

MedClean Propre Limpio



Regional Activity Centre
for Cleaner Production



Generalitat de Catalunya
Government of Catalonia
Department of the Environment
and Housing

No. 45

Modification of the process

Recovery of rinsing baths and substitution of cyanide zinc

Company background

SIMON, SA. Olot (La Garrotxa).

Industrial sector

Production of electrical material.

Environmental considerations

In the production of electrical material some metal parts require surface treatment in order to obtain the necessary quality or to improve their aesthetics. In the case of SIMON, SA, one part of its production process involves zinc coating and passivation of parts. In the coating process, the parts are immersed in a series of baths to prepare them for treatment.

Thus, parts go through the following stages: degreasing (chemical and electrolytic baths), pickling, activation and finally zinc coating (cyanide zinc) and passivation.

Between baths simple rinses are carried out (a single bath in a continuous water flow) to avoid pollution in the following baths due to drag-out. These single rinses generate wastewater containing remains of the treatment baths, which must be treated prior to discharge. The wastewater also contains some cyanide compounds and requires special treatment with sodium hypochlorite.

Background

The main factor that led SIMON, SA to introduce the activities detailed in this case study was the desire:

- To reduce the consumption of the raw materials used in the metal treatment process.
- To avoid the use of cyanide products and the products needed for the treatment of spent baths.
- To optimise water consumption in the rinsing baths and to reduce treatment costs.

Summary of actions

The company has introduced several changes in the metal treatment line. Firstly the process line has been modified to incorporate a tight recovery bath followed by double counterflow (cascade) rinsing after each treatment bath. They have thus been able to recover and reincorporate part of the dragout in the treatment bath and water consumption in parts cleaning has been optimised. In addition, there has been a reduction in the amount of pollutants in the effluents to be treated by the wastewater treatment plant, as well as a reduction of the wastewater flows.

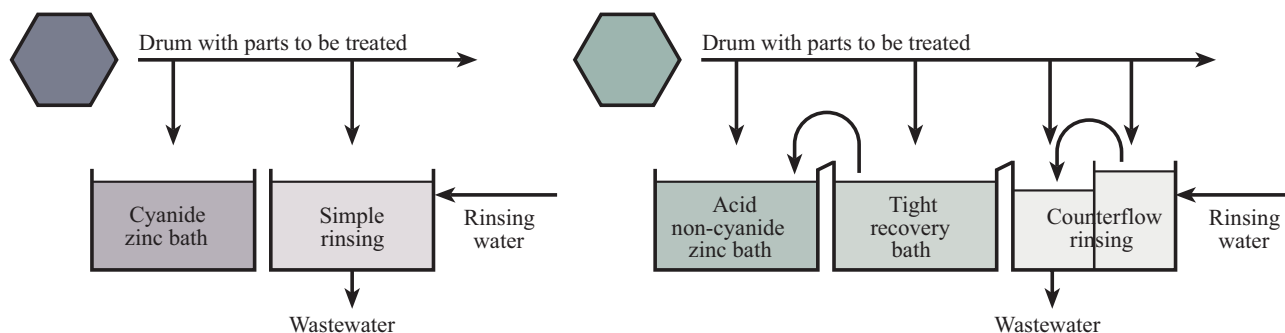
Raw materials substitution: use of an acid zinc bath instead of the former alkaline cyanide zinc bath. Thus the use of cyanide compounds is avoided, as well as the generation of an effluent whose management is very difficult and expensive.

Likewise good housekeeping practices have been introduced, such as the installation of seals between baths. The draining time for parts has been increased and the drum movement has been modified. This has reduced drag-out and optimised the process time.

Diagrams

OLD PROCESS

NEW PROCESS



Balances

	Old process	New process
Process raw materials		
Sodium cyanide (kg/y)	250	0
Sodium hydroxide (kg/y)	1,000	0
Potassium chloride (kg/y)	0	500
Hydrochloric acid (kg/y)	0	150
Boric acid (kg/y)	0	110
Water (m ³ /y)	7,168	2,508
Purification		
Calcium hydroxide (kg/y)	5,200	2,000
Sodium hypochlorite (l/y)	40,000	0
Sodium hydroxide (kg/y)	0	200
Sludge from purification (kg/y)	8,000	4,000
Economic balance		
Raw materials (€/y)	931.79	463.42
Purification (€/y)	5,401.90	260.24
Sludge management (€/y)	805.36	402.68
Savings		
Wastewater treatment plant maintenance (€/y)		3,005.06
Increased efficiency of process (€/y)		15,025.30
Increased production (€/y)		16,830.15
Total savings (€/y)		40,873.22
Investment (€)		248,674.77
Payback period		5.1 years *

Conclusions

The modification of the process described has allowed this company to reduce the volume of wastewater and wastes generated and to eliminate the use of cyanide compounds and thus to avoid the reagents needed for their destruction. Likewise, it must be taken into account that not only environmental improvements have been achieved; the company has also improved the quality of the parts and has increased the production of the galvanization line.

These activities have also led to significant economic savings. Through such activities the company has obtained significant savings in raw materials, and particularly in reagents for the wastewater treatment plant and in sludge management.

*As the actions carried out by SIMON, SA brought about a reduction in industrial waste generation, the company received a grant from the Waste Agency of Calalonia based on the Order of 9 February 1996, for the execution of waste minimisation projects. Therefore the payback period was shorter than expected.

NOTE: This case study seeks only to illustrate a pollution prevention example and should not be taken as a general recommendation.



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