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Recovery of cleaning solvents by vacuum distillation

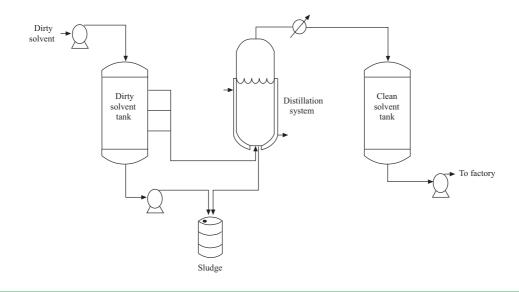|	
Company	Tintas K+E, SA. Vilanova del Vallès, Spain.
Industrial sector	Manufacture of inks and varnishes for graphic arts.
Environmental considerations	Industries that manufacture organic solvent phase inks consume large quantities of these products, which are used both in their manufacturing processes, raw materials, and in the cleaning operations of machine and manufacturing apparatuses. Dirty solvents with traces of pigments and resins are special waste.
Background	Prior to the implementation of this project, Tintas K+E, SA stored the dirty solvent until a large enough volume had been accumulated to send for external treatment, in which part was recovered. This involved high costs and the ultimate destruction of over 70% of the solvent. After external treatment this solvent did not fulfil the minimum quality requirements for use in the company's cleaning operations. In addition to the introduction of measures aimed at reducing solvent consumption in the manufacture and cleaning processes, the company undertook this project both to make savings in fresh solvent as it enabled them to guarantee the quality of recovered solvent, and to reduce the costs of thirdparty treatment of dirty solvents.
Summary of action	Installation of a compact vacuum distillation system for continuous recovery of solvent. Ninety per cent of the dirty solvent used in operations to clean the facilities is fed into the distillation system. Because of its composition, the remaining 10% must be managed as special waste. The dirty solvent, which comprises a mixture of solvents with traces of pigments and resins, is loaded into an initial tank from which solids are decanted. It then passes to the distillation unit boiler. The boiler has a measurement system that detects the level of accumulated sludge. When this level approaches the pre-established maximum, the process is stopped, and the boiler is opened and cleaned. The recovered clean solvent is stored in a second tank from which it is distributed to consumption points. With the current system of recycling at source, the amount of fresh solvent to be incorporated into the distilled solvent for cleaning the facilities accounts for approximately 30% of the total amount of solvent used in cleaning operations. Before this system was introduced, the fresh solvent introduced accounted for approximately 87% of the total amount of solvent used in cleaning operations.

Outline of the process

Balances

Balances	Old process	New process
Balance of materials		
Dirty solvent recovered at source	—	56,221 kg/y
Dirty solvent recovered externally	21,280 kg/y	—
Waste for final disposal	58,590 kg/y	18,740 kg/y
Fresh solvent for cleaning	69,230 kg/y	18,740 kg/y
Economic balance		
Cost of fresh solvent	€50,762.93 *	€13,741.11
Cost of recovery at source	—	€11,713.52
Cost of external recovery	€5,115.82	—
Cost of final disposal	€19,015.18	€5,631.60
Total cost	**€74,893.93**	**€31,086.23**
Investment	—	**€82,068.20**
Payback period	—	**1.9 years**

* Extrapolation in accordance with the current price of new solvent, which is approximately 0.73 €/kg.

Conclusions

The minimisation project undertaken by Tintas K+E, SA provides for a guarantee of the quality of recovered solvent. This represents both a large saving in the consumption of fresh solvent and also a reduction in the quantity of waste that the company discharges. Its environmental costs are therefore substantially reduced. The implementation of this kind of practice makes manufacturing processes more environmentally friendly.

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