

products will work better in lower water volumes but this combination may give you drift problems.

To avoid this, a shrouded boom such as the LERAP 3 Star rated Hardi Defender should be used to virtually eliminate drift.

As a rule, many systemic products used in broad leaf weed control advise the use of Medium spray qualities so are easier and safer to apply than a 'contact' type as you can use larger drops and lower water rates.

However, a 'contact' type product or one that contains one part of a mix with contact action may specify Fine to ensure these drops are retained all over the plant surface.

Labels may also suggest that water volumes are increased when plant canopies become denser and very high water volumes might be recommended where the product needs to reach the soil surface on greens, as the higher volume will run off the leaves to the surface below.

### EASY JET USE

Manufacturers have made the selection and use of nozzles much easier now. Bayonet fittings need just one quick flick of the wrist to fit nozzles and line them up automatically whilst colour coding means that at a glance you have the same size nozzles on a boom so you will apply the same dose.

By carrying three or four nozzle sets – one for each of your jobs – on special turrets they can be quickly snapped into position as you go from one use to another.

Even when the wind gets up half way through spraying, by switching nozzles you can simply switch to one with the same output – but producing a coarser spray – and keep spraying, avoiding the need to stop to recalibrate or go back to base.

Nozzles can also be individually turned off so that if you want to reduce the width of your swath as you spray around the outside of the greens, then just turn off those you do not want to spray.

### 'GREEN'ER SPRAYING

To get the best performance out of your products follow the advice that is offered on the label. In particular, identify any specific dose that you could use for the task in hand rather than use a higher 'catch all' blanket rate and then precisely time your spraying at the growth stage/pest levels described.

Good timing comes only with sound preparation. Calibrate the sprayer with clean water before you start, as you will save time, not delay the application, do a better job and reduce the risks of anything going wrong.

Many reported incidences of drift damage are due to boom heights being excessive. Booms are meant to work at 50cms and also remember to use boom cut-off sections to avoid overlapping a treated area and any ground that is not intended to be treated. You may be concerned at accidentally missed areas; the environmentalists are more concerned at those areas you have overdosed.

Any other advantages from better spraying practices? Wise operators will already know that when they use Very Coarse sprays or shrouded LERAP rated booms such as the Defender, anyone can very clearly see the much reduced drift. Although total volumes may be quite small – like Scottish midges in June – these small losses are becoming hugely troublesome to the bystander!



▲ Flood jets are commonly used on knapsack sprayers as they provide a wide swath and are less prone to nozzle blockages

More information on nozzles, sprayers, calibration and all the latest spraying news is on the Hardi International A/S ([www.hardi-international.com](http://www.hardi-international.com)) and Hardi Limited ([www.hardi.co.uk](http://www.hardi.co.uk)) websites or write to Hardi Limited at Unit 1 Europark (A5), Watling Street, Clifton-upon-Dunsmore, Rugby CV36 0AQ.



▲ Foliar applied sprays often require a finer spray, which are more prone to drift. A shrouded boom will virtually eliminate this problem

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**SEE THE 'TURFTIME TEASER' ON PAGE 45**

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# Some Thoughts on Bunker Drainage

Will Bowden uses his experiences travelling to some top clubs in America to share some useful advice on bunker drainage.

I would like to introduce myself as a young greenkeeper who like many others in my profession is continually keen to learn more and broaden their practical and theoretical experience and knowledge.

Although still in the early years of my career I believe that whatever your level of experience good ideas must be shared in order that as broad a spectrum of people as possible may benefit.

In recent years I have been fortunate to be involved in numerous experiences overseas as well as having worked on some fantastic golf courses under some very progressive and innovative Course Managers.

I do not claim to be an expert in any aspect of my profession, however I do believe that sharing ideas and experiences is a vital part of our development in order that we can understand more and appreciate the intricacies of greenkeeping. The aim of my articles is hopefully to strike a chord among other like minded enthusiastic greenkeepers young and old.

In May 2000 I was selected to take part in the inaugural Grand Tour Scholarship Scheme. Organised by Bettina Shrickel and at the time sponsored by Rainbird International I was offered one month to travel the entire East Coast of America stopping off at some of the world's most famous venues along the way!

As you can imagine it was an unbelievable learning experience and above all a great opportunity to learn a wider range of new philosophies and solutions to problems that in many cases were echoed back home in the UK. One such method was an innovative idea regarding bunker drainage and, primarily, the potential to reduce the severity of bunker washouts.

Although a problem of alarming proportions in the US where at certain times of the year flash floods reek havoc, I recognised its relevance to the British Isles and our ever-changing climate.

The method was being employed at a golf club called Winged Foot in the New York State. This is one of America's finest and most established golf courses regularly staging major tournaments and most notably host to several US Opens.

The entire course was under major renovation during our visit and although a club of extensive resources and facilities even these were being stretched to the limit.

As with our UK climate the frequency of flash flooding in New York State was increasing and with the combination of a comprehensive course overhaul and the ever more unpredictable weather, several maintenance issues were brought to the fore.

Most significant was the constant need to repair bunker washouts (at worst approximately two to three times per week). This had become such a huge drain on both manpower and financial resources that it was having a detrimental effect on the presentation of other golf course areas. The following investigation was therefore made to establish a successful method of damage limitation.

Picture 1 shows a typical bunker at Winged Foot and highlights the basic principle of perimeter draining that the club was embarking upon.

## THE PRINCIPLE

The idea of the perimeter drain is to enhance the already existing drainage infrastructure within a bunker, by plugging in a new perimeter drain and installing a two-inch perforated pipe in a trench dug to approximately eight inches at a four to six inch distance inside the top edge of the bunker. This drain line is then back filled with shingle to just below the lip and capped over with fresh sand.

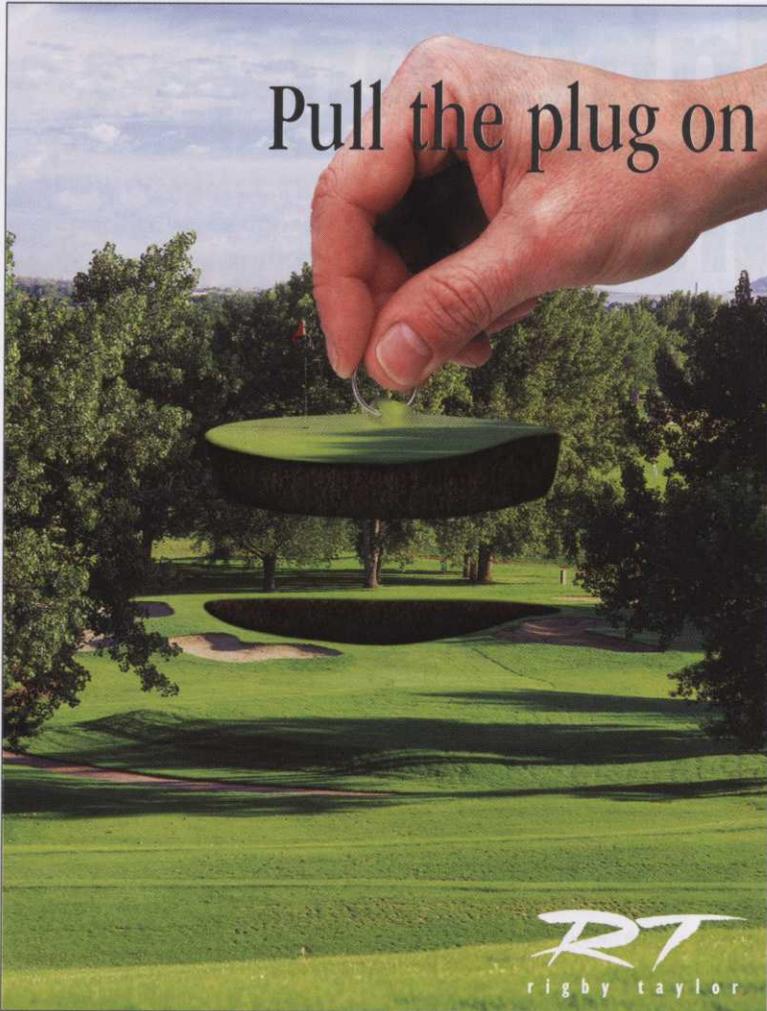
Picture 2 (over the page) illustrates the trench has been dug in to the bunker face and pipe laid with a back fill of shingle over it. This drain was plugged in to the main drain at the base of the bunker by a single lateral.

This method was proving to be extremely successful, it relies on catching the majority of the water being channelled down the bunker face and draining it away before it has a chance to gain momentum and in turn wash



▲ Picture 1

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## Some Thoughts on Bunker Drainage



▲ Picture 2

the sand down the steep face. Although undoubtedly a time consuming task in the short term it has proved itself to be a successful solution to a long-term problem.

A year later I was working as an Assistant at The London Golf Club and with a huge number of bunkers on both their Jack Nicklaus golf courses the damage caused by frequent washouts was a constant drain upon resources.

After describing this method to the Course Manager, Peter Todd, and his team we decided to test the effectiveness of this theory in a British climate. We began initially by selecting the worst two or three bunkers on the International Course.

The results were a resounding success, through the installation of perimeter drains complimenting the already existing infrastructure we were able systematically to pick off the worst affected bunkers and in turn embarked upon an ongoing drainage plan to encompass all greenside and problematic fairway bunkers over the coming years.

One of our fears was that these drains would rapidly become contaminated with sand and silt migration. This has not occurred as the first bunker we renovated over two years ago is still performing perfectly.

Over a period of time we began to make modifications to this theory and as the following picture shows we started to place perimeter drains outside the top edge.

The basic principle behind this echoes that of the internal drain. At The London Golf Club it is a characteristic of many holes to shape the long

grasses around the outer edge of some fairway and greenside bunkers. Not only did this create an attractive visual effect but it also allowed us to place drains on the bank of the hazard which would be effectively be hidden as the native grasses grew in the Spring.

This outer placement of the drain resulted in equal success and greatly reduced the likelihood of any silt/sand contamination. It is ideal in the sense that it actually catches the channelled water before it even has an opportunity to reach the bunker.

It has become clear that both methods are equally successful and having recently spoken to Peter at The London Golf Club he is continuing to employ this method of bunker drainage. Far from being a practice that is exclusive to more 'top end' establishments this is a simple method of bunker drainage that works and I believe can be utilised by all golf clubs large and small.

The key is to prioritise which are your problem bunkers and deal with those first, then systematically and over a number of years attempt to improve the overall drainage of all the bunkers on your golf course. It can be one a year, it doesn't matter!

Although by no means revolutionary I hope this suggestion will help those who have historically suffered from the constant nightmare of bunker washouts. I am sure many of you are employing similar methods already and, if so, rest assured your work is of great long term benefit and well worth the effort you and your team are putting in.



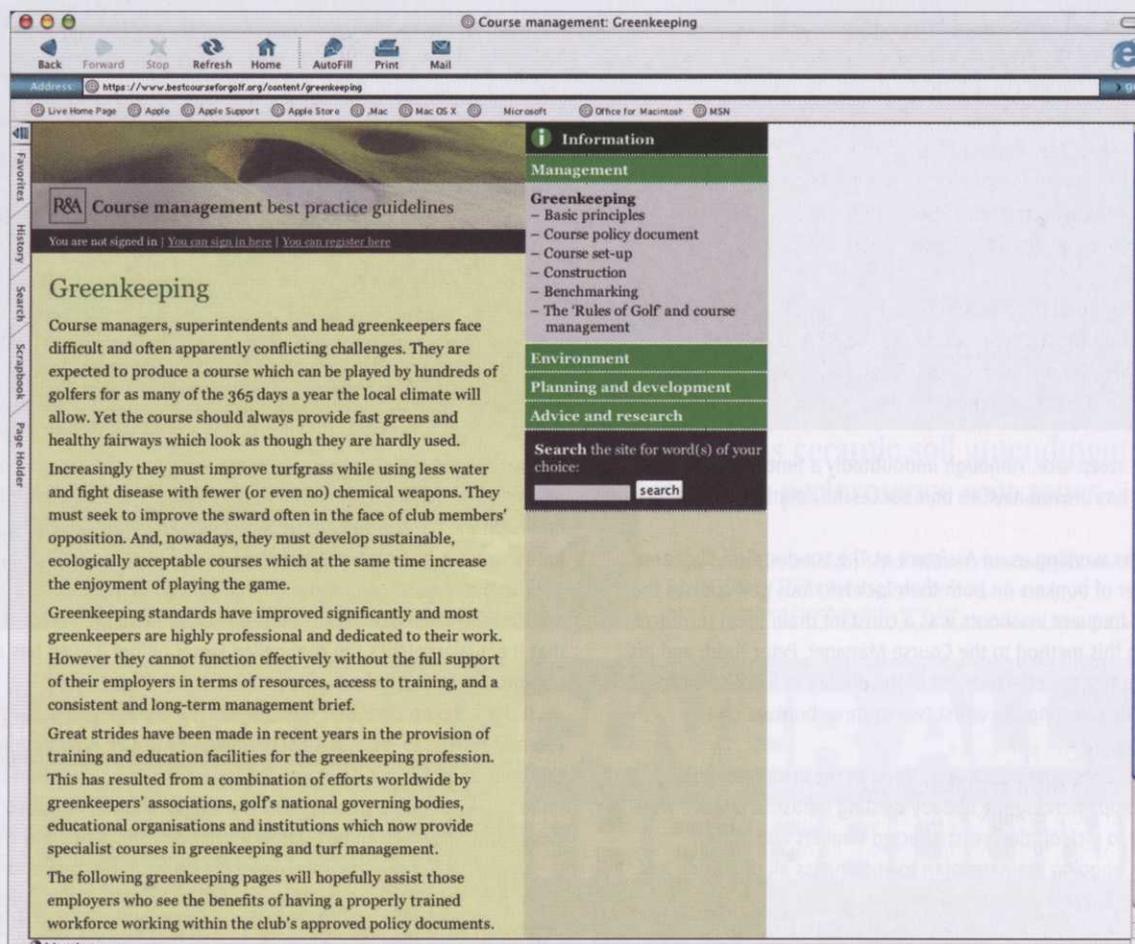
▲ Picture 3



▲ AFT Trenchers

# The R&A's Course Management Best Practice Guidelines

Steve Isaac, Assistant Director - Golf Course Management introduces the new R&A website.



## THE WEBSITE

February 18 saw the launch of our Course Management Best Practice Guidelines website, [www.bestcourseforgolf.org](http://www.bestcourseforgolf.org). It could be said the production of this website has been "in response to popular demand".

At the end of 2001, golf administrators and greenkeepers at the "Changing Course in Europe" conference in Portugal called for the R&A to take the lead on a number of pressing issues such as co-ordination of research, promoting the good name of golf to national governments and the European Union in Brussels - and promoting best practices in course management.

Since then, the need for help, guidance and leadership has been underlined by the increasingly stringent environment legislation the game of golf has to observe.

The purpose of this article is to explain the reasoning behind the development of the website, provide an introduction to the site and outline our hopes for its use.

## WHAT IS BEST PRACTICE?

Our definition of best practice is:

Management of golf courses in an environmentally and economically sustainable way.

One would hope that every course is managed to these fundamental principles. Any golf course is an integral feature of its environment and what happens on the course will have an impact on the ecosystem of the course and adjacent land.

Each club also has to live within its means, so economics has to influence course management policy. Fortunately, in most instances, environmental and economic sustainability often complement course quality.

Anyone working outside these parameters now has increasingly stringent environment-led legislation to contend with. You may have seen the implications of national government interpretation of EU Directives in Sweden and the Netherlands highlighted in the September issue of *Greenkeeper International*. This is a global phenomenon and not just restricted to Europe.

We must never forget that golf courses are a form of land management and this, in itself, requires positive action and inputs. Peter Dawson, the R&A's Chief Executive, summed this all up very well by stating:

"The challenge for golf is to maintain course quality and playability while respecting and positively contributing to the social and natural environment."



## WHY HAS THE R&A DEVELOPED THE WEBSITE?

In addition to the call for the R&A to take a leading role in matters pertaining to course management, as previously mentioned, the R&A has a history of contributing to this subject.

The documents, "The Way Forward", published in 1989, and "A Course for All Seasons" (1997), were the product of the R&A's Golf Course Advisory Panel which was formed in 1986. Latterly, the Golf Course Committee has taken on much of the Panel's work but to a more dynamic remit.

The website is a natural progression from the publications mentioned, and a great deal more. Most of you will know the R&A as the organisation which hosts The Open Championship every year and is responsible, along with the United States Golf Association, for the Rules of Golf.

The R&A is far more deeply involved in promoting the development of the game at home and, increasingly, abroad. Production of the best practice guidelines is a major step for the R&A within this objective. It is a statement of intent and support for those implementing or trying to implement sound greenkeeping.

Persuading those in government or environmental lobby groups who may be anti-golf that we are responsible users of land and can produce sustainable courses has to be a positive contribution to the worldwide development of the game.

## WHAT WILL YOU FIND ON THE SITE?

Access and use of the site is **completely free of charge**.

On entering the site we strongly advise that you study the downloadable User Guide. Read this and you will be able to make the most of the site.

The information on the site has been divided into the following sections:

- Management
- Greenkeeping
- Environment
- Planning and development
- Advice and research

The text is comprehensive yet intended to provide guidelines and not the definitive way to manage your golf course. We hope the guidance helps everyone using the site to develop a management system and programme which gets the best out of their club and course – but the manner in which this is achieved has to be site specific.

In the space of a brief introduction it would be impossible to give a worthwhile taster of the site's content but it does concentrate on the need for partnership, communication and documentation for a successful management operation, e.g. through the production of a business plan, course management policy and environmental statement. The best way to find out what is on the site is to visit [www.bestcourseforgolf.org](http://www.bestcourseforgolf.org).

It has been a difficult task to produce material comprehensive enough to satisfy the needs of those we hope will make use of it, yet not so detailed that it is irrelevant to those not working on courses in temperate climates such as the UK.

Remember that, just like any other site, ours can be viewed globally

and the R&A has a responsibility to all of its affiliated national governing bodies, ie. the golf unions, federations and associations that number more than 120, not just those based in Britain and Ireland.

We hope to have gone some way toward achieving this, but await feedback to help us develop the site so it is of real value to those responsible for course management around the world.

If the content of the site does not answer your question, the Advice and Research section is its "Yellow Pages" where links to the most respected organisations around the world can be found - these are sources of specific, detailed information.

The website does not only contain text. Those directly involved in course management can register to the site and complete checklists which will help in the professional, documented management of the club and its course.

The information you enter on to your site area is secure and only you can access this to manage the input. The R&A can view details of the clubs that register and how much they are making use of the site but not the comments linked to the checklists nor the content of any documents you produce as a result of working to the guidelines.

## WHO IS THE SITE AIMED AT?

The obvious answer to this is anyone involved in course management. Hopefully, course managers, greenkeepers, club committees, agronomists and the host of other professionals working in this field will gain from the use of the site.

However, beyond the obvious, the site is open to anyone, so club members and the general public can dip into our world and see how complex and technical looking after turf has become!

Great pains have been taken to compile text in plain English (with the possibility for translation into many other languages) and to produce information which is fully supportive of those working to or towards best practice. Whether striding down this road or wishing to start down the path of sustainability, the vast majority of greenkeepers have nothing to fear from the website and, we believe, much to gain.

## THE FUTURE FOR THE SITE

What you see now is just the beginning – it is a skeleton that will need fleshing out. We are fully aware of the need to constantly review the site, to see it evolve and sustain its intended purpose. This is a project that will never be finished.

Some of the information will change with time as innovations in turf management appear. Additional material will be posted as our programmes of research and technical investigation progress. **Your** contributions and suggestions will be a vital part of this evolution, so do feed your thoughts and ideas back to me:

Steve Isaac, Assistant Director - Golf Course Management  
R&A Rules Limited, Beach House, Golf Place, St Andrews, Fife KY16 9JA  
E-mail: [steveisaac@randagc.org](mailto:steveisaac@randagc.org)

We hope many of you will make regular use of the site and hope you find it of value as a management tool. Most of all, we hope you take ownership of the site and help it to evolve.

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# A Stitch in Time...

Roland Taylor provides you with a handy guide to looking after your machinery



While the fundamental principles of machinery, especially mowers have remained the same, there have been considerable changes in engines, drives and cutting systems. One change now evident is that modern equipment requires less maintenance than its predecessors.

While, manufacturers are constantly looking for ways of improving their products, other factors have brought about and influenced changes in design.

Over the last two decades major developments have taken place in engines. These have been driven by noise and emission regulations.

Before this legislation dominated the scene, another big introduction radically altered the reliability and starting of both four and two-stroke petrol engines. In the early 80s the electronic ignition was launched. Prior to this there had always been the uncertainty of whether an engine was going to start and run correctly.

Many readers will remember the days of contact points and how often they became worn or contaminated. These points had to be cleaned and the gap set correctly before a satisfactory spark was achieved. Often this was a time consuming operation.

Electronic ignition, which was a sealed unit, did away with contact points and eliminated one maintenance routine.

With proposed legislation on noise and emissions in the offing, engine manufacturers were faced with having to channel considerable resources into research in order to meet the specified requirements.

This has resulted in compact units without the loss of power. In fact, horsepower ratings increased whilst dimensions were reduced. Improved manufacturing standards mean engines are built to very fine tolerances. There are reductions in oil and fuel consumption and noise levels, while still achieving a power unit's maximum output.

Periods between servicing have also been extended. It is now commonplace to find more than one year's warranty even where a machine is used commercially.

As far as emissions are concerned, one leading engine manufacturer states that the levels emitted from their lawn mower engines, has, since 1995, been 70% lower than similar models produced in 1990.

This all sounds fine, but unless the machine and engine are well looked after, all this goes out of the window. A routine maintenance programme is essential if optimum performance, with minimal affect on the environment, is to be continually achieved.

## MAINTENANCE 2004

An engine is the vital component in all machinery. By comparing some of its requirements to that of a human, it is easier to see how things can start to go wrong.

## OIL

This circulates the system and has two main functions. Firstly, it provides a protective film between two surfaces, enabling them to move freely. Secondly, oil also acts as a coolant and dissipates any heat build up.

In human terms, most people at some time in their lives experience a stiffening of the joints.

It can be difficult to carry out the simplest of tasks and often considerable strain is placed on other parts of the body. Taking some form of oil (cod liver) is often recommended to keep those joints working freely.

In an engine the lack of that vital oil film between two metal surfaces causes the movement to become less fluid and the friction created is the main culprit.

On a cold day it is a common practice to rub your hands together to generate heat. Likewise if there is no oil between two metal surfaces heat is produced and eventually they become red hot and are fused together, causing considerable damage and a danger.

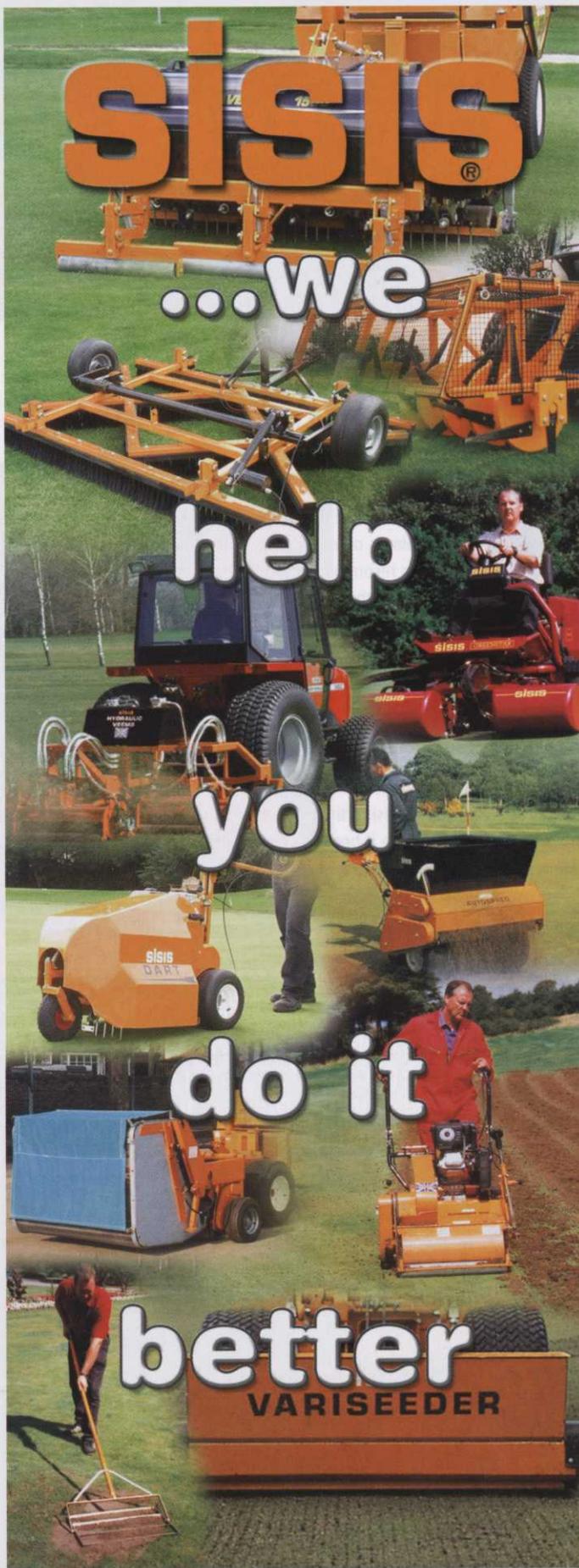
Oil is measured by its viscosity and this is effected by temperature, hence the reason for choosing the right one to suit the time of year. As the oil flows round the engine it becomes contaminated and, to help keep it clean, some power units have a filter in the system. This is not always the case, especially on the smaller engines.

Combustion is a dirty business, with carbon and sulphur as by-products. Condensation and unburned fuel are also present, so oil becomes quickly contaminated and its lubrication properties reduced.

Engine components wear and add minute particles of metal into the system. The volume of the oil over a period of time will be reduced due to burning off. The combinations of these factors results in the oil becoming useless.

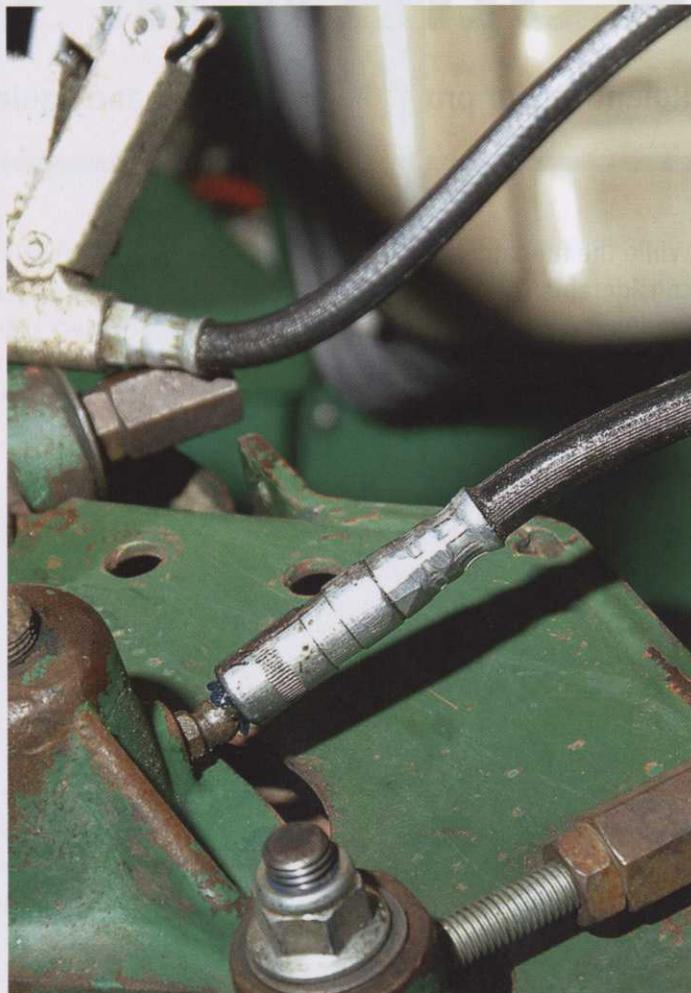


▲ Every time a machine is used ensure the engine oil level is correct



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## A Stitch in Time...



▲ Use grease gun sparingly

Oil changes should be carried out as laid down in the manufacturer's instruction manual, using only best quality lubricants. It is essential to check the oil level every time the machine is used and top up if necessary.

This procedure does not just apply to engines. Hydrostatic drive systems are just as important. With these the oil's cleanliness and the correct levels are paramount if they are to work correctly.

One should always be on the look out for those tell-tale signs of oil leakage, especially from the joints of hydraulic hoses. Early discovery and rectification of these will avoid the dangerous possibility of being showered with hot oil from a split hose or a loose joint.

There are other areas that require periodic greasing as a form of lubrication. Sealed bearings are common, but some machines still have grease nipples and with these there is always the chance of overdoing it.

The results can be blobs of grease that attracting dirt and sand forming an excellent grinding paste for wearing away components. By over zealous use there is also the possibility of the grease pushing a bearing seal out of its mounting. Regularly and sparingly is the answer.

### AIR

Without it we humans would not exist. The same applies to an engine if starved of air, and a number of things start to happen

Combustion needs air in the right proportions to the fuel, for maximum efficiency. Air has to be free from contaminants such as dust, to achieve this it must pass freely through a filtration system. It has another very important role; air acts as a coolant to ensure an engine is kept at the correct temperature.