Possibilities in the Palm of Your Hand

By combining GPS maps with GIS technology, you can maximize the power of your course's irrigation system

BY FRANK H. ANDORKA JR.,
MANAGING EDITOR

VADIM VAHRAMEEV

Now that your course has spent thousands of dollars creating a global positioning system (GPS) map of your irrigation system, the green committee is clamoring for a return on the investment.

You wonder how you can turn the map into something other than an enormous file that eats up memory on your computer. Unfortunately, you may not realize you're missing a central component that will open up nearly endless possibilities for the map's use. That impressive component, experts say, is the geographic information system (GIS).

A GIS is a computer system capable of assembling, storing, manipulating and displaying geographically referenced information gathered from the GPS. It turns your static

GPS map into a tool that potentially allows you to control your irrigation system from your personal digital assistant (PDA). When it's fully operational, a GPS/GIS map allows you to turn individual sprinkler heads on and off by clicking on it with your computer's mouse or your PDA's stylus.

"Most of the courses that have GPS maps don't know the power of the tool as an irrigation-system enhancer," says Paul Granger, president of Aqua Agronomic Solutions, a Clinton, N.J.-based irrigation consultant company. Granger started creating GPS/GIS solutions for golf courses in 1996.

"To allow superintendents to have a product that's useful and relevant to what they do, they need to combine their GPS map with GIS databases," he says. "Then the opportunities to use the information are endless."

Create an accurate base map

Before you can maximize the power of the GIS, however, it's important to have your course mapped by a GPS professional, says Brian Vinchesi, president of Pepperell, Mass.-based Irrigation Consulting. He says the hand-held GPS locators you can purchase at your local electronics store aren't sophisticated enough for the job.

"When you're creating a base map, you want to have someone with the appropriate experience to do this for you," Vinchesi says. "This isn't something an amateur can do as accurately as you need."

Vinchesi says many irrigation consultants can do the job in-house, and there are other companies who specialize in creating these maps (see page 30).

The amount of detail can vary, so superintendents should decide what they want to include before they choose a company to do the job. Jim Nicol, superintendent at Hazeltine GC in Chaska, Minn., says he hired Stratapoint, an Eagan, Minn.-based GPS company, to handle the GPS mapping in conjunction with the PGA Championship, which the course hosts in August. Nicol originally decided to map his course to help him deal with tournament crowd control, but he quickly realized how invaluable a map of his irrigation system could be.

"The maps we had were inadequate," Nicol

Continued on page 28

Picking a Contractor

Before you even consider using GPS/GIS on your course, you have to pick the right irrigation contractor. *Golfdom* asked superintendents for advice about choosing an irrigation contractor. Here's what they had to say:

"Select irrigation contractors with proven track records in your region. Check out past installation references thoroughly. Try to visit a site where they're presently working and see firsthand their performance. Do it unannounced (with the approval of the superintendent, of course) so you can actually see them in action."

• **OSCAR MILES**
CERTIFIED SUPERINTENDENT
THE MERIT CLUB, LIBERTYVILLE, ILL.

"Make sure you visit a recently completed job that was done by the same crew you expect to do your work. Ask how many of the crew members speak English. We had several situations where the foreman was the only one that spoke English. When he went home one weekend, none of the remaining crew spoke English, so it was difficult to communicate."

• **STEVE NUMBERS**, SUPERINTENDENT,
WESTFIELD COMPANIES CC
WESTFIELD CENTER, OHIO

"Hire a contractor with experience in the work you expect to be performed. A contractor who has only done new construction would not work well in a renovation. After all, it's not how much pipe you have put in the ground, it's what the ground looks like two months later."

• **JAY BUCK**, CERTIFIED SUPERINTENDENT,
MEADOWLANDS CC, BLUE BELL, PA.

"Be sure the contractor walks through with you and flags the sprinkler locations. With luck, he or she isn't locked into any one particular brand. Make sure he or she signs off on the work before payment is made."

• **JOHN C. CUMMINGS**
CERTIFIED SUPERINTENDENT
BERRY HILLS CC, CHARLESTON, W. VA.

"Pick a contractor that knows that irrigation installation is a game of angles and not bends. I've seen more pipes break because a joint was forced to fit instead of being tailor-made to fit. A good contractor always wipes excess glue off even if the pipe is 18 inches below the ground. That's a person that takes pride in his work."

• **PAT BLUM**, SUPERINTENDENT
COLONIAL ACRES GC, GLENMONT, N.Y.

"I checked with all the superintendents that I trusted and asked their opinions about who the best contractors were. Then I contacted those recommended contractors and asked them to send me a list of courses they had done. After narrowing the list to the top three contractors, I personally visited one of their facilities. I finally chose a contractor and all the preparation I did paid off. My irrigation system is 2 years old, and I haven't had any problems with it. My contractor keeps in touch periodically to check for any problems I might have."

• **KEVIN GOOLSBY**, SUPERINTENDENT,
SPORTSMAN AT PERDIDO GOLF RESORT,
PENSACOLA, FLA.

"This would go into the category of an irrigation contractor that you would not want to use. I recently served as a consultant in the planning, design and construction of a new golf course. I was in a meeting with a potential irrigation contractor, and we discussed the blueprints and lengthy specification documents that an irrigation consultant and I had spent the previous three months perfecting. After explaining the details of the plan I felt would make my irrigation system different from the average design, the potential irrigation contractor replied, 'Son we have built a lot more golf courses than you, and you have to understand that once the dirt starts moving, these plans go out the window.' While it's true that field adjustments are a fact of life, the comment that the plans are not needed is totally untrue."

• **DARREN J. DAVIS**, DIRECTOR OF GOLF
COURSE OPERATIONS, OLDE FLORIDA GC,
NAPLES, FLA.

HUNTER GOLF

A fully integrated GPS/GIS map allows superintendents to control their irrigation systems from anywhere they have a computer with central-control programs, like the Genesis III system from Hunter Golf.

Continued from page 27

says. "When we tried to install a new irrigation system in 1998, we were hitting mainlines and branches of the old system left and right because we didn't have an accurate record of where they were. We decided we needed to hire a professional so we could have something we could depend on."

Jason Bass, president of Stratapoint, says the GPS information is only as good as the attributes superintendents specify. The map can be as general or as detailed as they want, he added.

GIS integrates information

Bob Scott, president of Irrigation Consultant Services in Conyers, Ga., says the creation of GIS databases allows superintendents to integrate their GPS data into their irrigation system's central-control program.

Bass recommends a superintendent include specific information about irrigation heads, such as brand name, type of head, repair schedule, water-pressure requirements and other information. The more detail a superintendent provides, the more effective the map will be.

Bass says the same companies that handle GPS can often create your GIS databases as well.

Kevin West, superintendent of Olympia Fields (Ill.) CC, installed his GPS/GIS system in preparation for the 1997 U.S. Open. Since he's a computer buff, he created his own GIS databases and integrated them himself. Now he doesn't go anywhere on the course without carrying the map with him.

"I downloaded the interactive map to my PDA and carry it around with me on the course," West says. "That way, when I see a hotspot beginning or a spot that's being overwatered, the information I need to adjust the system is at my fingertips. It's so much more flexible than a traditional system."

Most irrigation manufacturers now provide software that will allow superintendents to integrate maps into their control systems, though the level of sophistication varies, Scott says. He also suggests superintendents not depend on their local irrigation sales representatives to create the databases because they may

Continued on page 30

"I downloaded the interactive map to my PDA and carry it around with me on the course."

KEVIN WEST
SUPERINTENDENT
OLYMPIA FIELDS (ILL.) CC

Continued from page 28

not be able to create maps with the level of detail that superintendents need.

Worth the cost

Vinchesi says the combined mapping and integration costs between $7,000 to $50,000, and Scott says the price should range between 7 percent and 12 percent of the overall cost of the irrigation system. Granger says the average cost is around $15,000.

"People believe it's much more expensive than it is," Granger says. "It varies by system and intricacy, but you can build a pretty powerful map for a fairly small investment."

Scott says most maps pay for themselves in two to three years. If you don't map your course now, however, you're going to regret it in the long run, says Matt Shaffer, superintendent at Merion GC in Ardmore, Pa.

Shaffer originally mapped his previous course, The Country Club in Pepper Pike, Ohio, so he could find its 258 gate valves. Prior to mapping them, Shaffer often had to guess at their location. The interactive map allowed him greater control over the system than he could have imagined.

"It's an incredibly powerful tool that allows you to manage your water more effectively and save your course money," Shaffer says. "If you're spending $900,000 on an irrigation system, why wouldn't you spend the extra 2 percent to 3 percent to make it as effective as possible?"

Shaffer says he doesn't believe members fully understand the potential savings in labor, energy and water expenses over the life of a system. When superintendents propose creating such maps, many members think of them as luxuries. Shaffer insists they're necessities instead. "Superintendents have to be ready to overcome the objections of members because members will often nickel-and-dime them to death," Shaffer says.

Granger says it will be a slow process, but he thinks GPS/GIS mapping will eventually become an industry standard on most courses.

"The power of GPS/GIS maps is beyond the dreams that most people have for them," Granger says. "We have to educate superintendents about how the maps will help them before they'll be generally accepted in the industry." ■

ILLUSTRATION COURTESY OF IRRIGATION CONSULTING

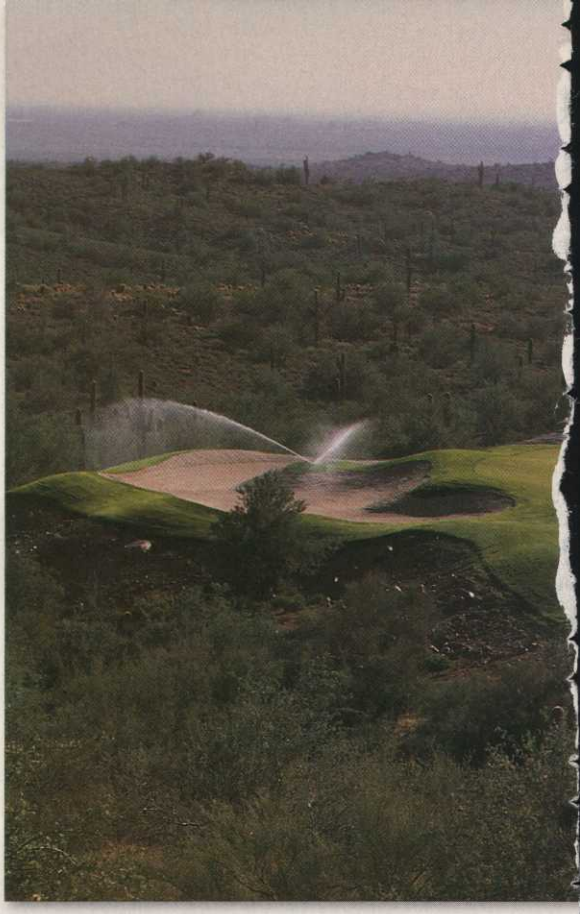
Each sprinkler head becomes a point on the map, easily activated on a PDA with the touch of a stylus.

For more information on GPS/GIS solutions, see these companies:

- **CompassCom**
  303-680-3221
  www.compasscom.com
- **GeoCadd Surveys**
  510-796-8555
  www.geocaddsurveys.com
- **Golf Course Map Co.**
  303-810-3472
  www.golfcoursemap.com
- **Horizon GPS**
  402-758-4653, ext. 115
  www.horizongps.com
- **Ragan Technical Solutions**
  561-776-9713
  www.ragantechnical.com/index.html
- **Stratapoint**
  651-905-8940
  www.pointforestry.com
- **Waypoint Technology Group**
  518-438-6293
  www.waypointtech.com
- **World Golf Mapping**
  561-379-8484
  www.worldgolf.com

In today's tight economy, an assessment of what you *really* need is more important than ever

BY LARRY AYLWARD, EDITOR



MIKE KLEMME

Remember that old jalopy you drove in college? God bless that bucket of bolts for getting you around. When that beater finally broke down, however, you had two choices of what to do with it — buy new wheels or take the heap to a mechanic to see if he could inject it with new life.

You weren't sure what to do, however, because you didn't know jack about what's under the hood. You weren't sure if you needed a new ride or if your old one just needed a tune-up. Big money was riding on your decision, though. What to do?

If you're a superintendent with an antiquated irrigation system, you can probably relate. You know the course's irrigation system needs repairs, but you're not sure what it needs and where it needs it. You ask yourself: Should I spend the house and upgrade to an entirely new irrigation system, or should I spend frugally and upgrade only the components that need to be modernized?

Decisions don't get much tougher for superintendents. There's a lot of money riding on the choice, as well as possibly a superintendent's reputation.

The decision should come down to a proper assessment of an irrigation system's needs. Sounds easy, like a short par 3, but it can be brain-draining.

"There's more to it than meets the eye," says David Davis, an irrigation consultant in Crestline, Calif. "It's not as simple as just looking for worn-out parts."

Assessing a problem is as much about being patient, attentive, organized and responsive as it is about being technically savvy. If a superintendent is all of those things while making an assessment, his decision about what to do with his irrigation system will be that much easier.

☑ Irrigation Evaluation

Urgent, but ...

There's a problem with the irrigation system, and it needs to be fixed — pronto. James Pitman, certified superintendent of Rolling Hills CC in Lomita, Calif., says superintendents must possess a sense of urgency when it comes to diagnosing problems with irrigation systems and fixing them.

Putting off fixing the problems will only lead to more trouble, Davis warns. "We call that deferred maintenance," he says, noting that some superintendents will defer major repairs for three to five years.

A fine and frightening example of deferred maintenance is a superintendent who doesn't pay attention to the deteriorating electrical grounding on the course's field controllers. "He puts off repairing it because he has to get on his hands and knees and get dirty to do it," Davis says.

Meanwhile, the ground wiring becomes loose and frayed. As a result, the controllers are damaged.

The bottom line: It doesn't take long for deferred maintenance to come back to haunt you, Davis says. "If you don't have a sense of urgency to solve a problem now, you might create a bigger problem later," he adds.

While a sense of urgency is important, you have to be careful not to be *too* urgent. A superintendent who's overeager to fix an irrigation problem may be in danger of rushing or even bypassing an assessment. Then he ends up tinkering — or "fixing" a problem before he knows what it is.

Tinkering will only get a superintendent into trouble, Davis says. When the exasperated superintendent discovers after three hours that what he thought was the problem isn't really the problem, there's enough steam coming out of his ears to drive a tub down the Mississippi. "The problem with tinkering is you can make a problem worse," Davis stresses.

Superintendent Bob Miller has been there and done that, and he warns superintendents not to tinker — lest they enjoy mental anguish. Before Endicott, N.Y.-based En-Joie GC upgraded its irrigation system about five years ago, Miller found himself toying and trying to fix outmoded irrigation heads. It was not fun. "Tinkering turns into frustration," Miller says, recalling a time when he was ready to pull his hair out.

Gettin' the low-down

Experience is important when assessing an irrigation system for repairs. Irrigation technology isn't rocket science, but it's also not as simple as A-B-C. It takes someone with knowledge and skill to make an assessment.

That person could be a veteran superin-

Continued on page 53

The question is: Should you spend the house on a new irrigation system or spend frugally on only the components you really need?

Continued from page 33

tendent like Pitman, who has more than 30 years of experience, or an outside consultant who specializes in irrigation technology. Pitman stresses that even the most practiced superintendent should keep an open mind about seeking help from an outside consultant. The bottom line is the bottom line and a consultant can help you save thousands of dollars, Pitman says.

Obviously, an experienced person knows what to look for and, more importantly, knows not to overreact to a problem. Remember that jalopy? Just because it had an oil leak didn't mean it needed a new engine. The same holds true with the problems associated with an irrigation system.

For instance, donuts and dry areas around sprinkler heads don't necessarily mean the heads need to be replaced. A person experienced in the process knows that it might only be the nozzles that need to be replaced, Davis says.

There are other telltale signs for other irrigation system woes, including a soaring electric bill. If your system is pumping the same amount of water as last year — but the increase in kilowatt usage from month to month has risen sharply — it's a clue there's something wrong. It could be that pipes are leaking or the pump station's motor is wearing out.

Document that problem

Yeah, the repair bills for the irrigation system are piling up, but don't you dare throw them away. Davis advises superintendents to document irrigation problems and keep track of time and money spent on them.

You know that members of the green committee like to think they know a lot about irrigation. They don't, of course, and won't believe there are problems with a course's irrigation system if they can't see them. That's why you have to show them that file folder.

"I knew a golf course that had old steel pipe in the ground for its main lines," Davis says. "The pipe began to rust and leak. The superintendent of the course documented all of the leaks."

The superintendent had a map of the course on his wall featuring the irrigation system. Each leak in the pipe was marked with a dot. The superintendent also took several photos of the leaking pipes and saved a section of pipe that had to be removed from the system because it sprung so many leaks.

When it came time for a meeting with his green committee, the superintendent was armed with documentation to support his request to upgrade the system. He showed the committee the map, the pipe and the photos. He stated his case and convinced the committee of the course's dire need. He got what he wanted.

Miller has been there and done that, too. He documented the many problems he had with the course's irrigation system at En-Joie. He wrote a report "in layman's terms" and distributed it to committee members. They talked about the report and how much it would cost to upgrade the system with new wiring, new heads and a computer system with radio controls. Committee members bought Miller's pitch, realizing that components of the course's irrigation system were outdated. "They realized we had to catch up with the competition," Miller says.

However, superintendents should walk a fine line when convincing green committees that their courses need irrigation upgrades. Most committee members are well-educated and take their roles seriously. If the superintendent wants them to spend big bucks on a renovation, they want to know why. But they want to be educated — á la Miller's pitch — and not told what to do.

Proper communication with your green committee or owner is vital during an assessment, and it can pay off in the long run. Pitman, who recently upgraded to a radio control system at Rolling Hills, says he saved the course about $90,000 last year in water and electricity bills. Pitman says it's all about giving a superintendent the right tools so he can apply his knowledge and do his job successfully. "But you have to be able to show people that you're using to the max what they've given to you," he adds.

Brian Vinchesi, president of the American Society of Irrigation Consultants, points out that golf courses committed to remodeling projects this year will take a long, hard look at every line item because of the current economic slowdown. Irrigation upgrades will get the longest and hardest glances because of their high costs.

Proper assessment of a course's exact irrigation needs has never been more important. ■

Donuts and dry areas around sprinkler heads don't necessarily mean the heads need to be replaced.

Looking for an Irrigation Consultant?

If you're looking for an irrigation consultant in your area, here's your contact list. The members of the American Society of Irrigation Consultants are independent professional irrigation consultants whose experience, training and track records have been verified prior to their acceptance to the group. **Contact information for these consultants is available at www. asic.org.**

ARIZONA
David Powell
Steven L. Sisler

ARKANSAS
Mitchell D. Langley

CALIFORNIA
Ray Arthur
John Blevens
Jeff Bradshaw
Don K. Burns
Martine Charles
David D. Davis, FASIC, CID
Martin D. Dickson
James D. Eddy
Reed C. Grandy
Thomas Nelson Groot
Steve Hohl
David Langendorff
David H. McClain
Toby Mertens
Russell D. Mitchell, FASIC
Eric Montelongo
Ivy Munion
Carol Myles
Dave Pagano, FASIC
Irwin A. Roque
Jess A. Roque
Daniel Scaliter
Frank Simon
Scott Sommerfeld
Fred Yoshimura

COLORADO
Ainsworth, Henry D.
Richard L. Aust, P.E.
Robert W. Beccard, P.E.
Douglas G. Macdonald
Stephen W. Smith

CONNECTICUT
Michael J. Astram

FLORIDA
Michael L. Prevost
Michael J. Russo
George D. Smith
Mitchel A. Walker

GEORGIA
Daniel F. Benner
Fredrick G. Hall
Bob Scott

KENTUCKY
Robert D. Pearce

MARYLAND
Brendan E. Lynch
Paul C. McMahon

MASSACHUSETTS
Robert M. Healey
Joseph Sarkisian
Brian E. Vinchesi

MICHIGAN
Carol C.J. Colein
Geoff Graber
Robb A. Werley

NEVADA
Joseph H. Fortier

NEW HAMPSHIRE
James M. White, P.E.

NEW JERSEY
James M. Barrett
Paul F. Granger

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Ken White

NORTH CAROLINA
Eric LaFleur

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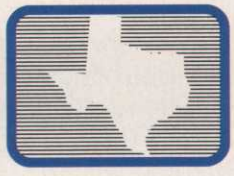


TEXAS
Hank Granger
Willie (Will) Leonard
Terry J. Little

UTAH
Dale Winchester

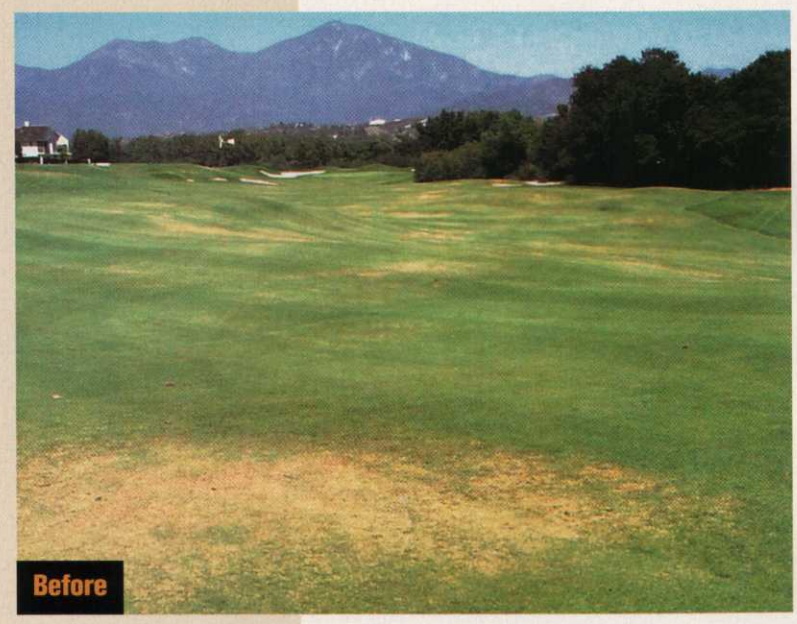
WASHINGTON
Royal A. Waldock

IRRIGATION TRENDS

More Bang, Less Bucks

Customized aftermarket nozzles boost coverage for energy-saving irrigation systems

BY FRANK H. ANDORKA JR., MANAGING EDITOR



Poor nozzle design can cause donuts to form around the sprinkler heads.

Problem

Low-pressure irrigation systems didn't provide adequate fairway coverage.

Solution

Aftermarket nozzles, which changed the water's distribution for more even application, eliminated the unsightly brown spots through better water use.

In the mid-1980s, California energy providers discovered that the state's burgeoning population would soon strain their resources. Since the energy companies couldn't build new power plants quickly enough to handle the increased demand, they decided to encourage conservation instead. They offered superintendents, whose golf course irrigation systems consumed considerable energy, a deal: If they would install lower-pressure irrigation systems (which require less electricity to start and to stop), the energy companies would pay their courses rebates for every kilowatt-hour of electricity they saved.

The energy companies hoped golf courses would replace older irrigation systems that required 100 pounds per square inch (psi) of pressure to operate with newer systems that required half that pressure, says Mike Huck, a former USGA Green Section agronomist who is now an agronomist for FCI Nozzles, a manufacturer of aftermarket irrigation nozzles based in Coarsegold, Calif.

Courses leapt at the chance to convert their systems and collect their rewards.

"The older irrigation systems wasted a lot of power," Huck says. "The old motors ran at full speed from the beginning of an irrigation cycle, which meant huge surges of electricity while they ran. The newer systems, featuring variable frequency drives [a pump system that starts and stops pumping water to the irrigation system gradually rather than at once], cut electricity use by 20 percent to 30 percent. The energy companies were paying enormous rebates — some as high as $60,000. A lot of courses were lured to replace their systems with that amount of money on the table."

One such golf course was Oakdale (Calif.) CC. It switched its irrigation system to a low-pressure model, which provided the energy-savings it promised. Combined with the energy company rebates, it appeared to be a good deal. Unfortunately, there was a catch.

The problem

Oakdale superintendent Mike Olson quickly discovered the downside to his course's decision. The original low-flow nozzles weren't designed to handle the force of the water being pumped through the system. As a result, the nozzles often broke as the high-pressure water demolished them. Olson says he'd seen the problem before at other courses, so he knew Oakdale wasn't alone in dealing with it.

"The maintenance on these systems became such a headache," Olson says. "You were

fixing the system almost as much as it was running. That wasn't acceptable."

Superintendents first asked irrigation manufacturers for help, Huck says. To their credit, the companies retooled the courses with more reliable nozzles at no cost. The new nozzles didn't break as often as the originals, and they still maintained the energy savings. Unfortunately, they didn't provide adequate fairway coverage because their water sprayed in a constant, straight-line stream, says Olson, who rapidly discovered members didn't like the resulting donuts around the sprinkler heads.

"It's hard to explain to screaming members why there is brown grass surrounding a sprinkler head," Olson says. "They think it's as simple as readjusting the trajectory on the water. Every time we tried to do that, however, the location of the brown grass simply moved to another part of the irrigation arc. We were in a no-win situation."

The pressure from his green committee for a solution became unbearable, Olson says. He wracked his brain for a solution.

He could completely retool his pump station to boost the water pressure, increasing his coverage with the current nozzles. Such a plan, however, would cost so much it would negate the energy savings — again. Olson despaired of finding an adequate solution until he stopped at the FCI Nozzles booth at a trade show to see what it had to offer.

The solution

An FCI representative suggested installing aftermarket nozzles into his existing sprinkler system. FCI nozzles can be customized to provide increased coverage.

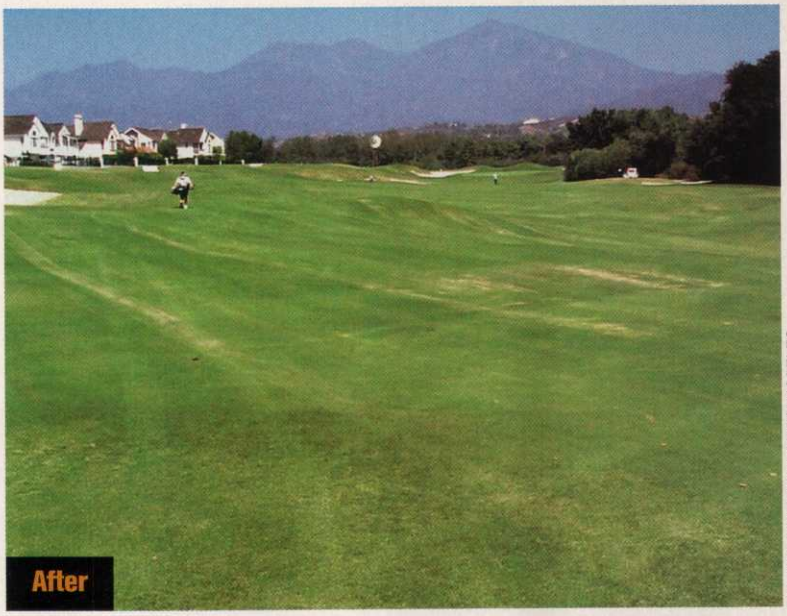
Aftermarket nozzles, even the customized ones that FCI produces, are traditionally less expensive than the nozzles built by manufacturers, so they can often be a bargain for superintendents.

The trick to eliminating Oakdale's donuts was to divert some of the water as it passed through the nozzle, so it hit closer to the head and applied the water more evenly. "We created a nozzle that has a notch at its opening that is lacking in other nozzles," Huck says. "It changes the trajectory on a portion of the water. As a result, you have several different arcs within an irrigation stream. Water is hitting more turf uniformly than with traditional nozzles."

Olson says he was skeptical of FCI's promise, but at about $15 per replacement nozzle, he figured it was worth a try. "It would be easier to replace a few heads to see if the product worked than to replace a whole pump station," Olson says.

Outcome

Olson bought 10 aftermarket nozzles and installed them on one of the most troublesome fairways. The results were visible within days.



PHOTOS COURTESY OF FCI NOZZLES

Aftermarket nozzles can provide better coverage because they can be customized.

"You could really see the difference," Olson says. "Where there were dead spots before, there was now healthy turf."

Still, Olson wasn't ready to purchase nozzles for his entire system. He purchased 100 more nozzles and installed them at other problem areas on the course. Only when he was convinced that the aftermarket nozzles improved his irrigation coverage over a couple of months did he decide to retrofit his entire system. He says he's waiting to see how the system performs during a real California summer, with multiple days over 100 degrees F. Last summer was unusually cool.

"It took me a while to be convinced, but this is the only nozzle I've seen that can provide me with this kind of coverage with a low-pressure irrigation system," Olson says. "I'm keeping a close eye on the system because the last time we tried to fix the problem it backfired." ■

Read another Real-Life Solutions on page 73