



Hortau has developed the only effective Irrigation Management System capable of reducing farm production costs and increasing yield. It is widely accepted that the days of cheap water and energy are behind us. Moving forward, the key to profitability will be in managing these costs. Our system helps growers clearly see what is happening in the field. This clarity makes precise irrigation decisions easy. Our system is effective because we use real time soil tension, weather, flow meter and pump pressure data. This real time data is used to fine tune irrigation schedules, run times, fertilizer use and frost protection methods.

How the system works

The foundation of our system is our TX3 monitoring station.



(TX3 Monitoring Station)

The TX3 is 100% wireless and can be placed anywhere in the field. These monitoring stations primarily measure soil tension (at various depths up to 6 feet) but can also be fitted with a soil temperature probe or air temp. /humidity probe for frost protection. When used for **frost protection**, the advantage of multiple temperature sites provides peace of mind. Frost protection alarms can call up to 3 cell phone numbers to alert the user with a pre-recorded voice message, text message or email.

The patented tension probes are unique in that they are easy to install, require no calibration with varying soil types, are not affected by salinity, have an accuracy of $\pm 1\%$ and require very little maintenance. The TX3 is currently being used in Strawberries, Raspberries, Blue Berries, Cherries, Almonds, Citrus, Pistachios, Wine and Table Grapes, Avocados and many more crops. Below are a few pictures from the field....



(Strawberry field)



(Blueberry field with air temp./humidity probe)

These monitoring stations send their data every 15 minutes to a centralized field station. This field station can be up to 1 mile away. From the field station the data is sent to the internet via cellular networks.

Our Field Station is self powered and can be located anywhere.



(Field Station)

The distance from the TX3 (monitoring station) to the field station is 1 mile.



(Field station coverage area depicted by red circle)

The mile telemetry range can be expanded to three miles with the use of repeaters. This allows for system expansion to neighboring ranches. The idea is to send as much data to one field station as possible to reduce monthly service charges. Rather than have multiple cellular modems sending information we use just one.



(System layout with use of repeaters)

The field station can also be fitted with our weather station...

Irrolis™ Sense Weather Station



Features/Benefits

- Measures **6 most essential** weather parameters: barometric pressure, humidity, precipitation, temperature, wind speed and direction.
- Accurate and stable
- Operates on the Web Base Station's solar panel
- Compact, light-weight
- Easy to install
- No moving parts
- Integrated into the Irrolis Web Software

(Irrolis Sense Weather Station)

The advantage of our weather station is that there are no moving parts and is maintenance free. The weather station is used to calculate on site ET, degree days and other agronomic models to monitor for disease and pest pressures. Alarms can also be set for any weather station parameter.

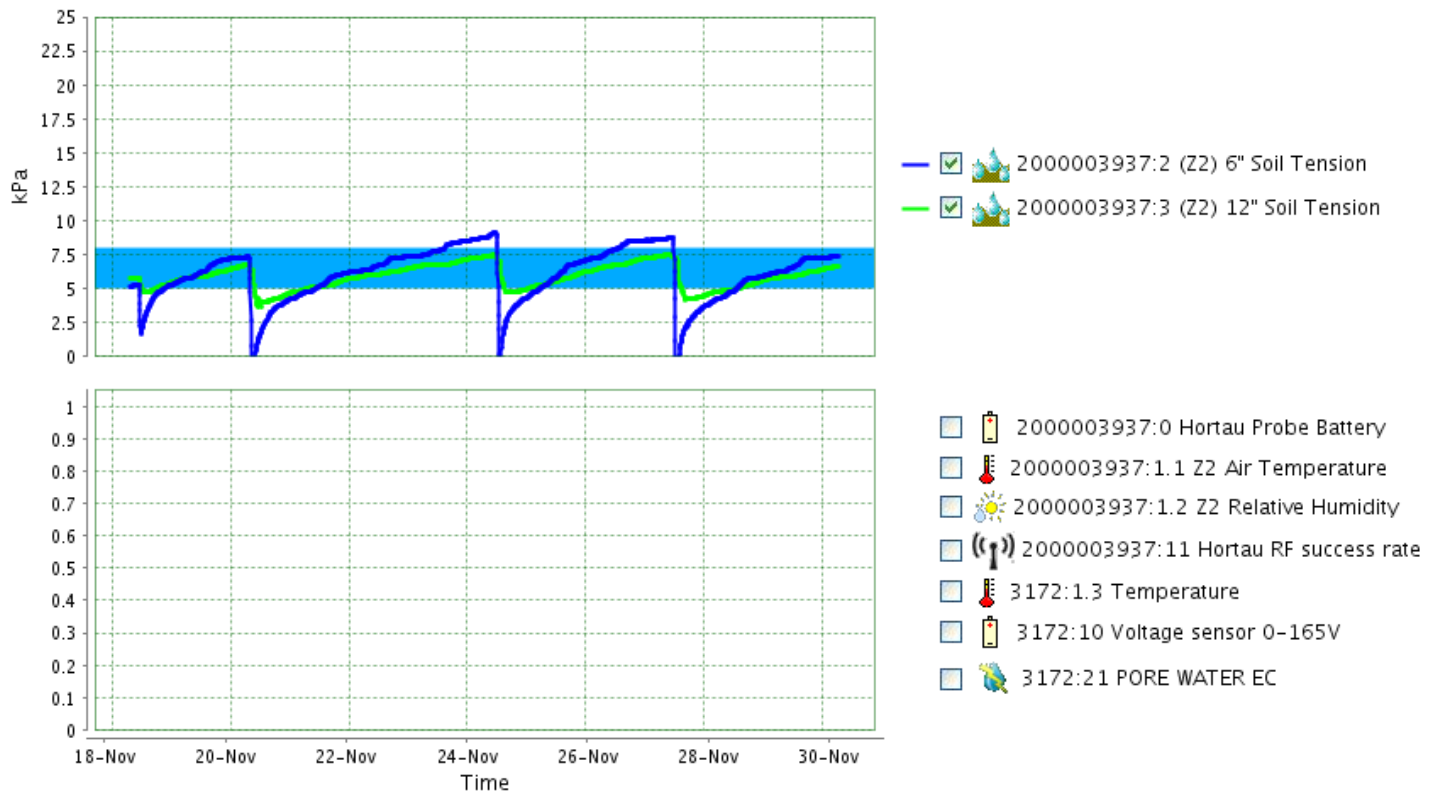
How real time data is used:

The information from the field is sent directly to the internet. Each grower has a unique user name and password to access the information. Once a grower logs in, the first thing they see is a field map outlining the various irrigation blocks to help identify where the monitoring stations are located.

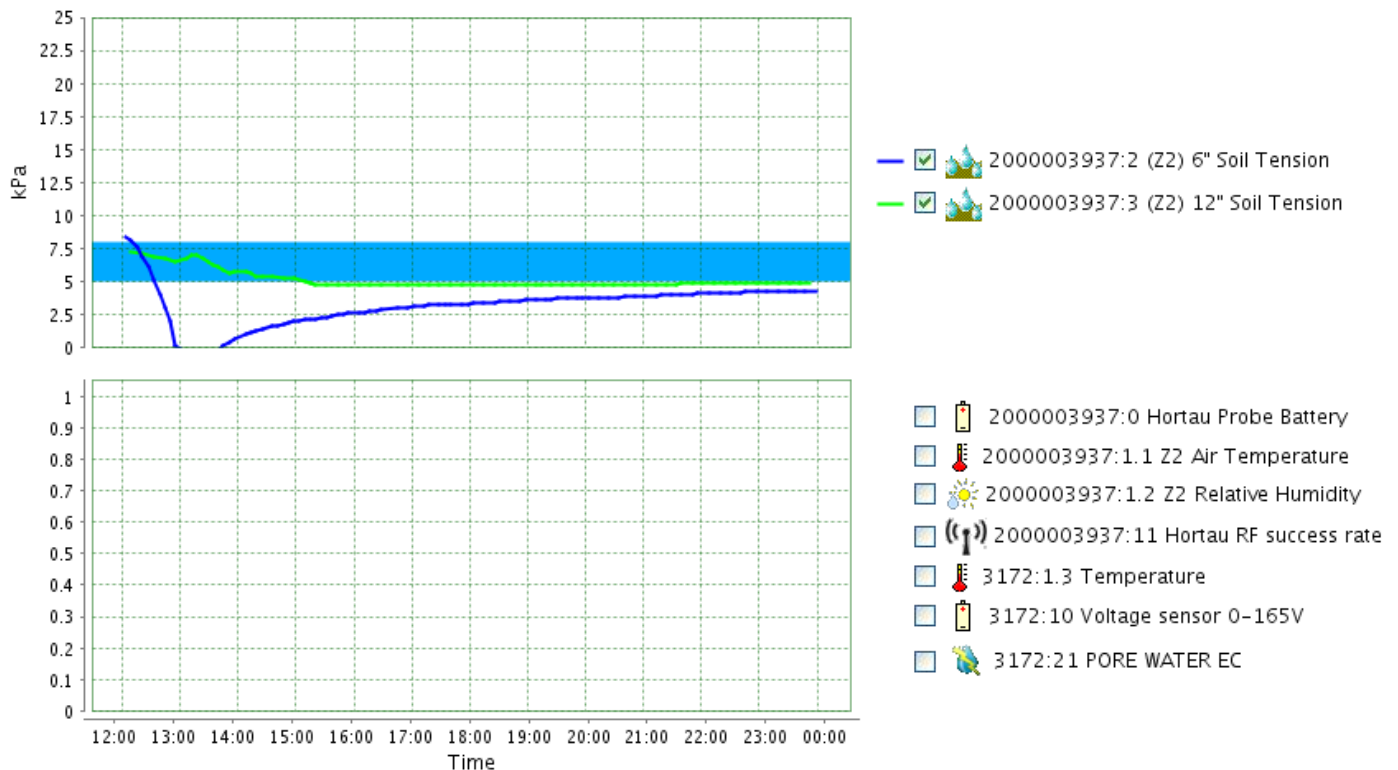


(Screen shot of grower's homepage)

To view the data in a particular block, the user simply clicks on that block and a data graph appears...



(Soil Tension Data from Strawberries)



(Establishing run times is easy with real time soil tension data)

How real time data is used:

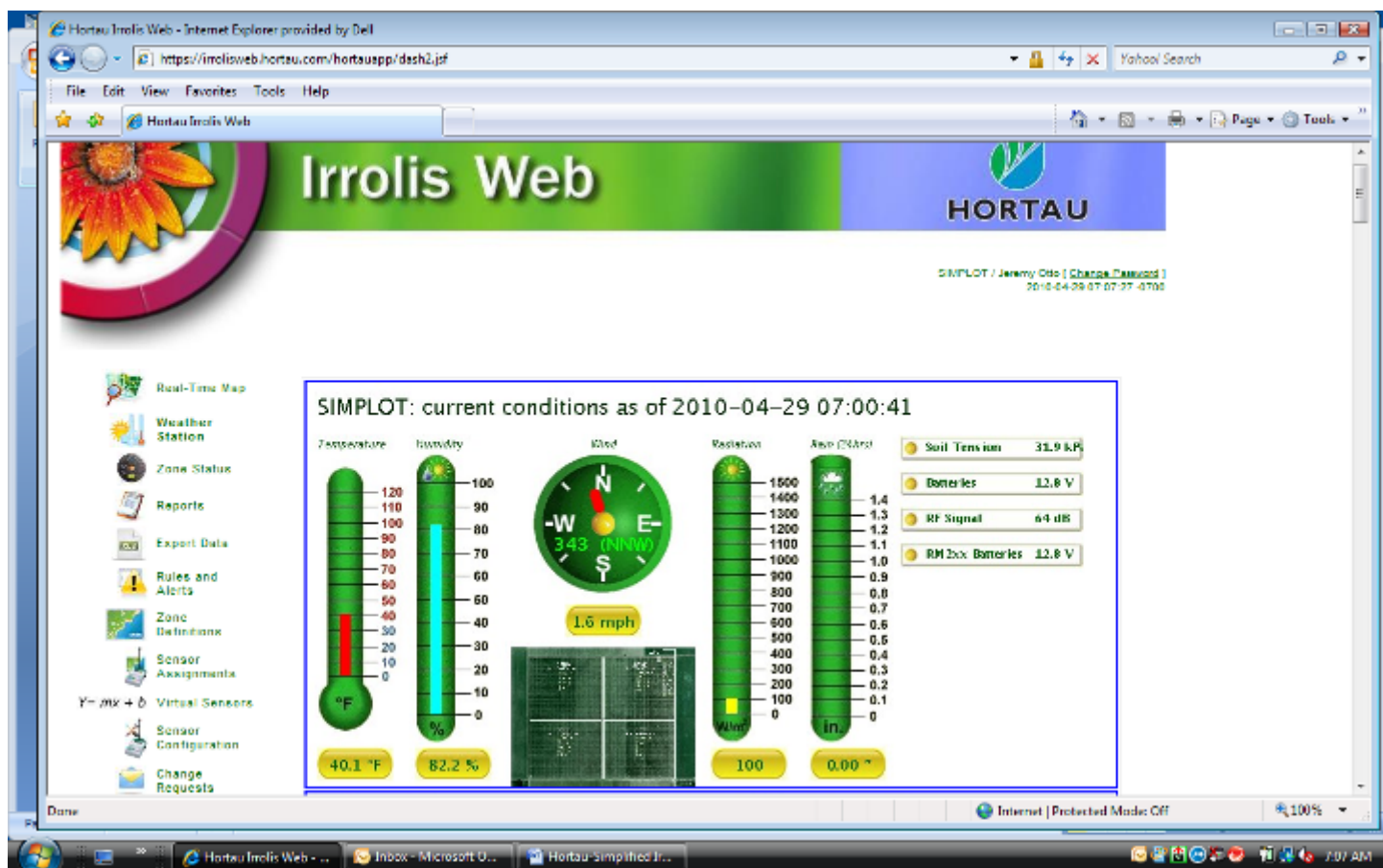
You will notice a blue band on the graph. This band is the key to the systems simplicity and allows any user (computer literate or not) to make an irrigation decision. The “blue zone” represents the optimal growing conditions for this particular crop. The lower the number on the left, the wetter or easier it is for the plant to obtain water. The higher the number, the dryer or more difficult it becomes for the plant to extract water from the soil (increased plant stress). In this case, when the shallow sensor reads above the blue zone (higher tension) the irrigation is turned on. A grower can tell when the irrigation was turned on by the sharp drop in tension. As the water moves through the soil profile to the deeper sensor, we know to turn it off when this sensor reads below the “blue zone”. The real time data also allows growers to determine how long to run the irrigation set based on the time it takes water to move from one sensor to the next (SEE GRAPH AT BOTTOM OF PREVIOUS PAGE). To fine tune even further, the use of wireless flow meters and pump pressure gauges can be used to determine exactly when the irrigation started and how much water was applied to a given block. The multiple depth readings show where the water and fertilizer is in relation to the active root zone.

Another feature of the Hortau system is the use of emails and text messages that alert ranch managers when conditions in the field are too dry or too wet (outside the “Blue Zone”). This helps when managing many acres and multiple locations.

When soil tension is closely monitored throughout the growing season and not allowed to swing too high or too low the results will be a favorable increase in crop quality and yield. This has been realized through many research projects and is well documented. This degree of accuracy or resolution can only be achieved by monitoring soil tension in real time.

Data is recorded 24 hours a day seven days a week, up to five years (Then archived on DVD). This history allows growers to go back in the season to determine what may or may not have affected the crop yield and quality. This information becomes invaluable to growers as they optimize their crop production and manage water costs.

Our weather station data can also be accessed 24/7 and can be viewed in a quick heads up display...



(Irrolis Sense Weather Station Data)

Our online software can calculate any model with the weather station data. Degree days, ET, etc. Alarms can be set for any weather station parameter. A common alarm is wind speed for spray applications. Having this information on the web allows growers and ranch managers to access this vital information from anywhere.



System Integration

We offer growers two ways to buy a system. The first is a 3 year lease to own option. The second is to buy the system outright. The system also has a monthly service fee that covers system maintenance, cellular network charges, software licensing and server maintenance. This fee is determined by the amount of equipment in the field.

To ensure system reliability we install all equipment, monitor and maintain every component. This is necessary to make the system worry free.

Complete training and support is also included with every system. We work side by side with farm managers to help fine tune operations.

Often growers prefer to outsource their irrigation decisions all together. For this, Hortau offers certified Irrigation Consultants that have years of experience in all crop types throughout California.