

Irrigation | Stuart Hackwell

Water efficiency at Desert Mountain

When you have the challenge of managing playing conditions for six golf courses in one facility—and one built in the desert at that—you had better be serious about water. That's why Shawn Emerson and the team at Desert Mountain in Scottsdale, Arizona, spend a considerable amount of time and effort making sure every aspect of water management is carefully scrutinized.

Desert Mountain is a 2,500 home gated community. Among its amenities are six golf courses built between 1987-2003. Each course is a Jack Nicklaus, ASGCA signature design. The total area under irrigation is 540 acres. Each course has its own superintendent to attend to the specific needs of each facility. As director of agronomy, Emerson oversees the entire operation.

Emerson has been at Desert Mountain for 13 years. The challenge of managing a large facility and growing turfgrass under arid conditions means he's constantly looking for ways to improve water management. With only eight inches of rainfall a year on average, supplemental irrigation is crucial to the success of the property. Actively managing the irrigation run times to conserve even a few percent means that a considerable amount

of water can be saved. Irrigated areas are precisely controlled so that the amount of water applied is specific to the needs of the grass type and the soil growing conditions with a minimum of water and energy use.

Each day the team at Desert Mountain employs a variety of tools to monitor soil and environmental conditions. In addition to computer controlled irrigation systems and weather stations, they have employed a series of cutting edge technologies to optimize turfgrass conditions, manage water and minimize energy use. A soil sensing system has been installed, regular soil and plant issue testing are conducted and pump station energy use has been studied.

The extensive use of soil sensors enables Desert Mountain to monitor soil moisture, temperature and salinity across the facility. Careful monitoring of these parameters during and following irrigation cycles and rainfall events enables Emerson to see how the soil responds to changes in irrigation and temperature. Keeping the soil moisture carefully controlled within a precise range produces optimal playing conditions and consistency while minimizing water use. If soil moisture is at desired levels, irrigation is delayed until key thresholds are observed.

Emerson has used sensors to evaluate changes in soil temperature in greens and was interested to observe that soil hotspots—areas where the soil temperature increases to a point that causes stress to the grass—moved in relation to the growing season. During the summer, when the sun is higher in the sky, the hotspot was in a different part of the green than in winter. Having this information on hand enables Emerson and his crew to better manage these hotspots to control the stress on the grass.

As the six courses were developed over 16 years, Emerson has seen improvements in design, drainage, irrigation system technology, grass types, and construction techniques over that time. As a result of these changes, he has the ability to experience different conditions at the different courses, which enables him to experiment with technology for optimal results.

Desert Mountain overseeds with ryegrass each winter when the bermudagrass go dormant. Having six courses provides the flexibility to not overseed two courses each year, allowing them to stay dormant and brown. The dormant courses are rotated each year. This saves a considerable amount of water

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Desert Mountain has saved both energy and water through careful management of irrigation

with minimal inconvenience to the membership. An added agronomic benefit is that the drying-off effect of letting a course go dormant for the winter months toughens up the desirable bermudagrasses and kills off undesirable grass types, which usually need water to survive, even in the winter.

Emerson employs a variety of irrigation strategies to make sure that irrigation water is efficiently used. Irrigation applications are managed based on infiltration rate of the soils, which minimizes surface runoff. Emerson describes this as “slowing down the application rate, allowing the water to wick into the soil.” If a sprinkler is allowed to run too long in any single area, the water will not infiltrate into the soil and will be wasted. An active maintenance program ensures that sprinklers are properly adjusted and in good working order. An upgrade program ensures that the latest sprinkler nozzle technology is employed to optimize system efficiency.

The courses at Desert Mountain have a variety of design styles, affecting how irrigation is managed. Some fairways are bowled to the center, with raised edges, which tends to keep water on the course. Other fairways are sloped from one side to the other, which can create surface runoff.

Emerson invites teams of turfgrass and irrigation experts to meet at Desert Mountain and review his practices. This ensures that the latest techniques are in use and provides

oversight to ensure that every detail is considered.

Recently, he turned an eye towards energy consumption of the pump stations that supply irrigation water for the golf courses. The Golf Resource Group, headed by architect Andy Staples, ASGCA Associate, conducted a complete evaluation of the energy and water use of the Renegade course at Desert Mountain. Staples assembled a team including an engineer and personnel from Rain Bird to conduct a series of performance tests to evaluate the efficiency of the pumps, central control, water use, and energy demand.

Results of the evaluation demonstrated that energy savings could be obtained in a variety of areas:

- Upgrading key components on the ten-year old pump station to current technology could achieve energy savings of 17 percent
- Additional refinements to control system programming to better align control system operation with optimal pump station efficiency could achieve further energy savings
- Simply reducing pump station capacity during seasonal off-peak use could save 6.75 percent of energy costs by lowering electrical demand. The power company charges based on peak electrical demand, so lowering pump station capacity during the off-season and taking longer to run the irrigation system could reduce electrical costs with minimal inconvenience
- Minimal reductions in turf area and tightening up on irrigation

run times could potentially achieve savings of five percent of water use.

Staples’ report concluded: “Management at Desert Mountain has done an excellent job of managing water on the property. Further, the golf course design fosters the responsible use of water by minimizing turf while providing a player-friendly environment.” Emerson was pleased with the information presented in the report and noted: “Managing water and energy consumption is an ongoing challenge at Desert Mountain. New technologies are introduced every day and the key to our future success is to employ these technologies.” ●



Stuart Hackwell

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