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No. 142 Pollution Prevention Case Studies

Optimization of the Electricity Consumption of a Closed Cooling System

Company	AkzoNobel Car Refinishes, S.L. (Spain)
Industrial sector	Manufacture of paints, varnishes and similar coatings, printing ink and mastics ISIC Rev. 4 no. 2022 (International Standard Industrial Classification of All Economic Activities)
Environmental considerations	AkzoNobel is aware of the scarcity of clean water in a changing environment subject to numerous impacts from current industrial development. For this reason, from the moment it started operating, it installed a closed-circuit water cooling system. However, this circuit had not been optimised according to the cooling requirements of the installation, resulting in excessive electricity consumption.
Background	AkzoNobel is the global leader in decorative paints and industrial coatings, and the largest manufacturer of specialty chemicals. It caters to consumers and industries worldwide with innovative products. Thinking ahead, acting now, because it is passionate about introducing new ideas and offering sustainable solutions to its customers. That is why it owns some of the most recognised brands in the market, such as Bruguer, Procolor and Sikkens.
Summary of actions	AkzoNobel Car Refinishes uses a closed water-cooling circuit. This circuit has three dosing pumps and three atmospheric cooling towers, each pump consuming 30 kW of power and with the capacity to pump 200 m^3/h. The cooling water is used for: - Paint production: cooling water for production mills (10% of the flow). - Resin production: reactors, thinning tanks, oil-water heat exchangers and condensers (90% of the flow). There are 9 pieces of cooling equipment in the entire installation, which are open 100% of the time, **even when they are not needed**. The flow of water pumped is quite higher then that required by the installation. Evidently, the installation needs to be redesigned, optimising it to meet the real cooling demand, thus reducing electricity consumption for the whole system. The overall investment requires: - Eleven pneumatic valves. - Instalment of the eleven valves. - Modification of the reactors' control software.

Photo

Balances

INVESTMENT	
Software modifications	€15,000
New pneumatic valves and installation	€8,050
Miscellaneous	€1,000
TOTAL investment	**€24,050**

SAVINGS	
The savings of this investment come from one of the cooling pumps being turned off. Electricity consumption of one pump: 30 kWh * 24h/day * 220 days/year = 158,400 kWh. 158,400 kWh * €0.1/kWh = **€15,840** On the other hand, there are water savings due to decreased evaporation in the cooling towers: 200 m^3/h less than now will be pumped: Of the 200 m^3/h, it is estimated that half is bypassed direct to the water-cooling tank. 100 m^3/h – 0.2% due to evaporations = 0.2 m^3/h * 24h/day * 220 days/year = 1,100 m^3/year 1,100 m^3 * €1/m^3 = **€1,100**	
TOTAL savings	15,840 + 1,100 = **€16,940/year**

RETURN ON INVESTMENT	1.42 years

Conclusions

Through a relatively low initial investment in new equipment, AkzoNobel has achieved a substantial reduction in energy consumption and has optimised water use, yielding a further reduction in the water required by what was already a closed cooling system. Together with the environmental benefit of these measures, the savings achieved through the new system allow a very short period of return on investment, proving that environmental improvements can also be financially beneficial.

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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