicles and industrial applications. As impressive as obtaining clean energy from electrolysing hydrogen and oxygen is in principle, there is still a long way to go before this type of propulsion can meet the demands placed on the internal combustion engine in terms of torque, providing variable output and power to weight ratio. [jp | sr]

Interview

The quality of the technology is crucial

Dr. Hans-Walter Knuth, Head of Exhaust Gases and Operating Materials at DEUTZ, explains why fuels made from renewable raw materials require a high-tech engine

Dr. Knuth, most of DEUTZ's engines can run on biofuels. What are the benefits of these vegetable matter-based fuels?

Dr. Knuth: To begin with, the use of these renewable raw materials as a fuel is almost neutral in terms of the CO_2 balance. During the growth of the crops used to obtain regenerative fuels, the amount of CO_2 taken from the air and converted to vegetable material is almost the same as that released into the air by engine combustion. Soot emissions are also lower when it is biodiesel, rather than diesel, that is burned – lower by between 40 and 60 per cent. Emissions of other particles fall too, by 20 to 50 per cent.

That sounds too good to be true …

The benefits can be substantial, particularly in the agricultural sector, but operators need to take certain things into account when using these fuels.

For example?

The distinction between biodiesel and pure vegetable oil is crucial. Most DEUTZ engines built since 1993 have been approved to run on biodiesel. All approved engines can run on biodiesel as they are, i.e. no retrofit kit is required. Now, 2012 series engines have been developed to run on pure vegetable oil. Special versions of these are being installed in rape oil-compatible tractors made by SAME-DEUTZ-FAHR and AGCO Fendt.

Are there any differences between these two types of biofuel?

Our rape oil engines have a number of special components which enable them to run on the difficult rape oil fuel. The main component is a two-tank system. Normal running is with rape oil, while startup and longer, low-load operations are with diesel. To achieve the best possible combustion, all the rape oil engines are supplied with DEUTZ's Common Rail system. In contrast, standard engines can run on biodiesel without any need for special components. With these two fuels, the oil change interval is halved compared with engines running on diesel. Long idle periods – for example, farm machinery being switched off during the winter – should be avoided. It also needs to be recognised that the output of an engine running on biofuel is five to ten per cent lower, meaning consumption increases accordingly.

And what about the warranty?

Providing the operator complies with the appropriate guidelines and only uses the fuels specified by the EN 14214 and DIN V 51605 standards, our usual warranty rules still apply. We recommend that fuel suppliers are chosen with great care and that the fuel quality is authenticated.

INFO | Alternative fuels

"Alternative fuels" is the term given to energy sources for petrol and diesel engines which – except for liquid gas – are not derived from petroleum processing. They include rape oil, ethanol from agricultural production, natural and liquid gas, and hydrogen. Rape oil and vegetable oils are converted to so-called methyl esters using methanol and then sold as biodiesel. Given rising prices and the prospect of increasing petroleum scarcity, renewable raw materials are becoming increasingly important. Apart from rape oil and rape methyl ester (RME), the alternatives to petrol and diesel fuel have a more or less restricted range and higher fuel costs. Research into hydrogen, as the energy source of the future, is ongoing. A brief overview:

Rape oil is a renewable raw material and is obtained from rape. The natural oil is acquired by pressing the plant and then filtering.

Rape methyl ester is the term given to rape oil that has been refined by esterification, and is very similar to diesel fuel. It is also known as **RME** and **biodiesel**. In chemical terms, it is fatty acid methyl ester (FAME).

Hydrogen is a colourless, odourless gas which, when burned, gives off steam and – because of the air's nitrogen content – nitrogen oxides. However, issues regarding its storage remain unresolved. Moreover, hydrogen production requires large amounts of energy and gives off substantial quantities of CO_2. Hydrogen production from solar sources is currently unprofitable due to the exorbitant cost.

SAME DEUTZ-FAHR

Towards a strong future with 80 years of experience

The Italian company SAME DEUTZ-FAHR can not exactly look back over its 80 year history and say it was uneventful. To celebrate the anniversary, DEUTZ has come up with something special

Leading from the front: a DEUTZ-FAHR Agrotron K 100 in action. Other SAME DEUTZ-FAHR brands include Lamborghini, Hürlimann and SAME

Photo: Steven Roller, SAME DEUTZ-FAHR Group S.p.A.

INFO | SAME DEUTZ-FAHR

SAME DEUTZ-FAHR with Vittorio Carozza as owner and Chairman, as well as Massimo Bordi as CEO, was formed in Treviglio by engineer Francesco Cassani in 1927. With the SAME, DEUTZ-FAHR, Lamborghini and Hürlimann brands, SDF is one the world's largest producers of tractors, combine harvesters, engines and agricultural machines. The international company combines global production locations with tightly-knit on-site sales: The network consists of 13 subsidiaries, 120 importers across the world, as well as a sales and service organisation with around 3,000 authorized dealerships. The tractor range with models from 30 to 270 hp is designed for every application and includes caterpillar and special tractors. The combine harvester range covers around 90 percent of market needs with its models from 120 to 360 hp. In 2006, 34,794 tractors, 23,439 engines and 26,906 transmissions were sold. That accounts for a business volume of 1,037 billion euros. With its around 3,000 employees, the group made a net profit of 40.2 million euros.

Classic and contemporary: a Lamborghini R6 (above, left) and a SAME Explorer (above) are two other SDF models – the historic engine (left) shows the DEUTZ 80th anniversary gift. The picture below shows a Hürlimann XE

At the SAME DEUTZ-FAHR's 80-year anniversary, President Vittorio Carozza was able to present a good balance to the invited guests. In 2006, the company that was formed in 1927 had group revenues of 1,037 million euros, taking it into the one-billion euro revenue category for the first time ever. The net profits also rose to 40.2 million euros, setting a new record *(box)*. Good news that raised the already happy atmosphere even higher.

Long way to global player

Compared to today, the beginnings were modest: As Francesco and Eugenio Cassani developed the first diesel engine especially for tractors, and installed it in the legendary "Trattice Cassani", the two brothers could not know that their small company would become a global agricultural machine producer, which from 1942 to 1995 was simply named "SAME" (Societá Accomandita Motori Endotermici, Limited Company for Combustion Engines). In 1995, after SAME took over the agricultural machinery division of Klöckner-Humboldt-Deutz AG, the name was changed to SAME DEUTZ FAHR Group S.p.A (SDF), with their headquarters in the Northern Italian town of Treviglio. It is still there today, just outside Milan. SDF's international direction began in 1973 when the current chairman Vittorio Carozza took over the management of the company. Shortly before, SDF had pooled its strengths on the Italian market by taking over Lamborghini Trattori. In 1979, Hürlimann expanded the SDF portfolio. In the 1990s, SDF Polska was founded. The eventual step into Asia came with an Indian joint venture. The 12-year partnership with DEUTZ AG was expanded to a strategic cooperation focussing on compact engines for agricultural machines in 2003. The agreement includes the provision of all four SDF brands with DEUTZ engines in the four to seven-liter displacement class. SDF also became principal shareholder in the DEUTZ AG, and is today the largest single shareholder with over 40 percent.

A special present

To celebrate the 80th anniversary, DEUTZ thought of something special. Holger Friedrich, who is usually in charge of the training center for compact engines at DEUTZ, was appointed "special emissary", and from the depths of the Czech agriculture he brought over a DEUTZ engine to Cologne that was built in 1927. Although the engine is 80-years old and has a long working life behind it, it still runs perfectly. The engine was cleaned up in Cologne and sent to Treviglio. It now has a place of honor there as a symbol of the German-Italian cooperation. [af] ■

Brand strength *With Lamborghini Trattori, SAME, DEUTZ-FAHR and Hürlimann, SAME DEUTZ-FAHR's portfolio offers the ideal machine for every need*

INFO | Chronology

1927 Francesco and Eugenio Cassani's tractor engine is installed in the "Trattice Cassani".

1942 SAME is formed from the Cassani Brothers family business (Societá Accomandita Motori Endotermici).

1951 Historic Tractor: SAME Diesel.

1952 SAME DA 25 – the world's first tractor with four-wheel drive.

1958 Italian design: SAME 240.

1965 Export hit: SAME Minitauro.

1972 SAME acquires Lamborghini Trattori.

1973 Company founder Francesco Cassani dies. Current Chairman Vittorio Carozza is his successor.

1975 Strong: SAME Tiger 105.

1979 SAME takes over Hürlimann.

1992 Foundation: SAME Polska.

1995 The takeover of the agricultural machinery division of Klöckner-Humboldt-Deutz (KHD) results in the new SAME group SAME DEUTZ-FAHR Group S.p.A. (SDF).

1996 Tractors and engine production in India through joint venture called SAME Greaves Ltd.

2002 SDF takes over the shares of Greaves LTD. The joint venture becomes SDF India.

2003 SDF buys more than 20 percent of the DEUTZ AG shares and becomes largest shareholder.

2005 SDF acquires the Croatian combine manufacturer Duro Dakovic PSU. SDF Combines is founded.

2006 DEUTZ AG shareholding increases to over 40 percent.

2007 SDF celebrates its 80th anniversary. To celebrate, DEUTZ presents the firm with an agricultural engine built in 1927.

Expertise

Fendt Field Day

Impressive solutions for farmers

There were fireworks at Fendt's 2006 Field Day as they presented 21 new Vario models. And it was very clear from the agricultural technology show near Würzburg that the premium manufacturer from Marktoberdorf in the Allgäu region has confidence in DEUTZ's new generation of engines

When it comes to building large tractors, the 926 Vario had already more than confirmed Fendt's innovative strength. But what the Marktoberdorf-based firm put on display at their company show in late August stunned visitors and had even "old hand" farmers raising their eyebrows – the latest top-of-the-range Vario 936 model has established new benchmarks.

265 kW output, maximum torque 1482 Nm achieved at 1,450 min^{-1}, and a top speed of 60 km/h make Fendt's flagship the world's fastest standard tractor and one of the most powerful. The heart of this monster is a DEUTZ TCD 2013 L06 4V, namely the new AgriPower engine. But that was not all – five further large tractors round off the 900 series. The 922, 924, 927, 930 and 933 models are also powered by the Cologne manufacturer's AgriPower variants. They output between 164 and 242 kilowatts.

Low consumption – long service intervals

The powerful AgriPower engines, with their four-valve technology, have an engine speed-independent, Common Rail high-power injection system that runs with pressures of up to 1,600 bar. "By combining cooled, external exhaust gas recirculation with fully-electronic engine control, we can achieve optimal fuel combustion," says Jürgen Degenhardt, Key Account Manager at DEUTZ, of the TCD 2012 and 2013 series benefits. This results in low fuel consumption in all the output classes. "And all of our engines also have long service intervals." Oil changes are only required every 500 operating hours. Moreover, it hardly needs to be stated that all the new Fendt Vario models comply with the strict TIER 3 emission standards.

Apart from the 900 series, Fendt presented 15 other new models on the Count of Schönborn's estate. And, in an unmistakable atmosphere of fields, machinery and innovation, over 50,000 visitors ensured that Fendt's 2006 Field Day once again exceeded expectations.

"Technology Tent" for engines

On the fields almost 100 tractors, caterpillars and combine harvesters showed off the potential that lies slumbering within them. And a number of fine innovations were on display in a technology marquee, where experts explained them to a fascinated public. "There was a tremendous crowd around the AgriPower engine," smiled Degenhardt, delighted with the positive reception *(see box)*.

Apart from their large tractors, Fendt were also showing compact models with infinitely variable transmission. The brand new Vario 300 series with the DEUTZ TCD 2012 L04 4V under the hood comes in an output range of between 69 and 91 kilowatts. The developers aimed to design a multi-purpose machine with top-class productivity, and the economical DEUTZ engine plays a key role. Fendt's new Vario 400 series also enjoy the benefits of the modern TCD 2012 L04 4V. Five models range in output from 84 to 113 kilowatts and serial production is scheduled to commence in March 2007.

First class for the middle class

Production of the 700 and 800 models began early this year – the 712, 714, 716 and 718 are all-rounders outputting between 97 and 133 kilowatts. This mid-class is powered by the TCD 2012 L06 4V. The same unit with superior output also powers the compact large tractors of the 800 series.

Here Fendt have thus succeeded in marrying the performance of the Vario 900 series with the agility and overview of the mid-class. The economical TCD 2012 L06 4V in the Vario 818 outputs 137 kilowatts, while the more powerful unit in the 820 delivers as much as 152 kilowatts. This is a record, as it is the first time that a tractor of this class has broken through the 150 kilowatt barrier.

The Field Day's visitors took a multitude of novel impressions with them as they left for home. Fendt spokesperson Sepp Nuscheler summed up the message for the visitors' with one simple phrase, "The same plough, the same field, but a brand new experience for the farmers." [jp]

INFO | Premium brand

The Fendt name has, for 75 years, represented agricultural machinery manufacturing. The company is now part of the AGCO Corporation and, as a premium brand, meets the toughest demands. And with great success: The plant shipped 12,157 tractors in 2006, and the company is aiming for sales of 13,400 in 2007. In 2006 Fendt's sales grew by 8.5 per cent to 884 million euros. The company's executives are confident that they will meet, and possibly even exceed, their 2007 sales target of one billion euros

Partnership *Fendt uses DEUTZ exclusively – all of the premium manufacturer's tractors are powered by the Cologne company. The Vario 300, 400, 700 and 800 series feature the DEUTZ TCD 2012 4V series. Output ranges from 69 to 151 kW. The Vario 900 is powered by a TCD 2013 4V and outputs between 140 and 265 kW. All the engines for the Vario series have turbocharging with charge-air cooling, Common Rail injection, external and cooled exhaust gas recirculation (EGRex), fully electronic engine control (EDS) and four-valve technology. Over 12,000 water- and air-cooled DEUTZ engines will be installed in Fendt's agricultural machines in 2007.*

The pinnacle of modern tractor production – the Fendt Vario 936 with DEUTZ's AgriPower engine. The diesel engine makes the 936 the most powerful standard tractor in the world

INFO | DEUTZ AgriPower – economical, powerful and quiet

Visitor interest at the Fendt Field Day centred on the Vario 936 and the AgriPower engine. DEUTZ had mounted a demonstration model of the TCD 2013 L06 4V in the so-called Technology Tent. The innovative engine complies with the strict values specified in the TIER 3 emissions legislation, and makes economic use of fuel. This is achieved using a Common Rail injection system and external, cooled exhaust gas recirculation. When combined with four valves per cylinder, DEUTZ's engineers have developed an engine that is quiet, low in emissions, and provides superior traction. The engine's top fuel consumption is 198 g/kWh. The maximum torque of 1,482 Nm is achieved at 1,450 min^{-1}.

Photo: DEUTZ AG, Fendt

Kramer Allrad

Talented loader

With its economical and versatile telescopic loaders, Kramer Allrad has established an innovative equipment class on the market and has set new standards. The extendable lifting arm opens up completely new fields of application

Based in Überlingen on the shores of Lake Constance, *Kramer has been developing innovative solutions for the construction industry for more than 80 years. Kramer's product palette includes wheel loaders, tele-wheel loaders and telescopic loaders. Their common design principle: all-wheel steering and one-piece chassis*

At the forefront of technology: the 4009 telescopic loader can even lift loads up to nine metres

Telescope" used to mean to collect or bundle things, or to allow things to be viewed from afar. In this respect, Kramer Allrad has really cleaned up. The telescopic loader series extends levels of comprehension by a new dimension. Thanks to the extendable lifting arm, the machine can deposit material at a great height.

Its operators are well aware of its worth. With its compact dimensions, the mobile machine opens up new fields of application. Up until the end of 2005, Kramer – market leader for compact wheel loaders, had exclusively wheel loaders and tele wheel loaders with all-wheel steering in their product portfolio. They have also been offering telescopic loaders for about a year now, optimally rounding off their product palette.

The company from the shores of Lake Constance has always enjoyed a good working relationship with DEUTZ – so it comes as no surprise that the Kramer factory has chosen engines from the Cologne manufacturer for its telescopic loaders.

Compact dimensions

Kramer's 3307 and 4507 models have already created a stir with their seven metre loading height – since August 2006 the flagship 4009 model has been the new point of reference: With a loading height of nine metres and a payload of up to four tonnes, the 4009 can be used for much more than just construction tasks. It is also used by recycling companies and the wood processing industry.

Andreas Breunig, Product Manager at Kramer: "The telescope range has been designed for power and speed. It will impress you with its compact dimensions, its enormous power and its mobility." In addition, the 4009 has a longer wheelbase than the six- and seven-metre telescopic loaders, and does not need to deploy supports at its maximum loading height. "This was especially important because we wanted to guarantee that operators could use the nine-metre telescopic loader flexibly and rapidly", explains the manager about the product's advantages.

For maximum stability even on difficult terrain, Kramer offers self-levelling and a swing axle lock on its top-of-the-range telescopic loader. If both of these are activated, the lifting arm can lift a load of up to three tonnes up to the impressive height of nine metres. A hitherto unsurpassed achievement.

The secret of its enormous lifting and tear-out forces lies in the large size of its triangle of forces. Together, the working relationship comprising the lifting cylinder, the frame, the lifting arm and the so-called Z-kinematics swing loads into the air.

Great potential for telescopic leaders

A joint venture with the company Claas also opens up an entirely new sector of the market. Thus the world's fourth largest agricultural equipment manufacturer is offering its own variant of the telescopic loader series for the agricultural industry under the name "Scorpion". "We have found the Kramer factory to be an internationally-respected and competent partner", says Lothar Kriszun, Director of Sales and Services at Claas, of the collaboration agreement between the two companies. As a manoeuvrable and compact vehicle, the Scorpion models can increasingly replace the traditional farm tractor with front loader.

The directors of Kramer Allrad, Karl-Friedrich Hauri and Martin Buyle, predict positive effects for the production volume: "We anticipate that sales at our Überlingen facility will double in the next few years. In the future, telescopic loaders for the construction and agriculture industries will contribute more than 40 percent of sales."

Another secret of the special vehicles' success: Thanks to the all-wheel steering, they can almost turn on the spot. In addition, the lifting arm can be retracted completely into the U-shaped frame, allowing the operator clear vision. Kramer has opted to use DEUTZ 2012 series engines to power the vehicles. Water-cooled, turbocharged in-line four-cylinder engines will be used. The base-model telescopic loaders and Scorpion models will be powered by a TCD 2012 L04 engine. Alternatively, a variant with charge-air cooling can be provided with an output of 90 kW at 2,400 rpm. All engines of course comply with emission standards stage III. A stepless transmission system transmits the power to all four wheels.

Kramer sees great potential for telescopic loaders in the future, and has already announced further innovations: the next generation of top models from Überlingen, models 4013 and 4017, will be capable of loading up to a height of 13 and 17 metres respectively. [jp] ■

INFO | Kramer Werke GmbH

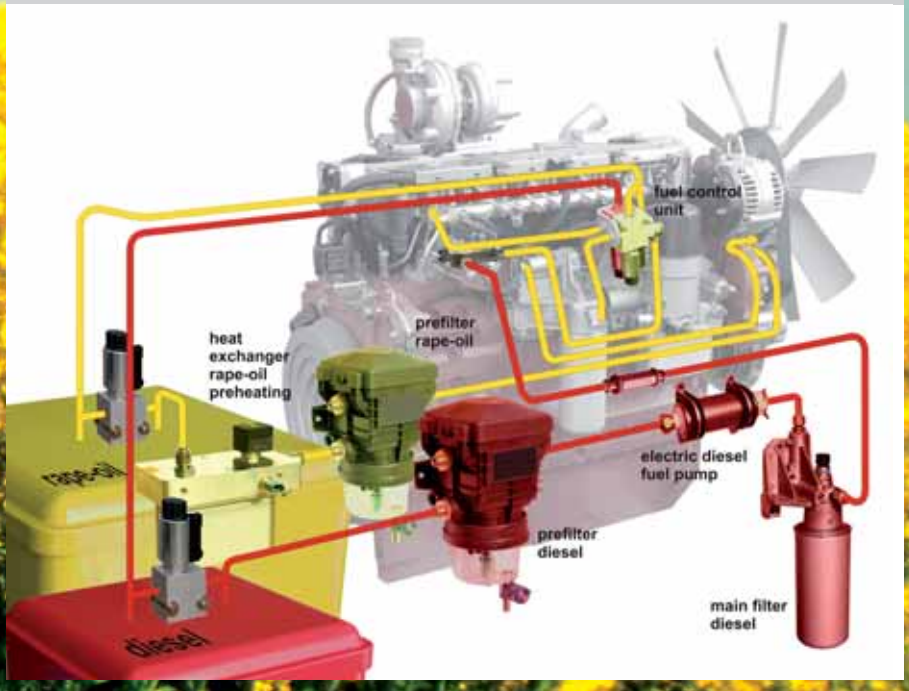
In 2001, when the Kramer Werke GmbH company, based in Überlingen on Lake Constance (Germany), merged with Neuson AG, the newly-formed Neuson Kramer Baumaschinen AG, based in Leonding (Austria), already boasted a wide range of products in the wheel loader and dumper segment and the mini, compact and mobile excavator segment. But, having first developed the highly successful tele-wheel loader and telescopic loader divisions, they have now established a new milestone in the history of the Kramer Werke company, which was founded in 1925. An agreement signed in September 2007 between Neuson Kramer Baumaschinen AG and Wacker Construction Equipment AG has created the opportunity to become a global supplier of construction equipment and compact construction machinery, with a worldwide sales and service network of more than 160 locations.

Photo: Claas, Kramer

The telescopic loader "Scorpion" from Claas is specially made to meet the requirements of the agricultural industry

INFO | DEUTZ Fuel Management®

DEUTZ Fuel Management® is a fully-electronic, ignition map-controlled fuel management system. It detects the engine's operational state and regulates efficient fuel switching in the two-tank system. In so doing, any risk of the two fuels mixing in the diesel tank is avoided by controlling the fuel return system during the rinsing process. An electronic controller ensures a temperature of 60 to 65 degrees Celsius – ideal for rape oil. The fuel circulation control also ensures that the rape oil fuel is swiftly available.



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