

tweaking and perfecting the distribution, or radial uniformity, of nozzles. But it's more than just achieving higher uniformities in a laboratory, manufacturers are designing heads and nozzles to account for wind drift by altering droplet size, and engineering how to keep a column of water together for a longer throw at lower pressures.

I would rank sprinkler nozzles as the second greatest technological advancement toward improving water efficiency. It's kind of a back door to conservation. As you improve sprinkler uniformity, you will use less water. But ultimately it benefits the turf-grass and the bottom line.

And finally there's the trend toward low-pressure irrigation equipment. This is a different level of conservation because it involves more than reduced water use. What you're doing is reducing the amount of energy to pump the water to—and through—the system, while reducing wear and tear on the system.

Essentially, lower-pressure systems are

designed to eliminate the need for booster pumps. But, there will be a trade-off because you can't throw water quite as far, so you might need an extra row of heads. There's a cost-benefit scenario that might mean the difference between requiring a pump booster system, and not having an irrigation system at all. Low-pressure systems are more about adapting to available line pressures and making irrigation more available without supplemental boosting.

ASIC: Can fertigation/chemigation play a role in water conservation?

JLB: Let's look at it this way: water conservation is only one area of sustainability. When you look at those types of delivery systems, you are inherently promoting conservation. Consider the footprint, even on your own site. When you introduce nutrients through the irrigation system, you've lessened considerably the oil-burning, maintenance-requiring machinery to go up and down the field applying them.

It's a totally different way of thinking about the movement and life cycle of materials. If you're not running that equipment up and down the field for that period of time, you don't have to change the oil as frequently and you're not running the motor, so your equipment will last longer. And if you drive less each year, that delays repairing or replacing vehicles. This is the "sustainability" side that we as a global industry are struggling to get our heads around, the consumption and movement of material.

Go back even further and look at the nutrients we're applying. Look at the amount of energy required to mine these materials, to refine, package and transport these materials. There's an entire energy stream that accompanies every product. If you're starting to think about these types of inputs, like employing fertigation instead of the traditional fertilizer-broadcast method, it's difficult. The impacts are widely unknown.

ASIC: From an irrigation design stand-

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IRRIGATION & DRAINAGE

point, what are the three weakest points in an irrigation system that can lead to water waste?

JLB: I'm going to stay on the sustainability concept. Inherently, the weakest points in an irrigation system correlate to how much material you put in the ground. If I can't use big rotors that spray 90 feet, I might have to use spray heads, which leads to more fittings, joints and moving parts.

There's an imminent failure rate to product because it's mechanical. If you use only 10 sprinklers instead of 70 sprinklers to water the same area, you'll have greater continuity and fewer repairs. So, the more equipment we put in the ground, the more opportunity for failure. When irrigation consultants look at irrigation design, we're trying to optimize equipment use.

Consider this: if you need to pump water through a pipe and you can use a bigger pipe, you'll use less energy to pump that water volume. There's a short- and long-term cost-benefit there. To go from a 6-inch to a 10-inch pipe might cost \$200,000 to install, but will easily save that in pumping over the years.

We (JLB & Company) have been trying to radically rethink "green" irrigation. I can use a new sophisticated rotor sprinkler that will throw water 40 feet with good uniformity or a simple agricultural spinner that will throw 40 feet with the same uniformity. Again, moving parts inherently lead to product failure, so which is the better choice?

Irrigation is under the microscope, and in some circles we're being identified as an evil, non-sustainable industry. We have to demonstrate some new thinking. We could move to HDPE pipe, which produces less off-gassing of volatile organic compounds during its lifecycle than PVC. But how do we quantify that this is "greener"? If I have 900 sprinkler heads for a project and don't use two-pound heads, but use 3-ounce heads, I'll only be using one-tenth of the materials.

The weakest link in irrigation has always been the wiring harness. It's very sensitive to nicks and other damage. We're thinking about wireless systems. Can we take all of the copper out of irrigation? Can we eliminate the PVC coating on wiring? Can we run irri-

range if tools to solve more immediate water-conservation problems; some accessories are good, and some will fade away in a capitalistic, Darwinian process. And what is over-accessorizing to some turf managers is under-accessorizing to others. Rain sensors or soil sensors can be abandoned from one manager to the next. The human element is the individual judge of whether or not there are too many bells and whistles.

With the green movement being imposed on some parts of the industry, now's the time for broad thinking and product hybridization. We need to consider this propagation of product. Inherently there's a cost to develop all of these equipment lines. If there were fewer of them, there ultimately would be less consumption and more conservation of materials. Green irrigation?

ASIC: What are the risks of relying too much on technology?

JLB: I think we're in an industry and society right now that will continue to apply technological solutions to problems and minimize human input. If we're looking to ensure that every ounce of water being applied to turf is beneficial, and it's up to either technology or humans, technology will win.

But humans are required to understand and value these activities. We need to get smarter on how we utilize the diminishing human element and

leverage the technology. At some point, water managers'—and even irrigation consultants'—roles may change very dramatically. We can't roll back the technology-revolution clock, so we're going to have to better understand the roles of humans and technology in our industry. ■

Luke Frank, former editor of *Irrigation Journal*, conducted this interview as a consultant for the American Society of Irrigation Consultants, www.asic.org.



Here's a shot from construction of the University of Kentucky's football practice field. Courtesy Jeffrey L. Bruce.

gation via solar technology? We're trying to think of each component in the system and how to use less of it, or where we can develop materials that impose less of a footprint.

ASIC: Where are we with effectively using technology to manage irrigation? Are we over-accessorized?

JLB: Historically, that has certainly been the case with controllers. People tend to utilize only a small fraction of a controller's capability. The distributors are over-accessorizing because have to carry the SKU parts.

But, these accessories give us a wider

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Turfco has taken the innovations developed for its renowned TriWave 60-in. tractor-mounted overseeder and applied them to a smaller, self-propelled machine.

Turfco engineers combined the company's patented WaveBlade design with precise alignment of the drive wheels on the TriWave Walking to achieve the ability to turn while seeding, with minimal disruption to existing turf. The WaveBlades are mounted on two 18-in. wide independent floating seed heads.

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Low-emission equipment maintenance recommendations

By Pete Fernald

A common question for today's low emission outdoor power equipment is "Does it require more maintenance?" For the operator concerned with proper equipment maintenance there is little additional work required.

But the operator who bases his maintenance on what he's done, or more correctly not done, in the past is in for an expensive awakening! He's gotten away with it up until now, but today's low-emission engines are far less forgiving and have a narrower margin of tolerance for abuse.

Today's CARB/EPA engines run at significantly higher operating temperatures.

These are "air cooled" engines so to run properly cylinder fins must be free of debris to dissipate the heat of higher operating temperatures.

Equally important is the cooling air intake area. In a typical modern trimmer, for example, this is the area under the crankcase and above the fuel tank. It's also an area where oil/fuel mix can accumulate if fueled by a careless operator. This sticky mix will combine with debris and effectively plug the intake. Engine temperatures will then rise and the engine will eventually fail. Cleaning cylinder fins and this intake area is critical and must become a regular part of your maintenance procedure!

What is often seen in the above high-

temperature scenario is a piston with stuck rings due to oil breakdown and burning onto the surface of the piston. The engine manufacturer is often blamed, but the culprit is the oil. Using modern high-temperature low-emission oil can prevent this failure.

Engine manufacturers are routinely asked "What oil should I use?" Manufacturers cannot require use of our brand of oil, but we can specify and require use of a particular ratio and grade (in this case, JASO FC or FD; ISO EG-D). At the same time, no reputable engine manufacturer is going to offer "bad oil." There are lots of general purpose oils available, but most are multi-purpose and do not excel in any one area. They are designed to work in a variety of engines and

do an acceptable job in average conditions and with lower engine operating temperatures. Very few are certified to carry these JASO and FC ratings.

Oils designed for use in outboards typically do not have additive packages capable of handling some of the operating temperatures encountered with 2-stroke trimmers, chain saws, etc. Unless expressly stated as certified to meet our ISO and JASO ratings, these oils should be avoided.

Selecting spark plugs

Today's higher engine operating temperatures dictate use of very specific spark plug heat ranges. Years past, you could be two or three heat ranges off with little or no problem. Today, with some high-temperature engines, even one range too hot may be too much. The days of "screws in and starts—must be interchangeable!" are over. Always

use the manufacturer's recommended spark plug heat range. If you must change brands, consult the plug manufacturer's cross-reference chart for the proper plug number.

One additional point: Do not assume a plug with a given heat range number is the same heat range as a competitor's with the same number. For example, the higher the number on a Champion spark plug, the hotter the plug. On an NGK, it is the opposite (higher number is cooler). Also, two different plug types that have the same heat range number may not be the same temperature. Always consult the application guide for that particular plug brand.

One could write a book about all of the fuel changes over the past 15-20 years! It's not going to get any better in the foreseeable future. The first and a significant concern is fuel shelf life. Over several decades, petroleum refineries have developed more and

more exotic processes to extract a higher percentage of gasoline per barrel of crude oil. As the profit is in gasoline, this is where petroleum research has been focused. With this "stretching" of gallons per barrel, there has been a penalty and that is shorter shelf life, especially in hot, humid climates.

Most manufacturers recommend a maximum storage period of 30 days in the heat of the season. Our dealers in very hot and humid areas recommend 1 week as the maximum period fuel can be stored. This is also very true for exposed, above ground fuel tanks due to internal tank temperatures.

Fuel stabilizers such as Sta-Bil and SeaFoam can be used to slow this oxidation process down. Old, stale fuel? It will NOT work! These products only work with fresh fuel. Use of a good fuel stabilizer can eliminate spring startup issues and is highly recommended.

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How much octane do I need? Most handheld equipment does not need high octane fuel. Medium-to-large chain saws and large backpack blowers have a slightly higher octane requirement and a few require premium unleaded. We frequently see dealerships and larger commercial users using premium unleaded. They've learned that these fuels tend to use higher quality components and give better performance with fewer complaints.

Always buy fuel from a name-brand dealer. Cut-rate stations sell fuel cheaper because they buy at lower cost. They are able to buy at lower cost because these fuels are often low-grade, old or do not meet higher standards of the name brand stations.

Every developed and most Third World countries are actively developing a domestic ethanol fuel program as a means to extend the available supply of vehicular fuel. OPE engine manufacturers recommend a maximum alcohol limit of 10%, yet several states are trying to get federal approval of a 20% minimum (E20).

All alcohols contain a high percentage of oxygen, but gasoline has none. Ethanol (the "E" in E20) is 37.6% oxygen and Methanol is 49.9%. Use of higher ratios of alcohol has exactly the same effect on internal engine temperatures as leaning out the carburetor.

A 20% ratio (E20) can quickly lead to engine seizure if the engine is run at WOT with a heavy workload.

Alcohol is not particularly compatible with gasoline and can easily separate out when combined with water; even in the form of condensation. When alcohol combines with water, it is heavier than gasoline and settles to the bottom of the tank (phase separation).

Alcohol is a very effective degreasing agent and can wash the critical oil film from internal engine components. It can also

attack magnesium and diecast aluminum components ("vehicular cancer" is the term used by General Motors). Soft parts such as fuel tubes, gaskets and diaphragms today can withstand ratios in the 10~15% range, but may deteriorate quickly at higher alcohol ratios such as E85.

Open containers

One additional fuel issue many commercial users fail to recognize is that of leaving a fuel container open. For an engine to start,

Getting the full benefit from today's low-emission engines requires a bit more attention to maintenance, but the reward is a longer-lasting and more trouble-free engine. If you are not familiar with the maintenance required, consult your Owners' Manual or pay a visit to your local servicing dealer.

fuel must vaporize to form a flammable gas. If a fuel container is left open, these "light end" components that make gas vaporize are boiled away and the fuel is effectively dead (worthless, hard to or no starting in high temperatures, etc.)

Another issue of major significance with an open fuel container is emissions. A modern CARB/EPA 2-stroke has approximately 1/8 the emissions output of its pre-CARB/EPA counterpart. Today, a major contributor to overall emissions is an open fuel container or spilled fuel.

Air filter maintenance

Proper air filter maintenance is critical to the operation and overall life of any engine. Lack of air filter maintenance can be catastrophic for today's low-emission hand-held two stroke engines. Just as the motorcycle industry found with the change from 2-stroke to 4-stroke dirt bikes, 4-stroke engines in a dirty or dusty environment must have a very effective air filter system and it must be maintained frequently and properly!

A 4-stroke has many heavily-loaded points such as pushrod to follower or rocker arm contact. A small amount of debris inside can quickly increase valve clearance to the point the engine may not start or run properly. Conversely, the same engine with proper air filter maintenance will seldom require any adjustment.

Another factor few people consider with air filters is resistance and resultant deterioration if run for prolonged periods without cleaning. As an example, a flat foam element air filter has little or no resistance when clean. As it starts to clog, it is moving around as the engine strains to suck in clean air. Over time, this filter can lift and bypass. Eventually, it can start to deteriorate and in extreme cases can be sucked into the engine!

An effective maintenance program and use of prefilters if available can add years to engine life. Many manufacturers offer foam prefilters or perhaps the filter itself is foam. Carrying a spare in the field can keep the engine running at maximum efficiency and give you longest possible life. Use of good filter oil on that foam filter or prefilter is another proven motorcycle tip that can extend primary filter and engine life even in extreme dusty areas. ■

Pete Fernald is the Director of Technical Services & Training at Shindaiwa.



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Colleyville, Crawford champs in Schools/Parks Soccer category

Seated in front middle: Chris McCord; from left to right in the back, Mike Almy, Joey Newman, Troy Crawford, and Steve Strickert.

The Pleasant Run soccer fields in Colleyville, TX, and parks supervisor Troy Crawford were presented STMA's 2008 Schools/Parks Soccer Field of the Year Award earlier this year. This complex, built in 1992, has about 570,000 square feet (about 13 acres) and features Tifway 419 bermudagrass.

SportsTurf: What channels of communication do you use to reach coaches and users of your facility? Any tips on getting good cooperation?

Crawford: We communicate via e-mail and phone like most organizations. If there are concerns from coaches or anyone in the youth sports organizations we will meet face to face to make sure their concerns are heard and we understand them fully.

As for getting good cooperation, it is just like any relationship, it requires some give and take. We will do everything in our power to

try and get games played. So when we cancel games due to weather, all the youth organizations are understanding and respectful of our decision. In order to increase cooperation with the youth sports organizations we have sent out surveys asking what they like and what changes they would like to see. We also have them rate us on our customer service and attentiveness to their needs.

ST: How did you get started in turf management? What was your first sports turf job?

Crawford: I was kind of lucky with how I got started in the turf management field. I was working for my brother, who is a graphic artist and he was designing logos and mailers for Jim Anglea, who at the time he owned Diamond Pro. During one of our meetings, Jim asked me if I'd like to come and work on the Texas Rangers grounds crew. I thought it would be fun and interesting so I agreed and the rest, as they say, is history. From there I was privileged enough to help construct the

field of The Ball Park in Arlington and I was then rewarded with a full time job.

I have had the opportunity to be the assistant at a few facilities and have even worked in the golf side. At each stop I learned a lot from my superiors which helped me develop my turf program here with the city of Colleyville. One thing I have learned over the years is I don't have all the answers but I do have a lot of good friends in the industry who are always willing to give me advice and direction when I call.

ST: How do you balance your family life with work demands?

Crawford: The balance between family life and work is a tough one. I put my heart and soul into both, but my family is my number one priority. My wife is always there to support me and is very understanding when it comes to working late or working weekends. There were many times when I worked with the Rangers and the Astros that she would come up and watch the game with me so we

could spend some "quality time" together.

In my present position I have an extremely knowledgeable crew that I can delegate duties to, which allows me to not have to always be on the fields or at the office. With a knowledgeable crew and an understanding wife the balance has become easier to manage.

ST: Have you planned any adjustments, large or small, to your maintenance plan in 2008? Did you purchase any new equipment or product for this year?

Crawford: We have made a few adjustments to our fertilization program this year. With the price of fertilizer going up so much we have found it more cost effective to eliminate some granular applications and substitute in liquid fertilizer. The rest of the cultural program will remain the same.

We were fortunate to receive some new equipment for this year. We purchased a new

drag machine and two new utility carts, one of which will also serve as a sprayer. The support we receive from our city council, city manager and park and recreation administration is second to none. They do an outstanding job getting us new equipment to help us stay efficient.

ST: What's the greatest pleasure you derive from your job? What's the biggest headache?

Crawford: I love to create the "WOW" factor. We have the tools, the equipment and the desire to create beautiful parks and athletic fields. My crew looks at these fields and works them as if they were their very own. The pride and attention to detail is exhibited daily by the results that they produce. This "WOW" factor is created because all of the crew believe in the idea and consistently help each other to achieve our common goal.

One major challenge that we face is the

way our facility was designed and laid out. The layout limits us from being able to rotate field directions. With each area being surrounded by walkways the fields can only be laid out in one direction, so we can never change our heavy wear areas.

ST: How do you see the sports turf manager's job changing in the future?

Crawford: I'm not sure what the future may hold for all sports turf managers. In our little part of the world, water conservation, or water management, has become a major concern. I'm sure this is the same throughout the rest of the country as well. I do feel that it is our responsibility as professional sports turf managers to help educate others in our area about the importance of water management. Without water there will be no future for natural turfgrass sports fields or the industry professionals who maintain and supply products in support of these fields. ■

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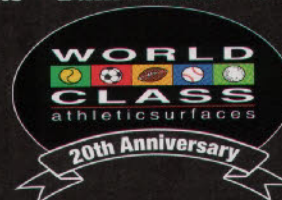


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FIELD OF THE YEAR

Pleasant Run monthly maintenance program

Fields are mowed every Monday, Wednesday and Friday; frequency decreases in the winter as weather dictates.

January

Spray Round-up and Trimec Classic on all dormant grass
Inspect irrigation system

February

Slice the playing surfaces one direction
Lay out fields for tournaments and paint
Move goals onto fields and secure
Spray Ferromec at 2 gal/acre
Spray Manage as needed
Inspect irrigation system

March

Slice the fields in one direction
Apply 24-4-12 25% SCU, 1% iron at 1 lb. of N per 1,000 sq. ft.
Spray wetting agent at a high rate
Re-paint fields every 10 days
Inspect irrigation system

April

Spray wetting agent at maintenance rate

Spray growth regulator
Apply 28-4-12 50% SCU, 4% iron at 1 lb. of N per 1,000 sq. ft.
Slice the playing surface in one direction
Re-paint fields every 10 days
Inspect irrigation system

May

Spray wetting agent at maintenance rate
Spray Ferromec at 2 gal/acre
Spray growth regulator
Spray for nutsedge as needed
Re-paint fields every 10 days
Lay out new fields for tournaments and move goals
Paint new fields for tournaments
Remove goals from fields
Verticut aggressively in four directions
Core aerify two directions
Vacuum all springs and cores
Scalp down all fields from 1 inch to ¾ inch
Sod any areas that need it
Topdress all fields with ¼ inch of sand
Drag in all the sand with cocoa mat
Roll all the fields one direction with 3-ton roller to help level
Inspect irrigation system

June

Spray wetting agent at maintenance rate
Spray growth regulator mixed with iron
Set up goals for soccer camps
Paint fields needed for camps
Water fields and let them recover
Inspect irrigation system

July

Fertilize fields with 24-4-10 50% SCU, 2% iron at 1 lb. per 1,000 sq. ft.
Spray wetting agent at maintenance rate
Spray growth regulator
Slice playing surfaces two directions
Inspect irrigation system

August

Spray wetting agent at maintenance rate
Spray Manage for nutsedge
Spray growth regulator
Spray Ferromec 15-0-0 6% iron
Core aerify all fields two directions
Lay out all fields
Paint all fields once every 10 days
Move all goals back onto fields and secure them
Inspect irrigation system

September

Apply K-Mg 7 lbs. per 1,000 sq. ft.
Apply 24-4-12 50% SCU 2% iron with trace elements 1 lb of N per 1,000 sq. ft.
Spray wetting agent at maintenance rate
Spray follow-up application of Manage
Spray fall pre-emergent on areas not overseeded
Re-paint fields every 10 days
Lightly verticut in one direction
Scalp grass from 1 in. to ¾ in.
Vacuum all grass and haul off site
Inspect irrigation system

October

Pull soil samples and send off for analysis
Spray all areas that are not going to be overseeded with Barricade
Overseed playing surface with 3-foot border
Spray all seed with wetting agent
Apply 15-15-15 50% SCU at a ½-lb. of N per 1,000 sq. ft.
Re-paint fields every 10 days
Inspect irrigation system

November

Re-paint fields every 10 days
Spray Ferromac 2 gal./acre to maintain color
Inspect irrigation system

December

Work on any projects associated with the fields
Service all equipment
Make sure welds on the goals are good, fix cracks
Inspect irrigation system

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