

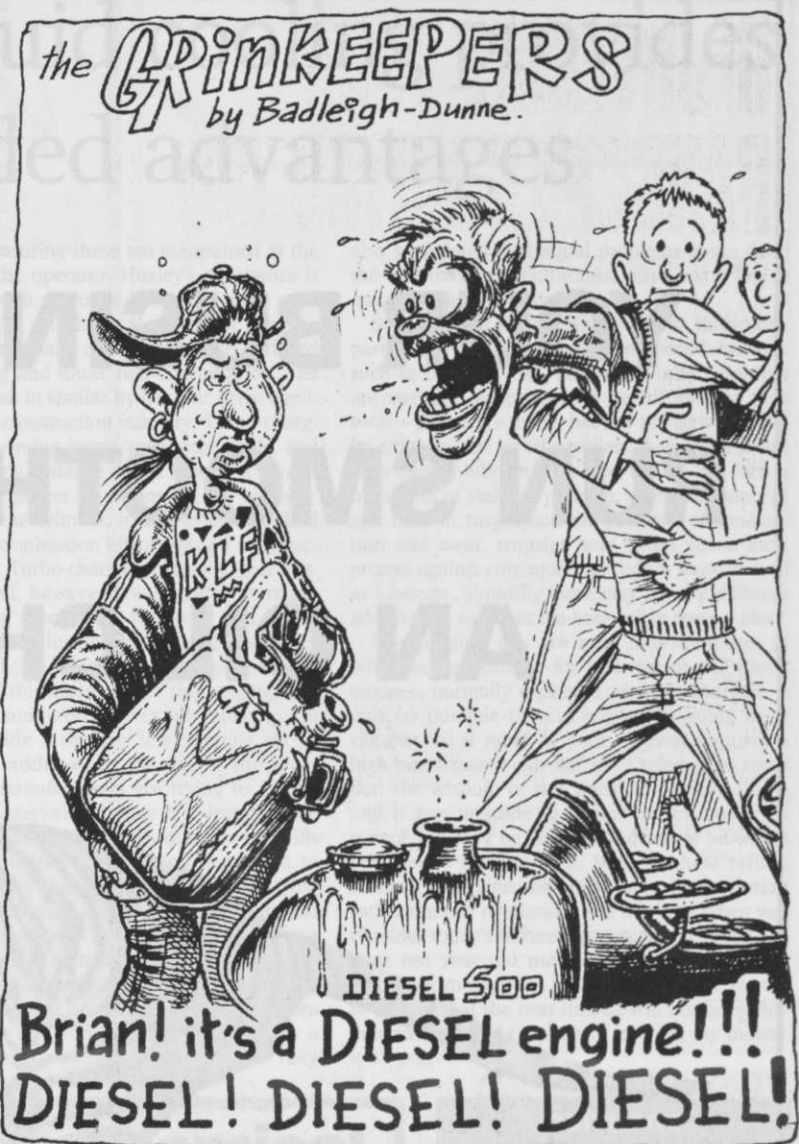
# INES

Then the question is, can I get an engine to fit my machine? The answer is most probably yes, as engines are now available in a very wide range of configurations from single and twin cylinder air cooled units which can be obtained in horizontal or vertical crankshaft form through multi-cylinder water cooled units. Engines are available with drive from either or both ends of the crankshaft and with additional PTO's for hydraulic pumps. Starting can be by rope, recoil, hand crank or battery. Power ratings can be from about 5hp onwards with very good torque characteristics.

As much machinery used on golf courses is imported from America (where fuel is cheap) the use of high horsepower petrol engines goes by unnoticed. In the UK, however, petrol is very expensive, particularly in relation to gas oil or 'red' diesel, so much so that a diesel engine can more than pay for itself in fuel saving in less than a year. If these savings can be made on a long life engine for one piece of equipment, imagine the scale of economy when a whole fleet of golf course equipment is considered; and as every course manager and greenkeeper will know, cost is of paramount importance. All courses have tractors and therefore diesel fuel will be readily obtainable. Its extended use will reduce the quantity of highly inflammable petrol that needs to be stored at any one time.

Now that diesel engines are made to be more readily started, many of the small units can be as easy to start on the recoil as a petrol engine. The multicylinder indirect injection engines have heater plugs and many or all of the features found on modern automotive diesel engines to ensure that they are trouble-free cold starters.

The diesel no longer need be regarded with suspicion, for it can be easily started, is reliable, economical and has a very long service life. There is a type and configuration for nearly every job on a golf course. As we have already seen, engines can be bought from small air cooled single cylinder versions to multicylinder liquid cooled units with their own radiators. Now is the time of year to consider re-engineing



that expensive equipment with a long life, low fuel consumption diesel engine.

■ Greenkeeper International acknowledges the assistance given in compiling this comparison feature from Briggs & Stratton (petrol) and Tecnamotor (diesel).

## Engine efficiency means less pollution

by HUGH TILLEY

Fuel economy was the prime goal for engine development a few years ago but now the goal posts are in front of lower emissions and pollution control – reflecting demand by customer, user and the general public. In particular the golf playing public is expecting mowers to be seen (but only if essential), but not heard nor smelt, (nor should they smoke or otherwise pollute the atmosphere). For the operator there are also health and safety hazards in noise and toxic and obnoxious emissions which have to be avoided. Development is also taking place in engine management systems which offer considerable scope for improvement in engine efficiency, the main factor restricting their introduction appearing to be cost and acceptability.

There is a clamour for bio-degradable and synthetic oils though this ideal has yet to match the reality. There has been rationalisation in the number of makes of small engine used in turf machinery, perhaps as smaller makers fall behind in R & D and marketing, and today is the day of the lightweight, high speed, compact diesel engine, especially for the professional who values the greater economy and reliability they offer – so

says one leading maker of such engines. Another manufacturer suggests that one gallon of diesel will do the work of three gallons of petrol, similarly he estimated the service life of a diesel to be twice or three times as long, perhaps 10,000 against 3/4,000 hours. This may be exaggerated as the latest petrol engines also have improved consumption and a longer service life. A number of American manufacturers have been a little tardy in adapting their machines to diesel – because 'gasoline' is cheap (in America). In the UK, diesel has many advantages and prime reasons for specifying it include the ease, safety, and convenience of storing. Considerations over whether to specify diesel or petrol must also look at annual running hours: some machines will never put in sufficient hours to justify the extra cost of a diesel engine. Significant advances have been made in petrol engines, and petrol is still the predominant fuel for pedestrian operated equipment, and because weight, simplicity and cost are usually important, most are air cooled. Much noise has been designed out by better balanced components and improved ignition chambers, and the trend is towards overhead valves which, while more complex and expensive, do

result in better ignition, – thus a cleaner, quieter burn and improved fuel efficiency.

Solid state or electronic ignition has made a dramatic improvement in both the reliability and performance of small petrol engines. Most people have also been converted to low octane unleaded fuel without real trouble. Many of these petrol engines now have automatic decompression systems which dramatically reduce the effort required to start them, this is particularly noticeable with recoil starters, but it also applies to key starting. Because the engine spins more readily so is it quicker to start -making 'first pull' starts more of a reality. The saving in broken cords and frustration can be quite real too.

Diesel engines are now available from about 5hp, and while they are more expensive than an equivalent petrol version they may now be very little heavier. Air cooled versions can be expected to be noisier than an equivalent liquid cooled version, but the deeper note of the diesel may be more acceptable than the more penetrating tone of an air cooled petrol engine.

The latest generation of diesels, particularly for ride-ons etc., are likely to be compact multicylinder water cooled designs, and these → 23

21 → will be seen more and more widely on golf courses as manufacturers ranges expand. These engines are inevitably of the indirect injection type which means they have a pre-combustion chamber. This 'feature' may be lost on the average greenkeeper, whose main interest is whether they work reliably. What he will notice is that indirect injection engines (usually) need the air in the cylinder to be pre-heated (with a glow-plug) before they will start, whereas the direct injection design, prevalent on tractors, will normally happily start after a few turns of the starter – battery drain is about the same either way. Indirect injection is slightly less economical on fuel although paradoxically it is actually more fuel efficient, it is also significantly quieter with a lower level of particulate emissions – ie. smoke, – telling advantages which come from the better controlled and relatively slower burn of the fuel.

Despite the extra complications of radiator and circulation system and the extra cost, the majority of compact diesel engines have liquid cooling, usually water. The significant advantages of this are in providing a more effective medium for heat transfer, and by providing a sound deadening jacket around the noise generation combustion chamber. If radiators and so on are an abhorrence, or unsuited for other reasons, perhaps an air cooled petrol engine is the better option.

The 'engine management system' on most small engines is a hand/foot throttle and mechanical governor with advance and retard mechanism. Motor racing is pioneering electronic controls which sense more parameters faster, and as well as the setting of the throttle and the engine's revs they can monitor load and power demand to give a faster response and significantly better fuel efficiency. The first (and currently only) manufacturer to use electronic engine control in the turf industry is Huxleys with their Electronic Drive Control (EDC) on the Huxtruk. While not fully integrated into the engine this unit controls engine and hydrostatic transmission according to the power and speed demands of the PTO

# Liquid cooling provides added advantages

and wheels, ensuring these are maintained at the speed set by the operator. Huxley's experience is that the EDC unit responds faster and more positively than the mechanical governor on the engine, and they claim quieter operation, reduced engine loading and lower fuel consumption. The unit was proven in similar hydrostatic drive applications in the construction industry. Turbo-charging is also becoming increasingly acceptable, and while in the first instance it was seen as a way of increasing the power of an engine, by 'blowing' extra air into the cylinder, it does offer a method of improving combustion efficiency and so reducing emissions. Turbo-charging places greater burdens on the oil, however few manufacturers are now specifying specific oils for diesel and turbo-diesel engines. Reducing emissions also includes reducing crankcase emissions – a major source of pollutant, and this means better ring sealing, and lower oil consumption. Lower oil consumption has a down side – there is less 'topping up' to replenish the additives in the oil. At the same time engine manufacturers are trying to extend their service intervals. If there is a lesson to be learned it is that the less often one fills or refills the sump the better quality of oil one ought to buy. One major lubricant manufacturer told Greenkeeper International that they have looked (and continue to look) at oils on the golf course (literally as well as metaphorically). Their conclusion is that bio-degradability has limited value, as much of the damage from oil spillage comes from suffocating the leaf and root of the grass, thus a wetter and water may be the best answer. They

also speculated that equal problems come from the additives and pollutants, often toxic heavy metals, which are in the oil.

Several firms are offering synthetic lubricants, particularly greases or special purpose lubricants such as chain-saw oil. Teflon and other additives are available which can reduce friction and thus wear – claims are many, but few are actively 'sold' by either engine or oil suppliers. A major problem with engine lubrication is that the oil has such a multitude of tasks to perform: to clean, intercept and hold in suspension the products of combustion and wear, transfer heat (from piston etc), protect against corrosion and reduce noise as well as lubricate. Typically there may be nine different additives to augment the base 'oil' in these duties.

Most engine oils are now multi-purpose, in other words, suitable for both petrol and diesel engines, normally aspirated or turbo-charged. It may be possible to save money by going for a cheaper oil if none of your engines requires a high performance oil, but the saving is so small that the wisdom of this must be questionable – and if you upgrade to a new diesel mower or tractor you may be left with a drum of oil which you should not use in it. Most of these refinements (in engine and oil) came by evolution rather than by revolution, and it is only when you consider today's technology against the engine in your ten year old mower that you realise the strides technology has made – nor is there reason to believe that the next decade will not bring further advances. (As a point of interest, my mower is 33 years old!)

## Correct approach to chemical usage: sensitive and sensible

**C**areful chemical selection and weed control programme planning will do much to answer the growing public and legislative pressures related to herbicide use in sensitive areas, according to Mark DeAth of weed control specialists Nomix-Chipman.

Speaking on the options for environmentally-friendly weed control at a specialist water quality seminar in London, Mr DeAth advised local authority and amenity managers to examine their options in detail. With the choice being between residual and non-residual herbicides, there are four primary strategies available to specifiers today, he said.

"The ultimate in environmental acceptability is to use non-residuals only. This will obviously have a higher cost in that at least two applications will be needed each season to give an acceptable level of weed control. However it also poses the least risk of water contamination.

"Another option is to alternate between residuals and non-residuals, using a residual in a single application one season followed by a non-residual which may require several applications the next," he continued. "This will reduce the chemical burden on the environment while maintaining good weed control."

"The third possibility is to combine non-atrazine and simazine residuals with knock-

down herbicides. This eliminates the use of atrazine and simazine but maintains a high level of weed control from a single application at a comparable cost to a triazine-only programme.

"Finally, the most economic option is to use triazine mixtures. Although this will control weeds over an entire season from just one application, it carries the greatest risk to local water supplies. No official restrictions have yet been placed on the use of triazine mixtures, but it is widely accepted that curbs will soon apply."

DeAth went on to outline factors which govern the choice of weed control strategy, including the availability of labour, the need for operator safety and the application equipment to be used.

With herbicide application becoming as important as chemical choice in achieving the best balance, he defined the key application needs. Systems should maximise labour productivity, minimise spray drift and operator contamination, maximise chemical use and minimise chemical disposal problems.

"Whatever strategy is chosen, there are a number of operating guidelines which should be followed to minimise the risk of water contamination," he concluded. "If there is any doubt, seek professional advice from suppliers and ensure that all advisers are BASIS qualified."

## OBITUARY

### Joe Gillett – always proud of his 'calling'

It is with regret that I now inform fellow BIGGA members of the death of Joe Gillett, the much respected head greenkeeper of St Annes Old Links Golf Club from 1953 until 1981.

Joe, as all who knew him will surely recollect, was a great character and a skillful golfer who played with great enthusiasm, especially remembered as a worthy winner of the Ransomes Trophy at Wallasey in 1971.

Joe came from a family of greenkeepers and began his illustrious career in 1931 at the Fairhaven Golf Club. He was always proud of his calling and it gave him great pleasure to see his chosen profession grow from strength to strength.

We are all proud to have known him and on behalf of all his many friends and members in BIGGA, I send our deepest sympathy to his wife, Barbara, and to his family.

GEOFF WHITTLE