

## Moisture and Salinity Monitoring Through In-Ground Sensors

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### The Problem

Monitoring soil moisture levels throughout the golf course to help make informed irrigation decisions is important at Prestwick. In the past, we did not have an accurate method to monitor current soil moisture levels. Furthermore, there was no effective, efficient way to monitor soil moisture in all of the different microclimates on the course.

### The Solution

The proposed solution was to upgrade our irrigation control software. The upgraded software provided the ability to install in-ground sensors throughout the course that measure soil moisture, soil temperature and soil salinity. We also purchased several hand-held soil moisture sensors to augment the in-ground sensors.

The upgraded irrigation control software displays real-time soil moisture readings from the sensors in an easy to read format. Data from the sensors also can be accessed from any computer, tablet or smartphone that has an Internet connection. The ability to quickly access moisture readings from all the sensors has helped us determine when, where and how much irrigation should be applied. Once a specific sensor indicates

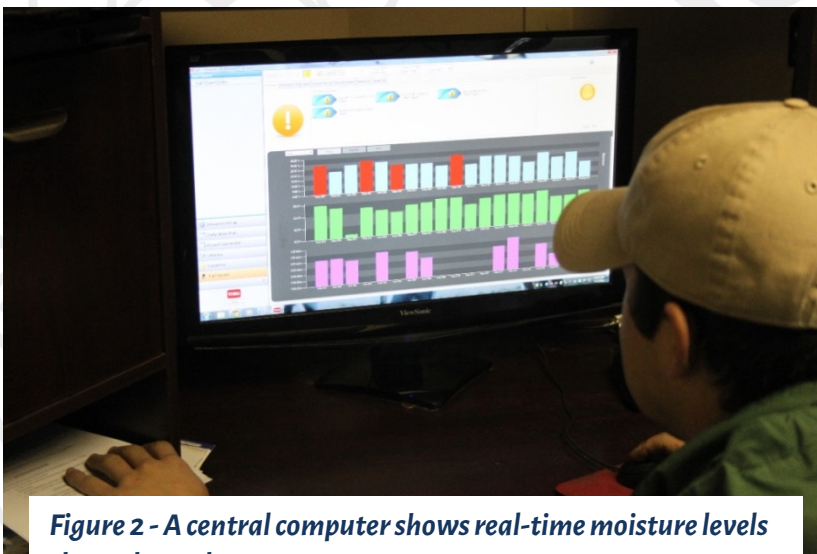


**Figure 1 - Once soil moisture sensors are installed in the ground, moisture levels can be checked easily throughout the day.**

a less-than-optimal moisture level, an irrigation technician is sent out to further spot check the soil with a hand-held soil moisture meter and make the final irrigation decision.

## The Results

Since installing in-ground sensors, the overall condition of the golf course has improved while reducing overall water use. Also, the players like the extra roll that has resulted from firmer fairway and rough conditions. We have strategically placed sensors in areas around the course that we have designated as wet, dry or average. By using the upgraded irrigation control software we also were able to designate each sprinkler head as wet, dry or average. Now, we no longer just irrigate the entire golf course; we start out by only irrigating dry areas, followed



**Figure 2 - A central computer shows real-time moisture levels throughout the course.**

by average areas a day or two later if soil moisture levels warrant irrigation. Wet areas seldom require irrigation. By categorizing the course irrigation by soil moisture conditions, the overall turf conditions have improved and we have seen a 25 percent savings in both water usage and electricity consumption to run the irrigation pumps.

Just like any new technology, it's only worth investing in soil moisture sensors if you can determine an effective way to use them. We learned early on that you have to determine what moisture level is too dry and what moisture level is too wet. Every course is different. Also, the sensors give slightly different moisture readings compared to the handheld moisture meters, so the two should be calibrated to one another.

If we had to do it over again, I would try to purchase more in-ground moisture sensors. The more sensors you have in different areas, the better you can fine tune your irrigation program.