Snack foods manufacturer improves efficiency by reducing waste

A Case Study at Burts Potato Chips

This Case Study demonstrates the cost savings and environmental benefits that can be achieved by using an environmental audit to identify ways of reducing waste and improving efficiency at a small food and drink company. An audit at snack foods manufacturer Burts Potato Chips pinpointed a number of opportunities to reduce production costs and achieve environmental benefits. As well as driving immediate cost savings, the audit highlighted areas where waste minimisation could be built into the company’s plan to relocate to a new and larger site. The benefits to Burts Potato Chips of undertaking an environmental audit include:

- Raw material costs reduced by over £25,000 (0.6% of turnover)
- Potential to reduce frying rejects by 90%, saving an estimated £175,000/year
- Potential to use production waste as animal feed rather than sending it to landfill
- Potential to reduce water consumption by up to 25%
Background

Burts Potato Chips uses traditional methods to produce a range of potato and parsnip crisps on two processing lines at its factory in Devon. As part of its use of broad sustainability issues to promote its niche market product, the company works hard to minimise its environmental impact. In 2004, Burts Potato Chips undertook a baseline environmental audit of the factory which identified a range of measures for reducing costs, increasing efficiency and achieving environmental benefits. More potential options will be implemented when the company moves to a new site with 3 - 4 times more production capacity.

Overview of Production Process

Potatoes and parsnips are sourced from local growers and are delivered to the factory in 2-tonne loads. Approximately 24 tonnes of potatoes and parsnips are currently processed each week. The main stages of the production process are:

- **first stage cleaning** of potatoes/parsnips to remove stones and heavy dirt;
- **scrubbing** to clean the potatoes/parsnips;
- **hand sorting** to remove damaged potatoes/parsnips;
- **slicing** of potatoes/parsnips;
- **hand frying** of the potato/parsnip crisps in sunflower oil in two 250-litre fryers, which are used in rotation;
- **hand sorting** to remove ‘frying rejects’;
- **seasoning** of the crisps;
- **weighing and packaging** in bags;
- **packing** of bags into boxes ready for dispatch.

Waste Minimisation Initiatives

New Seasoning System

A more efficient seasoning process was introduced in 2004 which utilises technology developed locally at Plymouth University. The new system (see Fig 1) involves generating a negative and positive charge on the seasoning and the crisp. The seasoning is attracted to the crisp with increased adhesion and coverage, thus reducing the amount of seasoning required.

The technology cost the company around £100,000 to install, but has improved quality control and generated savings of £25,000 in the first year through lower seasoning costs. The payback period at current production rates would be four years, but this is expected to fall as production increases with the move to the new factory.

Reducing Frying Rejects

When the factory relocates in 2006, manual sorting (see Fig 2) to reduce frying rejects will be replaced with an optical sorting machine.

Following the environmental audit, a trial was carried out to weigh the amount of frying rejects produced on each process line. These data were used as a key performance indicator (KPI) to assess process efficiency and to track areas where improvements could be made. During the trial, rejected crisps were passed through an optical sorter that assesses colour and moisture content.

The trial revealed that:

- around 500 kg/week of frying reject waste was being generated;
- manual sorting was removing large quantities (up to 90%) of crisps that were suitable for sale, ie 450 kg/week.

This finding prompted the company to specify an optical sorting process for the new site. The optical sorter will cost around £100,000, but is expected to result in cost savings of over £175,000/year at current production rates through reduced wastage and increased production efficiency. This represents a payback period of seven months. Even greater savings are anticipated when production expands at the new site.
Other Measures to Avoid Production Waste

Operations at the existing site generate waste associated with factors such as ageing equipment and the lack of guards on conveyors. The latter results in potatoes and crisps falling to the floor and becoming waste. The company expects to reduce waste of this type at the new factory through careful design of the plant layout and sourcing of appropriate equipment.

Improved Packaging

Redesign of the transit packaging for a key account customer has increased the packing density of boxes on a pallet by 147% (see Fig 3), allowing a higher weight to be carried per pallet. This has reduced handling, fuel and time costs. In addition, use of thinner cardboard in the boxes has reduced the weight of packaging waste generated by the end-user.

Water Saving Measures

The environmental audit identified significant potential for saving water. When the company moves to its new facility, measures to reduce leakage and the fitting of water saving devices such as servo-valves on hoppers are expected to reduce water consumption by as much as 4 m$^3$/day (25% of current water consumption). This represents an annual saving of approximately £4,000 in water-related charges.

Waste Oil Recovery

The sunflower oil is emptied into a holding tank two or three times per week so that the fryers can be cleaned. Half the oil is replaced each week; it is not all replaced at once because this would prevent proper frying of the crisps. Once a week, the waste sunflower oil (typically 500 litres) is collected for use in pet food manufacturing.

Potential to Use Waste as Animal Feed

Approximately forty 1,100-litre wheelie bins are currently filled each week at a cost of £19,435/year in waste disposal costs.

Much of the site’s solid waste is made up of waste crisps and vegetable peelings (the latter represent a relatively small quantity as potatoes are scrubbed not peeled). Waste crisps (frying rejects) are either green or burnt and have been fried but not flavoured. The audit identified the potential to send these wastes to a local farm for cattle feed.

A successful trial in 2005 halved the quantity of general waste sent to landfill and the company is setting up a long-term partnership with a local farmer to receive suitable organic waste. This is expected to divert large quantities of waste crisps and peelings from landfill and dramatically reduce the company’s long-term waste disposal costs. This change will also benefit the local farming community and reduce the transportation of waste.

Implementation of BS 8555

Staff training is now undertaken in accordance with BS 8555\(^1\). This helps to maintain awareness of environmental and cost saving improvements. It also emphasises the importance of environmental issues and complying with environmental legislation.

Cost Benefits

Waste minimisation initiatives have already resulted in considerable cost savings at Burts Potato Chips (see Table 1). The company anticipates even more savings when production gears up following the move to the new site, where further measures will be implemented.

Environmental Benefits

Significant environmental benefits also result from the various waste minimisation initiatives implemented and planned by Burts Potato Chips. These include:

- reduced raw material use;
- a reduction in avoidable production waste;
- large amounts of food waste diverted from landfill;
- water use reduced by up to 25% compared with current consumption rates.

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\(^1\) BS 8555 is designed to help small companies implement the environmental management system ISO 14001.

### Table 1  Summary of costs and savings

<table>
<thead>
<tr>
<th>Waste minimisation measure</th>
<th>Saving (£/year)</th>
<th>Cost (£)</th>
<th>Payback period*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implemented: New seasoning system</td>
<td>25,000</td>
<td>100,000</td>
<td>4 years</td>
</tr>
<tr>
<td>Planned: Optical sorting system</td>
<td>~175,000</td>
<td>100,000</td>
<td>7 months</td>
</tr>
<tr>
<td>Use of production waste as animal feed</td>
<td>~10,000</td>
<td>-</td>
<td>Immediate</td>
</tr>
<tr>
<td>Water saving measures</td>
<td>~4,000</td>
<td>Not known</td>
<td></td>
</tr>
</tbody>
</table>

* At current production rates.

Helpline: 0800 585794  Website: www.envirowise.gov.uk  E-mail: helpline@envirowise.gov.uk
Burts Potato Chips

Burts Potato Chips began operations in 1997 and currently employs 40 people at its site in Kingsbridge, Devon. The company hand fries a range of crisps free of artificial flavourings and preservatives, producing around 7 million bags per year for sale to a range of clients throughout the UK. Production takes place 24 hours a day, seven days a week. The current factory covers 740 m² (8,000 square feet) but, due to the company’s growth, Burts Potato Chips is moving in 2006 to a new site close to Plymouth with a floor space of 2,320 m² (25,000 square feet). Annual turnover is currently over £4.1 million.

Comments from Burts Potato Chips

Rapid expansion of our business has made us aware that we can improve efficiency and reduce waste without compromising quality.

"... we can improve efficiency and reduce waste without compromising quality."

Becky Woodward, Technical Manager

How will Envirowise help your business?

- Register on the Envirowise website at www.envirowise.gov.uk for information about your industry sector.
- Call the Environment and Energy Helpline free on 0800 585794 for more information on resource efficiency and waste minimisation.
- Find out what other support may be available - workshops, training events, on-line tools, local resource efficiency clubs, site visits - either by calling the Helpline or by visiting the website.

Useful publications from Envirowise

(EN463) - Key environmental performance indicators in the food and drink sector
(EN343) - Food and drink essentials: environmental information for the industry