Waste-Management System Cleans Up With UHF RFID

Compta is powering its Bee2Waste solution with an RFID solution from TechSigno using Chainway RFID readers to capture data from hundreds of thousands of waste bins as they are commissioned, and each time they are emptied.

By Claire Swedberg

Tags: IT/Infrastructure, Operations, Visibility

Apr 09, 2019—European waste-management company Compta is using RFID technology to automatically gain visibility into bin collection as part of its Bee2Waste program. The passive UHF solution was installed by TechSigno using the latter's cloud-based software, as well as RFID reader technology from Chainway.

Compta has employed RFID for more than a decade to track almost 250,000 containers used by its customers throughout numerous European cities. The system has employed low-frequency (LF) technology, which was captured and managed by a variety of processes and software platforms, depending on the municipality or company. The technology company sought a more seamless solution that would make the management of bins easier and universal across all of its clients' sites, says Sérgio Spinola, Compta's product and systems engineer. So for the past five years, the firm has been migrating to a UHF-based solution that could be used across its customer base. With UHF technology, the readers could capture tag ID numbers at a distance of several meters, and enable workers to capture and input tag data more quickly and easily than they did with LF RFID.

Users of the TechSigno solution, employing Chainway technology, are now applying an off-the-shelf UHF RFID tag to each bin as it is distributed to a customer's site. They then read the tag via a handheld Chainway C4050 RFID reader and link the tag's unique ID to customer data in the Chainway software, according to Mike Cui, the company's international technical support manager.

The C4050UHF is an Android-based rugged mobile computer with a quad-core processor, as well as a built-in RFID reader module. According to Cui, it can not only read UHF tags, but also accomplish 1D and 2D bar-code scanning, and can send data via a 4G cellular or Wi-Fi connection. The device detects its GPS location, and that data is linked to the tag ID as the tag is being read, as well as to the customer's information, such as his or her name and address. In this way, operators can quickly associate one or more bins to a specific location.

Waste-collection vehicles are equipped with a Chainway fixed RFID reader, attached to the hopper, to automatically track when and where each bin is emptied. As a bin is raised to the hopper for dumping, the reader captures its tag ID, and a wireless unit aboard the truck can forward that data to the software, along with the GPS location, via a cellular connection.

In some cases, Spinola says, waste collectors use handheld readers as well. For example, on the island of Sao Miguel, on the Portuguese archipelago of Azores, waste collectors capture RFID tag ID numbers via a handheld reader each time they empty a bin, and the GPS data on the handheld helps to confirm not only that the bin has been emptied, but that it is located in the proper place.

"In our opinion," Spinola states, "both fixed and mobile solutions are essential for the whole automation of the waste-management process." For instance, some collectors prefer to use handhelds during collection, and registering a new bin cannot be accomplished via a fixed reader. "The handheld was one of the main devices that helped our customers to organize and optimize all the processes needed for the management and distribution [of bins]." On the other hand, the fixed reader on the truck provides a faster, more automatic read for waste collection on large routes.

The evolution from LF systems to UHF has been a gradual one, Spinola says. "Today," he explains, "all our customers are switching to UHF technology and all new customers are using UHF tags only." The UHF RFID solution allows Compta to offer, as part of Bee2Waste, predictive planning and behavioral recognition, as well as big-data analysis, "helping them to overcome operational and management barriers."

In the case of predictive planning, the system uses GPS and collection times to analyze how quickly collection is accomplished within specific routes, thereby enabling dispatching and scheduling that meets an area's specific time requirements, while also creating more efficient routes. The behavioral recognition feature identifies each driver's behavior so that aberrations can be identified, and so that training or other support could be provided. In some scenarios, fewer trucks may be required to collect

waste throughout the company's district.

"Our product [Bee2Waste] offers a range of features that enable our customers to optimize operations and management," Spinola says, as well as to improve service quality, analyze local data and make intelligent decisions in real time. Ultimately, he notes, this results in a reduction in carbon dioxide based on fuel consumption, as well as cost savings—with regard not only to fuel costs, but to labor expenses as well. "In total," Spinola says, "we expect to have between 350,000 and 400,000 tags by the end of this year." Additionally, the company offers disposable RFID tags that can be applied to waste bags that residents or commercial customers may use, without bins, on some collection routes.

Spinola says the company will continue to evolve the way in which it is using the system. For instance, the pay-as-you-throw (PAYT) model is being adopted in some municipalities, by which customers would pay according to the amount of waste they generate. With this model, the system can be enabled with the RFID data to link a specific bin and its weight with the appropriate customer. In the future, he imagines using RFID with sensors, such as those measuring temperature, humidity, pressure and vibration levels.

In one city, Spinola reports, the UHF RFID system provided waste managers with a Christmas surprise. At that time, the tag reads were captured at a rate many times greater than that of the 150 bins that were live in the system. The company attributed that discrepancy to Santa Claus, who they said had been especially generous that year—the RFID tag reads were coming from gift packaging that had been discarded in the bins. The system can now also filter out unrecognized UHF RFID tag IDs.