Reducing the sports turf irrigation footprint

By Luke Frank

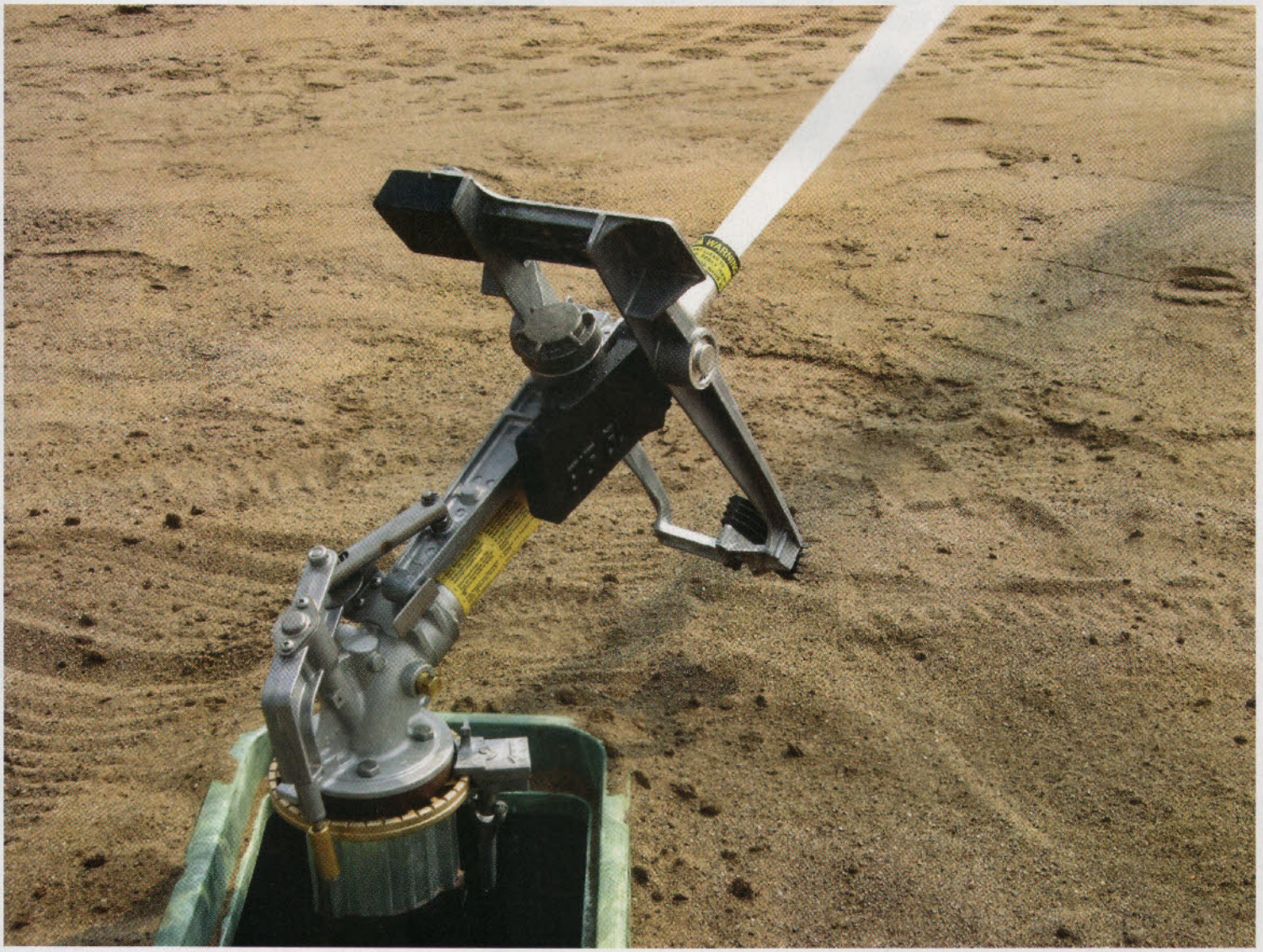
Building the softball field at University of Missouri in Columbia. Courtesy Jeffrey L. Bruce.

The American Society of Irrigation Consultants (ASIC) interviewed Jeff Bruce, president of Jeffrey L. Bruce & Company in North Kansas City, MO, about the latest irrigation system technology aimed at reducing water waste or overuse in the sports turf industry.

Bruce, who also is vice president of ASIC, is widely regarded as one of the most progressive irrigation designers in the sports turf industry, with numerous high-profile venues to his credit:

- Detroit Lions Practice Facility, Dearborn, MI
- Carolina Panthers Stadium and Practice Facility, Charlotte, NC
- University of Kentucky Football Practice Facility
- Arrowhead Stadium, Kansas City, MO
- Raymond James Stadium, Tampa Bay Buccaneers, Tampa Bay, FL
- Royal Hong Kong Polo Stadium
- Gator Bowl, Jacksonville Jaguars, Jacksonville, FL
- Razorback Stadium, Fayetteville, AR
- Palmer Stadium, Princeton University, Princeton, NJ
- Owens Field, University of Oklahoma, Norman, OK

We started out with the standard line of questions: What sprinkler components have created the most change in sports turf water use? Where are the weak links in irrigation design that can lead to water waste? Bruce offered some good insight, but the interview



quickly evolved from conservation to global sustainability and the footprints some of our irrigation product and management choices leave behind.

ASIC: What single irrigation component has created the most change in managing water for sports turf?

JLB: Probably the irrigation controller. It has provided huge amounts of functionality with multiple-schedule capabilities, cycle-and-soak functions, and interactive user features. Some of the controllers now available with affordable sensors enable a turf or water manager very customized, programmable operations specific to site conditions, like wind and sun exposures, soil conditions and the like. That's pretty powerful. I think single-handedly the evolution of irrigation controllers has done more to advance water conservation than anything else.

But we should remember that water conservation is only an emerging topic of consideration in sports turf. I mean, we leave a pretty small footprint in the overall scheme of things. What owners look at from a 'conservation' standpoint is continually combating heavy use of the turf area, and water is one of those elements best suited to restore grass and natural athletic surfaces.

So, athletic competition facilities consider water simply a cost of doing business. There are certainly some great sports-turf managers who are more focused on trying to use water efficiently, but facility owners haven't really placed an emphasis on water conservation. It's happening a little more in parks and recreation, where the facility footprint and public scrutiny of expenditures can be considerably larger.

And it should further be mentioned that sports turf managers have a higher priority, in a sense, with ensuring the safety of the users. Safer, playable turf generally requires more irrigation for a pliable surface that helps absorb shock that otherwise would go to an athlete's ankles, knees, hips, back, etc. Safety is one of the turf manager's highest priorities.

ASIC: Give me two other important irrigation system components for turfgrass managers who want to conserve water.

JLB: I think most irrigation consultants would agree that another system component that has benefited from considerable research and development is nozzle and nozzle-set design. Irrigation manufacturers are constantly

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 turfgrass 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-

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 irrigation 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.

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

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 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 valuate 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.