

Golf Course Maintenance Equipment 101

Is your golf facility equipped for the past or the present?

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An impressive array of maintenance equipment and specialized tools is required to meet expectations for course conditions and playability from today's golfer.

A diverse collection of specialized equipment, vehicles, and tools is paramount to providing desired golf course playing conditions. Unless you've worked on a grounds crew at a golf facility, many of you might be saying, "Well, I know they have a bunch of lawn mowers." There is much more to it than that.

As expectations for golf course conditioning have changed over time, so too have the sizes of equipment fleets. Never before have so many specialized pieces of equipment and tools been necessary for golf course maintenance and conditioning. In this article, we will review what a typical 18-hole golf facility has (or should

have) in its equipment inventory. Obviously, the size of the equipment fleet and the individual items in it will vary considerably by geographic region, site conditions, golf facility type, budget, and expectations for course conditioning. Regardless, I think you will be surprised at what goes into the care of a golf course.



At least four to six and usually eight or 10 walking greens mowers are needed at 18-hole facilities that are committed to hand-mowing their greens on a daily basis.

It is common for golf facilities that walk-mow greens to also have a utility vehicle and trailer assigned to the operator to get around the course and from green to green.



Triplex mowers are commonly used to mow greens, tees, and approaches, but they can also be used for intermediate roughs and even primary roughs around greens. Given the different mowing heights for each area of the golf course, separate mowers are needed for every use.

MOWING EQUIPMENT

Mowing consumes the most amount of time in day-to-day maintenance of a golf course. Because very few mowers can overlap from one area of the course to another, separate mowers are required for each area of the golf course. Of all the mowers, arguably the most important are greens mowers because they prepare the putting surface, the most important playing area of the golf course that, not surprisingly, is also the most intensively managed with lowest height of cut (HOC).

Putting Greens Mowers: Mowers for putting greens come in basically two varieties — walk-behind mowers or triplex mowers (riding mowers with three cutting units and three wheels). Walk mowing greens is preferred because it produces the best quality of cut and highest degree of putting green conditioning. Unfortunately, walk mowing requires considerable time and resources to complete. Riding triplex mowers are larger and much more efficient but, since it is extremely difficult set three cutting units to yield the exact same quality of cut, putting quality and appearance of the green can be affected.

All greens mowers, as well as the majority of mowers on the golf course, are reel mowers. Homeowners are likely more familiar with rotary mowers used for lawns and many sports fields. Rotary mowers, or typical lawn mowers, have one steel blade (sharpened on both ends) mounted horizontally underneath the mower deck, and as the blade rapidly turns it creates a vacuum effect to stand up the grass blades and cut them with the horizontally rotating blade. Rotary mowers create an impact cut similar to a scythe or axe. As a result, even the sharpest blade results in some tearing of the leaf blade, which increases significantly as the blade dulls.

A putting green reel mower has between nine and 15 blades on a single reel that spins vertically and uses a scissoring action against a fixed bedknife to cut the grass. The reel mower snips the grass, cutting each blade like a pair of scissors to a precise HOC. When mowers are maintained and set properly, this

makes for a very clean cut of the leaf blade, and this helps in maintaining a healthy turfgrass plant. The lower the HOC desired, then the more blades the reel should have. For a general overview of reel mowers, as well as a look at their history in the industry, please see [Reel Mower Basics](#).

Greens mowers are designed to mow especially low to provide a smooth putting surface and meet desired green speeds. Over the years, the HOC on putting greens has been lowered considerably from around 0.250 inch decades ago to around 0.125 or even lower today. Properly calibrating greens mowers is a daily job given there is so little margin for error at such low HOCs. Verifying the HOC and checking the quality of the cut is primarily the job of the equipment technician or mechanic. Measurements are now usually taken in increments of thousands of an inch as superintendents continually adjust mowing HOC throughout the season, depending on the time of year, the growth of the turf, and environmental stress. At present, typical mowing heights can range anywhere from 0.188 inch (3/16 inch) all the way down to 0.090 inch (just less than one tenth of an inch). Obviously, the lower the grass is cut, the less leaf surface is left to support plant health. Therefore, there is often a direct correlation between lowering the HOC and the ability of the turfgrass plant to tolerate stress.

For golf facilities where play typically goes off early in the morning on both the first and 10th tees, the number of greens mowers may need to be doubled so that maintenance can be completed ahead of play on both nines at the same time. This is a concept that is often misunderstood when the superintendent is asked to set up holes 1 and 10 before play each morning. More mowers (or at least more time to complete mowing) are also needed for golf courses that have a significant number of outings with shotgun starts with play beginning simultaneously on several if not all 18 holes. Yes, it allows all groups to finish at approximately the same time, but it often stretches the abilities of the maintenance staff because it requires that



Spring flushes of turf growth or mowing after heavy rain periods can result in unwanted amounts of clippings. More frequent mowing keeps clipping production minimal, almost invisible to the golfer, and clippings do not require removal.

the entire golf course be ready for play at once.

The number of greens mowers needed on any particular golf course depends on many factors, some of which include the size of the greens, transit times throughout the course, the level of maintenance desired, and the maintenance operating budget. The same is true for all other equipment, and we will continue discussing the different types of equipment needed, not necessarily how many of each.

Greens Collar Mowers: If your golf course has collars around putting greens, a second reel mower is likely required because the HOC will be higher than that of the putting surface. Collar mowers are often walking reel mowers with a width between 24 and 36 inches. Depending on golf course design and intent of the architect, the collar may be wide enough so that a triplex mower may be used. Sometimes the HOC for green collars is the same as the HOC for teeing grounds or approaches, so the same mower can then be used for those playing surfaces as well.

Note: Mowing of greens and collars likely requires the collection of clippings so they do not interfere with ball roll. When mowing other areas of the course, clippings can be left and are a good source of nutrients for the turf.

Tee Mowers: Tee mowers can also be either triplexes or walk-behind mowers, depending on the overall acreage of teeing grounds, the turning areas available (more room is needed to turn triplex mowers), budget, and the visual aesthetics desired at the golf course. During the growing season, teeing grounds are usually mowed between three and five times per week.

Approach Mowers: These mowers may either be triplexes or walking units, depending on labor, area of the approaches, and golf course maintenance standards. Many have gone to walk mowing these areas to reduce the damage caused by turning triplexes in tight areas, such as between bunkers or near greens.

Fairway Mowers: Fairway mowers are much larger than the triplex units discussed to this point. Typically, fairways mowers are four-wheel machines

with either five or seven cutting units. These too are reel mowers. Many golf courses mow fairways three or four days a week during periods of active turf growth to provide desired playing conditions and to prevent the grass from getting too long and having to deal with excessive clippings.

Intermediate Rough Mowers: If your golf facility has an intermediate cut of rough to transition between fairways and primary rough, yet another mower is required. Depending on the turfgrass variety, these mowers can be either reel (generally a triplex unit) or rotary mowers (generally a four-wheeled unit). The idea of the intermediate rough is to provide contrast, or definition, between the fairway and rough and also to lessen the penalty for golfers who just miss the fairway with their tee shots. Mowing the intermediate rough generally requires one pass with this mower around the fairway perimeters. Don't let this one additional mower pass deceive you, however, because to complete the circumference of 18 holes can be a

four- to five-hour task for one person. Intermediate roughs are generally mowed between three and five times weekly when the turf is actively growing. If the same HOC is used on other areas of the golf course, such as courtesy walks or the first cut of rough around greens, the same mower can be used for more than just the intermediate rough.

Primary Rough Mowers: The rough usually occupies the largest acreage of mown turf on a golf course. Like intermediate rough mowers, either reel or rotary mowers are used for the primary rough, although rotary mowers are most common because they can be much larger and more efficient for large areas. Because primary rough is not one of the highest-priority playing areas like greens, approaches, tees, and fairways, roughs are usually not mowed in the morning prior to play. Rather, rough mowing is often a secondary job once morning maintenance is complete. This explains why you often see large rough mowers during play in the afternoon. The

primary rough at your golf facility may be mowed at different frequencies. Because most golfers don't hit greens in regulation, some superintendents may mow the roughs around putting green complexes (often referred to as "surrounds") or around landing zones in fairways as many as three times a week. As for the rest of the primary rough that does not come into play as often, the rough may only be mowed once or twice a week, depending on growth. Concentrating on high-play areas makes golf balls easier to find and easier to advance. This is a great way to improve playability and pace of play, especially for high-handicap players.

For primary rough areas that rarely come into play, such as around tees, around trees between holes, or along the outer edges of the property, mowing can typically be performed just once a week.

Note: While maintaining multiple mowing heights for turf throughout the golf course can create a beautiful and manicured appearance, it requires more time and resources to achieve. Every playing area with a different height of cut requires different mowers and operators. So, if you're looking for more economic sustainability, consider minimizing the number of mowing heights throughout the golf course.

CULTIVATION EQUIPMENT

The next group of tools required for any course is the equipment used for turf cultivation. Unlike a farmer who can till a field every year before planting an annual crop, golf course superintendents must address their cultivation in a different manner. Much to the displeasure of golfers (and maintenance staffs alike), routine aeration is necessary. Aeration can be performed for a number of reasons, with the most common being to reduce soil compaction, manage thatch and organic matter accumulation, improve water infiltration, promote gas exchange, and provide avenues in the soil for deeper roots. While no one likes putting on greens that were recently aerated, it is important to understand that this practice continues to be critical in providing healthy turf and quality putting surfaces.



Three different models of mowers set to three different mowing heights are required to maintain the primary rough, intermediate rough, and fairway. Intermediate roughs can look great, but they require an extra mower, an extra operator, and an additional four to five hours for an 18-hole golf course each time the intermediate rough is cut, which is usually done between three and five times per week during active turf growth.

Walk-Behind Aerators: Aerators come in many forms and sizes, as do the aeration tines that can be fitted to the aerator. Modern walk-behind aerators for putting surfaces offer tremendous flexibility in regard to tine options, tine spacing, aeration depth, and ground speed of operation. The percentage of total surface area impacted — a combination of tine diameter and spacing — has been dramatically increased in the past two decades. Walking aerators are not only used on putting greens, but also on collars, approaches, and tees.

As already mentioned, modern aerators offer multiple adjustment possibilities. With older models, only hole spacing of 2 or 4 inches could be achieved. With current models, there is much more flexibility and aeration holes can be spaced as closely as 1 inch by 1 inch. Furthermore, blocks of smaller tines and tighter hole spacing can be retrofitted to modern aerators for even more options.

The tines, which can either be cylindrical or knife-like, come in different sizes and shapes, and can also be changed depending on needs of the golf course. Hollow tines remove a soil core and bring it to the surface. In doing so, core aeration is effective in removing organic matter, thatch, and soil from the upper rootzone of the putting surface. Core aeration is also very effective in relieving soil compaction. Solid tines do not bring any soil or organic matter to the surface, but they simply create holes through the canopy of the turf into the soil to encourage water infiltration and gas and air exchange at the rootzone of the turf plants. Small solid tines, sometimes referred to as needle tines or pencil tines, can be used when venting greens is required to provide turf some relief from summer heat. You have most likely seen evidence of venting greens at your golf course during midsummer. The solid tine holes or narrow slits are usually small enough that they do not affect ball roll on a green, especially once the greens have been rolled or a light topdressing (spreading of sand or sand/soil material) has been applied. This procedure is so minimally invasive that golfers might

Modern walk-behind core aerators are extremely efficient and come with a variety of attachments and settings that give turf managers plenty of options when aerating.



This older drum aerator can still be used, but it does not have the ability to relieve compacted soils as well as modern hydraulic-driven units.

Vertical mowing, or verticutting, is an important cultivation practice to control thatch at the turf surface.





A large capacity, twin spinner-type topdresser applies sand at a light rate over a putting green.



Modern sprayers have numerous features and options to maximize the application of fertilizers and pest control products on a golf course.

not even be aware that it has been performed. However, it is a key component of turfgrass maintenance and should be performed regularly.

Tractor-Mounted Aerators: Large tractor-mounted aerators are utilized in large areas of turf, such as fairways and roughs. With many hole spacing options available on modern tractor-mounted units, the need to walk aerate fairways is becoming a thing of the past. The new tractor-mounted aerators do a great job. If your golf course still has one of the old drum-type aeration units, it may be time for an upgrade to a new aerator that is more effective and efficient in improving soil conditions. This leads to improved turf

performance and better playing conditions.

Other Aerators: Over the years, there have been many other aerators added to the market. Some utilize high-pressure injection with either water or sand. Other aerators utilize spinning drill bits to create very large holes to a depth of nearly a foot. Other aerators utilize vertically rotating blades (see verticutting in the next paragraph) or knives to cut vertical slits into the soil. These aeration options do not replace conventional aeration but complement it. These other aeration options also are commonly contracted out to companies that specialize in the work, although some golf facilities do

purchase these specialized aerators if they utilize them enough to justify the purchase.

Vertical Mowing Units: Most homeowners know this as “power raking” or “dethatching.” You may have a landscaper perform this periodically on your own home lawn. The goal of vertical mowing, or *verticutting* as it is commonly known, is to remove some of the organic thatch buildup from the surface of the turf without interrupting the soil beneath the turf. The process involves tightly spaced rotating blades that cut vertically into the turf. Golf courses that have an excessive thatch or organic problem in their turf canopy (think large, deep ball marks on a



In the world of golf course maintenance, utility vehicles are the “jacks of all trades” as they can be used throughout the day transporting crew members, hauling tools or materials, or even operating other equipment like this small topdresser.



Several project tractors, dump trucks, and a backhoe are typically necessary to carry out many of the annual maintenance activities on a golf course.



Large pull-behind blowers can be used for debris removal of all kinds around the golf course.



When it comes to topdressing equipment, many golfers don't think about other equipment needed such as this drag broom to sweep sand into the turf canopy of a putting green.



Specialized equipment like this large turf vacuum, or sweeper, can make quick work of clearing debris following core aeration on fairways or in the fall when the time comes for leaf cleanup.

green) can require years of deep verticutting, core aeration, and sand topdressing before organic matter is reduced to an appropriate level. Verticutting, especially deep verticutting, can produce an amazing amount of debris to clean up, but this practice is an important element of proper turf maintenance.

TOPDRESSING EQUIPMENT

After aeration is performed, topdressing is the next step. Nearly every golf course topdresses its greens, collars, and approaches. Depending on the turfgrass species and soil composition, topdressing may also be required on tees and fairways. What is topdressing? In most cases for golf course applications, topdressing is the even application of sand across a turf surface that is then usually lightly broomed or irrigated to incorporate the material into the turf canopy. Topdressing is utilized to fill aeration holes following core aeration. It is also used on a light and frequent basis throughout the active growing season of the turf on putting greens to help smooth the surface (for true-rolling putts) and keep pace with ongoing organic matter accumulation of the actively growing turf. Not only is diluting thatch accumulation with sand important for performance of the turf, but sand also serves to firm the playing surface. Your golf course superinten-

dent may lightly topdress greens and approaches as frequently as once a week during periods of heavy turf growth. Topdressing also requires specialized equipment. Topdressing units come in either a belt-driven drop-type model or the newer spinning disc variety. These newer twin-spinner units throw sand at much lighter rates over a broader area, making light and frequent topdressing much faster. They are typically towed behind a heavy-duty utility vehicle or tractor because of the excess weight of the sand.

FERTILIZATION AND PEST MANAGEMENT

Applications of fertilizers, herbicides, fungicides, insecticides, or plant growth regulators require specific equipment for proper application. Most of these products are applied in one of two forms: granular or liquid. Granular products are applied with various spreaders, from small drop spreaders or rotary spreaders pushed by hand for putting greens to large rotary spreaders and pendulum-type spreaders for fairways and roughs that are mounted to tractors or heavy-duty utility vehicles. Fertilizing golf course turf is a very



Major cultivation practices require multiple pieces of equipment. Here, for the cleanup of aeration cores from fairways, a heavy-duty utility vehicle operates a sweeper that empties the collected soil cores into a large material hauler trailer pulled by a tractor.

specific science. The turf needs to be fed just enough for steady growth to encourage healthy plants and promote recovery from damage caused by traf-

fic (foot and cart), divots, ball marks, etc. Care must be taken to not apply more fertilizer than is needed. The superintendent's goal is to make specialized fertilizer applications to produce steady, even growth of the turf throughout the season. Plant nutrition is based on yearly soil testing, and sometimes plant tissue testing, so only the needed nutrients and protectants are applied to the turf.

Control of diseases and pests is also necessary for highly maintained turfgrasses on golf courses. Applications and treatment options vary by time of year and from course to course. The ability to properly apply products is paramount, and improvements in modern turf care products require improvements in application techniques as well. Manufacturers have worked hand in hand with product suppliers in order to make this possible.

Spraying is typically the mode of operation for liquid products. It is also utilized for spoon feeding (frequent, low-rate fertilizer applications) of putting greens and application of plant protectants and plant growth regulators. Many of the newer plant protectant products are highly concentrated and



Rollers are becoming more popular for their value in smoothing putting surfaces following aeration and achieving desired green speeds. When the turf is suffering from heat stress in the summer, rolling can even be used periodically as an alternative to mowing because it causes less mechanical injury to the turf.

specialized. The result is much less product actually being applied when compared to products in the past. This certainly makes it important to have a good, reliable sprayer in the maintenance fleet to ensure the proper volume of water is tank-mixed with spray products. The volume of water applied on a typical spray operation is between 1 and 2.5 gallons of water per 1,000 square feet. The appropriate amount of product is then mixed into the tank and the application is made to the desired turf area. Golf courses will usually have more than one sprayer, one for smaller areas such as greens and tees

and another larger sprayer for fairways and roughs. For regions of the country that have greens planted with a cool-season grass such as bentgrass, while the rest of the course is planted with a warm-season grass such as bermudagrass, it is extremely important to have a separate sprayer for the greens.

Many of the products that can be used on warm-season grasses are harmful to cool-season grasses. Since complete removal of such products from the sprayer is difficult, having separate sprayers is strongly advised.

In areas of the country that require more frequent spraying due to higher

pressure from diseases, weeds, or insects, it is typical for golf courses to have three or more sprayers in the fleet. As more and more liquid-applied products are developed, spraying may become even more commonplace than it is now, likely requiring multiple sprayers for any one golf facility.

TRANSPORTATION OF CREW, TOOLS, AND MATERIALS

Getting staff members, tools, and materials around the golf course in a timely manner requires utility vehicles. Many of these are lightweight, two-person vehicles that can carry some hand tools and possibly tow a greens mower on a trailer. There is also a need for more heavy-duty utility vehicles when hauling sand, gravel, soil, or sod around the golf course. These units can handle the excessive weight of materials and they are built to last a long time. Too often, however, golf facilities with tight budgets are trying to use lightweight vehicles to haul heavy materials around the course. Light utility vehicles are not designed for hauling heavy materials or pulling topdressers loaded with sand. Use of these light vehicles for heavier-duty tasks will lead to mechanical failures and shorten the vehicle's life expectancy. Using equipment to perform tasks that it is not designed to do will also diminish productivity and can be dangerous to the operator. The lighter utility vehicles should be used for early morning course setup; mowing greens, tees, or approaches with walk-behind mowers; and spot watering of greens before play begins. After initial course setup, you may often see the crew driving these same vehicles around the course to take care of other activities, such as hand-watering hot spots, emptying trash cans, refreshing ball washers and coolers, etc. Every golf facility needs a combination of lightweight and heavy-duty utility vehicles.

TRACTORS AND OTHER LARGE EQUIPMENT

Tractors are specialty equipment that can be used for many of the operations discussed in this article. Tractors with 40 to 60 horsepower are usually

Vast arrays of hand tools are required in the care of a golf course. Course maintenance is not all done from the seat of a mower.



Routine tree maintenance should be an annual event for golf facilities where trees impact turf performance or interfere with playability.



required for large-scale aeration, top-dressing, and project work. For a moment, think about aerating and cleaning up debris from 30 acres of fairways. One tractor is utilized to run the core aerator, a second tractor may be utilized to break up or process the aeration cores that have been brought to the playing surface, a third tractor may be necessary to run a large sweeper or blower to clear debris from the surface, and yet another is often needed to apply sand topdressing. That's at least three tractors, and likely a fourth, needed to complete one golf course operation over many acres. Sometimes green committees and golfers feel that the superintendent has more than enough tractors. In visiting hundreds of golf facilities during on-site agronomic support visits, I would say most golf facilities are an average of about one tractor short of what is needed to complete projects in a timely manner.

Other large pieces of equipment used on a regular basis include a backhoe with front-loading bucket and a rear-digging implement, trenchers, dump trucks, and pickup trucks. Skid steer units with rubber tracks are a popular piece of equipment on many golf facilities as well.

MISCELLANEOUS EQUIPMENT

Miscellaneous equipment required for daily golf course maintenance can include many things, and the tools needed largely depend on the expectations for the golf course, topography of the golf course, and golf course design and features. Assuming your golf course has bunkers, and most do, bunker rakes are the most common example of miscellaneous equipment. This includes both mechanical and hand rakes.

Blowers and sweepers are also common examples of miscellaneous equipment. They are used for cleaning aeration cores off playing surfaces, removing leaves in the fall, or even maintenance of hard-surface parking lots around the clubhouse and other buildings. Blowers can be handheld gas blowers for removing debris from small areas, backpack blowers that have a higher volume of air for slightly



Hydraulic lifts are utilized in the maintenance facility to efficiently service, repair, and calibrate numerous pieces of equipment.

larger areas, push blowers, pull-behind blowers, or tractor-mounted blowers for removal of debris from large areas.

Side-to-side rollers, sometimes referred to as speed rollers, are dedicated to selective rolling or smoothing of the putting surface following aeration and are becoming more and more popular in golf course maintenance. With the evolution of rollers, the ability to raise putting green heights has allowed for healthier turfgrass plants, while still providing desired green speeds and smooth ball roll. Rolling units can also be added to triplex mowers (the mowing units are simply removed and replaced with roller cartridges), and this works well for many golf facilities, although they are not quite as effective as side-to-side rollers. The old-fashioned water-filled push rollers can be used for sod repairs, but they are not often seen used for rolling greens.

A sod cutter is another critical piece of equipment needed for turf maintenance. Sod cutters can be utilized for project work and repairs of damaged areas. Several hole cutters are also necessary for cutting new hole locations, and keeping them sharp requires routine sharpening. Rotary push mowers, similar to those owned by homeowners, are also needed because

they are used for clubhouse grounds and in isolated areas of the golf course. Trimmers and edgers are other important items utilized on a daily basis in managing bunker edges, trimming around sprinkler heads and trees, and edging cart paths. Chainsaws and pruners are needed for tree trimming as needed and cleanup of debris after storms. Don't forget that chainsaws can also be utilized to remove trees that cause shade problems for turf.

A vast array of good-quality hand tools is also required. These include leaf rakes, landscape rakes, bunker rakes, brooms, picks, axes, numerous types of shovels, and small hand tools, such as pruners, hand trimmers, garden implements, etc.

SPECIALTY EQUIPMENT

A soil moisture meter is one of the newest tools being utilized on many golf courses around the country. Moisture meters allow turf managers to quickly measure the volumetric water content in the soil, and some even monitor salt content. These tools are critical in making daily irrigation decisions, and they help make everyone a better water manager. Making the most efficient use of water, thereby saving water, also reduces electrical power to run the irrigation pumps,



This type of maintenance facility cannot meet the needs for proper equipment care, nor does it provide adequate conditions for employees.

which is money saved. Moisture meters are a new tool in the superintendent's satchel, and every golf course should have at least one and preferably several of these units.

Other specialty tools include the USGA Stimpmeter® for measuring putting green speeds, and a digital level that displays the grade of the surface in degrees or percent slope. Digital levels are useful in determining potential hole locations and can eliminate placing a hole in an area that has too much slope for the speed of the green. See the article [Putting Green Speed, Slopes, and Hole Locations](#) for more information on choosing hole locations.

Large oscillating fans are becoming more popular because of their proven effectiveness in minimizing disease development and alleviating summer heat stress on putting greens established with cool-season turf species,

namely creeping bentgrass and *Poa annua*.

MAINTENANCE FACILITY EQUIPMENT

The maintenance facility or turf care complex itself is a place where many specialized pieces of equipment are also needed. To maintain a proper quality of cut on all mowers, whether reel or rotary, grinders are required for season-long sharpening. Reels must be kept sharp by the equipment maintenance staff for a clean cut of the turfgrass plant. Welders and torches are needed in the maintenance and repair of large equipment. A hydraulic lift is also necessary to provide full access when servicing, repairing, or calibrating mowers. An air compressor is important for powering air tools and filling tires. Steam cleaners are often used to keep equipment clean and running properly. Drill presses, drills, parts



Modern, well-designed maintenance facilities provide sufficient area for equipment servicing and storage as well as administrative duties and safe working conditions for employees.

cleaners, tire repair, and an assortment of other tools are also utilized in the day-to-day maintenance of golf course equipment. See the article [Turf Care Centers: The Heartbeat for Golf Turf Conditioning](#) for more information on what should be included in maintenance facilities.

PAYING FOR GOLF COURSE MAINTENANCE EQUIPMENT

So, how does your golf course pay for all this equipment? It is typical for a golf facility to have well over a million dollars' worth of equipment. No matter what each piece of equipment costs, it is only useful if it is operational. In response to a difficult economic climate in recent years, budgets have been reduced, and this often leads to delaying replacement of equipment until a later date. As older pieces of equipment and vehicles are retained well beyond their expected lifespan, the consequences are that outdated equipment is less reliable (leads to inefficiency in getting tasks finished), experiences more mechanical failures (leads to higher repair and maintenance costs), and is less effective (results in a noticeable reduction in course conditioning). Advancements in equipment technology have led to much greater productivity and efficiency with newer equipment. An operator is more efficient when equipment is not frequently breaking down. Newer equipment means less maintenance, fewer repairs, less fuel used, and increased reliability. High-use equipment, such as putting green mowers, tee mowers, and fairway mowers, needs to be replaced or turned over on a more regular basis than items like tractors or aerators that are used less frequently. A good superintendent will always put the interests of the facility and the golf course first. Sure, it is nice to have shiny new equipment, but if the golf course doesn't need it or funds would be better spent elsewhere on the golf course, then the superintendent won't ask for it. When your superintendent does ask for an upgrade of a piece of equipment, it is probably for good reason and you should listen.

Every golf course should have an equipment replacement strategy. This

should include a repair and maintenance schedule to track costs associated with annual operation of each piece of equipment, as well as identifying the life expectancy of each piece of equipment in the fleet. There are two basic ways of purchasing or procuring equipment for the golf course: purchasing or leasing.

Equipment Purchasing: Purchasing equipment outright is pretty self-explanatory. If there is a good capital budget and plan in place, paying cash is almost always the best option. Buying equipment on a loan, similar to a car or house, is an alternative. Loans are a good way to spread funds over a number of years and avoid huge financial hits up front, but they obviously cost more over the long term with accruing interest. Purchasing equipment offers the clear benefit of ownership, whether via cash purchase initially or at the completion of the payment period of a lease.

Equipment Leasing: Leasing is the second option. Leasing typically requires that the equipment be turned over at the end of the contract period. Sometimes leases offer a buyout, but more often the equipment is turned over and replaced with a newer, more efficient and reliable piece of equipment. As mentioned earlier, this would typically include greens mowers, fairway mowers, and other high-use items that accumulate many hours on the job each year. It may not often be advantageous to buy out one of these units at the end of the lease period, as the equipment has already been used for many years, has a high number of operation hours, and has reached its useful life expectancy. Leasing is a good way to immediately upgrade an aging equipment fleet if large capital expenditures are not possible for the facility at that time. The ability to finance leasing out of a golf course operational budget is what makes this option so attractive. A line item in the operating budget can be consistent from one year to the next and allows for accurate financial planning. If accumulating enough reserves in the capital budget to purchase reliable and properly functioning equipment outright is difficult, then leasing should be

considered. For more information on managing and funding your equipment fleet, please see the article [Fleeting Moments](#).

Caring for a golf course requires an incredible amount of highly technical and specialized equipment. It also takes an amazing amount of time to keep the equipment operational and

nance facility and explain why and how replacement of certain pieces of equipment will improve the playability, conditioning, and appearance of the golf course. If raising green fees or assessing the membership is needed to generate funding to upgrade an aged and worn equipment fleet, you now hopefully have a better idea of



Keeping equipment past its useful life expectancy decreases the ability of the maintenance staff to do their jobs efficiently. Regardless of whether equipment is upgraded through purchasing or leasing, a reliable equipment fleet is a must.

properly calibrated. Focused, regularly scheduled preventative maintenance is a must. Creating a simple Microsoft Excel spreadsheet allows the superintendent and equipment technician to closely monitor reliability and operational costs for each piece of equipment. The ability to sort and review equipment by age, price, life expectancy, etc., can go a long way toward proper planning for replacement, once yearly repair costs are understood.

CONCLUSION

Hopefully this article served as a valuable introduction to the most common types of equipment, vehicles, and tools needed to properly care for a golf course. Each and every golf facility will require different types and quantities of equipment, so comparing equipment lists from course to course may not be beneficial.

If you would like to learn more about the equipment needed in the care of your course, please contact your regional USGA Green Section agronomist. Furthermore, I'm sure your superintendent would be happy to show you around the golf mainte-

why modern and reliable equipment is important and where that money goes. Become knowledgeable of what is needed at your golf facility and be supportive in the upkeep and timely replacement of equipment so that you may enjoy the best playing conditions possible long into the future.

Author's Note: Equipment pictured in this article is not an endorsement of any particular manufacturer, model, or type. There are many choices for golf course maintenance equipment. What is the best fit for one golf facility may not be the best option at another. The superintendent knows best when it comes to determining the right piece of equipment for the situation and the golf course.

The author would like to thank Ty McClellan, manager, USGA Green Section Education, for his contributions to this article.

[DERF SOLLER](#) makes onsite visits to golf facilities in the Northwest and always makes a point to review the equipment fleet and maintenance facilities utilized in the care of each golf course.

Table 1. SAMPLE EQUIPMENT INVENTORY FOR AN 18-HOLE GOLF FACILITY

The following list of equipment has been compiled to meet the general needs of most 18-hole golf courses. Variations will occur in quantities needed, or specialty equipment may be necessary, depending upon many variables, some of which include terrain, golf course features and design, the level of maintenance desired, and regional requirements. (Table by Ty McClellan, manager, USGA Green Section Education)

AREA/USE	EQUIPMENT	NUMBER REQUIRED
Greens	Walk-behind putting green mowers	4-8
	Trailers for walk-behind green mowers	4-8
	Triplex putting greens mowers with grooming attachments	2-3
	Sets of vertical mowing reels for triplex mowers	2
	Walk-behind core aerators	2
	Side-to-side roller(s) (or sets of rolling attachments for triplex mowers)	1-2
	Tow-behind, heavy-duty topdresser	1
	Core harvester(s) or brush sweeper(s)	1-2
	Spiker or spiker attachments for a triplex mower	1
	Light-duty, cyclone topdressing machine	1
	Deep-tine aerator	1
	Approaches	Walk-behind mower(s)
Triplex mower(s)		1-2
Tees	Triplex mowers or	2-3
	Walk-behind tee mowers	4-6
Fairways	Trailers for walk-behind tee mowers	4-6
	Self-contained mowers with either 5 or 7 cutting units	2-3
	Tractor-mounted, deep-tine fairway aerator	1
Intermediate Rough	Heavy-duty topdresser/material handler	1
	Triplex mower or	1
Rough	Riding rotary deck mower (52- to 72-inch cutting width)	1
	Large, multi-deck rotary rough mower(s) or	1-2
	Tractor-pulled 5-gang reel unit(s)	1-2
	Riding rotary deck mower (52- to 72-inch cutting width)	1
Bunkers	Triplex trim mowers (for tee/green surrounds and bunkers)	2-3
	Mechanical bunker rakes (1 with front plow)	2-3
	Water/trash pump	1
Transportation/Utility	Hand rakes (or leaf rakes)	8+
	Heavy-duty utility vehicles	4-6
	Light-duty utility vehicles	4-6
Sprayers and Spreaders	Computerized sprayer (150- to 200-gallon size for greens)	1
	Large capacity computerized sprayer (250- to 300-gallon size for fairways)	1
	Backpack sprayers	2
	Hand-held, pump-type sprayers	2
	Rotary push spreaders	4-6
	Drop spreader(s)	1-2
	Large-volume fertilizer spreader(s) (rotary or pendulum)	1-2
Seeders	Tractor-mounted seeder	1
	Walk-behind slit seeder	1
	Drop seeder(s)	1-2
Tractors and Trucks	Utility tractors with PTO	2-3
	Skip loader with backhoe	1
	Dump truck	1
	Pickup truck	1
Utility Equipment	Large-area sweepers	2
	Tractor-mounted or pull-behind blower(s)	1-2
	Hydraulic equipment lift (in maintenance facility)	1
	Dump trailer	1
	Chipper	1
	Trencher	1
	Tractor-mounted slicer/seedler	1
	Sod cutter	1
	Walk-behind vertical mower(s)	1-2
	Small Equipment and Tools	20- to 24-inch rotary push mowers
String-line trimmers		4-6
Dew whips		4-8
Backpack blowers		3-5
Handheld blowers		2-4
Hole cutters		2-3
Portable soil moisture meters		2-4
Hoses and nozzles		4-10
Mechanical edgers		2-4
Chainsaws		2-3
Welder, torch, air compressor, power washer, Stimpmeter®, digital level, grinder (bedknife), grinder (reel), grinder (wheel), metal detector, wire tracer, parts washer, steam cleaner		1 each
Any number of rakes, shovels, brooms, prybars, picks, etc.		X