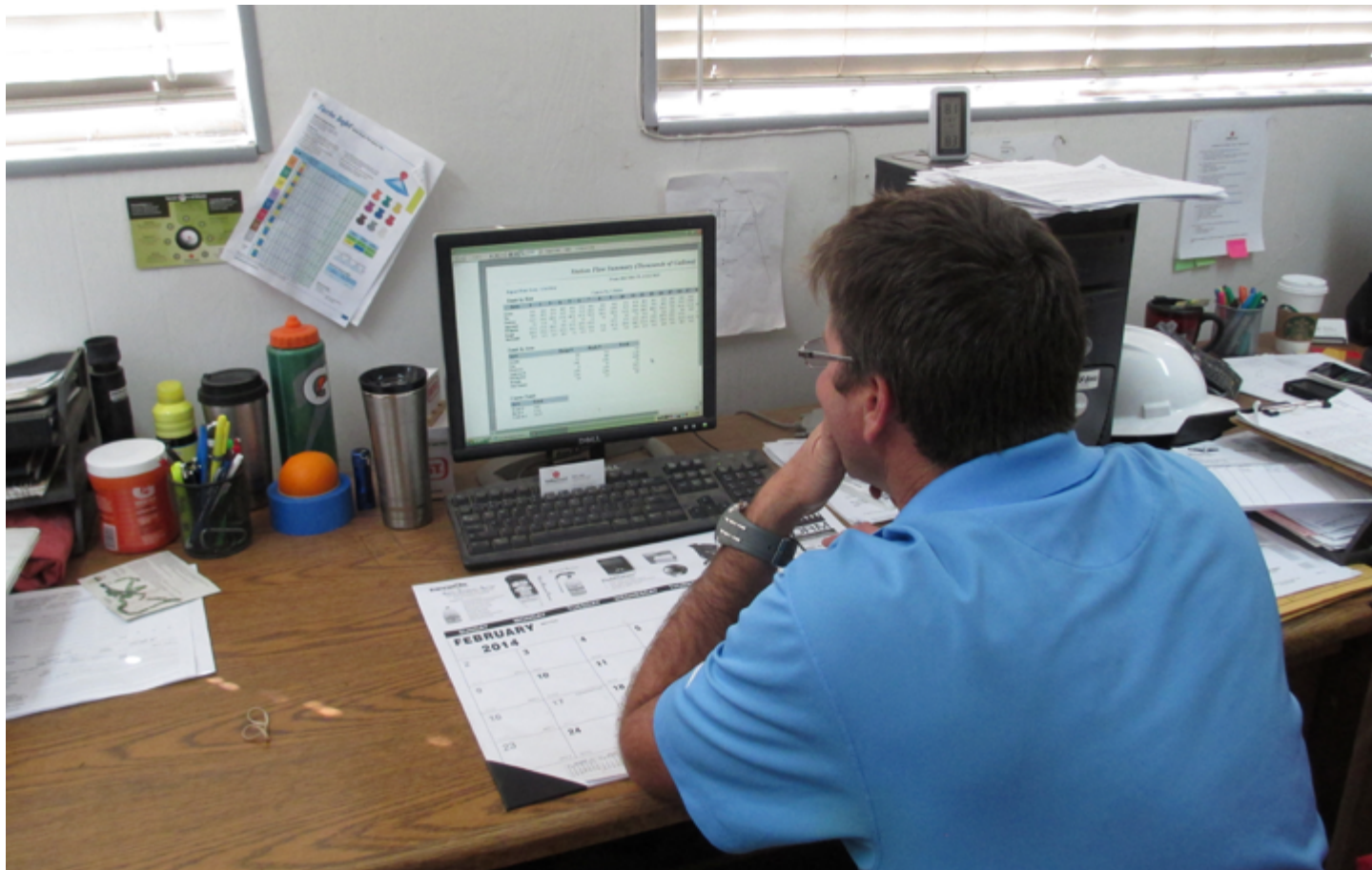


Developing a Preventive Maintenance Checklist for Golf Course Irrigation Systems

Proper maintenance can reduce labor and materials costs and may also help save water and energy while improving playing conditions.

BY BRIAN VINCHESI



A daily check of the central controller shows if the previous night's program operated on schedule. Adjustments to irrigation run times also can be made before the next irrigation cycle.

Irrigation systems are an integral part of golf course maintenance, just like maintenance staff, mowing equipment, and maintenance facilities. Without a functional irrigation system, it is virtually impossible to maintain golf course turf in playable condition. However, while mowers and other equipment are regularly seen working on a golf course, irrigation systems are a mystery to many golfers because they

are buried underground and most frequently operate at night. Therefore, it can be difficult for golfers to understand that irrigation systems wear out and are very expensive to replace. A new irrigation system can cost \$1.5 million or more, depending on location and complexity. Not surprisingly, most golf courses try to avoid this expense for as long as possible, especially since the true value of an irrigation

system often is not fully understood.

Golf course irrigation systems can quickly deteriorate from lack of maintenance. Irrigation system maintenance is primarily reactive at most golf courses — i.e., when a component of the irrigation system breaks or is not properly working, an irrigation technician or assistant superintendent is dispatched to make repairs. Pre-



Sprinklers should be checked every week to ensure that they properly pop up, turn, and retract. Check that they rotate at the correct speed and that they are not leaking.



Sprinkler nozzles should be checked frequently for clogs and wear. Also, ensure that the proper nozzles are installed in each sprinkler.



Turf can grow over sprinklers and disrupt irrigation coverage, especially in rough and naturalized areas. Check and trim turf around sprinklers every month.

ventive maintenance can reduce the amount of reactive maintenance and improve playing conditions. Developing a preventive maintenance program is the best way to extend the life of an irrigation system, maintain performance, and minimize the severity and frequency of problems.

Preventive maintenance programs must be customized to meet the unique needs of an irrigation system, and they should be based on a thorough check of the system and its components. As with any preventive maintenance regime, some tasks will need to be accomplished on a daily, weekly, or monthly basis, while others may require attention quarterly, semi-annually, or annually. Of course, while preventive maintenance reduces irrigation system problems, it does not eliminate some tasks that must be completed on an as-needed basis.

So, what does a preventive maintenance program look like for the irrigation system at your golf course? It depends on the type of irrigation equipment and its age, but a typical program includes the observation, adjustment, and maintenance at regular intervals of sprinklers, valves, controllers, pump systems, and other components. The following sections of this article can be used to create a customized preventive maintenance checklist for any irrigation system.

DAILY MAINTENANCE

On a daily basis, the maintenance staff should perform the tasks that are a normal part of routine irrigation system operation and management. Examples include the following tasks:

- Observe golf course turf conditions for wet and dry spots.
- Review the irrigation program from the previous night to confirm that the irrigation system operated on the programmed schedule.
- Check the pump system monitor for any inconsistencies or abnormalities. This may be done remotely depending on your pump system equipment.
- Review and record water use from the previous night's irrigation cycle.
- Document evapotranspiration with a weather station or online source.



Checking the satellite controllers and central computer for backup programs and accurate run times should be done at least once every month.

- Measure any precipitation using a simple rain gauge.
- Log any pipe breaks and component failures.
- For two-wire systems, check the operating log in the central control software diagnostics to verify normal communication between the central control software and each sprinkler or valve. Investigate stations that report possible issues.
- Prepare and prioritize irrigation repair orders and discuss them with the appropriate personnel. Assign additional staff to assist with repairs if necessary.
- Determine the water requirements for the next irrigation cycle and adjust the program accordingly.

WEEKLY MAINTENANCE

Daily observation and maintenance should occur as part of normal irrigation

system operation. On a weekly basis, time should be allocated to inspect the irrigation equipment itself and to make sure it is functioning correctly. Because the irrigation system most frequently operates at night, issues are not always obvious without inspection. Therefore, preventive maintenance on a weekly basis should include:

Check sprinkler operation to answer the following questions:

- Do any sprinklers appear to be turning faster or slower than usual? If so, time them to be sure.
- Does each sprinkler pop up, turn, and retract?
- Are part-circle sprinklers turning in the correct arc?
- Is there any leakage?
- Are any nozzles clogged?
- Update the central controller database with any changes.
- Check the condition of valve boxes and covers.
- Review the status of irrigation repair orders. Order necessary parts to complete repairs if they are not in stock.
- For two-wire systems, use software diagnostics to check the performance of each wire path for abnormalities such as excessive or unusual current draw and low-voltage reports.
- Visually inspect the condition of the pump station.



Clean field satellite controllers quarterly by dusting, removing cobwebs, and replacing insect repellent. This can greatly extend the life span of electrical components.

MONTHLY MAINTENANCE

Approximately once a month, the staff should:

- Check that sprinklers are not blocked by surrounding turf and trim around sprinklers as necessary.
- Inspect valve assemblies for leaks or damage.
- Examine and clean filtration devices. Check for wear on filter screens.
- Review and consider adjusting temporary changes made to irrigation station run times during the previous month.
- For two-wire systems, use software diagnostics to run a voltage check of every sprinkler or valve in the field. Compare voltage readings to results from the previous month to verify that there is no unexpected drop in voltage.
- Inventory and restock irrigation repair parts.

QUARTERLY MAINTENANCE

Dust, dirt, and debris can damage irrigation controllers and pump systems. Quarterly cleaning can significantly extend the life of system components, especially electrical items such as central computer controls and field satellites. Quarterly maintenance should include:

- Clean satellite controllers and replace insect repellent.
- Clean the pump system, pump house, and irrigation parts room.
- Remove dust from the central computer using a compressed-air duster.
- Check if software updates are available for the central control system and install them as necessary.
- Clean out rain gauges.
- Listen to the pump system as it starts up and shuts down during an irrigation cycle to ensure that it is

operating correctly. Check to ensure that pumps turn on and off smoothly, watch for excessive cycling, and listen to how the drive ramps up and down.

SEMIANNUAL MAINTENANCE

Exercise all quick couplers on the course, especially those that are rarely used.

- At minimum, record pressure readings at high and low points of the irrigation system using quick couplers and a pressure gauge. Compare readings to previous results and note any changes in pressure to identify potential problems.
- Pump system service should occur semiannually at minimum in climates with a 12-month irrigation season.



Pumps are the heart of an irrigation system. Semiannual maintenance of electrical and mechanical components by a trained technician ensures efficient operation.

ANNUAL MAINTENANCE

Exercise all isolation valves and drain valves to prevent them from sticking open or closed.

- Pump system service should occur annually in climates with a six- to eight-month irrigation season.
- Pressure-wash pump system filter or “Y” strainer screens. Check intake screens for clogging and debris.
- Test and certify the function of any backflow prevention devices. Hire a certified technician who works in accordance with state and local testing requirements.
- Test and service pressure-regulating devices.
- Test, clean, and service air-release valves by flushing “Y” strainers and exercising ball valves.
- Drain and winterize piping systems in cold climates.
- Level and set sprinklers and valve boxes to grade.
- Check antennas and their connections.
- Back up map and program databases on the central control system to an external device.
- Renew central computer service plan and update the computer according to service schedules.
- Check field controllers to ensure that backup programs are still installed and relevant.
- Calibrate flow meters on the pump system and water sources.
- Run a test of the battery backup that protects the central computer and replace it if necessary.
- Verify that a sample of grounding readings continues to meet manufacturer specifications. Compare readings across years to identify changes that could indicate reduced lightning protection.
- Check the calibration of weather station sensors and check all connections.
- Inspect quick-coupler hoses and hose-end fittings.

AS NEEDED

If necessary, hire a contractor to inspect the pump intake and clear any accumulated debris.

- Repair or replace pump intake screens.



Isolation valves and drain valves should be exercised annually to prevent them from sticking open or closed.

- Rewind pump motors and rebuild turbine pumps, replacing seals, bowls, and bearings.
- Perform an irrigation field audit every three to five years to monitor water distribution uniformity and sprinkler performance.

DIAGNOSTICS AND REPAIRS

With new technology, some of these tasks can be automated or are incorporated into the features of irrigation equipment. Today's central control systems have the ability to diagnose or

troubleshoot many aspects of a golf course irrigation system. They are often able to pinpoint where problems are occurring and can provide diagnostic data such as voltages and amp draws at every sprinkler. These troubleshooting features, currently available with newer irrigation systems, will only expand and improve in the future.

In order to efficiently service an irrigation system, it is important to maintain a small, on-site inventory of irrigation parts. It is difficult to perform maintenance when parts must be

ordered every time something goes wrong. Parts inventories should be diverse. However, every golf course should have at minimum a selection of fittings, a small amount of pipe, and repair couplings for every size of pipe used in the irrigation system. Additionally, sprinkler bodies and internals, sprinkler control wire, wire connectors, gate valves, and a variety of nozzles should be readily available. Other items that are good to have on hand include a spare faceplate and several spare circuit boards for field controllers; an electrical multimeter for testing voltage, amperage, and resistance; a metal detector; and a wire locator. Two-wire systems will require more specialized diagnostic equipment such as a clamp meter and wire radar device.

Depending on the age and amount of time required to maintain an existing irrigation system, employing an irrigation technician may be advantageous. Irrigation technicians focus on performing both reactive and preventive maintenance, checking pump system operation, and keeping the irrigation computer database accurate. If you have a large irrigation system — e.g., an irrigation system with 2,500 sprinklers or more — you may need two or more irrigation technicians. A properly trained irrigation technician will keep an irrigation system functioning as intended while reducing additional costs. A side benefit of proper irrigation system maintenance is the potential for reduced water use. When an irrigation system is in good condition, it is more efficient and saves both water and energy.

CONCLUSION

Although a preventive maintenance program will not make an irrigation system last forever, it will reduce the labor and materials costs associated with keeping the system operational. It may



A selection of pipe fittings and repair couplings of different sizes should be on hand so that repairs can be made in a timely manner.

also help save water and energy while improving playing conditions. A well-maintained irrigation system can even help reduce the stress level of maintenance staff by providing a dependable system they can rely on during hot, dry days when it is most needed.

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