case study

ENERGY MANAGEMENT SYSTEM (EnMS)

Karob Plastics – Roodeport

Manufacturer - Plastic container supplier 2015

BACKGROUND

Karob Plastics is a Roodeport-based small to medium enterprise (SME) manufacturing five, 20 and 25 litre High Density Polyethylene blow-moulded plastic containers in three different shapes. Karob Plastics implemented the first phase of Energy Management System (EnMS) in 2015 as a means of reducing the company's energy consumption.

The SME's main energy source is electricity. The annual electricity bill approximated R3.5 million, while the usage was approximately 3.0 MWh per annum. A decision was thus taken by Karob Plastics' top management to pursue the ISO/SANS 50001 implementation approach and sign up with the National Cleaner Production Centre of South Africa (NCPC-SA)'s Industrial Energy Efficiency (IEE) Project for the first phase of EnMS implementation.

Karob Plastics first collaborated with the IEEP during a SME Energy Assessment that was conducted in 2012. During the assessment, energy savings were identified amounting to 83 924 kWh per annum. Some recommendations were implemented, for example, the relocation of the compressors to a cooler position. However, no systematic approach was administered to reduce energy consumption.

The significant energy uses include injection moulding and the injection blow moulding machines, granulators, compressors, and lighting. Other auxiliary equipment includes water chillers, conveyors, and packaging equipment aligned with the process of plastic drum manufacture.

KEY FINDINGS

Over the 8-month period commencing from March to October 2015, five projects were undertaken, resulting in a total energy saving of 115 300 kWh, valued at R135 500. A reduction of 110 tons CO_2e was achieved.

The key lesson from the first phase of implementation was that savings can be achieved purely through behavioural and operational controls. Secondly, it was confirmed that even though savings are identified during energy audits, it is a critical factor to have an EnMS in place to support the systematic implementation of the recommendations and the sustaining of such improvements. The approach taken was to integrate the ISO/SANS 50001 requirements into the existing certificated ISO 9001 Management System.

IMPLEMENTATION OF AN ENERGY MANAGEMENT SYSTEM

As part of the development and first phase of implementation of the EnMS, Karob Plastics achieved significant savings by gaining employee cooperation and improving operational control.

Furthermore, the Powerstar electricity management system that Karob Plastics has been utilising since before 2012 was of significant benefit to the implementation phase. It assisted in the development of a sound regression baseline

using both tons converted and cooling degree days as the drivers, thus enabling better predictions of expected consumption against which the savings were verified. As a result of improved data management, Karob Plastics successfully lodged an appeal with the City of Johannesburg Ombudsman Power due to inaccurate billing and received a substantial refund.

IMPLEMENTATION CHALLENGES

The key challenge was quantifying savings in advance. This was because the improvement drives were heavily behaviour-based and operational optimisation focused. Because of the significant savings achieved, it was possible to look at the site-wide electricity consumption and compare the 2015 consumption to the 2013-2014 baseline. However, going forward, if the savings are smaller it is acknowledged that significant energy user (SEU) level metering would need to be considered to enhance savings measurement.

SUMMARY OF INTERVENTIONS

System	Intervention
Granulators	An internal campaign targeted at employees was started to emphasise the importance of running granulators only when they are in use. Additionally, the process of having one granulator operating per blow moulding machine was amended so that one granulator is operated per colour in use.
Blow moulder efficiencies	As part of energy efficiency optimisation, production planning placed emphasis on maximising the use of newer and more energy efficient moulders.
Water heating	Based on an analysis of the usage of hot water, the geysers were switched off.
Lighting and general energy saving awareness	Ensuring that if something is not running it is switched off (including lights).

LESSONS LEARNED

- **Energy savings** can be achieved purely through improvements in behavioural and operational controls.
- **Implementing an EnMS** will ensure sustainable energy saving through monitoring and analysis of data.
- **Sub-metering** enhances controls and assists in the management and tracking of SEUs.

FUTURE PLANS

- Investigate power quality in terms of maximum load unbalance.
- Procure electricity logger for sub-metering to improve SEU-Level measurement and analysis.
- Extend the use of the Powerstar system for electricity performance management.
- ISO/SANS 50001 certification postponed for future consideration.