EPA South Australia

CLEANER PRODUCTION

CASE STUDY

ILEC APPLIANCES
HEATING & COOLING

ILEC APPLIANCES

SUMMARY

ILEC Appliances, a company manufacturing heating and cooling appliances, has introduced a number of initiatives that have significantly reduced the operating costs of its powder coating process. It has improved housekeeping, monitoring more closely the usage of powder and paint, and has minimised the wet painting process that generated a large proportion of its solvent and liquid waste. Disposal savings are in the order of 58% for waste powder, 40% for solvent waste and 60% for liquid waste. The productivity of the powder coating line has increased by an average of 180%. These initiatives have been achieved without capital expenditure, leading to an immediate cost payback.

DEPARTMENT FOR environment and heritage

Government of South Australia

ILEC APPLIANCES

Business profile

Bonaire, Vulcan and Pyrox have been associated with heating and cooling products within Australia since Pyrox was established in 1922.

Bonaire Vulcan, now known as ILEC Appliances, has been a part of the Celi group of companies since it acquired the Heating & Cooling division of Southcorp Holdings in July 1999.

The Celi group was founded by Ted Celi, who, in 1972, began manufacturing evaporative cooling in the regional town of Leeton in New South Wales. In addition to ILEC Appliances, the Celi group also encompasses the name Celair-Malmet, which markets the Celair range of evaporative cooling products and the Malmet range of hospital equipment.

Financial assistance provided

A consultancy by Energetics was funded by a grant of $10,000 from the EPA's Pollution Prevention Fund to Bonaire Vulcan's previous owners.

ILEC Enterprises Pty Ltd, as the new owners of Bonaire Vulcan, saw the benefits from the Cleaner Production project, and implemented the recommendations of the consultancy review.

Cleaner production motivators

The major motivators behind ILEC's participation in the Cleaner Production project were to:

- enhance the working environment for employees
- reduce, with a view to eliminating, any impact of the coating process on the environment
- reduce the costs associated with the coating process
- enhance the quality of ILEC Appliances products
- gain insight into ways to improve coating processes and share it with other companies within the group and associated networks.

Process layout

The Ilec Appliances coating system incorporates:

- an overhead I-beam conveyor – total length 208 metres (approx)
- five-stage pre-treatment system comprising:
  - alkaline cleaner
  - overflowing cold water rinse
  - iron phosphate coating
  - overflowing cold water rinse
  - deionised water rinse
- dry-off oven which uses warm air expelled from the bake oven
- recirculating water-wall wet spray booth—on line
- powder coating clean room, with two powder booths, using positive air pressure
- gas heated camel-back bake oven.

TRADITIONAL APPROACH

The methods traditionally employed to coat components were:

- powder coating with full recovery of the three highest use colours
- powder coating all remaining colours (nine at the time of the initial review) without recovery (spray to waste)
- wet coating components, with two different types of organic solvent-based paint being used for differing applications
- cleaning one booth in the clean room while the other was being used.

The variation in size and colour of the components manufactured introduced a number of activities that actively created waste or led to the creation of waste.
The forms of this waste included:

- powder colours sprayed with no recovery, due to short batch runs
- powder continuing to be sprayed while no parts were within the spray booth, or spraying powder unnecessarily between parts
- uncontrolled use of paint thinners for the wet spray process
- cross contamination of powder from one powder booth to the other.

Waste associated with the coating operations (powder and wet) was costing the company approximately $40,000 per annum.

CLEANER PRODUCTION INITIATIVES

Benefits recommended and implemented

Housekeeping

- The positive pressure fan in the clean room was turned off until cross contamination issues could be resolved.

Monitoring

- Existing procedures have been updated to track raw material use (e.g. powder) in addition to tracking and analysing coating defects.
- A continuous monitoring, recording and reporting program has been implemented and key performance indicators set for powder coating waste and reworks.
- The use of paint thinners for wet spray operations is controlled and recorded.

Powder use optimisation

- If less than 200 kg of powder was being used, that powder is no longer used if possible. Low use powders that could not be removed are now scheduled as single batch runs to reduce changeover costs and the resultant waste powder.
- The number of powders in use has been reduced to five major colours, and the powder waste of each is collected separately and re-used. Previously, multiple powder colour wastes were collected in the same hopper and could not be re-used.
- Greater process control has been implemented with the installation of 'line of sight' sensing. Powder now only sprays when the part is in sight and not continuously. With the use of a multiple light curtain (as used for guarding machinery) parts can be monitored for varying shapes and sizes.

Wet painting

- Wet painting of parts is steadily being engineered out of all products.
- New technology powder has been sourced that will enable powder coating of parts that traditionally had to be wet coated due to the high temperature of the components.
- The existing water-wall wet spray booth is to be taken off line and replaced with a paper filter booth for small batch runs or one-off coating operations, such as maintenance requirements.

Training

Detailed training plans are ensuring that everyone working within the paint shop is fully conversant with all requirements of the coating systems. Training includes topics such as:

- types of chemicals within the paint shop, where used and their safe handling
- safety procedures and spill response
- principles of pretreatment, including practical training on recording and measurement
- continuing training in paint application.

BENEFITS

ENVIRONMENTAL

Powder waste	• Powder waste sent to landfill reduced by 58% or 2100 kg p.a.
Solvent waste	• Solvent waste reduced by 40% or 320 L p.a.
Liquid waste	• Liquid waste from the wet spray booth reduced by 60% or 30 kL p.a.

ECONOMIC

Chemical re-sourcing	• Chemical re-sourcing has reduced liquid waste costs - less sludge being generated, decreased chemical usage and improved product performance
Productivity	• Line loading density increased by an average 180%
Payback period	• There has been no capital expense; the payback period is immediate
OHS	• Improved working conditions for the workforce, with less hazardous solvents and greater control over the use of powders • Increased awareness of the hazards associated with all chemicals and substances in use

ADDITIONAL INITIATIVES

Re-sourcing of pretreatment process chemicals

- The chemicals used within the pretreatment process were causing excessive build-up of scale within the first three stages of the system, and oil carryover from the cleaner stage to the rinses.
- The scale build-up meant components weren't sufficiently cleaned, spray nozzles were blocked, and chemical and rinse tanks were contaminated; oil carryover was contaminating the rinse water and leaving some oil deposits on the components.

WHERE TO FIND ADDITIONAL INFORMATION

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