

2018 Case Study

C. F. Sauer West Holdings, Inc.

Intern: Allison Crowther
Major: Chemical Engineering
School: Kansas State University



Company background

C. F. Sauer has been producing and selling various condiments and spices since 1887. Their New Century plant was constructed in 2001 and makes products such as salad dressings, barbecue sauces, jelly, margarine and mayonnaise. The 210,000-square-foot plant employs 250 people and has allowed the company to expand its national distribution.

Project background

Management expressed they wanted to identify and reduce waste of liquid egg and oil throughout their process of mayonnaise and salad dressing manufacturing. Three projects were considered to reduce egg and oil waste, and several other areas of possible change were examined. Though these did not generate full projects, they did produce some general strategies on reducing waste and unnecessary consumption of ingredients and energy.

Possible projects and areas of improvement were identified through observation of normal operations, and through conversations with employees in management and those in multiple departments. Potential solutions were developed and discussed with the on-site supervisor, and environmental impact was assessed through continued observation and analysis of data collected as part of the plant's normal operations. Data was also gathered regarding implementation of recommendations by the previous year's circuit rider, specifically compressed-air leaks identified during his audit and subsequently repaired.

Incentives to change

The New Century plant has been tracking its loss of liquid egg and oil, meaning the amount that was consumed but not accounted for in its use. As of December 2017, economic values associated with

egg and oil loss were estimated to be \$350,000 and \$202,000, respectively, based on pricing at the time without accounting for energy usage or wastewater treatment. The facility is seeking to identify sources of waste and reduce unnecessary consumption of these ingredients.

Projects reviewed for P2 potential

Sparger control modification

This facility uses devices called spargers to force nitrogen into mayonnaise and salad dressing, making the final product lighter and fluffier. This product is sold by volume and the company wants to reduce the density of the mayonnaise through sparging so that a jar of mayonnaise is within a certain range of weight. However, this plant has been struggling to meet its target weights resulting in excess production

The deficiency in nitrogen use could be attributed primarily to difficulty in controlling the flow of nitrogen and viscosity issues. Processors could not use the flow meter consistently to control the volume of nitrogen delivered. Sparging reduces viscosity, and if the viscosity of a product is too low, it cannot be sold. Though there appeared to be viscosity problems with several formulas, these were addressed separately near the end of the internship. The intern focused primarily on the controls and found the issue was likely due to interference from pressure in the product line acting on the sparger, and that the flowmeters in use are slightly undersized. The addition of a flow controller or pressure regulator was suggested to solve the pressure problem. Despite the greater expense, new flowmeters with flow controllers were recommended in order to solve the problem more completely and because they allow for a more standardized approach.

The facility produces an estimated 2.6 million pounds of excess mayonnaise due to insufficient sparging, costing approximately \$1.05 million.

Since the viscosity problem was addressed late enough in the internship that the intern was not able to observe the effects of the proposed solutions, the same viscosity problems were assumed. Of the 12 formulas analyzed, four were assumed to have consistently high enough viscosity that improvement in sparging from modifying the controls would be significant. Since further effects of viscosity and human error in operating the sparger could not be defined, the reduction in mayonnaise produced as a result of proposed changes was conservatively estimated as 10 percent of the excess produced for the four formulas considered. Based on these assumptions, actual potential impact of the recommended solutions was estimated at 39.7 tons less mayonnaise produced in a year for the same amount of saleable product, saving the company \$31,484.

Preventative maintenance

Based on observation of several mayonnaise leaks and the word of multiple employees, the intern also investigated the facility’s preventative maintenance program and possible additions to be made. Seals at joints between sections of piping are a common point of leaks and some employees had suggested that all seals in the kitchens should be replaced regularly. This was considered to be potentially excessive, but it was recommended that processors have more consistent access to new seals and that they track leaks in order to evaluate which seals should be replaced more proactively. The history of work orders was analyzed to look for

common problems that could be integrated into the preventative maintenance program. However, there were not enough data points to establish reasonable schedules for addressing the issues identified. Leaks in the specified areas of concern resulted in an estimated 9,912 lbs. of mayonnaise waste annually, costing \$3,931, and causing the generation of an additional seven MTCO₂e in transporting the waste produced for proper disposal, but further research is necessary to address this issue.

Bulk ingredient receiving

Egg and oil receiving records were both analyzed to evaluate possible waste. Though there were discrepancies between egg shipment weights listed in the documentation from the supplier and weights recorded in the company’s storage tanks, it was determined these were most likely due to error in the scales used to generate the documentation, which was usually within industry accepted standards. There were too many uncontrolled variables to draw conclusions regarding oil receiving as a possible area of waste.

Other projects

A few possible areas for energy reduction were noted, particularly in the room used to store liquid egg, since the room is refrigerated. Observations and minor recommendations were also made regarding various facets of operations such as scrap recording practices, diversion of expired product and scrap, and process monitoring procedures.

Summary of 2018 P2 intern recommendations for C. F. Sauer West Holdings, Inc.

Project	Annual estimated environmental impact	Estimated cost savings (\$/year)	Status
Sparger controls	40 Tons 3 MTCO ₂ e	\$31,484	Recommended
Preventative maintenance	5 Tons 7 MTCO ₂ e	\$3,931	Further research needed
Egg receiving	Negligible	Negligible	Not recommended
Compressed-air leak repair	125,707 kWh 123 MTCO ₂ e	\$11,794	Implemented
Total ¹	40 Tons 125,707 kWh	\$43,278	
GHG reductions ^{1,2}	126 MTCO ₂ e		

¹Does not include projects “not recommended” or where “more research needed.”

²EPA P2 GHG Calculator with Cost, 7 April 2016 and EPA WARM Tool- Version 14