



and get very wet and in truth were not particularly good. When I took over as Chairman of Green I felt that it was something with which we could make an impact on the course," he explained, as we, together with Head Greenkeeper, Chris Martin, and Deputy, Michael Rogers, sat in the attractive well appointed clubhouse.

The Greens Committee met out on the course and agreed that the bunkers should be the main priority and that as well as rebuilding and designing them re positioning and draining should take place wherever necessary.

Howard's enthusiasm for the project was matched by that of the team who saw it as something really to get their teeth into.

"We talked about it between ourselves and, although we set ourselves some pretty stiff targets, we all felt that it was doable and that we would just crack on," explained Chris.

The aim for this winter was to do 25 greenside bunkers, which they deemed to be the most important, with 15 of those done by

Christmas...just around the time that the heaven's opened!

"The flooding affected us quite a lot because we'd planned to do certain areas which we couldn't get to and had to change our programme to suit. We bought sheets of board and laid these down to prevent wear and tear and have been very careful around the areas of the green," said Chris.

In the six weeks before Christmas the course was only open for around a week but, while this was unfortunate for the members, the upside was that the team could work with very little disruption. In fact the entire 4th fairway was under two feet of water which is unheard of for the course.

"It stayed for days then just began to recede when we'd have another downpour and it would all come back again," said Chris.

"We bought a pump to pump some of the water away and it's proved a very useful tool," added Michael, who joined the club from Royal St George's last year.

"It can pump 60-70,000 gallons an

hour and there are certainly jobs we wouldn't have been able to do without the pump."

Michael's role was that of project co-ordinator with responsibility for selecting the sand and he ensured a large number were examined before the decision on the final one was taken.

"The sand was the starting point. It was the thing we had to get right so took advice from Stuart Ormondroyd, at Bingley, and sent samples across for analysis. The recommendation was Nottingham - Number 6 which is a sort of tan colour with black specs which we think will fit in well," revealed Michael, who added that previously the sand was of an orange hue.

"As luck would have it Sandmoor in Leeds had started to use the same sand so we went across one morning to take a look. The greenkeeper there was extremely happy with it," explained Michael.

With the sand decided upon the next task for Chris and the team was to plan the practicalities of the job -

the hiring of the plant; the cost of the gravel; blinding layers and drainage pipes and to ensure that timings were all agreed.

"It was difficult to work out volumes required exactly until we started the job but we knew a certain amount of materials that we'd need so we got them in before we started and they as soon as materials became low we ordered more," said Chris

"We are very fortunate in so much as we have some excellent suppliers, who we can ring up in the morning and the material is there in the afternoon. It means that the work never stops and the worst scenario is overnight for virtually anything," explained Chris, who said that they used Greenpride for rootzone, JH Walker & Co for gravel and blinding layer sand and Lindum for turf. The club also struck up a good relationship with the plant hire company who allowed them to take machinery on a long term loan basis.

The first bunkers to be tackled were those surrounding the 9th green, a

Reigning in the Rain

Equipment Inventory

- 2 John Deere 2243
- John Deere 2653
- John Deere 955 with front loader
- John Deere 365 Trailed hydraulic
- John Deere 455 Bunker rake
- John Deere Aerocore
- 6x4 Gator
- Iseki 4270 tractor
- Richard Long versatile
- Richard Long top dresser
- SISIS Technicore
- SISIS Slitter
- Thatchaway Units
- Hardi Spray Unit
- Tornado Blower
- Cushman



Far page: One of the new bunkers complete with steps

Above: Bunker drainage going in

Above right: Another fine example

venue located a mere 100 yards from the team's base. However, while that may have been the plus of the chosen debut site, the inherent problems involved in the 9th hole made it anything but the ideal starting point.

"We picked the 9th because it was close and we could waste very little time toing and froing and because there was a decent temporary green and we could take the whole thing out of play," explained Chris.

However....

"Drainage was the main problem. We were not sure where the outlet pipes would be but luckily we found a concrete chamber which gave us a good depth for an outlet pipe. We traced this through the trees releas-

ing blockages as we went before we could even start the bunkers," added Chris.

Once they had overcome the initial problems the team set about planning the location and shape on the new bunkers.

"Looking back, knowing then what we know now, Chris probably wouldn't have started on the 9th but on the other hand we learned so much so quickly and the team developed so many skills it was probably a good move," said Howard.

"I see it for a slightly different perspective as they probably don't see how their performance has improved as much as I do. In the early work they may have been a little tentative about doing certain things whereas now everyone is tuned into what we are trying to do and everyone is

much more confident in taking things on himself."

It is a point which Michael elaborates upon.

"Initially we'd get everyone's opinion before me moved on and we'd perhaps have too many people on the job at the one time but we've learned from that now," he said.

While always working to a plan a little bit of license because they were aware that things could change depending upon the conditions they met when they started work.

It took them three to four weeks to complete the work on the 9th hole as they took their time to ensure they got it right but now, having this experience under their belts they have speeded up and the shaping is achieved which much more ease.

If a nagging doubt about having



bitten off more than they could chew entered Chris' mind it didn't show.

"If it had come to the point where we felt we were pushing ourselves too much we'd have eased off and slowed down a bit...but it never came to that," he said.

Members were kept informed via regular newsletters and the feedback has been very positive.

"We hope the members will be pleased with all the work we've done this winter," said Chris.

For construction work that has been carried out by the greenkeeping team, being maintenance friendly has not been at the forefront of their mind, although after the first year it should be more easy to maintain.

"There will be more fly mowing while the turf is given a chance to knit but there is a lot more character

to the bunkers now than before when they could be said to have been too symmetrical," said Chris.

The team has also taken the opportunity to improve other hump and hollow areas surrounding the greens and bit in additional drainage where required.

Having achieved their pre Christmas target of 15 the team are well on their way to hitting the winter programme target of another 10 and with each member of the team becoming a specialist in a particular area the skills they have acquired will stand them in good stead for years to come.

The second phase will begin in September of this year while some of the fairway bunkers, because of their size, might well stretch into a third winter.

By the end something will have been done to every one of the club's bunkers whether it be the installation of drainage or a bit of reshaping.

"Alan Coates is our main man on the digger; Robert Pilgrim is the drainage king, only happy if he's up to his waist in water; Philip Bradley is our turfing and shaping man while apprentice Alastair Bolch can turn his hand to most things. It's a team effort and it can't be done without the work of the individuals," said Howard, who oozes pride in the work of his team.

"It is one of the most successful projects the club has ever undertaken...it is certainly the biggest," he added.

York Golf Club is extremely proud of its status as one of the best courses in Yorkshire and to maintain that

position huge investment is made on giving the greenkeeping team the tools to do the job. This is illustrated by the modern John Deere kit which fills the maintenance facility.

"We are always looking for ways to improve and that includes our machinery fleet," explained Howard.

"We are all about best practice and if we find someone doing something better than us we'll take it on board. We're happy to nick ideas and hopefully people will do the same with our ideas," he explained.

While it has been the York weather that has hit the headlines over the last few months it perhaps more fittingly should be the work of the hard working and dedicated York Golf Club team who have triumphed in those difficult times.





Roland Taylor lifts the lid, or should that be the grass bucket, on the greens mower

Short back and sides

It is easy to forget just how much precision is required for a cylinder and bedknife to produce a high quality finish. The concept was originally developed by Edwin Budding from his system for cutting the nap off cloth, which was developed well over 170 years ago, and had to be highly accurate to avoid damage to the material. The environment in which it worked was clean with very few hazards, and the cloth could be kept level. These conditions are very unlike those in which a modern mower works, which are relatively hostile. Dirt, dampness and abrasives abound and mowing surfaces are very rarely flat. Blades can be quickly dulled and are sited in a position where there is always the risk of damage. Under these conditions if a greensmower is not correctly looked after, things can soon go badly wrong.

Getting the best results

As most readers are well aware the critical factor for achieving a quality finish is the reel to bedknife adjustment. This also plays a significant part in the mower's over-all performance. If the reel is set tight to its bedknife then the result is similar to applying a brake and all the components are placed under extra loading. To compensate, the engine governors open up and more fuel is consumed. In addition, heat builds up in both the reel and bedknife causing further

damage and possible scorching of the turf. The finish on the green deteriorates fast.

If the reel and bedknife are "off" adjustment there is less chance of heat, but the same applies as far as the rest of the mower is concerned, and the poor quality of cut will be obvious. Sand or dirt can be trapped between the cutting surfaces causing bluntness and damage.

Most modern greens mowers have either a 9 or 11-bladed reel with optional bedknives. The number of cuts (clips) per metre depends on the speed of the reel and the forward motion of the mower. Again adjustment can affect the finish, but there are other influencing factors. These include slack drive belts or chains, incorrect engine speed and the volume of grass being removed.

The height and frequency of cut also plays a significant role, especially in the speed of greens. In the past one method of overcoming the problem of a slow green was to close shave. The adverse results this produces far outweigh any advantages and today it is not recommended, even as a stop gap measure. By removing a large amount of the leaf area, the natural process of photosynthesis - so vital to healthy plants - is drastically reduced. The plants become weak and susceptible to disease, poa annua and other weeds will become quickly established in the thin turf. Mowing

should be carried out frequently with the machine set at 5mm. Regular light verticutting or grooming will deal with lateral growth and help to open up the turf to allow light and air to penetrate and circulate. It will also contribute towards speeding up a green.

Moving forward

When one looks at the history of cylinder mowing, it is surprising that it was almost 100 years after their introduction that a multi-bladed machine specifically designed for greens - the Ransomes Certes - was introduced. This was a push model, in spite of the fact that motorised mowers had been introduced over 20 years earlier and were being used on golf courses for cutting the fairways.

Greenkeepers had to struggle, pushing these greensmowers until the 1950's when manufacturers recognised a potential market and introduced petrol engine models.

Prior to the Second World War the need to speed up the mowing of greens was met by the introduction of the Overgreen, which towed three Certes push mowers. This machine was a forerunner to the triplex mowers that appeared in the UK from America in the 70s.

Now, 30 years on, the high profile that golf enjoys throughout the world has led to a plethora of greens machines. The biggest decision for

Short back and sides



most of today's greenkeepers is whether to go for a walk-behind or triple mower and which model to buy.

Some, or all, of the following factors are likely play an important role in helping decide which one.

Types, size and location of greens

If greens are heavily undulating, stepped, or if access is restricted, then a pedestrian model is almost certainly the best choice. On large greens the highly manoeuvrable triple is the answer. These can also be used on small greens but problems may occur if the machine has to be constantly turned on the actual playing surface because of the surrounding landscape, such as banks.

Time and staff

As we all know there are never enough hours in the day, or enough members of staff to carry out the host of tasks needed to keep a modern golf course in tip-top condition. A triple can make considerable savings in time and labour.

Personal preference

There are arguments for and against both these methods of mowing greens so, at the end of the day, it is what best fulfils each course's requirements. For some clubs, one compromise is to regularly mow with triples and use hand machines for competitions and special events.

On the market

Pedestrian

These come in cutting widths from 41cm (18") to 66cm (26") and are powered by petrol engines. There is generally a choice of bedknife thickness and ranges of optional equipment including turf groomer or verticutter, rotary brush, smooth or grooved front rollers.

Triples

Petrol, diesel and electric powered versions are available and working widths range from 1.50 metres up to 1.78 metres, depending on the make. All cutting units are fully floating and

Your greens' quality is riding on it.



there are ranges of alternative turf maintenance units such as turf groomers, verticutters and brushes from each manufacturer.

Demonstration

Because greensmowers (pedestrians or triples) are designed for a specific application, it is hardly surprising that the technical data is often very similar. Therefore the only way to make a true comparison between different makes and models is to mow a green! This is why a demonstration is so important. Whilst the time factor alone would not justify seeing all the makes and models available, certainly more than one should be accessed under identical conditions. When dealing with nature there are so many variables that no two greens will be alike. To obtain a true picture, all the mowers demonstrated should be viewed on the same day and in as close a locality to each other as possible.

A demonstration is not only a chance to evaluate a mower's performance but also an opportunity for operators to access its ease-of-use and to decide whether they are going to be happy using it.

For the future

The indications are that making mowers more versatile in relation to general turfcare maintenance has increased over the last few years. A number of machines are now on the market with interchangeable cassettes or attachments. Other changes likely to occur in the future will involve power sources, as possible legislation on exhaust emissions takes effect.

The one thing that is unlikely to alter to any degree is the actual principle of the cutting system. Budding was a clever guy, and golf, like so many other sports, has a lot to thank him for.



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Photo: Dr. SJ Heale



Are
your

Tim Colclough provides some helpful
hints to improve your putting surfaces

greens up to

scratch?

After yet another 'winter of discontent' at most of our inland courses it's not only the frustrated golfers who are desperate to see dry, playable surfaces, green-keepers too must be praying for a cessation of hostilities from above.

But do players expect too much from our bruised, battered, rain-sodden, frost-bitten and long-suffering patches of turf that we call putting greens, or do they deserve better? What standards of performance and playability should they expect and how can greenkeepers achieve that delicate balance between maintaining healthy, vibrant and sustainable turf and providing pace and bite through the competition season? How can we measure or judge the performance of the greens and how can we improve those standards? If someone could come up with a simple solution to these issues Agronomy would become a redundant occupation, fortunately for me and my colleagues the answers are not simple and are always different.

I'd like to start this discussion, somewhat controversially, by looking at the end product from the client's perspective. After all it is the club member who, effectively, pays all our wages. In simple terms we are the supplier and they are the customer and if we don't get it right they will look elsewhere (or we will go elsewhere!). What are the standards of performance that they judge the greens by? And how can we improve those stan-

dards to keep our customers coming back for more?

Green Speed

This must be right at the top of the list for most players as the key parameter for judging the greens, particularly from May through to September. Inevitably it is also the major area of conflict between the interests of the pace-hungry golfer and the grass loving green-keeper.

Green speed is easy to measure with the now well established Stimpmeter. Not only is it a reliable and quick test, but we also have a recognised set of standards to compare our results to. I truly believe that we should be regularly checking green speeds and keeping records of each measurement, matching it with other data that influence the result like time of year, cutting height, time after last cut, last fertiliser treatment, etc. It is also worth checking the speed after certain operations are implemented, just to see which have the greatest influence; what difference does a double cut make? What about a 0.5mm height reduction? How does it change during a hot, dry day? What about the influence of verticutting, grooming and top dressing? The list is endless. Sounds like a great idea for a research project to me!

This information would be a really useful ally for the greenkeeper, you would have a set of objective data so that when the players protest that the greens were much faster this time last

year - the evidence would be there. You would also know the likely effects of any one management operation, giving you the flexibility to choose the more turf friendly option - great for tournament preparation.

Currently we understand that the single major turf factor that affects green speed is cutting height, probably followed by surface firmness (which is related to thatch, moisture status, compaction, soil type, construction, etc). Third on the list would be grass density and texture (influenced by species, fertiliser, management, etc). But because mowing height has the biggest effect it is in this area that greenkeepers come under most pressure.

There is no doubt that this pressure is increasing and summer mowing heights continue to be pushed to the limits of endurance. Here I believe that greenkeepers have an obligation to stand up for the integrity of their beliefs, if only for the reason that there will be a pay-back for such practices. In the long term, and paradoxically, it will be the quality of golf that will suffer. Short term increases in green speed as a result of excessively close cutting (3mm or less for sustained periods) are directly correlated with poor winter performance, much increased susceptibility to stress (drought, disease, cold, stagnation, etc) and will encourage *Poa annua* at the expense of bent. A balance is possible and when sensible mowing heights are combined

Are your greens up to scratch?



Picture courtesy of Greenseek. 0113 267 6000

with other less damaging management techniques everyone should be happy. (See mowing article by Noel Mackenzie in last month's issue of Greenkeeper International).

Smoothness

There is no doubt that maintaining a strong, resilient and full turf cover will directly produce a smoother surface. The major causes of 'bumpiness' relate to weaknesses in sward coverage and the presence of blemishes like worm casts, weeds and disease. Particularly relevant at this time of year is the unevenness caused by the differential growth rates of the grasses in the spring. Most courses with high bent populations in their greens will be reaping the rewards in terms of the quality of the surface at this time of year. Those with full *Poa annua* swards will not notice this effect but the poor quality of the sward and the pick-up of growth will lead to unevenness for the reasons detailed above. One good reason to aim for bent domination of the greens.

Once decent growth does get underway, repeated light applications of top dressing will significantly improve surface smoothness, and may also help to promote the best conditions for improving pace – a management technique with direct and indirect implications for golf green improvement and one which Grass Science tries to encourage even at the low budget clubs.

Ball impact response

What is it that affects the response of a golf ball when it lands on the green? We all know that the skill of the player is the biggest factor, the

club and the ball selection also have an influence. But what is it about the turf that makes a ball stop quickly, retain back-spin or bound off into the trees behind the green?

Research work carried out by Steve Haake towards the end of the 1980's attempted to identify the factors that influence golf ball impact response. Somewhat inevitably he discovered that surface hardness had the biggest effect. Although the picture is not as simple as you might imagine. Excessively soft surfaces always stop a range of shots played into them, but this has little to do with backspin retention. It is much more likely that backspin will be retained on firm surfaces, this is because the time of contact between the turf and ball is reduced and hence the backspin is not converted into top-spin. As surfaces become harder backspin retention is increased but the energy of impact is not absorbed and the ball will simply bounce off a surface that is too hard. A turf with good resilience and some 'give' will reward a well struck shot, providing enough give to absorb most of the impact energy, yet firm enough to allow enough backspin to be retained so that the ball grips on its subsequent impacts. In other words well maintained, thatch free, healthy turf that is neither over nor under watered and drains efficiently.

Interestingly Haake also found that backspin retention was increased on bent dominated greens compared to *Poa annua* greens. An effect that may well have been related to the factors described above rather than a direct species link. In other words the bent tended to favour the firmer, drier greens.

Spatial Consistency

This is my term to describe the differences (or hopefully similarities) in performance between the greens around the course. Despite the best efforts of greenkeepers to produce uniformity of putting surface performance, the main factors which influence this parameter are very much out of their control i.e. construction and location. The differences in playing quality between a newly constructed sand dominated green and a traditional 'push-up' green are significant, particularly ball impact response. Similarly a green located on an exposed plateau at the top of the course will behave completely differently from a green placed in a hollow and surrounded by trees. When the two factors combine the potential for inconsistency escalates to worrying proportions.

Although it has now become something of a cliché, I still find myself reminding clubs of the dangers of reconstructing individual problem greens and creating 'one green which behaves completely differently to the other 17 on the course'. It is much more productive to take a long term, holistic view of the problem and many courses are now 'grasping the nettle' firmly in both hands and are embarked on complete green reconstruction programmes. On the other hand it may be completely unnecessary to consider reconstruction, especially if its just one or two greens that are causes for concern. There are other much less costly and less disruptive ways to improve problem greens to bring them in line with the rest. Every golf course has its own unique circumstances and clubs would be well advised to seek the assistance of a qualified Agronomist to discuss the various options available.

Temporal Consistency

Another fancy term, this time to describe the way greens change in performance through the year. Again a critical issue on golf courses these days because of the year-round nature of the game. No surprise that the method of construction has a huge effect; simply put, sand dominated greens are more consistent through the year, soil based greens tend to fluctuate according to weather conditions. Location is important too, greens that are exposed and dry quickly will perform better under wet conditions, the greens that collect water and are shaded will suffer when it's wet.

Species composition makes an enormous difference to the year round changes in the performance of a putting surface. Just like the differ-

ence between well drained greens and wet ones, *Poa annua* greens will fluctuate considerably from season to season; they produce seed heads through the late spring, are prone to drought in the summer, tend to lose colour and growth through the autumn, are prone to cold, waterlogging and disease stress in the winter and after all that look pretty awful in early spring. In contrast bent dominated turf is much more consistent in its performance through the year, and is much less prone to all the stresses that seem to hit *Poa annua* so badly. One very good reason for continuing the long term battle to improve the species composition of golf greens and, in particular, avoiding excessively close cutting in the summer.

Summary

The intention of this article is to highlight the standards of performance by which players judge our greens. An appreciation of these standards provides the green-keeper with a new perspective on the management of the course and, in particular, provides a focus for long term course development issues. The article also links the likely effects of specific turf management factors on playing quality and includes ideas for the manipulation of these factors to get the best performance from the greens. These suggestions are briefly summarised below:

- Keep records of green speed by taking regular stimpmeter readings throughout the year and take a note of weather and maintenance factors.
- Adopt a sensible, turf friendly approach to mowing height and use other less stressful maintenance methods to retain green speed.
- Maintain a programme of regular, light top dressing through spring and early summer to improve smoothness and pace.
- Sound turf maintenance practices that create a firm, resilient surface will favour skilful approach play.
- Take a long term, holistic approach to green reconstruction, there may be other less costly and less disruptive ways to improve isolated problem greens.
- Adopt a management programme that tilts the competitive edge towards bent, but not at the expense of good putting surface production – a balance is achievable and therein lies the true art of greenkeeping.

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