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Regional Activity Centre for Cleaner Production

MINISTERIO DE MEDIO AMBIENTE

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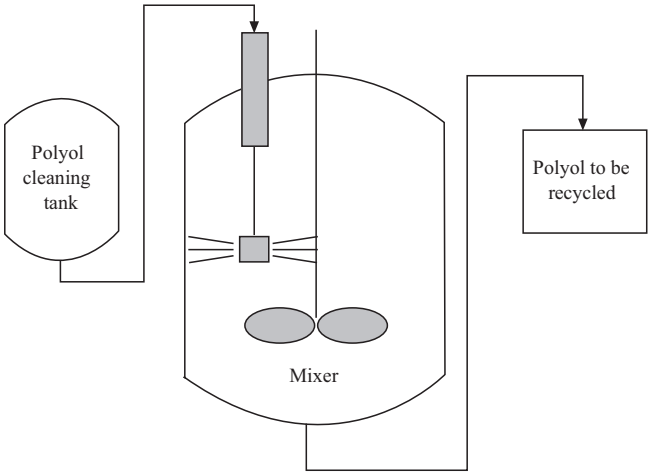
No. 83 Pollution prevention case studies

Cleaning system improvements: the CIP (clean in place) system

Company	Elastogran, SA. Rubí, Spain.
Industrial sector	Chemical. Manufacture of polyurethane systems for the automobile, construction and other industries.
Environmental considerations	Elastogran, SA develops and manufactures polyurethane systems and markets the raw materials for polyurethane and thermoplastic polyurethane granules. These products are mainly aimed at the automobile, construction, refrigeration, furniture, footwear and coating industries. The production process is discontinuous and based mainly on the mixture of raw materials (polyols or isocyanates) and other auxiliary materials (catalysts, expanders, fire-proofing, colourings and additives) to obtain liquid polyurethane components (formulated polyols and isocyanates), which are used by conversion companies to produce polyurethane. The combination of the two formulated components is known as the polyurethane system. Occasionally a system may be composed of three or more components, when auxiliary additives are incorporated. To obtain the two formulated components, the company uses different-capacity mixing recipients (reactors). The dosage and mixing process is highly automated and managed by PLC. Once mixing has taken place and the formulated liquid product has been obtained, it is stored and distributed to the customer. The system that was used previously to clean the reactors was totally manual and used water at high pressure. Due to the low solubility of the products in water, large amounts were needed to ensure that the reactors were completely clean. The cleaning water was collected in containers and managed as waste.
Background	The company decided to update and rationalise the cleaning system in accordance with its policy of commitment to quality and the environment. The objectives of the measure were as follows: • To reduce the amount of water used in cleaning the facilities. • To maximise the reuse of the products used in cleaning.
Outline of the measure	The aim of the measure is to replace the cleaning water from most of the processes with reusable polyols. The process consists in installing an automated controlled cleaning system (PLC) that comprises rotating heads inside the mixing recipients, which are connected to two heated tanks of cleaning polyols. Once cleaning is complete, the polyols used are stored in containers that are separated according to product type and reused as raw material in the subsequent manufacture of the same products.

Diagram of the process



Balances	Old process	New process
Balance of materials		
Production	24,239 t/y	37,565 t/y
Waste cleaning water to be treated	77,860 l/y	31,120 l/y
Wastewater/tonne	3.21 l/t	0.82 l/t
Wastewater	100%	25 %
Economic balance		
Cost of the water	70.07 €/y	37.34 €/y
Cost of managing waste cleaning water	25,140.00 €/y	12,567.00 €/y
Savings		
Saving in water consumption	32.73 €/y	
Saving in the management of waste cleaning water	12,483.00 €/y	
Total savings		**12,515.73 €/y**
Investment in facilities		**€36,061.00**
Payback period		**2.9 years**

Conclusions

The project led to a 75% reduction in the volume of waste from the cleaning of the mixing recipients, and a reduction in the water used for this purpose. Automation of the system also produced improvements in cleaning quality.

Pollution prevention at source is the result of the environmental policy of Elastogran, SA, and is part of the framework for ongoing improvement that was initiated by the company in 1997.

In 2001 the company performed a Minimisation Opportunities Environmental Diagnosis (MOED): It became EMAS registered in 2001.

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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