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Regional Activity Centre
for Cleaner Production



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

No. 19

Pollution prevention case studies

Cleaner production in a metal finishing company within the electronics industry

Company background

ST Microelectronics Ltd. (Malta) assembles and tests a wide range of semi-conductor products in major high technology sectors. The integrated circuits produced are used in various applications such as computers, telecommunications and transportation. The company launched an ambitious environmental programme to reduce the environmental impact of its activities aiming to reduce water consumption.

Industrial Sector

Metal finishing within the electronics industry.

Environmental considerations

Assembly of integrated circuits involves many process steps. Among these steps, electroplating is an operation with an important environmental impact. In this process, dissolved copper salts are generated as a waste product from copper leads etching, while tin and lead salts are present in rinse waters and in baths from solder electroplating. Since water is a very precious commodity in Malta, the company aimed to reduce its consumption by means of recovering and recycling.

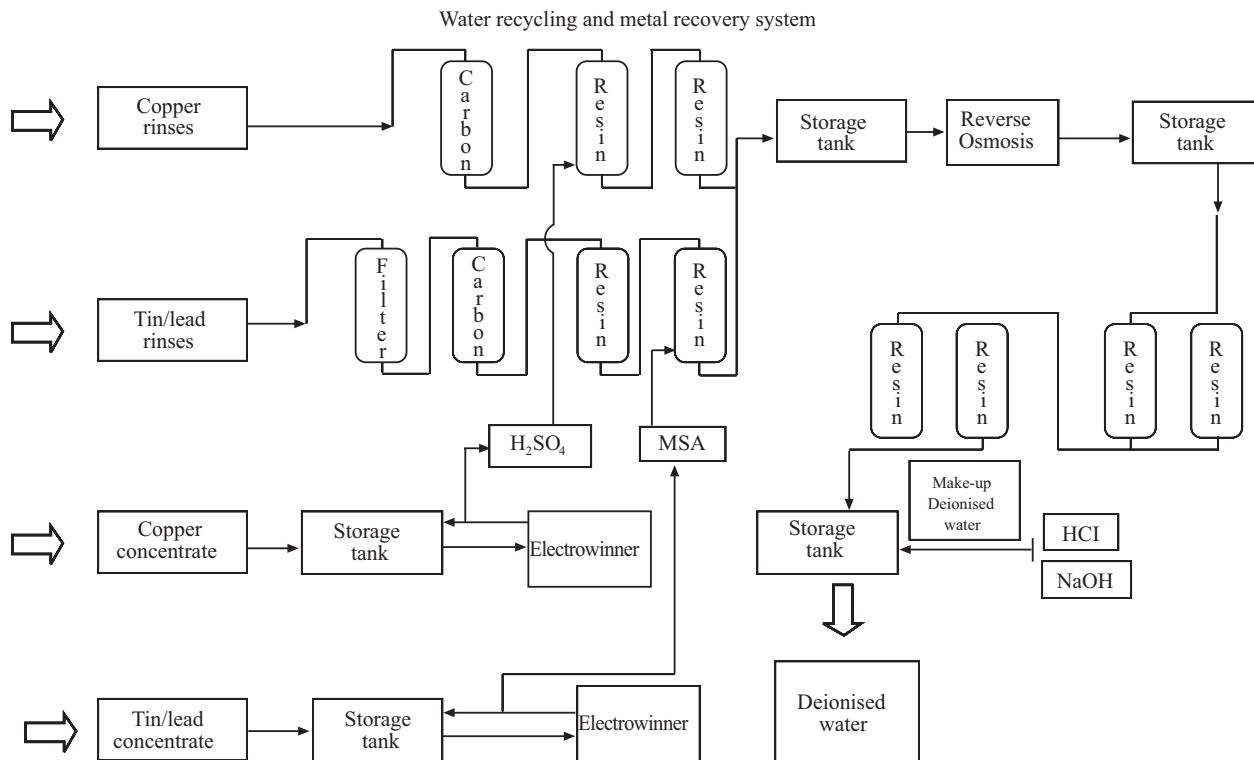
Background

The company's environmental programme to reduce water consumption was divided into two phases. The first one, involving recycling of silicon wafer cutting water, was completed in 1996, and the second one, aimed at recycling electroplating wastewater, was completed in 1998. The wastewater recycling system required the segregation of the different types of process wastewaters in order to use the appropriate technology to recover them. Four drains were found to be necessary, and therefore, four streams were obtained: acid concentrate containing copper, acid concentrate containing tin and lead, rinse waters containing copper, and rinse waters containing tin and lead. The drains were installed on all electroplating machines.

Summary of actions

The two drains for concentrates are sent directly into storage tanks from where they are circulated into electrowinners and subjected to plate out of metals for recovery. Copper and tin metals are sold to a metal recovery firm. The electrolytic removal of the metals generates acid that is collected and reused for regeneration of scavenger resins. The steams of rinsing operations are now passed into scavenger ion-exchange resins for the removal of heavy metals before being passed into a reverse osmosis unit, whose product is further processed by ion-exchange resins for removal of all other traces of salts. The resulting deionised water is conveyed back to the electroplating machines to be used once again as rinse water.

Diagrams



Balances

Option	Environmental Benefits	Investment	Annual Savings	Payback period
Water recycling and metal recovery system	<ul style="list-style-type: none"> Water consumption reduction Chemical consumption reduction 	€919,548	<ul style="list-style-type: none"> Water consumption 183,909 €/year Chemical consumption 5,312 €/year 	4.8 years

Conclusions

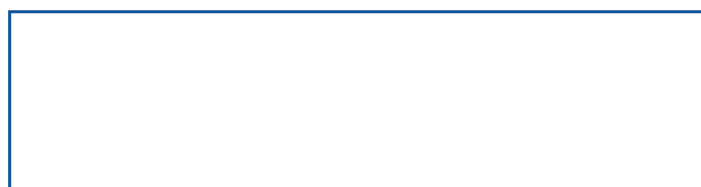
With the adoption of these cleaner production options, the company achieved a 78% reduction in water consumption (approx. 1,100 m³/week) due to recovery and recycling, a top priority due to water scarcity that also led to considerable economic savings. In addition, the recovery of heavy metals and ultimate sale to a metal recovery firm, and the reuse of acid generated by metals electrolytic removal, will contribute to obtain economic benefits that will reduce the payback period, as well as the chemical consumption and the generation of hazardous sludge containing heavy metals.

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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