

CLEANING EFFICIENCY – W₄

Eco-efficiency resources for the food processing industry

Cut down water and chemical use

Cleaning plant and equipment can account for a large proportion of a food processor's total water use. This can range from less than 10 per cent for 'dry' processes such as nut processing, up to well over 40 per cent for a meat or dairy processor. There are numerous opportunities for reducing water use in cleaning while still achieving a sanitary outcome.

Dry cleaning

Dry cleaning not only reduces water and chemical demand but also reduces the volume and improves the quality of wastewater.

Although dry cleaning is practised widely, there is often room for improvement. Operator training and commitment are key factors in achieving good dry cleaning outcomes.

- When using dry cleaning techniques, remove as much product from plant and equipment as possible. In some cases product can also be recovered and returned for processing or sold as a by-product, for example for animal feed.
- Use drip trays or lips on equipment and benches to help reduce the amount of material landing on the floor or into drains.
- Use scrapers, brushes and vacuum devices to pre-clean containers, equipment and conveyors prior to washing. Scrubber and vacuum cleaners can wet or dry clean floors and remove gross soiling before washing with water. These cleaners are fast and efficient and reduce chemical use, but may be unsuitable for small areas, or areas with restricted access.

Scheduling product changeovers

Cleaning requirements can be reduced or even eliminated by modifying or scheduling production to minimise the number of product changes. This can be achieved by processing similar products sequentially or scheduling more highly flavoured or dark products last.

SCHEDULING OF PRODUCTS TO REDUCE CLEANING

Australian Food Corporation, a food processing company, produces Halal meat patties. To certify that the patties contain only Halal meat this line is processed as the first batch of the day after the equipment has been cleaned from the previous day. If a Halal batch were to be run after a non-Halal then a full clean would be required. By running the Halal batch first, the company saves water, chemicals and time. (Australian Food Corporation is an ecoBiz participant.)



Equipment design

The design of equipment affects cleaning efficiency. Easy-to-clean equipment reduces water and chemical consumption as well as labour. When selecting equipment give preference to items with fewer moving, and easily accessible parts.

Designing pipework with minimal bends and dead ends where contamination can occur and ensuring they 'fall' to a drain point will help minimise cleaning. Additionally, durable and easy-to-clean floor and wall surfaces will help reduce water use in cleaning.



Replacing interlocking belts with smooth belts has saved labour and cleaning time and has improved food safety.

MULTIPLE SAVINGS FROM IMPROVED CONVEYOR BELTS

Food processing company, Australian Food Corporation, replaced interlocking conveyor belts with smooth TD 50 belts to reduce water usage. The interlocking conveyor belts required significant amounts of cleaning as product sometimes lodged in the crevices in the interlock.

The new smooth belts limit the possibility of product capture and require significantly less cleaning time, providing better results on cleanliness testing.

In addition to the daily water, time and food safety benefits, long term maintenance is also reduced. On average, at least one old interlocking belt broke per month resulting in a shut down of the line, lost product and lost time for maintenance. One of the new belts was installed over two years ago and has not yet malfunctioned. The belts cost approximately \$4,000 each to install and the water savings for the ten belts is approximately 788 kL per year with additional savings in labour time. (Australian Food Corporation is an ecoBiz participant.)



High-pressure cleaning systems

High-pressure cleaners are a water efficient option for floor and equipment washdown. Cleaning with high-pressure water can use up to 60 per cent less water, compared with using mains hoses.¹ Mobile high-pressure cleaners have flow rates ranging from 4 L/min to 20 L/min with pressures of up to 500 kPa. To reduce the time required to set up mobile pressure washers, it is worth considering installing a ring main system.

It is important that high-pressure cleaners complement cleaning procedures and should not replace dry cleaning. The use of high-pressure cleaning systems may not be suitable for some areas of the plant as aerosols from spray and splash can cause the deposition of micro-organisms from the floor to drain back onto equipment and product.



Trigger-operated controls for hoses

The installation of a trigger gun can provide significant savings for companies. A hose left on unnecessarily for one hour a day can waste between 470 kL and 940 kL of water a year. That represents \$1,565 – \$3,130 a year per hose². In contrast, the cost of a trigger gun can range from just \$20 to \$100 for a heavy-duty item.

- Ensure trigger guns are ergonomic, particularly where staff are required to operate the trigger for long periods of time.
- Automatic reel-up hoses can help to protect the hose and the trigger gun.

Automatic reel-up hoses reduce accidental damage to hoses.

¹ Envirowise 1998, Reducing the cost of cleaning in the food and drink industry, ETBPP GG154 www.envirowise.gov.uk

² Water charge = \$1.39/kL BCC water supply costs for between 201–300kL for January 2008 and Trade waste charge = \$1.94 BCC tradewaste charge category C for average food processor wastewater composition January 2008.

Pipe cleaning

Pipes are usually cleaned manually or with a 'clean-in-place' system. Before any wet cleaning commences, remove as much product as possible to avoid increasing wastewater loads and wasting product.

'Pigging' systems or low-pressure blowers that propel a 'pig' (usually a solid material plug) to push out product can often be used to clear pipes. Pigs are particularly useful for removing viscous liquids, but usually need specifically designed or modified pipework because the pig cannot pass through pumps or valve clusters. Smaller pipework can be more easily vacuumed or air-purged of product.

PIGGING REDUCES NEED FOR WATER FLUSHING

A stabilised fruit product produced by Food Spectrum is pasteurised in a heat exchanger before being packed. Previously, these lines were flushed with water producing a water product interface which was then packed off and blended with other product batches.

Starch plugs and pigs were trialled to reduce the interface with varying degrees of success. When a change was made to the pasteuriser it was found a silicon rubber pig adhered to the pipework, eliminating the need for flushing between product batches. This saved around \$700 per year in water supply and discharge costs and enabled 7,300kg of product worth \$14,600 to be recovered.

Container washers

Purpose built container washers, rather than hoses, can significantly reduce water required for cleaning.

- Washers should only be used when fully loaded and opportunities to recycle final rinse water for pre-rinsing should be investigated.
- The washer's speed and the length of the cleaning cycles should be adjusted for the most efficient clean while still meeting hygiene standards.

NEW CRATE WASHERS SAVE MONEY

Priestley's Gourmet Delights, a bakery product manufacturer, are replacing their crate washer with a more efficient one. The new washer will save approximately 3,400 kL of water per year and at a cost of \$300,000 to install, the payback period is three years. The new washer also has a smaller footprint, freeing up usable space in the factory. (Priestley's Gourmet Delights is an ecoBiz participant)

This series of fact sheets provides examples and suggestions to the modern food processor on how to achieve both economic and environmental benefits from eco-efficiency. Visit the project website www.ecoefficiency.com.au for more ideas and case studies.

The eco-efficiency for the Queensland food processing industry project is an initiative of the Department of Tourism, Regional Development and Industry and the Environmental Protection Agency with technical information provided by UniQuest through the UNEP Working Group for Cleaner Production.