INDUSTRIAL ENERGY EFFICIENCY IMPROVEMENT PROJECT IN SOUTH AFRICA

case study

Fan Systems Optimisation (FSO)

Consol Glass (*Manufacturing*)

2014

BACKGROUND

Consol Glass South Africa, a glass-packaging manufacturer in South Africa, has over half a century of glass-manufacturing experience. The company has a turnover of approximately R45 billion and some 1 800 employees. It provides glass-packaging solutions for a number of industries, including beer, wine, food and spirits, as well as tableware and packaging for pharmaceutical and cosmetic products to a range of local and international customers.

Consol has operations in Clayville (Midrand), Wadeville (Germiston), Nigel (Johannesburg) and Bellville (Cape Town), with a total production capacity of 950 000 tonnes of glass per annum.

KEY FINDINGS

For a total monetary investment of R1 948 018, Consol realised an annual financial saving of R1 800 000 and an energy saving of 2 117 650 KWh. It also reduced GHG emissions by 1 905 tonnes of CO_2 for the year. The total pay-back period was 1,2 years.

IMPLEMENTATION

In 2013, the Industrial Energy Efficiency (IEE) Project introduced the Wadeville plant of Consol Glass to the new industrial energy-efficiency concepts of energy-management systems (EnMS) and energy-systems optimisation (ESO), after which the company approached the NCPC-SA to participate in the capacity-building programmes offered by the IEE Project.

This resulted in the participation of Consol Glass delegates in a training session on fan-systems optimisation (FSO). Recognising the value of the different training courses offered by the IEE Project, Consol Glass subsequently sent personnel to attend an FSO expert-level training workshop. After the training courses, Consol Glass signed up to become an IEE Project host plant for fan-systems optimisation training.

As a host plant, the company had the benefit of the in-depth investigation of a specific fan system. A specific fan system was identified as having good potential for training, as well as for optimisation. International experts, who conducted the training, guided students at the Wadeville plant in the measurement and analysis process to ensure accurate results and reliable savings potential figures.

This fan system was one of the mould and deadplate cooling fans (#W30). After the training course, a report was drafted and budget was allocated to implement the first system optimisation based on the predicted savings.

ENERGY-PERFORMANCE RESULTS

As a result of the fan-system optimisation project, Consol saved 2 117 650 kWh/year in energy and R1 800 000 on its energy bill. Other benefits include more accurate control of the cooling operation, reduced wear and tear on the fan and ducting system and lower maintenance costs.

ENERGY-SAVING OPPORTUNITIES IDENTIFIED

The energy and financial savings achieved by the tests run at the Wadeville plant were even better than was hoped for and full installation of the intervention is now planned for all of the similar systems where it is anticipated that substantial energy savings will be achieved.

An application for capital, that includes the following, was prepared:

- Installation of variable speed drives (VSDs) on all of the mould-cooling fans and on the dead-plate cooling fans
- VSDs to be installed in the sub-room/fan chamber so that dust and moisture do not affect performance
- By locating the drive close to the fan, various harmonics and other EMC phenomena would be better mitigated
- The VSDs would work with the management control system and the internal valve gate to control air pressure delivered to the machines
- The solution would be autonomous and would have a fail-safe breaker that would revert the system back to its current operation method of direct online

SUMMARY OF INTERVENTIONS

System	Intervention	Capital Cost (R)	Energy saving (KWh/annum)	Savings R (Average of R0.82/kWh)	Estimated Payback period (years)
Mould & Deadplate Cooling Fans	**VSD drives**	**R 1 948 018**	**2 117 650**	**R1 800 000**	**1,2 years**

LESSONS LEARNT

The IEE Project assisted Consol Glass in analysing the plant's energy consumption in a systematic and holistic manner, thereby teaching the plant's engineers how to optimise processes throughout the various energy intensive systems.

- **Management commitment is key.** It was thanks to the buy-in of the management team that resource allocation (both personnel and capital funding) was made available
- **Using energy efficiently should be a priority.** The energy team put in place helped plant operators to understand the process requirements and the benefits of ESO implementation
- **It helps to offer training on-site where trainees can conduct system-optimisation assessments within the plant**, identifying numerous energy savings possibilities
- **EnMS should be put in place at the various plants** as this will limit the risk of improvements being linked to a single person rather than by the company culture
- **Constant monitoring of interventions, and reporting to top management on the achievements and challenges**, helps reinforce the commitment and provide security with respect to the effectiveness of the decisions taken.