



Five Techniques to Improve Irrigation Efficiency

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Water is an important issue on golf courses and all facilities can do their part to make the most efficient use of their resources, as it improves turf health and creates firmer playing conditions. I recently sat down with Mr. Dave Ragan, irrigation consultant at Ragan Technical Solutions, to discuss techniques for improving golf course irrigation efficiency. Older irrigation systems with poor designs and outdated technology can improve their water-use efficiency by upgrading the irrigation system (see [When is it Time to Replace an Irrigation System?](#)).

However, it may not be time for a new system at your golf course and these commonsense tips can help improve irrigation efficiency at any facility. The procedures offered in this article are technical and are intended for golf course superintendents and irrigation technicians.

1. It is important to understand the precipitation rate, or how much water is being applied to a given area. This can be calculated theoretically based on how many gallons/minute that a head applies, head spacing, design (square vs. triangular) and arc rotation (see [Landscape Irrigation Formulas](#)). This will give you a ballpark value but an additional step would be to verify actual precipitation rates by performing a catch



Figure 1 - Raising and leveling irrigation heads helps improve distribution uniformity and water-use efficiency.



can test. Understanding the precipitation rate for any given irrigation run time is especially important when scheduling irrigation based on replenishing water loss through evapotranspiration (ET).

2. Consider irrigation head arc rotation when determining run times for full circle vs. part circle heads. If 20 minutes is appropriate for a full circle (360°) head, then only 10 minutes are needed for a 180° arc and 5 minutes for a 90° arc. Irrigation software generally does not utilize an arc column/table in the station database for manual run time calculation, so this will need to be determined for each location.
3. Understand that there is greater water pressure nearest the pump station and that pressure reduces as you move further away. With hydraulic rotors, your precipitation rate will be highest nearest the pumping station. If all rotors run at the same time, there can be a considerable pressure loss furthest away from the pumping station. This can be verified with pressure gauges attached to quick couplers - one near the pump station and another further away. Return with a flashlight after the system has started and is under maximum load, and record pressure averages over a ten-minute period. Irrigation run times of heads closer to the pump station can be adjusted downwards, depending on the pressure differences recorded.
4. Maintain the most efficient distribution uniformity as possible. Unfortunately, there are no irrigation systems that operate with 100% uniform distribution and most irrigation auditors feel that a good number to shoot for is about 80%. This means that in order to adequately irrigate drier areas, some areas will be overwatered by 20%. Therefore, make certain to improve distribution uniformity as much as possible, to reduce water overuse. Mr. Ragan mentions that the most common means to improve distribution uniformity on golf courses include maintaining level irrigation heads, having a properly constructed flow management tree, using appropriate nozzles, properly matching nozzles to stators and making sure that nozzles are not excessively worn or clogged. The [Center for Irrigation Technology](#) is an excellent resource for testing irrigation heads and selecting the right nozzle for your heads.
5. Invest in a good moisture probe that measures volumetric water content. Portable moisture probes take the guesswork out of the irrigation equation by accurately reporting soil moisture at the root level. Develop threshold levels for soil moisture that are specific to your location, soil type and time of year for each playing surface. Moisture probes can help fine-tune irrigation scheduling by measuring soil moisture,



as it relates to turf health, under differing irrigation run times. Also, moisture thresholds can be adjusted upwards or downwards as ET changes throughout the year.

Make every drop of water count at your facility. Understanding precipitation rate, reducing run times based on irrigation head arc and pressure, raising/leveling heads, using proper nozzles and measuring soil moisture helps improve irrigation efficiency considerably. Also, keep records of irrigation reduction to evaluate how effective these strategies are over time.

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