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People

How well do you know the people who work for the Association?

In this new series we give you a chance to learn a little more about a member of BIGGA's Headquarters staff



#### Gemma Lee

**Position:**  
Membership Services Assistant

**What does your role involve?**  
Processing annual renewal subscriptions and new member applications. Prepare data for the mailing of 'Greenkeeper International'. Provide Regional Administrators and Section Secretaries with member lists and all relevant statistical information and data. Provide advice and guidance to members as required.

**How long have you worked for the Association?**  
Just over a year

**Where were you born and brought up?**  
Bradford

**Where did you work before you joined BIGGA?**  
Norwich Union

**What are your hobbies?**  
Going to the gym, swimming, socialising with friends on a weekend down at the local pub

**What is your favourite food?**  
Spaghetti Bolognese and Steak!

**What is your favourite film?**  
Bodyguard

**What was the last book you read?**  
Don't really read books. I should, I know!

**Who is your all time hero?**  
My Mum and Dad

**What was the best event you've ever attended?**  
Blue concert

**What is your claim to fame? (None not acceptable)**  
At the time (1992) I was the youngest person to climb the three peaks, Whernside, Pen-y-ghent and Ingleborough, in the Yorkshire dales area. I was nine years old at the time

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When your membership is due for renewal you will receive a newsletter which contains details of how to win an activity day of your choice. Activities are held all over the country so there should be a centre near you. A winner is selected every three months so it does not matter what time of year you renew your membership.

This month's winner is Graham Gardner from Tadmerton Heath Golf Club who has a choice of at least 20 activities to choose from ranging from Ferrari driving to powerboating. Congratulations Graham!

## Message of the Month Winner

Each month the person who has written the best message on the BIGGA Bulletin Board, which is found on the BIGGA website [www.bigga.org.uk](http://www.bigga.org.uk), receives an FM desktop scan radio.

Our congratulations go to July's winner, Michael Branson from Keswick Golf Club whose message was posted on the 19th May under the 'Education and Training for Greenkeepers' section.

# Course Feature

## Hitting the Heights

Royal St George's is known for the bunker known as the Himalayas but, as Scott MacCallum found out, in all other respects as well the course is hitting the peaks in preparation for this year's Open Championship



The daunting challenge facing golfers on the 4th tee

Fifty years ago last May the pinnacle of the Himalayas was finally climbed when Edmond Hillary and Sherpa Tensing stood atop Everest. This month the Himalayas will again be in the spotlight when the world's top golfers converge on Royal St George's Golf Club on the south coast.

Confused? Well, in this case, the Himalayas is the name given to the immense, mountainous bunker which faces golfers playing the 4th and, with a new tee in place for this year's Open, it is a near certainty that several unfortunate players, along with their "sherpa" caddies, will be forced to make reluctant assaults on the face of the bunker.

One of the abiding memories of the 1993 Open - other than the fact on the final round it boasted a leaderboard littered with the top players of the day and Greg Norman's final round 64 was one of the finest ever to win a Major Championship - was of Australian, Mike Harwood, tangling with the Himalayas.

"His ball stuck in the face of the bunker and he tried to go forward, failed, then tried to go backwards before going forward again," recalled Head Greenkeeper, Neil Metcalf, who was Deputy Head at the time.

The famous bunker, which has a twin at St Enodoc Golf Club, was revamped about five years ago with new sleepers installed and a huge digger used to dig it out.

Although the most famous of the course's 106 bunkers Neil and his team have ensured that most of them have been brought up to tip top condition for July.

"We began working on the bunkers in 2001-2 when we took on 50 of them - our own team doing half and BSP Landscapes doing the other half. It is no easy job as our bunkers are very steep with steep faces and each one was a major job in itself.

"Then over the last winter we did all the bunkers on the 1st, 18th, all the par-3s and any others that we identified as being in need of attention," explained Neil, who became Head Greenkeeper on 1 January 1996.

Royal St George's has a superb Open pedigree with a roll of honour which includes some of the game's biggest names. Greg Norman won the last Championship and Sandy Lyle the one before that in '85 to become the first British Champion in 16 years. Other Champions include Bill Rogers; Bobby Locke; Henry Cotton, in 1934, during which one round inspired the famous Dunlop 65 ball; Walter Hagen; Harry Vardon and JH Taylor.

The club learned that it would be hosting the greatest Championship in the world in 1998 and they have been working towards July 2003 since then. Neil's preparations started in earnest in the year 2000 when work on fairway width and definition began.



The Royal St George's Team

"The R&A gave us a guideline that they wanted the width of fairways to be between 25 and 30 metres and it was up to me to go out with a machine and shape them after that. There are exceptions where, because of specific bunkering, the fairways will be 40 metres wide," explained Neil, who was also pleased to be able to retain more generous widths on the regular members' landing areas.

"It actually differs quite a bit from '93 when the fairways were very wide and I'll be very interested to see the final video footage from this year's Championship and compare it with then. There will be many metres difference."

Players will be relieved that Neil was quick to point out that Carnoustie-like fairway widths were not on the agenda.

"If we did that many of our bunkers would end up 30 yards into the rough," said Neil, whose team have been working flat out in the run up to the Championship.

The other guidelines he is working to are two metres width for the first cut of rough at two and a half inches, then another two metres of second rough cut at four inches.

In addition to the tighter fairways players will find themselves facing a significantly longer golf course.

"It started with the par-5 14th which runs to the left of an out-of-bounds line. We raised the green and moved it back, closer to the out-of-bounds which lengthened the hole and enabled us to move the 15th tee back as well to also lengthen that hole.

"It has made the 14th a much better hole which threatens on both the tee and second shots," said Neil of the change that was implemented five years ago.

Other changes, including that previously mentioned at the 4th, have been combined to ensure that the challenge of Royal St George's can match the increased armoury the modern day player carries from 10 years ago.

The next phase in the long term preparations for the Championship came with the installation of a new state-of-the-art Rainbird irrigation system which, as the Law of both Sod and Murphy would dictate, heralded the arrival of flooding which had the nearby White Cliffs of Dover unsure of the direction in which they should be facing.

"It was the flooding which affected much of the country in 1999. Thousands of homes in the area, and nationally, were suffering and we were no different," recalled Neil.

"When the rain came, it came down in a monsoon fashion that I hadn't seen before. We just couldn't get the water off the land quick enough and the course just couldn't cope with the amount of water it was holding. Over the winter period we pumped between 50 and 55 million gallons of water off the course and into the nearby North Stream," said Neil, who said that ironically the club has an abstraction licence which allows them to take up to 25 million gallons out of the self same stream.

"We were in credit by 25 million gallons!"

It was around this time that rumours abounded about Royal St George's long term problems, the more malicious of which cast doubt on the club's ability to recover fully to the extent that The Open might have had to be moved. Among those was one that the Environment Agency had proposed that the water table in the area had to remain at a specified level which would have had a detrimental affect on the links golf played in the area.

"There was no truth in any of the rumours that were flying around at the time and, indeed, had The Open been here in the July of that year we would have been able to host it comfortably as the course was back in fine condition," said Neil firmly.

The freak conditions which contributed to that flooding haven't returned since and the only long term consequences have been that Neil has found that grass growth has been a lot quicker. The ground is still getting rid of water and the water table is still high so the grass is reacting to the moisture in the ground.

When he took over the reins of the course in '96 Neil was keen to instigate his own maintenance policy which entailed upping the vertidrain programme - in the winter he likes to create fissures under the soil to encourage the root systems of the fescues and bents - reducing the fertiliser input and starving the grass of water. But knowing the pain barrier that the course would have to go through he waited until after the Amateur Championship which was held later that year.



Neil Metcalf

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# Course Feature



So it was after the Championship, which was won by fellow Scot Craig Watson beating Trevor Immelman in the final, that the programme was put in place.

"The members and the Chair of Green were very understanding because they knew what we were wanting to achieve. I did say at the outset that we probably wouldn't see any real difference for at least five years while we went through the process of starving the meadow grass out and obviously the more it starves the more it flowers because it is hungry," said Neil.

It was ironic that having almost completed the process the flooding arrived, but three years further on the course is in good shape and Neil can't wait for the third week in July. Together with his Chairman of Green, Michael Attenborough, they have been heavily involved in the preparation work which goes towards hosting such a huge event.

"Fortunately we have a lot of land outwith the golf course and a lot of the hospitality areas are off the golf course, but we have to liaise with the on-site contractors to ensure damage is kept to a minimum before, during and after the Championship."

To prepare for everything Neil spent some time with Colin Irvine, of Muirfield, quizzing him on what to expect.

"I went up to Muirfield in April last year and again after the Championship and Colin helped me a lot by telling me about potential pitfalls and aggravations," said Neil, who is a former North East of Scotland golfer, who despite playing very infrequently manages to maintain a handicap of 3.

He is sure that he will feel immense pride when he is standing at the prize table alongside the 2003 Open Champion.

"It is the Championship everyone wants to win and it will have been played over my golf course. It will be the pinnacle of my career," said the man, who for that moment will experience how Edmond Hilary felt 50 years and two months before.

## MACHINERY INVENTORY

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If you fancy a flutter on The Open Greenkeeper International readers can take advantage of an exclusive offer of double payouts from betting experts Globet.

See page 6 for details on how you can place your bets



# TURFGRASS IRRIGATION WITH WASTEWATER

*Continue  
to learn*



The focus of this article is to provide an overview of turfgrass management concerns related to wastewater use – the issues that a turfgrass manager must understand for optimum turf culture. Turfgrass irrigation water quality guidelines for chemical constituents in the water are similar to those used for other crops with some refinement and guidelines are available on the websites: ([www.usga.org](http://www.usga.org); then go to the USGA Green Section Record issue noted in references 4 and 5) and ([www.turfgrasswater.com](http://www.turfgrasswater.com); then go to the water quality sections and guidelines where reference article 2 is located). A good irrigation water quality test determines constituents in the water, namely:

## GENERAL WATER CHARACTERISTICS

**WATER PH.** This is a concern only if the pH is unusually alkaline or acidic.

**Bicarbonate and Carbonate Content.** These ions react with Ca and Mg ions in the water to form lime in the soil or in some unusual situations in irrigation lines. The lime is not harmful and many turfgrasses are grown on calcareous soils. In a humid climate, lime additions to the soil are often needed. However, when irrigation water has appreciably Na ions that may create sodic soil conditions (soil structure deteriorates), alleviation requires relatively high levels of moderately slow-release Ca, such as from gypsum, CaSO<sub>4</sub>. If bicarbonates and carbonates are present in high quantities, the result is lime formation where the Ca in lime is very slow-release in comparison to gypsum; and these ions in the soil can also cause soluble Ca released from gypsum to be tied up in the lime form. The net result is insufficient soluble and moderately slow-release forms of Ca to displace Na from the soil cation exchange sites (CEC) and Na carbonate precipitates. It is in these situations where acidification of irrigation water is recommended to dispel the bicarbonates and carbonates as CO<sub>2</sub> gas from the water.

### NUTRIENT AND ELEMENT CONTENT

Wastewaters generally contain more nutrients than potable water, and some contain appreciable nutrients. Additionally, some wastewater sources require acidification treatment and/or large quantities of soil amendments to be added (such as when a wastewater may induce a sodic soil condition and large additions of Ca are needed). The nutrient additions, whether directly from the water or as a result of water/soil treatments due to the water characteristics, must be considered as part of the on-going fertilisation plan to maintain a balanced fertilisation programme.

**Nitrogen Content.** The wastewater treatment facility often must meet a regulatory level for N based on limiting algae and aquatic plant growth in discharge waters. Turfgrass managers should understand how much total N is being added per 100m<sup>2</sup> for every 10cm of irrigation water added (10ppm or

mg/L of N = .102kg per 100m<sup>2</sup> of N for every 10cm of irrigation water applied). And decrease N fertilisation accordingly to avoid over-application of N.

**Phosphorus Content.** Regulatory P levels for waters discharged from treatment facilities are normally very low since P in water is the most important nutrient controlling algae and aquatic plant growth. As a result, wastewater P contributes only small amount of P to the P fertilisation needs of the turfgrass, but if P levels exceed 0.10-0.40ppm or mg/L of P algae and aquatic plant control will be a challenge.

**Ca, Mg, K, Mn, Fe, Cu, Zn, Mo, Ni Levels.** It is important to consider the contributions of each of these nutrients to the overall fertilisation needs of the grass and make adjustments as needed. The most common problem is for a particular nutrient to be very high in the water, which may induce nutrient imbalances in the soil and eventually the turf plant – such as high Ca limiting Mg uptake. Sometimes the nature of the irrigation water requires certain amendments to be added to the soil in large quantities, such as when high Na in the water may require high Ca additions to the soil. In these situations, nutrient imbalances can also be induced.

**SO<sub>4</sub>-2 Content.** Sulphur, usually as SO<sub>4</sub>, is a nutrient that is often high in many wastewaters sources or becomes high as a result of acid treatment when water acidification is necessary. Turfgrass plants only require 1.5-3.0kg elemental S per 100m<sup>2</sup> per year as a nutrient. If high SO<sub>4</sub> levels occur in the soil due to high SO<sub>4</sub> in the wastewater, the soluble SO<sub>4</sub> can rapidly revert to reduced S forms when anaerobic conditions occur in the soil – regardless of the source of the anaerobic conditions, such as excess rain, perched water table from a layer in the soil, soil compaction, excess organic matter accumulation, sodic conditions, etc. Reduced S results in formation of FeS and MnS precipitates that cause the black coloration in black layer (3). These precipitates cause more anaerobic conditions. The SO<sub>4</sub> in wastewater can react with Ca in the water to form gypsum (CaSO<sub>4</sub>), which is much less prone to becoming reduced. If the Ca is not

sufficient to "scrub" the excess SO<sub>4</sub> from the water, light applications of lime can be added to the soil surface, where the SO<sub>4</sub> will react with the lime to form gypsum over time (it requires 1kg of lime per 1kg of excess SO<sub>4</sub> added). A high level for SO<sub>4</sub> would be > 90mg/L SO<sub>4</sub> = .304kg per 100m<sup>2</sup> elemental S for every 10cm of water added.

**Trace Elements.** Sometimes trace elements are unusually high in a wastewater source. Thus, an initial analysis of a potential wastewater source may include testing for any expected trace elements. The guidelines for these are based on long-term use of the water assuming that the particular element may accumulate (1).

#### SALT-RELATED ASSESSMENTS

When salt ions are low, which is common for many wastewaters, the primary problems for wastewater sources would be the nutrient/element content discussed in the previous section. However, when salt ions are high, salt-related problems can be very important and will require appropriate management regimes including – grass selection, possible chemical amendment of water and/or soil, leaching, cultivation programmes, alterations in fertilisation regimes, and other aspects. (1,3). The primary issues to evaluate are summarised as:

**Total Salinity.** Total soluble salts (TSS) in the irrigation water can cause salt accumulation in the soil and lead to salt-induced drought or specific ion toxicities. TSS is usually measured as Electrical Conductivity (ECw).

**Sodium Permeability Hazard.** If the wastewater has high Na content, it can create a sodic soil condition. Sodium causes deterioration of soil structure by destroying natural aggregation and dispersing clay/organic colloids that can plug soil pores. The net result is a reduction of macropores (> 0.10mm diameter pores)

for water permeability, reduced gas/oxygen exchange, and fewer root channels. No single water parameter can by itself determine sodium permeability hazard, but several parameters are used:

- SARw = Sodium Adsorption Ratio. SARw is used when Na, HCO<sub>3</sub>, and CO<sub>3</sub> are < 100, 120, 15mg/L, respectively.
- AdjSARw by pHc adjustment. Uses Na, Ca, Mg, HCO<sub>3</sub>, CO<sub>3</sub> to adjust the original SARw, or...
- AdjSARw by Cax adjustment (sometimes noted as adjRNa). Also, uses Na, Ca, Mg, HCO<sub>3</sub>, and CO<sub>3</sub> to adjust the original SARw.
- RSC (Residual Sodium Carbonate) which uses in the RSC calculation Ca, Mg, HCO<sub>3</sub>, and CO<sub>3</sub> contents.

In addition to SARw, adjSARw, and RSC values, the following factors are used in determining the severity of sodium permeability hazard:

- Individual water concentrations of ECw, Ca, Mg, Na, HCO<sub>3</sub>, and CO<sub>3</sub>. High ECw allows a soil to withstand higher Na without structure loss.
- Clay type. Shrink/swell clays are most prone to structural breakdown.

#### SPECIFIC TOXIC IONS

Specific ion toxicities are of several types and require guidelines to assess the potential for each type of problems, namely:

- Ions that may accumulate in the soil and cause direct root toxicities – Na, Cl, B.
- Ions (Na, Cl, B) that are taken up by plants and accumulate in the foliage to cause a reduction in physiological activity, colour, and enhance tissue leaf firing or desiccation.

- Direct contact injury to the foliage from the irrigation water, where Na, and Cl are of greatest interest. Trees and shrubs are more sensitive than most grasses.

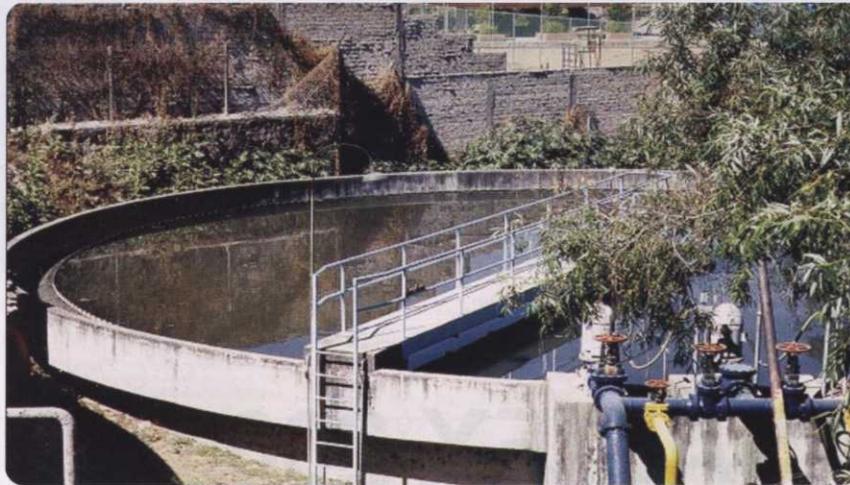
#### OTHER CONSIDERATIONS

Turf managers should consider some other factors beyond the constituents in the wastewater, namely:

- Contract stipulations with the wastewater provider should not require wastewater to be accepted by a turf facility when irrigation is not required since this leads to run-off, leaching, is environmentally unsound practice. Since wastewater treatment plants must measure certain parameters on a regular basis, it may be possible to make contractual agreements that result in the treatment facility providing all or most of the irrigation water quality data to the turf facility on a long term basis.
- While Total Suspended Solids are of concern for many non-potable irrigation water sources, it is generally not a concern for treated wastewater since effective treatment for fecal coliform bacteria (indicator organisms for more harmful micro-organisms) requires low levels of suspended solids and is monitored by turbidity measurements at the treatment complex.

- The article on effluent water by Huck et. al. (2000) is suggested for those seeking a detailed discussion of the various costs associated with use of wastewater.

Wastewater characteristics can vary greatly depending on the particular source. However, most wastewaters, treated for application to public sites, are good sources of water for turfgrass irrigation. Obtaining a good water quality test is essential for determining any potential problems or adjustments to management practices that may be needed.



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**Dr. Robert N. Carrow, Professor of Turfgrass Science, University of Georgia.** Emphasis of research is plant/soil stresses (drought, salinity, fertility) on turfgrasses, water conservation/use and water quality issues on turfgrasses. Email: rcarrow@griffin.uga.edu

**Dr. Ron R. Duncan, Professor of Turfgrass Breeding/Genetics, University of Georgia (retired).** Research emphasis is on breeding/genetics of seashore paspalum and tall fescue, salt-affected sites, water quality and conservation on turfgrasses. Email: duncanturf@hotmail.com

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# The 'Bunker Rake' debate

## Andrew Acorn rakes over some well worn issues

Left in the bunker, outside the bunker, stood up or lying down. This still remains a bit of a 'grey area' with the R&A rules, and it is put into the hands of you at your club in the 'local rules' or how you see them. This also brings into question, 'Which bunker rake is the best one to have? How many teeth should it have, how wide should it be, how long is the handle, which is the best shape, which type of grip should it have, is it a rake for members or green staff to use or is it both?

I was in great debate with five key people from the industry about this fascinating subject during a teatime pint of Guinness in O'Neill's Irish bar within the CNN centre in Atlanta Georgia. On my right was Welsh Course Manager Jeremy Hughes, on my left was rake manufacturer James Buckholt from BMS Europe, opposite was the bunker raking caddie of European Senior Tour player David Oakley and my trade counterpart Terry Adamson next to him was the USPGA Tour Agronomist John Scott and on his right was Andy Campbell MG.

We had collected leaflets and pens from the show and the scribbling on the reverse sides started, the lively conversations went quiet when each of the group started to draw up his designs for the best type of rake for sand traps. Four more pints each, and 68 different sketches later, we had designed the perfect rake. It had long teeth on one side, short teeth on the other side the handle was 3 x piece telescopic. It had reverse side teeth and a bit which levelled the sand as well. All we had to do was get this design patented and manufacture it back in the UK and we would all then be millionaires on the proceeds from the royalties?

But with our fuzzy heads cleared up by later the next afternoon we saw our design as a little impractical to make, and a little impractical to sell to the mass market and agreed that there is 'no' one rake that can do all the jobs you ask of it.

During the build up to the 2001 Open Championship at Royal Lytham & St Annes, we at Acorn Golf received an order from Head Greenkeeper Paul Smith for 80 of the wooden hay rakes, which were to be given out to the BIGGA Greenkeeping Support Team to rake the bunkers. After the first day of practice a comment made by a well known senior golfer was, that the rakes were leaving lines like ridges in the sand after they had been raked and that this he thought was unacceptable. Another phone call from Paul Smith and we sent the van up and collected the rakes in the evening and between Paul and ourselves we decided to cut approx 3" off each side of the rake to make it shorter and by using the 'band saw' in our workshop saw the teeth in half at a 45 degree angle. We then took them back up the same night for resumption of practice the following day. With the addition of levelling from the back of the rake by the Support Team the championship went smoothly 'in the bunkers' from then on in.



Contact Andrew Acorn, Managing Director of Acorn Golf (UK) on 01925 757005.

## 'Sexy' Rakes

It's hard to get excited by rakes, in fact it is probably a criminal offence to get turned on by them. But Amenity Technology is doing their level best to set a new trend with their revolutionary 'double-team' comprising the 'Silver-Streak' and 'Contour' rakes.

It is a proven fact that golfers remember the details of their round more than they remember the larger aspects of the surroundings. For example; a poor lie in a bunker will be remembered forever, the overall immaculate conditions forgotten after a few short weeks. It is impossible to force golfers to comply with requests to rake bunkers, repair pitchmarks, replace divots etc, but it is possible to make it easier and less of a chore for them to do so.

Complimentary pitchmark forks on the first tee are certainly a good reminder if not a direct plea, providing ergonomically designed rakes in the bunkers are another.

The 'Contour' bunker rake has been scientifically designed to assist with more efficient raking of bunkers while reducing stress to lumber regions and shoulders. By increasing the efficiency of each 'pass' the amount of raking required is significantly reduced. American golf journalist Hal Phillips put his back out while raking a bunker – one look at his swing today will let you know just how debilitating that injury was. Needless to say he was NOT using a Contour rake...

The 'Silver-Streak' rake is designed to prepare the bunker for the best possible playing conditions – the double-headed design promotes both raking and smoothing of sand.

With the 'Silver Streak' currently available on a 'three for the price of two' deal, it is just possible that rakes are about to get sexy after all, well maybe just a little bit.

### THE SILVER STREAK RAKE

16" double action head allowing for both raking and smoothing of bunkers. Comes complete with a 48" blue fibreglass handle.



### CONTOUR BUNKER RAKE

A dynamic new maintenance bunker rake complete with 22" head and a choice of 54" or 72" wooden handle.



# MACHINERY MAINTENANCE

*...made easy!*

We take a brief look at some of the maintenance products and advice on the market today...

## STAY SHARP

Keith Cann-Evans highlights the best way to keep your most valuable machinery in tip-top condition.

The prime objective of every golf course is to keep the greens in top condition. Huge investment is made in a vast array of course maintenance equipment, of which, grass-cutting machinery probably accounts for the largest proportion of spend.

It is essential that these machines are kept fully functional. Which is why being able to service and sharpen the blades quickly and efficiently, minimising the downtime, is as important as the mowers themselves.

Until recently the option to purchase your own grinder or retain the services of a contractor has been a financial decision depending mainly on the number of units requiring servicing. The financial investment of a grinder has been compared directly with the cost of using a contractor. But using an outside agency brings its own problems. Apart from the inconvenience of having to schedule the grinding programme it can also mean the machines are off site for an extended period of time.

One element that has altered the equation is the requirement of modern day clubs to improve the quality of the greens to meet the standards expected by members. This has led to a greater emphasis on top dressing programmes, which inevitably reduces the sharpness of the grass cutting equipment. This in turn increases the frequency for re-grinding the cylinders and bottom blades. The net result is the equipment requires more than the annual sharpening and costs rise accordingly. The flexibility and efficiency of having your own machine on site and having complete control over the time management of the workshop can be the deciding factor.

Many grass cutting machinery manufacturers believe that the key to achieving optimum performance from your mowers is to grind the blades back to the original manufacturers specification. To do this you have to choose your grinder and method of sharpening from the number of grinding machines available offering spin, relief or a combination of both methods of sharpening.

Keith Cann-Evans is Managing Director of Hunter Grinders Ltd

