

# Med *Clean* *Propre* *Limpio* **Mediterranean**



Regional Activity Centre  
for Cleaner Production



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Pollution prevention case studies

## Reduction of drag-out in chromium plating

### Company background

Manuel Muñoz Clarós, S.L. (Barcelona) is a company with a staff of 15 employees that coats metal parts (mainly metal tubes) with hard chromium on top of nickel. The metal plating line is automatic; a crane, controlled by a computer programme, dips the parts that are fit in a support in the different tanks: degreasing, bright nickel, semibright nickel, pickling and chrome bath. Between these tanks there are rinsing sealed water tanks and continuous rinsing water flow tanks.

### Industrial sector

Metal plating

### Environmental considerations

There is drag-out between tanks due to the process characteristics, the fact that the parts are successively dipped in various tanks, and the form and position of the parts in their supports. Because of the drag-out, there is a loss of raw material (that may affect the quality of the baths that follow) and water consumption to rinse the parts before dipping them in the following baths.

These drag-outs may affect the composition of the baths thus modifying their characteristics and reducing their useful life. They also imply the need of treating the wastewater to eliminate the compounds dragged to the rinsing waters.

### Background

The company carried out a Minimisation Opportunities Environmental Diagnosis (MOED). The MOED, among other aspects, compared the theoretical drag-out (that is subject to the parts being coated and its surface) with the real drag-out. The result was that the real drag-out was 2.4 times greater than the theoretical one.

The possibility of reducing the drag-out encouraged the company to carry out the actions that are described below, since this way they could:

- Reduce raw material consumption
- Reduce pollution from a tank to the other and thus lengthening the useful life of the baths
- Reduce the pollutant load to be treated in the wastewater treatment plant thus achieving savings in raw material
- Reduce the water consumption in the rinsing process and maintaining the same rinsing quality

### Summary of actions

The first action carried out was to identify why the drag-out was higher than expected. The structure of the supports of the parts contributed to the accumulation of liquid in various areas and thus increased the drag-out. The following actions were carried out:

- a) Substitute some areas of the supports that were empty, by uncored blocks to prevent the accumulation of liquid inside them.
- b) Improve the inside structure of the supports and eliminate the use of some parts that hindered the drainage and thus contributed to increase drag-out.

With these actions the company managed to reduce drag-out and achieve a drag-out similar to the theoretical one. This way, savings in raw material, water and wastewater treatment were achieved. As well as improving the structure of the racks to reduce the drag-out, these were plastified to avoid metal deposition on its surface and prevent the loss of raw material. Flow meters were also installed to control the flows entering the tanks.

### Diagrams



### Balances

	Old process	New process
<b>Raw material and water consumption</b>		
Chromic acid	4,000 kg/year	3,520 kg/year
Nickel chloride and nickel sulphate	3,150 kg/year	2,205 kg/year
Boric acid	600 kg/year	240 kg/year
Sulfuric acid	2,520 kg/year	2,160 kg/year
Degreasing agents	9,175 kg/year	8,579 kg/year
Water	11,356 m <sup>3</sup> /year	4,542 m <sup>3</sup> /year
<b>Savings</b>		
Water		10,127 €/year
Raw material		6,103 €/year
Reagents and wastewater sludge generation		4,211 €/year
<b>Total savings</b>		20,441 €/year
<b>Investment</b>		3,606 €/year
<b>Payback period</b>		2 months

### Conclusions

Thanks to the actions described in this case study, which are some of the pollution prevention alternatives recommended in the MOED, the company has achieved more than a 60% reduction in water consumption and a 15% reduction in raw and auxiliary material consumption. By means of these improvements reductions in the wastewater generated by the company have been achieved and the economic savings generated have allowed a payback period of 2 months. The company has thus become more efficient and has improved its environmental quality.

**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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