



Cleaner Greener Production Programme

AT A GLANCE

As part of its involvement in the Cleaner Greener Production Programme (CGPP), Tayto introduced a number of on-site environmental improvements. These initiatives included investigating a possible change in case design (which would in turn lead to reduced cardboard usage); the collection, separation and sale of waste cooking oil (which previously had been disposed of in landfill); and the achievement of a higher sale price for starch, a waste by-product, (as a result of focusing on the end user and recycling the materials used). In addition, the company launched a number of on-site environmental awareness campaigns for staff: these campaigns have proved very successful.

TAYTO LTD

Tayto was founded by Joe 'Spud' Murphy in 1954 at Moore Lane in Dublin. Prior to the establishment of this company, potato crisps were imported from the UK, and were marketed in one of two options only – unflavoured or lightly salted. Tayto developed Ireland's first cheese and onion-flavoured crisps product and the company has been famous for this ever since. Each year Tayto uses 20,000 tonnes of Irish potatoes to produce more than 125 million bags of crisps. Over the years, the company has diversified into the production of a range of other snack products including Chipsticks, Mighty Munch, Snax, Onion Rings and Waffles.



TAYTO ACHIEVES A REDUCTION IN MATERIAL LOSSES AND PRODUCTION COSTS AS A RESULT OF ON-SITE ENVIRONMENTAL IMPROVEMENTS

AIMS OF THIS PROJECT

The overall aim of this project was to reduce material losses and costs.

The specific project aims were to

- Reuse and thus achieve a higher sale price for potato starch, which is a by-product of the crisp production process.
- Quantify the amount of cooking oil that is emitted from the cooker exhaust system, and find ways to recover/re-use it in the overall production process.
- Reduce the amount of corrugated cardboard that is used to package bags of crisps.

SECONDARY AIM

The secondary aim of this project was to increase employee awareness of the environmental impact of the company's various operations and activities.

PROJECT DESCRIPTION

(i) Reduced usage of corrugated cardboard

Cardboard packaging is used for single bags of crisps as well as multi-packs.

The CGPP project team identified that if it were possible to achieve a reduction in the amount of air contained in each crisp box then this would in turn lead to a reduction in the amount of cardboard packaging utilised. As a result, the level of environmental impact created by the company's operations would be reduced, and savings would also be made on the various costs associated with cardboard production and transport.

Against that background, the project team set about developing a design for a new 'ideal case'. A particular feature of this ideal case is that its manufacture would require 9.3% less board than conventional cases. The design alteration would necessitate the filling of the box with one layer of product containing 60 packs. (Conventional cases contain seven layers of product, each containing eight packs.)

In order to carry through the requisite changes into actual packing methods, an automatic case-packing machine was modified. A series of tests was then carried out on that machine to assess its performance. Unfortunately, the modified equipment did not achieve adequate efficiency levels: in fact, it had a failure rate of one in five cases.

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Next, the project team decided to investigate the possibility of using robotic equipment to fill the 60-pack case.

An alternative packaging in a natural colour was selected because white cardboard has a greater negative impact on the environment (due to the extensive use of chemicals during its manufacture). Among other benefits, the natural colour board selected by the CGPP team proved to be more compatible with the case-packing equipment. The cases were able to hold more bags than those used previously. Specifically, case fill increased from 56 units to 60 units. Moreover, the project team discovered that there was a potential to increase that to 64 units: this would create a 5.7% reduction in board usage per case of crisps manufactured.



Figure 1: From front, old case, ideal case and new case

The Tayto sales team is currently evaluating the impact of further increasing the number of packs per case. A series of promotions (offering 64 packs per case) has been underway since Autumn 2003, and initial indications are that customer reaction is positive.

Table 1: Board usage efficiency

Filling method	Number of packs per case	Case weight (grams per case)	Case weight (grams per pack)	% board saved	Comment
7x(4+4)	56	360	6.43	0.0%	standard
10x6	60	350	5.83	9.3%	ideal case
7x(4+4)+4	60	388	6.47	-0.6%	new fill (60)
8x(4+4)	64	388	6.06	5.7%	new fill (64)

In tandem with the development of the 'ideal case', a new method of multi-packing was developed and implemented. This method involves gusseting the pack to reduce excess air in the outer case.

(ii) Oil recovery

Tayto crisps are cooked in sunflower oil. During the cooking process, moisture from the potato slices is evaporated through the oil and extracted through the cooker flue. Theoretical oil usage is less than actual usage.

Prior to Tayto's involvement in this CGPP project, it was believed that the variance was lost in airborne oil emissions escaping through the flue.

Also prior to its involvement in this CGPP project, Tayto dealt with the airborne emissions of oil either by burning it in a boiler or by collecting it in a scrubber for subsequent disposal.

The CGPP project team decided to change this established practice by condensing the oil and returning it to the fryer.

A mass balance of all sunflower oil utilised was completed. When the oil loss figures were tabulated, emissions to air did not account for all losses. Tests on the condensed oil showed it to be unsuitable for re-use due to concerns about purity. Subsequent investigation showed that losses to water during cooker cleaning were responsible for most of the variance in oil use. For this reason, additional segregation and recovery steps were implemented: these were aimed at recovering the oil, and a customer for the recovered oil was identified.

Waste oil is no longer disposed of in either sewers or landfill. Moreover, the company is now able to achieve a price of €144 per tonne for recovered oil.



Figure 2: Air scrubber and cooker exhaust stacks



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(iii) By-product up-cycling

As part of the preparation of potato slices for frying, they are first washed in cold water to remove any starch. This starch is then recovered from the water, using a centrifuge. It is subsequently sold to an animal feed formulation company.

In recent years, the market value of starch has declined sharply due to lack of competition for end-use of the starch.

The aim of this phase of the project was to fully cost the starch recovery operation and to increase the price obtained by Tayto for starch sales to food ingredients companies.

An analysis of the total cost of this operation showed that there was a loss of €12.20 for every tonne of starch produced. The CGPP project team set out to identify a number of potential end-users. Large food ingredient manufacturers were identified as the most suitable end-users. Meetings were held with a number of these companies to determine their level of interest and their requirements.

Following trials, difficulties arose due to the microbiological instability of the starch and the presence of minute specks of potato peel. Further work was carried out with potential customers and Tayto identified a number of methods that could be used to stabilise the product and remove the peel specks. However the cost of implementing these methods was shown to be prohibitive.



Figure 3: Starch Recovery

Finally, Tayto identified a feed formulation company, and agreed more cost-effective methods of packaging and transporting the starch.

ACHIEVEMENTS

Tayto have identified an 'ideal box' that would reduce board usage and protect the product. In addition, the equipment required to automatically pack this box was identified.

New multi-packing equipment was commissioned that reduces bag size, improves case fill amounts and thereby reduces board usage.

Analysis of the starch recovery process indicates that cost savings of the order of €14,653 per year are being achieved (See table below).

Table 2: Cost savings

Cost per tonne	Old	New	Change
Bag	€19.00	€1.90	Recycle
Pallet	€7.50	€3.75	Recycle
Labour	€2.00	€2.00	Same
Transport	€24.00	€0.00	Collect
Sales value	€40.30	€37.31	
Net value	-12.20	€29.66	
Cost @ 350 tonnes per annum	-4,271	€10,382	€14,653 gain

LESSONS

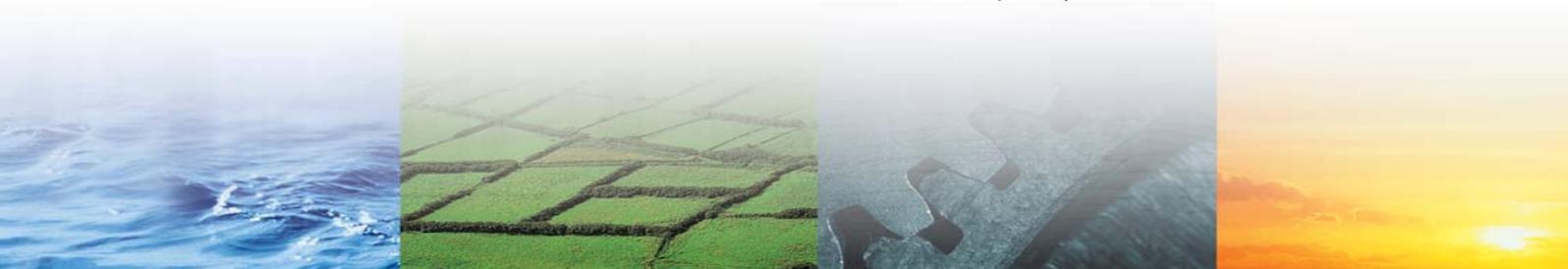
In relation to cooking oil loss, a thorough process review with in-depth measurement proved essential in order to correct earlier incorrect assumptions about oil losses. As a result of this move, Tayto successfully avoided committing itself to unnecessary capital expenditure.

MORE INFORMATION

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CLEANER GREENER PRODUCTION IS...

the application of integrated preventive environmental strategies to processes, products, and services to increase overall efficiency and reduce risks to humans and the environment.

- Production processes: conserving raw materials and energy, eliminating toxic raw materials, and reducing the quantity and toxicity of all emissions and wastes
- Products: reducing negative impacts along the life cycle of a product, from raw materials extraction to its ultimate disposal.
- Services: incorporating environmental concerns into designing and delivering services.

CLEANER GREENER PRODUCTION REQUIRES...

new attitudes, better environmental management, and evaluating available technology options. We need to take good environmental practice to the stage where it is an inherent part of any business operation.

HOW IS CLEANER GREENER PRODUCTION DIFFERENT?

Much of the current thinking on environmental protection focuses on what to do with wastes and emissions after they have been created. The goal of cleaner, greener production is to avoid generating pollution in the first place.

This means:

- Better efficiency
- Better business
- Better environmental protection
- Lower costs
- Less waste
- Less emissions
- Less resource consumption

WHY IS THE CLEANER GREENER PRODUCTION PROGRAMME BEING RUN?

The Irish Government, through the National Development Plan 2000 - 2006, has allocated funds to a programme for Environmental Research, Technological Development and Innovation (ERTDI).

The Department of the Environment and Local Government asked the Environmental Protection Agency (EPA) to run the CGPP as part of the ERTDI programme. With the programme continuing to 2006 about 60 businesses will be supported to implement cleaner greener production and to demonstrate their achievements to the rest of Ireland.

The long-term goal is to ensure that cleaner, greener production becomes the established norm in Ireland. The programme seeks to promote environmentally friendly business through increased resource productivity, waste reduction, recovery of materials, improved efficiency in a product value chain, energy management, and a change of culture within organisations.

The programme aims are focussed on avoiding and preventing adverse environmental impact rather than treating or cleaning up afterwards. This approach brings better economic and environmental efficiency.

PROGRAMME MANAGERS:

The Clean Technology Centre (CTC) at Cork Institute of Technology was appointed to manage the programme in association with O'Sullivan Public Relations Ltd, and Energy Transport Actions Ltd, (ENTRAC).

The CTC was established in 1991 and is now nationally and internationally regarded as a centre of excellence in cleaner production, environmental management and eco-innovation across a range of industrial sectors.

WHERE CAN I GET FURTHER INFORMATION?

This case study report is one of 29 reports available from the organisations that participated in the first phase of the Cleaner Greener Production Programme. A summary of all the projects and CD containing all the reports are also available. More information on the Programme is available from the Environmental Protection Agency

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