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Regional Activity Centre
for Cleaner Production



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Pollution prevention case studies

Recycling of rinsing water from electrochemical nickel plating by means of a vacuum evaporator

Company background

Vitri Electro-Metalúrgica, S.A. (Torelló, Spain)

Industrial sector

Metal industry. Manufacture of illumination apparatuses.

Environmental considerations

The company Vitri Electro-Metalúrgica, S.A. manufactures caps for electrical lamps. One of the productive processes of the company, surface treatment, and more specifically, electrochemical nickel plating, is the one generating the most relevant environmental impacts. These impacts result in the generation of wastewater and sludge with a high nickel content.

Background

The factors that drove the company to carry out the investment required were the following:

- Desire to reduce the wastewater pollution load generated in the process.
- Reduction of costs of raw materials from nickel plating.
- Reduction of cost for treating the sludge generated.

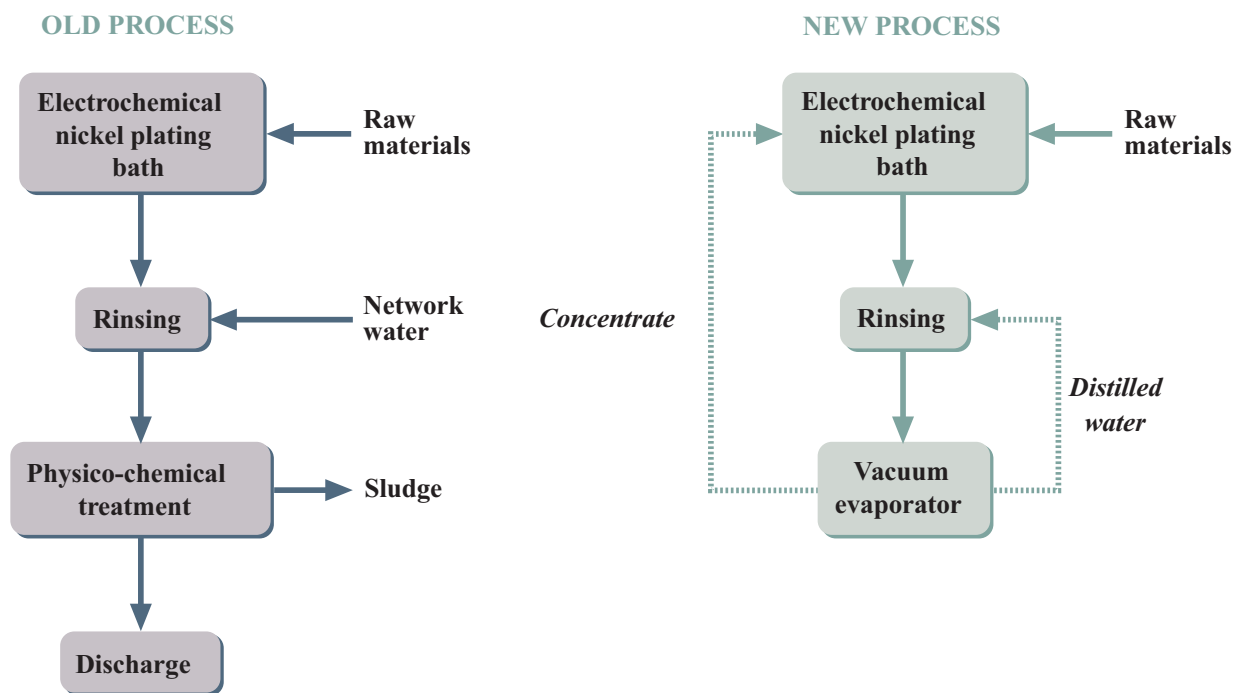
Summary of actions

The action that Vitri carried out consisted of installing a vacuum evaporator to treat water from the rinsing baths of electrochemical nickel plating.

The system uses heat energy in order to evaporate the liquid part and concentrate the salts dissolved in the wastewater. The system used is vacuum evaporation, which allows evaporating an aqueous solution at temperatures as low as 30-40°C, thus avoiding excessive and unnecessary consumption of energy to bring the solution to boiling point and, simultaneously, avoiding the degradation of certain organic components present in the bath.

The action performed makes it possible to obtain, on one hand, distilled water that is recirculated to the rinsing baths and on the other hand, a concentrate of reagents that is recirculated to the nickel plating bath.

Diagrams



Balances

	Old process	New process
Material balance		
Nickel chloride (kg/y)	12,100	1,600
Nickel sulphate (kg/y)	7,020	480
Boric acid (kg/y)	3,900	220
Nickel anodes (kg/y)	10,880	6,400
Water (m ³ /y)	10,000*	6,360*
Sludge (t/y)	40.68*	12.64*
Economic balance - Costs		
Raw materials (€/y)	236.6 thousand	95.9 thousand
Water (€/y)	6.0 thousand	3.8 thousand
Treatment of sludge (€/y)	7.6 thousand	2.5 thousand
Total costs (€/y)	250.2 thousand	102.2 thousand
Total savings (€/y)		140.0 thousand
Investment (€)		132.2 thousand
Payback period		0.9 years

* Values of the electrochemical nickel plating line including its subprocesses.

Conclusions

Installing a vacuum evaporator in the company Vitri Electro Metalúrgica, S.A. resulted in an interesting action of pollution prevention at source. The new process allows the company to reduce the pollution load and at the same time, the water consumption, the raw materials consumption and the amount of sludge generated in the physical-chemical wastewater treatment plant.

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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