ADVANCED MANUFACTURING OFFICE: INDUSTRIAL ASSESSMENT CENTERS

Emco Enterprises: Substantial Energy Cost Reduction Opportunities

The Industrial Assessment Center at West Virginia University was asked to perform an energy assessment at EMCO Enterprises. As a result of the assessment, recommendations were made for improvement in several areas. Opportunities for saving energy were identified as utilizing higher efficiency lamps, installing compressor air intakes in coolest locations, eliminating compressed air leaks, developing a repair and replace policy, and by insulating structure walls. Six of the nine recommendations made by the team were implemented, resulting in the reduction of energy consumption by 1,945 MMBtu per year, and an annual saving of $46,637 , or 15 percent of the energy costs.

Emco doors facility where the energy assessment was conducted by the IAC at West Virginia University near Luray, Virginia. Photo provided by Michael Arndt.

Industrial Energy Efficiency

The Industrial Assessment Centers are at the forefront of the student training, innovation, and exciting research in manufacturing energy conservation and efficiency across the United States.

Company Background

EMCO Enterprises makes high quality, cost effective, storm doors for residential and commercial buildings. The facility is located in Luray, Virginia. The plant area is heated with forced air propane heater. The plant consumes 3.5 million kWh of electricity and 1,650 MMBtu of propane annually. The energy cost for the plant is approximately $309,000 per year.

Assessment Approach

An assessment team from the IAC spent one day at the facility in June 2011, examining its operations and collecting data. The team was led by the center director Dr. Bhaskaran Gopalakrishnan. The other members of the team included lead student engineer Dayakar Devaru and student safety officer Ramkrishna Babu Maddula.

Assessment Benefits

The implemented recommendations will result in annual savings of $46,637 which is reduction of energy cost by 15%. The paybacks range from immediate recovery to 2.3 years for different projects identified. This has potential to reduce carbon dioxide emissions by 1,248,048 pounds.

Energy Conservation Awareness

In general, the management and employees of EMCO Enterprises are "energy conservation" oriented, and follow many good practices to save energy. Some industry best practices observed at the plant included use of synthetic lubricant for the compressor, the use of large industrial fans for heat destratification, and the use of setback controls for HVAC. The building was very well insulated and the plant air was recirculated to recover energy. The assessment team applauded this awareness and worked on identifying other ways to save energy by discussing them in detail with all the parties involved in the assessment. All the recommendations identified by the team were also discussed at the end of the day, and the company's personnel were encouraged to call the IAC Center at any time for further discussion and/or clarification.

Lighting

The plant used metal halide lighting in the plant areas. The lighting was a mixture of 1000W and 400W bulbs fixtures. The light levels in all the plant areas were observed to be adequate. The assessment team suggested T5 high output fluorescent fixtures in the place of metal halide lighting. The plant saw the value in bright and efficient lighting with occupancy sensors. The initial efficacy of metal halides is high which deteriorates over its life time. The efficacy for 400W metal halide is 87.5 lumens/watt and that of 1000W metal halide is 96 lumens/watt where as for T5HO the initial efficacy is about 93 lumens/watt. The color rendering index however for T5HO is 85 and for metal halide only 65. The life of T5 bulbs is much better than the metal halide counterparts. The light levels are estimated to be better than the previous lamps and at the same time reducing energy usage. Upgrading lighting with electronic ballasts, reflectors, and occupancy sensors in the plant and office areas has increased the efficiency of the lighting system. In effect these suggestions have greatly reduced energy usage

Compressed Air System

The facility has 300 hp compressor system capacity supplying air to different end uses. It was found that compressed air system is a significant energy consumer and is responsible for 18% of the annual electricity cost. The facility used compressed air for equipment cylinders, actuators and blow off cleaning. When the team assessed the performance of compressed air system it was observed that the compressors are partially loaded and not sequenced. The facility used relatively high pressure for the whole compressed air header due to a few machines which required high pressure. The assessment team suggested sequencing the compressors and producing the compressed air minimum required pressure while using a booster compressor for the machines that need higher pressure. Since these projects needed high capital costs they are under consideration. It was found that replacing ordinary nozzles with vortex nozzles and fixing hoses and tools that leak air reduced the needed load of compressed air. These projects have relatively low payback on investment. This reduced the energy usage by compressed air system by 22%.

Results

The table presents the annual cost savings that will be realized annually at the EMCO Enterprises facility due to implemented recommendations. Energy conservation opportunities identified in the assessment that were implemented will reduce electrical usage by over 572,756 kWh annually. This translates into an annual savings of $46,637 and an reduction in CO2 emissions of 1,248,048 pounds.

Implemented Recommendations

Assessment Recommendations	Annual Resource Savings	Total Annual Savings	Project Cost	Simple Payback
AR 1: Replace the MH and HPS Vapor Bulbs with T5 Bulbs	438,885 kWh 97.5 kW	$35,791	$69,419	2 years
AR 2: Repair Compressed Air Leaks	96,044 kWh 21.3 kW	$7,832	$363	0.1 years
AR 3: Replace Ordinary Nozzles with Vortex Nozzles	34,324 kWh 7.7 kW	$2,803	$1,613	0.6 years
AR 4: Install Occupancy Sensors	3,503 kWh	$211	$490	2.3 years
Total	572,756 kWh 126.5 kW	$46,637	$71,885	1.5 years