

Planning for irrigation modernization

by Jack R. Donis

It is safe to assume that the golf course owner with a manually operated irrigation system will at some time investigate the possibility of automating the system. And why not? There is much to recommend system modernization and automation. The benefits include: less water usage, less electricity usage, the potential for better turf through better control of the growing environment, less labor input, less disruption of play. A good turf irrigation system — tailored for the specific course — is one of the few turf maintenance tools with the potential to return the initial investment.

The planning phase of a golf course irrigation system modernization project is unquestionably the most important. The proper questions asked — thoroughly investigated and correctly answered — will, to a large extent, determine what the system will be in terms of the materials selected and in their eventual placement. Also, it will have considerable influence during the design phase.

The planning phase is the information-gathering phase. Do not confuse the planning of the system with the design of the system. These are two distinctly different operations. If the planning phase is thoroughly done, then the subsequent design will be: 1) easier to complete, 2) more realistic, and 3) more useful and practical. This thoroughness must include all phases of the system.

Too often there is a tendency to look upon system modernization as a process of selecting sprinkler heads, control valves, and a control system, and to forget about such things as the pumping plant — the heart of the system. The pumping plant, whether as a pressure booster or as the primary source, must keep pace with the



The pumping plant is the heart of the system. Superintendent Sonny Faust had this one installed when modernizing his irrigation system at Southern Hills CC in Tulsa.

changing system. Indeed, full utilization of the new system is usually dependent upon a revised and redesigned pump plant. The two go hand-in-glove. The multiple pump approach gives the greatest amount of system flexibility. Properly engineered, this approach can provide several advantages for the superintendent, including constant main line pressure to facilitate certain maintenance functions such as filling spray tanks and spot watering syringing. Additionally, the constant pressure system will make life easier for the total system by eliminating pressure surges and entrained air.

Also, the modern automatic system will generally require cleaner water than was used in the old system. Many older systems incorporate large nozzle sprinklers at high pressure — usually 90 psi and higher. This type of system might simply “blow out” particles of dirt and debris that are permitted to enter the piping system. Most automatic systems will incorporate at least some sprinklers, usually around the greens and on the tees, having smaller nozzles that will not pass this debris. Additionally, most automatic control valves have very small internal ports that are even more sensitive to water quality than sprinkler heads.

This most vital aspect of system modernizing must be considered early on. Even if a modernization project is to extend over a period of years, the water quality is important the very first year!

The potential usefulness of the existing mainline and fittings must be thoroughly evaluated. Pipe and fittings for a complete new system can total up to a third of the total cost. It should be determined how much of these, from both a practical and a hydraulics standpoint, are usable in the new system. Keep in mind, however, that marginally useful pipe and fittings should not be used. There are numerous areas involving false economy with irrigation systems. Very often the dollar saved today will develop into a 2-dollar expense at a later date. With components that are

as costly and difficult to get to such as pipe and fittings, do not gamble on the usefulness of existing materials.

Too often the system modernization work is “figured out” by a materials supplier whose interests seldom extend beyond the “getting the order” phase of the job. While many such firms do have qualified personnel, it really is not reasonable to expect them to invest the time necessary to make the complete project workable. Irrigation system modernization is much more involved than simply purchasing materials!

Do it right from the beginning

Very often the course owner has very limited information about the system that needs modernizing. Highly useful and, more often, essential information includes:

- 1) A current aerial photograph of the course. Photographed to provide a 100 scale picture, this is much more satisfactory than using outdated plans and maps. Golf holes change over time depending upon how they are played. Mowing patterns will change the way a hole is played and consequently the areas requiring irrigation have changed. When the aerial photograph is taken is an ideal time to devise a highly visible marking system for locating “in-the-ground” site features such as utilities, drain pipe systems, gate valves, pipe, quick coupling valves, etc.
- 2) A topographic map of the course. Knowing elevation differences will significantly affect the location of system components. If these elevation differences are known during the design phase, then the design becomes just that much more useful and realistic. Additionally, it is obvious that system hydraulics will be greatly affected by elevation differences. These matters should not be guessed at.
- 3) Electrical power. Sources and availability of electrical power for use on the course are necessary; particularly with the advent of centrally programmed systems, where

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the coordination of the power source for the central programmer and the field controllers is necessary.

- 4) Water data. Complete information about the amount, the quality, and the water pressure if known is very important.

Not only does the owner seldom have this information readily available, he is sometimes reluctant to take the time and/or spend the money to develop this preliminary data. It should be pointed out that the quickest way to have a potentially disastrous outcome is by not having as complete as possible information when starting. Under the best of circumstances there will be inevitable unforeseen problems; attempting to reduce these to a manageable level is the whole idea behind the planning phase.

Many times it is the owner's wish to proceed with system modernization on a phased basis. Often this involves beginning with the greens and tees automation: a portion of these one year and a portion in each of the following couple of years. The conventional thinking too often is that because the work each year is not very large or significant, an overall plan is not required. This type of thinking is not only wrong, but it ignores the more important point of where do we ultimately want to be. It is essential on a phased conversation type job that what work is done today must be usable as the work progresses over the years. This is most important for pipe and wire sizing. Having the plans and the "work-completed-to-date" information being carried around in the head of a superintendent, who could be gone on short notice, is a very poor way to manage an investment that could easily reach \$200,000 or more.

System modernization projects, more so than new construction, often end up being do-it-yourself jobs. The owner should be fully aware of the magnitude of this method. If his superintendent has done this type of work previously and understands the system proposed, then this way can work out quite well. And it is fair to say that many times the inexperienced superintendent can successfully tackle the job, if he does his homework and is vitally concerned. Also, a lot depends upon the complexity of the system. A less complex system would naturally be easier to understand and probably easier to install.

I have seen systems go in the

ground under many different arrangements. My personal feeling, however, is that the course owner is better served by having a truly qualified irrigation contracting firm effect the installation. There are no disadvantages to doing it this way if the contractor is qualified and cares! From the owners standpoint, this way will cost more money. However, when we're dealing with complex systems and hundreds of thousands of dollars it seems best to entrust work of this magnitude to highly qualified professional installers. Let them solve the problems; let them take the responsibility. The successful installation of 800-plus sprinkler heads, 250-plus control valves, 50 miles of wire, and a complex control and pumping plant are really best left up to truly qualified individuals and firms.

This does not mean that the superintendent should become a totally disinterested party; to the contrary, as the person charged with operating and maintaining the system, he must be keenly aware of all aspects of the system and of the installation. The smart superintendent is out with the contractor all the time observing what is going on, as well assisting in major decisions affecting his golf course.

Design the best possible

Earlier I made the point that system modernization involves much more than simply buying sprinkler heads, automatic valves and control system. I want to emphasize this point by stating that a truly versatile, workable system has built into it what I call refinements. These refinements are not "gold plating," but are so often essential pieces of equipment. I am referring to such things as pressure reducing valves, air and vacuum relief valves, pressure relief valves, main line check valves, main line isolation gate valves, etc. These are the hardware items, where needed, that can elevate a good irrigation system to a truly versatile maintenance tool. These items must be planned into the system. Their absence, where required, can lead to very expensive repair both to equipment and to the golf course itself.

In system modernization it is advisable to plan for, or to design for, the maximum condition. It makes little sense for a system to be adequate for anything less than 100 percent of the time. Here in the Willamette Valley, until maybe 7 or 8 years ago, the conventional thinking was that if a system could provide one inch of water per week for turf that would be enough.

Well, it took a few jobs and additional observation and input to prove that that was simply not enough water to carry a golf course through our summers. We now know that we must at least provide for the ability to apply a minimum of 1½ inches per week. Why let the golf course burn up during those months when the income potential and rounds played is the highest?

Most geographical areas that I am familiar with experience a lessening of wind velocity during those hours normally assigned for operating the automated irrigation system. However, not all areas are like that. Many areas experience a night time continuation of high velocity daytime winds. This condition must be taken into account in the planning phase if a truly workable system is to result.

Always plan to satisfy the maximum critical condition.

Once the planning/information gathering phase has been completed, the design phase can begin. With thorough information the designing of the system becomes, essentially, an exercise in product application. It is necessary for the designer to have first-hand knowledge of the various products available so that intelligent decisions and selections can be based upon an assessment of what is best for a particular situation. In the irrigation industry, this type of objective thinking can best be made by a professional with only the best interests of the owner/client in mind.

In elemental terms, an automatic irrigation system is the way to apply water WHEN (time) and WHERE (place) it is required. Recreational turf areas usually have a time period within which to complete the irrigation. The amount of time allotted will directly affect two important factors: the amount of water required, and the cost of the system. As the time available for irrigation decreases, the demand on the two above factors increases.

The following three statements are good to keep in mind during the planning phase:

- 1) Use equipment constructed and intended for your application.
- 2) Never exceed any manufacturers recommended maximum spacing pattern.
- 3) Attempt to "go for lower", i.e. "lower pressure = lower precipitation = lower cost."

With proper planning the design process can be made simpler, and the end result—the installed system—will be a more effective turf maintenance tool. □