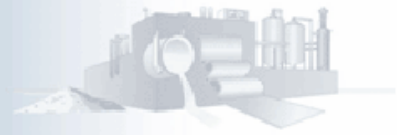


Aluminum Industrial Assessment



Industrial Technologies Program

Assessment Date:
February 22, 2006

Benefits:

- Identified potential annual energy cost savings of \$2 million
- Many payback periods are under 20 months
- Natural gas savings of approx. 43,000 MMBtu per year

Applications:

The IAC team identified opportunities to increase productivity and reduce energy usage by optimizing the furnace system, using the optimum size compressors and increasing the efficiency of the motors. The high percentage implementation of recommendations at this plant will encourage the IAC team to help other similar facilities in the future.

Aluminum Foundry: Pennex Aluminum Company, Wellsville, PA, Implements Major Recommendations

Summary

Lehigh University's Industrial Assessment Center performed an energy audit at Pennex Aluminum Company, Wellsville, PA, and identifying potential savings of about two million dollars through reduction in energy consumption and improvement of productivity. Assessment recommendations amounting to \$255K were implemented. The major cost savings resulted from a 12.5% reduction in cycle time, as a result of increased productivity and efficiency of the homogenizer furnace. Also, \$70K was saved by switching the melting furnace to low fire mode when the furnace door is open. Other savings were realized by addressing the problem of energy losses due to poor insulation of some furnaces in the plant. An \$80K insulation project helped solve this \$100K problem. A few other smaller energy saving recommendations were also implemented.

Company Background

The manufacturer produces various sizes of Aluminum logs, billets, and extrusions. In the process, the raw Aluminum is melted, cast, heat treated, quenched, extruded and annealed. The stress free metal is then tested, packaged, and shipped to customers. The facility has an area of approximately 150,000 ft². It was reported during the assessment that the production area operates 50 weeks per year, 7 days per week, and 24 hours per day.

Assessment Approach

A team from the Lehigh University Industrial Assessment Center, lead by Dr. Alparslan Öztekin, performed the necessary tasks in order to carry out a successful energy audit. The tasks included: initiating company contact, familiarization with the basic manufacturing process and energy consuming equipment, performing a plant visit that included an in-depth discussion with plant technical engineers, gathering required information from plant equipment, writing the technical report, including energy savings recommendations and calculations, and, finally, following up on the report to determine which recommendations were implemented.

Energy Conservation Awareness

The assessment team identified energy conservation awareness practices for the employees at the facility as a cost-effective way to significantly reduce energy consumption. Employees are encouraged to monitor the operating conditions of furnaces and optimize the efficiency to find the best possible energy output and least energy waste from the furnaces. Also recommended were the regeneration of the furnace's exhaust heat and the use of an optimum size compressor for the plant. Future energy management projects include reduction of compressed air leaks and system insulation checks and improvements.



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Furnace Systems

The homogenizer furnace was releasing its exhaust heat to the atmosphere at an average temperature of 500°F. Recommendations included the use of heat in exhaust and the replacement of the present burners with more efficient ones. The roof of the melting furnace was poorly insulated; it was suggested that the roof be well-insulated to reduce unnecessary heat loss. Also there was no air-fuel ratio monitor for the furnaces; adjustment of the ratio of fuel and air to optimum operating conditions was advised.

Reduce Heat Loss through Open Furnace Doors

The team observed that the melting furnace's burner is on full firing mode when the furnace door is opened for the metal charging process and also for the molten metal agitation process. Each day, the furnace door is open for 32 minutes for the charging process, 20 minutes for the agitation operation, and 15 minutes for the skimming operation. The total time that the door is opened each day is 62 minutes. It is therefore proposed that the burner's firing mode be switched from full firing to low firing when the furnace door is open to save natural gas energy.

- Calculations revealed that upwards of 7,900 MMBtu of heat is lost due to current practices, adding an unnecessary \$66K to the natural gas bill.
- The new mode of operation needs only minimal labor, at a cost of \$75 per day; the payback period for this savings will be within 1 month.

Results

The Lehigh University's energy assessment resulted in an annual savings of \$255K through increased productivity and reduced the amount of energy wasted. Table 1 presents the implemented recommendations, along with their energy savings and associated cost savings. Other energy recommendations the team made are expected to be implemented at a more convenient time in the near future.

Projects Identified

Implemented opportunities are described in the following table:

Table 1. Opportunities at Aluminum Foundry

Recommended Action	Annual Resource Savings	Annual Cost Savings	Implementation Cost	Payback (months)
Regeneration of Homogenizer Furnace	23,994 MMBtu	\$102K	\$49K	6
Switch Melting Furnace to Low Firing Mode when Furnace Door is Open	7,920 MMBtu	\$67K	\$75	1
Adjust Boiler Air/Fuel Ratio	7,506 MMBtu	\$63K	\$9K	2
Insulate the Roof of the Melting Furnace	2,700 MMBtu	\$23K	\$80K	42
Total	42,120 MMBtu	\$255,000	\$138,075	7

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