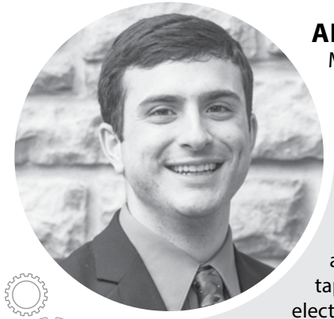
STANLEY ENGINEERED FASTENING



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COMPANY PROFILE
Stanley Engineered Fastening, a division of Stanley Black and Decker, produces fasteners and assembly solutions. The facility in Decorah, Iowa, currently employs 379 workers who are dedicated to producing quality products. Part production focuses mainly on large-scale tapped extrusions with a variety of metals and alloys. In-house processes include passivation, electroplating, CNC, and heat treatment. Stanley is a global provider of fastening solutions for major projects and products, with an annual production of 1.3 billion fasteners.

PROJECT BACKGROUND

At the Stanley Decorah facility, nitric acid is used for stripping copper coating from parts, and for the passivation of stainless-steel fasteners. Stanley Engineered Fastening asked their Pollution Prevention Intern to find a suitable chemical to replace the nitric acid used for passivation. Additional projects centered on optimizing the cleaning, stripping, and passivation lines, including finding a more cost-effective substitute for alkaline cleaners and rinsing agents. Piping and instrumentation diagrams (P&IDs) of all the systems analyzed in this project were developed to aid in future maintenance and update work. While onsite, the intern also developed a preliminary analysis of the feasibility of implementing wind energy.

INCENTIVES TO CHANGE

The passivation, cleaning, and stripping line used at the Stanley facility uses a scrubber system to control the fumes generated from the nitric acid passivation tank. A less hazardous alternative chemical would reduce the overall quantity of hazardous materials used onsite, eliminate the use of extensive personal protection equipment (PPE) for refilling and emptying of these tanks, and improve the working environment for line employees.

Corporate goals for Stanley Black and Decker include reducing carbon emissions by 20 percent and to have 10 percent of their overall energy use produced from renewables by the end of 2019. Stanley Decorah has a potentially favorable location on part of their property for installation of a wind turbine and there is considerable interest to look into the viability of wind energy at the plant. These goals presented an opportunity for the Stanley Decorah plant to investigate the feasibility of wind energy.

RESULTS

Replacement of Nitric Acid with Ambidet PS96: Stanley currently uses nitric acid for stripping copper from parts and for the passivation of stainless-steel. Scrubbers, extra PPE, and line downtime are required for the operation and refilling of the nitric acid tanks. Two potential alternatives were evaluated using small-scale lab testing. One of these alternatives, Ambidet PS96, produced favorable results both in cleaning and passivating the parts. While the PS96 is more expensive to purchase than nitric acid, the benefits of eliminating the use of nitric acid in this process would outweigh the additional cost. Parts that require passivation must meet additional criteria and specifications dictated by the end use customer, and must be approved by the customer(s), prior to any changes made to the production processes. This recommendation will require additional review and approval before implementation may be considered.

Alkaline Cleaner Substitution: Large quantities of alkaline cleaners are used on the passivation, stripping, and cleaning line at Stanley. With such large quantities of cleaner being used, an analysis was conducted to determine if there was a viable alternative that could be effective in smaller quantities and/or at a lower cost. Large scale testing was completed and while the results didn't allow for an option to be used in lesser quantities, it did identify an alternative cleaner, Power Soak LS-150 that was effective in Stanley's cleaning applications and could be used in the same quantities but for a lower cost. The switch to the new cleaner has been completed and it is currently being used on the production line.

Electrocleaning Cleaner Substitution: Stanley uses two types of processes for the cleaning of their fasteners. When alloy parts are sent through the line they are cleaned by an electrocleaning process. This process requires a conductive cleaner that is significantly more expensive than the traditional alkaline cleaner, Power Soak LS-150, being used in the other cleaning process line. The intern recognized that the Power Soak product has a manufacturer specification for electrocleaning. As a result, large-scale comparison testing was conducted to determine the viability of using the Power Soak in Stanley's electrocleaning process. It was determined that at a 10 percent concentration, the Power Soak is effective and cleans comparably to the current conductive cleaner. Being able to use the same cleaner for both cleaning lines will decrease the number of different chemicals on the factory floor and simplify the overall cleaning process for their fasteners. Because the Power Soak is already available onsite, its use in the electrocleaning process can be implemented once formal approval for a permanent switch is granted.

Finishing Rinse Agent Substitution: Stanley uses a finishing rinse agent at the end of the passivation line to help with the final physical appearance of parts. A generic version of this rinse product is available and two large-scale tests determined that the generic product performed as well or better than the current rinse agent and was more cost effective. The replacement product is readily available for use with approval.

Wind Turbine Feasibility Study: Stanley Black and Decker has a corporate goal of receiving 10 percent of its energy, across all facilities, from renewable sources. A site-specific initial feasibility analysis was completed by the intern and modeled after a wind turbine that was recently constructed at Luther College in Decorah. With the project costs modeled after the Luther wind turbine and using wind data from 2011 and 2012, it was determined that there is potential for a wind turbine to supplement the energy use at the Decorah plant and generate significant cost savings. A multi-phase study is recommended to more accurately determine power output, life cycle costs, and cost saving potential.

Piping and Instrumentation Diagrams: The intern developed P&IDs for the electroplating line and the passivation, cleaning, and stripping line. Accurate P&ID files reduce downtime for maintenance by allowing for quick location of valves and pipes. Files were created in the same format as previous company P&IDs to maintain consistency and ease of use.

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
Replacement of Nitric Acid with Ambidet PS96	$101	1,367 gallons Nitric Acid Risk Avoidance	Recommended
Alkaline Cleaner Substitution	$14,559	N/A	Implemented
Electrocleaning Cleaner Substitution	$6,580	N/A	Recommended
Finishing Rinse Agent Substitution	$3,148	121 gallons water	Recommended
Wind Turbine Feasibility Study	$400,233	5,771,391 kWh	Recommended
Piping and Instrumentation Diagrams	$750 (one time)	N/A	Implemented