RIDING THE ELECTRICAL CURRENT INTO THE FUTURE

The environment and alternative power sources drive fairway mower changes

By John Walsh, Contributing Editor

It's difficult to predict the future in any specific detail, but it's clear the two driving forces that will change fairway mowers are the Tier 4 emission standard and electric or hybrid technology.

Emissions standards will consume the industry, says Dana Lonn, managing director for The Toro Co.'s center for advanced technology. Specifically, the Tier 4 standard, which is related to particle trappings, will be difficult to comply with.

"It requires significant engine changes," Lonn says, adding the Environmental Protection Agency's requirement is a logical extension of emissions control, moving down the horsepower line from trucks to cars to mowers.

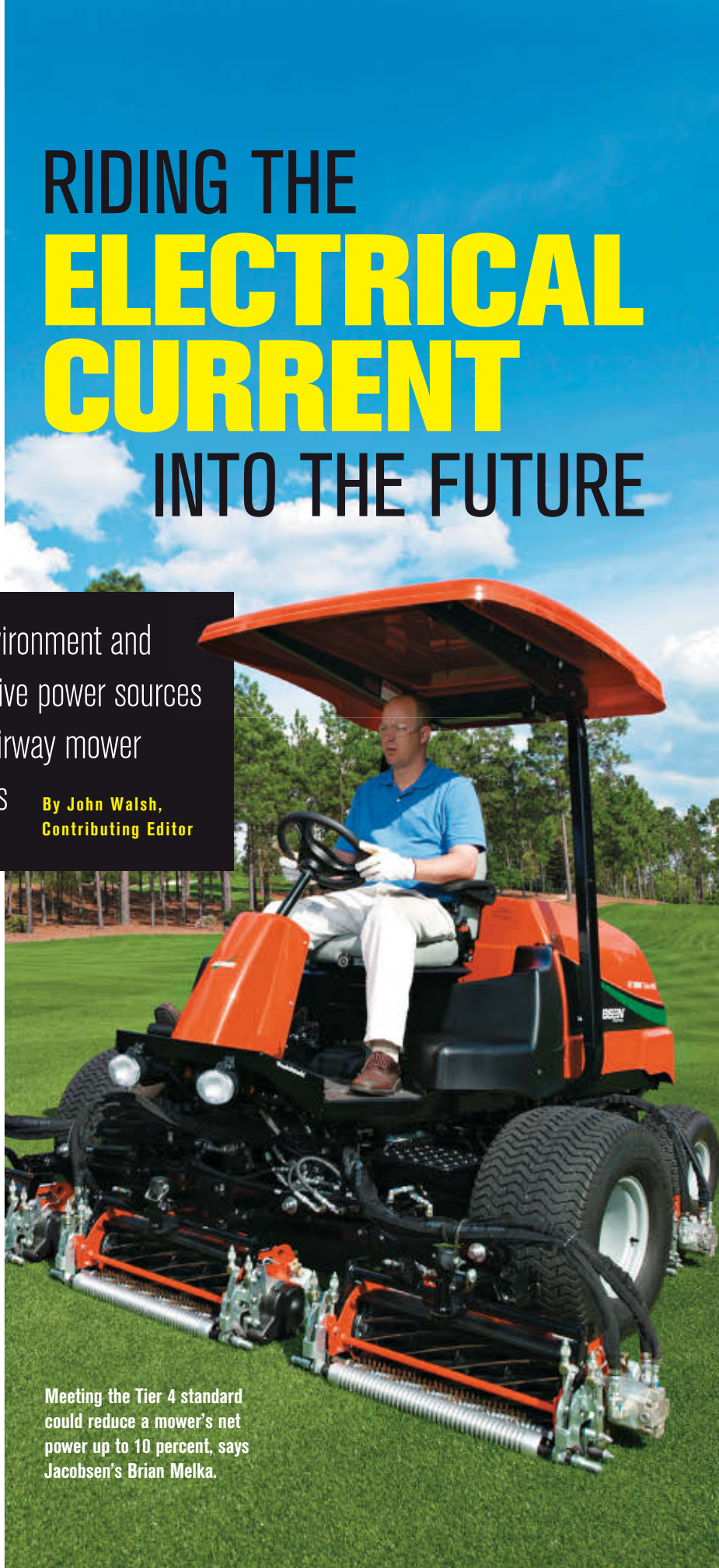
Lonn says it's too early to tell the cost to comply with the Tier 4 standard — which will be in effect for mowers in 2013 — but it will be more than $100 per unit.

"The standard forces us to put in new engines in every fairway mower," he says. "That's a significant resource investment."

John Deere is moving forward with plans to make the needed changes to comply with the regulation, and the changes may not be visible to the customer, says Tracy Lanier, John Deere's golf product manager.

"However, the next tier appears to be increasing the cost of the engine to levels we haven't seen in our industry from previous engine regulatory requirements," Lanier says. "Golf course maintenance budgets will be under more pressure in the future because of costs associated with this regulation.

Continued on page 46



Meeting the Tier 4 standard could reduce a mower's net power up to 10 percent, says Jacobsen's Brian Melka.

Continued from page 44

However, it will provide a diesel engine that greatly reduces emissions, which will pay dividends down the road for the environment."

Meeting the Tier 4 standard is tricky and could reduce a mower's net power 5 percent to 10 percent, says Brian Melka, Jacobsen's director of product management.

"It's in everyone's best interest to reduce pollutants, but it's going to be very expensive," Melka says, adding that progressing from meeting the Tier 3 standard to the Tier 4 standard will be twice as much work. "The price increase will be 10 percent or more for all manufacturers."

In some cases, complying with the Tier 4 standard will be a non-issue, but in other cases it might force Jacobsen to go up an engine class, Melka says. Also, meeting the standard will raise the RPMs of the engine to maintain a mower's power. This would increase noise levels, gas consumption and heat output.

"It's nothing we can't work around," he says. "We just have to manage the changes meeting this standard is going to cause."

Hustler Turf Equipment is addressing the issue, too — although not like manufacturers have a choice. But in the case of Hustler, which has two fairway mower models (7500 and 7700), it's not actually engineering the changes. That falls to Shibaura, a Japanese company with which Hustler has a strategic partnership. The two companies share engineering responsibilities for some equipment, and Hustler has marketing and distribution responsibilities in the United States. Shibaura, which is working on a catalyst and particulate filter, will build all the new Tier 4-compliant engines.

"These Tier 4-compliant engine packages are a new design and aren't currently used in the European or other international markets," says Adam Kleiber, engineering manager for Hustler's golf and industrial products.

From the retail end, changes that need to take place don't come free, and a lot of that work will increase costs, says Brad Unruh, Hustler's product manager.

"We haven't gotten far enough to determine the cost increase, but from talking to other manufacturers with sub-50-horsepower engines, the cost could double," he says. "It's going to be interesting to see what happens in the market in 2013 and how the market bears the increasing cost of these new engines because the market is already struggling."

Alternative power

In addition to more environmentally friendly engines, alternative power is sure to dominate the fairway mower landscape. It's already started with electric and hybrid technology.

The term "hybrid" isn't definitive, however, because it's based on many different contexts, Lonn says. In the automotive world, the term means an engine turns off when a car is stopped. Or it can mean multiple sources of power, such as being able to drive on batteries or gas.

"The term has been bastardized in mowing terms," Lonn says. "Why are electric-driven cutting units versus hydraulic versions hybrid? The issue gets down to the trade-offs of driving cutting units electronically or hydraulically. There are pros and cons of both."

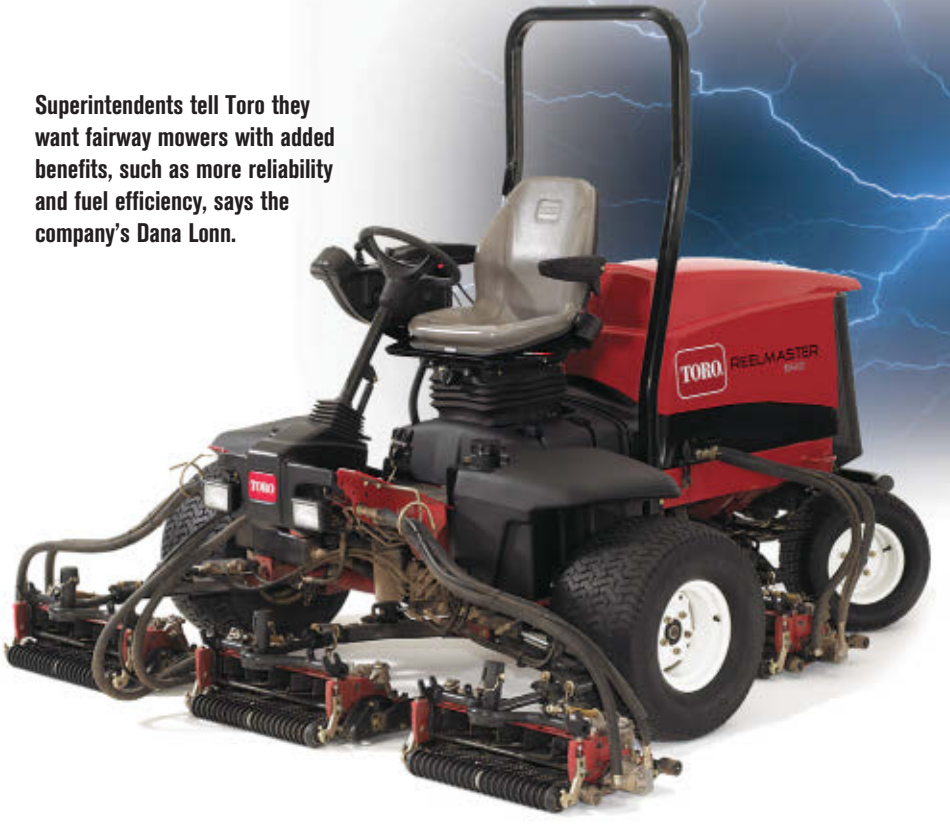
Hydraulically, components are small because the fluid that passed through the motors also cools them, which helps reduce their size. The negative is the fluid can leak, which isn't good because grass and oil don't mix.

Electrically, the positives are that users have a lot of control. Devices could be more efficient, but they don't have to be. It's all in how they're designed.

"Those are the discussions we've had with fairway mowers," Lonn says. "Do you want to scalp bermudagrass? How heavy is the machine? Do you want groomers? If you want all that, it's difficult to do electronically. Making electrical components in our market is challenging because of water from dew, washing, etc., and circuits don't like water. I'm not against electrical — some electrical cutting units are good. It's a design problem.

"We're aggressively working on

Continued on page 48



Superintendents tell Toro they want fairway mowers with added benefits, such as more reliability and fuel efficiency, says the company's Dana Lonn.

Riding the Electrical Current

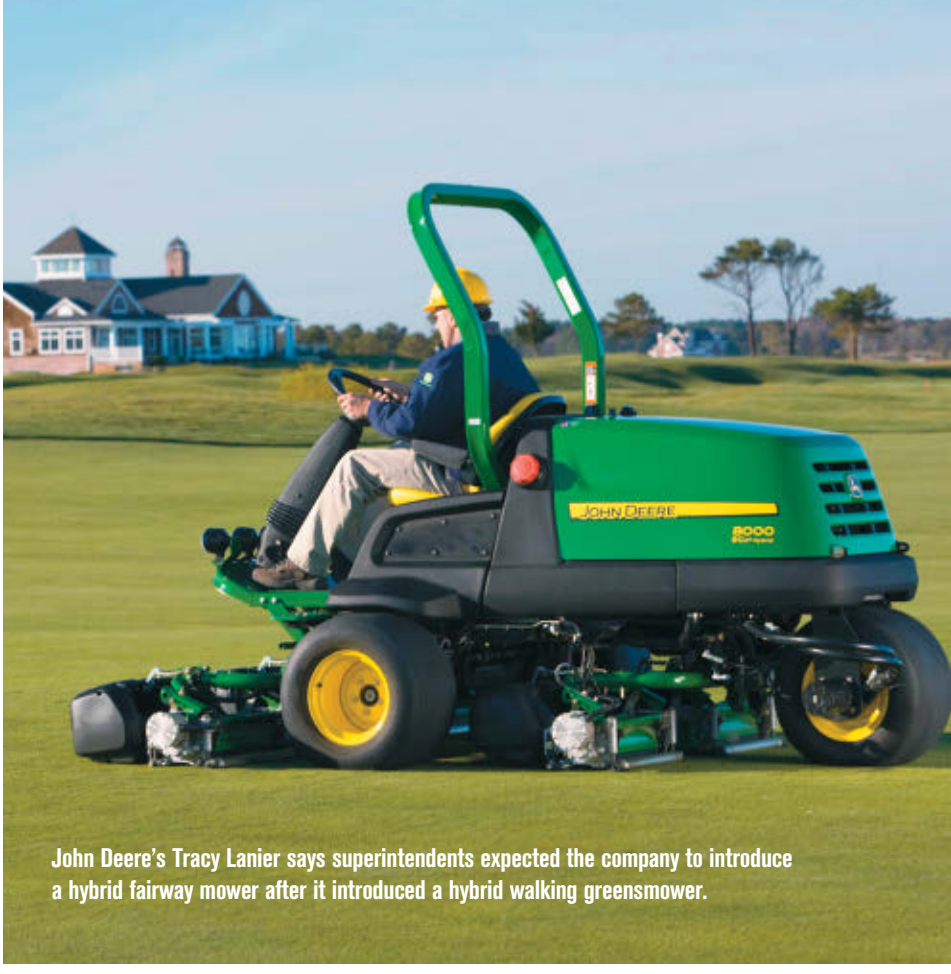
Continued from page 46

multiple energy sources in a broader sense," Lonn adds. "We need to share energy between the motor and batteries or another storage device. We need to get to the point of sharing the engine load with a short-term storing device to achieve worthwhile energy storage."

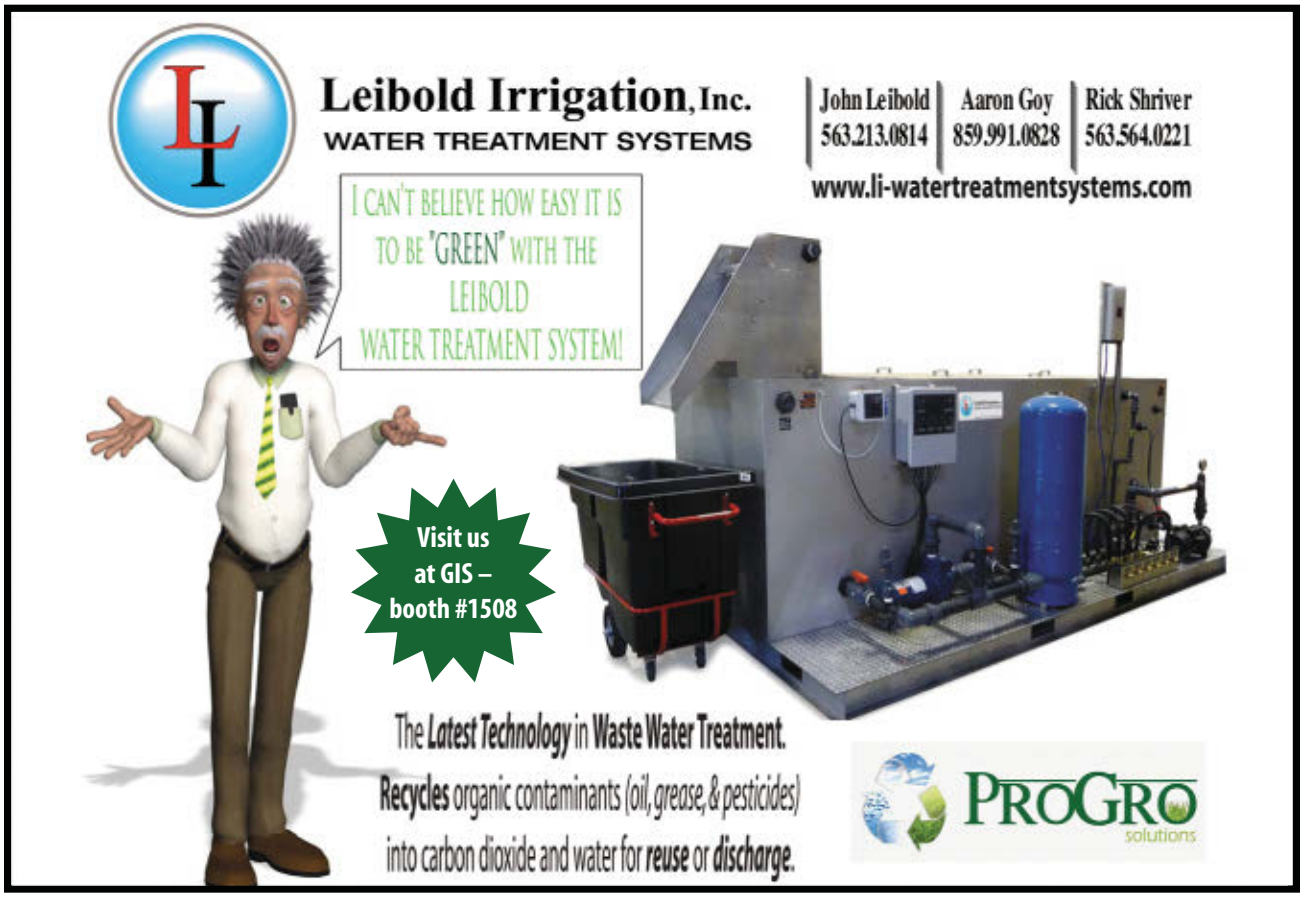
The duty cycle of a cutting unit is another challenge for electrically powered fairway mowers. If one is mowing a green, for example, that person has 20 to 30 seconds of on time, then he lifts and turns the mower. For a fairway unit, one could be mowing 15 to 20 minutes continually. That duty cycle is different, and with more power, the machine needs to manage heat differently.

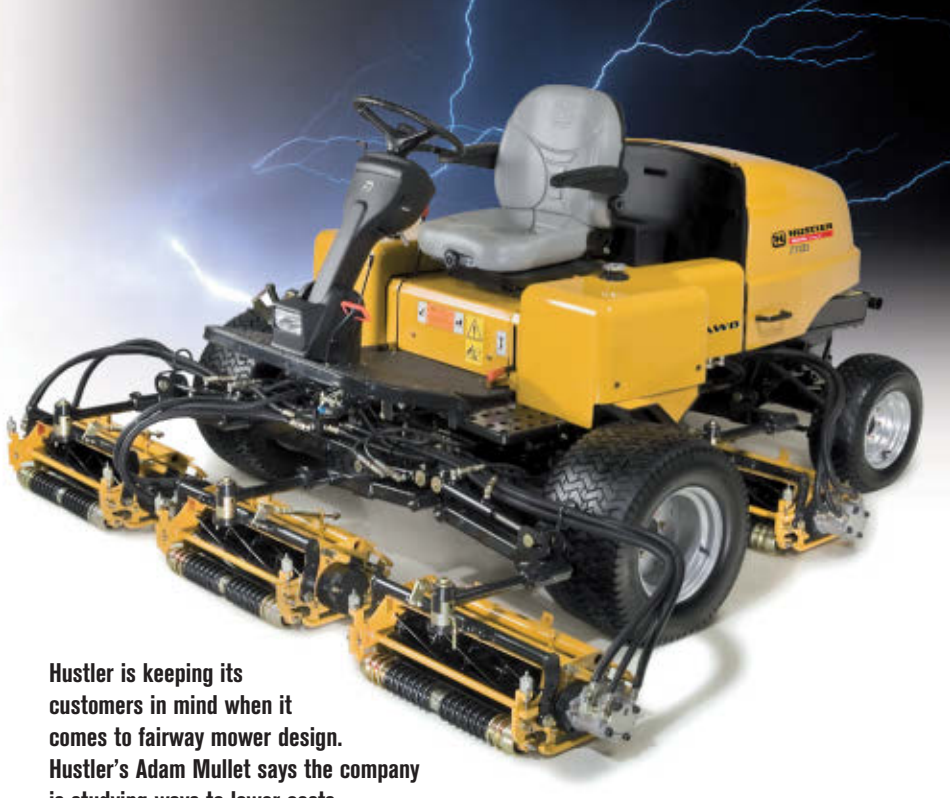
"An electric fairway mower is more difficult to design than a greensmower, but it's worthwhile to spend time and money figuring it out," Lonn says. "The

Continued on page 50



John Deere's Tracy Lanier says superintendents expected the company to introduce a hybrid fairway mower after it introduced a hybrid walking greensmower.





Hustler is keeping its customers in mind when it comes to fairway mower design. Hustler's Adam Mullet says the company is studying ways to lower costs.

Continued from page 48

advantage is more fuel independence in the long run. We'll be less dependent on fossil fuels."

Toro is working on hydrogen-fuel-cell-powered utility vehicles. It's also working on lithium ion batteries, which drive electric motors, which, in turn, drive the cutting unit in its walking greensmower prototype.

"It's a matter of *when* not *if*," Lonn says about an alternative-energy-source-driven fairway mower. "It needs to be worth what the customer pays. We're not quite there yet from a product evolution standpoint."

In 2009, John Deere introduced several hybrid fairway mowers, of which all the cutting units are driven electrically. The main reason for that change was to reduce leaks points, Lanier says.

"Reel-driven mowers traditionally have been hydraulically driven," he says. "We went after the reel circuits because of the amount and likelihood of leaks."

The hybrid mowers — 7500 E-Cut, 8500 E-Cut and 8000 E-Cut — reduce sound levels. Depending on the size of the mower, engine noise can be reduced 1 to 3 decibels. The hybrids also can increase fuel economy because the reels aren't tied to engine speed, so operators can throttle back the engine and keep the same clip frequency, Lanier says. Operators can achieve as much as a 30-percent reduction of gasoline. The average is 20 percent by throttling back about one-third.

"Superintendents were expecting the hybrid fairway mowers after we introduced the hybrid walking greensmower," Lanier says. "Considering the economy, we've met expectations, and the mowers have been very well accepted in the marketplace."

Some superintendents have completely switched out their old mowers for a complete fleet of hybrids, while others have kept some old ones and replaced one or two with a hybrid. Those familiar with Deere's hybrid greensmowers are more likely to switch out completely with the hybrid fairway mowers, Lanier says.

Presently, B-10 biodiesel is the only alternative fuel available for Jacobsen fairway mowers. However, the hybrid platform is the wave of the future, Melka says. The company will apply the electric technology it features in its walking and triplex greensmowers into fairway mowers, but it's several years away from launching a hybrid or electric fairway mower.

All of Jacobsen's electrical systems are rated to meet a national marine standard — IP67. To make a smooth transition into using more electrical components, the company is learning from the outdoor power sports and yachting industries to learn more about electrical systems that work when submerged in water 24/7. Jacobsen plans to use the expertise in those industries and apply it to mowers in the golf market.

Hustler, which released an electric zero-turn mower in the fourth quarter this year, will look at more products in the electric category.

"As fuel prices continue to fluctuate, we see alternatives as more of a solution, as diesel engines become more cost prohibitive," Unruh says.

The next step in electric technology for fairway mowers is moving the electrical circuit into other areas of the machine, such as the traction system and the steering and lift system, Lanier says. But there's a dilemma to adding this technology.

"What's the benefit, and how can superintendents keep down their costs?" he says. "We're continuing to look at what customers are willing to accept for a price premium."

No matter what the changes are in fairways mowers, manufacturers always have one thing in mind — customers.

"We're aware of price sensitivity," says Adam Mullet, Hustler's director of marketing. "A lot of golf courses are struggling with finances, and we're doing everything we can to lower costs. We're studying ways we can do that."

Toro's customers are always asking for features and benefits.

"They're not telling us how to design it," Lonn says. "They're looking for attributes: quieter, no leaks, reliability and fuel efficiency, which comes and goes as the price of diesel fuel fluctuates. But they don't want to give up performance." ■

Walsh, a Golfdom contributing editor, is a freelance writer from Cleveland.