"Smart Technologies" Available for Recycling Professionals

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Increasingly, solid waste and recycling agencies are being asked by their political decision – makers to improve efficiency, focus on customers, and reduce increased costs. Unfortunately, many agencies are still being managed through a combination of manual processes, desktop computer tools, limited vehicle and cart tracking and management tools, and custom databases. While effective, these methodologies often entail more effort, labor, and costs. Many agencies have realized that they need "smart technologies" to better support their service, ensure continued quality service delivery, and meet expanding business requirements. This article provides a brief overview of smart technologies available for recycling professionals.

Deployment of RFID Technology

Municipal solid waste management organizations are increasingly buying radio frequency identification (RFID) tags and embedding them in solid waste and recycling bins. An RFID tag is like a barcode that can transmit its identifying numbers as a radio signal to a receiver up to 100 meters away. This means that it is not necessary to see an RFID tag or even be close to it to scan it, as opposed to a barcode, which must be scanned with a handheld reader. Though relatively new to the solid waste industry, RFID is a proven technology that has been in use for over 20 years in a variety of industries.

When utilized in recycling operations, small readers placed on waste and recycling trucks can automatically detect and read RFID tags. The readers are small radios with antennas that constantly emit a signal. When an RFID tag comes within range, the reader's signal supplies the tag with the tiny bit of power required to activate it. The active tag transmits its data and the reader records it.

Including this RFID technology in the overall residential collection system would require an investment for both the RFID tags on the agency's existing refuse carts and readers,

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preferably included with automated collection trucks if such are not already in use. The advantages to the agency's customers would be substantial, including:

Asset management – ability to track the location of the waste storage bins.

Data tracking and enhanced real-time productivity measurements.

Route visualization and intelligence.

Ability to target needed education and outreach for individual homeowners or neighborhoods (e.g., in areas where recycling rates are below average).

REMOTE VOLUME MONITORING

An emerging technology involves the remote monitoring of trash volume in each collection bin. In this approach, Internet-connected small mobile closed circuit televisions are placed inside trash bins, feeding real time information about the extent to which each bin is full. Using such equipment, a waste collection agency can monitor its bins and schedule collection of only those bins that are full or near full. This would reduce unnecessary collections and increase efficiency.

ROUTING

Managers of both private and municipal solid waste collection operations in the United States have been using increasingly sophisticated routing software over the past 20 years to optimize solid waste collection routing and fleet and personnel performance monitoring. However, the decision to use any particular computerized routing application must be carefully considered. Since equipment costs, labor and fuel are significant operating expenses for waste collection operations, reducing the number of routes, labor hours and/or mileage through route optimization is a critical and straight forward approach to increasing efficiency and reducing costs.

Waste routing software is not always easy to implement, and too many municipalities have experienced failed implementations. Typical complaints we have heard include that the software is too complicated to be adopted into daily operations; it is too expensive to purchase outright or procure through a monthly service fee, and/or the system maintenance requirements are too extensive. Waste collection routing generally is complex and requires multiple types of routing algorithms to accomplish the optimal routing solutions for different conditions, including:

High density for residential curbside collection (particularly in areas with multi-family units),

Point-to-point routing for commercial collection or residential bulky items collection.

Experience shows that no one application on the market handles all types of waste routing situations effectively. Some of the more widely used routing software applications for typical residential solid waste collection fleets include Fleet Smart™, Route Smart™, WM Design™, and WM Logistics™. Several software vendors have developed point-to-point routing software applications. Point-to-point routing is used when the daily delivery locations (e.g., as might be used by FedEx) or, in the case of solid waste, daily collection (the reverse of delivery) of bulky waste might vary.

Customer Software Products

There are a variety of management information and software products used by solid waste and recycling agencies across the United States. Each has its particular advocates and uses in the solid waste management practice. Some are more designed for developing daily recycling and bulky waste routes. Others are designed as integrated software products that provide a daily interface for agency employees to track customer records, billings and complaints. In recent years, some of these packages have been sold as "cloud-based solutions" with reasonably small monthly access changes rather than complete purchases.

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Using "cloud-based", or internet-based, technologies allows for data to be accessed and/or operations to be modified remotely, provided the user has access to an internet or cellular connection. Our firm is currently completing a survey for a Florida client to help identify the advantages and disadvantages of current industry products with the aim of implementing the best fit for their needs.

Final Words

Smart technologies are expected to grow substantially over the next decade as agencies attempt to minimize their overall costs in solid waste collection and recycling and increase overall efficiency.   As discussed briefly in this article, each of these technologies has their own advantages and disadvantages. It is important for each agency to conduct feasibility assessments to evaluate the economic costs to implement and to update.

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