

GREENER OUTLOOK FOR GOLF COURSE MACHINES

Mike Beardall looks at the changing face of fuels on golf courses as more environmentally-friendly equipment becomes available

Machinery on golf courses has traditionally been powered by petrol or diesel. But now in the 'greener' age biofuels, gas and electricity are playing their part in meeting the demands of the environment lobby, and bio oils that leak onto grass do not have the devastating effects resulting from mineral oil spills.

The Government has set targets which aim, in the case of fuel, to raise the amount of fuels from renewable sources sold in the UK by at least five per cent in 2010. And on golf courses many conservationists are encouraging course managers to buy equipment which runs on greener fuel.

"The benefits are many," says Ron Perera of New Holland. "The reduction in pollutants, fuel security of the future by using natural supplies and not relying on fossil fuels, and less emission of carbons into the atmosphere."

Mower engines which run entirely on sunflower oil have been introduced by manufacturers such as Etesia in the last 12 months and many already run on LPG or can run on SVO (straight vegetable oil) or PPO (pure plant oil).

Biodiesel is the most popular fuel at present which is part diesel and part plant oil.

In Germany and Austria, where green fuels are the norm, it has been shown that it is 20 per cent cheaper to run machines on biofuels, and it is on costs that most course managers make their decisions.

"Money is the number one reason for people to switch fuels," says Tim Evans of Renewable Zukunft (future).

"In surveys all machinery users across the UK put saving money before saving the environment, which is a sad fact but true – and ultimately good for the environment, because biofuels are cheaper to produce and save money in use."

Some of the problems of running engines on pure vegetable oil have been addressed by manufacturers.

Mower producer Etesia's research and development team recognise that an engine run on vegetable oil tends to "gum up", especially when cold - the resin build-up eventually causes serious damage.

To overcome this problem they developed a dual ignition system whereby the unit is initially fired up and runs for a few seconds on diesel supplied from a small fuel tank.

When the temperature reaches around 200 degrees, an electro-valve automatically switches supply to the main bio oil fuel tank to enable normal mowing and other tasks to be carried out.

Once the operator has completed his work, he switches back to diesel for the last couple of minutes to allow the fuel to clean through the engine.

During 2007, Bio Concept Hydro ride-on rotaries have been put to the test in France where local authorities have been successfully cutting and collecting grass with Etesia mowers fuelled by rapeseed oil.

Throughout these extensive trials the machines experienced little or no loss of power and performance remained unchanged. Fuel consumption matched that of diesel and emissions were considerably reduced.

Engine manufacturer Lombardini is supplying new engines to powered ride-ons in the Hydro rotary ranges that can simply switch between conventional diesel and B30-diesel (30 per cent plant oil) according to fuel availability or operator choice.

The two fuels are interchangeable – no modifications are required and there is no need to clean either the tank or the engine.

Toro introduced biodiesel-powered mowers and a hydrogen fuel-cell utility vehicle at the GCSAA show in California last year (2007).

Two dozen models of Toro's new biodiesel ground equipment were on display with new diesel-to-biodiesel conversion kits. Toro's new turf equipment will be delivered to commercial customers in 2008.

Toro has branded the equipment "Biodiesel Ready," meaning it can run on 20per cent vegetable oil and 80per cent petroleum (B20). Vehicles that run solely on biodiesel fuel could be on the market as early as 2009, said Steve Wood, Toro's biodiesel project manager.

"The time is right for Toro and the industry to commit to this effort," CEO Mike Hoffman said. "Our biodiesel readiness initiative is part of a commitment to developing innovative solutions that meet the evolving needs of our customers and help to better the environment."

Ransomes Jacobsen is another manufacturer committed to the use of alternative power in the golf sector and back up this assertion with a range of machines powered by electricity or LPG.

The E-Z-GO ST480 has a payload of 363.2kg (800lbs) and can run on

LPG. And an electric version of the MPT 800 is available with a 36 volt motor. The MPT 1000 is also electrically driven with a 36-volt, DC high efficiency series motor and the capability of carrying a heavier payload of 450kg (992lbs).

LPG-powered versions of the 800 and 1200 are available offering significant fuel savings and a reduction in harmful emissions.



Electric greens mower

The Jacobsen Eclipse 122 hybrid greens mower was introduced at BTME last year and redefines tournament quality of cut with a choice of fixed or fully floating cutting units, two electric motors for traction and cutting and alternative power options.

In true hybrid fashion, there are two power options: one uses a 48 volt genset powered by a 4.6hp Honda petrol engine, while the other is a drop-in 48 volt battery pack.

The Eclipse 122 has a fixed cutting unit, while the 122 F has an independently mounted, fully floating cutting unit which produces an optimum cut in any conditions.

Both machines utilise the exclusive Jacobsen In-Command™ OPC system for easy operation, while the use of electric motors reduces maintenance requirements.

SEPARATE PANEL?

The problem with mineral oil is that it is persistent. It does not readily biodegrade, it's toxic and most importantly it's non-renewable.

Says Tim Landsell, technical director of Ransomes Jacobsen: "The cost of remediation is expensive - there's clean-up cost, downtime of equipment and possible fines from legislative bodies.

"Clean up costs for Bio Oil spills are less. It comes from renewable sources and can mitigate sanctions and possible fines. It helps to preserve our environment and can have enhanced performance properties over mineral oil."

Turf Kill: If the plant is exposed to a sufficient amount of oil, the leaf,



Bio oil prevents spill damage to grass



As Tim Landsell explains: “For non-rhizome grass types self regeneration is just not possible. Once an individual grass plant is suffocated, there is no way it can regenerate. The solution, in this instance, is to reseed the affected area after 30 days following a bio oil exposure. Reseeding post petroleum oil exposure would not be possible for years without soil remediation.”

A recently published study by engineers at the Cushman Division of Ransomes Jacobsen showed that the use of soaps and other surfactant cleaning systems on mineral oil turf spills actually exacerbated the turf kill effect due to a “spreading out” of the petroleum oil’s toxic effects. The same cleaning aids when used with biodegradable fluids, speed up the rate of biodegradation.

Inevitably, oil leakages into the golf course environment will occur. To minimise the environmental effects of this exposure a number of approaches can be employed:

The use of biodegradable oils to replace mineral oil in lubricant applications.

Spill remediation aids, such as soaps or cleaning to “wash away” oil. Topical oil absorbents to “suck up” the oil.

Well maintained equipment to minimise leakage risk.

stem and root will be coated with an oil film. This will cause the worst case scenario regarding oil spill effects. Oil is not soluble in water. An oil film on a leaf will block the tiny leaf pores, stopping gas and moisture diffusion between the leaf and atmosphere, as well as prohibiting photosynthesis.

Oil coating a root will stop the soil water and oxygen absorption process between the soil and plant. If the oil coating remains on the leaf and root for a sufficient amount of time the plant will suffocate and die, typically within a week.

Soil Contamination: Another effect from significant oil exposure is the effect on the soil. Mineral oil is a known toxic material to living things. When sufficient oil is released into soil, the previously discussed plant effects occur.

But, more importantly, the presence of mineral oil in the soil causes a “sterilisation” of the soil, which causes a decrease in the level of microorganisms present. Grass plant regeneration into the “sterilised” area is highly unlikely and the soil in a mineral oil spill zone must typically be removed and replaced so that reseedling of the region can be done.

Mineral oil will biodegrade and its rate of biodegradation in soil will typically occur over a period of one to two years. Conversely, other oils, such as natural esters (vegetable oils) or synthetic esters, biodegrade over a two to three week period.

For this reason, biodegradable lubricants are finding more and more use in spill sensitive applications. They minimise the turf kill effects on grass because they essentially disappear fast enough (biodegrade) to allow the grass to regenerate.

