



## Electrical Distribution Equipment Plant: Manufacturer of Electrical Distribution Equipment Implements Big Energy Savings Recommendations

**Assessment Date:** APRIL 4, 2008

### Benefits:

- Implemented six of the eight assessment recommendations
- Recommendations will save approximately 14% of the total energy bill
- Recognized as a energy saver by the Department of Energy

### Applications:

The Emerson-Sola assessment team discovered opportunities to decrease energy usage thereby increasing capacity, improving product quality, and enhancing corporate competitiveness. In order to decrease energy usage, the assessment team identified potential energy savings on six different energy expending components of the facility.

### Summary

Through the Department of Energy's Industrial Assessment Center located at the University of Alabama at Tuscaloosa, Emerson-Sola, an electrical distribution equipment product maker, was able to realize significant monetary savings from reductions in energy consumption. Emerson-Sola implemented six of the eight assessment recommendations, and savings resulted from reductions of both natural gas and electricity usage. Through a variety of recommended actions, Emerson-Sola was able to save approximately \$42,400. The overall average payback realized was 0.3 years. Savings realized from the implemented recommendations resulted in a 14% energy savings, which qualifies the plant for DOE Energy Saver recognition.

### Plant Operation

Emerson-Sola manufactures a variety of heavy duty electrical transformers, including ventilated transformers, constant voltage transformers, and power transformers. Products are created through winding wire on the arbor of a lathe. Cores for the transformers are created by stacking pre-cut steel plates. The cores are integrated with the coils in a cabinet, and the cavity is filled with sand. Epoxy is introduced as a binder. After curing the epoxy, the transformers are sent to final assembly, testing and inspection. The facility consists of one 71,000 square foot building, and annual utility bills for the facility totaled approximately \$174,000.

### Assessment Approach

A team of faculty and students from the University of Alabama's Industrial Assessment Center performed an Industrial Assessment in the spring of 2008. The assessment was led by Center Director, Dr. Keith Woodbury, a Professor in the Department of Mechanical Engineering at the University of Alabama. A group of four students also participated in the assessment. The team spent one day on-site gathering information and making measurements regarding energy usage.

### Energy Conservation Awareness

Prior to the visit, Emerson-Sola was employing several good energy conservation practices. The company had replaced many of their T-12 fluorescent lights with more efficient bulbs. Also, they used a smaller air compressor during the night shift when compressed air demand was reduced.



## Energy Conservation Improvements

The University of Alabama Industrial Assessment team recommended the following measures, all of which were implemented by the company. These recommendations are designed to ensure reduced energy usage and more efficient operations:

- The O<sub>2</sub> content is a measure of the combustion efficiency of the ovens. Savings were realized by decreasing the O<sub>2</sub> content without compromising the baking process.
- The facility utilized a 250 hp, 50 Hz generator to test finished transformers. A 50 hp generator was repaired to replace the 250 hp unit.
- The facility was using 10-60 Watt T-12, 8 foot fluorescent lamps to light the upstairs storage area. Using infrared motion sensors, to control the lighting, saved electrical energy due to the reduction in energy consumption by the fixtures.
- The IAC identified several compressed air leaks caused by leaky valves and fittings in the distribution system. A program to repair the leaks and regularly check the air distribution components to detect leaks resulted in a yearly cost savings of \$5,894.
- The facility is currently employing a jet (venturi) vacuum pump to move sand. Jet vacuum pumps are inherently inefficient because they utilize compressed air to induce suction. A rotary vane vacuum pump was recommended.
- The heat generated by the two compressors in the compressor room is currently being exhausted to the atmosphere. There is considerable opportunity to transfer this thermal energy into an area where it can supplement the heating provided by the current heating equipment. By redirecting the heat into the main plant area, a significant amount of cost savings on heating the main floor area can be realized.

## Results

Table 1 shows the annual cost savings that Emerson-Sola obtained by implementing these energy conservation opportunities identified by the IAC team during the assessment. Based on these results, the facility can reduce energy consumption of natural gas by 477 MMBtu/yr, of electricity by 226,952 kWh/yr, thereby saving the facility \$42,405 per year. The total estimated implementation cost of these recommendations is \$12,294 yielding an overall simple payback of .29 years.

## Projects Identified

Opportunities for reducing energy consumption that were identified during the assessment are described in the following table:

<b>Table 1. Opportunities at Emerson-Sola</b>				
<b>Recommended Action</b>	<b>Annual Resource Savings</b>	<b>Annual Cost Savings (\$)</b>	<b>Implementation Costs (\$)</b>	<b>Payback (years)</b>
Improve Oven Efficiency	324 MMBtu/yr	\$3,336	\$3,900	1.2
Repair Smaller Generator to Replace Larger One	212,318 kWh/yr	\$35,423	\$4,000	0.1
Install Occupancy Sensors in Storage Area	2,111 kWh/yr	\$110	\$272	2.5
Repair Leaks in Compressed Air System	4,742 kWh/yr	\$557	\$1,000	1.8
Replace Jet Pump with Rotary Vane Vacuum Pump	7,781 kWh/yr	\$900	\$1,552	1.7
Recover Compressor Waste Heat	153 MMBtu/yr	\$2,079	\$1,570	0.8
<b>Totals</b>	<b>477 MMBtu/yr and 226,952 kWh/yr</b>	<b>\$42,405</b>	<b>\$12,294</b>	<b>0.3</b>

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