TECHNICAL ADVANTAGES OF HDPE PIPE

The methods briefly described above are used to install an HDPE golf irrigation system. Not included in those descriptions are the technical advantages in using HDPE pipe and fittings for golf irrigation applications. They include:

Pipe fatigue factor – When water surges take place within PVC pipe as sprinkler cycles turn on and off, the PVC pipe and fittings expand and contract ever so slightly. Due to the chemical composition of PVC, the material is weakened over time. With HDPE pipe, however, it contracts to its original size without weakening. For this reason, AWWA "derates" PVC pipe, stating that over time, the pressure the pipe can handle is reduced from its originally manufactured pressure rating. There is no such derating for HDPE pipe. The lifespan of PVC pipe is 25 to 30 years; HDPE pipe's is more than 50 years.

Flexibility – According to manufacturers' recommendations, larger diameter PVC pipe cannot be deflected (bent) more than 5 degrees. HDPE pipe has a bend radius of 25 times the diameter of the pipe with no detrimental effect to the pipe. This eliminates many of the fittings and thrust blocks required for PVC pipe installation, which in turn, reduces the number of potential main line breaks.

Leakage – Even the best installed PVC irrigation systems experience leakage at fitting and valve locations. With the butt-fusion technique for HDPE fittings and valves, the pipe and fittings become one monolithic unit, which eliminates leaky joints. This saves water and electrical costs as it eliminates pump cycling to maintain pressurization. Environmentally, as more courses choose to use effluent water for irrigation, less leakage means less worry about environmental breaches.

Freeze breaks – In colder climates, golf course personnel must drain as much water as possible from PVC pipe systems before winter to avoid the freezing and breaking of the irrigation system. HDPE pipe can be frozen solid and not break, although draining the irrigation system before winter is still recommended. Worry about breakage is eliminated with an HDPE system.

Going green – Most professionals in the golf industry are concerned about environmental issues – from the materials used to build the golf course to the inputs used to maintain them. The EPA has expressed concerns about PVC at various seminars and would like to see it disappear from the irrigation industry. HDPE pipe is 100 percent recyclable. **GCI**

Rick Robbins is president of RRI, Inc., which began designing golf course irrigation systems in 1981 and with HDPE in 1997. He can be reached at rrigolf@comcast.net.

HDPE and PVC: Working Pressure Rating and Fatigue Life

Design Fatigue Life (Years) at Velocity of 4 fps at 1 cycle every 15 minutes

					PE3608				
Pumping Pressure (psi)	**PVC DR14 PC305**	**PVC DR18 PC235**	**PVC DR21 PC200**	**PVC DR25 PC165**	**HDPE DR9 PC200**	**HDPE DR11 PC160**	**HDPE DR13.5 PC128**	**HDPE DR17 PC100**	**HDPE DR21 PC80**
25	> 100	71	64	36	> 100	> 100	> 100	> 100	> 100
50	86	43	26	17	> 100	> 100	> 100	> 100	> 100
75	59	31	21	15	> 100	> 100	> 100	> 100	> 100
100	56	29	20	14	> 100	> 100	> 100	> 100	
125	54	27	17		> 100	> 100	> 100		
150	50	26			> 100	> 100			
175	46				> 100				
200	43				> 100				

Pumping Pressure exceeds Working Pressure Rating, not suited for use.

Design Fatigue Life less than 50 years.

The above chart gives the estimated design fatigue life for PVC using C900-07 and HDPE pipe based on a two-to-one safety factor. Light blue indicates an acceptable Working Pressure Rating and more than 50-year fatigue life.

BY JOHN STIER, PH.D.

VELVET TOUCH

Researchers consider velvet bentgrass as an alternative to creeping bentgrass, evaluating whether it can provide high-quality golf turf and reduce the need for fertilizer, water and fungicide inputs.

Most of us take for granted the creeping bentgrass (*Agrostis stolonifera* L.) turf used for putting greens. Daily irrigation and routine disease control practices are just an accepted fact of management costs. But creeping bentgrass only has been used commonly on putting greens for about 50 years. Can there be another, lower maintenance alternative? The turfgrass research program at the University of Wisconsin-Madison has been developing approaches towards lower cost, more sustainable golf courses since the early 1990s, and the potential looks good. We're particularly interested in addressing fungicide, nutrient and water issues.

Superintendents are constantly dealing with new restrictions on fungicide use. Mercury-based fungicides met their end a couple of decades ago. More recently, restrictions have been placed on the more common, lower cost fungicides such as PCNB, chlorothalonil and iprodione. PCNB will likely be phased out in the next two to three years, eliminating arguably the most cost-effective means for controlling snow mold disease.

Golf courses of the future will need to be maintained with less reliance on fungicides. The most practical way to reduce fungicide requirements is to use grasses that are inherently resistant to diseases.

Fertilizer use on golf courses also is becoming a contentious issue. The large and sudden increase in nitrogen costs in 2008 had superintendents asking me when was the single best time to fertilize, as they could only afford a single application for the year. Bans, or at least restrictions, on nitrogen use are likely to occur, beginning in the Northeast as the Environmental Protection Agency seeks to reduce nitrogen fertilization of golf courses. States such as Minnesota and Wisconsin have already severely restricted phosphorus fertilizer applications to turf.

Water restrictions are the up-and-coming bane of golf course management in many areas of the country and are no longer restricted to the South. It's becoming an accepted fact that many golf courses may have to cut back their use of potable water due

'L-93' creeping bentgrass (left) had coarser leaf texture and lower turf density than 'Vesper' velvet bentgrass (right) when maintained as putting greens in Madison, Wis.

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to other public demands. Last year the state of Wisconsin began requiring golf courses to submit information on their water use. This is likely the first step towards limiting ground and surface water withdrawals for irrigation – and Wisconsin is considered a water-rich state.

One of the most insidious and least-recognized challenges to the golf course industry is the development of invasive species rules at both state and federal levels. Virtually all turfgrass species commonly used on golf courses are on one or more invasive species lists. Creeping bentgrass, for example, is listed by The Nature Conservancy as a prime example of an invasive species (http://wiki.bugwood.org/Invasipedia).

Some states (e.g., Massachusetts and Wisconsin) are beginning to pass bans on the sale and transport of plants deemed invasive. Publicly-funded sites (e.g., municipal golf courses) tend to be the first areas to respond to actual and impending regulations, eventually followed by private industry.

HISTORY OF VELVET BENTGRASS

Velvet bentgrass (*Agrostis canina* L.) is native to North America, though it was also likely introduced about 100 years ago in bentgrass seed mixtures known as South German bentgrass (Brilman, 2003). Its leaves are extremely fine-textured, producing a dense, uniform turf well-suited for putting greens. During the first half of the 20th century, it was deemed a better putting green surface than creeping bentgrass (Monteith and Welton, 1932). Problems with seed supply, coupled with the advent of seeded types of creeping bentgrass and good marketing in the 1950s, motivated golf courses to begin using creeping bentgrass.

In the 1960s, Dr. Skogley developed the first new velvet bentgrass in nearly 30 years. Named 'Kingston,' it struggled to gain acceptance because its light green color caused managers to over-fertilize it, leading to excessive thatch development (Brilman and Meyer, 2000).

Other breeders, notably Dr. Leah Brilman of Seed Research of Oregon and Dr. Bridget Ruemmele of the University of Rhode Island, began developing new velvet bentgrass cultivars in the 1990s. In the past 10 years several cultivars have been released by various companies, including 'SR7200,' 'Vesper,' 'Legendary,' and 'Greenwich'.

Velvet bentgrass has the capacity to provide high-quality golf turf with reduced reliance on water and chemical inputs. In fairway situations, velvet bentgrass has been shown to use less water than creeping bentgrass (DaCosta and Huang, 2006a). Velvet bentgrass has better drought tolerance than other bentgrass species, perhaps partly because it uses more of its energy for root production, which allows it to extract water better from the soil (DaCosta and Huang, 2006b).

The fine leaf texture of velvet bentgrass may lead some people to think it's less traffic tolerant than creeping bentgrass, and so won't hold up under typical putting green traffic. Scientists at Rutgers University, though, proved otherwise. They planted two cultivars of velvet bentgrass and 13 creeping bentgrasses, then tested them under four levels of traffic (Cashel et al., 2005). The two velvet bentgrass cultivars, Vesper and SR7200, maintained excellent turf over the three-year test. The velvet bentgrasses always had better turf quality than the

Velvet bentgrass greens had the same level of green speed as creeping bentgrasses, regardless of mowing heights, while providing an even denser turf.

JOHN STIER

creeping bentgrasses, as good or better turf density, and essentially no annual bluegrass (*Poa annua* L.). Greens seeded to creeping bentgrasses had 5 to 15 percent annual bluegrass at the end of three years.

Annual bluegrass infests almost all mature putting greens. Many biotypes look and grow differently than bentgrass, which reduces the quality of the putting green and can affect ball roll. Annual bluegrass also requires more water and chemicals than bentgrasses to keep it in green during the summer. Golf course superintendents will occasionally overseed greens with bentgrass to reduce the amount of annual bluegrass, but it doesn't always work. One study showed that planting SR7200 velvet bentgrass into a turf of 100 percent annual bluegrass resulted in as much as two-thirds of the green being converted to velvet bentgrass, one and a half to seven times better than creeping bentgrass cultivars (Henry et al., 2005). The ability to maintain velvet bentgrass on a putting green instead of annual bluegrass will reduce a golf course's input costs.

WISCONSIN RESEARCH

Textbooks state that velvet bentgrass is adapted only to New England and perhaps the Pacific Northwest. However, no studies conducted outside of these areas have been published, and the extent to which velvet bentgrasses were ever planted outside of these areas is unknown.

The few scientific studies of velvet bentgrass all have been conducted on acidic soils (pH < 7.0); consequently, conclusions have been reached that an acidic soil pH is needed to grow velvet bentgrass. Part of the reason for conducting turf research, though, is to test assumptions and find new uses for plants. Given that about one-third of U.S. golf courses are in the Midwest, with soil pH often above 7.0, we've been evaluating velvet bentgrasses in one way or another for nearly 10 years.

One of our first trials was a test of shade tolerance. Velvet bentgrass has been touted as more shade tolerant than creeping bentgrass, but no data have been published to support the claim. We partnered with golf course superintendent Scott San at Greenwood Hills Country Club in Wausau, Wis., to compare SR7200 velvet bentgrass to Penncross in the shade. Those plots were planted in the early 2000s and maintained at tee height. SR7200 maintained much better turf cover and quality than Penncross over a two-year period.

We have since constructed two putting greens at the O.J. Noer Turfgrass Research and Educational Facility in Madison, Wis., for further shade research. We're comparing newer cultivars of each species, Vesper velvet bentgrass and Tyee creeping bentgrass, both of which have received high scores in cultivar trials (NTEP, 2008; Cashel et al., 2005). The greens were planted in summer 2008 and are being maintained under 80 percent shade. Three levels of N fertilizer (1, 2 and 4 pounds per 1,000 square feet per year), with and without the plant growth regulator trinexapac-ethyl, are being tested.

The ability to maintain velvet bentgrass on a green instead of annual bluegrass will reduce input costs.

A primary focus of our turf research program is to develop low input sustainable golf courses. We recently finished a project designed to determine the suitability of velvet bentgrass as a putting green turf with low fertilizer rates on a high pH (7.5) sand root zone. Vesper and SR7200 velvet bentgrasses were planted next to Penncross and L-93 creeping bentgrasses in 2004. We tested three mowing heights, 0.1, 0.156 and 0.25 inches, and two N rates, 1 and 3 pounds per 1,000 square feet per year. Normally, we irrigate putting greens on sand root zones every day, with enough water to replace water used by the plants the preceding day [i.e., 100 percent evapotranspiration (ET)]. Due to the lower water use of velvet bentgrass, and the need to conduct research in advance of probable water restrictions, we only replaced 75 percent of the daily water use.

We found that 1 pound of N per 1,000 square feet on an annual basis was simply insufficient to provide acceptable quality putting green turf of any cultivar on the sand-based root zone (Koeritz and Stier, *In press*). At 3 pounds of N per 1,000 square feet, Vesper velvet bentgrass was the only cultivar that produced acceptable quality turf. The turf quality of Vesper was best at the lowest mowing height of 0.1 inch, which is currently the benchmark of many high-end golf courses. Vesper produced twice the shoot density of creeping bentgrasses (~ 18,000 to 28,000 shoots per square foot compared to ~9,000 to 14,000 shoots of creeping bentgrass). Denser turf not only produces a better looking turf but one that is more resistant to weeds such as annual bluegrass and chickweed. One of the potential drawbacks to a dense turf can be loss of green speed. In our study, we tested green speed every two weeks for two years, and found no difference among cultivars. Both velvet bentgrasses, particularly Vesper, had much less dollar spot disease than the creeping bentgrasses. At 0.1 inch height of cut, for example, Vesper had only 5 percent of the amount of disease seen in Penncross and only 10 percent of the disease seen in L-93. Such extraordinary disease resistance can allow for much lower fungicide costs as the need for application is decreased.

Another trial, started in 2007, is helping us to determine if the acidity of fertilizers affects the quality of velvet bentgrass, as suggested by observations more than 70 years ago (Monteith and Welton, 1939). We planted Vesper velvet bentgrass on both a silt loam soil and a USGA sand-based root zone and have been using fertilizers representing a wide range of acidity. The pH of both soil types is about 7.5, which is considered basic, not acidic (7.0 is neutral). During the first year, we found the more acidic fertilizers sometimes produced better turf quality on the sand root zone. In the second year, however, we did not find that acidity was important. We are continuing the study through 2009 as sometimes climatic differences between years can change results, along with age of the turf. One positive result so far is that, once estab-

lished, velvet bentgrass on the soil green is able to produce high-quality turf with only 1 pound of N per 1,000 square feet. This is considered a very low N rate, and could be quite useful for golf courses seeking to reduce their fertilizer inputs.

We're extending our research into the use of velvet bentgrass for low maintenance, sustainable golf course fairways. We're planting monostands of velvet bentgrass, creeping bentgrass, fine fescues, Kentucky bluegrass and a mixture of velvet bentgrass and fine fescues. Turf will be irrigated to replace only 40 percent of water use during the summer, far lower than what is normally used to maintain creeping bentgrass or Kentucky bluegrass. All turf treatments will receive low and high N rates, with and without fungicide applications. We'll be monitoring turf quality, disease and soil moisture. We anticipate that the velvet bentgrass and fine fescue turfs will perform much better than the creeping bentgrass and Kentucky bluegrass turfs. The treatment we're particularly interested in is the mixture of velvet bentgrass and fine fescues, as they both appear capable of providing good turf with few inputs, yet have different growth habits. So far it appears that velvet bentgrass can reduce the need for fertilizer, water and fungicide inputs, especially on soil-based root zones. **GCI**

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In one velvet bentgrass trial, fertilizing with 3 pounds of nitrogen per 1,000 square feet (right side of photo) each year provided faster spring green-up than using only 1 pounds of nitrogen per 1,000 square feet (left side of photo).

ERIC KOERITZ

IMPACT
ON THE BUSINESS

Keeper of the velvet greens

BRENT ROGERS, SUPERINTENDENT AT EAGLE'S NEST GOLF CLUB IN MAPLE, ONTARIO, SHARES HIS PERSPECTIVE ON WHAT IT'S LIKE TO MANAGE VELVET BENTGRASS GREENS. **BY MARISA PALMIERI**

How is maintaining velvet bentgrass different from other types of turf you were most familiar with?

My previous experience was with *Poa annua*, Penncross, Penlinks and Providence creeping bents, from the West Coast of Vancouver to the East Coast of Cape Breton Island, Nova Scotia. The very first head-scratching issue I had was just after seeding [in 2002]. It was the traditional seven to 10 days to germinate, and then it was like watching molasses. It took weeks for the greens to thicken up. I understood that I was dealing with a strange animal to begin with – bunch-type growth and absolutely no stoloniferous growth habits that a conventional creeping bentgrass inherently possesses – but this was absurd. [Architect] Doug Carrick would come for his site visit and pace around like an expecting father wondering if the greens ever were going to fill in; the ownership had the same puzzling look on their faces. This was the nature of the beast. Don't expect quick establishment; it's not going to happen. Because of the super fine leaf blade, velvet bentgrass has such an incredible density to it, so fine, so dense, so upright – the perfect putting surface. In fact I had a conversation with Dr. Peter Landschoot from Penn State just last year and he said, "Velvet is the finest putting green grass in the world." Unfortunately, velvet has fallen by the wayside since its trendy reintroduction back in the early 2000s.

You have to appreciate that there are no text books; there's very little if any current literature regarding growing and maintain velvet bentgrass. It's been trial and error. It took me three years until I was getting the results I was looking for. The biggest myth perpetrated by agronomists in the past was that velvet doesn't need a lot of nitrogen and if you over fertilize velvet, it's a death sentence. In those first three years I had this in the back of my mind, but at the same time I knew the greens could be better. They still looked thin. It was an acceptable putting surface, but it was a struggle to keep them consistent. They would look good for a week, then go sideways, then look terrible, only to turn around and look great again. We had sound management practices and constant soil and tissue monitoring; again, all the soil labs and top agronomists had no benchmarks for what constituted an ideal range for nutrients in the greens. There was no established data anywhere. I was certainly frustrated, but I was not giving up. The course at the time was still getting great reviews, but that wasn't good enough. I felt almost ashamed of the greens – I had to get these greens to the next level. At times during this period I'd picture my industry colleagues enjoying their afternoons, laying back in a lounge chair, ice cold beer in hand watching their lovely creeping bentgrass become even more flawless, as I ran around my golf course sweating, frustrated and kneeling on the greens peering into the canopy of the grass. I'm sure the golfers must have thought that either I was praying to the turf gods or I had gone crazy.

In late 2005 I started to custom blend some fertilizers and slowly increase the nitrogen levels, completely ignoring the warnings that were so ingrained in my skull about over fertilizing velvet. As it turned out the velvet liked the extra nitrogen. It thrived, it became denser.

Cultural practices such as topdressing are a must with a dense turf like velvet in order to constantly dilute the thatch layer; however, that same dense canopy can make it next to impossible to work a topdressing sand into. I've had to search for sand that's fine enough to incorporate into the canopy, but yet still falls within the specifications of the root zone matrix. Verticutting is an excellent tool to utilize in conjunction with topdressing in order to open that canopy up.

What are some of the greatest challenges associated with velvet?

Where do I start? Because of its bunch-type growth and fine texture, it's extremely slow for ball marks to heal – we're talking season-long. We now incorporate mini plugs to remove the whole ball mark because we cannot sit around and wait for the recovery period. The biggest challenge is recovering from drought stress. Do not allow these greens to wilt or even approach the wilting point. The plants will not die, but all the above surface leaf tissue does and it takes two to three weeks for the plant to send up new shoots. Heaven forbid we ever host a professional event in which the tour agronomist expects us to maintain U.S. Open-style greens. They would be 100 percent brown. With mowing heights getting lower and lower and the expectations of green speed, you want to maintain them at a comfortable spot that works for both the turf and the golfer.

Has working with velvet bentgrass been what you thought it would be?

I can honestly say yes, and then some. I knew it was going to be a challenge, and trust me it has delivered its promise. If I could hit one point home through this whole conversation it's that velvet is unpredictable. Dr. Peter Landschoot is correct when he said that velvet has fallen out of fashion. I find it very ironic that all of these new generation creeping bentgrasses are being bred to have finer texture, short internodes and a dense upright growth habit – all the characteristics of velvet. If only more research and development was put into velvet bentgrass, you could have the perfect turf species in every way. In this day and age of genetic modification, anything is possible.

Would you characterize velvet bentgrass as "low maintenance?"

I would certainly not attach a label saying "low maintenance." It needs just as many inputs, a lot more topdressing and verticutting. If you had a very high-end private club with 15,000 rounds a year and a great maintenance budget, you could have some fantastic greens. I will say that we apply fewer fungicides than we would otherwise apply to a creeping bentgrass.

Do you have advice for other facilities considering velvet bentgrass?

Each course must evaluate its needs, from the type of facility, the vision of the architect and the requirements of the superintendent to maintain the level of conditioning that the clients expect. I want to make a point that all turfgrass species will respond differently to the type of root zone you have – straight sand, 80/20, 70/10/20, etc. These are my observations of the trials and tribulations that I've had here. Perhaps other superintendents in different parts of the world have achieved greater success with velvet. What surprised me was the lack of sound management data out there, even after seven years of having it. I guess that's why it went by the wayside back in the 1950s when Penncross came on the scene.

The little things

The members at Bigwin Island Golf Club don't notice the golf course accessories – and that's how superintendent Scott Heron likes it.

BY MIKE ZAWACKI

DAVID COLT

Image is everything.

As director of turf operations for Bigwin Island Golf Club in Huntsville, Ontario, one of Canada's top-ranked golf courses, Scott Heron understands this fact and it's why he pays particular attention to his annual golf course accessory purchases.

The Bigwin Island course, which Heron and his crew of 27 are responsible for maintaining, is a par-72 layout measuring 7,166 yards from the championship tees. The course is designed with a variety of tee locations measuring 6,742 yards from the blue tees, 6,287 yards from the white tees and 5,346 yards from the red tees. Each nine is a par 36 consisting of two par threes, two par fives and five par fours.

Every year Heron purchases new flags, flagpoles and tee cups for each of his course's 18 holes. An excessive annual purchase, some golf course superintendents may say, but essential for Bigwin Island, Huron adds.

"They just don't last," he says. "The weather coupled with the fact that they're getting picked up and thrown down all the time marks them up pretty good. And the cups, they really get beaten up by the end of a year's time."

Heron tends to purchase accessories based on quality and durability. He wants a flagpole and flag to go the distance from July to July, the typical year these items are pressed into service. Another factor, though, is the relationship he has with his vendor, Bayco Golf.

"I put a lot of trust into the advice that my sales rep offers when I have questions about the accessories I'm about to purchase," he says. "Also, I value the fact that if there's a problem during the year with any of these products, they take care of any issues without any worry."

While not as frequently, Heron approaches other course accessory purchases in the same fashion.

For example, occasionally a tree will damage a course trash can, prompting it to be replaced, or one of the course benches begins to show, that too much be refurbished or replaced.

The cost is minimal, roughly $2,000 per year for all of his course accessory purchases, but the return is invaluable because most often it's the little things that make a difference in the course's overall presentation, Heron says.

"Sure you could use these things forever, but they'd look pretty ugly," Heron says. "It's one of those things that, by replacing them, none of the members really ever takes notice that they're new every year. But if you didn't replace them, and they started to show some wear and tear, then it would begin to attract the attention of the membership." **GCI**

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BACK AT BLACK

Craig Currier, superintendent for Bethpage State Park, oversees agronomics for five golf courses within the 1,600-acre New York state park system. He's readying the Black Course for its second U.S. Open Championship.

Q Are there any preparation differences between 2002 and 2009?

A The one thing that affects the course is the amount of public play received – 250 rounds per day in season. Our greens are 80 percent *Poa*, so to be able to handle the traffic, get ready for the event and be healthy enough to withstand the impacts from anthracnose and drought stress gets tricky. We're on a regular, spoon-feeding liquid fertility program. We use 1/10 of a pound of nitrogen per week, combined with a micronutrient package and supplemented with humic acid and separate calcium applications to make the turf healthy and strong. The course is also on a weekly growth-regulation program.

One of the benefits this year is that the course will close to public play on June 1, allowing us ample time to coordinate our on-course work and volunteer schedules, keep track of final off-course operations and set-up and fix ball marks and divots. We also check and monitor isolated dry spots on putting greens so we can have proper moisture content and firmness. To respond to the stress and wilt caused by foot traffic, we hand-water and closely monitor irrigation. Finally, we protect chosen hole locations for the U.S. Open so there are no old hole plugs, scars or wear from traffic.

Our greens are slightly bowl shaped and we've drilled and filled our greens four times in the past two years to improve water infiltration. This practice is done in conjunction with weekly sand topdressing and hand-broomed to backfill any hole or groove created.

What's really helped in the preparation is the closing of the Black Course on Mondays. This is key for us to conduct maintenance practices we couldn't otherwise accomplish.

With a healthier plant, quality of cut on the putting greens is vital. We're using the Jacobsen Eclipse mowers. The adjustable reel frequency designed into this unit has enhanced the quality of cut and will result in a more consistent, smoother ball roll.

It's been challenging to comply with the state's chemical application policies. We've been fortunate to have the insight and guidance of Dr. Frank Rossi of Cornell University to guide us through the process. As we are a state park and offer more than just golf, we have to be sensitive of other uses and visitors.

What's really helped in the preparation is the closing of the Black Course on Mondays.

Q What are the changes in set-up between 2002 and 2009?

A The primary difference is the implementation of the USGA's graduated rough philosophy. During the initial stages of the 1997 renovation, we overseeded fairways to perennial ryegrass. When the fairways were narrowed for the 2002 event, the outside edges became primary rough, with the turf density high and grown in at 6 to 8 inches. These conditions only afforded the contestants a sand wedge recovery shot.

Today, we have varying heights-of-cut between 2.5 and 4.5 inches. The density and health of the grass is similar to 2002, but we'll have to mow daily during this championship to keep heights uniform. This will require more equipment, labor and coordination and more mowing, as the rope lines are set further back than in 2002.

Q What changes have been made to the course over the past seven years?

A We've added length to holes 3, 5, 7, 9, 12 and 13, going from 7,200 to about 7,500 yards. The two most prominent changes are on the 7th hole, where we took it from 480 to 525 yards (par 4) and the 13th hole, which was extended to 610 yards from its previous 555 yards (par 5).

Bunkers have been added to holes 4, 8 and 9. The ninth will really test the players off the tee. We deepened bunkers on the 10th and 11th holes, reshaped the cross bunker on 12, added and deepened bunkers on 13 and deepened the bunkers in the landing zone on 18.

Putting greens were expanded on two holes. On the par-3 eighth hole we slightly rolled the green over on the front edge to bring the pond more into play for shots that are short to a front hole location. On the par-3 14th hole, we added a back shelf, going from left to right, which will penalize a ball hit over the green by bringing the downslope into play. These changes add additional opportunities for hole locations, as well as shot options.

Q Do you have any concerns for this year?

A Of course, my biggest concern is weather, as rain and thunderstorms impacted us in 2002.

Q In 2002, you proposed to your wife. Any big plans for this year?

A No response... (Currier smiles). GCI

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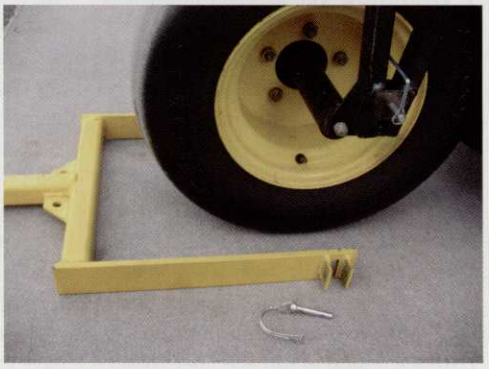
Travels With Terry

Globetrotting consulting agronomist Terry Buchen visits many golf courses annually with his digital camera in hand. He shares 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.

TOW-TALLY EFFICIENT

At The Members Club at Grande Dunes in Myrtle Beach, S.C., turf equipment technician Joe Corsetti came up with the idea to tow a John Deere Aerocore 800 greens aerifier behind a turf vehicle to save the operator lots of walking time in-between aerifying greens. The tow bar design uses tubular and flat steel welded together that's attached to the tow vehicle with a hitch and pin with a chain so it won't get lost. The other end is attached to the aerifier with a U-shaped metal bracket held in place with two lynch pins that connect/disconnect easily. The aerifier shift lever is transported in the "neutral" free-wheeling position up to 10 miles per hour from green to green. Corsetti's concept has a patent pending; it took about three and a half hours to build and it cost about $65 in materials.



GETTING FLOORED

The Locust Hill Country Club in Pittsford, N.Y., has a unique wooden floor in the shop and employee lunch room. It was implemented by golf course superintendent Rick Slattery, equipment mechanics Dan Lloyd and Rich Bournival and longtime employee Dennis Smith.

The floor, which was installed in 1960, is made of 4-inch thick yellow pine that began to splinter with age. The employees began the renovation process by using a sander to remove 35-years of paint build-up and the top 1/4-inch of the pine. They caulked the cracks and intially applied three coasts of epoxy.

They sand the floors and apply a light epoxy coat every December; sometimes another coat of epoxy is applied in the spring. It takes about an hour and a half to apply the epoxy on the 30-feet by 35-feet shop floor. Besides protecting the yellow pine, the epoxy is soft to stand on, which the equipment mechanics' legs and backs really appreciate. They use Benjamin Moore 100% Solids Epoxy Floor Coating CM40-00 (at about $100/gallon – 4 gallons initially and 2 gallons per application for upkeep), which resists spills from petroleum products. The floor is dry mopped once a week and then washed with a benign cleaner or mild soap. **GCI**