

Pipe dreams

Gillette Stadium's turf conditioning system

Photos by John Vastyan

BY JOHN VASTYAN

In the world of professional football, money talks. You might even say it's the foundation for everything that happens on the field. Unless, that is, the field itself is deemed unfit for play, something that quickly affects the bottom line.

Last year, one NFL team learned a costly lesson when their network-broadcast game was cancelled amid furious controversy moments before kickoff. TV images captured the root of the problem when layers of tough artificial turf were peeled back, leaving viewers with the only graphic images from a game that just wasn't gonna' happen. The

fans, managers and players were livid. TV audiences aimed their remotes elsewhere, and advertisers wanted a refund. Total damage: an \$8 million loss in revenue and some measure of embarrassment.

A sports turf professional recently said, "The field is the game's foundation. If it's unsafe, you place the entire franchise at risk. A \$20 million QB can fall hard and spend the rest of the season in recovery. The condition of the field can be our worst nightmare or an answer to dreams."

There's a trend afoot: Real grass. What gives real turf an advantage, and players the best surface going, lies hidden in the soil where roots receive gentle warmth from miles of pipe that circulate heated fluids.

Gillette's Field

One of the newest and most advanced turf conditioning systems is now hard at work under the field at Foxboro's new Gillette Stadium, home to this year's Super Bowl champs, the New England Patriots. According to Dennis Brolin, the Patriot's field superintendent, the application of technology to enhance turf performance has "finally come of age."

The Patriots' new radiant heating/turf warming system, manufactured by Springfield, MO-based Watts Radiant, uses 153,000 lineal feet, or 29 miles, of cross-linked polyethylene (PEX) pipes that feed warmth to the soil. The manufacturer has installed similar systems for other sports facilities, including Safeco Field and BankOne Ballpark.

Watts Radiant engineer Kolyn Marshall, who designed Gillette Stadium's system, says that turf warming and turf conditioning systems are gaining broad and enthusiastic acceptance in the realm of professional sports especially turf sports, such as soccer and football. The reason is a growing need to protect a team's investment, the players themselves.

According to CNN Sports Illustrated, at the end of the 2001 season there were over



The Patriots' new radiant heating/turf warming system uses 29 miles of cross-linked polyethylene (PEX) pipes that warm the soil.

160 injuries reported in the NFL. Of these injuries 21 were ankle-related and 46 were knee-related. Almost half the injuries can be attributed to turf related conditions.

"New turf conditioning systems have evolved substantially in just the last year," says Brolin. "It's an evolutionary process, and Kolyn's on the grass-cutting edge. You might say he's the Charles Darwin of sports turf technology."

At just 25, Brolin was hired in 1996 as the protégé of Pierre Landry, one of the most respected sports turf professionals in the NFL. When Landry moved on, Brolin stepped in. Within months, the Patriots put him in charge of the 93,200 square-foot playing field Gillette Stadium project.

Unlike what many of us might have done at such an early age, Brolin moved deliberately to research the technology. He recalls many 18-hour days when his focus was entirely set on pounding down the learning curve. He visited experts, hit the books, spoke with manufacturers and installers, logged a thousand-some calls and took trips to turf-conditioned NFL fields in Baltimore, Cleveland, Green Bay and Cincinnati.

Says Brolin, "The turf professionals at each of the facilities I visited were incredibly gracious. They gave me more insight into the technology than I could have expected. Most importantly, I learned from them what went wrong with their systems, or where improvements were needed. Each

had a different set of problems, which they shared with me, giving me a huge advantage in making preparations for our field." (See sidebar.)

Even with new developments in irrigation and soil management, the ability to grow turf is directly related to the condition and temperature of the root zone. Constant root zone temperatures help to accelerate turf growth, allowing for faster repair of damaged areas, and also help to maintain a more pliable soil condition, the perfect environment for roots to grow.



Typically the radiant system in the field is turned off a few days before game day, just the opposite of what you'd think.

With a turf conditioning system in place, and doing its job, the result is a healthy grass playing surface that's better cushioned, causes fewer skin abrasions or deeper, more serious injuries, and plays well. It improves turf quality, extends the growing season because roots don't go dormant, and greatly reduces maintenance costs because the field is so much more durable. Typically, all sodding, seeding and patching are eliminated.

Does it melt snow?

A turf warming, or turf conditioning, system is similar to a snowmelt system, but there are key differences that separate them. "The main difference is what our goal is," says Marshall. "In a snowmelt system we are trying to melt snow at the surface. To do this we need a surface temperature greater than 32 degrees. In a turf sys-

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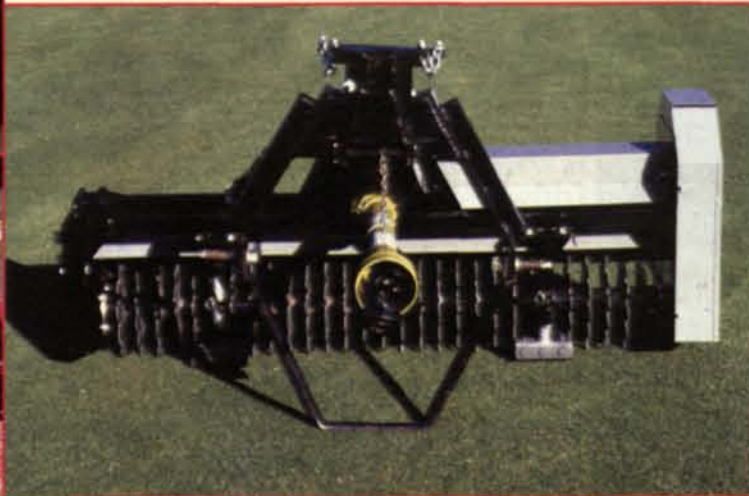
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tem our target isn't the surface, but rather an area 6"-10" down where the root zone is. This layer is designed to maintain anywhere between 50-60 degree temperatures, depending on the turf, soil conditions, and climatic conditions."

There will be times when a turf system will melt snow, though it's really not designed to do this. According to Marshall, most turf systems aren't operational during the weekends when most games are played.

"The underground pipes are usually moving fluids [a water/glycol antifreeze mix] Monday through Friday," said Marshall. "Typically, the radiant system in the field is turned off a few days before game day, just the opposite of what you'd think. If it did

snow, and the system was on, there's a chance that slush would form, becoming a real problem, endangering both players and field."

With the turf system turned off a few days before a game, this also allows the turf to stabilize. In most cases, the heat will have dissipated before Sunday, so the likelihood of seeing snowmelt action during a weekend game isn't too great. A natural, dryer, more stable snow is better.

Before a radiant design can be done, several factors must first be determined. "Among these," says Brolin, "are the actual soil conditions. Most professional fields are multi-layered beginning with a solid base of compacted earth."

According to Brolin, this layer will typically contain the main drain lines that will pull excess moisture from the field. A covering of 1/2 inch washed stone typically supports everything in this layer. Above this, a layer of 3/8-inch peastone stone, or something like it.

"It's in this layer where the irrigation lines and radiant tubing are contained," says Brolin. The next layer is called the root mix layer; it contains a wide range of soil and sand mixtures. Each field will require a different root mix mixture depending on how the field is to be used, the abuse level, the turf conditions and the type of turf used, to name a few.

In addition to the physical properties of the stone, the material's "cut" plays a relatively important part. "Rough-cut stones tend to capture more air pockets than smooth ones," said Marshall. "The captured air pockets decrease the layer's ability to conduct energy. Most stone layers range between 20-40 percent air, give or take, amounting to a considerable amount of 'insulation.'"

The root mix layer introduces an entirely new set of variables into the equation. Here's where all of the root growth takes place, the layer is fanatically fertilized, watered, and aerated. Of these, says Brolin, "Water is the most important factor. Most root mix layers will maintain anywhere between 30-50 percent moisture at any given time, depending on the turf that's used. Water helps to increase this layer's conductive ability, creating a much more even temperature distribution."

Understanding how each of these layers is constructed is just the beginning. The next step is to determine where the radiant tubing is to be placed. This decision is influenced by layer construction and also by how the field is to be maintained.

Aeration is a key component. Different fields will require different aeration techniques, but one thing is the same: something must penetrate the field in the aeration process. The radiant tubing, and any irrigation equipment, needs to be deep enough not to be damaged or interfere with the aeration process. In most fields, the construction is such that the build up is uniform, creating a "domed" effect as one looks across the field. This method helps with water control and also allows for even depth of all components.

To Brolin, the most critical part of the system's performance happens at the point where heat moves from the pipes to the root zone mix. Fluids in a pipe of up to 130° to 140°F would be very hard on grass roots, so this became a key interest of his. He learned that, if exposed to those temperatures, the roots would gradually die, root pathogens would proliferate and moisture would be pushed up to the surface where field-tenders least want it.

Zoning a radiant turf warming system plays a critical role. It's influenced by mechanical constraints, such as how the supply and return lines are accessed, field abuse (which areas need faster recovery) and solar exposure, based on knowing when certain areas of the playing field will be warmed by the sun. The shape of the stadium and the shadow it casts chiefly determines the amount of solar exposure each section of the field receives.

For the Patriots, a six-zone system was created with three zones on either side of the 50-yard line. Tubing runs parallel to the sidelines, from the end zones to the midfield and back. Four-inch manifolds were installed along each end zone for the 3/4-inch E-PEX to connect to.

"After seeing the system go in, and studying the plans, we recently were told by professionals with a large commercial construction firm that our tolerances were tighter and more demanding than those made of the firm when building high-rises," says Brolin. "I guess that didn't surprise me entirely!"

"Nothing will ever replace grass," says Brolin. "But you've got to have the system in place to support it. Every detail has to fall in place. It all comes down to quality control, the right plan, the right installers, and the right materials manufactured to perfection. **ST**

John Vastyan is president of Common Ground, Uncommon Communications, Manheim, PA. He can be reached at 717-664-0535.

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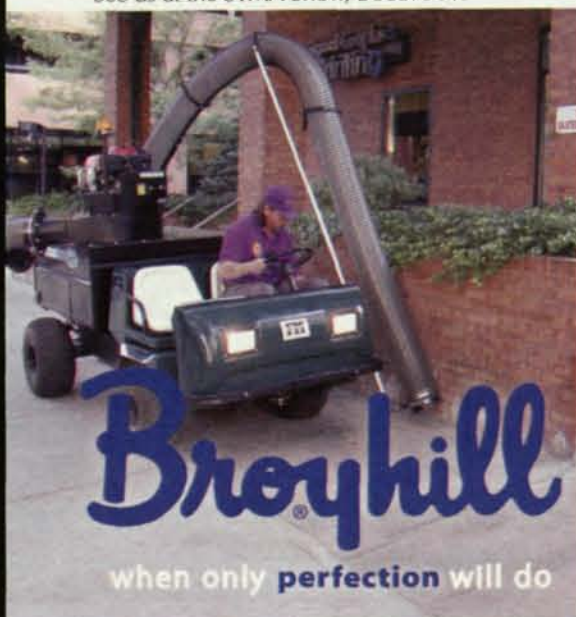
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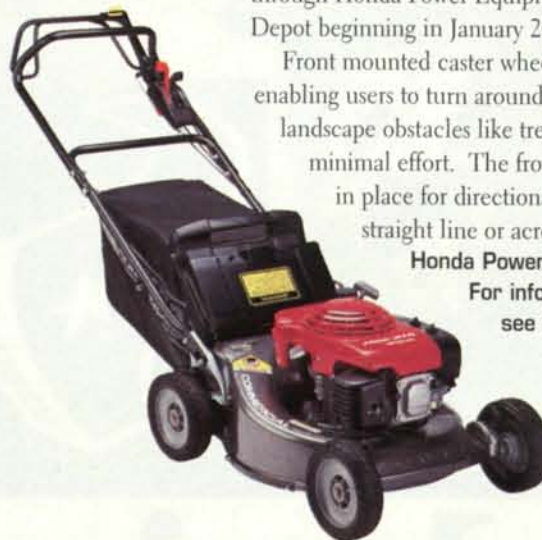
Honda Power Equipment will introduce a caster wheel version of its Harmony II lawnmowers to meet customer demand for enhanced maneuverability.

The Honda HRZ216TDA will join the existing 5-model lineup of value oriented Harmony II mowers, and will be available through Honda Power Equipment Dealers and The Home Depot beginning in January 2003.

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Brolin's hit list

For Dennis Brolin, the first order of business before developing a turf conditioning system at the Patriots' new field was to thoroughly research the technology, and similar systems. His search for information, over many months, entailed countless calls, long hours, and trips to several NFL venues. Here is what he calls his "hit list":

Cleveland Browns. Turf pro Chris Powell taught him how to accommodate for movement of the sun, and varying levels of heat as light shifted around the stadium. Brolin also learned from them about the importance quality control on the field construction site. Specifically: soil testing, sub-contractors and budgeting.

Denver Broncos. Ross Kurab is a top trouble-shooter. Challenges they had with their system helped Brolin to avoid a myriad of problems.

Baltimore Ravens. Vince Patterozzi was especially helpful with insights that enabled Brolin to understand and better manage the labor union issues. Plumbers, electricians and other skilled labor professionals were given focused directives and kept on task, on schedule and on budget.

Chicago Bears. At first, Brolin was resistant to trying state-of-the-art "soil amending" practices. Ken Mrock convinced him to do this. "I'm very grateful for his help. The turf is healthy and resilient to disease," says Brolin.

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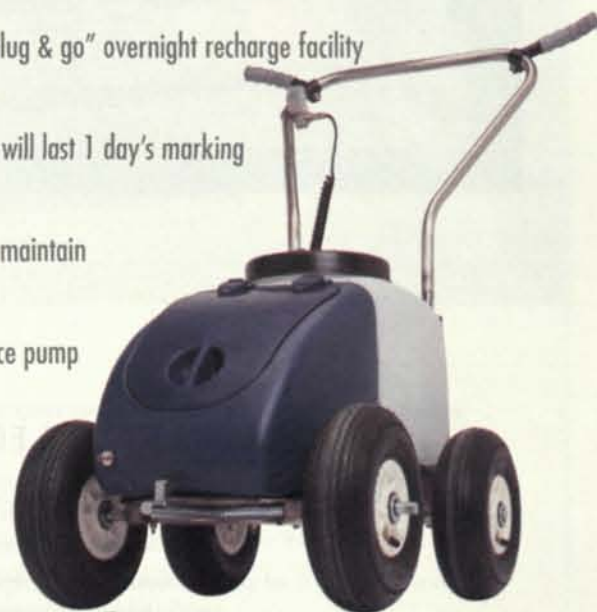
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From brushes to spinners— not just topdressers anymore

BY MARLENA CANNON

It wasn't all that long ago that sportsturf maintenance equipment always included a good old brush machine of some sort. But as many sportsturf managers are discovering, leaving those machines in the shed saves time and money since manufacturers of topdressers have upgraded and fine-tuned their equipment to meet the needs of professionals in athletic turf industry.

Logan Hamocon, owner of Sport Turf Hawaii, is a case in point. As a contractor and consultant with the City and County of Honolulu, the Kamehameha Schools sports fields, the parks on Oahu and others, he does everything from construction, design review and specification, inspection, and setting up maintenance programs.

Ten years ago as a golf course superintendent in the Philippines, he used a self-contained unit with spinners attached to it. The distribution was very poor especially when the material was wet, which was pretty much all the time. For large areas, he would go with a spinner and accept the distribution inefficiency because of the time savings. But for work on the greens, he would spec a drop type spreader with a brush. And, he acknowledges that took forever.

Now he's an avid advocate of spinner type topdressers. What made him switch?

"The advancements in the machines over the last 5 years has made an enormous difference," says Hamocon. "In the early '90s doing a fine turf topdressing without a brush was impossible. Now, that's not a problem at all. You can vary the depth of the

layer from a fine dusting to a thicker layer depending on what the field needs."

Rich Valentine, grass superintendent at Delaware echoes Hamocon's views. Eighteen months ago, he bought a Dakota 440 Turf Tender to replace his old brush type topdresser. Initially, the idea was to save time.

"Racing is such a time-sensitive operation," says Valentine. "The horses train in the morning, so our crew has only a half-a-day to get the work done. Quite frankly, we had quit topdressing because there just weren't enough hours in the day. Buying the Dakota enabled us to get back into good agronomic practices. It's all about increasing productivity. You can get more accomplished, in less time with less people, with a well-built topdressing machine."

The versatility of today's spreaders has impressed a lot of sportsturf managers. Valentine says he gets a kick out of trying to figure out other ways to use his machine, saying proudly that he probably comes up with a new idea every month.

On his race course grounds, Valentine says he uses his topdresser "to mulch beds without breaking branches or to throw pea gravel into drainage ditches. We rarely use a wheelbarrow anymore."

Hamocon agrees saying that he uses his machine for infield work, fertilizing and landscaping jobs like spreading mulch and wood chips. "I used to have to have a lot of different pieces of equipment," Hamocon adds. "Now, I would feel very confident speci-

fyng one good topdresser to do it all."

Last year, the City of Winnipeg used their topdresser for their soccer fields, baseball diamonds, and cricket fields. With the efficiencies they found there, they've decided this year to put the machine into other uses as well. One of the most showcased sections of the City's Riverwalk system is from the legislative buildings to The Forks, a national park where the Red River and Assinboine Rivers meet. Every spring, after the high waters of the rivers recede, a new limestone base needs to be put down on this high-traffic tourist attraction. This year, rather than apply the limestone with tractors and tedious hand spreading, the City will be pulling the topdresser out of the shed.

"We think we can spread it more evenly, adjust the depth of the limestone better and get it applied more smoothly than the old way," says a superintendent of parks. "The walk is a mile long and 12-15 feet wide. I'm guessing we can do the job in a third of the time."

Bob Eichert, vice president of Aer-Core, Inc., Downingtown, PA, provides aerification, seeding and topdressing services to several hundred golf courses and sports fields. He also sells equipment.

"We've seen a general increase in the sales of topdressers," he says. "But in the last 5-7 years, we've really seen an increase in the number of athletic field managers who want that service contracted. There's such a high demand on the quality of the turf and the need for the players to have a good playing surface is critical. Many sports fields were poorly built to begin with and in many cases, the construction equipment used to build them contributed to the compaction. That, combined with heavy use, has resulted in fields that are in terrible condition. Heavy core aeration and topdressing with a good compost can bring a field back to life in a hurry."

He also attributes the increase in sales and demand for service to the fact that the new topdressers are so well designed, citing those models which feature low psi tires, large hoppers, and exacting calibration features.

Hamocon's take is the same. "Some turf managers may feel like the accuracy of a spinner application is more difficult," he says. "With the fine-tune calibration capability on the newer machines, the only problem you really have is with the operator. If something goes wrong, it probably wasn't because of the machine."

Another reason for the increasing acceptance of topdressers in sports field management is economics. "Cost used to be a factor," says Eichert. "That's just not the case anymore. These machines are really material movers, that can backfill, spread gravel, lime, seed, fertilizer, and topdress all in one. Plus, some topdresser models include a front-end box scraper. When you think about all the machines they replace, the investment just makes sense."

ST

Marlena Cannon is a freelance writer who specializes in green industry topics.

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