

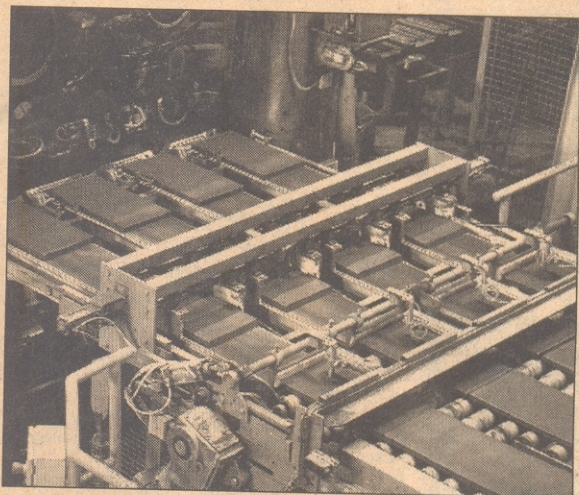
Recycling Heat, Cutting Costs

Kajaria Ceramics uses a waste heat recovery system from Transparent Energy Systems to reduce energy consumption

FOR any ceramic manufacturing facility, heat and electricity are the two key inputs. In the past few years, rising fuel costs have put serious pressure on the bottom line of ceramic facilities. Tile manufacturers in particular were struggling to overcome this problem. Any conventional engine-driven co-generation system used in the process industry usually produces electricity and steam or hot water and involves a waste heat recovery boiler. However, in the ceramics industry, steam or hot water has no direct use. At the same time, a large quantity of high-temperature hot air at a constant pressure is vital for spray-drying.

Identifying the Problem

At Kajaria Ceramics, one of India's leading ceramics players, the electricity demand was met with two natural-gas-based power engines with 40 percent fuel efficiency. The company faced the common problem of fuel costs. It was evident that a gas-driven power engine with a waste heat recovery system (WHRS) was the answer. Although the high-temperature exhaust flue gases from power engines are a rich source of heat energy, finding a viable technological solution to integrate the WHRS into their main manufacturing process posed a major challenge.



Seeking Solutions

Transparent Energy Systems accepted the challenge of designing the WHRS for Kajaria. This required the integration of the waste heat from the power engine flue gases into the main spray-drying process. This integration had to be carried out in such a manner that the required temperature and pressure could be maintained in the spray dryer without affecting the power engine operation by putting adverse back-pressure on the engines. Another potential source for waste heat recovery at Kajaria Ceramics was the low-grade waste heat available in the engine jacket water. Channeling this heat into the system demanded more technological expertise. Transparent Energy Systems had to combine the high-grade heat from the engine exhaust flue gases with the low-grade heat from the jacket water for the spray-drying process, without disturbing the critical parameters of the spray dryer and the power engines. Another challenge in integrating the WHRS into the main spray-drying process was ensuring that a breakdown or non-availability of the WHRS would not stop the main process plant, but instead allow it to continue production at its rated capacity. Also it had to be ensured that the WHRS, while increasing energy efficiency, did not reduce the production plant capacity, output or quality.

Achieving Results

Transparent Energy Systems came up with an ideal co-generation system to resolve these issues and make the optimum use of resources. A novel feature of the integrated system is that it allows the flexibility of using multiple engines for single as well as multiple spray dryers, while maintaining the critical parameters of the spray dryer. The complete system is controlled through a Programmable Logic Controller (PLC) and all the parameters can be controlled, logged and monitored as per the requirements.

Kajaria Ceramic's waste-heat-based co-generation system made their manufacturing process more energy-efficient and achieved dramatic benefits for Kajaria. The system resulted in an overall co-generation efficiency of more than 85%, which is very high by the standards of the ceramic industry. The fuel consumption for the spray dryer was reduced by 25-30%, which is very high even when compared to international standards. To add to this, the whole project had a very short payback period of less than a year.