CAS DATALOGGERS

Wireless Temperature Monitoring of Cocoa Bean Fermentation

Data Loggers Help Ensure Superior Chocolate Taste

CAS DataLoggers provided the data logging solution for a cocoa manufacturer that needed to record temperature and humidity in cocoa bean fermentation boxes in the tropics. The beans had to be carefully fermented to bring out the best flavors and give the chocolate its richness. After farmers gathered the cocoa pods and scooped the cocoa beans out, the cocoa beans were fermented inside wooden boxes or "sweatboxes" for a period of six days. A 220 lb. batch of beans, along with their pulp, was placed in these boxes. Given the amount of fermentation, the temperature would rise quickly, often climbing to 122°F (48°C). Throughout the process, the beans also needed to be rotated within the sweatboxes.

However, if they were rotated too often, the beans would be too oxygenated, causing overheating and resulting in dark blotches. If the beans were rotated too infrequently, though, fermentation would be incomplete since beans in the center of the sweatbox got less oxygen than those on the sides. The entire process was extremely painstaking, but without closely monitored fermentation, the cocoa beans would not result in high-quality chocolate. Therefore, the manufacturer required a wireless monitoring solution which could communicate with office computers to ensure that the temperature and humidity inside the sweatboxes followed the desired trajectory.

INSTALLATION

The cocoa manufacturer installed four [T&D RTR-503 Wireless Temperature and Humidity Data Loggers](#), along with a [T&D RTR-500 Wireless Data Logger USB Base Station](#), atop the wooden sweatboxes. The external sensor on each RTR-503 data logger was placed inside each box and began measuring and recording the temperature and humidity levels while the cocoa beans fermented inside. Each wireless unit had a temperature measuring range of 0°C to 55°C (32°F to 131°F) and a humidity measuring range of 10% to 95% RH. The loggers could measure in either Celsius or Fahrenheit and were housed in water-resistant cases, with a clear LCD display and options for screw terminals or wall mounts.

USAGE

The loggers' wireless communication range extended up to 150 meters (500 feet), and their data could be collected remotely via USB, [GSM technology](#), LAN and handheld data collectors. Current readings and recorded data from the sweatboxes were sent from the RTR-503 data loggers (Remote Units) via wireless communication to the Base Station, and then to an office computer via the USB cable. By registering another RTR-500 as a Repeater, the wireless range could be expanded even further. Each logger had an 8,000 data set memory and a battery life of about 10 months that could be upgraded to a larger capacity battery with a lifetime of about 4 years. A Base Unit could download via wireless communication one RTR-503 Remote Unit at full logging capacity in about four minutes.

Usage Cont.

Additionally, by registering the RTR-500 as a Base Unit, it was possible to download recorded data and current readings from the remote units and send the data by e-mail or FTP to a designated address. The unit was also set up to monitor for warnings and send warning reports via e-mail. Moreover, by sending the recorded data to the online T&D WebStorage Service, the data and alarm status could be shared and viewed from any Internet connected web browser.

The wireless base station also included software for automated download, real-time monitoring, and email alarm notification. By setting the Warning Monitoring Function to "ON", if the upper or lower limits were suddenly exceeded and that occurrence had been judged by the RTR-500 to qualify as a warning, a Warning Report Mail containing warning details was immediately sent to up to four specified addresses, providing total transparency to the temperature and humidity profiling process.

Benefits

The cocoa manufacturer realized several benefits to the cocoa bean fermentation process by using the wireless temperature and humidity data loggers to monitor temperature and humidity levels inside the wooden sweatboxes. The T&D wireless system not only monitored the fermentation of the cocoa beans but also sent the data to an office PC and sent email alarms when temperature or humidity went out of specification. The recorded data also aided in analysis to make improvements such as finding the optimal rotation time. These data loggers enabled workers to micromanage the painstaking fermentation process, ensuring superior chocolate with a taste that made all the work worthwhile.

For more information on **T&D Data Loggers,** cocoa bean fermentation or to find the ideal solution for your application-specific needs, contact a CAS DataLogger Application Specialist at **(800) 956-4437** or www.DataLoggerInc.com.