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Pollution prevention case studies

Installation of a feedforward control system in a ceramic kiln

Company	Porcelaine de Sologne.
Industrial sector	Chinaware and decorative ceramics.
Environmental considerations	Ceramic kilns consume large amounts of energy, especially gas.
Background	<p>Firing ceramic products requires a kiln operating at determined settings for each type of product, based on established temperature curves.</p> <p>Porcelaine de Sologne was previously using a conventional kiln with four lines operating according to pre-calibrated firing regimes.</p> <p>After a serious problem with the kiln, the company was forced to install a new one. In doing so, it decided to implement a good housekeeping practices programme to optimise energy consumption in its manufacturing processes.</p>
Summary of actions	<p>The company decided to install a feedforward control system in the new kiln. This system improves the control and adjustment of firing temperatures, making the kiln more flexible in its operations and thereby optimising energy consumption.</p> <p>The advantage over a conventional kiln is that the new system features a sensor which monitors oxygen content in the firing chamber, allowing it to be adjusted in real time.</p> <p>It also makes it possible to calculate the amount of gas necessary for efficient firing in accordance with the quality of the gas and the nature and weight of the product being fired. The feedforward control system comprises:</p> <p>A number of precautions were taken for the installation of the equipment:</p> <ul style="list-style-type: none"> - a programmable logic controller which governs stop/start sequences and active safety functions, - two programmers which control temperature and pressure, - two regulators.

Photo



PHOTO: PORCELAINE DE SOLOGNE

Balances

Energy balance	Gas consumed in firing ceramics products Before: 5,371 MWh/year (414 toe) After: 4,571 MWh/year (352 toe)
	Energy savings: 800 MWh/year (62 toe) (a 15% reduction in energy costs incurred in firing ceramics products relative to pre-installation costs).
Economic balance	- Direct financial gain (linked to energy savings): €8,537 - Indirect financial gain (linked to reduction in defective products rate): €15,247 - Total savings: €23,784
Total investment	€60,990 Considering only the additional cost in installing the feedforward control system relative to a conventional system (€213,427 in total)
Payback period	2.5 years relative to additional cost

Conclusions

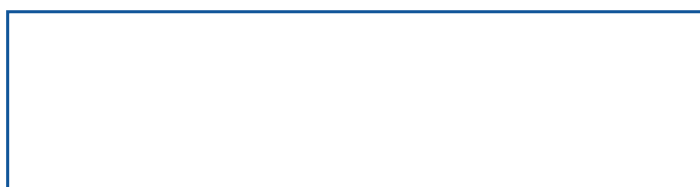
With the new system, the per-product firing cycle has been reduced by an hour on average, while greater consistency has been achieved in product quality. The system has also allowed Porcelaine de Sologne to develop a new range of products which require firing conditions very difficult to obtain with a conventional kiln. Working conditions have been improved too, thanks to the system's ease of use and the flexibility it gives the new kiln.

The company has thus gained a competitive advantage while simultaneously optimising its operations and reducing energy consumption.

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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