

## Comprehensive Energy Survey of Printing & Packaging Company

### Summary

PowerTherm was contracted to undertake a Comprehensive Energy Survey of a printing and packaging company. The objectives of the survey were to provide an insight into how energy is consumed at site, and to identify energy saving measures with a payback of less than 3 years. The survey included an analysis of historical usage identifying the correlation between production volumes and electricity use, and quantified annual energy use by all major production equipment, air compressors and building services plant. It identified recommendations for change to operating practices, production equipment layout and controls, waste extraction system layout and controls, compressed air installation and controls, lighting installation and controls, and the heating system. Opportunities for heat recovery from both the air compressor and production equipment were identified, described, and cost-benefit evaluated. The survey identified cost-effective measures that could reduce total annual energy costs by 23%.

### Site Description

All figures in this case have been changed to protect client.

The facility consisted of a large industrial unit, including offices, comprising 7,500 m<sup>2</sup> (80,000 ft<sup>2</sup>). Annual energy spend is €380,000.

The process includes printing machines, cutting machines, gluing machines and boxing machines. Support services include vacuum pumps, compressed air, waste extraction, and machine cooling. Building services include mechanical ventilation, space heating and lighting.

The large goods entrance and exits result in considerable ventilation heat loss.

### Data Collection & Analysis

In order to establish the relationship between production volumes and electricity use, a regression analysis was undertaken on historical records. Half-hourly electrical load data (MV90), available from the electricity supplier, was also evaluated.

Due to changes over 40 years electrical distribution of the facility was not well understood and this was investigated.

In order to establish actual electricity use by different equipment, energy analysers recorded use over 7 day intervals and these related to production volumes.

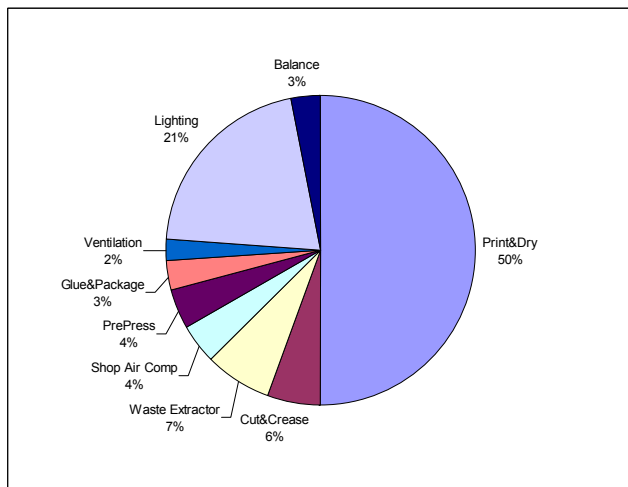
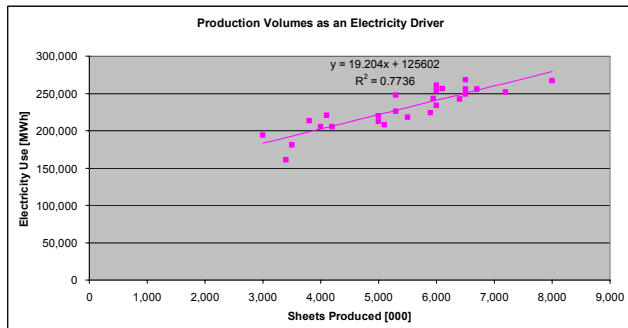
A number of readings were taken of power use by equipment in different production modes, including idle and standby. Particular attention was paid to the energy intensive ink drying process.

Printing machine installation and operation manuals were reviewed, and energy saving opportunities discussed with the supplier.

Current readings and operating schedules of other equipment helped build up the profile.

The lighting installation, control and operating hours were also quantified.

This data was used to construct an energy pie.



## **Recommendations**

Compressed Air Systems – There were 4 compressed air systems, and it was recommended that this be reduced to two systems – a high pressure and low pressure system. In each case changes were recommended to air compressor installation, internal control settings, sequence control and operating timeschedules. The distribution system was inspected and the cost of leaks evaluated. Electricity savings were valued, along with implementation cost.

Heating – the heating requirements were evaluated, including a proposal the client had for new radiant heaters. Rather than recommending a new system, it was recommended that changes be made to goods entrances to reduce uncontrolled ventilation heat loss, and then heat from the compressed air process be recovered. If comfort issues persisted, only then should a new heating system be evaluated. Heat savings from the various measures were valued, as were implementation costs.

Printing & Drying Process – the energy intensity of the drying process made it a particular focus of attention. A number of changes were recommended to operating practices and machine control. This is a specialised process, so these were discussed with the equipment vendor to ensure their viability. Valuing electricity savings was particularly important in securing buy-in to changes in operating practices.

Waste Extraction – changes were recommended to the layout of the waste extraction system that would facilitate their automation, allowing different extractors to be shut down during pauses in production.

General automation – in the case of much of the other equipment and building services plant basic recommendations to system control (timeschedules and setpoints) were made.

Lighting – most lighting was energy efficient and suited to the environment. New fittings were recommended in the warehouse which would allow occupant-based control of the lighting.

Monitoring & Management – the regression analysis provided a useful means of budgeting annual energy spend based on projected production volumes. Observed best practice, i.e. the 50% of the months that energy use was below the trendline, provided realistic targets for future performance. In addition, as all savings were quantified, the impact of implementation of specific measures could be assessed. Submetering of some equipment was recommended so that the impact of changes in operating practices could be assessed and any deviations from new operating practices quickly identified.

## **Conclusions**

This was a very thorough survey, which included a detailed review of the production process. After issuing the report all measures were discussed with the management team and implementation timeframes agreed.