

# **Waste Minimisation at a Manufacturing Company (MF5)**

## **Case Study 2**

### **Metal Finishing Waste Minimisation Club**

#### **Background**

MF5 is a small manufacturing company situated in Pinetown, South Africa. The company was established in 1980 and employs approximately 90 people. The company manufactures and plates zinc and steel trims (buckles, badges etc.) for the fashion industry, 20% of which is exported.

#### **The Process**



Raw material is brought in as metal ingots and undergoes a number of processes such as zinc casting (both spin and pressure die-casting); metal processing; tumbling and electroplating. Copper Brass, Zinc, Nickel, Silver or Gold plating may be carried out on the trims. Those areas that were identified as the main sources of waste were the tumbling (see diagram on left) and plating departments.

#### **Identification of Waste Minimisation Options**

The management of MF5 has committed themselves to a programme of waste minimization and a number of options to reduce water use and effluent production were identified and implemented.

The areas chosen for investigation included:

- Water consumption
- Effluent control, and
- solid waste disposal

A total of 11 waste minimization options were identified for the site. These waste minimization options are listed in the Table 1.

#### **Implementation of Waste Minimisation**

Of these waste minimisation options identified, 6 have been implemented by the company (summarised in Table 1). Savings in water, energy and chemicals have been realised and quantified in most cases. The factory has established a waste minimisation team who meet on a regular basis. Worker education has also been carried out to increase awareness of good management and environmental practices.

**Table 1: Summary of Identified Waste Minimisation Options**

Waste Minimisation Option	Status
1. Replace automatic flushes in toilets with manual	Implemented
2. Recycle water from tumbling	Implemented
3. Cover hot tanks at night to reduce evaporation	unknown
4. Fix leaks	Implemented
5. Replace overflow rinses with static rinses	Implemented
6. Install drainage bars, and drip trays	Implemented
7. Install vaporiser to remove LPG from bottles	Implemented
8. Rationalise compressed air system to eliminate dead legs	Unknown
9. Install external insulation of hot wash tanks	unknown
10. Supply outside air to moulding chiller condenser coil	unknown
11. Optimise start-up times of electric furnaces	unknown

### **Water Consumption**

The company has 5 water meters which are recorded on a daily basis. The overall water consumption has been reduced from between 16 to 18 kl/day to 10 kl/day by implementing a number of options. These include:

- installing new rinse baths and spray rinses,
- fixing leaks,
- introducing drag-out tanks;
- replacing automatic flushes in the urinals with a manual system (saving 3 kl/month) and
- recycling of water from the tumbling area (saving approximately 6 kl/day).

### **Recycling in the Tumbling Department**

Tumbling is a process where deburring, polishing and paint removal of the trims occurs. The trims are placed in mini-grinders with a grinding media and tumbled for between 1 and 2 hours depending on the finish required. Water is used throughout the grinding process to continuously remove the fine metal particles that are created during the deburring process. As a result, large volumes of water were consumed and a large quantity of sludge produced.



In an effort to reduce both the water use and the mass of sludge produced, methods of recycling this water were investigated. The solution was to install a filter press to remove the fine metal particles and recycle the water back into the process (see diagram on left). The sludge that is produced is more compact and dryer, resulting in less volume requiring disposal. Chemical costs are also reduced as less chemicals are required for effluent treatment.

The payback on this investment is of the order of 18 months.

### **Energy Consumption**

Liquid Petroleum Gas (LPG) use has been optimised by the installation of vapourisers on the supply system, thereby ensuring complete emptying of the gas cylinders and less frequent replacements by the supplier. This resulted in a saving of R500 / month for the company.

### **Chemical Usage**

Chemical use has been decreased through a number of measures, such as:

- The design of drip trays that can be placed under the barrels during decanting such that any excess solution drains back into the plating bath;
- Introducing drag-out tanks
- Testing of effluent prior to disposal, resulting in a saving of R 2 250 / month in effluent treatment costs

### **Economic Benefits**

<b>Item</b>	<b>Saving Approximate Rands / year</b>	<b>Payback</b>
Water (Total) • Recycling • Fixing Leaks • Flushing system	8 000	18 months
Chemicals	Not quantified	
Energy	5 500	Immediate
Effluent (treatment)	24 750	Immediate
<b>Total</b>	<b>38 250</b>	

### **Environmental Benefits**

- Water use decreased by 8 kl/day
- Less chemicals and metals discharged to the environment
- Less sludge being discharged to landfill

### **Contact Details**

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