Rebuild or Resurface

Greens must be rebuilt every 15 to 20 years, even those of USGA method construction – or do they?

BY BUD WHITE

The architect has completed the green complex reconstruction plans, including the long-range plan for the entire golf course. The grass variety has been chosen for the putting surfaces. A high-quality sand has been identified and the rootzone mix has been evaluated by an accredited lab. Bids have been put out and returned, and a contractor has been selected. Rebuilding the greens will cost $655,000, and they will be closed for about nine to ten months.

Many courses have undergone this process, but in this case, did the course officials consider resurfacing instead of rebuilding? This is a fair question, and resurfacing may be a feasible alternative.

Nearly all golf courses eventually face the decision of renovating greens to improve playability and agronomic performance. Many courses today are confronted with this dilemma, even with 10- to 20-year-old greens built to USGA guidelines. A resurfacing option may be available for these courses, costing as little as 20% of the cost of total rebuilding. Although total reconstruction is often the mindset, it is not always necessary.

Research has shown that greens built to the USGA method maintain their original integrity below about the 4-inch depth many years after construction. It is the upper 3- to 4-inch zone that undergoes a drastic change in composition in the field with age. An increase in silt and clay from topdressing, wind movement, or sometimes through dissolved solids in irrigation water, creates this change in the upper zone. Organic matter (OM) buildup, however, is the primary effect that leads to poor infiltration, a tendency for black layer, increased algae on the surface,

Careful observation and testing are needed to determine whether a green must be rebuilt or only resurfaced.

poor rooting, an affinity for localized dry spot (LDS), and soft playing surfaces. This zone also can remain quite wet because organic matter increases water-holding capacity. This problem is located in the top 4 inches of the green and is not a profile/drainage system problem. If the greens were originally built to USGA specifications and were properly managed over the years, the surface layer can be replaced or modified to put the putting green system back into as-good-as-new working order.

How is the "rebuild vs. resurface" decision made? This step-by-step decision-making process includes:

- Digging test holes in greens to evaluate the integrity of the drainage system and profile.
- Correctly taking undisturbed soil cores.
- Sending sand samples from several sources to the lab along with the cores.
- Utilizing lab services to evaluate undisturbed soil cores.
- Deciding on a surface renovation procedure.

WHERE TO START

Resurfacing is a very effective option for courses that have older greens built to either USGA or California specifications. A scientific and systematic testing process is essential to ensure that your greens are candidates for successful resurfacing with long-term benefits. For poorly built greens, resurfacing alone is a temporary or *Band-Aid* approach, but it can improve performance for three to five years. Some courses have utilized this approach to improve the greens temporarily and optimize time to raise money and develop a long-range plan before spending reconstruction dollars.

As mentioned earlier, many golf courses with well-built older greens find that the rootzone mix below the 3- to 4-inch upper zone still functions the same as when it was installed, but that upper 3 to 4 inches becomes unacceptable over time. When the lower portion of the rootzone is tested by an accredited lab and found to be within specifications and when the drainage system is

Deciding whether to rebuild or resurface a green should be based on several steps. One is to evaluate the integrity of the drainage system. Here, a test hole was dug on the high side of the putting green and water was added directly to the gravel blanket.

intact, the club can choose the option of green resurfacing instead of full renovation to restore the greens back to their original condition.

This explains why rigorous aerification and topdressing is so vital to the health and life of turf and greens. Properly done, aerification can lengthen the *useful* life and performance of a green. The newer bentgrass and bermudagrass putting green grasses produce substantially more thatch and require more aeration. When organic matter accumulation becomes unmanageable, resurfacing or reconstruction is necessary.

During the renovation decision process, it is important that greens be evaluated for external growing conditions, because reconstruction alone will not solve a problem such as poor air circulation or excessive shade. The *Green Section Record* article "Helping Your Greens Make the Grade," by Jim Moore, March/April 1998, which can be accessed online at http://www.usga.org/turf/articles/construction/greens/make the grade.html, is an excellent scorecard that should be utilized on difficult green sites to make sure all external factors are addressed. An important factor is the adequacy of the greens' irrigation system, which often is lacking.

Detailed testing is an essential investment in time and lab costs to ensure successful renovation. This procedure monitors the aging process of the roootzone and evaluates the effectiveness of the aerification and topdressing program. Test holes dug in existing greens can measure the function of the gravel blanket and check water flow through the drainage system. This also helps locate the exhaust end of the drainage system if all outlets have not been found.

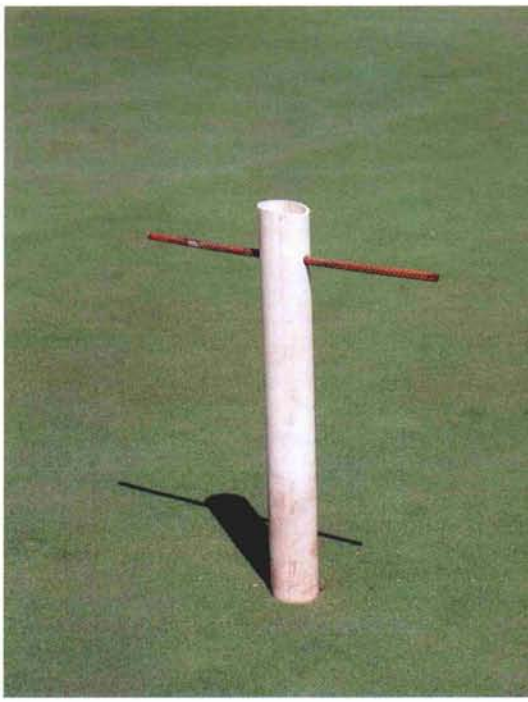
It is best to dig this test pit in the high side of a green so the cleanliness of the gravel blanket can be checked as water works its way through the gravel blanket, into the drain system, and eventually out of the drain outfall pipe.

LAB WORKS

Undisturbed soil core samples are taken by driving a 3-inch PVC pipe through the green profile and gravel blanket and into the subgrade. To remove the core, drill holes in the top of the pipe, put a piece of rebar through the holes, and pull the pipe out of the green. The pipe is then sealed on both ends and sent to an accredited lab for an undisturbed core evaluation. The lab will test the profile as it exists in the field, as well as the upper 3 to 4 inches and the lower 4 to 12 inches. The results help determine if the green profile is functioning properly and if it still meets guidelines below a certain depth. This is an excellent test for tracking the aging process of greens.

Along with the undisturbed core samples, the superintendent must send a sample of the sand expected to be used for the resurfacing. Ideally, the sand source will be the same one used when the greens were constructed, but this is often not the case. If there are questions about sand quality, or if a course is shopping for different sand sources for price, then multiple samples can be sent to the lab for evaluation. A gallon of each sand should be sent, along with a letter of explanation regarding your resurfacing plan. Contact the lab director prior to sending the samples so he/she is aware of your project, and provide some history and background to assist with the evaluation process. The lab will also provide sampling recommendations and shipping details.

The proper procedure for sampling sand, as for any rootzone or topdressing material, is detailed in the "Quality Control Sampling" brochure, available through your USGA Green Section office. Good quality control is essential for establishing the initial sand quality, and regular monitoring must be carried out as loads are delivered throughout the renovation process.



Undisturbed soil core samples help determine 1) if the green profile is functioning properly, 2) if it still meets guidelines below a certain depth, and 3) effects of the aging process. Cores are taken by driving a 3" PVC pipe through the green profile and gravel blanket and into the subgrade. The undisturbed core is sent to a lab for analysis.

GREEN REDESIGN

In the past, it was common for architects to utilize the rootzone mix instead of the sub-base for surface contour design. This practice does not adhere to the USGA method for construction, which requires that the sub-base mirror the finish grade contour and the rootzone be a consistent 12" ± 1" in depth. Therefore, rootzone depth validation should be conducted with probes to ensure a uniform rootzone depth. Only very minor modifications, if any, can be made to soften contours when resurfacing. If the golfers are happy with the existing contouring, then the upper 3 to 4 inches of the rootzone mix can be removed and a sand or mixture should be applied, making sure it is compatible with the existing rootzone mix. Rototilling may or may not be utilized (discussed

Over time, golf course greens change composition in the upper profile. The new profile (above) is from an eight-month-old green that was rototilled and resurfaced. The aged profile (right) shows the aeration history in the profile of a 12-year-old green.

later). The surface is then firmed, floated (smoothed), sterilized, and replanted.

The recommended standard today is a maximum of 3% slope on putting surfaces that will be maintained at a green speed approaching 10 feet as measured by the Stimpmeter.® A high percentage of older greens are too severe in slope and contouring for the increased speed demands of today's golfers. Existing slopes must be carefully evaluated and measured to stay within this guideline if at all possible. Severe slopes and faster greens are a recipe for disaster.

DECIDING ON A PROCEDURE

There are several ways to proceed with a resurfacing project.

- Thoroughly core aerate prior to sod removal and fill the holes with the replacement sand. Many superintendents double or triple aerate. Then, remove the sod to the 2- to 2½-inch depth, fill the void with the replacement sand, and float the green. Sterilization, final smoothing, and replanting complete the resurfacing. Deep-tine aeration or drill-and-fill can be utilized to penetrate the entire zone to more thoroughly

eliminate deep layering. Sand is introduced 8 to 10 inches into the profile, versus 3 to 4 inches by conventional aeration only.

- The above procedure has also been utilized when resodding greens. Ideally, the sod is cut as thick as possible to remove more of the organic mat layer. Coordination with the sod producer is essential to ensure that the new sod is cut at the same depth as the sod being removed. After sod removal, the surface is lightly raked for smoothness, sterilized, and the new sod is installed.
- Remove the organic layer 2 to 4 inches deep, depending on the depth of the OM accumulation, and fill the created void with the replacement sand. The profile is tilled 6 inches deep to eliminate any layering that may still exist. This can be done quite effectively and uniformly by removing the upper 4 inches, followed by installing the replacement sand, rototilling the green in multiple directions approximately 6 inches deep, refloating, and firming. The new surface can then be inspected by the architect before planting to insure that the original contours are maintained.

Special Note: The turf on the collar should also be removed as part of the renovation. Sterilizing the collar provides a buffer for keeping *Poa annua*, bermudagrass, or other offensive grasses out of the green. The collar is also used as a transition, or tie-in, to the green surrounds and should be as seamless as possible. This cannot be done at the green edge.

As noted earlier, not all greens need to be rototilled. Many green renovation projects have been successful with thorough aeration prior to sod removal, topdressing to fill the holes, removing the sod, and reinstalling the replacement sand or sod without any disturbance to the profile below the sod layer. Light hand raking prior to new sod installation is needed, of course. Aeration must be deep enough, however, to completely

The collar should be included with putting green resurfacing to maintain green purity and a seamless tie-in to the surrounds.

reach through the layer of OM buildup. The OM depth depends on the age of the green, cultural management practices, and the growing environment, all of which can affect the rate of accumulation.

When an area is rototilled, firming and floating procedures must be implemented to prepare the seedbed for planting. Green contours can be lost without careful rototilling procedures, and new surfaces should be inspected and approved by the architect prior to planting.

Consequently, the best method for preserving contours will have to be considered on an individual basis. Both of these methods, rototilling or not rototilling, can be successful. The lab can assist with recommendations about which method might be better for your greens based on the test performance of the undisturbed soil cores.

Green contours can be lost without careful rototilling procedures. One method is to leave sod strips during rototilling and sand replacement to help maintain the contour details.

Firming and floating the finished product is a critical part of the renovation process, just as it is with new construction. Thorough applications of water are needed to maintain good soil moisture while firming and floating. Many courses contract this work out, as a quality golf course contractor is knowledgeable about the best procedures for firming and floating greens. If this work is done in-house, it is important for the superintendent to pay careful attention to preparing a firm and smooth seedbed.

A good rule of thumb is to firm and float the seedbed until the average-size person can walk across the green without leaving a footprint greater than ¼-inch deep. Again, watering must be included in the process to achieve appropriate firmness. To reiterate, collars must be included in the sterilization process. This also allows *Poa annua* and/or bermudagrass to be cleared from the collar to prolong a weed-free putting surface.

Total renovation is not the only alternative for improving green quality. Scientific and dependable methods are available to evaluate older, yet well built, greens to determine the quality of existing construction. Resurfacing has not been used frequently in the past, but many courses save 70% to 80% of what it would cost for complete reconstruction.

Moreover, the anticipated nine- to ten-month downtime is substantially reduced to four or five months, on average, due to the greatly reduced scope of work. This can significantly reduce revenue loss and golfer inconvenience. Your regional USGA Green Section staff agronomist can help any golf course work through this evaluation process and assist with quality control procedures during testing and renovation. Knowing the construction quality of your greens and researching renovation alternatives with an accredited lab could save your course money and downtime, and create much improved putting surfaces.

BUD WHITE *is a senior agronomist in the Green Section's Mid-Continent Region.*