ALUMINUM
Project Fact Sheet

A Motor System BestPractices Business Case Study

Total Value Added

Net Present Value:	$411,933
Payback:	6 days

Benefits

- Increased aluminum production potential
- $103,700 annual energy cost savings
- No capital cost; 6-day payback
- Reduced dust collection bag cost
- Reduced maintenance
- Enhanced system reliability, due to an additional spare fan
- Reduced emissions

The smarter we run our plant, the better it is for the company's bottom line, local community, and the environment as a whole.

—Cecil Pulley
Showcase Demonstration
Team Leader at Alumax

Alcoa/Alumax Reduces Energy Cost while Improving Its Dust Collection Systems

In 1995, Alumax (subsequently acquired by Alcoa), an aluminum refiner, decided to improve the energy efficiency of its four-pot line dust collection systems at its smelter in Mount Holly, S.C. One consultant recommended installing variable frequency drive (VFD) controls on the four-fan system. The plant engineer was skeptical of the proposal and brought in a second consultant, who recommended a three-fan, variable-inlet-valve (VIV)-controlled system. Motor Challenge was called upon to determine which proposal was the more efficient and cost effective.

Decision

Motor Challenge determined that the three-fan VIV system (which, in contrast to the VFD proposal, required no capital investment) was the more efficient. It reduced the system's energy cost by $103,700 per year. This was accomplished by opening the VIVs wider, resulting in less pressure loss through the VIVs. The system increased fan efficiency enough to allow for one fan in each of the four systems to be shut down. The system operated in that configuration for 2 1/2 years (until the fourth fan was needed to accommodate an increase in production of 7 to 8 percent).

Mount Holly Aluminum Production Facility

Rationale

Wise analysis led to choosing a system that produced the following benefits:

- ***Energy savings*** from shutting down one fan in each of four systems
- Reducing the energy required to operate the dust collection system gave Alumax the opportunity to redirect that energy to ***increase aluminum production*** by more than 500,000 pounds per year
- Lower flow rates improved the efficiency of the dust collection bags, ***reducing emissions 1-2%***.
- Lower flow rates ***extended the life of the dust collection bags by at least 10%***
- This project had greater potential benefits in that the ***fourth fan became a spare*** which, in the advent of another fan breaking down, could be used as a spare and prevent unknown hours of downtime. Such a situation, however, did not occur during the project time frame.

The modifications and the ensuing benefits—can be ***easily replicated*** at other Alcoa sites.

Total Value Added

Initial costs (consulting fees):	$ 5,000
Potential incremental annual revenue[1]	**$ 375,000**

Savings

Estimated profit on incremental revenue	75,000	(assumes a 20% marginal profit)
Energy savings	103,700	(3,346,320 kWh saved x $0.031/kWh)
Reduction in Dust Collection Bags	123,500	(10% x 16,896 total bags x $73.08/bag)
Labor (reduced bag changeout)	10,000	(10% time savings x $48/hr fully loaded x 2,080 hrs/yr.)
Total incremental pretax profits	**$312,200**	

Incremental Cash Flow Analysis

		Time (Years)		
	0	1	2	3
Potential incremental revenues		$375,000	$375,000	$187,500
Costs associated with incremental revenues		$300,000	$300,000	$150,000
SAVINGS				
Energy		$103,700	$103,700	$ 51,850
Reduction in number of dust collection bags		$123,500	$123,500	$ 61,750
Labor (reduced bag changeout)		$ 10,000	$ 10,000	$ 5,000
COST				
Consulting fees	$ 5,000			
Incremental pretax profits	(5,000)	$312,200	$312,200	$156,100
Tax (@35%)	(1,750)	$109,270	$109,270	$ 54,635
After-tax profits	(3,250)	$202,930	$202,930	$101,465
Net present value[2]	$411,933			

[1] Incremental revenue assumes that 3,346,320 kWh in saved energy is redirected to produce an additional 500,000 lbs of aluminum, which is sold at a market price of $0.75/lb.

[2] 12% discount rate applied to after-tax cash flows, assuming a 35% tax rate and a 2.5-year project life.

The Department of Energy's Office of Industrial Technologies (OIT), through partnerships with industry, government, and non-government organizations, develops and delivers advanced energy efficiency, renewable energy and pollution prevention technologies for industrial applications.

As part of its Industries of the Future initiative, OIT accelerates research and development of advanced technologies identified as priorities by the country's most energy and resource intensive industries. To improve industrial efficiency and competitiveness in the near term, OIT offers tools and resources on motor, steam, compressed air, and combined heat and power systems.

PROJECT PARTNERS

Alcoa/Alumax
Mount Holly, SC

Jacobs-Sirrine Engineers
Greenville, SC

FOR ADDITIONAL INFORMATION, PLEASE CONTACT:
The OIT Clearinghouse
Phone: (800) 862-2086
Fax: (360) 586-8303
http://www.oit.doe.gov/steam

Visit our home page at:
www.oit.doe.gov

Please send any comments, questions, or suggestions to
webmaster.oit@ee.doe.gov

Office of Industrial Technologies
Energy Efficiency
and Renewable Energy
U.S. Department of Energy
Washington, DC 20585

DOE/BPBC-003Rev.1
May 2000