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Regional Activity Centre for Cleaner Production

MINISTERIO DE MEDIO AMBIENTE

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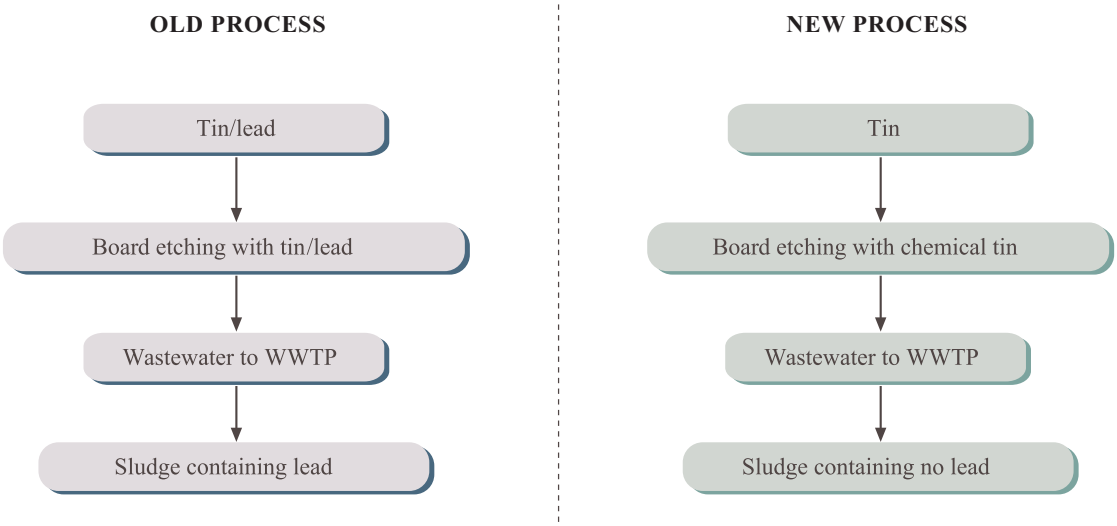
No. 87 Pollution prevention case studies

Elimination of the use of lead in the manufacture of printed circuits

Company	PROCIRCUITS, S.L. Terrassa (Vallès Occidental).
Industrial sector	Electronics. Circuit manufacture.
Environmental considerations	PROCIRCUITS, S.L. manufactures printed circuits in the electronics industry for equipment and appliances of different types to customer specifications. The production process involves the manufacture of printed circuits on baseboards with a layer of copper. These are subject to different processes of tooling, addition, photosensitive emulsion for marking out the circuits, and board insulating and processing. The photosensitive emulsion is subsequently removed and the copper is etched away with a tin-lead bath. The removed copper, lead and tin generate wastewater that requires subsequent treatment. Lastly, the circuits are tested, silkscreen printed and cut to the required sizes. In order to be able to manufacture the parts and remove the unwanted copper on the boards, the galvanising line involved the use of a tin-lead bath. This generated a residual current of these elements, which ended up in the wastewater. Once treated, the wastewater generated waste sludge with a high lead content.
Background	As described above, PROCIRCUITS, S.L. generated a wastewater treatment sludge with a high heavy metal content, which included lead from the lead-tin galvanising line. In 2002, the company implemented a plan of action to improve the quality of the waste it generated and to reduce environmental impact. The measure was intended: – To achieve a process that brings an end to the generation of hazardous waste. – To eliminate the use of lead in the printed circuit manufacturing process. – To prioritise the environment benefit (intangible benefit) over and above any other consideration.
Summary of actions	The project involved the replacement of the etching line and the elimination of excess copper through the use of tin/lead on the printed circuit boards with a new etching line that uses only tin. The new lines yield the same quality of manufactured printed circuits yet allow for the total elimination of lead from the production process. As a result, lead is removed from the sludge generated in the wastewater treatment process and is no longer contained in the raw materials handled.

Outline of the process



Balances

	Old process	New process
Balance of materials		
Tin-lead consumption	900 kg/year	0 kg/year
Tin consumption	0 kg/year	4,746 m^2/year
Sludge waste with lead	11,340 kg/year	0 kg/year
Sludge waste without lead	0 kg/year	11,340 kg/year
Economic balance		
Cost of managing waste with lead	2,105.31 €/year	0 €/year
Cost of managing waste without lead	0 €/year	1,196.56 €/year
Total savings		908.75 €/year

Conclusions

The implementation of the project prompted the elimination of lead from the wastewater and from the treatment sludge. Lead is a heavy metal, considered a danger to human and animal life and natural ecosystems, for both flora and fauna. The generation of a total of 11,340 kg/year of hazardous waste containing lead content was prevented, reducing the hazardousness of the waste generated. With the change of raw material, this has become a non-hazardous waste.

This initiative to prevent waste at source arose from the company's environmental policy and was included in the 2002 environmental improvement plan aimed at adapting production processes using the latest and most environmentally sound technologies.

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

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