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SPOTLIGHT ON EFFICIENCY

Sort a wider range of materials

GERRY VINES considers the innovations that are emerging in sorting technologies

The continued squeeze on public finances suggests that investment in the recycling process from that sector is unlikely to increase anytime soon. But salvation may come from the industry itself in the form of innovation.

A number of technologies currently being trialled or in the research phase may produce only incremental impacts but, when combined, they could enhance the efficiency of the recycling process and create the momentum needed by the sector.

A large proportion of the cost of sorting waste is spent on manpower. Picking cabins, where manual workers identify and extract material streams by hand, were first introduced in the early 1990s and are now *de rigueur* for segregating coarse waste.

But their days may be numbered. Last year, engineering company Stadler launched the world's first fully automated waste sorting plant in Oslo, Norway. It has 14 near-infra red (NIR) units that can process up to 30 tonnes of waste an hour. But the plant relies on incoming waste to be sorted into colour-coded bags.

A more comprehensive automated system, which was demonstrated at the RWM show in 2013, has been pioneered by ZenRobotics in Oslo, which uses robots with artificial intelligence to replace manual pickers (*see feature opposite*).

World first: Stadler's fully automated waste sorting plant in Oslo

It uses a combination of sensor technologies to analyse materials as they pass along the conveyor belt. Data collected from the sensors is then processed and the robotic arms controlled to pick through the materials and place them into the correct containers.

Initially set up to sort construction and demolition waste, ZenRobotics believes it can be expanded to include household waste streams in due course. The technology has not yet been introduced to the UK, but McGrath is investigating its feasibility.

Meanwhile, the Illuminate project, funded by Chester-based C-Tech Innovation, is in the process of developing an automated sorting and recycling system for lamps and light bulbs. Current recycling methods often cause extensive lamp breakage, materials contamination and mercury emissions, which may adversely affect the environment, cause processing difficulties and lower materials value in the recycling stage.

> "AFTER IDENTIFICATION AND SEPARATION, THE MATERIALS FROM BOTH MERCURY-CONTAINING AND NON-MERCURY CONTAINING LAMPS CAN THEN BE HANDLED BY THE APPROPRIATE PROCESSING STEPS"

Illuminate aims to develop a multi-sensor system able to recognise different types of lamps rapidly in the waste stream. After identification and separation, the materials from both mercury-containing and non-mercury containing lamps can then be handled by the appropriate processing steps.

Textiles is another sector where sorting technologies are being investigated (*MRW 13 June, p28*). The current manual systems for sorting by colour, fabric type and so on are particularly inefficient. But Fourier transform infra red spectroscopy is a hyper-spectral imaging technique which could potentially enable the colour and fibre content of textiles to be determined.

Another technique would involve applying a tag, either radio-frequency ID or 2D barcode, to items during manufacture which could permit low-cost dynamic sorting on a range of criteria. WRAP believes the latter is the most commercial option.

While the modest cost of making and attaching the label would fall on the manufacturer/retailer, it would create a new marketing benefit. But a code format and label material need to be identified that are machine-readable.

Optical detection technology was developed several years ago, and such techniques are now increasingly used to sort plastic wastes into polymer types. NIR spectroscopy enables recycled feedstock to substitute for virgin polymers in the manufacture of new high- quality plastic items.

McGrath recently purchased the next generation of magnetic separators from Steinert, which use a combination of high frequency eddy current technology and dual-block neodymium drum magnets to extract up to 98% of ferrous and non-ferrous metals as well as recovering stainless steel contaminates.

Further processes are currently under development with Steinert, focusing on total metal recovery and the separation and sorting of plastics grades from mixed waste to produce the highest quality recycled aggregate product.

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