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BUNKERS

How to Meet Players' Expectations Through Realistic Design, Construction, and Maintenance

By Lewis C. "Chip" Powell



The prominent role of bunkers in golf course design was secured during golf's golden age as prolific bunkering became synonymous with the great designs of the likes of MacDonald, Tillinghast, Ross, Thomas and Mackenzie who employed a wide variety of styles to not only create strategy but "The Look" as well. In this current era of design the art of bunkering has reached new heights (or depths, depending on how you look at it) as designers have many times relied on sand to provide far more of "The Look" (a.k.a. eye candy) than strategic function.

Unlike today's players, golf's golden age players were not as interested in "fairness" and as a result placed far less value on the pristine maintenance of anything on the course let alone the bunkers. Fueled by unrealistic television images and excessive concern for fairness, today's players have come to expect pristine conditioning not only on greens, tees and fairways, but on bunkers as well.

The daunting task of meeting players' high expectations often with limited resources has left many of today's golf course superintendents pretty much between a rock and the hard place. While it is tempting to want to think that the solution is as easy as using a power bunker rake or installing some miracle liner, the ultimate solution will require not only the efforts of golf course superintendents but a far better effort from architects and owners as well.

For starters, architects must focus more on designing golf holes for golfers and superintendents instead of photographers, even though this may result in not getting the recognition deserved for designing subtly brilliant golf holes that don't photograph as well as those

Golf courses must honestly assess the conditioning expectations in bunkers versus the cost to maintain the quantity and style of the bunkers. Photo by Joel Jackson.

loaded with eye candy. In addition, architects must do a better job of educating clients and players as to what constitutes a great golf hole and that doesn't mean the one that photographs the best.

Respecting maintenance budgets still leaves plenty of room to do more with less by placing smaller bunkers in strategic locations while eschewing the temptation to place gratuitous eye candy in locations that most often offer no challenge to the better players, continual frustration for higher-handicap players and excessive added expense to the maintenance budget.

Once the quantity of sand has been sensibly addressed, focus should turn to construction technique. Just as the USGA method of greens construction has become an industry standard, nearly all new bunkers are now constructed in a manner that meets demanding criteria for both sand type and drainage. At a minimum, all bunkers should be constructed with an extensive subsurface drainage system with lateral line spacing dictated by slope and native soil type. Bunkers should then be finished using 4-6 inches of sand carefully evaluated by a qualified soils testing laboratory with physical characteristics that provide high water infiltration rates, resistance to ball plugging and resistance to movement by high winds.

In addition to these base requirements, the quality of the native soils must be considered with measures taken to prevent contamination of the imported sand addressed at the time of initial construction.

In recent years many new fabrics and spray-on polyurethane liners have been introduced that are effective with regard to preventing native soil contamination to the imported bunker sands. While these products offer benefits, they also come with the downside of significant initial expense and, if maintenance is not carefully performed, shortened life expectancy especially around the edges where the need is the greatest. If properly installed and maintained, these products all offer improved playing conditions, ease of daily maintenance along with extending the life of imported sand and drainage systems by preventing contamination from the extremely fine particles found in nearly every native soil encountered.

The bottom line is that liners must be looked at seriously and considered as part of the true cost of construction if pristine bunker conditioning on a day to day basis is the desired end result. How many courses would construct fewer bunkers if the true construction cost were addressed up front?

Finally and most importantly though is the fact that, even if properly constructed, the day-to-day quality of bunkers is ultimately more controlled by maintenance than any other single factor. The point being that great maintenance can make up for some construction deficiencies while poor maintenance can destroy the quality of the best-constructed bunkers.

Maintaining high-quality bunkers comes down to performing two basic tasks: raking and edging. And few would argue that both frequency and technique are the deciding fac-

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And the Survey Says...

We posed a quick survey on bunker maintenance issues to several superintendents. Here are the responses of Shane Bass, St. James Bay GC in Carrabelle; Mike Bellino, DeBary G&CC in DeBary; Greg Kriesch, Heritage Palms in Ft. Myers; Chris Neff, Timaquana CC, Jacksonville; Matt Taylor, Royal Poincian GC, Naples; and Craig Weyandt, The Moorings Club in Vero Beach.

Q: Do you machine-rake or hand-rake?

Bass: We machine-rake three days a week and the other four days we hand-rake only the bunkers that need attention.

Bellino: We machine-rake the center and hand-rake the edges. It takes two men about four hours to do this.

Kriesch: We machine-rake the bunkers. It takes four people 3.5 hours per day for 36 holes.

Neff: We Machine-rake fairway, but hand-rake greens bunkers

Taylor: We have 36 holes. We machine-rake fairway bunkers and hand-rake greens bunkers. It takes three people 3.5 hours per course to rake the bunkers. One course has smallish greenside bunkers. These are raked by the greens-mowing person.

Walker: Machine-rake all bunkers. It takes one person 3 hours.

Weyandt: We machine-rake our bunkers. It takes one person 3 hours in the morning.

2. Do your bunkers have drainage installed?

Bass, Kriesch and Weyandt: Yes, they were built with drainage.

Bellino: Four new bunkers have drainage.

Neff: Yes, installed during the recent course renovation.

Taylor: Some bunkers have drainage but we also have installed drainage in others.

Walker: No drainage.

3. How many bunkers do you have and how often are they edged? Also how many people and how long does it take?

Bass: We have 62 bunkers. I have one person who takes care of the bunkers completely. He is the only one in the bunkers except for someone to rake them on his days off. He edges about four or five holes per week and flymows the ones with fingers every time we mow roughs. It takes him about 5 hours to machine-rake all the bunkers. After raking the bunkers he edges

about four or five holes a week. He also hand-sprays any weeds in the bunker collars.

Bellino: Our 56 bunkers are edged monthly. It takes four men two days to complete the task.

Kriesch: We have 36 holes. There are 88 bunkers on the Royal Palm course and 76 bunkers on the Sabal Palm course. It takes two people per course about 20 hours to edge the bunkers over a 4.5–5-day period. Our edging cycle is once every two weeks in summer. Every three or four weeks in cool season.

Neff: We have 76 bunkers that are edged biweekly. It takes two men four hours to edge them.

Taylor: 36-hole layout. One course has 42 bunkers the other has 57. They are edged biweekly. On each course it takes six people four hours per course to edge the bunkers.

Walker: We have 38 bunkers. It takes four men two days to edge the bunkers.

Weyandt: We have 46 bunkers. They are edged weekly. It takes three people an average of seven hours to edge and clean up the bunkers weekly.

4. Have you ever had to modify bunkers to prevent chronic washouts?

Bass: No, but that is why you need an architect who understands maintenance (ours was Robert Walker) and why the superintendent needs to be there from the very beginning.

Bellino: Yes. On some with steep faces that had chronic washouts in heavy rains we sodded the bunker faces.

Kriesch, Neff, Taylor, Walker and Weyandt all replied No.

5. Do you do anything special to firm up the sand to improve the lie of the ball?

Bass, Kriesch and Neff: No

Bellino: No. I seem to get more comments when we are watering a lot or if it's raining a lot, that the bunkers are too hard. We have a homemade attachment for our sand pro with 5-inch rebar spikes to loosen up the sand.

Taylor: Not really, but we use 37M bunker sand. We have the standard rake assembly on our Sand Pros that is used when the bunkers are wet. If the sand is dry we install brushes on a separate Sand Pro. This helps to keep them from getting too soft.

Walker: No. We use 37M sand, which firms up nicely. We only cultivate one inch deep when raking.

Weyandt: Yes. If we see that the bunkers are getting too soft from machine raking we just

hand-rake until they firm up.

6. Please make any additional comments regarding bunker maintenance tips as you see fit.

Weyandt: The most important thing about bunkers is construction. Know where the water is going to go to prevent washouts. Install drainage in bunkers at the time of construction. A little time spent in the beginning during construction will save hours of time repairing washouts later.

Neff: Tell everyone to take Bob Randquist's bunker class at the GCSAA show if he continues to teach it. It really makes you think about bunkers and how they fit at your club.

Bobby Weed did outstanding job of bringing bunker play back into the game at Timuquana CC. My outlook is consistency from the chipping green to the 18th hole throughout the golf course. We are very conservative when it comes to edging the bunker. We don't look for sharp edges like some courses. We try to keep our contour definition but without shaving the edge. We don't rake bunkers every day as well. I try to keep them a little on firm side barring effects of weather and playing traffic.

Every winter one project is the addition of new sand throughout the golf course. Depths are checked and additional sand is applied only if needed. We do not rake the edges every time. We rake the bunker completely one day including the edges and the next without. It's kind of like mowing a green without mowing a cleanup pass to save the edge of the green. We try not to build up sand on the edges too much. I will be looking at different varieties of grasses on faces of bunkers over the next few years. We are discussing a possible renovation of bunkers and we might consider some of the new bermudagrasses or zoysiagrasses for a different look. Also, the addition of small pop-up heads around the bunkers is becoming more and more popular. This is almost necessary with the higher standards now being demanded throughout the industry.

Having the opportunity to work five Players Championships and a U.S. Senior Amateur has really opened my eyes to different beliefs on bunker maintenance. Is there really a perfect bunker in this world of golf? Understand the level of expectation for bunkers from your club, depending on the type of facility (public, private, resort, etc). Then develop your management programs to meet expectations. But it is still a hazard in the end isn't it?

tors that truly make the difference with regard to both aesthetics and playability.

With regard to edging, light and frequent should be the mantra if consistent quality is the goal. Staying on top of edging offers the benefits of better day-to-day eye appeal and most importantly less disruption of the native soils that are a constant threat to contaminate imported sands. Frequent edging does require adequate labor resources and any club that demands high-quality bunkers must address this as a true cost of maintenance

Frequency is also a key with regard to raking but, just as important as frequency, is how the bunkers are raked. While power rakes are well suited for removing footprints and preventing weeds from thriving in very large and flat bunkers, they are ill suited for raking smaller bunkers and those with any type of flashed sand. While many creative attempts have been made to mitigate the destructive aspects of factory-installed rakes, the best power rakes are still no match for the results obtained by careful hand raking. When was the last time you saw a tourna-

ment course on TV with bunkers not raked by hand?

Once again, hand raking requires adequate labor resources and any club that demands high-quality bunkers must address this as a true cost of maintenance. I repeat: how many courses would construct fewer bunkers if the true cost to properly maintain them were realistically addressed up front?

The challenge of meeting high player expectations with limited resources is one that does not appear to be going away anytime soon. Meeting this challenge will require all parties involved to honestly address the role of sand on our courses by creating realistic construction and maintenance budgets.

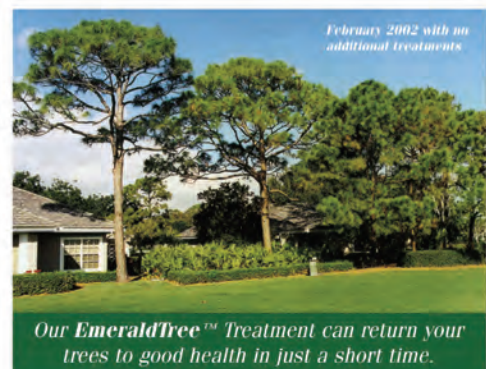
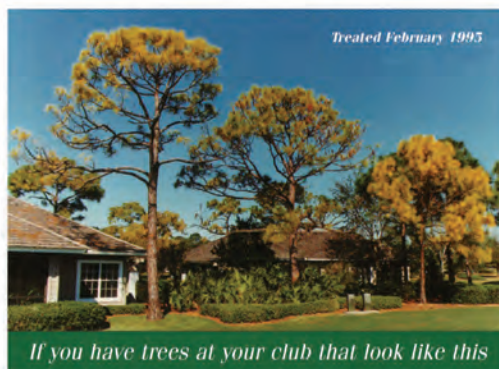
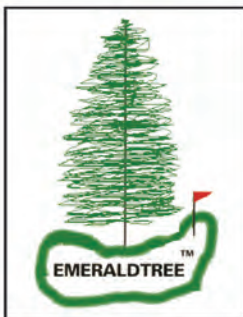
For new courses, this will require making fundamentally sound decisions about the style and quantity of bunkers as the design of the course develops. For existing courses, this will require an honest assessment of conditioning expectations matched with maintenance resources and the realization that the ultimate solution will most probably require the rebuilding of all improperly constructed bunkers and

the possible elimination of sand in order to find the proper balance.



Golf Course Architect Chip Powell.

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Professional Cup-Hole Cutting

By Michael Hoffman

The most valuable areas of a golf course are the greens and any activity that occurs on the greens should be the most meticulous, cautious and professional activity that transpires anywhere on the golf course. I have developed the following procedures over the years to help me and others do a thoroughly professional job of cup hole cutting and cup hole painting for daily operations and for tournaments.

CUP HOLE CUTTING PROCEDURES

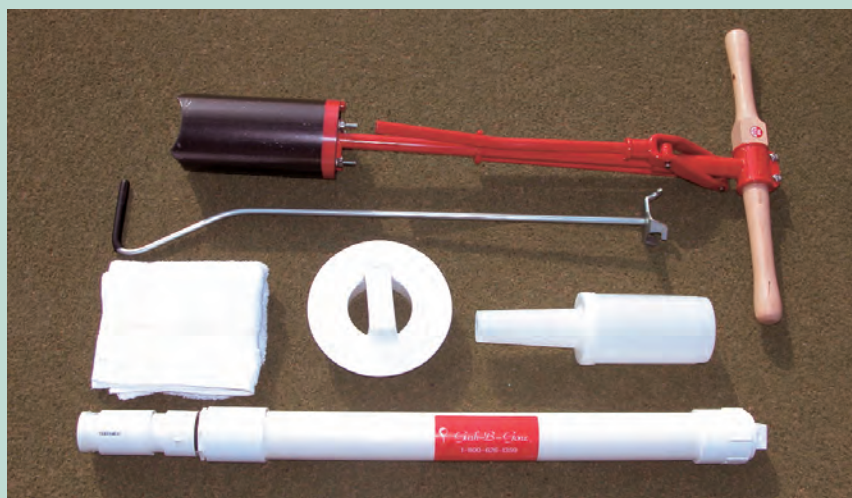
Determine the hole position either from a designated pin sheet or by using an approved rotation system as designated by your club. When using a pin sheet, pace the depth measurement from the front edge of the green and mark that dimension with your tool/sand container and then pace off any left or right distances.

For example a pin location designated 14/8 would be 14 paces from the front edge and 8 paces from the left or right edge as indicated on the pin sheet. Single numbers mean the location is in the center of the green.

Now that the position is determined, if you are using a twist-in or rotating-cut hole-cutter, hold the cup cutter 18-24 inches above the green and release it. I have found this produces a cleaner hole edge than just placing the cutter edge on the surface and twisting it in. Using this drop-release method, the cutter will generally penetrate the green surface 1.5-2 inches. Remove the cup cutter from the hole.

Release the grass plug into the container; wipe off the outside of the cutting cylinder with a towel. Carefully insert the cup cutter into the new starter hole. Bring the cup cutter to a perpendicular position by centering the level. Rotate the cup cutter left and right, exerting a downward pressure until the standard 7-inch depth is reached.

Please note that this should be done slowly while checking the level during the process. There are various devices



Items required for proper cup hole cutting – From the top: inside-bevel cup-cutter with level, cup puller, clean towel, cup setter, water bottle and a uni-par sand dispenser. Not pictured: a ball mark repair tool. Photo by Joel Jackson.

Recommended General Procedures

- Sharpen cup hole cutter weekly
- Carry the hole cutter in the cab of the utility vehicle and/or with a rubber mat to protect the cutting edge
- Use a container that is "edgeless" on the bottom to carry tools, sand, water, etc.
- Always wipe the bottom of the container before you arrive on the green
- If possible carry some green sand or purchase a ball mark tool that dispenses green Uni Par sand

and stops that can be used to indicate when the hole has reached the required depth when using the two-plug cutting method. I have found that by measuring 7 inches from the top of the scallops on the cutting shell and then painting a mark or applying a high visibility tape just above that mark gives me a good guide to achieve the proper regulation 7-inch overall depth.

Now slowly twist the cup cutter while at the same time lifting up on the handle to remove the cup cutter and plug from the hole. It is important to do this slowly to prevent soil from falling out of the cut cutter cylinder. If soil does fall out, carefully replace the cup cutter back into the hole. Once the cutter is all the way down in the hole, lift it up 1-2 inches and

The operator should have the following items when cutting cups:

- Pin sheet with hole locations
- Cup hole cutter with centering level
- Small water container
- Cut setter tool
- Small amount of sand
- Small clean towel
- Cup puller tool
- Ball mark repair tool
- Small flashlight
- Edgeless 5 gallon container

then gently push down recapture the soil that fell out. Again, slowly remove the cup cutter with a slight left/right rotation. Place the cup cutter into the container.

Clean off the inside and outside of the cup. With both hands insert it into the new hole rotating it left to right until the top of the cup is 2 inches above the green. With the water bottle apply a small amount of water around the outside of the cup. This will help keep the edge from drying out during the day. Also apply a small amount of water inside the cup. This can remove any residue that was not wiped out. It also helps clean the ferrule hole of any sand, dirt or debris that may cause the flagpole to bind. If you want to pre-check the flagpole angle to make sure its perpendicular and not leaning before using



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the cup setter, place the flagpole in the cup while it is still elevated slightly above the green. If it is leaning slightly, move it to perpendicular while in the cup and gently compress the area around the cup. Remove the flagpole and insert the cup-setter tool.

Insert the cup setting tool into the cup. Push down firmly until the rim of the cup setter touches the surface of the green. It is important not to force the cup setter. If you do not achieve full depth and surface contact with firm foot pressure, the hole was not cut to the proper depth. Remove the cup setter and cup and repeat Step 2. Remove the cup setter with a straight upward pulling motion. Do not twist or rotate the cup setter when removing it as it can damage the edge of the hole. Replace the flagpole and check to make sure it slides easily in and out of the ferrule.

To replace the plug in the old hole, clean off the cutting cylinder before you insert it into the hole. Place the cylinder into the hole making sure it is all the way to the bottom of the hole. Release the soil plug while keeping the cylinder contacting the bottom of the hole. Once the

soil plug is released, remove the cylinder from the hole. To ensure the soil plug is all the way to the bottom of the hole – reinsert and repeat the above steps. This helps prevent any possibility of the soil plug from sinking.

Remove any debris from the grass plug. Measure the thickness of the grass plug with your thumb. Use your thumb mark to measure how much, if any, soil you need to remove or add to achieve a level plug replacement. Gently insert the grass plug into the hole at a slightly tilted angle pushing in the front edge of the plug first towards the back edge that is inside of the hole. Push down on the plug so that it is level with the surrounding surface.

Use a ball mark repair tool to mesh the edges of the plug with the green's surface by inserting the tool about 1/2 inch in from the edge of the plug and twisting the tool outward. Sprinkle a small amount of water over and around the plug. This will help promote faster regrowth.

Finally, with very slight pressure tamp the plug with your foot. Sometimes a very slight twisting motion with your foot

will help mesh the edges. The tightness of the plug is critical. Test the surface around the plug for firmness. It should feel the same as the plug.

HOW TO PAINT CUP HOLES FOR TOURNAMENTS

The operator should have the same items utilized in daily cup hole cutting with the addition of the following items:

- Spray paint hole cover device
- Two cans of white hole paint
- Small cloth 8 x 8 inches
- A damp 24 x 24-inch overspray towel with a 5-inch diameter hole cut in the center

After the cup hole has been cut following the previous guidelines, the following procedures are to be used when painting the cup hole.

Prior to setting the cup with the cup setter, insert a small rag into the cup to cover the bottom of the cup.

Set the cup with the cup setter. Place the spray paint hole cover device into the cup

Place the damp 24" overspray towel around the cup hole cover device

Insert the spray paint can nozzle



Rules of Thumb

Left: Use your thumb to measure the remaining depth of the soil plug to the surface.

Below: By checking the "thumb length" on the side of the grass plug, you can judge how much soil to remove so the plug will fit properly. Photo by Joel Jackson.





Mike Hoffman demonstrates an easy way to check and adjust the straightness of the flag-pole by inserting it in the cup before it is set to its final depth. Photo by Joel Jackson.

into the hole cover device

Begin to spray by rotating the paint can 360 degrees clockwise. It is important to note the starting point for the spray pattern to avoid overlapping the paint. One 360 degree rotation is sufficient.

Remove the overspray towel. Remove the hole cover device and place it

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on the towel to avoid getting any drips on the green.

Rotate the small cloth that is in the cup so that it collects any paint that is on the cup interior. Remove the cloth from the hole

Following these procedures will give you better results in your hole cutting and painting operation.

We have a 5-6 minute video available that demonstrates the entire hole-cutting procedures step by step, from pacing off the hole location to cutting the hole and replacing the plug as noted in this article, as well as some other helpful tips to improve your hole cutting process. The video is available in English or Spanish. Email: flachoff@cs.com or call 352-223-1900.

Editor's Note: *Mike Hoffman has many years experience in the golf course industry in golf operations and maintenance. He is currently the golf course maintenance service manager at the Isleworth G&CC. Hoffman is responsible for daily course set up, detailing and quality control. Hoffman has authored articles for various golf publications and holds several patents for golf course tools including the AccuPro cup cutter and a cup cutting level.*



A moist clean towel with a 3 inch hole cut in the center catches any overspray when painting tournament cups. A small cloth in the bottom of cup during painting is used to clean the sides of the cup as needed. Photo by Joel Jackson.



Sanding Tool

The UniPar sanding tool easily and quickly dispenses green sand to fill ball marks on the green. Using the UniPar tool like a pepper mill a light application of green sand can be made to blend in the edges of the replaced plug. Photos by Joel Jackson.

