ADVANCED MANUFACTURING OFFICE: INDUSTRIAL ASSESSMENT CENTERS

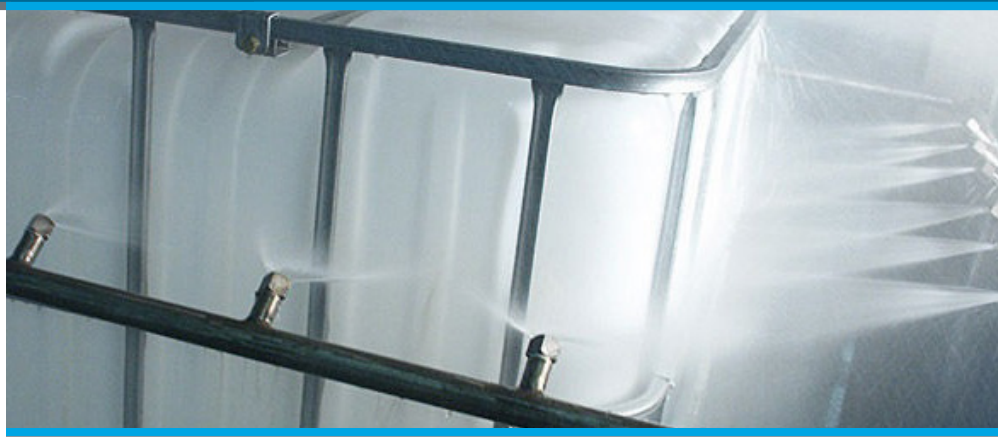
Compressed Air Savings: Less is More

While leaks in industrial compressed air transmission lines are often disregarded as minuscule expected losses for a pneumatic system, one might be overwhelmed by the repercussions of this oversight.

With their commitment to helping local industry realize cost and energy savings, the Industrial Assessment Center at the University of Alabama Tuscaloosa, led by Dr. Keith Woodbury and a group of four students, performed an efficiency analysis for Mauser's plastic barrel manufacturing plant in the year 2013, identifying six key recommendations for cost savings.

Company Background

Established in southern Germany by Dr. Alfons Mauser in 1896, the Mauser brand has surmounted a plethora of challenges in their industry, producing and reconditioning plastic and steel drums to satisfy the demands of their global market. Most recently, In 2008, by acquiring American Fiber Drum Corp., Mauser was able to begin fiber drum manufacturing in the United States.



Reconditioning of an intermediate bulk container (IBC): This process circumvents the consumption of materials to produce new IBCs, thereby lowering costs. *Photo from Mauser.*

Summary

Through the Department of Energy's Industrial Assessment Center (IAC) located at the University of Alabama at Tuscaloosa, Mauser USA, an intermediate bulk container manufacturer, was able to realize significant monetary savings by reductions in energy consumption. Mauser implemented six of the eight assessment recommendations which resulted in savings from reductions in electricity usage. Through the implementation of these six recommendations, Mauser was able to save approximately $28,367. The overall average payback was 0.2 years. Savings realized from the implemented recommendations resulted in approximately 9% overall energy savings.

Plant Operation

Mauser fabricates 275-gallon plastic barrels, or IBCs (intermediate bulk containers), for commercial and industrial use. The single process line incorporates a plastic IBC line and a steel cage line. For the IBC line, resin is vacuumed from the outdoor silos to mixing silos inside the facility. After mixing, the material is conveyed to the top of the blow molding machine. On the cage line, steel tubing is fed onto a machine, which bends and solders the tubing into a cage used to surround the plastic containers. Finally, the plastic containers are inserted into the steel cages and prepared for shipping. The facility consists of one 82,000 square foot building, and annual utility bills for the facility totaled approximately $323,904.

Lower Pressure, Lower Cost

Air leaks are inevitable in pneumatic systems owing to cyclical stresses, temperatures, etc. At the first sign of decreased end of line pressure, a common "quick fix" is to increase the pressure of the system to compensate for downstream losses due to leaks; this equates to higher energy consumption at the compressor. Through diligence and timely repair of new leaks, a lower system pressure may be utilized, thereby decreasing compressor energy consumption, as well as costs.

Energy Conservation Awareness

Prior to the visit, Mauser was employing several good energy conservation practices. The facility utilizes energy efficient lighting and even occupancy sensors in some areas of the plant. Lights are turned off in the facility when they are not in use. Long-lasting, low-friction synthetic lubricants are used for lubrication and cooling in the air compressors. A variable speed drive (VSD) is used in the compressed air system, and the air compressors are turned off during non-production

weekends. The facility has a compressed air leak maintenance program, and employees regularly check and tag compressed air leaks in order to reduce artificial demand.

Compressed Air Assessment

First, the facility's equipment does not require an operating pressure as high as is currently used in the plant. The facility was maintaining their compressed air system at 117 psi and it was determined that this could be reduced to 95psi. This would still provide the facility with the amount of pressure needed.

Next, the IAC identified several compressed air leaks caused by leaky valves and fittings in the distribution system. A program to repair the leaks and regularly check the air distribution components to detect leaks could be implemented to avoid the energy loss of compressed air leaks for $1,900/yr.

Energy Conservation Assessment

Installing occupancy sensors in certain areas throughout the plant reduces the energy consumption of the lighting system by turning off unnecessary fixtures when the area is unoccupied.

Several motors were driven by standard V-Belts. Conversion to Cogged V-Belts from standard V-Belts, would consume less power for the same load.

The facility continuously operates a large flash grinder motor that is used to grind up excess plastic product. By implementing a queuing strategy for the flash grinder, multiple pieces of flash can be ground at one time, thereby reducing the run time of the large motor.

Finally, heating and cooling could be controlled by installing programmable thermostats that condition rooms only during hours of occupation. This reduces the energy consumption of the HVAC system.

Tabulated Savings Quantified

The facility can reduce energy consumption of electricity by 361,081 kWh/yr, thereby saving the facility $28,367 per year. The total estimated implementation cost of these recommendations is $6,791 yielding an overall simple payback of approximately 0.2 years.

Implemented Recommendations

Assessment Recommendations	Annual Resource Savings	Total Annual Savings	Capital Costs	Simple Payback
Reduce Compressed Air System Pressure	103,829 kWh/yr	$8,157	$800	0.1 years
Reduce Leaks in Compressed Air System	87,576 kWh/yr	$6,880	$1,900	0.3 years
Install Occupancy Sensors	60,263 kWh/yr	$4,734	$858	0.2 years
Replace Standard V-Belts with Cogged Belts	49,551 kWh/yr	$3,894	$490	0.1 years
Implement Control Strategy for Flash Grinder	33,142 kWh/yr	$2,603	$2,591	1.0 year
Use Programmable Thermostats in Office and Break Room Areas	26,720 kWh/yr	$2,099	$152	0.1 years
Total	361,081 kWh/yr	$28,367	$6,791	0.2 years