case study

ENERGY SYSTEMS OPTIMISATION in an SME

TECHNIPLATE

Plating Tank Temperature Control

March 2013

THE ISSUE AND MAIN FINDINGS

Techniplate Electroplaters is located in Silverton Pretoria and offers a range of plating products and services, including electro-polishing, embossing, etching and colouring. In the delivery of these services, the company makes use of plating tanks which operate at extremely high temperatures, resulting in high energy (specifically electricity) consumption.

Consumption statistics showed that the total amount of energy used by the site was equal to 2,186,708 kWh per annum, at a cost of R735 202.

Key findings:
After an investment of R 46,200 a saving of R 172,751 (23.5% saving) with a payback of 4 months has been realised. Energy savings of 421 344 kWh (19.3% saving) have been achieved.

ENERGY CONSERVATION OPPORTUNITIES IDENTIFIED

An IEE Project energy audit identified that Techniplate's plating tanks' temperature was being manually controlled, thereby resulting in high degree of temperature variations, excessive temperatures and excess energy use.

Recommendation: Plating Tanks Auto Temperature Control (ECO1)

IMPLEMENTED SAVINGS MEASURES

Measurement and data analysis

Data measurements clearly showed that when auto temperature control is on, energy consumption was significantly lower than when auto temperature control is deactivated. The difference in the average (mean) energy consumption is 1.9 kWh.

Table 4 Summary Statistics of the Measurement Data

Parameter	Energy Consumption		Temperature Control	
	Auto Control	Manual Control	Auto	Manual
Mean	5.3 kWh	7.2 kWh	50.4 ° C	55.1° C
Median	5.2 kWh	7.0 kWh	50.5 ° C	56.2° C
Min	4.2 kWh	5 kWh	49.8 ° C	49.6 ° C
Max	7.2 kWh	9.4 kWh	51 ° C	57.2 ° C
Range	3 kWh	4.4 kWh	1.2 ° C	7.6 ° C
St Deviation	0.76	1.88	0.44	2.85

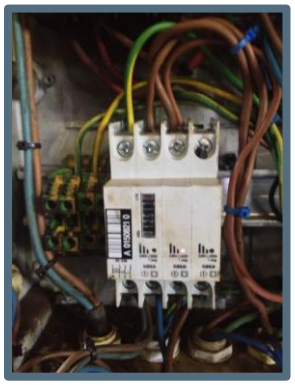
Both the mean and the median of temperature are higher when there is no auto control. The difference of the means shows that without auto control the tanks are running **4.7 ° C hotter**. Temperature variability as indicated by the standard deviation is 6.5 more without auto control. This high variability might have quality consequences on the product.

The temperature profile of the plating tanks is also far more stable with auto control than without it. When operating on auto control, the variance is as low as 1.2 ° C while without auto control the temperature has a wide range of 7.6 ° C.

The plating tank energy consumption profile for both auto and manual control also shows that without auto temperature control energy consumption is higher.

A temperature controller and an energy meter (shown left) were installed at each plating tank at a cost of R1,100 each – a total cost of R42,600.

DETERMINATION OF SAVINGS AND PAYBACK PERIOD



Below is the calculation of the energy cost savings and payback period.

Energy and Cost Saving	
Cost per kWh	R 0.41 per kWh
No of plating tanks	42
Total energy used per year	2186708 kWh
Cost of energy consumed per year	R735 202
Energy saving (determined from difference of means from table 4)	1.9 kWh
Working hours per year (24 x 4 + 14) x 48	5 280 hrs
Total energy to be saved per year (5 280 hrs x 1.9 kWh x 42 tanks)	**421 344 kWh**
Percentage of energy saved	19.3 %
Cost of energy saved per year (421 344 kWh x 0.41)	**R172 751**
Percentage of costs saved	23.5 %

Payback Period:

- Total cost of installation for 42 tanks **= R46,200**
- Payback period (46,200/17,251) = **4 months**

CONCLUSION

This simple energy-saving measure resulted in a saving of 19.3% of energy and 23.5% of the energy costs of this SME. In addition, the investment was paid back in the relatively short timeframe of only four months.

Another benefit of the measures is better process control, which may result in better products.