Energy Savings Opportunities for Plastic Manifold and Papers Filter Manufacturer

The Industrial Assessment Center (IAC) at West Virginia University (WVU) discovered opportunities to decrease energy usage and enhance corporate competitiveness. Sogefi USA, Inc., a global supplier of original parts for automotive industries, is located in Prichard, WV. The assessment team focused on the plastic molding machines as well as the tempering ovens. The recommendations at this facility may serve as a template for potential savings at similar facilities.

Company Background

Sogefi USA, Inc. facility located in Prichard, WV is a leading manufacturer of filtration systems and flexible suspension components for automobiles.

Summary

As a result of the energy assessment, energy efficiency recommendations were developed for energy and cost savings. Opportunities for saving energy were identified with respect to

- installation of variable frequency drives in injection molding machine pumps
- economizers on the HVAC units
- replacing the existing lamps with LED lamps
- installation of photosensors for lamps, installation of occupancy sensors for lamps
- insulation of hot surfaces and oven doors
- installation of capacitor banks to reduce the power factor related to cost
- installation of sequencers in air compressors
- replacement of ordinary compressed air nozzles with vortex nozzles
- reduction in the compressor discharge pressure setpoint for all compressors.

Two of the thirteen recommendations have already been implemented. Six recommendations will be implemented in the year 2021 and one recommendation will be implemented in the year 2022. The implementation of the nine energy efficiency recommendations will result in an annual energy savings of 1,278,616 kWh of electricity, annual energy savings of 62 MMBtu, and annual cost savings of $76,749.

Energy Conservation Analysis

In general, the management and employees at the facility are “energy conservation” oriented and follow many good practices to save energy. For example, the plant used LED lighting in some parts of the production area, VFD on oven blowers, robotics arms in processes, and control systems on ovens. The assessment team was pleased with the level of energy efficiency awareness amongst plant personnel.

The recommendations identified by the team were discussed with the plant personnel on the assessment day. The plant personnel were encouraged to contact and interface with IAC-WVU for further discussion and/or clarification required with respect to the implementation of the assessment recommendations.

Benefits at a Glance

The implemented recommendations will result in annual electricity savings of 1,278,616 kWh, natural gas savings of 62 MMBtu and annual cost savings of $76,749. Average Payback is 15 months. Implemented recommendations will reduce carbon dioxide emissions by 2,807,175 pounds.

Lighting and occupancy sensors

The assessment team suggested to replace existing lighting with LED lamps and install occupancy sensors in designated areas. Occupancy sensors reduce the electrical usage for lighting during unoccupied periods and hence contribute towards saving energy. Similarly, daylight sensors would reduce the intensity/quantity of lighting in areas that have adequate sunlight during the day. Implementing these sensors in the facility areas will increase the efficiency of the lighting system.

Process Equipment

Reducing the pressure and air leaks delivered to compressed air consuming equipment and processes will reduce the volume of air consumed by the system. This reduced the facility's compressed air usage significantly. Similarly, the facility has five air compressors, therefore, the assessment team suggested the compressor system be sequenced using automatic controls.

The assessment team also suggested the facility install economizers in their rooftop HVAC units to reduce energy usage. Economizers are essentially a duct and damper system which allows fresh outside air to be used directly for space cooling whenever the outdoor air has a lower total heat content (enthalpy) than return air.

Energy savings were identified by installing a capacitor bank to improve the power factor to at least 90%, thereby reducing the total electrical charges for the plant. Finally, the facility was encouraged to implement vortex nozzles instead of ordinary nozzles to reduce compressed air requirements for the facility.

Natural Gas Savings

The facility was recommended to insulate hot surfaces on burner assembly and casing of the oven. This would help the facility in saving 62 MMBtu of gas annually. The team projected a savings of $1,270 annually after implementation.

Preventive Maintenance Savings

Electrical motors are widely used equipment in manufacturing facilities.

The assessment team recommended the use of a repair/replacement policy for motors. By performing motor analysis regularly, motor efficiency can be improved, thereby reducing the energy usage of the motors.

Similarly, the facility was also suggested to repair air leaks in compressor air-lines regularly by replacing seals around air filters, repairing breaks in lines, and shutting off airflow during the period with low usage.

Assessment Savings Tabulated

The following table presents the annual cost savings that have resulted at Sogefi USA, These energy conservation opportunities will reduce annual electric usage by 1,278,616 kWh and gas usage by 62 MMBtu per year. This translates into an annual cost savings of $76,749 and an annual reduction in CO_2 emissions of 2,807,175 pounds.

Implementation of Recommendations

Planed Assessment Recommendations	Annual Conservation (MMBtu)	Annual Conservation (kWh)	Total Annual Savings ($)	Capital Costs ($)	Simple Payback (months)
Add Economizers on the HVAC Units	-	452,685	22,091	28,000	16
Replace the Existing Lighting with LED and Install Occupancy and Daylight Sensors in Designated	-	355,454	19,827	15,605	10
Install a Capacitor Bank to Reduce the Power Cost Adjustments	-	-	10,950	36,000	40
Install Sequencer for the Existing Compressors in the Plant	-	193,167	10,700	5,225	6
Replace Ordinary Nozzles with Vortex Nozzles	-	131,420	6,413	2,438	5
Establish Repair/Replace Decision Policy through Motor Management System	-	55,469	2,587	575	3
Repair Compressed Air Leaks	-	31,760	1,730	1,251	9
Insulate the Hot Surfaces to Reduce the Heat Losses	62	16,877	1,270	427	5
Reduce Compressor Pressure Set Point	-	21,700	1,181	75	1
Total	**62**	**1,278,616**	**76,749**	**89,596**	**14**