

Case Study

Making the grade

Council-run recycling facility invests in hi-tech kit to maintain paper quality.



Close-up of sorted News and PAMs grade paper output at Exeter MRF

Commissioned in 2001, Exeter City Council's Materials Recovery Facility (MRF) was one of the first in the country to process co-mingled household recyclates, including most forms of rigid and flexible plastic.

The Local Authority provides residents with a single green bin for paper, cardboard, plastic, steel and aluminium. Glass is collected separately. The green bins are emptied fortnightly, and their contents delivered to the MRF located in the Marsh Barton Industrial Estate.

Every year the Exeter facility processes up to 10,000 tonnes of mixed recyclate into separate material streams using both manual and automatic segregation methods. The outputs are sold on for reprocessing domestically and abroad. Rather than maximising return on recyclables, Plant Manager Chris Callister's key driver is to increase diversion from landfill. However, he also strives to run the MRF on a commercial basis: "Like the privately-operated facilities, we aim to process as much material as possible."

Exeter MRF - key facts

- Operator: Exeter City Council
- Commissioned: 2001
- Capacity: 11,000 tonnes per annum
- Tonnage processed: 9,000 tonnes (2008)
- Recovery rate: 93% (2008)
- Employees: 26
- Inputs: Co-mingled household recyclates, paper from dedicated paper banks, small volume of local trade waste
- Outputs: Paper (News and PAMs), cardboard, rigid and flexible plastic (PET, HDPE, LDPE, PP), aluminium cans, steel cans, textiles
- Not accepted: Polystyrene, mixed media plastic, glass



Input stream of co-mingled recyclates prior to sorting by the Exeter MRF

“Like the privately-operated facilities, we aim to process as much material as possible.”

Plant Manager
Chris Callister

The problem

As part of a Devon-wide contract the Exeter MRF supplies Aylesford Newsprint’s paper mill in Kent with high grade recovered Newsprint, Periodicals and Magazines (News and PAMs). A few years ago Exeter faced a problem which threatened to jeopardise this relationship and undermine the goal of maximising the city’s recycling rate.

At the time paper coming to the Exeter plant was sorted manually by eight people in a picking cabin. With relatively low volumes of material to process, paper outputs were of sufficient quality to meet the exacting standards set by Aylesford. But as environmental awareness grew in the city so Exeter’s householders began recycling more. Between 2002 and 2007 the volume of material collected at the kerbside almost doubled. The rise in feedstock tonnages meant that quantity started to compromise quality.



Stockpile of sorted News and PAMs grade paper ready for delivery to the reprocessor

“We were struggling to remove all the plastic, card and cans so our paper outputs began to get contaminated,” says Mr Callister. The quality of Exeter’s News and PAMs was slipping to such an extent that the Council was in danger of defaulting on its contract with Aylesford Newsprint, risking financial penalties. The MRF needed to improve the way it recovered paper.

The solution

In 2006, after two years exploring the possible solutions, Chris Callister and his team decided to purchase a TiTech optical sorter. This sophisticated equipment uses optical technology to sort paper from plastic and cans at a greater rate than is achievable manually (see Background box). The plan was to use the optical sorter to carry out the bulk of paper sorting, with a skeleton staff performing final ‘polishing’ of the output streams.



The TiTech uses high-precision jets of pressurised air to blow contaminants off the line

The new kit was expensive and, with public money at stake, approval for the purchase took a long time. Meanwhile, in the six months to October 2007 Aylesford rejected several paper consignments on the grounds of quality. Needing an interim measure to avoid landfill, Mr Callister negotiated a deal to send Exeter’s lower quality paper to Somerset-based recovered paper broker Perrys Recycling, who were already taking Exeter MRF’s cardboard output.

The optical sorter was installed in March 2008. Fitting took just two weeks with minimal disruption to the normal running of the MRF. The total cost of kit and installation was £250,000. This price included on-going service contracts. Exeter City Council contributed the bulk of the finance, with government grants accounting for the remainder.

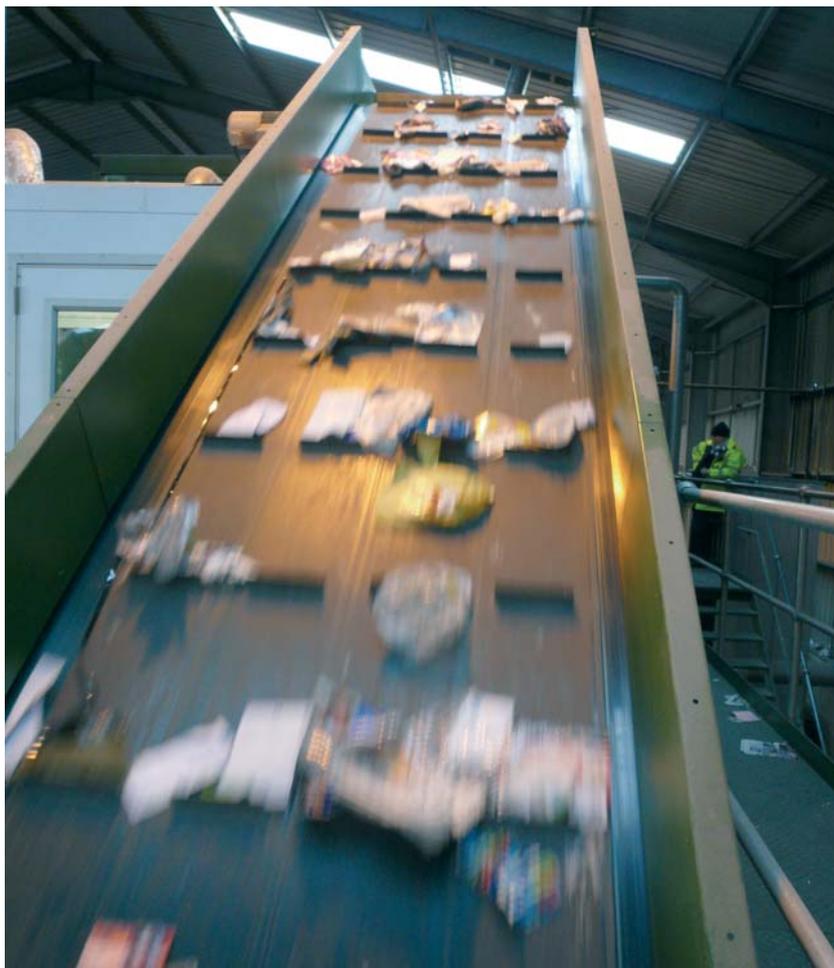
The results

The investment has been a success, as the optical sorter allowed Exeter to maintain quality while getting to grips with the volume of feedstock now being processed.

Shipments to Aylesford resumed once the quality of paper from Exeter was restored to the high levels required by the contract.

Mr Callister has redeployed some of the people formerly working in the paper cabin to other tasks within the MRF. He estimates that by reducing labour costs and generating additional revenues the optical sorter should pay for itself in less than 10 years.

Aylesford Newsprint's Commercial Manager Chris White is happy with the quality of paper from Exeter's MRF as it meets Aylesford's demanding specification. Mr White commented, "A text book project that we can all learn from, the first thing they did was to contact the customer and invite their help in defining the problem. It was then researched well, implemented extremely well and the results speak for themselves, well done Exeter."



Background: How an optical paper sorter works

TiTech is one of several brands of optical sorting equipment used in MRFs. At Exeter the optical paper sorter is positioned over a belt conveying mostly News and PAMs paper, but also a proportion of card, brown paper, plastic and metal. The input stream passes through a unit comprising several fast-scanning sensors. A metal detector identifies steel or aluminium cans, while a Near Infrared (NIR) sensor recognises plastics. Non-target paper such as brown or printed card is pin-pointed by combining spectrometry information from the NIR sensor with that detected by a separate visual sensor.

The relative positions of unwanted materials on the belt are transmitted with the appropriate delay to a downstream valve block. High-precision jets of pressurised air shoot the contaminants off the paper line and over a splitter roller. News and PAMs-grade paper is allowed to pass on.

TiTech sorters use only a small amount of light (and hence heat) to function, so minimise the risk of fire, but they are not infallible. For example, black plastic food trays are not detectable. Contaminants covered by newspaper may also be missed, but such 'overlaps' are tackled by accelerating the line as it approaches the unit thus spreading out the recyclates.

Although faster than humans, optical sorters are typically around 85-90% effective in this type of application so both the positively and negatively sorted output streams need further hand-picking to ensure maximum quality.

The paper line at the Exeter MRF before sorting

"A text book project that we can all learn from."

Commercial Manager
Chris White



Final manual sorting of the News and PAMs paper line at the Exeter MRF

Useful contacts

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Abbreviations

- LDPE: Low Density Polyethylene
- MRF: Materials Recovery Facility
- News and PAMs: Newsprint, Periodicals and Magazines
- HDPE: High Density Polyethylene
- NIR: Near Infrared
- PET: Polyethylene Terephthalate
- PP: Polypropylene

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