Success Story: Chrome Deposit Corporation

Despite Growth, Chrome Deposit Corporation Reduces Its Energy Use, Minimizes Its Environmental Impact, and Improves Its Energy-Management Practices

Tucked away in a nondescript industrial park off the I-95 corridor, Chrome Deposit Corporation's (CDC's) Newark, Delaware, manufacturing facility is a small site that is making big changes. The Delaware Manufacturing Extension Partnership (DEMEP)—a nonprofit resource organization that provides sound technical field agents and consultants to help Delaware manufacturers improve their productivity and profitability—identified CDC as a potential candidate to receive an Energy Savings Assessment through the University of Delaware's (UD's) Industrial Assessment Center, and facilitated the connection. CDC executives partnered with UD's Center for Energy and Environmental Policy and the U.S. Department of Energy's (DOE's) Industrial Technologies Program (ITP) to explore ways to reduce its energy consumption and environmental impact—while continuing to expand its facility's operations. With a few inexpensive, easy changes to infrastructure and preemptive management of operational processes, CDC has been able to reduce its energy costs by 25% per unit, minimize its environmental impact, and continue to seek novel solutions to its energy-management practices.

The Company

CDC reconditions finishing work rolls, which require grinding, chrome plating, and/or texturing. The rolls are used on rolling mills to provide superior finishes on both steel and aluminum sheets. CDC has seven locations across the United States. The company's Newark facility specializes in hard chrome plating and electro-discharge texturing of the product surface prior to plating.

Energy and Environmental Challenges

Metal finishing, a subset of the fabricated metal products industry, is largely composed of small, independently-owned facilities that employ 50 or fewer people. Generally, these smaller facilities have limited financial resources at their disposal which, in many cases, means energy efficiency initiatives will take a backseat to more pressing business objectives. While industry standards, certification requirements, and customer demands help to drive improvements in energy efficiency and technology, economic pressures facing the industry often result in companies seeing their most viable option as retrofitting existing technologies as opposed to making wholesale process changes.[1]

Working with hard chrome during the plating process holds inherent environmental implications. Not only must CDC contend with byproduct air emissions and waste, but the plating process itself is energy intensive—relying on both electrical and natural gas resources to fuel operations. Between 2002 and 2004, electricity represented approximately half of the industry's energy costs, with purchased fuels (primarily natural gas) comprising the remaining portion. As a whole, the metal fabrication industry consumed 41,965 trillion kilowatt hours and 234 billion cubic feet of natural gas in 2006, which equates to the total annual energy consumed by 762 billion households, or the annual primary energy consumed to provide electricity to 1.11 trillion households.[2]

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Implementing Energy Efficiency Recommendations

Since production began in 1986, CDC has tracked its energy usage and costs, keeping pace with its growth. In a judicious effort to enhance its portfolio of responsible business practices, CDC initiated an Energy Savings Assessment through DOE-ITP's Industrial Assessment Center program. The company also collaborated with an assessment team from UD's Center for Energy and Environmental Policy to identify areas of concern and potential sources of energy savings. In addition to the assessment, CDC's management group began its own energy efficiency initiatives to focus attention on operating practices, operations-related water usage and reductions, and increasing the fuel efficiency of its truck fleet.

As seen in Exhibit 1, results of the energy assessment pointed to six distinct areas through which technological and process improvements could capture energy savings in both quantity and cost. Of the recommendations, CDC pursued the implementation of four and is planning to employ an additional recommendation over time—as upgrades to equipment are required. The only recommendation CDC declined to implement required process automation and the installation of specific process controls. The company's management group thoroughly investigated these alternatives and consulted with industry experts before electing not to implement the recommendation.

DOE-ITP Industrial Assessment Center Program

- Provides small and medium-sized manufacturers (gross annual sales < $100 million) with energy assessments
- Has local teams of engineering faculty and students from 26 participating universities across the country perform the assessments.
- Serves as a training ground for the next generation of energy-savvy engineers, providing valuable hands-on experience to college students
- Saves facilities participating in the program $55,000 a year on average with a payback period of 12 months

> "The audit process suggested by DEMEP and conducted by the UD team was very helpful in pointing out deficiencies. We had considered pursuing some improvements before, but this made us aware of the magnitude of available savings. Now everyone in the plant is energy conscious and looking to eliminate waste."
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> **- John Blasko, General Manager**

Reducing Natural Gas Consumption

One of the improvements CDC observed during this time was a reduction in natural gas consumption. The assessment team recommended an analysis of stack gases from the boilers used for heating chrome tanks and wastewater evaporation. The analysis revealed that the boilers were burning rich, which prompted technicians to adjust boiler settings in order to achieve the recommended burn ratios. Shortly thereafter, CDC employees discovered that the savings from this change were actually higher than the study initially estimated. The immediate success of this simple manipulation caught the attention of CDC executives, and within weeks the facility's gas lines were being checked for proper functioning. This inspection exposed a number of small joint leaks. Repairs were made and additional fuel savings were realized. After implementation, CDC's natural gas usage decreased by 12% despite increased production.

Reducing Water Usage

Another impressive outcome of CDC's energy efficiency efforts was a drastic reduction in water usage. Initially, CDC's rectifiers were cooled by city water. The company's management group authorized the capital purchase of two chillers and implemented a closed loop system to cool heated components. The result—an 85% reduction in water use. This reduction in usage will undoubtedly result in regional energy saved at the source utility through avoided water consumption of purification pumps, compressors, fans, and chemicals. With competing and increasing demands for water, this outcome is a significant achievement for CDC.[3]

Exhibit 1.
Energy Efficiency Recommendations

1	Insulate condensate tank and pipes
2	Install stack dampers (not recommended by boiler manufacturer)
3	Install covers on plant exhaust fans
4	Analyze flue gas air-fuel ratio
5	Reduce compressed air pressure
6	Replace motor drive belts with energy efficient pulleys and cogs

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Conclusion

CDC approached energy efficiency with some trepidation. While the company's management group embraced the concept and the will to mitigate its environmental impact, they were not prepared for the straightforward assessment and analysis process, nor had they truly anticipated the quickness with which they would realize results. Although total energy expenditures increased by 5% from its 2007 data baseline, electrical usage was reduced 18% per unit and natural gas usage declined 35% per unit. Ultimately, CDC's cost per unit showed a decrease of approximately 25% from both energy sources combined. The facility's success is now being used as a benchmark within the company's network of plants. The Newark site's energy efficiency efforts have not stopped here—the management group has set its own internal goals of increasing the miles per gallon of its truck fleet by 5% and purchased mud flaps that are expected to reduce the underside drag on the trailers, which will ultimately increase fuel mileage.

Exhibit 2.
Results of Implemented Assessment Recommendations

INPUTS	PERCENTAGE CHANGE
Electricity (kWh)	11%
Natural Gas (cubic feet)	-3%
Waste (metric tons)	-7%
Water (gallons)	-85%

Endnotes

[1] U.S. Environmental Protection Agency (March 2007), Energy Trends in Selected Manufacturing Sectors: Opportunities and Challenges for Environmentally Preferable Energy Outcomes, *http://www.epa.gov/sectors/pdf/energy/report.pdf*.

[2] U.S. Energy Information Administration, 2006, Table 1.1: By Mfg. Industry & Region (physical units), *http://www.eia.doe.gov/emeu/mecs/mecs2006/2006tables.html*.

[3] U.S. Geological Survey (2009), Estimated Use of Water in the United States in 2005, *http://water.usgs.gov/watuse/*.

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