

Superintendents share their sharpening and grinding tactics so that your colleagues will be green with envy about your greens.

LOOK sharp!



Like anything else, the methodology in keeping reels sharp varies from course-to-course.

“How are the greens?” Invariably this is the first question one golfer will ask another when discussing a particular golf course. In this one little four-word sentence lies a dozen other unspoken questions with regard to speed, roll, size, firmness and even color.

What the golfer doesn't realize is the amount of maintenance that factors into the answers to these questions. Aside from your fertility and irrigation practices, the quality of cut from your greens mowing equipment can make all the difference between enticing a one-time customer and securing a repeat player.

Reel maintenance has been one of the most evolving practices of turf maintenance almost since the dawn of golf. Commercial reel mowers date back to the early 1800s and needed to be pulled by horses. Even then technicians were forever tweaking and adjusting the reel-to-bedknife relationship in their attempt to achieve optimum results.

Today superintendents and equipment managers have honed the practice of reel maintenance to a fine art. Whether the philosophy is light contact or no contact, spin grinding or angle grinding, all come down to the same thing: a clean cut goes a long way toward healthy greens and happy golfers.

Like anything else, the methodology in keeping reels sharp varies from course-to-course, one equipment manager to another. Budgets, equipment, personnel, and training all come in to play and it's vital that the superintendent and equipment manager see eye-to-eye on what is best for their facility.

For example, at Grand Traverse Resort & Spa in Acme, Mich., golf and grounds manager Paul Galligan keeps it pretty simple.

“Every time the mowers come in,” he says, “the reels are gone over, period.” Contact, height of cut, front facing if needed – everything is checked out. Of

course, Grand Traverse is a resort with 4 techs maintaining equipment for 3 golf courses. This level of maintenance is necessary, expected, and budgeted.

However, it's a whole different world at a public facility with a small budget and a single equipment technician. There, it's not unusual to hear reels spinning for hours on the backlap machine or witness mowing operations come to a grinding halt while a reel gets serviced because there was no backup equipment. That's never a good scenario.

Kenny Meals, turf equipment manager at Baltusrol Golf Club in Springfield, N.J., put things in perspective. “First you have to look at the golf course as a whole,” he says. “What grinders you have, what equipment, how much time you can afford to spend on grinding are all factors.

“Over the years, I've done different methods of maintaining reels and bedknives,” Meals adds. “First it was contact and backlapping, sharpening twice a year. Then I moved on to spin grinding and sharpening only on a Bernhard grinder with no contact. Once the reels started to make contact they would get sharpened, but that was mainly due to the ease of the setup of the Bernard... In general, you can grind the reels quicker. Fortunately, too, we had spare sets of reels for all the machines, which worked out very well.”

In the South, where there never really is an off-season, equipment techs don't have the luxury of a winter rebuilding program. Winter is the height of the season as the snowbirds fly south to play golf, and maintenance practices don't vary as much as they do in northern climates.

Stephen Tucker, equipment manager at the Ritz-Carlton Members Golf Club in Bradenton, Fla., explains his situation. “We don't have a winter rebuilding/sharpening routine here as winter is our prime season, so equipment has to perform day in and day out. Our summer and winter schedules look very similar despite the

growth patters of the turf.”

Tucker goes on to explain that because of the changing conditions there isn't a specific grinding “schedule” to follow.

“Whether we topdress, verticut, etc., all of these cultural practices affect the quality of cut so we address the need to grind as it becomes apparent from our daily checks,” Tucker says.

Obviously budget-sensitive, the ability to do daily checks on your cutting units goes a long way to maintaining a quality cut throughout the season. At those courses without the high-end budget, usually the mechanic depends on the operator to tell him if the units seem to be cutting OK. If there are no comments or complaints from the operator, then the mechanic usually moves on to put out some other fire instead of worrying about the reels.

While this method may work a majority of the time, superintendents must question whether the health of their greens is worth the risk? The operator might say the mower was cutting OK, but later in the afternoon the white cast across the green is the tell-tale sign the units were dull or out of adjustment and tearing the turf instead of cutting it clean. It's something an operator can easily miss during the morning mowing.

Remember, too, that an effective height of cut will be a little different than the bench setting. Factors such as the weight

Additional factors

If you've never been to a Toro University training session, then you've missed out on an opportunity to learn some of the different factors that affect the quality of cut and the health of your turf. Some may surprise you and include:

- Tire pressure on the mower
- Traction speed
- Reel bearing condition and adjustment
- Roller and roller bearing condition
- Roller selection
- Reel and bedknife sharpness

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of the cutting units, attachments, as well as turf conditions like excessive thatch will all influence the effective height of cut. Be aware and adjust accordingly.

For Meals, Baltusrol GC has some pretty high standards as far as reel maintenance goes. "To maintain sharpness we adjust the mowers after we mow six greens with the walkers, and adjust the fairway units after each cutting. We backlap all the mowers once a week and front face every two weeks."

When it comes to grinding Meals is in the 'light contact' camp. "Currently when we grind we relief grind and spin grind," he says. "Setting the reel to bedknife at light contact allowing the contact to keep the edges sharp through metal-to-metal contact."

Tucker, on the other hand, has a similar routine, but with a slightly different methodology.

"Every machine we use gets checked out after use," he says. "There isn't a time where

Often overlooked grinding advice

Superintendents and technicians all seem to have their own ideas on when and how to grind reels. For some, their grinding philosophies are as guarded as a certain colonel's seven secret herbs and spices.

So, for an expert look at reel maintenance, Erik Sides, training manager for Jacobsen Turf Equipment, offers a few basics superintendents and technicians should keep in mind when it's time to grind.

Check the reel first

Before doing any grinding, Sides advises that you thoroughly clean the reel and cylinder. Next, always check to make sure the reel and roller bearings are good and reel has proper end play.

"It's virtually impossible to get a good, consistent grind if there are worn bearings," he says. "Save yourself the headache and check these before wasting time at the grinder."

You should also look for a "coned" reel by using a pi-tape or other measuring device to check circumference. An uneven reel can affect cut quality as well as lead to contact with the bed knife. If you find a coned reel, Sides recommends following the directions for your specific grinding equipment to get the reel back to true.

Maintain proper clearance

"Easily the most overlooked, but key component of reel maintenance is to make sure bedknife clearances are maintained," Sides says. A couple of minutes spent ensuring the reel blades are not coming into contact with the bedknife can save hours of grinding time down the road.

"We definitely promote daily clearance checks," he adds. "As a rule, you want between one-thousandth to two-thousandths clearance between the bed knife and reel blades. Avoid metal-to-metal contact, as that quickly wears down a reel."

Pulling a reel, mounting it in the grinder and replacing the unit can take up to an hour per reel. Daily clearance checks take just a few minutes and can help extend reel life and save shop time by extending the duration between spin grinds.

Don't overlook the relief angle

When you do have to grind, Sides says, don't

overlook the relief angle.

"There are two distinct schools of thought on grinding," Sides says. "Those that spin grind only and those that relief grind in addition to spin grinding. I wholeheartedly recommend everyone maintain the relief angle throughout the life of the reel."

The relief is key to keeping the reels and the tractor working the most efficiently.

"Without the relief angle, you potentially increase drag on the reels or increase the likelihood of metal-to-metal contact," he says. "This puts more strain on the entire tractor and generates more heat in the hydraulic or electrical systems."

In addition to adding wear to the unit as a whole, this additional strain can also start to have a negative impact on fuel economy.

"Drag, wear and heat are minimized with a relief angle and proper bedknife clearances," Sides says.

The proper angles for reels can generally be found in manufacturer's manuals.

Time to grind

How often to grind is another question Sides is frequently asked. While there is no hard and fast rule, this is a major factor that a lot of folks overlook.

"How often and how heavy you topdress will dictate how often you'll need to grind," he says. "The more sand that goes down, the more frequently you'll have to grind."

One way to extend reel life and still aggressively topdress is to make sure the sand gets worked in well before mowing. Brushing or dragging will help keep the sand down at the root level where it belongs and not up eroding the reels on your mowers.

Lay out a grinding schedule

Finally, Sides recommends setting up a grinding schedule. This will help ensure that units get taken care of in a regular fashion as well as allows superintendents to plan enough time to get the job done.

"Too often, we see reels get overlooked because there's 'Just no time to grind,'" Sides says.

we don't bring the machine in after it has been used and check the height, adjust the cut and file the bedknife. The reason being is that the most important job we do is to maintain cutting units."

The difference is in the backlapping, Tucker says. "We don't

backlap at all nor have I in my 13 years as an equipment manager," he says. "This is simply due to the fact that I have always been fortunate enough to have grinders."

He verifies that there are a lot of different schools of thought and all the tech's out there need

to do what allows you to produce the best results for your course.

"I look at it like maintaining an airplane," he says. "Pilots have to go through a series of checks every time they go from one airport to another to insure the safety of the aircraft and that it

will perform as intended. If they see the least little thing wrong they address it immediately. I don't see cutting units as needing any less attention than that." **GCI**

Jim Black is a frequent GCI contributor.

Backlapping vs Grinding

There are many practices and philosophies for maintaining reels and bedknives. Some choose to grind and utilize no backlapping, some will backlap only to get the longest life between grinds, and others prefer a position somewhere in the middle. Regardless of your preference, the key to proper cutting is to have a sharp reel and bedknife.

The modern technology in backlapping valves provides

Backlapping is a very quick and simple process and, depending on the number of reels on the machine, should take no more than two to 10 minutes to complete an entire mower. In regard to how often to backlap, first determine what level of expectation you require for your cut quality. The lower your height-of-cut, the more maintenance is required for the turf and for the

substitute for grinding. There will come a point in time during the reel's life where simply backlapping alone will not be sufficient. The land area of the reel blade will eventually increase, the length of the relief angle will decline, and there won't be as much surface area to hold the backlapping compound. At that point, the reel must be ground. However, backlapping is successful in extending the time between grinds to save maintenance time during the growing season.

When a reel is ground, it is important to re-establish the relief angle to allow for backlapping again in the future. The relief angle is critical in that it gives a place for the reel to hold the backlapping compound when it is applied.

Even more important, when both reels and bedknives are ground, backlapping after grinding matches the bedknife to the reel to ensure both components are operating in exactly the same cutting plane. Backlapping hones the reel and bedknife to the same cutting plane.

Also, when a reel is ground, it's common for a burr to exist on the backside of the reel blade. Technicians may sometimes experience issues where the bedknife-to-reel clearance opens up while mowing, causing the mowers to lose their cut. The cut may be shaggy, and grass blade tips may be torn and brown out. What causes this in a lot of cases is that the bedknife-to-reel clearance was set with the burr still present on the back of the reel blade. The machine cuts paper when it leaves the shop, the fairway or green may be cut very well for a few holes, and then – all of a sudden – the mower is cutting poorly. The burr on the back of a freshly ground reel wears very rapidly. By backlapping after

grinding, the burr is removed and the cutting unit can be set properly before it goes out to mow and it will stay on cut for a longer period of time.

Tracy Lanier and Brad Aldridge are John Deere Golf product managers.



There are many philosophies for maintaining reels and bedknives.

all reels on a machine can be backlapped at the same time. Backlapping valves are innovative in that they sense the restriction between the reel and bedknife when the backlapping compound is required, and adjust hydraulic flow accordingly to keep reel speed constant for a premium backlap. This makes the backlapping process the quickest method to help maintain the sharpness to the reel and bedknife. The more frequently a golf course backlaps, the longer they are able to keep a pristine, sharp edge on both the reel and the bedknife, and extend the time between grinds.

reel mower. There are also other variables – such as top dressing program, grass type, course soil conditions and the amount of grass being mowed by the machine. These variables and expectations for cut quality will determine how often to backlap and each individual course should determine its own program. It can be as frequent as after each mowing or it can be once every week or two. The key to backlapping is that you are maintaining the sharpness, while not trying to re-establish like when you are grinding. So, backlap before you lose your edge.

Backlapping should never be a

Spin Grinding vs Relief Grinding

This is public information on the www.deere.com public website that will provide some excellent information on relief vs spin grinding.

www.deere.com/en_US/ProductCatalog/GT/servlet/com.deere.u90785.cce.productcatalog.view.servlets.ProdCatProduct?pNbr=RG55_XF&tM=GT

When opening the page, click on the "More" link at the end of the first bullet point that says "Choose from spin only or spin and relief grinding ..."

Bedknife Grinding

This is also public information on the www.deere.com public website that will provide some information on the importance of maintaining proper bedknife angles.

www.deere.com/en_US/ProductCatalog/GT/servlet/com.deere.u90785.cce.productcatalog.view.servlets.ProdCatProduct?pNbr=BG15_XF&tM=GT

After the page has opened, click on the "More" link at the end of the first bullet point that says "Maintaining bedknife angles is key to premium golf course playing conditions ..."



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As mower manufacturers prepare to roll out emission-compliant equipment, the industry provides some clarity on the impact Tier IV will have at the course level.

From the moment President Richard Nixon signed the Clean Air Act in 1970, industries across the country have been working toward improving the air we breathe. Be it cars and trucks on the roads or factories that dot our landscape... this crucial policy has saved countless lives by reducing harmful pollutants.

While the golf course industry has been at the forefront of many environmental issues, the Clean Air Act is now taking center stage as the new Tier IV begin to take hold.

Environmental Protection Agency's website reads:

"EPA has adopted a comprehensive national program to reduce emissions from future non-road diesel engines by integrating engine and fuel controls as a system to gain the greatest emission reductions. To meet these emission standards, engine manufacturers will produce new engines with advanced emission-control technologies similar to those already expected for highway trucks and buses. Exhaust emissions from these engines will decrease by more than 90 percent. Because the emission-control devices can be damaged by sulfur, we are also adopting

a limit to decrease the allowable level of sulfur in non-road diesel fuel by more than 99 percent."

These reductions in NOx and PM emissions from non-road diesel engines will provide enormous public health benefits. EPA estimates that by 2030, controlling these emissions would annually prevent 12,000 premature deaths, 8,900 hospitalizations, and one million work days lost.

The NOx – or oxides of nitrogen – form smog, while PM – or particulate matter – comes out of exhausts as smoke. The PM will see the most significant reduction – a 90-percent decrease from current standards.

While equipment manufacturers work closely with companies building the engines for their machines, Grant Young of Toro says his company and its competitors are waiting for final engine specifications before moving forward.

"From there, the equipment manufacturers have to make it work in the equipment, which is where engineering dollars for the equipment manufacturers comes into play," Young says.

Rachel Luken, Jacobsen product manager, says her company has taken a hands-on approach. "Jacobsen has been working in conjunction with our diesel engine supplier, Kubota, on technology methods and approaches to meet the lower emission standards," Luken says. "With Kubota's rugged and reliable engine expertise, coupled with Jacobsen technical staff, we believe we are designing and incorporating engines, filtration and electric needs in efficient and innovated ways.

Jacobsen will be utilizing multiple solution paths for the range of products affected, such as:

- Conventional Tier 4 Final path using fuel injection and exhaust after-treatment technologies, while also paying close attention to the machine's hydraulic and electrical efficiencies so optimal power is transferred; and
- Utilizing engines under 25 hp by reducing

VIEW

by Rob Thomas

power without compromising overall performance or supplementing with hybrid power to manage peak power demands.

"Jacobsen is also striving for commonality and consistency where possible between existing product and across newly powered product to reduce customer technical maintenance and service parts complexity," Luken says.

"Ultimately, Jacobsen is using innovative solutions to make equipment more environmentally friendly while still meeting customer performance, productivity and quality expectations," she adds.

Mark Ford, marketing manager at John Deere Golf, says his company is looking beyond the Tier IV standards.

"Our objective is to do more than meet

Replacement plan

Jacobsen offered a few thoughts to consider as capital equipment budgets are developed for new or replacement equipment:

- Buy on regular routine: When a capital equipment plan calls for new equipment and/or existing equipment useful life ends, buy what is available and pay market price.
- Buy ahead: Prices are forecasted to rise when Tier IV compliant equipment is released, so postpone the purchase of higher-priced equipment and buy in advance of a regular replacement cycle.
- Buy environmentally friendly: Despite the expected higher prices, actively seek out and purchase the greenest Tier IV product.
- Buy used: Since equipment is compliant based on the year of engine manufacture, buy equipment that is already in use.

the requirements of Final Tier IV," Ford says. "We are using this as an opportunity to provide additional value for golf course superintendents and technicians."

The John Deere approach is five-fold:

- Optimized. Engineering and product development teams are working to ensure the equipment fully meets regulatory requirements, while delivering the power, reliability and low cost of ownership.
- Fluid efficiency. Rising fuel costs are on everybody's minds. Deere's Final Tier IV-compliant equipment will not compromise on fuel efficiency.
- Field proven. Deere engages in a comprehensive program of field testing prior to new equipment launch. Machines that meet these new standards undergo thousands of hours of testing before they are released.
- Integrated. Deere's engineering, supply management and product management teams have been engaged in a thorough, ongoing design review with engine and component suppliers to work hand-in-hand to supply the most seamless solution possible.
- A Fully supported solution. A history of agricultural and construction equipment manufacturing means the John Deere enterprise has a great deal of experience transitioning to new compliance standards. They will be there as an organization for customers every step of the way.

Positives are plentiful, but John Patterson, president of the International Golf Course Equipment Managers Association, expects to see the price for new equipment rise substantially.



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“When it comes to cost increase, the number I am hearing most often is 20 percent for affected machines which remain diesel powered, and between 10 and 15 percent for machines which are converted to gasoline power, to cover the cost of development.”

— John Patterson, International Golf Course Equipment Managers Association

“When it comes to cost increase, the number I am hearing most often is 20 percent for affected machines which remain diesel powered, and between 10 and 15 percent for machines which are converted to gasoline power, to cover the cost of development,” Patterson says.

“At PGA National we are evaluating the cost benefits of turning our large equipment fleet (for 90 holes) one year early, potentially saving \$100,000 in purchase cost, plus R&M savings,” he says. “It is difficult for any operation to accelerate capital purchase plans, but potential six-figure savings are very persuasive.”

There are other options, Patterson says, but at what cost?

“There may be a slight increase in the used equipment market, but generally the increased cost of running older equipment far offsets the higher initial cost of new, efficient – and warrantied – stock,” he says. “Those who would normally purchase outright may be more likely to look at leasing for tax benefits to offset the purchase cost as well.”

While the Tier IV regulations are forcing changes and likely adding cost, Luken says Jacobsen has evolved with the environment in mind since the Clean Air Act amendments affected off-road diesel regulations

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New standards

Considering the shakeup across the industry - from engine and equipment manufacturers to golf courses – many wonder if the Tier IV emissions regulations constitute the “finish line” or if there are even higher standards to meet on the horizon.

“I believe we will be done with this type of regulation for a while, but it is anyone’s guess,” says Stephen Tucker, equipment manager for the Ritz-Carlton Members Golf Club in Bradenton, Florida. “Regulations are driven by government policy, so as new policies are approved and mandated, our regulations will change. Nature of the beast, I guess. Maybe one day they will ask the effects of the policy before implementing it, but of course why would they do that ... makes too much sense?”

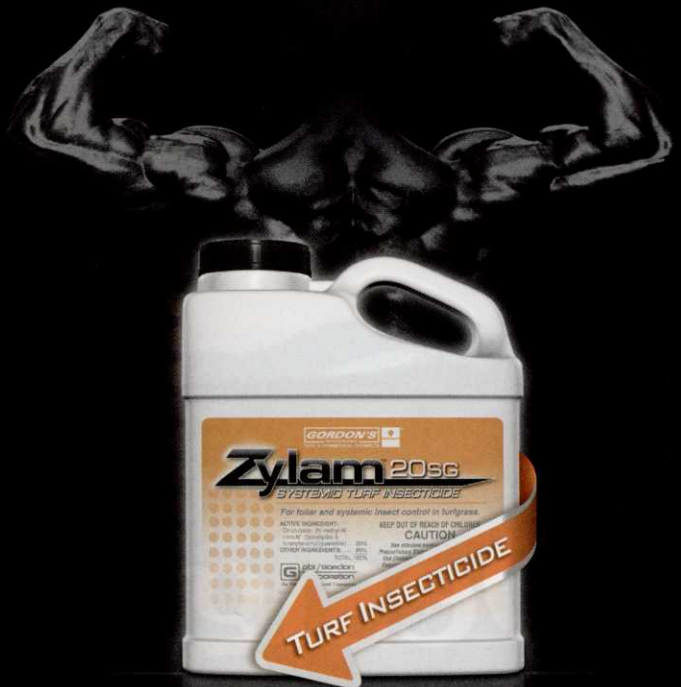
Tucker sees potential for fleet changes at many courses.

“I believe you will see a gas version of many of the machines that will fall into Tier IV,” he says. “I really believe this is the direction that most facilities will go as long as the machine can perform to the same level and the costs remain where we currently are or less.

“If you’re an equipment manufacturer this becomes an even tougher question because they are not sure what direction the industry will go, so you can’t really put all of your eggs in one basket ... or at least I wouldn’t.”

John Patterson, president of the International Golf Course Equipment Managers Association, joked “Tier IV is it until we all get the new ‘Mr. Fusion’ power plants.”

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(TIER IV continued from page 73)

in the mid 1990s.

Many Jacobsen models will ultimately go through as many as five different lower-emissions standards: Tier 1-3, Tier 4 Interim, and Tier 4 Final," Luken says.

"In past tiers, the adaptation of the new lower-emission-com-

pliant engines into equipment was more streamlined," she says. "In most cases the changes were internal to the engine with minimal mechanical and electric affect to the host pieces of equipment. Therefore, the cost to the market place were typically absorbed or incorporated into normal pricing cycles."

"The best way to lessen the impact is being proactive in planning out your equipment purchases or leases for the next eight years. Whether you have the capital money to spend or not, there should always be a plan."

*– Stephen Tucker, equipment manager,
Four Seasons Resort and Club*

pliant engines into equipment was more streamlined," she says. "In most cases the changes were internal to the engine with minimal mechanical and electric affect to the host pieces of equipment. Therefore, the cost to the market place were typically absorbed or incorporated into normal pricing cycles."

Now with the upcoming new Tier 4 Final, the cost to make engines and equipment meet the lower emission standards is much greater – significant R&D, engineering, development and testing investments are being spent by both engine and turf equipment manufacturers to ensure their ability to meet the standards, Luken says.

"Tier 4 Final compliance means much more than just an engine change," says Luken. "There are many more components and subsystems external to the engine that will need to adapt."

According to Luken, the Tier 4 Final turf equipment will be outfitted with new engines and exhaust systems with advanced electronic controls, additional filtration and after-treatment, and updated cooling systems, to name a few. To accommodate

these new, additional, and larger components, many turf equipment chassis, engine compartments, and functional controls require redesign... leading to added costs.

Young agrees that the previous tiers of compliance haven't been

as onerous in terms of technology, complexity or cost.

"Most have been transparent – or of nominal consequence – to the end customer," he points out. "That says, we are always looking at alternative fuel/energy options, many of which have benefits – one being lower emissions – but typically come with a cost."

As for the increased cost to the consumer, Young says attempts to lessen the financial impact by Toro is always ongoing.

"One thing to remember in this is the engine, and decks/cutting units are usually the majority of the expense as it relates to a mower," Young says. "So, when the cost of the engine goes up significantly, you have to look very hard at the rest of the machine to recoup or find cost savings to offset, and weigh that against what those may mean in terms of performance and/or customer satisfaction."

Stephen Tucker, equipment manager, Four Seasons Resort and Club, Dallas at Las Colinas, believes looking well into the future will soften the economic impact of Tier IV regulations.

The best way to lessen the

impact is being proactive in planning out your equipment purchases or leases for the next eight years, Tucker says.

"Whether you have the capital money to spend or not, there should always be a plan," he says.

Tucker also believes general managers and owners need to get educated on Tier IV now so they can make the right decisions going in, or at least know the impact.

"It is much easier to plan for bumps in the road than to have to make a decision once you have it right in front of you," Tucker says.

He adds that everyone needs to be open to the alternatives such as gas engines.

"At the end of the day, if we can get the grass cut without sacrificing quality for less money, then that is the decision we should be making right now," Tucker says.

While the new systems and technologies come with a price, they may also allow improvements to engine noise, sound levels, performance and diagnostic capabilities that may provide return on the purchase price investment, according to Luken.

"Jacobsen is also exploring innovative, non-conventional approaches where technically feasible to deliver lower emissions and meet compliance where needed using additional non-diesel power to manage peak power demands," Luken says. "A hybrid-powered solution would alleviate a portion of the equipment's total cost of ownership by offering fuel savings up to 40 percent annually."

She points to the Jacobsen Eclipse 322 riding greens mower as an example. It utilizes true hybrid power – lower hp engine coupled with buffer electric power to deliver equivalent total system power – and when com-

paring that to other all-engine-powered and hydraulic machines in its class, it delivers significant annual fuel savings, as well as saving on hydraulic oil since it is an all electric machine.

Jacobsen offers an online cost savings calculator to estimate possible savings (www.jacobsen.com/eclipse-calculator/).

If the bottom line is cost, Tucker sees a great deal of uncertainty.

"In an economy that is unstable with rising fuel costs and a business that needs some normalcy, this will make an impact which some are addressing now," he says. "We have been asking for advancements in technology over the years and the manufacturers have delivered with hybrids and such.

"However, at the end of the day, in the current economic climate," he adds. "We just need to get the grass cut for the least amount we can do so without impacting the quality.

"We can work on advancements later," Tucker concludes. "Let's make some cost-effective machines and get past this rough spot, then push toward technology advancement again."

Patterson knows superintendents and course management will adapt.

"The IGCEMA's tag line is 'Educating technicians for the future' and we hold the belief that any new technologies developed within our industry can/will be mastered through education," Patterson says. "Just as with any other new technology (or change), most will embrace it, many will complain, some will resist it, mistakes will be made, but ultimately it will become mainstream." **GCI**

Rob Thomas is a Cleveland-based freelance writer and frequent GCI contributor.