STEEL

BestPractices
Management Case Study

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OFFICE OF INDUSTRIAL TECHNOLOGIES

ENERGY EFFICIENCY AND RENEWABLE ENERGY, U.S. DEPARTMENT OF ENERGY

Implementing a Compressed Air System Leak Management Program at an Automotive Plant

Benefits

- Saves over $560,000 per year
- Reduces compressed air use per unit of production by more than 50%
- Allows establishment of successful leak management teams at 12 other company facilities

Applications

Compressed air systems are found throughout industry and are often the largest end-use of electricity in a manufacturing plant. Compressed air leaks can be a significant source of wasted energy and should be addressed through the development of a leak management program.

Summary

The energy team at Visteon's Monroe plant, formerly owned by Ford Motor Company, implemented an ongoing compressed air system leak management program. The team developed an approach that combined a traditional "find and fix" effort with an innovative implementation and marketing program. As a result of the leak management program, compressed air system consumption was reduced by more than 50% on a per production unit basis. This represents savings of over $560,000 per year and an 11.5% reduction in annual electricity costs.

Plant Background

The Monroe plant, located in Monroe, Michigan, employs over 2200 people and produces a variety of structured metal parts such as coil springs, sway bars, driveshafts and catalytic converters for the automotive industry. The plant's production process involves heat treatment of metals in order to form and mold them into shape. Compressed air is important for Visteon's production process since it is used by numerous cylinders, stamping presses, venturi vacuum lifters and actuators.

Monroe Plant

Prior to the project, the plant required 17,000 scfm at 87 psig. This was supplied by a combination of four centrifugal and three reciprocating compressors having a total of 4,300-hp.

Project Summary

The Monroe plant energy team is made up of volunteers, most of whom are plant employees, but also involved are employees of Ford Motor Land Development Corporation and Visteon's utility, Detroit Edison. An energy coordinator from the plant whose objective is to reduce energy waste leads the team. Once the team at the Monroe plant was formed, their first target was the leaks in the plant's compressed air system. They gathered the baseline data, both during production and during a holiday shutdown, so they could estimate the cost of compressed air and calculate the loss due to air leaks. By effectively communicating the potential savings of a leak management program by calculating the return on investment (ROI), they convinced management to start an air management program.

The leak management program that the Monroe Team developed was unique because it combined the traditional air leak program with innovative implementation and marketing. The program started with a traditional "find and fix" project that grew into a process involving all of the plant's workers. They knew that the key was not only to have management support, but also to have the participation of the line workers and the skilled trades people.

The team started with the conventional process of identifying and repairing air leaks, which generated a list of leaks and repairs that could be tracked. The results were published weekly and served to bolster the plant manager's support. As a result, upper management bought red "energy team" jackets for every team member, which helped them stand out in the plant and gave them a special identity. While they developed this identity, they never lost sight of the fact that their goal was to make every employee a member of the energy team. They included their colleagues in a cooperative framework that made it apparent to everyone in the plant that they were there to help instead of to criticize.

To market the program, the team developed a procedure for all employees to report leaks. They used items like buttons, hats, tee shirts, key chains, and refrigerator magnets to promote the program and reward employees for helping and becoming part of the team. They posted "leak boards" in several locations in the plant that showed the leaks that had been identified and repaired. The black dots on the board became symbols of progress.

The energy team also developed posters to illustrate the cost of air leaks, as well as other causes of energy waste. They took charts from the Compressed Air and Gas Institute, developed fact sheets on the cost of air leaks, and passed them out to the employees. They also used their company's internal

communication network to develop messages that were shown on the monitors throughout the plant. In addition, the team developed stickers and placards for proper shutdown of equipment and gave presentations on energy saving measures.

The most important part of this story is that the team used top-down support combined with bottom-up implementation. They made everyone aware, but concentrated their efforts on the people who had the knowledge of the equipment and could make the necessary changes. The team's successes led to a new and permanent change in the plant's institutional culture.

Results

When the program started in 1989, the plant used 17.4 million cubic feet (mcf) per day, or 3.4 mcf/BWS (Budget Work Standard, an internal measure of production) hour during production. By 1992, air consumption had been reduced to 9 million cubic foot per day, or 1.6 mcf/BWS hour. After completing the project, the plant was able to take three reciprocal compressors totaling 1550-hp offline, base load a 2,500-hp centrifugal compressor and used an 800-hp centrifugal compressor for peak needs. This represents savings of almost $1700 per day during the week and $1200 per day on weekends and 11.5% of electricity costs. Non-production compressed air consumption was reduced from 5400 cfm to less than 600 scfm.

The project team's approach generated a positive attitude toward energy efficiency that reduced the plant's compressed air consumption through leaks and inappropriate uses to less than 10% of the total compressed air produced. The Monroe energy team illustrates the effectiveness of an energy awareness team that can develop successful processes. They have also shared their experience and helped build successful compressed air energy awareness teams at other facilities. They are as willing to share ideas as they are to implement them from other plants. This is also one of the keys to their success.

Energy Team Presentation

Lessons Learned

In order to know how a compressed air system works and how much energy it uses, it is essential to have the data to use as a baseline in a compressed air system improvement project. Baselining must tie compressed air consumption to output metrics or numbers that are meaningful. For production facilities, the baseline would be linked to compressed air usage per unit of production. For a non-production facility, it should be based on usage per time (hour, day, month, year) or per area (square feet or meter).

Energy Team

Industry of the Future—Steel

Through OIT's Industries of the Future initiative, the Steel Association, on behalf of the steel industry, has partnered with the U.S. Department of Energy (DOE) to spur technological innovations that will reduce energy consumption, pollution, and production costs. In March 1996, the industry outlined its vision for maintaining and building its competitive position in the world market in the document, The Re-emergent Steel Industry: Industry/Government Partnerships for the Future.

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BestPractices is part of the Office of Industrial Technologies' (OIT's) Industries of the Future strategy, which helps the country's most energy-intensive industries improve their competitiveness. BestPractices brings together the best-available and emerging technologies and practices to help companies begin improving energy efficiency, environmental performance, and productivity right now.

BestPractices focuses on plant systems, where significant efficiency improvements and savings can be achieved. Industry gains easy access to near-term and long-term solutions for improving the performance of motor, steam, compressed air, and process heating systems. In addition, the Industrial Assessment Centers provide comprehensive industrial energy evaluations to small and medium-size manufacturers.

Project Partners

Visteon Corporation
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Detroit Edison Company
Detroit, MI

Ford Motor Land Development Corporation
Dearborn, MI

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