

Compressed Air Systems



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PPL ELECTRIC UTILITIES

Case Study

GENTEX Corporation

2010

Snapshot



Objective: The Gentex Corporation supplies life-support products for the military, homeland defense, and civilian and law enforcement agencies. It set a corporate goal to reduce energy consumption by 10 percent between 2008 and 2010 with further plans to work toward the ISO 50001 protocol. That protocol establishes an international framework for industrial and commercial facilities to manage all aspects of energy, including procurement and use of energy for their site.

Solution: Gentex worked with PPL Electric Utilities to identify a cost-effective energy-efficiency measure consistent with its goals, therein targeting the 20-year-old compressed-air system. A comprehensive compressed-air audit resulted in the installation of a new variable-speed air compressor with heat recovery, a heat-of-compression dryer for heating incoming air and zero air-loss condensate drains, as well as optimizing the air-distribution system. The new system has exceeded expectations. Gentex is now exploring other energy-saving projects and intends to manage its energy through participation in ISO 50001.



Results

Energy savings: Annual energy savings of 1.2 million kWh/yr (\$106,000, based on \$0.085/ kWh) and 17,000 therms of natural gas, providing a simple payback of less than 2.5 years.

Maintenance costs: Lower maintenance costs.

Reliability: Higher reliability of new system.

Improved Quality: Gentex's manufacturing processes benefit from higher quality compressed air characterized by more consistent pressure and low moisture content, resulting in a better-quality end product.

Blowdown: Reduced quantity of condensate drain blowdown and increased energy savings now that the system drains the condensate based on need versus the older, inefficient system of setting the drains on a timed-interval basis.



Applications

Compressed air systems

Background:

Gentex Corporation, a world technology leader in both the military and commercial markets, is the preeminent supplier of life-support products for the military, homeland defense, and civilian and law enforcement agencies. The company has four operating units: Helmet Systems, Respiratory Products, Electro-Acoustic Products and Performance Materials.

Gentex set a corporate goal to reduce energy consumption by 10 percent between 2008 and 2010 and is now looking into the new ISO 50001 protocol, which establishes an international framework for industrial and commercial facilities to manage all aspects of energy, including procurement and use of energy for their site.

The Helmet Systems unit, located in Carbondale, Pennsylvania, manufactures helmets for military, law enforcement and civilian aircraft personnel. Projects completed during the past two years included extensive relamping and the installation of an energy management control system. Gentex worked with PPL Electric Utilities to identify a cost-effective energy-efficiency measure that would be consistent with Gentex's goals and serve as a good demonstration project for a case study that would benefit other companies. Ultimately, the Gentex compressed-air system was identified as an appropriate project.

Application:

Gentex's existing compressed-air system consisted of a 150-hp, 20-year-old single-speed compressor. The system was regularly maintained, had no provisions for heat recovery, used timed condensate drains, and needed work to eliminate leaks and improve air pressure.

First, a comprehensive compressed-air audit was conducted. It resulted in a proposal for a new variable-speed air compressor with heat recovery, a heat-of-compression dryer for heating incoming air, zero air-loss condensate drains and air-distribution system optimization. The variable-speed drive improves electricity utilization by ramping up or down to meet the plant's compressed air needs versus a single-speed unit, which operates at its rated value and cycles inefficiently.

Heat recovery and the heat-of-compression dryer recycle the heat produced during compression of the air and use it to preheat both boiler feed water and the air entering the compressor.

The zero-loss drains replace timed condensate drains and remove condensate from the air distribution system based on system conditions. Improvements such as leak detection/remediation and proper pressure settings optimize the system's distribution of compressed air.

Conclusion:

The new system has outperformed original estimates. Energy savings and lower maintenance costs make this a cost-effective capital project. Positive results from projects like this provide measurable success toward Gentex's energy-efficiency goals and the savings can either be reinvested in the business or flow to the bottom line.

Next Steps:

Gentex plans to manage its energy through participation in ISO 50001.

Plant engineers are exploring energy projects involving air handler control, motors and variable-speed drives using PPL Electric Utilities' E-power rebate and incentive programs for energy-efficient equipment.

Alternative Applications:

Even small compressed-air systems use a relatively large amount of energy, and many systems in use today have been pieced together over time in an attempt to meet a plant's need for production and facility expansion. The result is often a lack of balance and components that negatively interact to create artificial air demands, poor compressed-air quality and added operating and maintenance expenses. Production and management teams need to identify these shortcomings and, using resources like utility programs, implement plans to optimize their compressed-air systems for savings on energy costs and improved production.

Information on PPL Electric Utilities' E-power rebates and incentives is available at www.pplelectric.com/e-power. Rebates are retroactive for projects that were installed after July 1, 2009.

