Taking Your Pulse; Maintaining the Heart of Your Golf

By E. Paul Eckholm, CGCS

In part I of this series we looked at the foundation of an irrigation system, the water supply and the pump house. In this article we will look at the next link in the system, the pipe and sprinkler heads. This is the part of the system that non-professionals will at least sometimes see. What we tend to see is that irrigation systems are the forgotten piece of the puzzle when it comes to turfgrass maintenance. Many people look at irrigation and think that if the water comes out of the head everything is good. Nothing could be further from the truth. We as professionals need to realize and communicate that, for the system to be truly efficient and useful, periodic maintenance, repairs, upkeep and occasional updating of the system must be done.

Piping

Irrigation system piping has come a long way in the past 50 years. Many different types of pipe materials have been used for irrigation systems and each has had its own positives and negatives.

Course Part II

Some of the products that may be found currently in use on golf courses are:

- **Transite** - A cement asbestos product, developed by Johns-Manville, used for its strength and long life. The downfall of the product was the asbestos component which when broken or cut would be released to the air and has been demonstrated to cause cancer. It was also difficult to repair when broken. This type of pipe is now considered hazardous waste and needs to be handled specially.

- **Steel and Ductile Iron** – Strong, cheap and abundant. Rust and corrosion of steel and overall weight are the limiting factors with these products. The ductile iron products are still very common in the irrigation industry, mostly used where a strong fitting is needed and the plastic materials will not withstand the forces placed upon it. The type of graphite used in manufacturing of ductile iron makes it much more resistant to corrosion than standard steel.

- **Galvanized steel** – The galvanization was intended to help slow down the oxidation of the steel and the eventual failure of the pipe due to corrosion. The problem is that the minerals in the soil react with the galvanization and accelerate the corrosive process. Also difficult to repair if a hole developed.

- **Copper** – Much better anti-corrosive properties than the Galvanized steel, however, cost proved to be the limiting factor.

- **Brass or cast bronze** – used

mainly for irrigation heads and valves. These products have excellent anticorrosive properties, are very strong and last a very long time. The negatives include cost and brittleness. Brass and bronze heads being replaced with plastic can easily be taken in for scrap and generate a significant amount of cash.

- **Thermoplastics** – This category includes polyvinyl chloride (PVC), polyethylene (PE) and the newest high density polyethylene (HDPE). These products have been the mainstay of the irrigation industry since the early 1970's and are now probably the most commonly found piping products found on golf courses. They are strong, long lasting, and easy to install and repair. Additionally they are light, corrosion resistant and have excellent insulating capabilities. The downfalls of these products are improper fusion of the pipe, improper pipe rating and overall lack of knowledge about the product and its proper use.

A quick word about pipe ratings:

- **Schedule rating**: The schedule rating is a number relating to the wall thickness of the pipe. There is no official correlation between wall thickness and photopressure ratings.
- **Class rating:** The class rating is a pressure rating for normal

photo Erin McManus

operating pressure. This number does not have a standard for surge pressures or water hammer.

- **SDR** (Standard Dimensional Ratio): this number is a ratio of the pipe diameter to the wall thickness and is a standard ASTM number. Since it is a ratio, the numbers are backwards, ie. The higher the number the thinner the pipe wall.
- As a general rule think of schedule numbers for fittings, generally schedule 40. Class 160 pipe is normally SDR 26 and Class 200 pipe is normally SDR 21.

Once you know what type of pipe is in the ground, the next factor to consider is the pipe sizing. This can usually be determined by looking at an as-built drawing of the system. If you are lucky, there is a very good one of these on the property, if there is not, you should start to develop your own by making notes every time someone digs a hole and finds pipe in the ground. With the knowledge of what is in the ground a superintendent can determine if there is enough capacity to add additional lines to areas previously not irrigated.

Without this knowledge, the risk is that additional heads will either cause too much water flow through a pipe exceeding the flow rating of the pipe or there will not be enough water capacity to operate the heads properly.

Irrigation designers spend a large amount of time making sure that there is proper pipe sizing for the system as designed. If there are plans to add additional areas of irrigation at a later date those, considerations should be planned for in the initial design. Adding lateral lines to a system designed for additional output, is a lot easier than adding new main lines to increase capacity. It may seem like a simple thing to pull in a bunch of additional piping to add heads to a previously non-irrigated area, but the calculations necessary to add that additional pipe is more than measuring the length of the run and counting the number of heads. That is if you hope to have it work efficiently and effectively.

Knowing what type of pipe, the size of that pipe and where it is, can make a superintendents life easy or hard. With the proper knowledge, repairs can be coordinated efficiently, extensions can be made where necessary and updates can be justified.

Sprinklers

The golf course sprinkler is the one piece of irrigation equipment that is visible to the public. From the beginning the goal has always been to distribute irrigation water evenly across the entire wetted diameter of the throw of the water. As with pipe, there are a number of different products and materials in use on today's golf courses. The earliest golf course sprinkler was the impact sprinkler. A product originally developed for the

agriculture industry, the impact sprinkler forever changed the way golf courses were irrigated. We still see today many courses watering with impact sprinklers and the manufacturers still try to improve on a well developed product. This technology was eventually moved inside of a case that could be permanently buried in the ground and turned on individually or as a group.

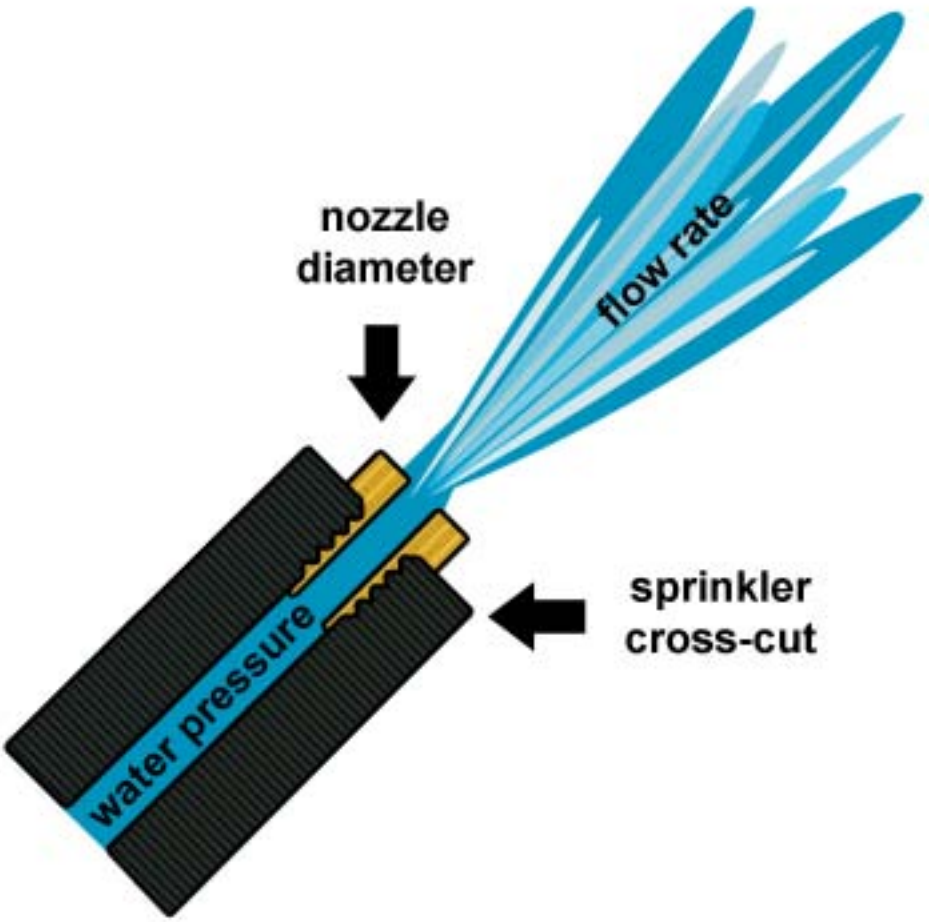

photo irrigation.wsu.edu

As with the above-ground impact sprinkler, the in-ground impact is a tried and true technology that still is in wide use on today's courses. When the engineers determined that there should be a better way of rotating the sprinkler around to improve the uniformity of the distribution pattern, the gear drive rotor was born. This technology was coupled with injection molded plastics to provide what we today see as the mainstay of new irrigation sprinkler heads. Add a valve in the bottom of the head and electric control and you have the modern golf course irrigation head. Manufacturers continue to work with these products and what we will see in the future will improve control and efficiency.

All of these sprinklers have their place on the modern golf course. However, it is the job of the superintendent to look at how, when and where each of these products is used. As the cost of golf course operations continues to increase it is up to the management teams to help determine areas where efficiencies can be improved. Evaluations of the

sprinkler heads should be done on a continuing basis. Initial evaluation should look at the age of he heads, condition and placement.

As with all products, age will adversely affect the performance of the sprinkler. Wear caused by friction of water will wear out the nozzles; this can be exacerbated if the water is dirty or has large amounts of dissolved solids in it. Some nozzle wear is easy to see, some is not. The best way to determine if the nozzle is good after initial inspection it to conduct a catch can test. This will tell you if the nozzles are distributing the water evenly across the pattern. You do not need to do every head. If a given number of heads are found to be defective, many of them probably are and should have the nozzles replaced. If the head is physically damaged, it should be replaced. Many times parts can be replaced without needing to replace the entire head.

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Check to see if the head is properly placed to cover the area needing to be irrigated. Over time shapes of features on golf courses change. This can cause the irrigation heads to be in the wrong place. Many times they can be easily moved, other times more drastic measures may be needed. If the heads are not level the distribution pattern will be distorted. This seems like common sense, but the pattern can vary greatly with just a very small tilt.

Delving a little deeper into the operation of the head can reveal some drastic differences.

Turn the head on and observe the operation. How long does it take to come on? How long does it take

photo sprinklerheadtrimmer.com

to make a full revolution? How long does it take to shut off? All of these things affect just how much water you are applying to a particular area. This may not be a huge problem in the rough, but on a green that already holds water or is dry; this can become a bigger issue much more quickly. These quick observations can lead to finding a head that needs some repair, adjustment or replacement. This saves time, money and additional headaches down the road.

As with the other parts of the irrigation system, a small amount of time invested can lead to more efficient operation of the system as a whole and provide more piece of mind for the superintendent. Additionally, from a planning standpoint, these evaluations will aid the superintendent in promoting the updates that may be needed to the system.

E. Paul Eckholm, CGCS, is a former golf course superintendent with over 25 years of experience in golf course management and is currently an irrigation specialist at Yamaha Golf and Utility. Paul has been working with numerous manufacturers of irrigation products for the past 15 years on product development related to water use reductions. Paul currently holds a number of certifications in irrigation technologies.