

Machinery maintenance

Roland Taylor offers some useful advice on machinery maintenance and getting the most out of your equipment.

There are three good reasons for having a maintenance programme in 1996.

The first is, of course, safety.

The Health and Safety Provision and Use of Work Equipment regulations 1992 states the following under section 6 (Maintenance).

1. Every employer shall ensure that work equipment is maintained in an efficient state, working order and good repair.

Where machinery has a maintenance log this will be kept up to date.

The word "efficient" relates to how the condition of equipment could affect health and safety and not to its actual productivity.

The document stresses the

importance of machinery being maintained so that its performance does not deteriorate to a level where people's safety is at risk.

Under the sub-section entitled "Routine Maintenance", it states that periodic lubrication, inspection and testing as recommended by the manufacturer, plus any specific legal requirements should be carried out. Any components that are found to have failed, or are showing signs of possible failure before the next scheduled service should be repaired or replaced.

In addition to the safety aspect and keeping the machine operational, routine maintenance should be looked upon as a preventative exercise that will help to provide early warning signs of possible future breakdowns.

2. Caring for the environment. A major component of any powered equipment is the engine and

regardless whether it is petrol or diesel it is a potential source of pollution. Manufacturers have made great strides in recent years to reduce the amounts of emissions that their power units produce, but the fact still remains that the levels of pollutants emitted are governed by the carburettor settings and the general condition of the engine.

Noise and vibration are two other factors that need to be taken into consideration. That hole in the exhaust will increase the decibel rating considerably. A badly balanced or damaged blade is not only dangerous it also sets up vibration throughout the machine.

3. Preventative measures. Any maintenance programme should include an overall inspection of the machine to identify any possible area for potential problems. Nuts and bolts sometimes become loosened. Belts or chains

wear and become loose, these will require adjusting or renewing. Rotary blades and flails showing any signs of damage or excessive wear need replacing immediately. Cylinder damage will generally have already been identified in the deteriorating quality of cut.

By carrying out a general inspection of the whole machine every time it is in for an oil change, little things can be dealt with before they become big breakdowns.

Any machines used on a golf course will at sometime be working in a fairly hostile environment. It is subjected to high levels of dust, dirt, grass clippings, sand and chemicals so keeping it clean should be part of any programme. Regular removal of these deposits reduces the possibility of:

- Engine damage
- Poor performance



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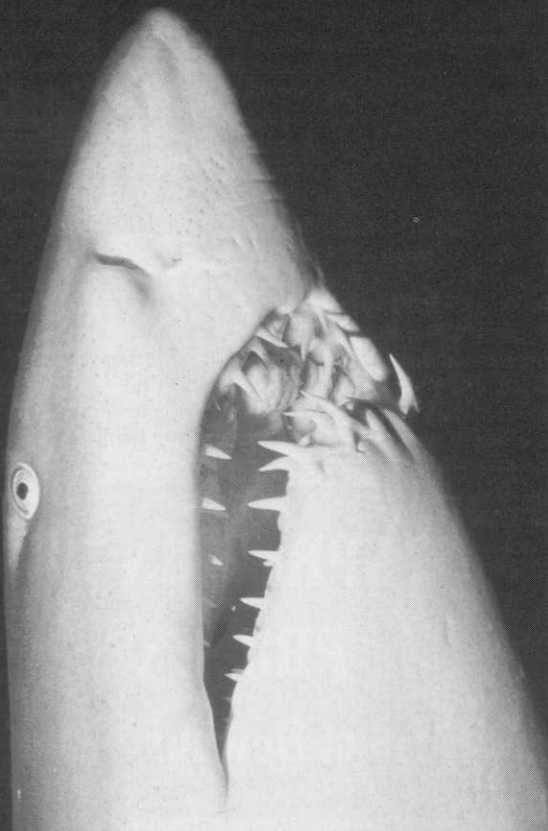
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Machinery maintenance

'Oil is the engine's life

- Drop in efficiency
- Damage to metal components through corrosion
- The machine is easier and more pleasant to use and service.

There are plenty of pressure washers (see December issue) on the market to make this task easy.

Considerable advancements in the design of equipment, engines and components have led to longer periods between services. While this is a bonus it does not reduce the importance of carrying out regular inspections within the intervening time, in fact it increases it.

With the new season only just weeks away, now is an ideal time to take a look at your equipment maintenance programme for 1996.

Engines

The most important component of any piece of machinery is its power source, which always needs to give optimum performance and therefore requires regular attention. A majority of readers will have machinery fitted with diesel engines. These require similar servicing to their petrol counterparts with certain exceptions such as spark plugs.

There are five main areas to be considered: Oil, air, fuel, electrical systems and emissions.

Oil

This is the engine's life blood and as such requires constant monitoring. Its main function is to keep friction (heat) to a minimum. For this to work satisfactorily the oil has to be of the right viscosity and used in the correct quantities. During use it is subjected to extreme temperature fluctuations and is polluted by the combustion process plus normal engine wear. As a result lubrication deteriorates and the oil will require changing.

How often this is done will depend on the manufacturer's recommendations and the quality of the oil. Levels should be checked every time the machine is used and topped up if necessary. A consistent drop in the amount of oil shown on a dipstick is a good indicator of excessive use of oil, and is a sure sign that something is going wrong and needs attention.

Oil Changes

There are two other areas where we are now seeing developments in the types of oils available – two stroke engines and hydraulic systems.

Smokeless two-stroke oil has been around for over 30 years. It is only now beginning to be recognised as beneficial to the operator, the engine and the environment. The basic ingredient of their latest introduction is a colourless, odourless gas (isobutylene) that is changed to become a non-toxic water white liquid called polyisobutylene. When the correct formula of this highly combustible oil is added to the petrol and introduced into the combustion chamber, it decomposes to its the original gas which produces water vapour and carbon dioxide. Both these are harmless and do not pollute the air with oil smoke.

Conventional refined petroleum base oils have high boiling temperatures and do not readily decompose during combustion. They are converted into a dense oil vapour that forms clouds of oil smoke. This remains in the air until it cools and then settles on the ground and eventually rain washes the oil into streams and rivers.

Another disadvantage with petroleum based oils is the formation of residual tar-like deposits which build up in the engine. These find their way into piston ring grooves and exhaust ports. The engine's performance very quickly begins to deteriorate.

A smokeless oil produces no carbon residues, so its detergent action is more effective in dealing with carbon and gum deposits produced from burning petrol. As a result the engine is cleaner and performs better.

Biodegradable oils for hydraulic systems are now on the market. These are manufactured from rape seed oil and are claimed to have superior lubrication qualities to mineral oils. They are also said to be user friendly and minimise traditional non-allergic health complaints such as eczema and irritation of the respiratory tract. Tests have shown that within 21 days about 87% or more of the oil is broken down. In trials carried out by the

'blood and requires constant attention'

Turf Research Association it was found that when the oil came into contact with grass, discoloration occurred but there was no long term damage to the root system. Biodegradable chain oil has been available from chainsaw manufacturers for a number of years.

Air

The highly efficient air filtration system on an engine is designed to ensure that dirt does not enter the combustion chamber. Blocked filters cause an engine to run rich, and the pollution levels emitted rise sharply, so does the amount of fuel used. Starting becomes difficult.

A foam cartridge is the most common air filter used and these need regular cleaning, especially in a dry, dusty season like the one we experienced during 1995. If a filter is found to be excessively dirty or damaged it will need

replacing with a new one.

Air is also used as a coolant and for it to be effective it needs to flow freely through the cooling fins on both an engine and the hydrostatic transmission unit. Dirt and grass clippings tend to block these and as a result restrict the amount of air passing through them. In this case the temperature begins to rise dramatically and if the obstructions are not cleared, the units will eventually seize-up or catch fire. Again, this is likely to occur more often in dry dusty conditions, so regular checks need to be carried out, especially under guards and covers.

Petrol

One of the most common engine problems in spring is failure to start and the culprit is stale petrol. When investigating the cause it is often discovered that fuel left in the system has dam-

aged carburettor components and piping.

In this situation drain off any liquid in the system, dismantle the carburettor and clean all the parts with a proprietary cleaner, fit new ones if necessary and fill the tank with fresh fuel.

Modern fuels have a limited life so unless a stabiliser is added the system should be drained prior to the piece of equipment left idle for long periods.

Electrical system

Electronic ignition consistently produces a highly efficient spark. However, the spark plug does require some attention since its life and performance does depend on how much it is fouled-up rather than actual electrode wear. There are a number of factors that contribute to this build-up of carbon including the shape of the combustion chamber, engine running speed and operat-

ing temperature. It is not worth cleaning a spark plug - always replace it with a new one of the correct type for that particular engine and with the correct gap setting.

Emissions

These depend on how efficient the combustion process is and this is reliant on the correct mixture of air and fuel. As has already been shown, blocked air filters can change this ratio, so will a badly adjusted carburettor. Fluctuations in engine running temperature or a fault in the electrical system can also alter the levels of emissions. It is important that carburettor settings are correct and are regularly checked to ensure they have not changed. Badly worn engines, while being extremely inefficient, are also a major source of pollution.

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Machinery maintenance

hydraulic systems

Hydraulic systems are commonplace on today's machinery and like the engine these require regular attention if problems are to be avoided. On some applications systems work at extremely high pressures – often as much as 10,000psi.

For this reason and to obtain long life only the correct oils should be used.

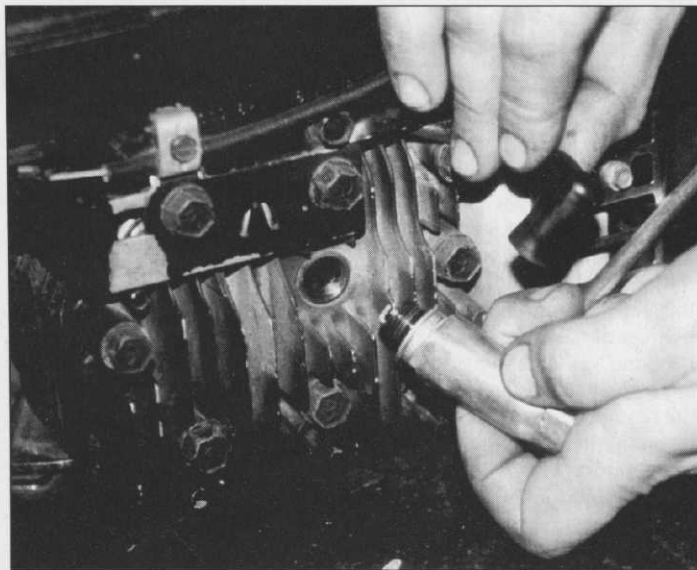
One of the most important factors to bear in mind when dealing with hydraulic systems is cleanliness. The introduction of any dirt or water will spell disaster.

A daily inspection of the whole system is recommended and particular attention should be paid to the following:

- Is the oil at the correct level? A drop in oil level could mean a leakage. It may only be small at this stage, but it needs further investigation.
- Does the oil look dirty?
- How is the system performing, are there signs of it slowing down? A pump may be wearing.
- Is it noisy? This is often the symptom of a blocked filter.
- Has the operating temperature increased? The cause needs to be found.
- Hydraulic hoses which show signs of chaffing need to be re-routed or replaced. Signs of leakage from joints also need attention.

Periodically clean or replace any filters in the system in accordance with the machine's instruction manual.

If a problem does occur then call in a hydraulic specialist.



Grease

Sealed bearing assemblies are today commonplace and require no attention. However, greasing points can be found on some pieces of equipment. It is very easy to over-grease, so care is needed – overdo it and the grease is forced back out of the nipple or seal where it hangs in a blob, attracting dirt, sand and any other foreign matter that is floating around.

Belts, Chains and Guards

These days, chain or belt drives usually have an automatic adjuster. It is worth making sure that these are working correctly and that the belts are not fraying or splitting. In the case of chain drives these will require some form of lubrication.

Guards that are showing signs of fatigue or damage should be repaired or replaced.

Cutting Systems

In the introduction we talked about the safety aspect regarding cutting systems.

Other problems are also associated with blunt or damaged blades:

- The power requirement to drive them increases considerably.
- Greater stress is placed on the engine and components such as bearings, belts and chains.
- The quality of cut rapidly deteriorates and the turf may be damaged.
- An unbalanced blade is highly dangerous and vibration sets up throughout the machine could cause metal fatigue.

In the case on a rotary or flail mower where it is known that the cutting system has come into contact with an obstruction, the blade carrier should be inspected thoroughly for any sign of broken welding or distortion and replaced if necessary.

Knowing your machinery is important factor in avoiding problems. Always be on the lookout for a change in the normal pattern.

- Does the engine sounding different or has it suddenly become

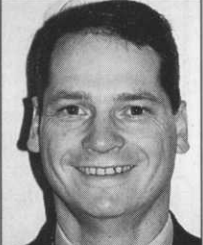
ing difficult to start?

- Are the hydraulics slower or noisier?
- Is there an alteration in the overall noise of the machine
- Are drives less smooth in their take-up?
- A hot spot is one of the biggest symptoms of a problem.
- Has fuel consumption increased for no apparent reason?

All these are strong indicators of a possible problem that needs further investigation. By acting immediately the chances of that frustrating breakdown at a most inconvenient time are greatly reduced.

Today's golf course equipment has to be cost effective, efficient and consistently produce a high standard of finish. This will only be achieved if it is cared for, maintained and serviced regularly. Time invested in this is well spent and will pay dividends all round in the long run.

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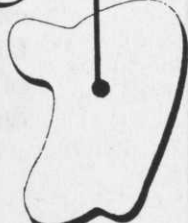
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