

Consider for a minute how much we have all come to rely on the internal combustion engine in our work and personal lives. Not until something goes wrong do we realise just how difficult it would be without it.

Over the last three decades virtually every operation carried out in golf course maintenance has been mechanised. An engine's function is often taken for granted – turn a key or pull a rope and it starts. That is until the day when nothing happens and the odds are this will occur when that particular piece of equipment is most needed. The petrol or diesel engine has become of paramount importance in enabling course managers and greenkeepers to fulfil their duties to the satisfaction of the golfing fraternities.

In this article we are looking at a number of aspects relating to the engine. These include engine emissions and the environment, replacing the power unit as an alternative to buying a complete new machine, plus tips on how to care for this important part of your equipment.

A cleaner environment

Engine technology has increased in leaps and bounds over the last decade, largely due to outside influences. Governments throughout the world have been pressurised into doing something about the way they protect the planet. As a result the pollution created from burning fossil fuels is very much under the

POWERFUL or POWERLESS?

PETER OAKFORD looks at engines

spotlight. Proposed legislation on this issue is being continually introduced. Engine manufacturers recognising this and their responsibilities have assigned vast amounts of money to research and development to produce cleaner and more economical power units.

Here in the United Kingdom every car owner knows unleaded petrol is cheaper. This is because of a government initiative to encourage us to use it instead of leaded fuel. As part of the policy for cleaner air the MOT now entails stricter tests on exhaust emissions. These are only the tip of the iceberg. Research carried out by the California Air Resources Board (CARB) in America has given engine manufacturers their biggest challenge to date. Stringent controls on the emissions from industrial engines fitted to all types of amenity equipment are on

the way. To understand what is involved it is necessary to look at the cause. Tests in the States revealed that pollutants from these units were pumping into the atmosphere at far higher levels than originally thought and action was needed to reduce it.

There are three main culprits produced by the combustion process that are harmful to health, carbon monoxide, hydrocarbons and nitric oxide.

Carbon Monoxide

This is generally considered to be the greatest health hazard. It is produced as a result of incomplete fuel combustion due to a lack of oxygen. The critical factor in avoiding production of carbon monoxide is the fuel and air mixture. A rich mixture produces this gas whilst a lean one keeps the level down. Badly

adjusted or worn carburettors are the main cause.

Hydrocarbons

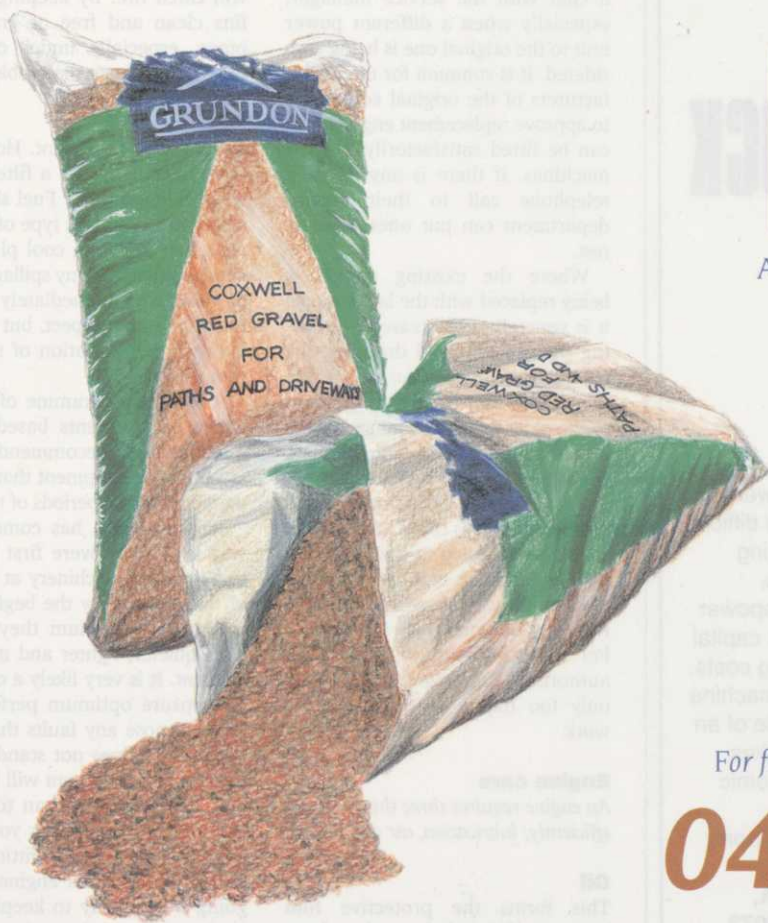
These are also formed by incomplete fuel combustion. In this case if the fuel mixture is too lean the engine runs erratically and emissions of hydrocarbons increases. Another source of hydrocarbon pollution that is often not taken into account is fuel evaporation from containers or spillage.

Nitric Oxide

This is produced as a result of oxygen and nitrogen combining at high temperatures. It is very dependent on the fuel and air ratio. The temperature of an engine can be lowered by retarding the ignition timing and re-circulating the exhaust gases. This will then reduce the formation of nitric oxide. Unfortunately this action also tends to reduce the power output.

Catalytic converters

These are increasingly being included in car exhaust systems, but they are still expensive to produce. The breakdown process entails oxidising the hydrocarbons and carbon monoxide at high temperatures. On small engines there is no oxygen in the exhaust system for the action to take place, this has to be introduced into the converter. Another problem at present is the amount of heat created. It is far greater than that produced from a standard exhaust



Are pleased to introduce our full range of

- Path Gravel
- Top Dressing
- Bunker Sand
- Drainage Gravel
- Rockery Stone
- Puddle Clay

For free advice and quotation call our action line:

0420 476407

AD
REF
437

'Fitting a diesel engine will, in the long term, represent a considerable reduction in fuel bills'

system and represents a potential safety hazard. However the experts are working on it and the signs are that a breakthrough is not too far away.

The above indicates the importance of maintaining an engine correctly, especially in relation to the fuel and carburettor adjustments. Vast amounts of money have been used throughout the world to find solutions to these problems. The result of all this research is the introduction of engines that conserve fuel and oil, run quieter and issue less pollution. In addition, a better power to weight ratio is commonplace and modern electronics ensure they start easier. Present manufacturing processes, plus use of the latest materials have contributed to a reduction in maintenance requirements. In a nut shell, today's engine is a vast improvement on its predecessor of ten years ago.

All this would be fine except that the workload placed on equipment has also changed. Workforces have been reduced to a minimum, tight budgets restrict the purchase of new machinery, so the life of existing equipment has to be extended. In addition, it is now working for longer periods. In some instances it

is not until it finally gives up the ghost that any decision is made on what to do with it. In these situations economical ways of keeping equipment going have to be sought.

Replacement engines

There comes a time when even the most cared for engine shows signs of wear and a decision has to be made whether to repair, replace or trade-in the complete machine for a new one. If repairing the old power unit looks like being extensive and expensive then replacing the engine may be a solution. Another possible reason for this course of action is the savings in fuel. The modern petrol power unit is less thirsty and more economical to run than its predecessor. Alternatively, fitting a diesel engine will, in the long term, represent a considerable reduction in the fuel bills.

Before deciding to replace the existing power source there are several points that require consideration. Carry out a full assessment of the condition of the whole machine. Has it been maintained on a regular basis? Have any major parts or components been replaced in the last year?

In the case of mowers, what is the present state of the cylinders and

bedknives? Have they been ground regularly, if so, how much life is left in them? Will all the components such as transmissions and drives withstand the increase in power a new engine produces? Components could have been under pressure and stress if the engine has not been operating effectively. These too may need replacing. Is the mounting frame sound, not rust eaten? This point is also particularly important if a heavier power unit is being considered as the replacement.

It is strongly recommended that this full assessment is carried out thoroughly either by your own workshops or a recognised service specialist, otherwise you may find within a short period of time other parts of the machine start breaking down.

Once all these aspects have been taken into account and fitting a new power unit is a viable proposition, a choice of which one has to be decided. Now is the time to seek help from the spare parts manager at your local specialist dealer. He will be able to supply prices and specifications and tell you whether an engine replacement kit is required.

Competition between engine manufacturers is keen, so it could be an advantage to consult more than one supplier. It is also worth having a chat with the service manager, especially when a different power unit to the original one is being considered. It is common for the manufacturers of the original equipment to approve replacement engines that can be fitted satisfactorily to their machines. If there is any doubt a telephone call to their service department can put ones mind at rest.

Where the existing engine is being replaced with the latest model it is generally just a case of removing the old unit and dropping the new one in place. Sometimes the dimensions may be slightly different to the older version so minor adjustments are necessary. If a complete change of engine is being carried out modification to mountings and change of pulleys could be required. These are supplied in a kit with the new replacement unit. In a majority of cases the changeover can be carried out by your own workshops. For those without this facility an authorised engine supplier will be only too happy to carry out the work.

Engine care

An engine requires three things to run efficiently; lubrication, air and fuel.

Oil

This forms the protective film between all internal metal surfaces and dissipates the heat that is built

up from friction created by the moving parts. Over a relatively short period of time oil will become contaminated and its lubricating properties diminished. As a result the engine begins to overheat. If oil levels are allowed to drop, the temperature rises. If nothing is done about this the engine eventually seizes-up which can be an expensive lesson to learn. Dipsticks require inspecting at least once a day. The manufacturer's recommendation regarding oil changes should be followed and a top quality lubricant used.

Air

Air is critical to the efficient running of the engine and it must be clean. This is achieved through an air filtration system. These are generally found in the form of a foam pad, impregnated with oil. Periodic cleaning, especially in dry dusty conditions, is a requirement. If they become blocked through neglect then the engine runs erratically and starting becomes difficult. Dirt is drawn into the engine causing damage to internal components.

Air has another function, that of maintaining the correct engine temperature. This is achieved by a flow of air over cooling fins. If these become blocked with dirt and dried grass the flow is obstructed and the engine gets hot. In extreme cases it will catch fire. By keeping cooling fins clean and free of grass clippings, especially under cowlings, this will eliminate the problem.

Fuel

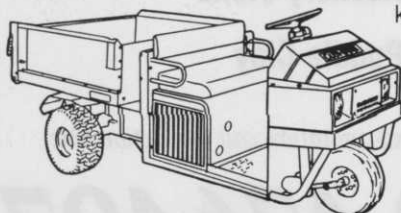
Clean fuel is important. How many readers actually use a filter funnel when filling a tank? Fuel should be stored in the correct type of labelled container and in a cool place with good ventilation. Any spillage's must be dealt with immediately not just from the safety aspect, but to avoid hydrocarbon pollution of the environment.

A weekly programme of maintenance requirements based on the manufacturers' recommendations is essential for equipment that is being worked for long periods of time.

Engine design has come a long way since they were first fitted to grass cutting machinery at the turn of the century. By the beginning of the next millennium they will be even quieter, lighter and more fuel efficient. It is very likely a computer will ensure optimum performance and diagnose any faults that occur. Technology does not stand still, so tomorrow's equipment will be better and more efficient than today's. It may not be possible for you to buy new machinery, but by fitting an up-to-date replacement engine you are going a long way to keeping your equipment operating at its peak performance.

REJUVENATE YOUR CUSHMAN TURF-TRUCK WITH A KOHLER COMMAND ENGINE

Many Turf-trucks are still in good condition, but powered by an engine which is now unreliable and parts are difficult to obtain. A kit is now available to replace the existing engine with a KOHLER COMMAND 20 h.p. engine.



The COMMAND repower kit saves both capital and running costs. A usable machine for the price of an engine makes sound economic sense.

Get the facts from:

J.H. Hancox Limited,
Alcester Road, Portway, BIRMINGHAM, B48 7JA,
West Midlands. Tel: 0564 824343, Fax: 0564 824073