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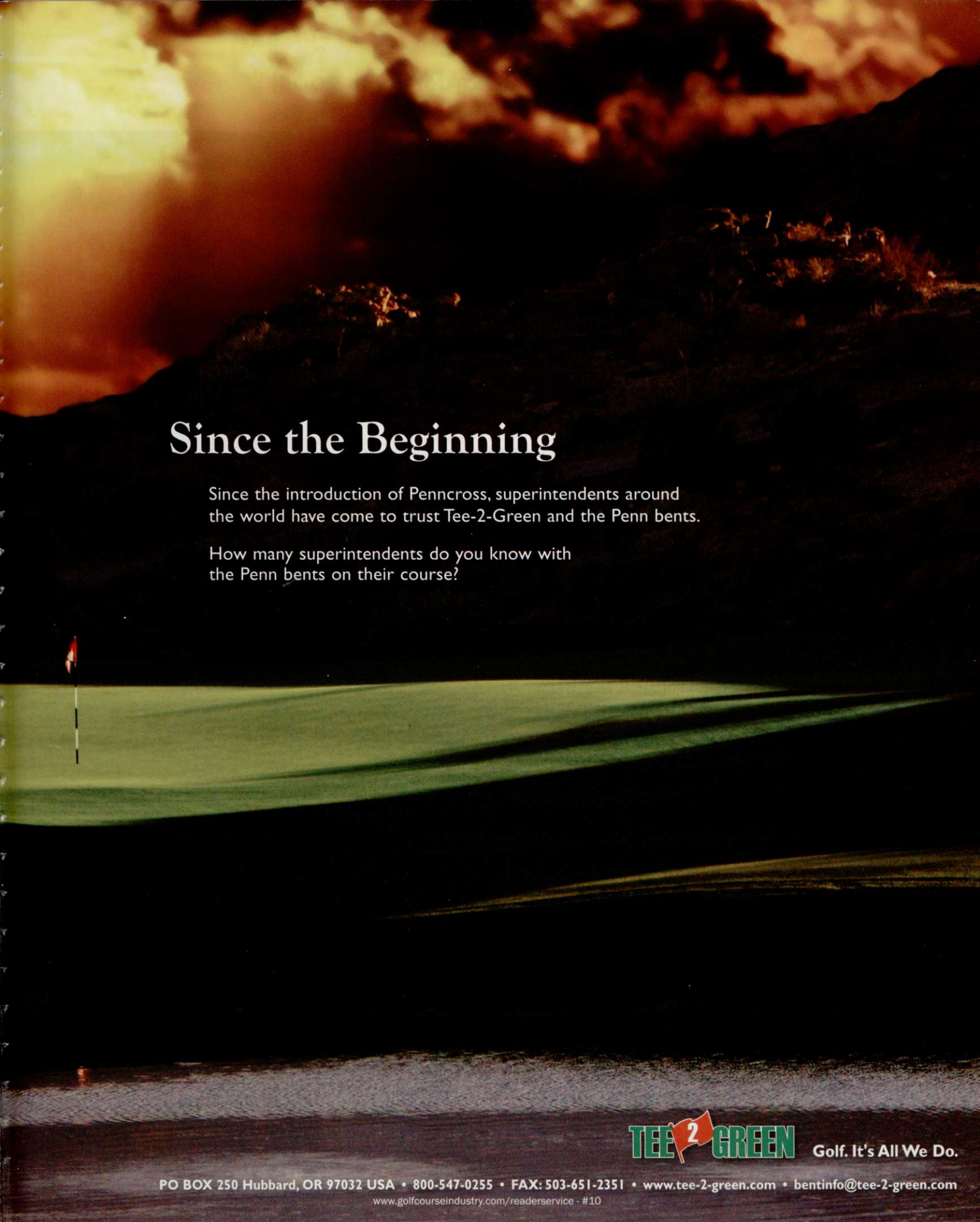
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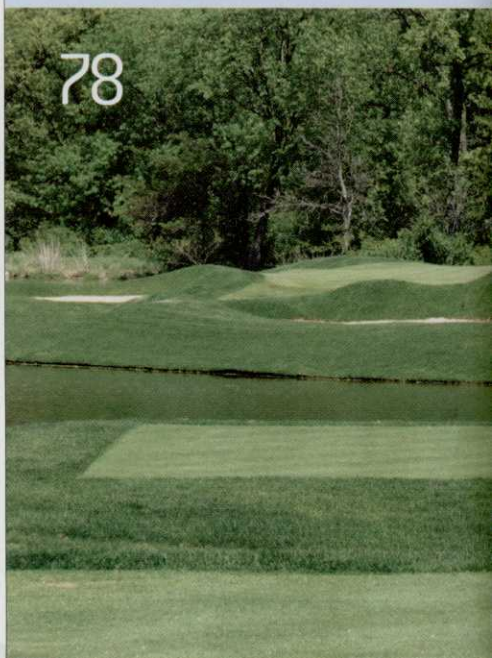

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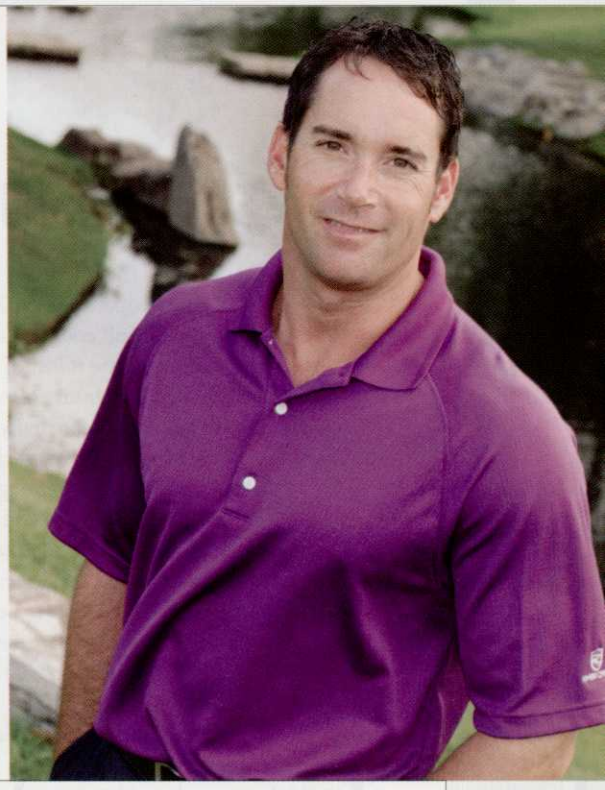

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A look at Valhalla Golf Club's efforts to prepare for the tournament.

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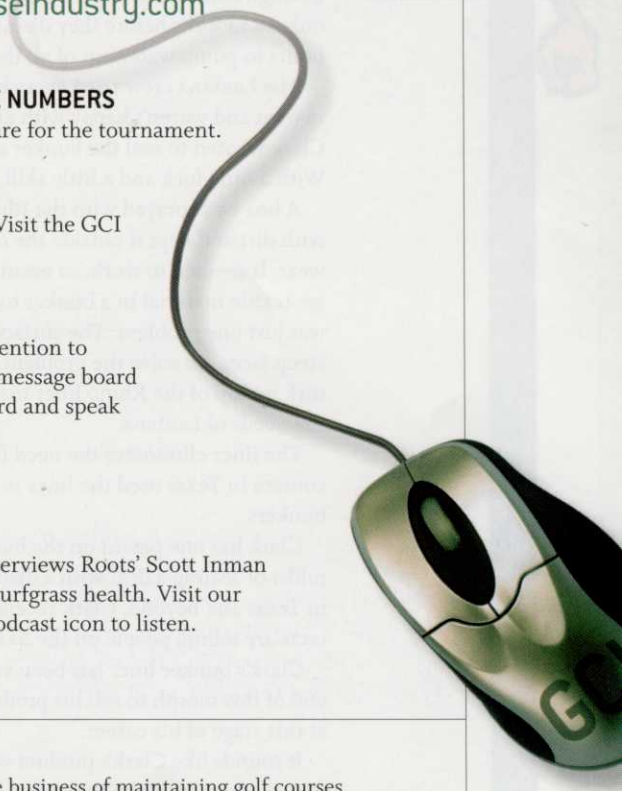
GCI PODCAST

John Walsh, editor of GCI, interviews Roots' Scott Inman about biologicals and overall turfgrass health. Visit our home page and click on the podcast icon to listen.



EDITORIAL MISSION STATEMENT:

Golf Course Industry reports on and analyzes the business of maintaining golf courses, as well as the broader business of golf course management. This includes three main areas: agronomy, business management and career development as it relates to golf course superintendents and those managers responsible for maintaining a golf course as an important asset. *Golf Course Industry* shows superintendents what's possible, helps them understand why it's important and tells them how to take the next step.

John Walsh
Editor

A SILVER LINING

I got the call in the middle of last month. Boy was Morris Johnson excited. The director of golf course operations at River Oaks Country Club in Houston rarely gets worked up about new golf course maintenance products, but this was an exception.

River Oaks is in the midst of a course renovation, and Johnson was elated about the installation of a new bunker liner – the likes of which he and his colleagues in Texas haven't seen before. Reportedly, the liner lasts longer than the others on the market and seals better, keeping the sand cleaner longer.

As an editor, I'm lucky enough to tour the manufacturing facilities of many suppliers that serve the industry and learn about a plethora of advancements in technologies that help superintendents do their jobs better and more efficiently. It's amazing to see all the brainpower, planning and execution that go into the development of various high-quality products, from equipment to pesticides to irrigation systems.

However, editors are less likely to hear about an innovative product that's the brainchild of a superintendent. That's what's so interesting about Kevin Clark, the guy who ignited Johnson's excitement.

Clark, an assistant superintendent at Lantana Golf Club in Texas, is proof that necessity is the mother of invention. Lantana is a Jay and Carter Morrish design that features high, steep-sloped bunkers. The natural and synthetic liners in the bunkers (halfway through construction, the team switched from natural liners to synthetic ones) lasted only 18 months before they disintegrated into dust in the sand. It required 200 man-hours to pump water out of all the bunkers and return them to playable condition.

The Lantana crew tried every bunker liner – even various combinations – on the market and weren't happy with any of them because none provided a long-term solution. Clark wanted to seal the bunker and keep the sand from contamination for a long time. With a little luck and a little skill, Clark came up with a better idea.

A box was sprayed with the Rhino liner material used on truck beds, and he filled it with dirt and kept it outside the office for a while to see how the liner material would wear. It seemed to work, so eventually the Rhino liner material was sprayed on top of geotextile material in a bunker to see how it would hold up in a golf application. There was just one problem: The surface was too slippery, and the sand wouldn't stick to the steep faces. To solve the problem, Clark glued polypropylene fibers, similar to artificial turf, on top of the Rhino liner material. It worked. Clark invented a bunker liner to fit the needs of Lantana.

The liner eliminates the need for gravel, Clark says. It was such a good idea, 12 other courses in Texas used the liner in test bunkers, and River Oaks is installing it in all its bunkers.

Clark has one patent on the bunker liner and another one pending. He's also in the midst of sealing a deal with a distributor that has a 14-state territory. Word is spreading in Texas and beyond. Clark received a call from someone in Charlotte, N.C., and architects are telling people on the East Coast.

Clark's bunker liner has been successful enough that he'll be leaving Lantana at the end of this month to sell his product full time, something he never thought he'd be doing at this stage of his career.

It sounds like Clark's product will be good for the industry and great for him. And I'm sure Johnson won't be the only superintendent excited about the bunker liner, which just might bring a smile to your face – if it hasn't already – when you discuss the topic next time. **GCI**

We would like to hear from you. Please post any comments you have about this column on our message board, which is at www.golfcourseindustry.com/messageboard.

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Calling the shots

Great column in the May issue ("Where the power should be," page 8). I believe I'm one of the fortunate ones in the industry. My position was made possible by Senior Tour star Jim Colbert. Nine years ago at the first board meeting of our club, which opened in 2000, a discussion broke out about establishing a green committee. Within seconds, Colbert interrupted the discussion and asked if anyone had a better background in turfgrass than me. It was an intense moment: I didn't know anyone in the meeting or what to expect, but that was it. It's never been brought up again, and I haven't had a green meeting in nine years. I'm trusted to call all the shots – that includes mowing, heights of cut, topdressing time table, aerification schedule, set up, etc. Colbert has a great respect for our profession. The funny thing is, because I call the shots, I work 10 times harder to provide superior conditions because the course is a reflection of me – not any committee.

David W. Gourlay, CGCS, CCM
Chief operating officer
Colbert Hills Golf Course
Manhattan, Kan.

Our Disneyland

I still enjoy reading Pat Jones. He's one of the true good guys of this crazy turf industry. And yes, I agree with him that Augusta is still our industry Disneyland ("The truth about Augusta," http://www.golfcourseindustry.com/news/news.asp?ID=4097). Of course, my friend Steve Flesch, who I watched grow up playing my courses, had his own version of the Matterhorn.

Jerry Coldiron, CGCS
International sales representative
Hector Turf
Boca Raton, Fla.

Job restlessness

I enjoyed Pat Jones' column "Reinventing yourself" (on page 88 of the April issue). It sounds a lot like the WSTC's process mapping scheme I talk about in my presentations at various state conferences, but it holds true.

The column was even more intriguing because it hit me where I was about five months ago as a superintendent. I made that same list of good and bad about my former golf course, and I wasn't happy. My time with my kids was pathetic because I was always tired and worn down from my golf course management schedule. No weekends off, no holidays off, just the whole rat race of being a superintendent. Sixteen years of it, and I realized as much as I loved being on a course, I hated being a superintendent at a place that didn't respect my contributions – hence my change in careers. It's amazing to see my kids in the mornings (which I never got to do before) and to be home most nights without going back to check irrigation or sprays. It's also amazing to work a "real" schedule with weekends off. So that's how the real world works outside of the turf world.

Thanks for reaffirming why I made my change. I hope others take your column to heart.

Charlie Fultz
Mid-Atlantic technical representative
Grigg Bros.
New Market, Va.

Political banter

Regarding Mark Jarrell's letter to the editor in the May issue ("How will you vote," page 10) ... he claims he's an independent voter who's not pushing a Democratic agenda, but I doubt his independent status. Jarrell says how much better the checks-and-balances system would work if both parties had adequate representation. So, in his world, things would be fine if we did away with elections.

As for the many years of unchallenged Republican rule (2001 through 2006), the minority party is supposed to challenge the ruling party. The Democrats were so successful at it, they're back in power.

I wonder if Jarrell will be as concerned with the unchallenged control of government if the Democrats take the White House, while retaining control of the Senate and the House. I suspect this bogus concern will quickly become a nonissue with Democrats and Jarrell.

Jarrell wants us to look at the economy, housing and the cost of goods but not the Bush-lowered tax rates. Doing so, we should conclude the only salvation for our country is to put a government-loving Democrat in the White House. Gas costs more than $4 a gallon, the housing market crashed, the cost of food is skyrocketing, and Democrats have managed to do all this in just two years of controlling the Senate and House.

I've thought long and hard about it and concluded it's not in my best interest to have a Democrat in the White House.

Dennis E. Bishop
Ontario, Calif.

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Darren Harris, a former assistant at Lakewood Country Club in Dallas, is the new superintendent at Canyon West Golf and Sports Club in Weatherford, Texas. He can be reached at dwhturf@yahoo.com or 214-683-1453.

BETTER TIME MANAGEMENT

Everyone talks about time management, but who really takes it to heart? Amid your daily duties as an assistant, managing your time will do wonders now, and hopefully create good habits in the future.

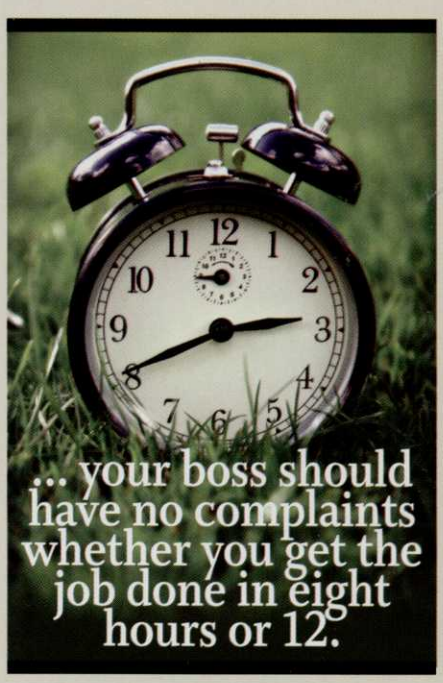
As long as the sun is up, there must be something to do, some say. But starting a fairway drainage project at two o'clock in the afternoon doesn't make sense. I'm not saying we should take it easy, but we should work hard at the course and be done with it. We work long hours, and some say we're paying our dues. But who are we paying?

Employers don't base their hiring decision on how many hours you work per day. And if you work hard and are efficient with your time, your boss should have no complaints whether you get the job done in eight hours or 12. There's no need to hang around waiting for something to do, just for the sake of saying you worked 10 hours one day. There are more important things to deal with.

I have a wife and beautiful baby boy at home who mean more to me than anything. My goal is to get my job done and get home – plain and simple. Sometimes it's not as early as I'd like, but sometimes it is, and I'm rewarded with being able to play with my son before he goes to bed. We must prioritize the important projects and duties and attack them as time allows. Planning is your biggest ally in proper time management.

For me, planning starts the day before. Although this might not work for everyone, it works well for me. I learned this habit from my former superintendent, who wrote everything down and always planned the following day. I try my best to be back at the office 30 minutes before the crew clocks out. This provides me enough time to evaluate the day's achievements and decide what needs to be accomplished tomorrow. I'm also around the shop for employees who might have questions, and to verify completed and incomplete tasks.

I'll record that day's activities in a log and write the first jobs of the next day on the board for the morning. I'll also write tomorrow's plans on a notepad on my desk and anything else I need to remember for the morning. Then I'll answer phone calls, check the shop, check the yard and head home. I try my best not stay 30 minutes later than when the crew clocks out. This varies depending on irrigation scheduling needs and special situations – but the point is I try.



The next morning, I try to arrive 30 minutes before the crew to check what's planned for the day. Sometimes it's a little later, but try to stick to my schedule. This time gives me the opportunity to review the plans for the day, make adjustments and get revved up for the day. I don't like being there right at starting time and jumping into everything immediately. This gives me a cushion to get ahead.

Once the crew arrives, we have a staff meeting and head out on the course. Usually, I'll lag behind for 10 or 15 minutes to assign second jobs. Depending on the size of the crew, I use a spread sheet to write down first, second and third job assignments to carry with me so I can address a crew member on the course if a job needs special instructions.

Before lunch, I try to come in 20 to 30 minutes early to check the board, assign any remaining jobs and make and send necessary phone calls and e-mails. It's all based on 30-minute intervals. Giving yourself breathing room always helps.

This sounds a lot like what a superintendent should be doing. But the job of an assistant, in its simplest form, is to assist the superintendent. We all should be doing these types of jobs and setting good habits for ourselves. Doing so now will only benefit you in the future.

It's easy to translate more of the assistant and second assistant roles. Starting your own records and logs will help you organize items in the future and give you a quick reference for spreader settings, fertilizer applications, etc. I write important information and notes in a simple weekly planner that lasts all year. There's not enough space for everything, but the small size allows me to carry it with me at all times. I also use the spreadsheet – clipped to my steering wheel – for notes, irrigation problems and areas that need attention. If anyone is interested in a copy, e-mail me, and I'll send it to you.

When the staff needs to know how we set our topdresser last time we aerified, or at which rate we sprayed the greens during the last application, I just pull out my little notebook and look. I have about eight books I look back on constantly for application timing, what worked and what didn't. You can keep records of projects, spray calibrations or anything you feel might help you later on.

I've always been an avid notetaker but just recently started reading my old notes. Hindsight is 20/20. Why not help yourself by planning and managing your time better? It will help you become a better superintendent when the time comes. **GCI**

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Before

After

Jeffrey D. Brauer is a licensed golf course architect and president of GolfScapes, a golf course design firm in Arlington, Texas. Brauer, a past president of the American Society of Golf Course Architects, can be reached at jeff@jeffreydbrauer.com.

PRACTICE FACILITY GUIDELINES

For golf to thrive, many say the construction decade of the 1990s should be followed by the instruction decade of the 2000s. I see an increased demand for new, or improved, practice areas at public, private and resort facilities. At public facilities, practice areas can provide learning programs and increase revenues. At private and resort facilities, they can provide superior practice conditions.

Good practice facilities are necessary to attract play. Recently, we renovated a public course to add a driving range because business surveys showed the facility lost play and range use to nearby courses with practice areas. We located the new range close to the clubhouse and parking lot to maximize off-the-street, range-only business. A costly rerouting was needed to accomplish this, but the business plan suggested it was necessary.

Space requirements make adding a practice range to an older course tricky. Modern driving ranges use 15 to 17 acres, compared to 10 to 12 acres a decade ago. Increased distance suggests driving ranges should be longer than 300 yards. For divot recovery, tees should be 45 to 60 yards deep. If tees are at both ends, total range length should exceed 400 yards. For years, the standard was 300 yards.

Recognizing that the greater volume of range balls hit – thousands per day versus 100 to 250 on golf holes – increases the potential of impacts from wayward balls, ranges are widening to increase safety. Ranges are better placed in the interior of a layout rather than in border areas because golfers, generally, are more aware of their surroundings and potential dangers while they're playing.

Distance is a better safety buffer than netting, mounding and plantings for use next to roads, parking lots or surrounding property. Most errant shots land within 15 degrees of the intended line, but a few stray as far as 22.5 degrees off line. Thus, driving range tees should curve inward to direct shots toward the center of the range, and landing areas should be at least 500 feet wide (wider than 600 feet is preferred) based on potential stray shots.

Sheer size doesn't make the ideal range, though. Besides safety, a range should be located in an area where mature tree loss during construction is minimized and the potential for lost range balls to creeks, forests or native areas during ongoing operations is minimized, too. However, remote locations can affect operating costs because of increased cart use, vandalism and theft.

> ... size doesn't make the ideal range ... however, remote locations can affect operating costs because of increased cart use, vandalism and theft.

Ranges should be near the clubhouse for golfer convenience and visual control, near the first (and, if possible, the 10th) tee and consistent with general traffic flow. To distribute use evenly, the main access point should be centered rather than at one end, which tends to concentrate use on the near side.

The ideal range is aligned in the north-south direction to avoid facing the sun, and aligned into prevailing winds to shorten typical shots and produce the best practice environment for good players. Headwinds accentuate offline shots, assisting with swing evaluation.

The modern practice facility provides more than an open field on which to hit balls. The setting should be equal in quality to a good golf hole, ideally playing over a slight valley and slightly downhill for visibility. It should allow the golfer to see the ball land and roll out for feedback and replicate the playing experience:

- A target fairway similar to the golf course in terms of turf, width, etc.
- Target greens, shaped to the style and almost the size of the course, and ideally with bunkers, if maintenance cost isn't prohibitive, at various distances with good distance marking from multiple tee spots for distance assessment.
- A private lesson tee that's secluded, yet convenient.
- An indoor video and teaching area.
- Tee areas replicating course conditions.
- Uneven and sloped lies on the fairway and rough.
- An area to practice hitting out from under trees.
- A fairway practice bunker, best aimed out into the range for ease of ball pick up.

A short-game practice area should be located near the main range, and also should simulate the on-course experience:

- A practice chipping green with all surrounds found on the course:
  - Fairway chipping areas
  - Rough
  - Mounds, grass bunkers, cross, uphill and downhill slopes, etc.
- Greenside sand bunkers, because skulled shots should land in safe areas.
- A 30- to 120-yard wedge game practice area marked in 5-yard increments to practice distance control.

Creature comfort is important. Details such as portable shades, fans and mist systems in summer and enclosed covered hitting areas for winter are popular. Refreshment stands stocked with water and sunscreen, chairs, bag stands, club cleaners, in-ground trash receptacles and a visible clock to ease fears of not being on the first tee on time all add character and function.

Making the short-game areas and a portion of the practice tee ADA accessible is required and is a good idea because many disabled golfers use the range only. Truthfully, I'd be tempted to confine my golf to an ideally designed range as well. GCI

Jim McLoughlin is the founder of TMG Golf (www.TMGgolfcounsel.com), a golf course development and consulting firm, and is a former executive director of the GCSAA. He can be reached at golfguide@roadrunner.com or 760-804-7339. His previous columns can be found on www.golfcourseindustry.com.

A MODEL JOB DESCRIPTION

As promised in my last column, the following is a model job description for a GCSA chapter executive director.

Nature and scope. The executive director is the chapter c.o.o. engaged, presumably, as an independent contractor to avoid the legal entanglements of an employer-employee relationship. The executive director might work out of the chapter office or his/her residence depending on circumstances with board of director approval.

Personal characteristics. As the representative of the chapter and its members, the executive director shall have a neat appearance in person and dress, demonstrate an enthusiastic approach to his/her work, be familiar with the private golf club environment, be an efficient public speaker and publication writer, and play golf with an approved USGA handicap.

Community relations. As its representative and spokesman, the executive director shall educate the regional golf community about the chapter's mission statement and liaison effectively (including making guest speaking appearances and providing guest written articles) with regional entities such as sister golf organizations, government and public service organizations, nonpolitical environmental groups, vendors, valued corporate leaders, charitable organizations and youth groups – among others.

General chapter duties and responsibilities. The executive director shall:

- Be responsible to the board of directors for the administration of the chapter.
- Contribute to policy-making and execute decisions made by the board of directors on a timely basis.
- Ensure the chapter is insured properly for the full scope of its activities and responsibilities.
- Attend and ensure proper minute-taking at board of director and selected committee meetings as a member of each without the right to vote.
- Promote, register participants and manage chapter golf tournaments, activities and educational programming, which includes helping to obtain guest speakers.
- Present a monthly state-of-the-chapter message to the board of directors.
- Ensure all chapter records, paperwork and legal and historical documents are maintained and secured at a location designated by the board of directors.
- Ensure the chapter office (if any) operates in a professional, efficient and courteous manner.
- Attend appropriate regional and national shows (the GIS), educational forums and meetings as provided for within approved annual budgets.
- Ensure all chapter standing committees function with applicable mission statements.
- Provide an effective orientation program for new board members and committee chairmen.

Re: staff. The executive director shall:

- Periodically review the chapter's need for administrative support and establish or adjust staffing as required.
- Annually evaluate staff performance.
- Ensure applicable job descriptions are available for key staff personnel.
- Hire and fire staff as authorized within approved operational budgets.

Re: chapter members. The executive director shall:

- Ensure membership databases and directories are managed and maintained current.
- Ensure sample employment contracts are available to chapter members as they negotiate with employers.
- Circulate regional and national job availability notices on a timely basis.
- Establish an effective interface with regional golf club/course boards, green committees and search committees to best ensure chapter members are employed within fair market value written agreements, which includes establishing an effective chapter club employment relations committee.
- Ensure the preparation and presentation of printed and Web site informational materials to educate these same club/course elements to the principle that golf course superintendents, as a professional class, have earned the right to written employment contracts.
- Maintain an annual record of the percentage of chapter members working with written contracts.

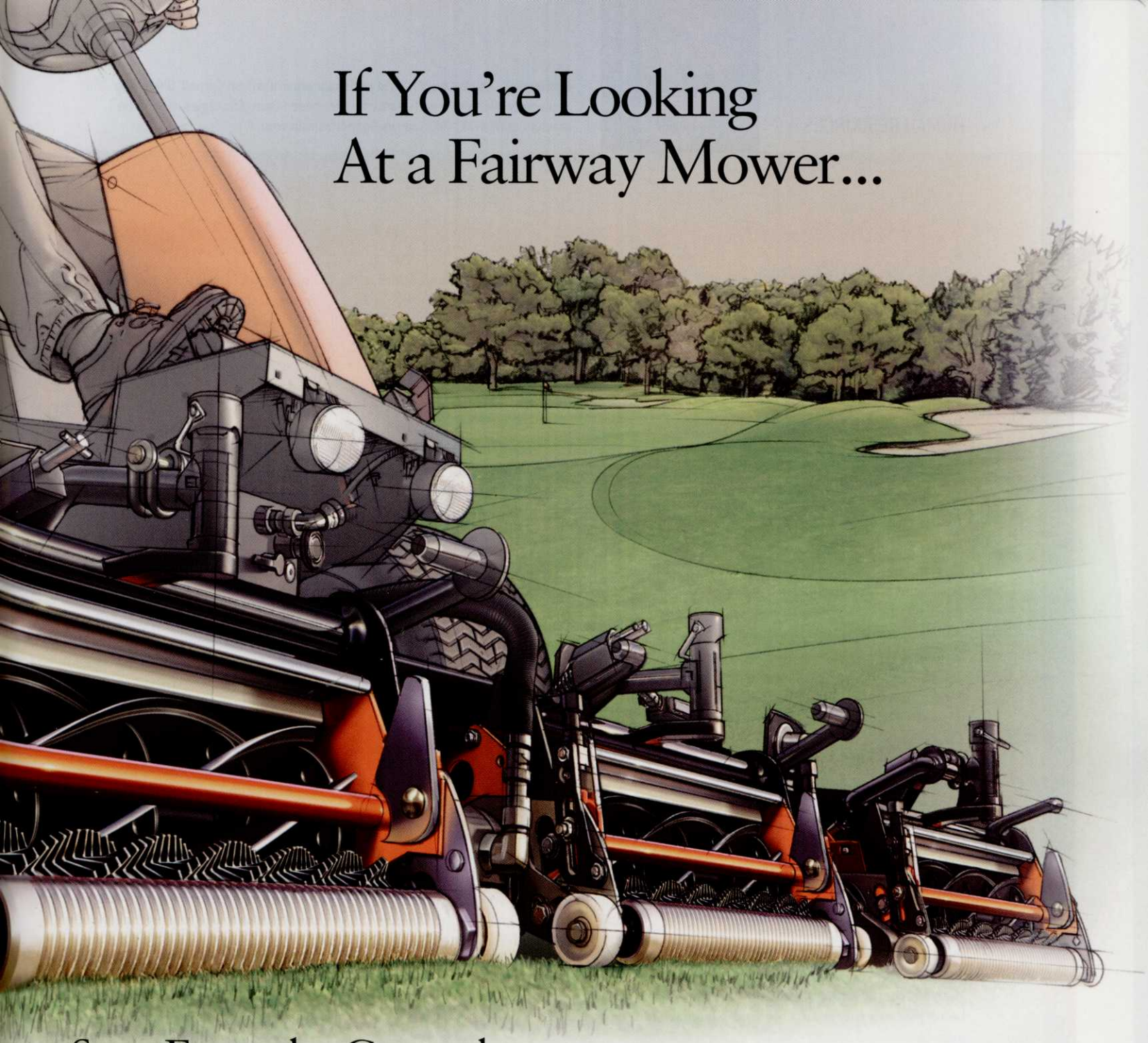
Re: communications. The executive director shall:

- Phase in the conversion of chapter communications from hard copy (newsletter, member directory, event notices and registration, etc.) to a paperless electronic format (ensuring the proper management of a chapter Web site) at a pace appropriate for chapter members to digest. This would include allowing chapter members to pay dues and event fees online.
- Write for chapter publications and Web site as circumstances suggest.
- Design polls and surveys to feed and support a database to be used to educate chapter members and the regional golf community about key issues.

Re: fiscal. The executive director shall develop a fiscal management strategy to include:

- Optimizing the selling of ad space within chapter publications (magazine, newsletter, etc.) and Web site.
- Helping obtain sponsorship for chapter activities and events.
- Ensuring the proper collection of dues and the appropriate management of accounts receivable and payable.
- Ensuring the preparation of appropriate operating and capital budgets on a timely basis for board of director approval.
- Developing annual fund-raising programs.

Newly hired executive directors need not undertake all the detailed assignments profiled within the above job description. Rather, they should look to phase into their new assignments only to the extent that's natural to support their chapters' current mission statements. **GCI**



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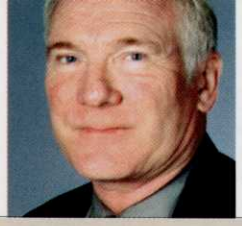


Robert A. Milligan, Ph.D., is professor emeritus from Cornell University and senior consultant with Madison, Wis.-based Dairy Strategies. He can be reached at 651-647-0495 or rmilligan@trsmith.com.

PRICELESS

One of the most common frustrations I've encountered during my 20 years of working with superintendents is an insufficient budget to pay maintenance staff employees what they deserve. With economic issues facing the golf industry, this frustration will only grow. Perhaps employers need to think differently about compensation.

When thinking about compensation, most people think salary or wages, and other economic benefits such as social security, unemployment insurance, vacation and sick days, health and life insurance, retirement, etc.

Think about why you chose to be a golf course superintendent. Was it because of money? What were the main reasons? I suspect they were mostly noneconomic.

Now, think about why employees work. Economic and noneconomic compensation come to mind. Their economic return includes a salary or hourly wage, as does yours. Your noneconomic compensation includes love of turf and the outdoors, golf, tradition and successes or accomplishments. Noneconomic benefits for the maintenance staff, while not exactly the same as managers, produce similar results. Employees go home with noneconomic benefits such as accomplishments, job satisfaction, being part of a successful crew and personal growth.

With this broader view of compensation, think about what you can do to provide the best possible compensation package for your employees by adding improved noneconomic compensation.

When my sons started to play sports, I enjoyed coaching their baseball teams. Several other coaches in the league believed playing ball should be just about having fun. Although those coaches were well intentioned, I rarely observed their team members getting a lot of satisfaction out of playing baseball. They weren't having fun. As for me, I wasn't overly competitive, yet I provided two things to the kids on the team:

- An opportunity to be a member of a winning team that didn't necessarily mean we won every game. It meant everyone did their best. We got better, and we encouraged rather than criticized each other.
- An opportunity to succeed. Everyone played the same number of innings, but each player was positioned where he had an opportunity to succeed. We didn't put players in key positions until they had a likelihood of succeeding.

In this way, the winning – the satisfaction and fun – came from being a member of a successful team (not necessarily a team with many victories) and from personal success and improvement. Similarly, providing noneconomic compensation for employees isn't about making work fun. It's about being a member of a successful crew, and the personal growth and success that contribute to the crew's success.

The following are suggestions for providing greater noneconomic compensation for your maintenance employees:

1. Provide high-quality, positive feedback. By high quality I mean very specific, so the employee knows exactly what he did to earn the positive feedback. The result of this noneconomic compensation is that most days an employee leaves work with the satisfaction of having had a successful day.

2. Provide maintenance staff opportunities to learn and succeed by building on their strengths. A sense of accomplishment from excelling at some tasks and learning and mastering others provides the noneconomic compensation of satisfaction from accomplishment and growth. The focus on building on strength comes from excellent research throughout the last two decades that shows we can make greater progress by building on our strengths than by trying, usually unsuccessfully, to overcome our weaknesses.

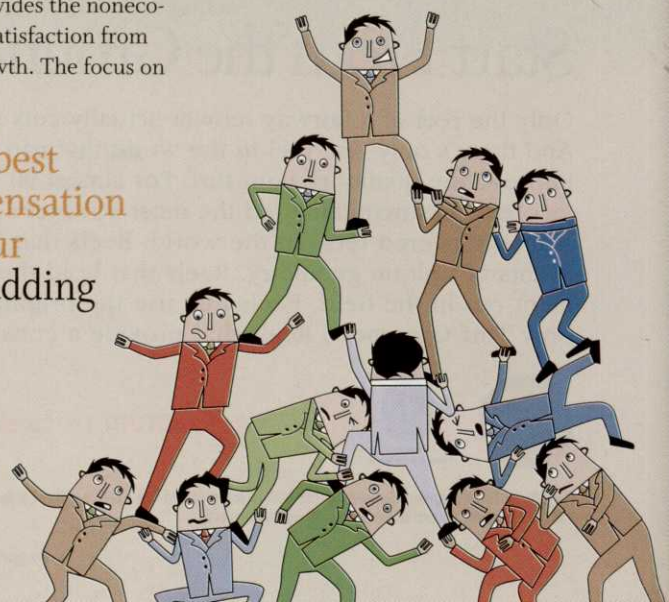
3. Provide excellent supervision. The relationship an employee has with his supervisor is, apart from his relationship with his family and a few close friends, the most important relationship in his life. Remember the supervisor's responsibility is to provide the training, direction, coaching, and support to enable the employee to succeed.

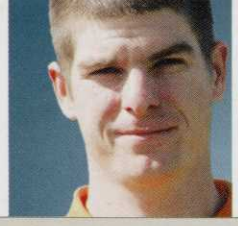
4. Engage your employees in the success of the course. Do everything you can to encourage your employees to have pride in the course. Each of us wants to be a member of a winning team. Contribute to this form of noneconomic compensation:

- Always speak positively of your course, your club and your industry.
- Continually reinforce your vision for the course and your plans for the future.
- Provide items – hats, shirts, etc. – that confirm their importance to your course
- Seek their ideas and input into course decisions.

Remember noneconomic compensation contributes to the total compensation employees receive and it's the least expensive compensation you can provide. **GCI**

... provide the best possible compensation package for your employees by adding improved noneconomic compensation.





Steven Tucker is the equipment manager at the Ritz-Carlton Members Golf Club in Bradenton, Fla., and the president of the International Golf Course Equipment Managers Assocation. He can be reached at 941-309-2913 or stephen.tucker@ritzcarlton.com.

SETTING THE CUTTING UNIT

Cutting units generate some of the most controversial questions in the turf equipment industry. Do you backlap? Do you spin grind? Do you relief grind? The real answer is … whatever works best for you at your facility.

But when you analyze this answer, what can you learn from it? If you were learning how to set up a cutting unit properly, where would you find information about this procedure? Every property has its own unique challenges that require you to understand what cause and effect you have when setting up cutting units.

The most common problem with cutting unit setup is inconsistency. Many golf courses have more than 40 cutting units to maintain, and each one needs to be set just right to achieve accurate results. One of the biggest mistakes can be made when setting the height of cut. It's not necessarily as easy as it sounds.

Typically, when you have someone set the height of cut, you want the same person setting all the units of that type because each person who holds the gauge bar on the cutting unit might hold it differently or apply more or less hand pressure. While this seems minor, it can cause a slight inconsistency with cutting units.

Setting the attitude of the cutting unit also plays a large role. The attitude describes the position of the bed bar as it sits in the cutting unit in its working position. Typically, you can find the correct settings and procedures to this process in the operator's manual that comes with the equipment. Each cutting unit must be set up with the same attitude, or it will cause a different look on the turf.

Also, keep in mind the reel diameter plays a huge part in this process. If the reel on one cutting unit is more worn than the other, the attitude will need to be adjusted so they all match and are consistent. A good measuring device to check reel diameter is a Pi Tape, which provides the most accurate measurement of reel diameter.

Cutting units should be checked after each use to determine the proper setting for the next mowing. Using a cutting unit that's maintained regularly ensures the best quality of cut and maintains consistency and a sharp edge. The most common way to maintain cutting units is by using sheets of paper to check the quality of cut and a hand file to dress the front face of the bedknife. A hand file maintains the angle the bedknife as it was ground originally. You don't want to change that angle by using hand grinders that don't lock your angle in place.

> It's important to realize that whether you relief grind, backlap or spin grind, you can achieve the correct look if you set up the cutting unit properly.

Before you grind the cutting unit, execute a series of checks. First, look for any signs of reel damage: cracks, bends, nicks, etc. Then check all bearings from reel to rollers. If there's any play, they might need to be adjusted or replaced, depending on the type of cutting unit. Avoid grinding a cutting unit with bad bearings because this will impact the grind considerably.

Once you've determined your bearings are OK, it's a good idea to remove the bedknife and check the bushings to make sure you don't have significant wear that will affect the setup once you're finished.

Now you're ready to grind the cutting unit. It doesn't matter which method you use. The idea is to have a sharp reel. Whether you have relief or not, you can still have an excellent quality of cut either way. Once the grind is complete, check the bearings to ensure nothing is loose.

Once you double check the bearings, you're ready to install the bedknife. Read the manual to see how to install the knife properly. Some manufacturers have plastic washers that need to be set a certain way to prevent bed bar tweaking.

The final stage in setting up the cutting unit is to "parallel." This seems to be the most difficult process to understand. The sharpest, most correctly ground cutting unit in the world is ineffective if it's not parallel. This process aligns the reel and rollers, ensuring all three are on the same plane so the downforce of the cutting units and cut line remain the same across the length of the unit. If one roller is slightly off, the weight won't transfer evenly and will cause those dreaded dark lines and a mismatched cut. You can learn paralleling procedures in the operator's manuals or on www.igcema.org.

There are many ways to achieve great quality of cut. Achieving a consistent mowing pattern on every golf course is no big secret. It's important to realize that whether you relief grind, backlap or spin grind, you can achieve the correct look if you set up the cutting unit properly. **GCI**

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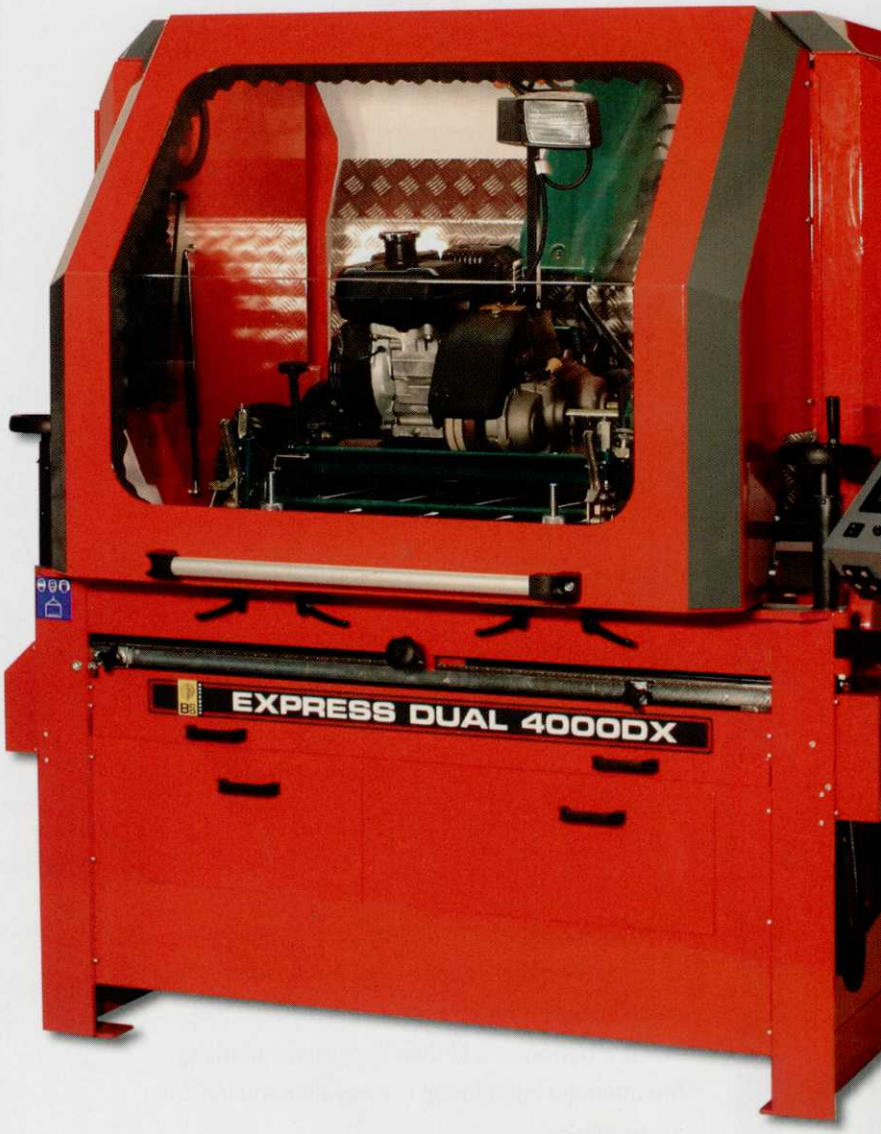

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International golf membership

The international golf membership base has increased significantly during recent years. Now there are close to 7,000 golf courses and almost 4.5 million affiliated golfers in Europe, the Middle East and Africa. Still, to grow membership is to manage supply and demand effectively, and few countries within the EMA region can lay claim to such a well-developed golf market.

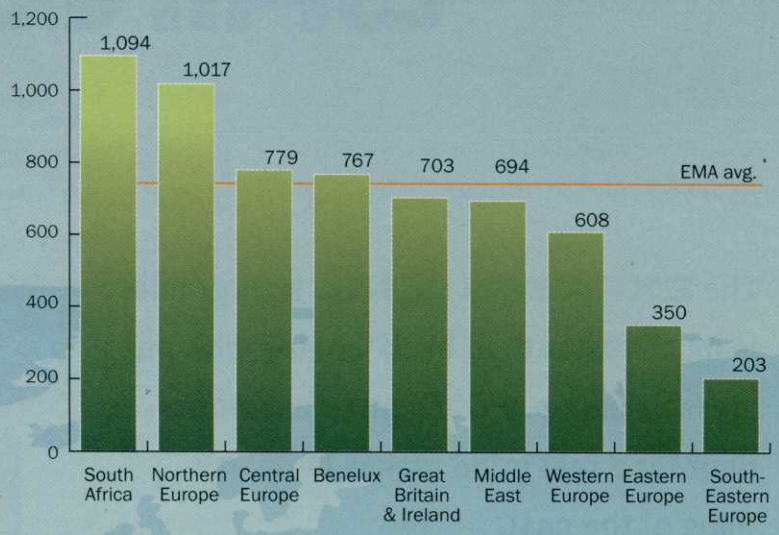
In Europe, golf in Scandinavia is the most affordable, which also explains why golf clubs in these countries have been able to grow their membership bases significantly. Eighteen-hole golf courses in northern Europe, Spain and South Africa have the highest number of members in the EMA region, averaging more than 1,000 people in most of these countries.

Eighteen-hole golf courses in Great Britain, Ireland and South Africa have the highest share of individual male members among all regions (63 percent). On the other hand, the share of female members is the highest at Central European golf clubs, which have about one third of the total membership base on average.

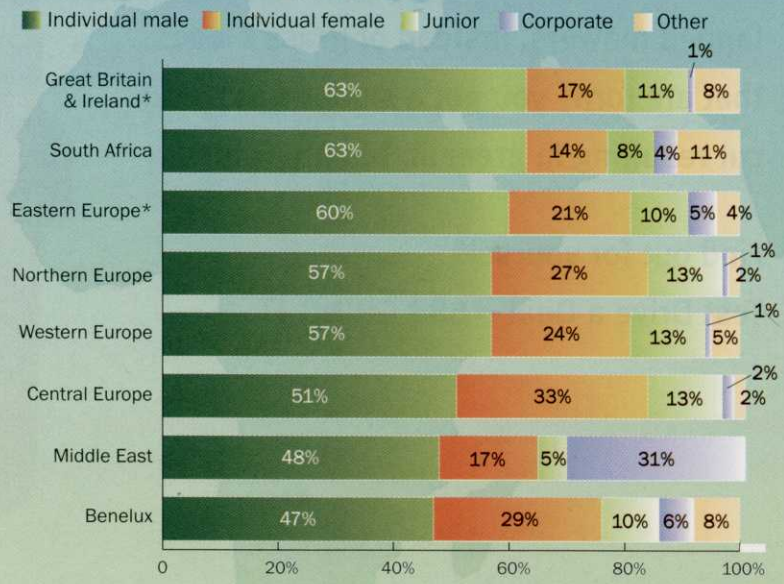
Collating data from almost 1,500 golf courses in Europe, the Middle East and Africa, the 2007 Golf Benchmark Survey allows facilities to compare their individual operational and financial performances against high, average and low performers in their geographic markets. Membership information is a key demand indicator of the survey.

Source: KMPG's Golf Benchmark Survey 2007

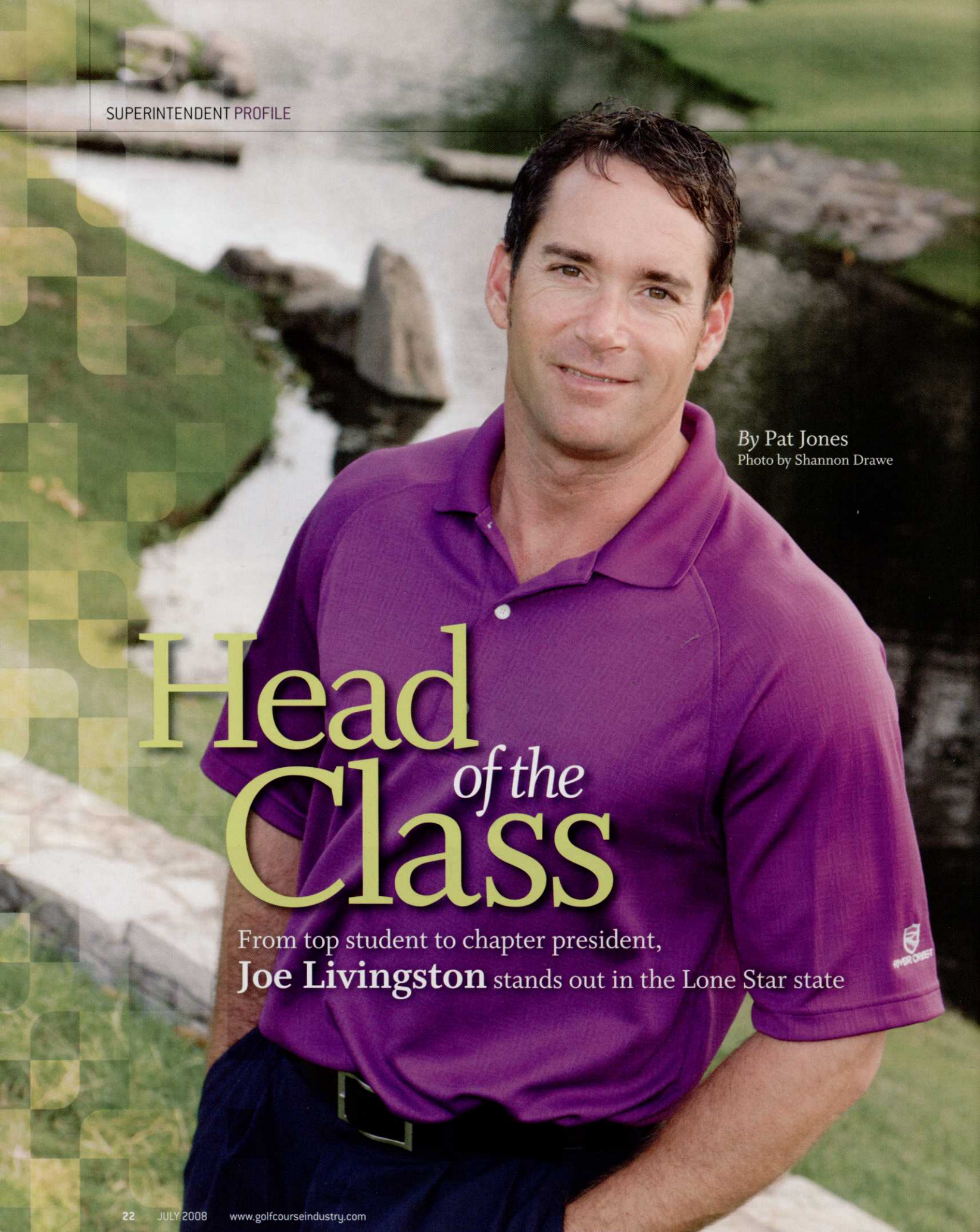
Average number of members of 18-hole golf courses.



Membership composition of 18-hole golf courses by region.



** All Courses*



Head of the Class

From top student to chapter president, **Joe Livingston** stands out in the Lone Star state

By Pat Jones
Photo by Shannon Drawe

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I first saw Joe Livingston on the show floor of the 1993 GCSAA Conference in Dallas. I was, at the time, the scholarship and research director for the association, and Joe had won the first-ever Mendenhall Award as the top candidate in the annual scholarship competition. I had been looking forward to meeting this clean-cut, corn-fed youngster from Iowa whose grades and background had impressed the selection committee.

As I introduced myself to the crop of scholarship winners gathered at the convention center, I noticed one looked a little different from the rest of the best-and-brightest we'd collected that year. He had long hair, a ponytail, an earring, an evil-looking grin on his face and just a hint of a rock 'n ' roll attitude. The rebel in the bunch was, of course, Joe Livingston.

Flash forward 15 years: the hair is shorter, the earring gone (at least during work hours) but the grin and attitude remain the same. Livingston is the certified superintendent at Fort Worth's famed River Crest Country Club and an acknowledged leader in the local and national superintendent community. After graduating from Iowa State in 1995, he served as an assistant at River Crest before an 18-month stint as superintendent at Eldorado Country Club in nearby McKinney, Texas. From there, he moved to the Fazio-designed Stonebriar Country Club in Frisco before finally returning to River Crest as superintendent in 2002. He's been there since.

Today, the 30-something Livingston isn't so much a rebel in appearance as in spirit. His strong opinions and willingness to jump in and work have propelled him to the presidency of the North Texas GCSA. And, around the course, he's more likely to be doling out compliments than cracking the whip.

How's the golf business in Dallas-Fort Worth right now?

In a word: competitive. The private side is still strong, but members are working more hours during the week. Most golfers are just grinding to keep up. On the public side, you have to provide value for the dollar. Service is key if you're going to get those corporate outings that haven't already been cut back. You're going to sink or swim based on good service and good marketing.

Our business plan at River Crest is pretty simple. We do almost no outside outings, so it's all about membership recruitment and retention. We've kept our membership full and have a waiting list because our members recruit

friends. The club is a family. We have a strong junior membership program that feeds our regular membership. Most junior members, by the time they've reached 35, have built strong relationships and want to stay here.

How did an Iowa boy end up in the Lone Star State?

I went to Iowa State. Professor Nick Christians is my hero. He was the greatest advisor ever. My dad was a superintendent at Sioux City Country Club for many years. I was looking for an internship in '93, and Nick suggested I head south. I saw an article about Colonial Country Club in a magazine, so I called information and got a hold of Scott Johnson, CGCS. He said, "Bring your sunscreen, 'cause you're gonna work and you're gonna learn." After the internship, I went down there and took an assistant's position under Doug Fisher at River Crest. And that was how I ended up here.

Joe's rules for success

>> Visit our Web site to read Joe Livingston's personal philosophy about turfgrass management, derived from his experiences and the many superintendents he's worked with through the years.

You and I first met when you were a GCSAA Scholar way back when. How was that experience?

Dr. Christians pushed all of us to complete the application form for scholarships. I'd always been a straight-A student and had a ton of on-course experience. But I was shocked when I realized I'd gotten the first Mendenhall Award in the nation for the top GCSAA scholar. The convention was in Dallas, and GCSAA flew us in. I had long hair because I was a drummer in a rock band. I was young and wide-eyed, with no idea how big the business was. I remember you took the scholars under your wing and fed us a few drinks, and we smoked a lot of cigarettes. It's funny I ended back down here in the Dallas area.

You're still a big ISU guy though.

Everybody feels tight with his school, but Nick is a special guy. ISU is one of the largest turf schools in the nation, yet Nick knows every student. He gets involved in your life. Of course, he's a great teacher – ISU has won all those turf bowls – and he teaches the fundamentals so well. I just want to thank him because he basically brought me to ISU and told me what it would do for my career. He knew what I needed. I owe him a lot.

What are your biggest challenges?
On a daily basis, I worry about staying hungry. I constantly want to push myself and improve on the experience the staff and I have created. So, that makes me think about the people I've surrounded myself with. A gallon of gas costs half their hourly wage. I lie awake thinking they have to feel appreciated or else they're going to move on. As a manager, 90 percent of what I do is praise and give credit. I walk around most of the day and pat them on the back and say, "Nice job." You have to give three times more credit than criticism. I have three guys with 35 years of experience and only a handful with fewer than 10 years.

What's the state of most chapter associations right now?
I'm fortunate to be involved with the North Texas GCSA. I'm president this year. All we talk about is providing value to our membership. We try to mirror the GCSAA, but we face the same challenges it does. Members are always asking, "What have you done for me lately?" There are still many assistants, horticulturists and staff who don't belong at all. We have great events, but usually it's always the same 75 guys who participate out of a membership of 400.

Local education is essential. You can't always work through the national. How can we give back to our members and get more people involved? Everything costs more: printing, Web sites, meetings. We're lucky to have supportive vendors. To me, without the vendors, we'd be in deep trouble. We're constantly asking them for more, but they have budgets, too. We try to treat our vendors well in our association, as we should.

What's the biggest mistake superintendents make these days?
It's no secret this usually has nothing to do with turf. First, it's living up to your promises. You have to be who you say you are and do what you say you'll do. You have to be honest. You can spin agronomic stuff all day long, but it breaks down trust. Would you go back to a doctor who lied to you?

On the agronomic side, it goes back to the basics of what Nick taught us at ISU – you have to have a balanced approach. Mother Nature will throw you curve balls. You have to be patient. Guys try 800 different "fixes," which makes it impossible to assess what's working. You need to focus on the basics of plant needs.

If you could teach a class for the GCSAA, what would the topic be?
I'd call it "Commanding respect and enabling those around you" – basically, how to be a model manager around your customers and your people. Don't get caught up in the small stuff. Give your people the resources to get the job done and

give them credit for what they do.

Just a few weeks ago, we had a huge member-guest tournament. A couple of my guys went out of their way to take care of little stuff most people wouldn't notice. On the final day, the liner fabric in one of the bunkers was loose. It was something the average member would never have noticed. But, when I went by, one of my guys was over in the bunker cleaning it up with a pocket knife and replacing sand by hand. I walked up and told him, "This just gives me a great feeling about who you are and what you do." I could have driven by, but I stopped and got out to talk to him. That's my real job.

What do you wish you'd done differently throughout your career?

I chose a great path, but part of me would love to have remained on bentgrass fairways just to see if I could have been as successful in the North. I went to Oakmont last year for the Open, and I was standing there thinking what an amazing job John Zimmers had done. And I thought, "I'd love to know what I could do with all of this."

Earlier in my career, I'd wish I'd made things simpler. I was driven to set the world on fire – demanding a lot from my staff – and I pushed too hard. It took me a long time to learn patience.

What do you see yourself doing in 15 years?

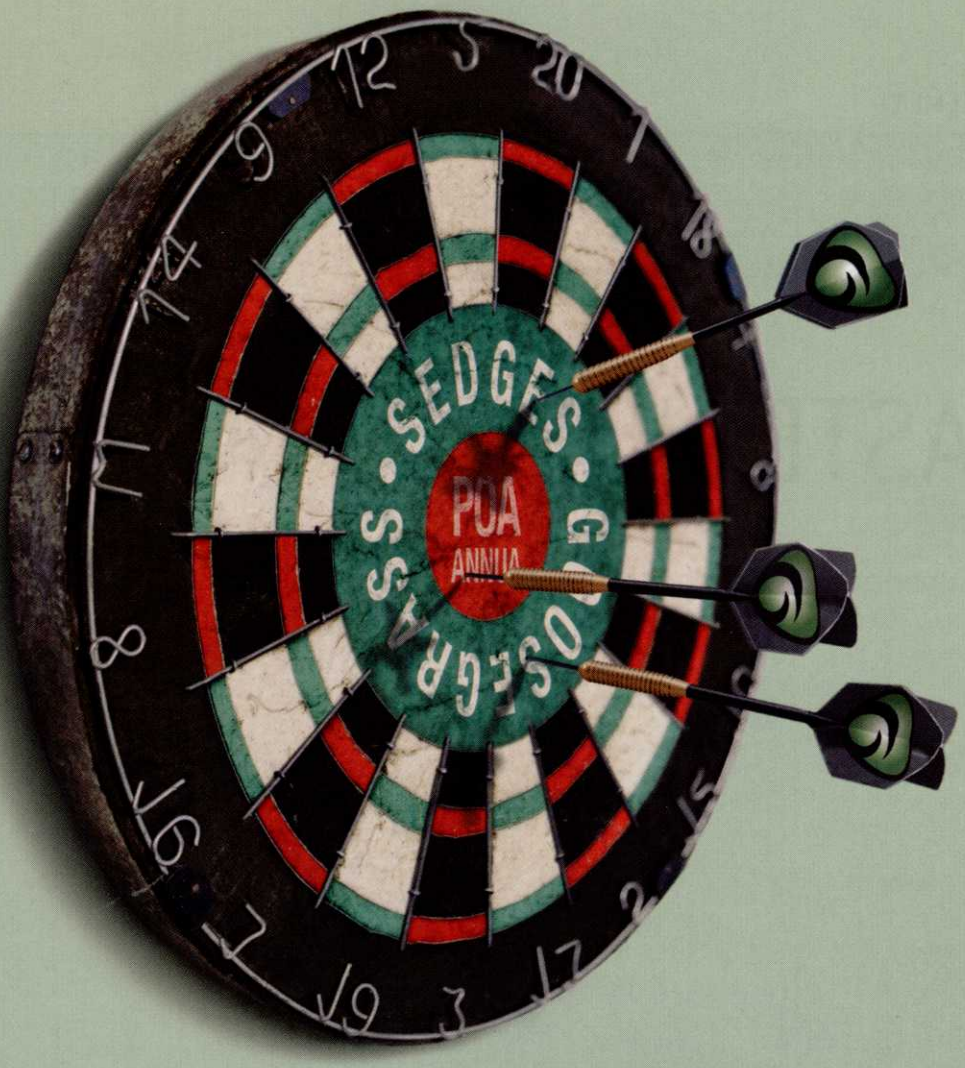
That's a difficult question. I hope I'm still driving this course in the morning with a smile on my face. I love tournament golf and tournament prep. I love visiting golf courses and thinking, "How do you get a place to look ready for an Open Championship?" I'd love to be a part of that process and work with the great folks who manage some of those courses and share some of the things I've learned.

What advice do you give young people who are interested in the business?

The greatest advice I can give them is to figure out what they want their final destination to be. You have to plot your career to get to that destination. When you move to a part of a country, make sure it's where you want to live. You get in that local rotation and end up staying put, so pick a place that represents what you want to do. It's hard to put in words, but choose a place that fits you because it will be a reflection of you.

Final thoughts?

I'm thrilled to be raising a beautiful daughter. I have a real life outside the course, and I'm discovering it's OK to be a person. It's OK to leave the job behind and play an instrument and dance with your daughter. It's a great life and a lot of work, but I'm just a normal guy. My dad had no education. He was just a simple tell it like it is guy, but he taught me that if you work your butt off, someone will notice. That was the best lesson of all. GCI



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Superintendents face the new realities of water quantity and quality

BY JOHN WALSH

Water usage: It's a serious national issue, that's for sure. It's a lot more serious for some than others, but no matter the irrigation situation at the 16,000 or so of golf courses throughout the country, the majority of superintendents are striving to use less water more efficiently. And they're becoming better managers because of it.

It's a popular topic now, but water – both quality and quantity – has been an important subject in the industry for years. It's been reported that perhaps as many as 1,000 golf courses in the country are irrigating with effluent water now.

"I'd say 95 percent of superintendents are definitely concerned about the quantity of water use," says Dennis Fitzwater, golf course superintendent at the private, 18-hole Corning Country Club in New York. "Today's superintendents are more educated about water use. We look at water quality differently than even five years ago. We can treat water or add amendments or surfactants to the soil to adjust pH, lower bicarbonate levels and help water do its job better."

DEALING WITH SALT

Mark Clark is no stranger to the water issues facing superintendents. He's been growing grass with poor-quality water for years, and it's not getting better. Clark is the golf course superintendent at the 21-year-old Troon Country Club (a private facility not related to the management company). He has been a superintendent for 27 years and has been at the 18-hole club in Scottsdale, Ariz., for 10 of those. He maintains 419 Bermudagrass on the fairways and tees and SR 1020 bentgrass on the greens. He overseeds with

perennial ryegrass, working within a $1.4-million maintenance budget as he tends to the 65 acres of highly maintained turfgrass (11 acres are part of a driving range). Clark's irrigation source has been city effluent water for eight years. Before that, it was Colorado River water and, before that, potable well water.

In Arizona, water restrictions started in the state's larger cities in 1980, resulting from a groundwater protection act. Currently, Clark estimates that 40 to 45 percent of the golf courses in the state use effluent water for irrigation.

"I have a limited amount of water to use to irrigate the golf course, but I have a 40-percent increase for leaching," he says.

Twenty-three golf facilities are on the same water line as Troon. The effluent water is treated off site at a water treatment plant, pumped to a water distribution system where it's stored until the golf courses need it, and then pumped to the golf courses' storage ponds.

The golf courses in the area paid for the city-maintained water distribution system, which is basically a storage facility. Each golf course on the water line negotiated with the city to pay an extra $100,000 to have access to cleaner water. Not every course wanted it, but the decision was based on what the majority wanted.

"The cost could put some golf courses out of business," Clark says.

Clark pays $1.16 per 1,000 gallons of water, spending a little less than $200,000 annually for water, which doesn't including the electricity needed to pump it.

As a result of effluent water use, Clark has seen a decrease in the quality of turf because of sodium build up.

"The grass can wilt, look salty, lose color and even die," he says. "It's difficult to establish ryegrass because it's more susceptible to salt than Bermudagrass. The members don't like it, but they understand the water situation."

To improve turfgrass health, Clark leaches greens once a week, but he doesn't leach the fairways because it's too expensive and time consuming. Instead, he relies on aerification, rain and topdressing.

Applying flushing-type wetting agents and topdressing fairways with sand are two popular ways superintendents deal with high salinity, says Clark, who spends $1,700 an acre to offset the salt in the turf.

Many courses could switch to the usual salt- and drought-tolerant turfgrass, but a bigger problem is establishing cool-season grass when overseeding, Clark says. So, researchers are developing salt-tolerant ryegrass.

"Some breeders are finding positive results," he says. "We're still three to four years away from having something, but once we have that, we'll be ahead of the game."

A DELICATE BALANCE

Lee Bladen's water-use situation is different than that of most golf course superintendents. The superintendent at the 22-hole Old Palm Golf Club in Palm Beach Gardens, Fla., has two water sources, potable and effluent, both coming from the same utility.

The 3-year-old, Ray Floyd-designed course, which features Seadwarf paspalum wall to wall, sits on a utility company's potable well field. Because of that, the golf course was designed around 18 wells. The majority of the water used to irrigate the course is reclaimed, but potable water is used within 75 feet of every well because the wells can't be contaminated with reclaimed water.

The effluent water lines and potable water lines at Old Palm are spaced 3 feet apart. All the lakes (58 acres) are lined because they hold reclaimed water. There are six irrigation pumps – five for reclaimed and one for potable.

Bladen negotiated a contract with the utility to pay about $30,000 a quarter, which allows the course to use 1 million gallons of reclaimed water a day. Through another contract, Old Palm has rights to an additional 600,000 gallons at a fee of about $4,000 a month, which is just for the right to access the 600,000 gallons. If Bladen uses any of the 600,000 gallons, he pays about 25 cents per 1,000 gallons. In total, Bladen spends about $200,000 a year for reclaimed water and about $15,000 a year for potable water. His maintenance budget is more than $2 million.

Golf courses within a mile of Old Palm use reclaimed water through the same utility, but each has a different agreement, Bladen says. Bladen is allowed to use potable water twice a week, and there's not really any restriction on the amount of reclaimed water he uses, although his usage driven by cost.

Currently, Old Palm, which has a 33-acre practice facility, is in a drought condition, a modified phase three, Bladen says. Water use reduction is based on formulas that include soil type. The original phase three was to cut back 35 percent of a facility's water use. The grass at Old Palm isn't brown as it was when water use was limited to greens, tees and fairways.

At Troon Country Club in Arizona, superintendent Mark Clark spends $1,700 an acre to offset salt in the turf. Photo: Troon Country Club

Lee Bladen, superintendent at Old Palm Golf Club in Florida, negotiated a contract with a local utility to access an additional 600,000 gallons of reclaimed water to irrigate the course if needed. Photo: Old Palm Golf Club

"Last year, it got dangerously low to where we almost couldn't pump," Bladen says. "It was rough. I fought like hell to get more water. Now we're locked into an agreement. I have to make the best use of water, or I'm fighting a losing battle. Even though we're not restricted by the South Florida Water Management District, I still need to impose self restrictions."

At Old Palm, which is owned and managed by WCI Communities, the landscaping around the property is irrigated with a half million gallons of reclaimed water a day, and the golf course is irrigated with the same amount. Bladen's maximum a day is 1.6 million gallons, though he doesn't use it all.

"I'm drying up in some areas," he says. "I send out a newsletter to members to let them know what's going on. Everyone's well educated about the water issue. There are some golf courses on the other coast that are only allowed to pump 150,000 gallons a day. It's ugly. Last year, before I was able to get an extra 600,000 gallons, I was pumping 375,000 gallons a day for 110 acres."

Bladen also is looking at reducing the amount of highly maintained acres on the golf course, a practice that is part of the Audubon Signature Gold Program.

More recently, Bladen installed subsurface moisture sensors, which he can track on the computer, to help use water more efficiently. They determine when and what to water.

"I'm working all the time to reduce water use," he says.

LOOKING AHEAD

Because the water situation in Scottsdale is so serious, the city agreed never to build another golf course in the city limits, Clark says. If a course was built before 1985 and had access to well water, it has been allowed to keep using the well water to irrigate because of a grandfather clause that's part of the new water regulations. But that right will be lost in the future, Clark says.

"They will fight hard, but politics will make them give it up despite the water law," he says.

Despite water-use concerns, the amount of groundwater in the Scottsdale area has actually increased because the city is taking renewable water and is putting it back into the ground, Clark says.

"It's all about how quickly we can turn water around," he says. "If you speed up the use cycle from tap back to tap, we'll have more water."

It's no question water is the No. 1 issue facing superintendents in Arizona – everything else is secondary, Clark says.

"More people are going to demand clean water, which is why the cost of water will increase," he says. "Water is the cheapest commodity in the U.S., yet it's considered a rare resource. I don't get it. We're going to see more of that, even in the places that have water, because effluent water is a commodity people can sell."

When it comes to water use and conservation, Arizona is ahead of the curve because it started regulation in 1980, Clark says.

"We've learned to manage," he says. We don't have 120-acres of turf on our golf courses. But I worry whether water will restrict golf course development in the future. That will be a difficult trend to overcome in a lot of parts of the country."

In the end, water use will change the way superintendents maintain golf courses. Some changes will be more severe than others based on location.

"I know there are superintendents suffering, but they're also becoming better," Bladen says. "They're also working harder because they have to make water go farther."

Clark predicts an even more drastic change.

"It's becoming very difficult to grow grass with poor water quality," he says. "I see us playing on synthetic grass in the future." GCI

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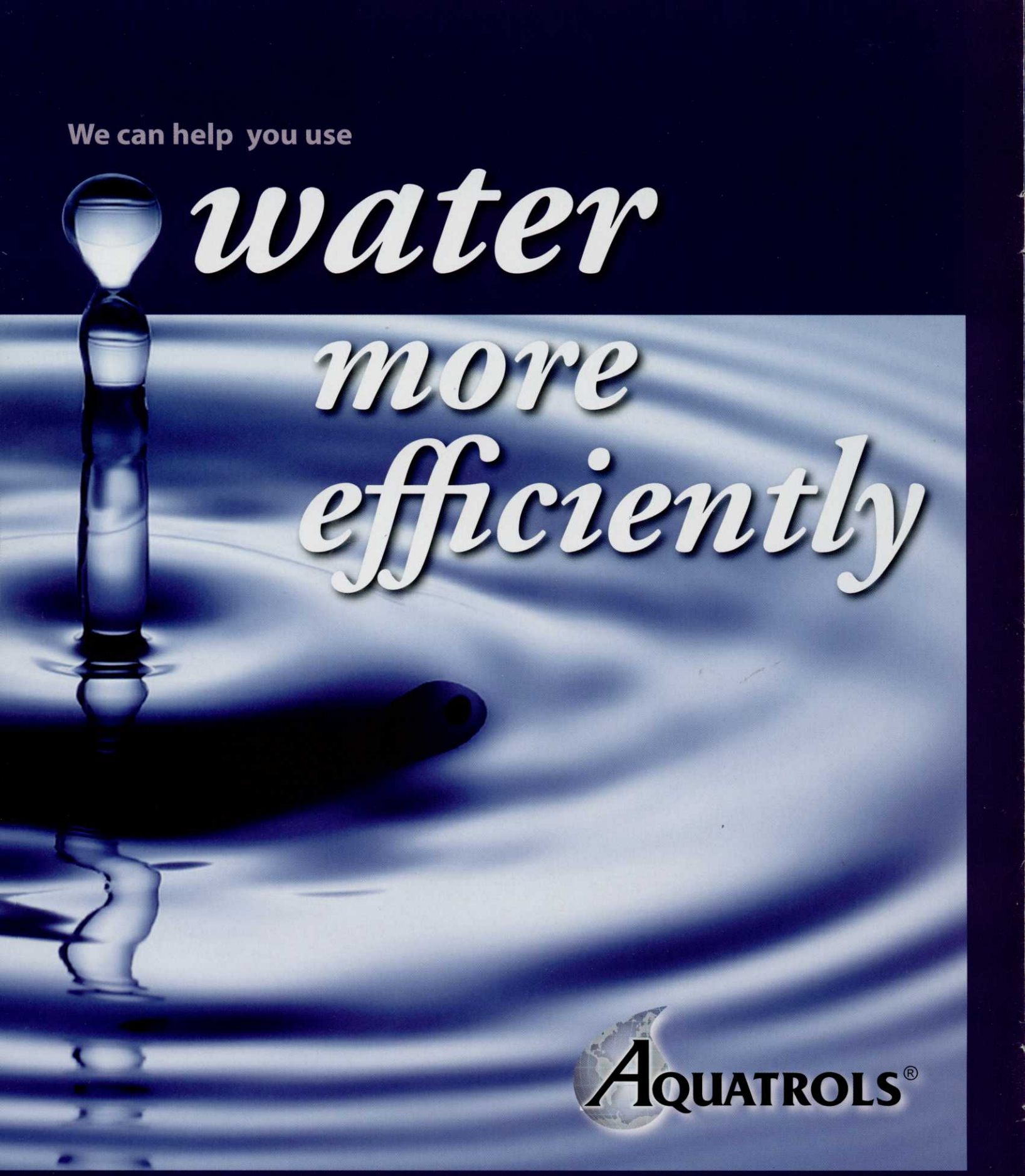
SMART IRRIGATION

INSIDE

Photo: Toro



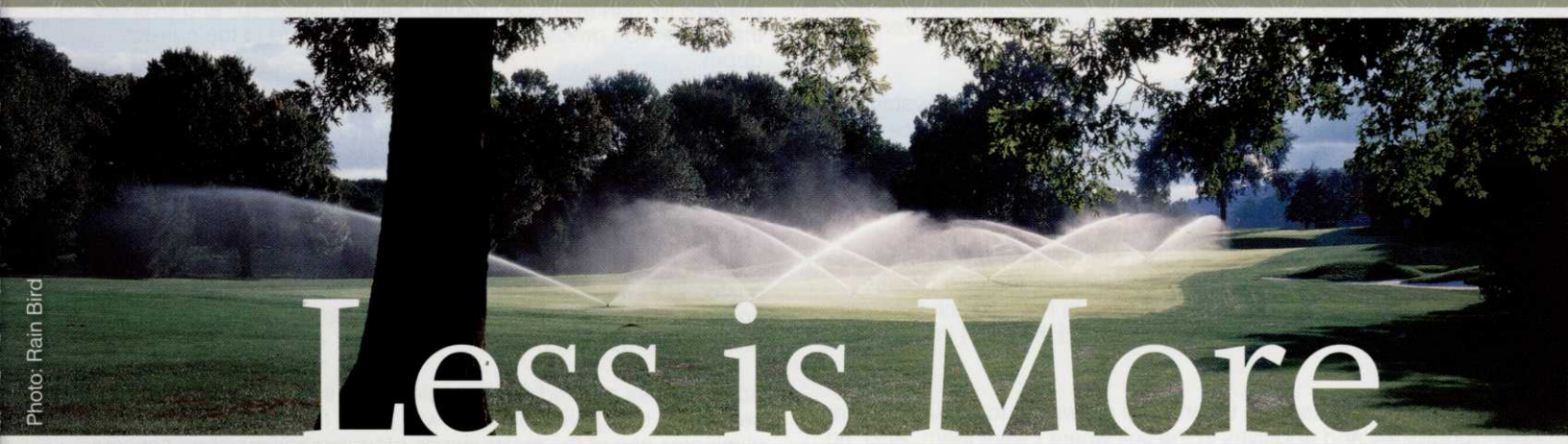


Photo: Rain Bird

Less is More

Superintendents downsize water consumption by upgrading efficiency

By John Walsh

Irrigation is an important issue to many golf course superintendents, even in areas where high-quality water is plentiful and restrictions are nonexistent. In states such as Arizona, Florida and Georgia, regulations and restrictions can result in less-than-desirable water quality at reduced quantities, making it difficult to grow healthy turfgrass. But throughout the country, diligent superintendents are working to irrigate more effectively and efficiently.

INTRODUCING BROWN

At the private California Golf Club of San Francisco, golf course superintendent Tom Bastis doesn't pay for water. He does, however, pay to pump it from two wells that sit on property.

"Other courses in the area pay half a million dollars or more annually for water," says Bastis, who grows fine fescue in the rough, colonial bentgrass and fine fescue on the tees and fairways, and A-1/A-4 bentgrass on the greens.

Despite not having to pay for the water, which is high in bicarbonates and has a pH level of 7.7, pressure to restrict its usage comes from Bastis, who operates within a $1.6-million maintenance budget.

"Nobody is looking at how much we pull out of our wells," he says. "Yet, 30 minutes away in the East Bay, there's water rationing."

There used to be three other clubs – San Francisco Golf Club, The Olympic Club and Lake Merced Golf Club – tapping into the same aquifer as California Golf Club, but these facilities pulled out and are paying for reclaimed water, which is better saltwise than the water Bastis uses.

"I'd consider buying reclaimed water," he says. "It puts the golf course in a better light. The resources are getting taxed, and sooner or later someone is going to come and tell us to get off the drinking water. But right now, they're just asking what we're using."

As part of a recent course restoration, Bastis changed all the grass types to those that are more drought tolerant because he's trying to dry out the golf course. He also increased the native areas on the course from 20 acres to 55 acres.

"We're trying to change and evolve," he says. "We're predominantly *Poa* in this area. We're introducing brown to the course in the fairways partly because we don't want to create that much thatch and growth. This course is about players, not green grass everywhere."

Bastis is using water more efficiently, partly because of an irrigation renovation that increased the size of the pump station, which, in turn, decreases overall watering time.

Also, subsurface drip irrigation, which was installed around all 144 bunkers, and closer

Superintendents need the right tools and accurate intelligence to create a high level playing surface across a golf course.

But now, superintendents want more: precise data about irrigating to prescribed depths in the root zone, the capacity to prevent leaching or runoff and use fungicide and fertilizer to their optimum levels.

AquaSpy – the world's most advanced soil moisture system – gives the superintendent the technology and intelligence they need to achieve these goals. AquaSpy's Golf and Sports Turf Division, GolfLinx, provides the technology neatly packaged for over one hole, three holes, nine holes or an entire course.

"Having been a golf course superintendent for 35 years I actually thought I had done it all," says Lee Bladen, the Golf Course Superintendent at Old Palm Golf Club in Palm Beach Gardens, Fla. "AquaSpy has completely changed the way I irrigate my golf course."

"This moisture sensing technology allows me to accurately place fungicides and additives in the soil where I want them. Also, no more probe, feel, and guess work. Best of all, I have reduced my watering frequencies and quantities."

Each AquaSpy probe is "stacked" with layers of sensors that provide precise and easy monitoring at multiple 2-inch depths – up to 12 inches – so the superintendent understands what is happening in the root zone. From there, the probe can deliver intelligence on infiltration rates, root activity, drainage and plant turf water use.

The probes report back to the Course Maintenance Facility allowing the Superintendent to irrigate to the desired depth of the root zone. This eliminates guesswork and assists the Superintendent in determining when to irrigate after a rain event, and identify how deep typical irrigation affects the soil profile over time.

AquaSpy integrates climatic data with soil moisture and salinity data into one package enabling the Superintendent to either prepare for rain events or monitor salinity "build-up" and oversee the leach/flush process at the correct times and to the correct depth.

The AquaSpy Viewer range of software packages are designed exclusively for Superintendents and data can be accessible anywhere, anytime using a PC or laptop with internet connectivity, regardless of the PC operating platform.

The data downloaded on the PC or laptop is highly repeatable – which is critical for irrigation scheduling – and enables the customer to watch the plant extract soil moisture through a continuous logging process. Results Trends over time are easily displayed graphically.

AquaSpy has created a fully sealed tube that enables the sensors to sit against the inner wall of the tube housing. This eliminates one of the major issues plaguing soil moisture sensors – the air gap. This unique, patented design dramatically raises the bar when it comes to the sensor's accuracy, precision and repeatability.

It also creates unrivalled convenience and flexibility. AquaSpy probes are installed below the surface, making them ideal for turf applications. The technology is suited to all soil types and each unit is easy to install.

AquaSpy industrially designed, low cost, plug and play technology has been developed by AquaSpy Inc and its US-based sports turf arm GolfLinx.

AquaSpy chief executive Nigel Hennessy said soil moisture technology is an essential tool for Superintendents faced with water shortages and the need to cut costs while maintaining the demands of fine tuning playability on their golf courses.

"Our new multi-sensor probe delivers water savings and enables managers to manipulate the speed of the greens and bring the course up to competition level," Mr Hennessy said.

This is echoed by the responses from other Superintendents who have installed AquaSpy probes, including Scott Whorrall, the Director of Golf Course Operations, The Club at Mediterra in Naples, Fla.

"As water availability and costs continue to be a concern in our area, AquaSpy has been an excellent tool for helping Mediterra reduce its irrigation volume while maintaining healthy turf," Mr Whorrall said.

Find more information about AquaSpy products at www.aquaspy.com or contact the company at 714-966-1975.

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irrigation-head spacings – 5 feet closer, from 65 feet to 60 feet apart, because the course is impacted highly by wind – contribute to irrigation efficiency.

AN UPGRADED SYSTEM

Dennis Fitzwater isn't facing any water issues or regulations, but the golf course superintendent at the private 18-hole Corning Country Club in New York is still trying to use water more efficiently.

With a budget of $440,000, Fitzwater grows bentgrass/*Poa annua* greens, tees and fairways, and bluegrass/ryegrass rough. The average rainfall in Corning has been below normal during the past few years, but nowhere near drought conditions, Fitzwater says, adding that any change in the use of water will be driven by the Chesapeake and Delaware water system. Located in the Susquehanna watershed, Corning's water source comes from two ground wells from which Fitzwater pumps directly.

"It's not a big difference compared to those who have ponds, but the disadvantage is that I can't see the water level," he says. "Still, I don't have to deal with evaporation. I don't worry about whether the wells are going dry. I just pay to pump the water."

There are several parts of Fitzwater's irrigation system that improve water efficiency:

- Variable frequency pumps, which have drive motors that eliminate water hammer and control the flow of gallons per minute.
- Upgraded computer programs that pinpoint where to apply water, allowing for individual head control, convenient scheduling, nighttime watering and labor reduction.
- Sensors that turn off the system when it rains.

Fitzwater's irrigation software is 2 years old, but the irrigation system itself is 9 years old. He can't justify replacing all the heads, but any replacement to the system always incorporates the newest technology.

"We maintain firm, quality conditions," he says. "We push water to the fullest extent. I've never heard about the course being not green enough or lush enough. Our members understand the water issue."

The water Fitzwater uses to irrigate Corning is high in pH and salts. To combat that, he uses soil amendments and plans to add a synthetic acid injection system, which will lower pH and bicarbonate levels and reduce the need for surfactants and amendments.

WETTING AGENT MAN

Much like Fitzwater, Jason Regan isn't facing stringent water-use regulations, but water efficiency is something he tries to improve. The golf course superintendent at the private, 18-hole Selma Country Club in Alabama maintains Tifdwarf Bermudagrass greens and 419 Bermudagrass tees and fairways with a maintenance budget of $320,000.

> "We push water to the fullest extent. I've never heard about the course being not green enough or lush enough." - DENNIS FITZWATER

However, the club installed a new Toro irrigation system in 2000. Since then, Regan has seen improved turfgrass health. The double-row irrigation now in the fairways used to be single row.

"It's like night and day," he says about the improved turfgrass conditions.

Regan has no irrigation in the rough and says it will take another five years to irrigate the entire course. Improvements to the club

At California Golf Club of San Francisco, the pressure to use water more efficiently is internal from superintendent Tom Bastis. Photo: California Golf Club of San Francisco

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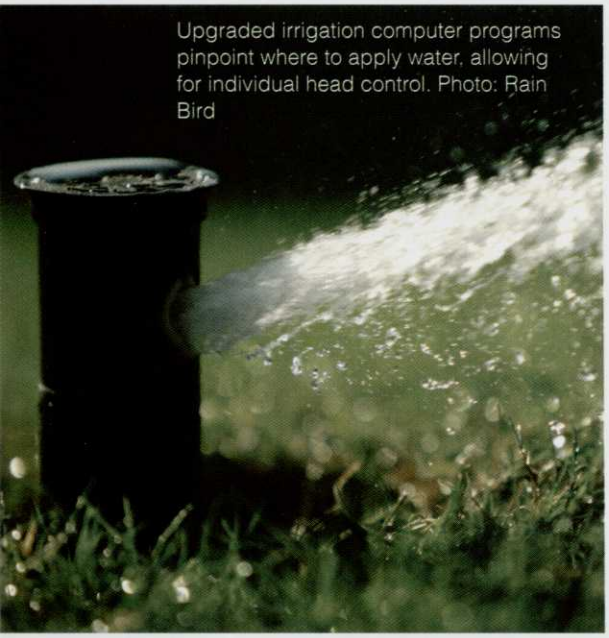

Upgraded irrigation computer programs pinpoint where to apply water, allowing for individual head control. Photo: Rain Bird

are financed by the 415 members, a steady decline from 480 when Regan arrived 10 years ago.

Still, as long as the course has access to quality water, it's in good shape, Regan says. The club's water source is an artesian well on property.

"Rainfall this year has been better than the past two years," he says. "We never got into a situation like Birmingham did with extreme drought and water restrictions on home lawns."

To help improve water efficiency last year, Regan started a wetting agent program that included injecting Dispatch into the irrigation system. He bought two 55-gallon drums of Dispatch, which helped reduce irrigation water by 30 percent.

"During the peak of summer, I watered every night," he says. "With the wetting agent, I went back to irrigating every other night."

Regan has been spraying Dispatch and Revolution on greens and using Aqueduct with his drench application. He's using only Dispatch on the rest of the course, but because Regan's budget was cut, he can't afford to inject Dispatch into the irrigation system this year.

While concerns about water use have been expressed in the area, it's nothing to worry about, Regan says.

"Some citizens inquire about where the irrigation water for the golf course is coming from," he says. "They thought it was city water. It's not really an issue."

NOZZLE CHANGE

Water isn't a big issue at the private, 18-hole Twin Lakes Golf Club in Carmel, Ind., either. Last year was a dry season, but not droughty, says John Westermeier, CGCS. But while conditions weren't as severe as they could have been, the dry season caused him to look at the club's irrigation system.

"I came here in 1985, when we didn't have any fairway irrigation and were using hoses to water the greens and tees," says Westermeier, who maintains the course with a $400,000 budget. "From 1986 to 1988, we had an irrigation system installed, but it wasn't a top-of-the line system."

Through the spring of this year, Carmel has had above average rainfall, so Westermeier didn't have to use the irrigation system until early June. The water he uses to irrigate the golf course comes from nine interconnected lakes, which are on the course and fed from underground wells. He pumps from two of the lakes.

During the renovation that took place in the late '80s, Toro 670 heads were installed. But the heads have a coverage weakness: They neglect the turf 10 to 20 feet around the head, Westermeier says. He read comments about FCI nozzles being good replacements for the old Toro 670 heads. Hoping he'd found a solution, he bought two dozen nozzles and installed them. In a few days, he saw the difference the new heads made.

"Toro's new products are fantastic, but they're expensive," he says. "We had money that was budgeted for trees, but after getting approval from the owner, I bought 75 more FCI nozzles, which took care of all my fairways except one."

Since using the new nozzles, Westermeier has reduced his irrigation run times by 20 percent, but he says he can't quantify the dollar amount saved. He also estimates he'll save 20 percent on the electricity to run the system, too. With an older irrigation system, it takes 13.5 hours to water the entire golf course.

"The nozzles will pay for themselves in a year, if it's dry," he says.

Westermeier views the nozzle changes as a temporary situation. In five years, he plans to replace the irrigation system's drives and heads. And because FCI doesn't offer replacements for the Toro 630 heads around the greens, Westermeier will replace them with 830s or 860s.

Twin Lakes' single-row irrigation system is dated, so Westermeier doesn't have computer controls. Until the irrigation system is upgraded in five years, the system will be controlled with hydraulics. Westermeier plans to upgrade the pump station first this fall.

"The cost to renovate has to come out of the operation expense," he says, adding the course has operated profitably for 23 years. "The irrigation upgrade sell is easy because we don't have member equity. Having a single owner streamlines everything."

Westermeier is in the same boat as many other superintendents.

"We're all trying to use resources more efficiently," he says. **GCI**

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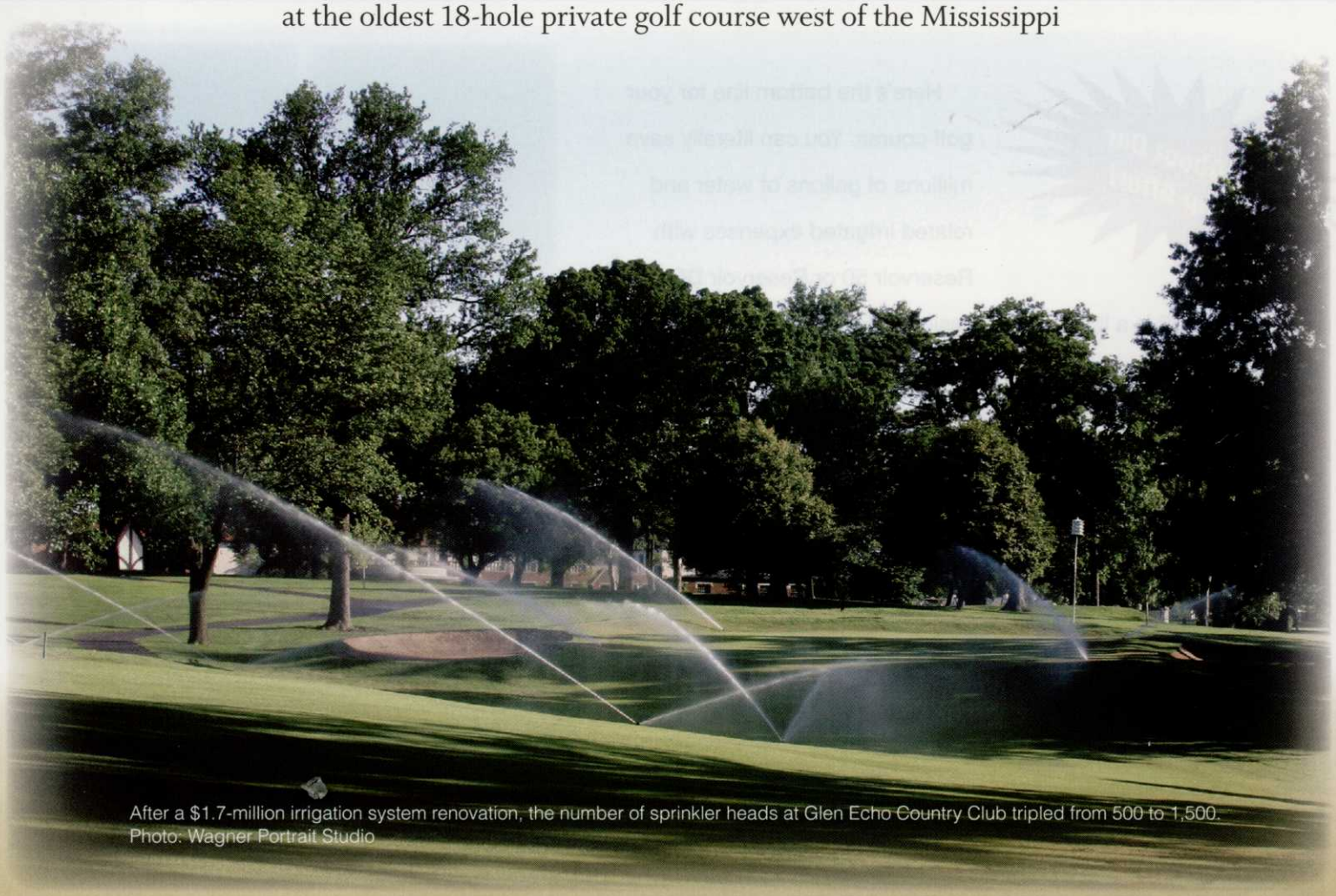
MAKING HISTORY

By Margaret Hepp

A new superintendent facilitates a new irrigation system at the oldest 18-hole private golf course west of the Mississippi



After a $1.7-million irrigation system renovation, the number of sprinkler heads at Glen Echo Country Club tripled from 500 to 1,500. Photo: Wagner Portrait Studio

In 1904, 21 years before the first fairway irrigation system was developed in Dallas, the golf course maintenance crew at Glen Echo Country Club in Normandy, Mo., prepared for the first (and only) Olympic golf tournament played on American soil. Glen Echo has gone to great lengths to maintain its course since its inception in 1901. Most noteworthy is the 1911 American Golfer note that Glen Echo, in its Report of the Greens and Grounds Committee publication, recommended subirrigation of its greens.

"Theoretically, subirrigation is all right," American Golfer states. "But we have not seen a green treated in this way, with the exception of an experimental one at Onwentsia last summer, which was really not so good as any of the regular ones."

By the time Scott Egelhoff arrived at Glen Echo in February 2006 as golf course superintendent, the existing irrigation system had been in place for many years. Egelhoff knew he'd encounter quite a bit of history during his tenure at the course, but its 28-year-old Toro irrigation system, the oldest in the St. Louis area, came as a surprise.

Nonetheless, Egelhoff settled into his new job, becoming accustomed to the lay of the land, battling the *Poa annua* and Bermudagrass encroachment characteristic of the St. Louis area and gearing up for extreme summer temperatures. But he soon realized the ornery old irrigation system was more than just an annoyance. It threatened the turf and health of the entire club. A 12-inch pipe break and pump station failures caused disastrous consequences, spraying unsuspecting members during play and flooding areas of the course with water that had run all night. The irrigation system was down that summer for 36 days – disastrous when you take into account St. Louis experienced its hottest July in history that year.

It wasn't just the malfunctions that were causing problems, either. Egelhoff was forced to overwater his fairways to drive water into the cool-season rough.

"We were wasting gallons of water," he says. "You'd set the clock on the old heads for five minutes, and you didn't know if you were going to get two minutes, five minutes or 10 minutes."

It dawned on Egelhoff that his own job might be in jeopardy if he didn't instigate a considerable change. As the new superintendent of a club steeped in tradition, Egelhoff knew he was taking a big risk. But his job – and the golf course – was too important. It was time to speak up.

PROOF IN THE PUDDLES

Egelhoff went to the general manager, Thom Johnson, and the green committee chairman, Hal Wagner, with a plan. He anticipated the two to challenge his proposal, but he was surprised to find they were receptive to his renovation plan. Johnson and Wagner knew the system had been causing problems, but Wagner says no one had been able to explain the situation as effectively as Egelhoff did.

"Scott recognized immediately that we had problems maintaining our grasses," Wagner says. "With his help, we began to put together the details of what we'd allowed to happen throughout the years. We were facing irrigation failure."

Once he got the green light, Egelhoff's first phone call was to Tim Burch, superintendent at St. Louis Country Club. Burch had taken Egelhoff under his wing when he started at Glen Echo and was happy

to hear of the upcoming renovation. He directed Egelhoff to Brian Nichol at nearby Algonquin Country Club, where a new irrigation system had just been installed. Nichol couldn't say enough good things about his irrigation consultant, Erik Christiansen, president and founder of EC Design. Egelhoff called the firm right away. Christiansen recommended Egelhoff gather as much data as possible with his general manager and green committee chairman to help sell the renovation to the membership.

The team went to work, assessing the current system and then performing a cost analysis, which they eventually presented to the green committee and board.

"We wanted them to understand just how inefficient and limited the system really was," Egelhoff says.

The renovation pitch traveled through board, green committee and full membership meetings, and Egelhoff, Johnson and Wagner also worked to disseminate information to individual members whenever possible to generate support of the project. Finally, the project, a $1.7-million renovation wholly funded by the membership, was approved.

BREAKING GROUND

The renovation began Nov. 22, 2006, the day before Thanksgiving. The course remained open as EC Design consultants Larry Collins and Erik Christiansen, Leibold Irrigation Construction Co. and the Glen Echo staff worked in concert to install the new Toro OSMAC system. In particular, Egelhoff and EC Design focused on greens and tees, where they thought most problems would arise.

"I remember those guys with tape measures trying to figure out where to put each head to make sure it would fight 20-mph wind," Egelhoff says. "And Larry and I questioned every head. We made a few changes once the design was in place because we didn't like the coverage of the slopes. I called Larry twice and asked him to fly back to Glen Echo."

Collins and Christiansen accommodated each of Egelhoff's requests for improvements, no matter how small, and they labored over spacing and nozzle placement. In the end, the club tripled the number of heads from 500 to 1,500.

"The sprinkler heads do the work, so we like to concentrate on head spacing," Christiansen says. "It pays off long term. Sprinkler heads are the muscle of the system, and they're important. But my fee is the same whether I ask you to put one sprinkler head out or 2,000. I don't represent the products. I don't represent contractors. I'm just here to ensure my customers make educated decisions."

Fertigation and weather systems were installed on the course as well. The fertigation system features two 550-gallon calibrated tanks in which Egelhoff is able to mix wetting agents. The system also is equipped with nitrogen and calcium jets designed to target a water quality issue common of golf courses in the St. Louis metro area. Egelhoff was able to refine the pH of Glen Echo's water to 6.8. The system will pay for itself during the next few seasons, he says.

"We knew we could touch the whole golf course by making sure our water quality was good," Egelhoff says. "It was definitely designed with the thought in mind that fertigation is the future."

Scott Egelhoff estimates Glen Echo saved 20,000 gallons of water May through August from 2006 to 2007. Photo: Wagner Portrait Studio

IMMEASURABLE IMPACT

With the new system up and running, Egelhoff didn't waste any time planting new zoysiagrass in the greens surrounds. Two days after the renovation was completed, he brought in two semi truckloads of the warm-season grass he'd struggled to maintain since his arrival.

"We did major renovations on our greens surrounds and fairways where we had single-row irrigation," he says. "A lot of triangular areas died because the spacing was so terrible. Now, we're totally covered, and it looks wonderful. You can't even compare the two systems. It's night and day."

Egelhoff is especially pleased to be able to turn his attention to achieving Audubon International certification for the golf course. It was one of his major goals as he prepared for his job at Glen Echo.

"I knew that to become certified I needed to make an impact in water conservation, water management and water quality," he says. "With a new, state-of-the-art irrigation system, I could prove Glen Echo was environmentally conscious."

The course is on track to receive certification later this year. As he navigates the facility through the Audubon certification process, Egelhoff has attempted to calculate water conservation to date, but the utter chaos of the former system makes efficiency difficult to quantify. What he does know is he's not flooding the greens, he can trust the clocks, and he's able to mark dry and wet spots and input changes to the computer.

"How do you measure that?" he says. "It's immeasurable. We went from a single row to five or even six rows on certain fairways, and I've got control over everything. The turf is much more uniform."

Egelhoff estimates the course saved 20,000 gallons of water May through August, from 2006 to 2007.

"We had the hottest July ever in 2006, unfortunately, but it helped sell the irrigation system," he says. "Last August was the hottest in St. Louis history, and we were great."

WORK WITH THEM

Scott Egelhoff, golf course superintendent at Glen Echo Country Club in Normandy, Mo., offers suggestions for dealing with members when it comes to construction projects:

1. **Pinch their pennies. Spend members' money as if it were your own.**
2. **Build trust. Get your g.m., golf pro and members involved in and educated about what it's like on the golf course and what your challenges are.**
3. **Show, don't tell. Take pictures because they're about as factual as you can get. If I show you a picture, you can't tell me it's just my opinion.**
4. **The great outdoors. Have green committee meetings outside. Show members the situation with no spin involved.**
5. **Look ahead. Mark areas on the course you know you'll renovate in the future.**
6. **Make it last. Don't do a project on the cheap. A year or two later you'll have issues. That's disastrous for trust.**

A JOB WELL DONE

The completed system was handed over to Egelhoff May 15, 2007, and the club celebrated with a grand reopening ceremony. The management team, staff and 150 members attended the party, where Egelhoff and his crew fired up 30 heads on the golf course at once.

"The camaraderie outweighed everything else," Egelhoff says. "That night, I knew we'd done the right thing."

Christiansen, a former superintendent, says a good superintendent wants to know everything to help get the club he works for the best possible irrigation system.

"For Scott to go through this process at an early time in his career was a tough task," he says. "Superintendents like Scott keep pushing the profession to a new level. The club benefits from that. These guys didn't do this for a bonus. They did it because they love what they do."

Egelhoff, who is glad to be able to focus on the golf course once again, is grateful for the opportunity to grow.

"The project taught me a lot about myself, but it wasn't me alone," he says. "I just happened to be the golf course superintendent when it needed to be done. Hal, Thom and the members believed in me and trusted me. Now we have a system that'll last years to come." GCI

By David McPherson

IT'S NOT A DIRTY WORD

Effluent water is becoming a more common irrigation source

"Water, water everywhere, Nor any drop to drink"
From *The Rime of the Ancient Mariner* by Samuel Taylor Coleridge

Nationwide, water for golf course irrigation isn't scarce yet, but the precious natural resource is under intense scrutiny by governmental and environmental groups.

Enter effluent water. More golf course owners and superintendents are turning to recycled water as a smart irrigation choice. Effluent water is environmentally sound because it preserves the natural resource by recycling usable treated water that's normally dumped into the ground, rivers and oceans. One of effluent's attractions is its endless supply, even in times of drought. As long as people are showering and flushing toilets regularly, the supply is consistent.

JUSTIFICATION IN THE DESERT

Bill Rohret, CGCS, at Angel Park Golf Club in Las Vegas – one of the largest and busiest golf facilities in the state – switched from potable water to effluent water in 2001.

"We can justify being a golf course in the desert because we use reclaimed water," Rohret says. "If we were using potable water, people would be up in arms."

Angel Park's decision to use the alternative irrigation source was driven initially by politics. During a drought in 2001, the Las Vegas Valley Water District needed potable water to supply the fast-growing community. Moving water from Lake Mead to the west side of town was costly to the water district because of the significant change in elevation.

"The water district said, 'We're going to build an effluent plant in the neighborhood, and we want you to take our water,'" Rohret says. "They built a state-of-the-art treatment plant. Much of it is underground, so no odors are emitted into the community. Most people don't know it's there."

Angel Park Golf Club's conversion from potable water to effluent water cost about $1 million. Photo: Angel Park Golf Club

The average yearly cost to use reclaimed water at Towne Lake Hills in Georgia is about $3,000. Photo: Towne Lake Hills

The plant, called Durango Hills, can process 10 million gallons of effluent a day. Angel Park pays $2.33 per 1,000 gallons for recycled water. Fresh water costs about $3.50 per 1,000 gallons, so Angel Park saves significantly. Rohret believes recycled water expenditures will increase later this summer.

When Angel Park converted to effluent water, there were other costs as well, mainly to build or retrofit pump stations because recycled water wears out the irrigation infrastructure more quickly than potable water. The conversion from potable water to effluent water cost about $1 million, Rohret says.

"We had to reline all our irrigation links with 60 mL PVC liners to prevent leakage into the environment," he says. "We also rebuilt a bunch of our lakes and installed new pump stations."

A WATER AGREEMENT

Richard Staughton, CGCS, general manager at Towne Lake Hills Golf Club in Woodstock, Ga., also uses effluent water. Towne Lake Hills was built in 1994 and is part of a housing development that started a couple of years before the course opened. A water treatment plant was part of the development and was online when the course was constructed.

"This has been our only source of irrigation for the course from day one," Staughton says. "The water is a good source. The owners feel good about the business decision that was made 14 years ago to irrigate with reclaimed water, especially with the present and future water crisis in the state."

An agreement was reached between Towne Lake Hills and the county water department, which is the water supplier, allowing the course to determine the amount of water needed. There are no minimums or maximums.

"In a sense, the water itself is free because the course pays monthly for the power required to run the pumps, plus a $100-per-month maintenance fee for pump repairs," Staughton says. "The average yearly cost is about $3,000 to use reclaimed water."

SALT OF THE EARTH

Although Rohret generally has been happy with the overall quality of the reclaimed water he uses, he's not happy with the salinity levels (about 800 parts per million). Because of those levels, he has to aerify his greens more frequently to improve the health of the turfgrass. Aside from the turf, trees develop an effluent sheen because of the additional bicarbonates in the water.

"This is a white look," he says. "When the water spray hits the trees, it causes the leaves to defoliate in the summer."

Angel Park's Bermudagrass greens are overseeded with *Poa trivialis*, or rough bluegrass, in the winter. But a problem with *Poa trivialis* is that it's sensitive to rapid blight, which can damage greens badly if not caught early. Rohret didn't see this disease until three years after the conversion to recycled water.

"Rapid blight is salt sensitive, so we test salinity levels every week and flush our greens once a month to wash away the salt," he says. "We're also noticing higher salt levels in poor drainage areas on our fairways and roughs. Aerifying and flushing is a must."

Since Towne Lake Hills switched to effluent, Staughton has seen salinity levels rise. The sodium levels increase during the summer if there are no flushing rains, so Staughton does sodium and gypsum flushes during the summer as a safeguard.

The Nevada department of natural resources requires Angel Park to post signs around the lakes warning the water is recycled, even though the water used at Angel Park is so clean you could bathe in it or drink it, according to Rohert. The course is also required to post this fact on scorecards.

Towne Lake Hills also communicates to its golfers that the course uses effluent water. It has a sign posted in the golf shop that states reclaimed water is used to irrigate the golf course.

ON THE WAY OUT

Tom Verrips, CGCS, at Otter Creek Golf Course in Ankeny, Iowa, has used effluent water to irrigate the course for 20 years, but that's going to change soon. The course is in the midst of a grow-in because the original 18 holes were renovated completely. Verrips can still use the effluent until the grow-in is complete, but after that, he's going to use well water.

"When I arrived, Otter Creek was an 18-hole course with an automatic double-row irrigation system for the fairways, but I couldn't use it because there wasn't enough water," he says. "We looked at drilling wells, but then effluent as a potential water source was brought to the table by a young engineer working for us who spearheaded the project."

The effluent water has been good for the course, Verrips says.

"In 1988, we had a drought, but as a result of our effluent water supply, we were the only public golf course with an irrigation system on its fairways and we were able to stay green," he says. "We went from about

20,000 rounds a year to 38,000."

Verrips says the quality of the effluent was always top-notch, so that's not the reason Otter Creek is changing its irrigation source. Rather, the decision is driven by politics and economics. The city of Ankeny decided to change water sources for various reasons.

"We're basically land-locked," Verrips says. "Recently, another golf course was built south of ours, and they have a holding pond and well. They put in a pump station and have an empty hole for our course to pump into.

"I hate to lose the reliability of the effluent because I knew what it was," he adds. "I always thought it was progressive to use effluent water, but it became a political and economic issue."

ON THE WAY IN

The public, 36-hole River Ridge Golf Club in Oxnard, Calif., isn't irrigating with effluent water now, but it's in the process of switching from well water to recycled water by 2010.

"The city has got the infrastructure set with the exception of the piping out to the golf course," says Kyle Kanny, superintendent at River Ridge. "The city recently changed all its mainline water distribution piping and left the old pipes for effluent distribution."

Kanny is excited about the transition.

"I can't wait for it to happen because the water quality I currently get out of the deep well isn't that good for growing grass, though it's fine for consumption," he says.

"Our bicarbonate and sodium levels are high for grass, and the combination of those two items is a superintendent's nightmare."

Oxnard is building a reverse osmosis plant that will clean the water used to irrigate River Ridge.

"During reverse osmosis, effluent water is forced through a filter to remove impurities," he says. "I'll be able to dictate the chemistry of the water. The water quality I'll wind up with will be far superior to what I'm using now."

Kanny pays for the use of his irrigation water now, but when he uses the effluent water, it won't cost him a cent.

"That's the agreement with the city," he says. "We get the free effluent in exchange for our water rights. It's such a win-win."

Kanny believes all golf courses will have to use effluent water eventually because water is a dwindling resource.

"Good planning can make the switch to effluent such a positive experience for generations to come," he says. "You're taking dirty water, cleaning it and then putting it back into the aquifers. Meanwhile, you're growing great grass, and you're not using any potable water." **GCI**

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Amendments contribute to water efficiency when they fit course conditions

Water Precisely

By Michael Coleman

You've been in the industry a while, and you're ready to take your turfgrass management program to the next level. You need tools that will reduce your maintenance time and make your course look better using less water. The right surfactants and wetting agents can reduce watering and boost turf health.

Determining the best combination of surfactants, wetting agents and other inputs for a course depends on local conditions. Superintendents might have fairways that stay too wet on top, even with less watering, or localized dry spots that always need hand-watering. It's possible to solve these issues, but superintendents should rely on their experience and experiment before investing too heavily in certain products.

MOVING WATER

Rich Cope, golf course superintendent at the University of Texas Golf Club in Austin, planned his surfactant program while he was growing in the course. With five years under his belt at the club, Cope has used various products, depending on what he needs to accomplish on the course. On the TifEagle greens, he uses Wet-Sol.

"It helps penetration a great deal and aids tremendously in capillary movement of the water," he says.

Course conditions tend to guide his wetting agent usage, especially when he detects dry spots. On the other hand, too much precipitation during the winter calls for another tool he likes to use.

"During wet season, when I need to move water through the green, I use Surfside," he says. "It's good at moving water vertically."

When selecting a surfactant that will help use water more efficiently, specific properties of a course are some of the biggest factors involved. Selecting the right product can be complex, involving a lot of variables.

Kelly Durfee Cardoza, founder of Avalon Consulting in Taunton, Mass., helps superintendents determine how to use water more efficiently while keeping courses healthy. Avalon specializes in water management practices and helps superintendents reduce the amount of water they use throughout the year.

"I have clients who've said to me, 'I'm consistently too wet on the top, no matter what we do,'" Cardoza says. "They've switched from one product to another before they find the right solution for their situation."

Variables such as course traffic, turf age and condition, soil type and thatch point to the best option.

At the University of Texas Golf Club, superintendent Rich Cope spends about $14,000 a year on two wetting agents but in return reduces water usage about 30 percent. Photo: Texas Golf Club

A DIFFERENT MIX

Greg Hollick knows from experience different soil conditions require a different mix of surfactants and wetting agents. Hollick, director of golf course operations at Ballymeade Country Club and The Golf Club at Cape Cod, both in Falmouth, Mass., has two distinct agronomic challenges. Ballymeade is an older course with fairways that are capped with a loam material. Cape Cod, a Rees Jones Design, opened in 2007 with sand-based tees and greens. The course has native soils on the fairways, and Hollick has no issue with excess water.

"It's almost like one large USGA green," he says. "It moves through pretty quick."

Hollick's experience working for the PGA at the TPC of Jasna Polana in Princeton, N.J., and the TPC of Boston during its grow-in proved valuable when he moved into the lead superintendent role at Ballymeade and started planning for the new course at Cape Cod. The first-hand knowledge helped him when he selected surfactants and wetting agents, which he considers just a few of the tools a superintendent needs to grow in a healthy course.

Hollick uses Cascade on the greens and tees and Dispatch on the fairways at The Golf Club at Cape Cod. At Ballymeade, Hollick uses Rely on the fairways and tees and Revolution on the greens. He spends about $9,000 on wetting agents each year at Ballymeade and $12,000 a year at Cape Cod.

"You see immediate results where your water is penetrating and moving down through the profile," he says. "If you have a hydrophobic situation on your greens or your tees after you apply it, you can see the following morning that there's definitely dew removal there. It doesn't bead up on the surface."

Better penetration isn't the only bonus from surfactants, Hollick says. They reduce man-hours, expedite drought recovery and improve turf color and quality.

THE RIGHT PRODUCT

Veteran superintendent Doug Petersan, who has been at the Austin Golf Club in Texas for nine years, has a clear focus for his water management program. For Petersan, golfers are No. 1, and cost factors and efficiency are secondary considerations.

"What we're looking at more than the economics is the quality of the product we deliver to our members," he says. "We measure more from the quality of the surfaces we're providing than the cost."

Petersan has used various products at several courses throughout the years, and some work better than others.

"I don't want any product that's going to keep the top inch or two very wet," he says.

"I have a soil sampler, and I pull cores out of greens every day."

Cope brought another product, Hydratain, into his arsenal during the past two years, after experimenting with it.

"I was probably the first guy to use it on a golf course in Texas," he says.

Cope spot treated dry areas to test the product. Because of hot conditions and a tendency for limestone to heat up quickly below the surface, there's often water vapor trapped in the soil unavailable to the plants. Cope likes the way Hydratain causes condensation of water molecules in the ground, making more water available to the TifSport turf. Areas where he used the product recovered, looked better and stayed green, which was a big factor in his decision.

If an area is hydrophobic, a wetting agent is needed to help the product penetrate the profile. While Cope estimates he spends about $14,000 a year on Hydratain and Wet-Sol, he estimates his reduction in water usage at about 30 percent. Studies covering a variety of products have shown a 30-percent reduction in water usage is realistic in many situations.

However, just because one product works well on the front nine of a course doesn't mean it will work as well on the back nine.

"Even in the same small general area, it's a function of your soil conditions, how much play you get and how your irrigation system operates," Cardoza says.

OTHER INFLUENCES

Soil variations, which include the presence of fungicides, also can have an influence on these products. Dara Park, Ph.D., a researcher at Clemson University, initiated a study with Bruce Martin, Ph.D., investigating the effect of surfactants and fungicide combinations on Champion ultradwarf Bermudagrass and localized dry spot.

Superintendents can use devices to measure volumetric water content at different soil depths. Photo: Dara Park, Ph.D.

"Past research demonstrates that certain combinations of surfactants and fungicides tend to increase disease control to a greater

extent than if the fungicide was applied alone," Park says. "During those experiments, it was observed that there was also an influence on quality and LDS."

A new study Park started this year examines how different surfactant chemistries influence soil moisture within the soil profile along a depth gradient. This will help superintendents combine the proper surfactant with their course's soil conditions.

"Making sure you get the most from a surfactant depends on identifying the proper surfactant chemistry for the situation," Park says. "This process is important because there are different surfactant chemistries for different purposes. To identify which surfactant to use, the superintendent must fully evaluate the situation."

After looking at the options, it helps to run a test on a small area to see what works best. Suggestions from colleagues can be helpful, but superintendents shouldn't always take into account the differences in specific turf conditions between courses. Proper identification of combinations which increase quality and reduce localized dry spot can help reduce time, labor and chemical costs.

PART OF THE BIGGER PICTURE

The ideal situation is to get turf to the right height and eliminate the need to mow, Cope says. He uses the plant growth regulator Primo Maxx on the greens only to help reduce mowing time during the week. Another noticeable benefit is less water loss from transpiration and evaporation. Plus, deeper rooting puts more moisture within reach.

Plant growth regulators aren't universally popular, though. For instance, Petersan purposely avoids the need for plant growth regulators by limiting the amount of fertilizer he uses.

No product is a replacement for a well-devised maintenance program. Surfactants, wetting agents and plant growth regulators are part of a larger program that includes tracking evaporation, using weather stations and generally following good agronomic practices.

Whatever the product, proper focus needs to be placed on the use of these aids.

"They can be helpful, but they can also cause you problems under certain environmental conditions," Hollick says. "If you have a wet year, obviously you're not going to be putting a wetting agent down that will last you 90 days."

With all the other factors to consider when maintaining healthy turf, superintendents can't just throw any surfactant or wetting agent out there and hope it works well.

"It's another tool for the superintendent's belt," Hollick says. "You have to customize it to your golf course." GCI

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the BIG step up

There's a lot at stake for young assistant superintendents transitioning into a head role

By Margaret Hepp

You can almost feel him willing the golf course onto the ground.

It's been five months since Michael Heustis was hired as golf course superintendent of the Chicago Highlands Club, but it'll be months before he's able to groom any grass. For now, it's dirt – and there's plenty of it.

The hazy Chicago skyline, just visible from the facility grounds, is a reminder that throngs of people and regular business hours aren't as far off as they seem. Until the course opens in 2009, though, it's touch and go. And while Heustis is as impatient as a kid on Christmas morning, he's loving every minute of it.

You might call it his first Christmas. Before he accepted the invitation from partners John Baxter, Tom Healy and Joe Hills to lead the golf course staff at Chicago Highlands, Heustis had spent his entire career pursuing roles just outside the spotlight. He's always been passionate about agronomy. As a teenager, he spent five summers at Indian Springs Golf Club in Saybrook, Ill., just outside his hometown. Once he earned his degree in agronomy from the University of Illinois, Heustis worked as assistant superintendent at Lake of the Woods Golf Course in Mahomet, Ill., before moving to Atlanta to become an assistant superintendent at Peachtree Golf Club.

From there, he says opportunity came knocking, but anyone who's been recruited for a superintendent position – or any leadership position, for that matter – knows that such opportunities are rarely happenstance. Shortly after Heustis volunteered at the 2005 Walker Cup at Chicago Golf Club, he was offered a job as assistant superintendent at the historic facility.

Once he became part of this integral community, Heustis began to expand his career. He became active in superintendent's associations throughout the Midwest, held instructional seminars and even built a career-oriented Web site. In short, as a

Construction of the Chicago Highlands golf course, orchestrated in part by superintendent Michael Heustis, is currently under way.

golf course professional, he reached out – and when you hold your hand out long enough, someone's bound to grab it.

Sure enough, Heustis landed his first job as head superintendent, and it's a big one. He'll be in charge of a maintenance budget around $1 million, and the 18-hole, par-72 course set on 270 acres will pull its membership from the 4.1 million people within a 15-mile radius of the site, according to Baxter.

"My brother-in-law asked me, Did you ever think you'd be here?" Heustis says. "I hoped to. I just didn't know how it'd play out."

At 30, Heustis lacks the bravado that some of his peers in the business exude. There's a quiet drive in everything he does, and his halting, circumspect articulations about the golf course show an eager desire to succeed and please. He gives credit to every crew member who's helped him along the way, except, of course, himself. It's this self-effacing manner that will help him transition into his role as head superintendent. But personality aside, is he ready to lead the grow-in of a major new facility in one of the country's top golf markets?

SMALL TOWN HERO

Just north of Chicago, in the farmland of Wisconsin between Madison and Milwaukee, sits a little place called Watertown. Watertown Country Club welcomed Mike Upthegrove as superintendent of its 18-hole golf course and grounds in April 2006. He'd been an assistant superintendent at Whistling Straits in Kohler,

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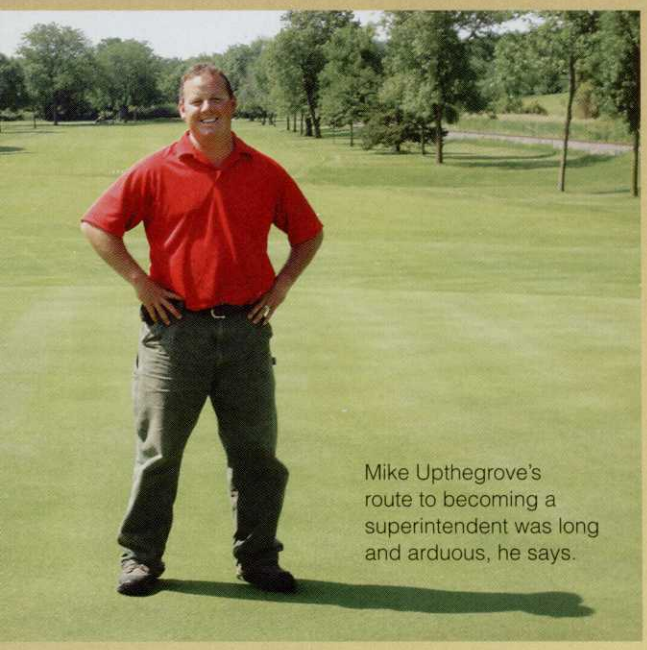

Mike Upthegrove's route to becoming a superintendent was long and arduous, he says.

Wis., but unlike Heustis, whose path is about as linear as it gets, Upthegrove's route was, in his own words, long and arduous. Along the way, he acquired degrees in culinary arts and business management and worked as a chef for a short while before he felt called back to agronomy.

What's propelled Upthegrove to this career choice is an experience that's stuck with him since he was a young boy in Port Austin, Mich., a tourism-fueled town of about 700 people. The nearest golf course was a 9-hole private facility about 20 miles away. So his father and the rest of the Port Austin men's golf club rallied the community to build the 18-hole Bird Creek Golf Course on the edge of town. Golf course construction and volunteerism aren't two concepts typically paired together, but that's how the course came to be. Upthegrove often visited the site with his father, and remembers fondly learning to drive and helping to haul materials.

As fascinated as he was by the process of constructing the golf course, the communication and leadership that fueled the project left a lasting impression on Upthegrove. Maintaining a golf course, he learned, involves a lot more than just turf knowledge – it requires a degree of finesse with peers and crewmembers.

SCHOOL'S OUT FOR SUMMER

Newly married and with two college degrees, Upthegrove changed directions and took a job as an assistant superintendent at the 54-hole Geneva National Golf Club in Lake Geneva, Wis. He was discouraged quickly by his lack of experience and knowledge. Unwilling to give up, he returned to college, this time to the University of Wisconsin-Madison, where he studied agronomy. As a student, he was hired as a crew foreman at Whistling Straits, and became the assistant superintendent after graduating. Now he's in his first job as head superintendent.

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Rethink Tomorrow

of superintendents who bring a diploma and textbook turf knowledge to the golf course. There's a new pyramid of accomplishments in place for aspiring superintendents. At one time, it was about who you knew and how well you and the golf course held up to stress.

Those factors are still important, but the average superintendent is younger every year, just 43 years old in 2007, according to the GCSAA. More than 70 percent have at least a two-year degree, and 44 percent have a bachelor's degree.

But even with a degree under his belt, a young superintendent has his work cut out for him. Scott Egelhoff, the golf course superintendent at Glen Echo Country Club in St. Louis, arrived in 2006 to discover a failing 28-year-old irrigation system. He struggled to charm the membership and keep his job while pitching a multimillion dollar renovation in his first few months on the job. (See page S10 in the Smart Irrigation supplement.)

"When I first got in here, there was a definite to-do list," Egelhoff says. "But before you can shape up a golf course, to get any kind of seed to germinate or sod to grow in, you have to have water, especially in St. Louis. When I first got here, I focused on the golf course and human resources, but I knew the irrigation system was something I needed to address right away."

At Watertown, Upthegrove took the same approach, focusing on the golf course and human resources, but he's also applying a different sort of education, the kind he learned as a 12-year-old boy. He strives to apply his people skills to the membership at the golf course. When he joined the Watertown staff in 2006, he made sure to introduce himself to every person on the course he didn't recognize.

"It helped open the communication lines, so if there was something the previous superintendent had done that I wasn't doing or didn't know about, the members could approach me and say, 'This used to happen out here, and we really liked it,'" Upthegrove says.

BIG SHOES

It's a daunting challenge to live up to the reputation of a predecessor, and an even greater challenge to build a membership's respect and trust as a newly hired superintendent. Upthegrove's position has a unique duo of pressures: the responsibility of a promotion as head superintendent coupled with immersion into an established community. Unlike Heustis, who will help build his membership from scratch, Upthegrove had to navigate through an adjustment period at Watertown. But it was a hurdle he was determined to clear.

"I felt I'd met all my goals as an assistant superintendent," he says. "If you have aspirations to be the leader, there's only so long you can stand not be in that position. Once I figured

that out and I thought I could handle it, I made my move."

Fortunately, Upthegrove says, his predecessor, Oscar Peterson, who'd been at Watertown three years, was ready and willing to help him through the transition. One particular challenge is maintaining a golf course with a budget of a little more than $300,000.

"During the first few months as a head superintendent, your head's spinning," he says.

THE BUCK STOPS HERE

Heustis is in the midst of a reality check: He's interviewing sidekick candidates for the assistant role. Between 12 and 15 candidates applied for the job before he narrowed it down to three. He hopes to become a mentor to the young man he hires. But Heustis has just begun to walk without an assistant's crutch.

"As an assistant, the buck doesn't stop with you," he says. "You're able to lean on your superintendent. When you're the superintendent, it's all on you."

For any new superintendent, there's a steep learning curve – but it can be difficult to stay grounded when you can't even visualize the grounds.

Heustis has been working to build the basic components of the course: seed, staff, irrigation, equipment. It's a task that requires endless research, but Heustis has done a lot of reading on his own at his new home just behind the golf course. Once the irrigation system is installed, Heustis will oversee the topsoil spread over the entire course, and then he'll plant grass seed.

"We're still figuring out where we're going to plant bluegrass, bentgrass, fescues – things like that," he says.

In the meantime, Heustis is still working with Arthur Hills on the layout of the course. He's somewhat in awe of the lengths of perfection to which they've gone, tweaking the construction and making final adjustments for months.

"You've got to take the time to get it exactly as you want it," he says. "It's silly not to."

Heustis also is focused on building a great team, starting with his assistant and moving down through the chain of command. As a model exemplary employee, he calls to mind a laborer from the Chicago Golf Club.

"This man had never set foot on a golf course before," he says. "He required a lot of training, but he always wanted to learn more. Whether it was learning how to operate a different piece of equipment or acquiring new techniques, he concentrated on doing things right – not doing things his way. He's now one of the best employees they have there."

Heustis took this model to heart, and he's realistic about his position at Chicago Highlands. He's earned the job, but he has a lot to learn.

"Any decision for the golf course isn't going to be just a Michael Heustis decision," he says. "It'll be a group decision, and that's a great thing for Chicago Highlands." **GCI**

Photo: The Ranch Club

BY MARGARET HEPP

Been there, done that

Richard Haas, CGCS, settles in Montana to perfect his grow-in know-how with cool-season grasses

Few aspects of agronomy will surprise you after you've worked at multiple golf courses for multiple decades. Richard Haas, CGCS, thought he'd seen it all in 2002. That's when he took 20 years of experience as a superintendent and international project manager to Missoula, Mont., where more than 100,000 rounds of golf are played annually, to build and open The Ranch Club.

Haas moved to Montana from Northern California, where he maintained bentgrass greens with ryegrass and bluegrass fairways. Before that, he was in Southeast Asia, where he relied heavily on Bermudagrass cultivars in the Philippines, Taiwan, China and Japan as a project manager/superintendent with the Robert Trent Jones II group. When Haas arrived in Missoula, he learned that the tried-and-true Montana turfgrass on golf courses is bluegrass, with bentgrass greens.

When the time came for Haas to choose the playing surface for a new golf course, he didn't reinvent the wheel, but he did make a few modifications based on his own research and experience. He elected to grow in his greens with L-93 creeping bentgrass, seed three varieties of Kentucky bluegrass on the fairways and tees, and plant four types of fine fescue in the rough. All turf, aside from the L-93, was hydroseeded. The grow-in process was smooth and successful, despite the challenging tight clay soil. As the greens grew in, Haas became locked in a battle with the L-93, fighting desperately (and unsuccessfully) to maintain a tight-knit stand. The grass also was reluctant to emerge from the harsh Montana winter.

"We didn't get our L-93 to what I would consider even acceptable standards until July 4," Haas says. "The color was off, and it didn't grow well. It still putted well for us, but golfers don't want dingy-looking greens. They want dark greens."

Realizing L-93 performs best in warmer climates, Haas decided to take another shot at grow-in perfection in Missoula. In August 2004, once the turf at The Ranch Club had grown in completely, he headed up the road to Missoula's daily-fee Canyon River Golf Club. Construction at Canyon River had been halted three years earlier, post-Sept. 11. The owners brought Haas in to see the course to completion, and, armed with pages of notes about his successes and failures at The Ranch Club, he was ready with a plan of action. Pleased with his Jacklin products at The Ranch Club, Haas worked with the company to determine the best grass varieties for Canyon River. Douglas Brede, Ph.D., research director and operating officer of Jacklin, showed Haas the latest research about their latest bentgrass cultivar, T-1, and highly recommended it for the new course.

Richard Haas stands on two-week-old T-1 bentgrass at Canyon River. He and his crew never mowed greens shorter than 1/8 of an inch (below). Photos: Richard Haas

"Once I saw pictures of T-1 on a golf course, I said, 'I can't not try it," Haas says.

The superintendent and his crew planted the T-1 on the greens and were quite pleased with the results throughout the grow-in process, and afterwards.

"I consider it the miracle grass for greens," Haas says. "With a magnifying glass, you could see germination in three days. We were mowing within the first 14 to 16 days. In the spring – late March, early April – we had dark green greens that came out of winter quickly. It putted phenomenally. We had some of the best putting conditions you could find in the Northwest when the course opened."

Haas never cut his T-1 shorter than 1/8 of an inch and was able to achieve green speeds between 10.5 and 11.5. Then, in 2007, Canyon River held a local pro-am. Haas and his crew double-cut and rolled the greens daily to prepare for the event, and during the tournament, green speeds peaked at 14. Players were blown away, Haas says.

"We proved we could get the greens fast without sacrificing the turfgrass plant by cutting too low," he says.

The T-1 grass is fine-textured yet dense, with strong upright growth, Haas says, so he made sure to stick to a strict schedule of topdressing and verticutting every two weeks.

"The canopy is tight, so to get the sand in, we had to lay it down first and verticut it in," Haas says. "That was a trick I used for Bermudagrass because the canopies were tight, and I didn't want that sand to sit on top of the canopy and wash in. After we topdressed and verticut, we never had complaints because the putting surface didn't change."

The golf season at Canyon River runs April 1 to Nov. 1, so Haas began verticutting in early March and continued through to April. He put down final topdressing applications in mid to late October to protect the crowns through the winter.

Haas also was pleased with the ballmark recovery of the T-1. In its first season, the greens were somewhat slow to recover from wear, but Brede advised Haas to wait another year until the plant matured completely. Although he was skeptical, Haas kept a patient eye on the greens until the following season.

"When 2007 rolled around, the plants did mature, and ballmark recovery was wonderful," Haas says.

Another challenge at Canyon River presented itself as the fine fescue secondary rough grew in. These areas weren't irrigated, and in Montana, where most of the rain falls in April and May amid low temperatures, the daytime summer temperatures resulted in weed problems.

"If I had to do it again, I'd have at least temporary irrigation during grow in," Haas says.

The fescue also grew in a bit thicker than Haas planned. He seeded the fairway at 3 pounds per 1,000 square feet.

"I should have cut the seed quantity down to 1.5 or 2 pounds per 1,000," he says. "We also seeded a little ryegrass in with the bluegrass, but I wouldn't do that again. Ryegrass is clumpy, and it can produce thicker stems that don't cut well."

Perfectionists are never satisfied because there's always room for improvement. Haas left Canyon River in February to pursue a new project later this year in the Middle East, Eastern Europe or possibly Asia.

"Once you do construction, it's hard to get it out of your blood," Haas says. "It's different every single day." **GCI**

BY MARGARET HEPP

A-OK

In his first superintendent job, an Oregon native seeds a course close to home and reaps the rewards

Some say hindsight is 20-20, but David Phipps, superintendent at Stone Creek Golf Course, says hindsight is A-1.

As construction project manager and golf course superintendent from the beginning at the course in Oregon City, Ore., Phipps was in the driver's seat for all turf decisions. He chose to seed Tee-2-Green's creeping bentgrass cultivar PennLinks on his greens during the 2001 grow-in.

Once the greens were established with PennLinks, Phipps realized the benefits of other grasses he'd considered that were more tightly knit. He needed a bentgrass variety that would be more effective at fighting annual bluegrass. So, he went back to Tee-2-Green for advice. The company strongly recommended Penn A-1, a creeping bentgrass Phipps eventually purchased and interseeded in conjunction with each aerification. The A-1 has been part of the Stone Creek greens for four years. Phipps continues to spread 1/4 to 1/3 of a pound of bentgrass seed per 1,000 square feet after aerifying and verticutting. Each application, consisting of two pails, 25 pounds per nine holes, costs about $200. To apply the seed, Phipps starts by aerifying, cleaning and topdressing the greens, then goes over the greens in a crisscross pattern with a spreader set at a low speed.

"In retrospect, it would have been great to use A-1 from the start," Phipps says. "It's necessary to keep throwing seed in the ground. *Poa annua* freely seeds year round and builds its own seed bank, so why shouldn't we build a seed bank with bentgrass as well? As of now, my greens are probably 95 percent clean."

Since the A-1 has grown in, Phipps has seen a significant change in the texture of the greens, and he's pleased with his new, tightly knit bentgrass. To keep the greens exactly as he likes, Phipps changed his fertilizer applications. He's using more now than in years past, but he's improving quality.

Above: New Penn A-1 roots in the soil profile at Stone Creek Golf Course. Right: Mike Turley, assistant superintendent at Stone Creek, will seed the greens in a crisscross pattern with the spreader set at a low speed. Photos: David Phipps

Phipps and Turley spread 1/4 to 1/3 of a pound of bentgrass seed per 1,000 square feet after aerifying and verticutting. Photo: David Phipps

"I originally started out using about 3 pounds of fertilizer a year," he says. "At 60,000 rounds a year, the greens take a beating. I had to bump the nitrogen level up, and once I did, I saw significant improvement."

The greens are primarily on a sulfate diet, including ammonium sulfate, potassium sulfate, ferrous sulfate, zinc sulfate and other nutrients Phipps mixes together and sprays on the turf.

"I'm probably applying about 5.5 to 6 pounds of fertilizer annually on the greens," he says. "That's what I've found they require with play, and I can keep the green speeds between nine and 10."

Fungicide applications on the greens range in frequency from two to four times a year, usually to combat summer stress with a Chipco Signature (fosetyl) and Daconil Ultrex (chlorothalonil) mix. It helps keep the greens strong through a heavy wet period.

Elements of weather and frequency at Stone Creek are two of Phipps' biggest maintenance difficulties. He tries to aerate the greens between two and six times a year, optimally opening up the greens every 45 days, but his plans aren't always executed according to schedule.

"I'm always playing a game with Mother Nature," he says. "It's difficult to find the opportunity to verticut, aerate and topdress regularly. Our crew arrives at 4:30 a.m., and they try to seed, brush and mow before play hits us at 5:30 a.m."

Hubbard, Ore., where Tee-2-Green is headquartered, is 15 miles from Oregon City, and Phipps says location alone gives A-1 an advantage over other varieties in his book. Still, while Phipps is content with his A-1 for now, he's always looking for ways to improve. He seeded a nursery with Jacklin's Alpha creeping bentgrass to compare it firsthand to Penn A-1.

"There are some great varieties out there," Phipps says. "I've played some Alpha greens that are phenomenal. I'm not opposed to trying other grasses, but if I grew in another golf course, I'd want to do some further research. Alpha and A-1 are very close."

Phipps has no intention of reseeding his greens in the near future. And though golfers at Stone Creek haven't commented on any difference in the greens since Phipps interseeded with A-1, he considers that a positive.

"The lack of complaints is always a good thing," he says. **GCI**

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14th Hole

The $2.9-million overhaul of the South Course at Olympia Fields hasn't erased the course's classic style. Above: The 14th hole in 1923. Right: The renovated 14th hole. Photos: Olympia Fields

Polishing An Old Gem

By Mark Leslie

A restoration at Olympia Fields refines the South Course

History is embedded in the walls of the clubhouse and locker room at Olympia Fields Country Club in Illinois. But, with the unveiling of the South Course restoration, a new chapter begins.

Even before Walter Hagen defeated Bill Mehlhorn, 6 and 5, in the 1925 PGA Championship, Olympia Fields was making news. The darling of Chicago, featuring 18 holes designed by Willie Park Jr., 36 by Tom Bendelow and 18 by Willie Watson, Olympia Fields became a venue of choice soon after it opened in 1916. Western Open officials chose it for their tournament in 1920, and the Western Junior event followed two years later.

But Hagen and the PGA made it prime time in 1925, and thereafter, championships piled upon championships:

- The 1928 U.S. Open when Bobby Jones lost a 36-hole playoff by a stroke to Johnny Farrell.
- The Chicago Open won by Sam Snead in 1938.
- Another PGA Championship in 1961 when Jerry Barber defeated Don January in a playoff.
- The U.S. Senior Open in 1997 won by Graham Marsh.
- Another U.S. Open in 2003 won by Jim Furyk.
- A couple of NCAA Championships along the way.
- A half dozen more Western Opens, including Jack Nicklaus' victory in 1968 and Bruce Crampton's in 1971.
- Four Women's Western Amateurs.

The famed Chick Evans once said, "For good golf – and lots of it – no more delightful place can be found than Olympia Fields Country Club."

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Most of this hullabaloo took place on the Park-designed North Course. But Bendelow's South Course – often called the hidden gem of the south suburbs, with its yawning, tree-lined fairways and twisting, challenging greens – has now undergone a considerable makeover by Steve Smyers and lead architect Patrick Andrews.

Smyers, a lover of classic design and the first golf course architect on the U.S. Golf Association's executive board in 70 years, has restored the South Course to the degree that some club members fear it will equal or even surpass its more famous brother on the north end of the property.

"I can't say it will rival the North Course, but it will make the South Course competitive for the next four decades," Smyers says.

Leading up to the opening, anticipation is high, says club manager Russell Ruscigno.

"More of our members have walked the course, and the response has been overwhelmingly positive," Ruscigno says. "Steve and Patrick have vision that's pretty incredible."

AT A GLANCE
Olympia Fields Country Club

Location: Olympia Fields, Ill.
Web site: www.ofcc.info
Project type: Restoration
Cost: $2.9 million
Architects: Steve Smyers and Patrick Andrews
Builder: Wadsworth Golf Construction
Director of grounds: Sam MacKenzie, CGCS
Project started: July 2007
Project completed: October 2007

A BOLD STEP

Smyers, Andrews and Sam MacKenzie, CGCS, director of grounds, overhauled and modernized the South Course. It was an extensive project that cost $2.9 million. Olympia Fields officials, including South Course restoration committee chairman Jeff Goldman, faced many much-needed improvements:

- An antiquated irrigation system.
- Inadequate tee space.
- Putting surfaces that had shrunk by 20 to 30 percent throughout the years.
- Bunkers with little character or contour.

"There was no one thing more important than the other," says MacKenzie, a 1983 Michigan State graduate who joined the Olympia Fields staff in March 2006 after 11 years as superintendent at Broadmoor Country Club in Indianapolis. "When you have a 90-year-old house, you need to change the carpet and put in a new heating system. That's kind of what we did here. It was long overdue."

A bold step was needed, and Smyers thought

the South Course needed updating for a modern golf game in which golf balls are driven far past the imaginings of Tom Bendelow or others of that era.

"The South Course was sound when it was built, but not now," Smyers says. "Changes that were made throughout the years caused elements that were integral to the design to be lost. So, we reread the land, moved the championship tees back to restore the historical landing areas, and adjusted and added bunkering to return the original shot values."

MacKenzie provided old aerial photos and design plans that Smyers and Andrews used to recreate the shapes and patterns of the South Course's classic bunker style. This was crucial to the process.

Of the club's original four golf courses, Bendelow designed Course 1 (now the South Course), Park designed Course 4 (now the North Course), and Bendelow and Watson tag-teamed on the design for Courses 2 and 3. But in 1945, Courses 2 and 3 were sold to developers, with the first and 18th holes from Course 2 becoming the eighth and ninth holes on Course 1. Since then, the North Course has become the favored son, while the South Course has been, largely, the members' course and hasn't received the care the North Course has, MacKenzie says.

"But the members absolutely love the South Course," he says.

The club's leadership agreed with Smyers that they would love the South Course even more if it played the way it was meant to be played and if its agronomic deficiencies were addressed.

One of the chief problems was that the third green sat in the flood plain of Butterfield Creek and any significant flooding put the front half of the green underwater. Smyers rerouted the hole that played from east to west. Now it plays northeast to southeast, and the new green complex is relocated on a wooded hillside. Crews from Wadsworth Golf Construction removed 1.5 acres of timber and cut a 10-foot wedge out of the hillside to build the green.

Meanwhile, the 13th fairway was rerouted, turning a straightaway hole into a slight dogleg. Smyers also designed a new creek that now wraps around a pond on the hole, which is now an irrigation source. This maneuver also pleased local environmental authorities. Runoff from U.S. 30 and neighborhoods south of the golf course was causing water-quality issues with the pond. But now the creek diverts that drainage

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water around the pond while creating a feature on the 13th hole.

"The green was left untouched, but the rest of the hole was completely rebuilt," MacKenzie says.

Crews also undertook a significant drainage project on the 17th hole, recontouring to help with the drainage issue.

MUCH-NEEDED IMPROVEMENTS

Throughout the South Course, bunkers, tees and greens have a new face. Yet there are some improvements MacKenzie cherishes that golfers won't even notice. Forty-nine bunkers – mostly greenside – were restored, repositioned or added to develop strategy, interact with the landscape and to highlight target areas. Tees were renovated and others added to lengthen the course by 700 yards to almost 7,200 while maintaining the 6,500-yard distance for member play. And greens that had shrunk significantly through the years were expanded an average of 1,450 square feet to their original size and shape.

The ground game is a critical part of play on the South Course and almost every green is open in the front so golfers can run the ball up onto the putting surfaces. MacKenzie points to regrassing the tees and fairways with a blend of Penneagle II and PennLinks II.

"This blend gives us a wide range of adaptation across the spectrum of the various microclimates on the course," he says. "The National Turfgrass Evaluation Program studies in Chicago showed they were good with wear and drought and heat tolerance and had good resistance to brown patch and dollar spot. If there's a reason to regrass, there are a lot of new cultivars that can help you."

The old irrigation – a single-row system with a mix of Toro, Rain Bird and Hunter heads with Rain Bird controllers – was replaced with Toro's newest, the Network VP, a satellite system with Site-Pro software.

The existing Flowtronex pump station, installed in 1999 and capable of pumping 3,600 gallons per minute, was retained. But everything else was replaced. MacKenzie is thrilled with the 1,200-head, triple-row system with two outside rows in the rough and perimeter watering around all the greens.

"The idea is to have single-head control, as opposed to two and three heads paired together before," MacKenzie says. "Now we have much tighter head-to-head coverage across the playing surface. I can dial in individual heads and manage water better in specific areas that are wetter or in shade, so the playing area is a lot more consistent."

The single-row system meant fairways were wet in the middle and dry on the outside. Now MacKenzie has the ability to run less water to the center row so he can make the middle of the fairway firmer.

Drainage is an issue MacKenzie believes never ends on any course. But now, at least, the South Course is a drier layout in many ways. Drainage on the old bunkers was hit or miss, and a third of the bunkers didn't drain properly. Now it's all new, just as it is on all other parts of the course that underwent construction or needed improvement.

Another important new element of the course is the practice range, which sits on the first and 18th holes of the original Course 3 and was languishing without turf, a vestige of the 2003 U.S. Open. Prior to the restoration, the range had been functioning as a parking lot and was in disrepair for the past five years. But Andrews spent an extraordinary amount of time shaping the target greens on the range, and MacKenzie opened the range with practice pads in early May.

ELEVATED STATURE

By building new tees and bunkers, changing the grass lines and expanding the putting surfaces, the golf course is dramatically different. So, which course is the better of the two? It's debatable.

"One reason the North Course got more attention is that it's a slightly better piece of ground, and the South Course can be wetter," MacKenzie says. "We corrected a lot of those problems. We'll go back next year and significantly upgrade some of the old drainage that needs to be replaced."

Some folks think the South Course will overtake the North Course, MacKenzie says.

"The North will always be a great test of golf and one of the top golf courses in the nation," he says. "We've elevated the South Course's stature without any question. But we we'd have to have something besides the club championship on it before we could say it has overtaken the North Course. The South Course is definitely dramatically improved. It's night and day from what it was." **GCI**

BY DEYING LI, PH.D.

What lies beneath

TDR-tension infiltrometer tests root-zone materials, monitors green performance

The golf boom in the United States after World War II stimulated many practical changes in putting green construction. One of the adjustments is the increased use of sand as an amendment to the native push-up greens or using pure sand as root-zone material.

As a result of the research conducted in the 1950s, sand-based green specifications were generated by the USGA Green Section. These specifications have been revised several times since they were first published. The uniqueness of USGA greens is the inclusion of a gravel layer below the sand profile, which creates a hanging or perched water table. With an optimum size of sand particles, the root zone can provide sufficient air space and remain less vulnerable to compaction. The artificially created water table helps hold water, and the amount might be increased further by adding organic materials or inorganic soil amendments to the sand.

To meet USGA specifications, the material has to satisfy certain standards. Presently, USGA recommends total porosity be 35 to 55 percent, noncapillary porosity, 15 to 30 percent, and capillary porosity, 15 to 25 percent. The current USGA-recommended saturated water conductivity is at least 6 inches per hour.

It's important the material is tested before, during and after the construction of the putting greens for contracting, quality control and inspection purposes. Testing physical properties starts with particle size analysis, which dictates other properties. The confidence interval for particle size analysis is about 10 percent to around 35 percent. For water conductivity, it's about 20 percent using the USGA-specified procedures. The confidence interval is used to compare differences between loads as they're mixed, and for quality control purposes. For instance, if a standard drains at 10 inches per hour, then each subsequent load should drain between 8 and 12 inches per hour, based on the 20 percent confidence interval for saturated water conductivity (K_{sat}).

The inconsistency of those test results for root-zone materials within the labs has caused inconvenience in bidding and contracting processes during construction. At times, architects, contractors and superintendents didn't know how to use the results, so they applied much more stringent criteria than the K_{sat} tests were able to meet. Saturated water conductivity has been a magic phrase among golf course superintendents when they talk about greens. Saturated water flow occurs only for a short period during a rain or irrigation event. Conductivity is only a fraction of the water movement characterizing root-zone materials. More information is needed about the unsaturated flow of water to understand the root-zone materials better. A superintendent also might want to know how saturated water conductivity changes throughout time and how it's affected by cultural practices.

The primary objective of this study was to develop a methodology that allows easy measurement and monitoring of water conductivity of root zones without the need for destructive sampling. Some academic exercises also were involved to investigate factors that influence the accuracy and consistency of saturated water conductivity tests, such as the soil packing process, dissolved air in testing water, wetting direction and organic matter.

Table 1. Particle analysis of the testing material

	Soil separate			Sand particle diameter					
	Sand	Silt	Clay	Gravel	Very coarse	Coarse	Medium	Fine	Very Fine
				2 mm	1 mm	0.5 mm	0.25 mm	0.15 mm	0.05 mm
	(%)			(% retained)					
Sand I	99.96	0.03	0.01	0.04	8.57	36.78	37.89	14.14	2.53
Sand II	99.28	0.57	0.15	0.28	3.78	21.79	40.19	21.01	12.23
Desired values		≤ 5%	3%	≤ 3% gravel		≤ 60%		≤ 20%	≤ 5%
				≤ 10% combined					

MEASURING METHODS

Two sand sources were included in the study (Table 1, at left). Sand I conformed to USGA specifications, and Sand II was higher in the fine fraction. The soil materials were packed into brass rings at a moisture condition of 8 percent.

A calcium sulfate-thymol solution was prepared following the procedure by Klute and Dirksen. Thymol was used to inhibit the growth of microorganisms in the solution. Before the solution was used, dissolved air was removed

A TDR-equipped tension infiltrometer can be used to monitor water conductivity *in situ* in the field and allows direct agronomic interpretation and comparison of laboratory test results.

with a vacuum boiling apparatus.

Before testing capillary porosity, water retention curve and water conductivity, the soil samples were saturated at normal atmospheric pressure or under a vacuumed condition with three test solutions: tap water, deionized water and a calcium sulfate-thymol solution. Because water conductivity increases exponentially with degree of saturation, a small variation at the saturating point can cause dramatic differences in saturated conductivity. The purpose of these procedures was to test if improvements made in the degree of saturation can help improve the consistency of saturated water conductivity measurements. Tap water can disperse soil aggregates and cause underestimation of water conductivity, so calcium sulfate was used to increase the concentration of testing water.

Using deionized water or a calcium sulfate-thymol solution didn't seem to improve the consistency in the measurement of water holding capacity and conductivity. One reason might be the low clay content and lack of soil structure in the testing materials. Saturating the soil material under reduced pressure generally provided higher estimation of water conductivity (Table 2, page 87) without much improvement in consistency. This led us to believe other random errors induced during the sample preparation and testing process might be underlying reasons for the poor repeatability. Because sand particle size distribution is fundamentally responsible for pore size distribution and water conductivity, it's important to have accurate estimation of the particle size analysis. This is especially true when organic materials are incorporated in the root zone because a thorough mixing is difficult to achieve.

Although there were large variations in saturated water conductivity, it might not be as problematic as commonly considered from an agronomic point of view. Saturated flow rarely happens under actual putting green conditions, and if it happens, it's in a different way than that of the laboratory test where saturation starts from the bottom of the sample.

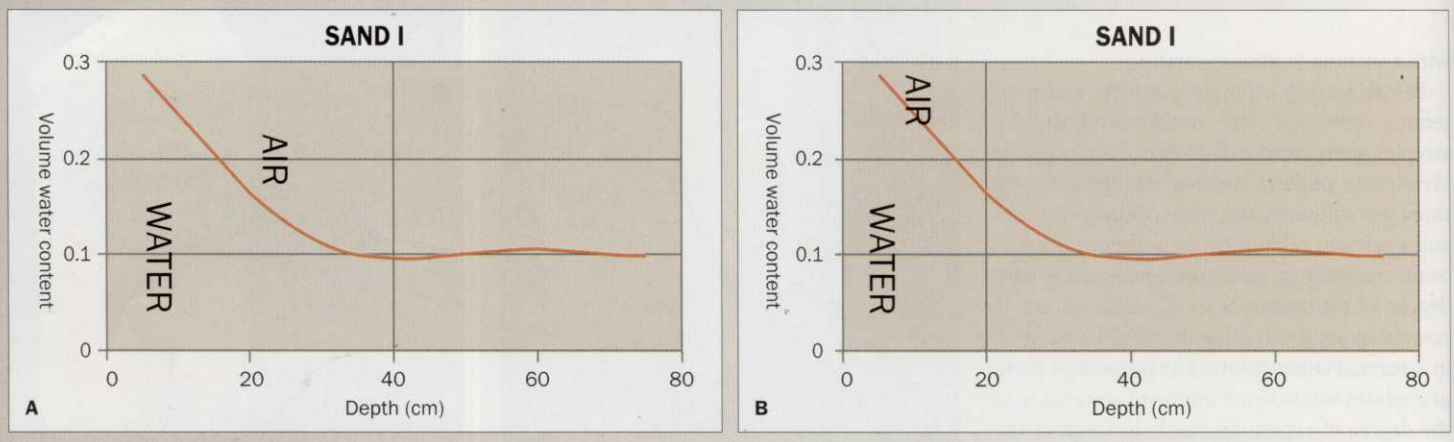
Furthermore, saturated water conductivity decreases quickly as the green ages because of fine particle migration, fine organic material accumulation and layering. Essentially, good drainage is maintained through diligent cultural practices, provided correct materials were used during construction and for topdressing.

Including a water release curve in specified tests can be useful to bridge the gap between perception and reality. Water release curves provide more balanced information about hydraulic properties of the root-zone materials in addition to water holding capacity and saturated water conductivity. Instead of debating which pressure heads should be used to determine air porosity, water release curves allow the end user to interpret water holding capacity and air porosity based on the root-zone depth.

A separate study was conducted to test the hypothesis of whether putting greens that vary in depth can provide water regime control. As

shown in Figure 1, when the water release curve is rotated 90 degrees, total air and water volumes, as indicated in the figures, are determined by root-zone depth – 0 being the bottom of the root zone. Contrary to the traditional air porosity report, which reflects only the average across the depth of soil core being used in the test, using the whole water release curve can provide information of air and water in the whole profile.

Figure 1. The charts below compare water and air capacity in root zones at a depth between 40 cm (A) and 20 cm (B) using the water-release curve generated from Sand I. Another way to look at these figures is to rotate them 90 degrees counter-clockwise and visualize the root-zone depth from the bottom. The total air and water capacity ratio changes as you change the root-zone depth.



Water content and air capacity can be predicted from the water release curve using the van Genuchten equation. Graphically, the water capacity is the area to the right of the curve enclosed by the curve, axis, and soil depth line, while the air capacity is the area to the left of the curve enclosed by the curve, top line of water content and line of soil depth. In this case, the total water and air capacity is 20 percent and 10 percent, instead of 10 percent and 20 percent, respectively, for the 40-cm-deep root zone. The water content and air capacity would be 25 percent and 5 percent, instead of 17 percent and 13 percent, respectively, for the 20-cm-deep root zone.

MEASURING WATER INFILTRATION

A tension infiltrometer equipped with a differential transducer as described by Casey and Derby was used to measure water infiltration in the lab and in the field. The transducer calibration was conducted on a suction table from saturation to 350 mm, in 10-mm increments. A linear regression equation (R^2=0.99) was achieved between the voltage reading and the tension setting. Water tension at the bottom of the disk was monitored from the transducer by closing the water inlet briefly and then checked against the flow rate of water.

Soil samples also were packed in brass rings 10 cm in diameter and 10 cm tall to a bulk density of 1.55 g/cm^3. Water infiltration was tested on the repacked soil cores and in the field using a

Table 2

		K_{sat}			
	Testing solution	**Sand I**	**Sand II**	**Sand I: Peat (9:1)**	**Sand II: Peat (9:1)**
		cm/hr (SD)			
Wetting pressure					
Saturation at ATM	Tap water	51.3 (3.0)	38.2 (3.8)	40.4 (3.1)	26.8 (2.1)
	Deionized water	54.6 (4.6)	35.7 (5.2)	36.2 (2.8)	22.9 (5.0)
	$CaSO_4$	53.7 (3.0)	39.1 (4.0)	41.8 (3.3)	25.4 (4.2)
Saturation at vacuum	Tap water	54.6 (3.4)	46.2 (3.5)	52.0 (4.6)	35.2 (3.0)
	Deionized water	58.2 (5.1)	43.7 (4.1)	38.6 (4.4)	32.5 (3.4)
	$CaSO_4$	59.4 (2.9)	40.4 (3.7)	39.1 (3.8)	36.9 (3.2)

time domain reflectometer (TDR)-tension infiltrometer. Materials were tested on 300, 250, 120, 60, 30, 20, 10, and 0 mm tension settings, 10 minutes for the first four settings and 5 minutes for the last four settings. The transducer was logged every second for the first 1 minute and every 2 seconds afterward. Water conductivity for 3-D infiltration in the field was calculated following a nonlinear regression method. Water conductivity of one-dimensional infiltration was calculated by the method described by Klute and Dirksen.

The tensions at the bottom of the infiltration disk were close to the set tensions except minor differences for Sand I. The discrepancy was attributed to the high flow rate at near saturation. The problem can be corrected through increasing the diameter of the connecting tube from the water reservoir to the infiltration disk and reducing friction loss of the pressure head from the valves and fittings.

With inclusion of water measuring probes, such as TDR, the water content can be measured during the same process of measuring water conductivity. The whole process can be automated to measure and estimate the major soil hydraulic properties at the same time with the same set up, reducing human error and operation time.

Tensiometers were built with the same principle as described by Ankeny, et al. Two dimensions of the infiltration disk were manufactured, 10 cm and 20 cm in diameter. The three-rod probes are 86 cm long, 0.25 cm in diameter and spaced 1.5 cm apart. The performance of TDR probe was evaluated with a TDR-100 with water and air, respectively. The wave form provided enough resolution for precise measurement of water depth, which was calculated from L minus x, where L is the TDR rod length, and x is the distance of water surface to the top of the water supplying tower.

Sand materials were prepared in a PVC tube 10 cm in diameter and 7.8 cm in length with a double layer of cheese cloth attached at the bottom with a rubber band. At the side of the PVC tube, three access holes were drilled to insert a three-rod TDR probe 5 cm long. Both TDR probes in the soil and the TDR probe in the infiltrometer were multiplexed via a SDMX50 multiplexer to a data logger.

The performance of TDR automated water level measurement was compared with differential pressure transducer automated and visual observation. Water level measurement automated with TDR is as good as, or better than, differential pressure transducer automated measurements.

Table 3

Material	K_{sat}		Air porosity	
	Measured	Estimated	Measured	Estimated
	——cm/hr (SD)——		——% (SD)——	
Sand I	51.3 (3.0)	47.2 (2.6)	8.5 (0.08)	8.2 (0.10)
Sand II	38.2 (3.8)	35.4 (2.2)	12.7 (0.11)	11.4 (0.09)
Sand I : Peat (9:1)	40.4 (3.1)	37.8 (2.6)	15.1 (0.16)	13.8 (0.14)
Sand II : Peat (9:1)	26.8 (2.1)	24.1 (1.3)	18.2 (0.20)	16.9 (0.18)

Measured (traditional ASTM specified methods) and estimated (TDR-infiltrometer) saturated water conductivity and air porosity (n=10).

Water content and infiltration were measured at 10-cm water tension. Soil sorptivity for the laboratory materials was estimated using the differentiated linearization method developed by Vandervaere et al. Saturated water conductivities were calculated according to this method as well. Water release curve could be established from the tension and water content in the soil cores. Alternatively, air porosity was derived from the water content and bulk density measurement at the 30-cm tension set on the infiltrometer. Saturated water conductivity and air porosity data are shown in Table 3.

WATER RETENTION AND CONDUCTIVITY

Using the tension infiltrometer equipped with TDR for water-level monitoring, we were able to monitor water level without the need for calibration for each measurement, which is required for transducers. Water content in the sample immediately below the infiltrometer also was measured with a TDR probe at the same time infiltration was measured. Thus, the soil water retention and water conductivity can be measured simultaneously, whereas in the traditional procedures, water retention and water conductivity are measured in two separate steps.

The following points highlight the differences between the TDR-equipped infiltrometer approach and the traditional approach specified in the ASTM methods:

• The TDR-infiltrometer method uses core soil samples 10 cm in diameter – twice as big as in traditional methods. The TDR-infiltrometer method has less error introduced by marginal flow effects.

• Because water retention and water conductivity are measured simultaneously, compaction of soil samples after water retention measurements and before water conductivity measurement as in the traditional procedures is avoided, which greatly reduces variations associated with compacting.

• Measurements of the TDR-infiltrometer method are conducted in the unsaturated range of soil samples, which reduces the inconsistency of saturation that contributes to major vatiation in the water conductivity measurement.

• Wetting direction in the TDR-infiltrometer method is the same for laboratory and field samples. It also can be used to monitor water conductivity *in situ* in the field and allows direct agronomic interpretation and comparison of laboratory test results.

• Devices used in traditional methods usually are fabricated by individual laboratories, while the TDR-infiltrometer method uses a more accurate, specially manufactured instrument. The initial cost can be quickly offset by savings in labor and time.

Confidence intervals of the water holding and water conductivity test results can be reduced among and within laboratories. Soil hydraulic properties from the laboratory test can be compared with the field performance because of the consistent methodology. The TDR-infiltrometer method also can be used to collect soil water movement information to be used for subsurface irrigation control and estimation of chemical movement within soil profiles. **GCI**

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Cited literature can be found with this article online at www.golfcourseindustry.com.

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TOURNAMENT INSIDER

TURF TIPS AT THE TPC

Q While preparing for the PGA Tour's Tournament Players Championship, golf course superintendent Fred Klauk used an interesting method to light the way for his staff early in the morning so they could see where they were mowing. What lighting devices were used?

A Other host superintendents have used Department of Transportation lighting units. However, these units are heavy, noisy, fuel-powered and not moved easily, and often result in complaints from neighbors. Additionally, the light is so bright it's incredibly difficult to look into. Klauk's solution was inflatable lighting units made by Prism Lighting Services in Jacksonville, Fla. The benefits are:

- One person can raise the metal halide light as high as 15 feet in a few seconds without using a metal structure.
- The brightness is equivalent to 1,000 watts.
- A series of fans inflate and support the structures, projecting a low level light and making the system quiet.
- The structure is enlarged vertically and can be used in a narrow space.
- Support ropes and sand bags provide anchorage, which allow the device to be operated in wind gusts as fast as 25 mph.
- The system can be powered by an autonomous generator or irrigation system electronics.
- The weight and dimension make it possible for one person to operate and transport the unit with a small utility vehicle and trailer.
- The light projected is easy on the equipment operator's eyes, especially in early morning darkness.

Q The practice teeing ground during the Tournament Players Championship is huge – 550 feet by 175 feet. Yet, incoming golf course superintendent Tom Vlach installed an artificial practice surface from end to end. With a teeing ground so large, why is there a need for an artificial surface?

A At The Players Club, every detail is attended to so the competitors can concentrate on their craft completely. A perfect and spacious natural surface is essential for their practice routine. A flawless practice surface is vital for the competitors' daily routine during the Championship.

Vlach placed a strip of artificial turf within the boundaries of the regular practice teeing ground to provide a maintained, easy-to-use surface for resort guests. The material, from Turf Evolutions of Georgia, is a great alternative for play leading up to and after the event. The turf is relatively easy to install, which the company does.

> For upright growth to occur, the thickness of the mower bedknives during pretournament weeks becomes vital.

From Vlach's perspective, it's a low-maintenance material that requires no topdressing or additional servicing other than blowing off organic debris that accumulates on the surface. It's easy on the physical components of long practice sessions. For example, it's soft under foot, making it relaxing to stand for a long period of time and hit balls. It's also less stressful on the players' muscles and reduces the impact to the joints of those who practice their flaws for an extended period of time.

Members and guests say the surface has a good playing feel, similar to real grass. Vlach can let members and guests practice on the artificial turf when the existing teeing ground is too wet or dormant during the off season. The only drawback is the inability to use a longer tee.

Q With The Players Championship now held in May, were there any maintenance adjustments Klauk and his staff needed to make in their agronomic or mechanical programs to prepare the new ultradwarf playing surfaces?

A With the new Mini Verdi putting surfaces, preparations and attention to mowing details within the equipment facility increased, says Mark Sanford, equipment manager of the Tournament Players Club.

Sanford reviews the agronomic requirement for additional light sand topdressing in the months leading up to the tournament. For upright growth to occur, the thickness of the mower bedknives during pretournament weeks becomes vital. Thinner bedknives are used to reduce dragging, streaking and uneven cut lines. Entering the championship week, sand topdressing is eliminated and even thinner bedknives are used, especially when mowing below 0.1 inch.

Moisture content in the air and in the turf creates a fat and puffy leaf tissue. This swelling can alter the quality of cut daily, requiring Sanford to recheck the height of cut constantly.

Sanford ensures each putting surface is walked and checked before mowing to remove organic debris and sand. He also checks to make sure there are no coins, ball markers, long tees or items stuck in the putting surface that can damage the bedknife, reel and quality of cut.

To ensure the height of cut remains the same throughout the morning and afternoon, all transport vehicles and trailers remain on the smooth and even cart paths. Having the vehicles remain on a smooth surface eliminates the mowing unit from bouncing up and down on the trailer and upsetting the height of cut, prevents damage to the unit in any way and reduces gas from being spilled or overflowing from the tank. Sanford suggests using a dipstick when filling equipment with gas to measure tank depth to ensure the fuel level is set 1 inch below the tank cap level. This reduces spills onto the turf. **GCI**

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Travels With Terry

Globetrotting consulting agronomist Terry Buchen visits many golf courses annually with his digital camera in hand. He will share helpful ideas relating to maintenance equipment from the golf course superintendents he visits – as well as a few ideas of his own – with timely photos and captions that explore the changing world of golf course management.

Ramp it up

A Salsco greens roller comes standard equipped with a transport trailer, which also can be used to transport walk-behind greensmowers. Scott Kroll, golf course superintendent, and Brian Gunning, assistant superintendent, at the Sunnybrook Golf Club in Plymouth Meeting, Pa., modified the transport trailer to haul walk-behind mowers.

The wire-mesh trailer floor and ramp were covered with 3/4-inch-thick, construction-grade plywood sheets held in place with four 5/8-inch-diameter carriage bolts, flat and lock washers, and nuts. On either side of the ramp, notches were cut into the plywood so the ramp could be closed completely and latched vertically.

Before the plywood floors were installed, the 1/4-inch-thick rubber strips, which provide additional traction for the greens roller when entering and exiting the trailer, were removed. Eighteen-inch-long-by-6-inch-wide 1/4-inch-thick rubber strips were installed to act as a bumper by softening the impact of the walk-behind mowers front rollers against the trailer safety railing. The rubber strips were screwed into railing supports with two 3/16-inch-diameter hex-head screws and 3/4-inch-diameter flat washers.

The 4-foot-by-8-foot sheets of plywood cost about $20 from Lowe's, the mounting hardware cost about $10, and the labor time took about an hour and a half.

Mix it up

What started out as a 1,600-gallon fertigation system tank was converted to a premix tank for chemicals and granular fertilizers. To customize the premixing operation, Eric D. Spurlock, Manakin Course superintendent, and John Haley, director of golf course operations at the Hermitage Country Club in Manakin-Sabot, Va., installed a separate stand-alone Banjo inductor manifold system with a 15-gallon storage tank.

Granular fertilizers, such as ammonium sulfate, are added through the 15-gallon inductor tank. Then, valves are opened and closed on the manifold, and the inductor acts as a toilet bowl that sucks the products through and breaks them down in the process, adding them into the 1,600-gallon storage tank. About 375 pounds of ammonium sulfate are mixed into about 600 gallons of water, which takes about 20 minutes. One control valve agitates the mixture, and another keeps the flow from being restricted into the large tank when it's in use. The agitator is used constantly as the sprayer applies chemicals or fertilizers to keep them in suspension.

The storage tank was on hand already. The 5-horsepower, 220-volt motor and 2-inch-diameter, centrifugal flooded-suction pump were slightly used. The hose, fittings and agitator assembly were purchased new and cost about $1,500. The inductor manifold system cost $375. The 15-gallon inductor tank, stand, wye strainer and fittings cost $250.

An electrical contractor hooked it all up in about two and half to three hours. **GCI**

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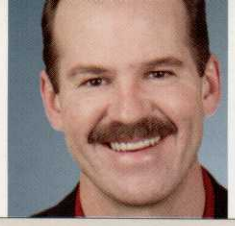

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THE FUTURE IS NOW

SNOBSVILLE, N.J. – JULY 15, 2508 – Scientists at the Institute for Studying Silly Stuff Using Huge Government Grants announced a major archeological find: ancient American sites called country clubs.

According to experts, country clubs were social and recreational gathering places similar to modern family virtual-reality fun centers, designed to give wealthy 20th-century Americans a place to play golf – as well as a now defunct game known as tennis – drink copious quantities of alcohol and generally have poorly paid workers serve at their beck and call.

"As ridiculous as it sounds, these country clubs were places where men would physically meet to play golf, drink beer and smoke cigars, while women played a game called bridge with these little paper cards and drank pink-colored cocktails," said Inga Johanson, Ph.D., the institute's director. "This was long before holographic projections replaced face-to-face personal contact. It seems quaint today, but people used to actually leave their homes to engage in recreation and business."

Remarkably, golf courses of the day used real living grass on fairways and greens.

"It was an incredible waste of agua-water to keep these things alive," said Tiger Woods the XIX, a noted golf historian and descendent of a moderately successful player of the era. "Can you imagine actually using millions of gallons of agua-water – which we now have to distill from the sea and ration to a few liters per person each day – to keep golf course grass green and pretty? It seems insane, but they did it."

Today, with genetically produced pseudograss that requires no inputs, golf courses have become public grounds that cost nothing to play. According to the institute, people used to pay as much as $100,000 (about $1 trillion in today's loonie-dollars) just to join these ancient clubs.

"We believe 20th-century Americans might have suffered from some kind of mass delusion that caused them to spend ridiculous amounts of money at these clubs," Johanson said. "This is remarkable, considering our preliminary studies show the food at these places really sucked."

Yet, according to scientists, some things haven't changed.

"The primary similarity between those old courses and ours today is that players still bitch constantly about green speed," Woods said. "Believe it or not, Hyper-Stimpmeter readings in the low 30s aren't fast enough for some golfers. People laugh when I say my ancestors used to putt on real grass greens that Stimped at 11 or 12!"

Computer-aided putting devices and microchip-driven balls have become so accurate that some courses today are simply paving their greens with painted concrete to meet golfer expectations.

"This new technology is ruining the game and causing more headaches than ever for the robo-superintendent," Woods said.

The golf courses of 500 years ago were also tiny in comparison to our modern ones, according to the report. Today's courses average about 12,000 yards in length while those in the mid-20th century were merely 6,500 yards. With driving distances approaching 800 yards, even many modern classic facilities have to lengthen constantly to keep up.

Some diehard fans of classic courses like Augusta/Microsoft National have called for a rollback in technology to protect the integrity of the game, but golf's governing bodies have yet to respond.

"We're thinking of putting semivoluntary guidelines on club and ball technology," said the cryogenically frozen head of David B. Fay, the longtime executive director of the Nike/Titleist Intergalactic Golf Association (formerly the USGA). "Our robo-lawyers are studying the subject urgently right now and we hope to issue a definitive report about the matter within the next 50 years."

So why, the scientists wonder, did these clubs, which seemed so popular just a half-millennium ago, become extinct? Johanson speculates it was because of a combination of factors:

- American culture was changing and the comforts offered by those clubs were available in many other places, including the home.
- The clubs failed to evolve and offer new amenities to attract families with 21st-century needs and interests. "The typical club member in those days was an affluent suburban man with a family," Johanson said. "About that time, the demands for men to work more and be with his family were increasing dramatically. Most clubs simply didn't recognize that and failed to offer more incentives to spend time and money at the facility."
- Golf, the mainstay of most clubs of the day, was time consuming and few facilities recognized they were competing for members' time even more than their money.
- The virtual world, represented by the primitive video games of the time, was becoming more attractive to children than the real outdoor world and clubs failed to find ways to merge the appeal of digital entertainment with their traditional services such as golf, swimming and dining.
- Most clubs were slow to accept the fact they had to market fiercely to survive. "It's amazing how many of them just sat on their hands and hoped things would change," Johanson said. "It was a recipe for extinction."

The Institute's final conclusion upon examining the remnants of several country club archeological sites (mostly consisting of fragments of ugly drapery, shards of so-called championship trophies and hundreds of bad photos of past presidents) is that the concept of the country club could have survived to this day if the people running them had possessed the foresight to adapt and change.

"In a way, they were like the Neanderthals trying to come to grips with the emergence of the more modern *Homo sapiens* species thousands of years ago," Johanson said. "They simply didn't recognize times had changed and they needed to change with them." **GCI**

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