

A sporting challenge

NL4
2014

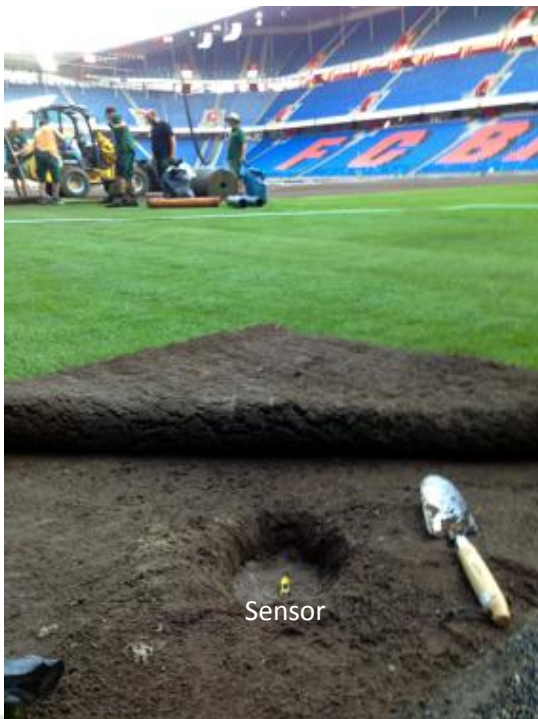
The turf on sports fields, especially of large stadiums, represent an important issue - not only in terms of sport - but also as one of the largest cost drivers. Therefore, the monitoring and maintenance of the lawn takes on a special significance. PlantCare has installed a soil moisture monitoring system as part of the redesign of the entire pitch range of the St. Jakob -Park stadium in Basel. Soil moisture and soil temperature are measured at different positions and the measured data are transferred wirelessly in the control room situated behind the grandstands.

The St. Jakob-Park Stadium, home ground of FC Basel, was opened in 2001. It has the UEFA 4-star award and was about CHF 250 million. It has more than 38,000 seats and is the largest stadium in Switzerland.

Due to the different shading of the lawn, in recent years it was not without problems to irrigate correctly. The lawn was locally too dry and on other areas too wet and so the operator decided on a complete renovation of the entire playing surface. At the same time the irrigation system has been reinstalled.



To get a better overview of the soil moisture and their differences, PlantCare was commissioned to install a monitoring system that measures soil moisture and soil temperature at the face-off spot and at the four corners of a certain depth. Thus, the Greenkeeper always has a current overview of the moisture condition of the play ground.



The contract includes some very special problems. The sensors as well as the electronics must be installed so that nothing protrudes from the surface. This means that the electronics would have to be buried, which would make a wireless connection not possible, because wet soil absorbs the radio waves very strongly. Therefore, the connection between the sensor tips and the electronics had to be done by cable. At the same time, the sensor electronics must be assembled in one place - the cabinet where the TV cameras are connected with television broadcasts. This demand led to cable lengths up to 250 meters. Since, fortunately, the measured values of the PlantCare sensors do not depend on the cable length at all, this requirement could easily be met.

In total, over 400 meters of cable had to be used.

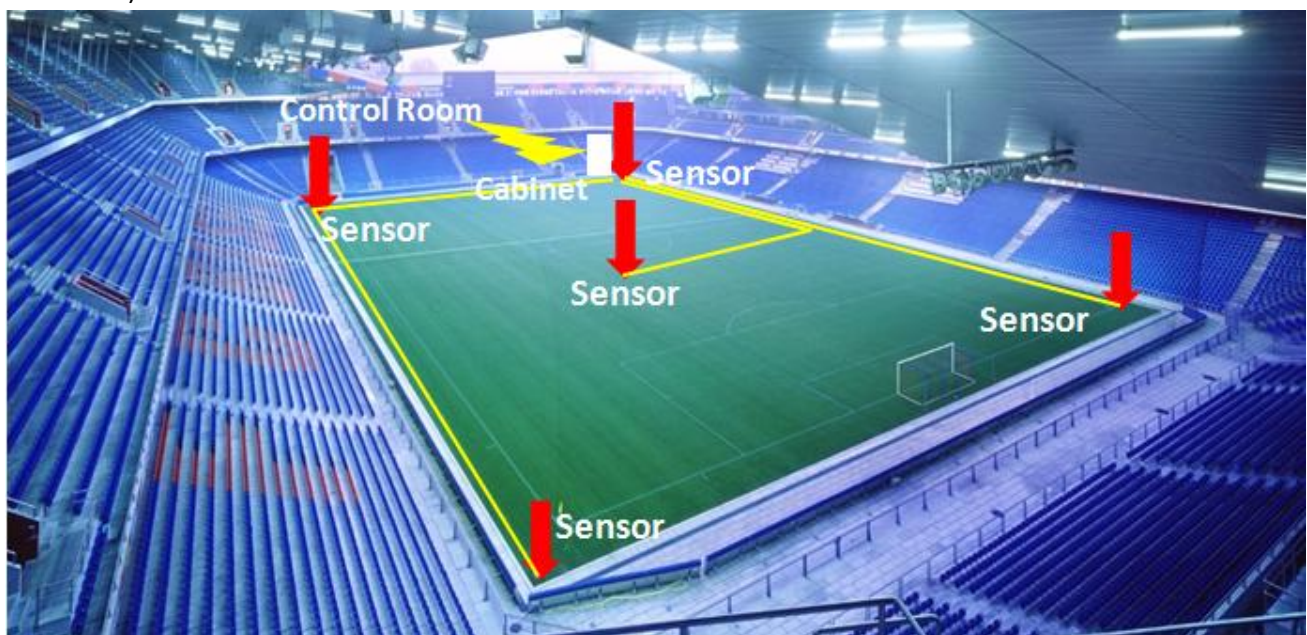
Another challenge was that the sensor electronics of all five sensors must be housed in a metallic electrical cabinet for reasons of possible vandalism. From there, the radio signal must be transmitted out of the cabinet and through the reinforced concrete bleachers in the underlying control room.

This problem could be successfully solved also: The electronics of the five sensors were attached to the right housing wall of the electrical cabinet. On the opposite side a repeater has been attached, which take-on the signals from the sensors and emits them again with higher energy. In order to get the signal out of the metal cabinet, an external antenna is used, which now transmits the radio signals in the control room.

In the control room there is a second repeater that receives the signals and transmits them on another radio frequency to the controller, where the data finally are displayed on a screen.



A special issue also resulted from the special substrate used as turf base. This substrate, understandably, has a high water permeability, otherwise puddles would immediately appear in case of rain. The high water permeability corresponds to a low field capacity of the soil. Correspondingly, the felt used in our sensors has to have a low field capacity also. Therefore, the most suitable felt for this demanding application had to be selected in laboratory tests. Measurements have shown a field capacity of approximately 65% (100% = full saturation).



The work was carried out in collaboration with our partner company, Hirt Walter AG, Riedikon made.