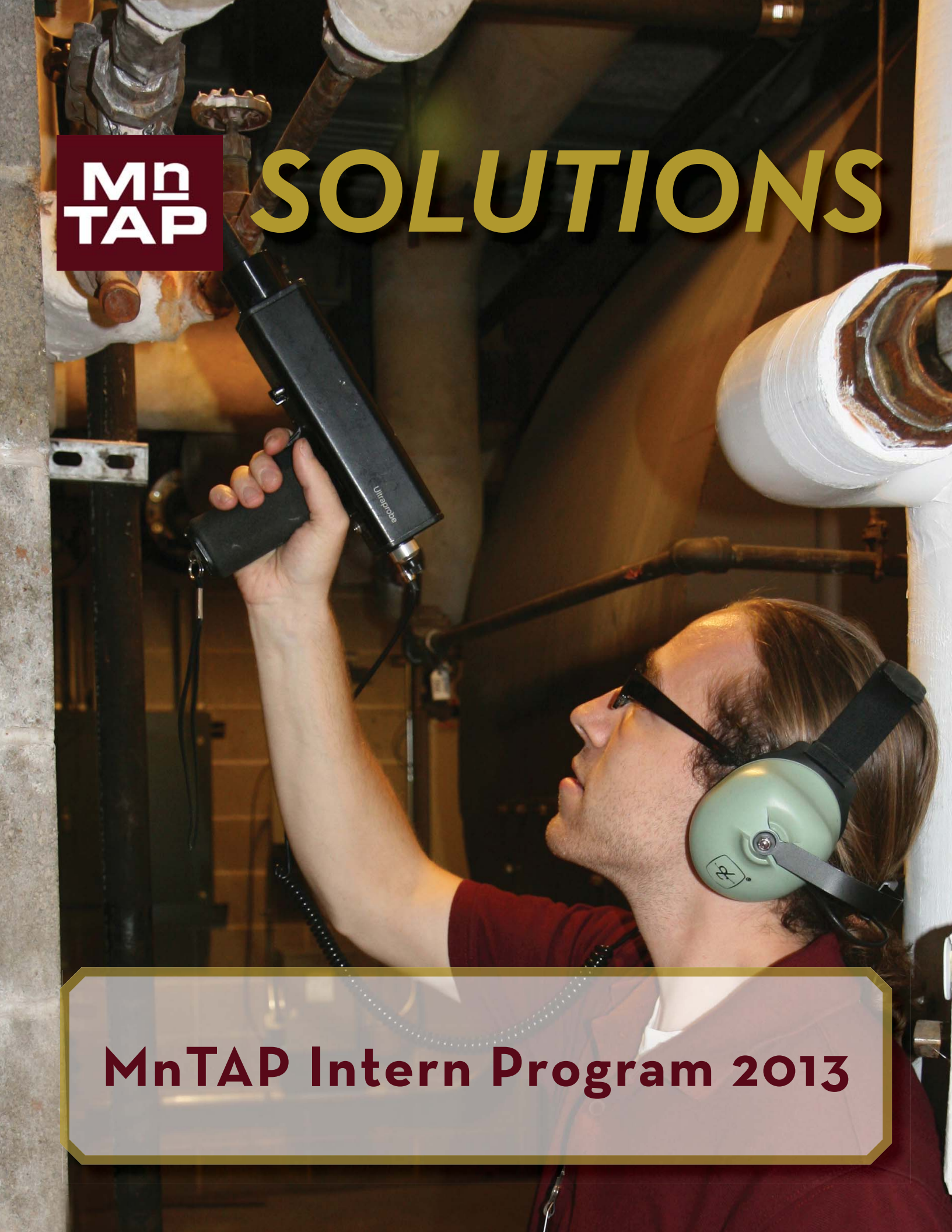

MnTAP

SOLUTIONS

MnTAP Intern Program 2013

MnTAP thanks our generous partners who made this vital work possible. Each of these organizations contributed financially to support at least one intern project for 2013. Their support helps MnTAP increase the number of intern positions each year and helps fund our continuing energy efficiency work.

"The knowledge and out-of-the box thinking of the intern not only helped us with short term savings but showed us ways to look at our processes in a whole new light."

Craig Johnson, Maintenance Manager II,
CSM Bakery Products

The 2013 intern projects were supported by the work of the following MnTAP staff (with the projects they advised):

Anna Arkin
Solid Waste Specialist
Tennant Company

Laura Babcock
MnTAP Director

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St. Croix Forge

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Mark Powers
Engineering Coordinator
Schwing America

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Associate Engineer
St. Luke's Hospital

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Director's Note

MnTAP Internships: "ALL IN"

Laura Babcock
MnTAP Director

Since 1985, MnTAP has been "all in," coordinating an intern program that places highly qualified, upper level engineering and science students in facilities across Minnesota to provide solutions for pollution prevention, energy efficiency, and resource conservation. The intern program is an important part of our on-site outreach activities, with MnTAP staff members participating closely with businesses to identify and scope projects, as well as mentor the students throughout the internships. The working relationships developed with company staff members often lead to continuing interactions and identification of additional projects to address conservation opportunities.

We appreciate that Minnesota businesses and our utility and agency partners have also been "all in," providing significant project opportunities and financial support to continue this program each year. Companies benefit by having a highly qualified, independent problem-solver focus attention on their projects. Interns leave companies with well-defined project plans and often a significant start on implementing the outlined solutions. Project sponsors have an opportunity to bring their unique expertise to the discussions and contribute to the overall project implementation.

Each year the MnTAP interns work hard to demonstrate how they are "all in" the process by applying the knowledge gained through their course work to real industrial challenges. MnTAP internships provide students with the opportunity to manage a project, develop and test new ideas, and implement their recommended solutions. As the interns progress through the program, it is rewarding to see their transition from students to young professionals ready to enter the workforce.

We hope that as you read about the 2013 MnTAP intern projects and the results achieved, you will be inspired to go "all in" and see how your company can benefit from having an intern at your site to maximize resource efficiency, increase energy efficiency, reduce costs, and prevent pollution.

> "I was pleased with the student, project support, the outcome - everything! It will be beneficial to the company when we resolve the remaining questions and implement."
>
> ~John Juleen, Maintenance Supervisor, St. Croix Forge

2013 Intern-Proposed Solutions

Recommendation	Reduction	Cost Savings	Equivalents (per year)
Water conservation	53,655,850 gallons	$287,290	Water for 1,470 Minneapolis residents
Solid waste	522,570 lbs	$102,620	Half the weight of a Boeing 747
Energy	2,191,877 kWh	$153,500	Electricity for 230 Minnesota homes
Energy	317,327 therms	$328,790	CO_2 emissions from 351 passenger vehicles
Total Potential Cost Savings		**$872,200**	

MnTAP Intern Program

A History of Success

For 28 years, MnTAP has been coordinating an intern program that places highly qualified students in facilities for up to three months. MnTAP began offering the program as a way to faciliate implementation of pollution prevention solutions. The goal of the program is to provide benefits to companies and students while building MnTAP's knowledge base and extending our services to businesses around the state.

Interns Have Far-Reaching Impact

The impact of the intern projects has reached far beyond the walls of the host facilities; many of the solutions identified during the projects have been applied to other companies, which magnifies the impact of the program. From Thief River Falls and International Falls in the north to Albert Lea, Preston, and Jackson in the south, MnTAP intern projects have stretched across Minnesota. In fact, MnTAP interns have worked in facilities in 88 distinct communities; half of those communities are out-state, while the other half are in the Twin Cities metro area.

Companies Reap Rewards

More than 175 companies have participated in the MnTAP program in the past 28 years. Interns have worked with companies as small as 12 employees and as large as 1,000+ employees, in industries such as hospitality, healthcare, manufacturing, and food processing.

Participating companies have proven to be committed to making changes. Through follow-up over the course of two years, MnTAP encourages and supports intern companies to implement recommendations. Typically, 50% of the recommendations are implemented over time.

Summer 2013 interns

Students See Success

The MnTAP intern program is very popular with students as well. In 2013, 90 students applied to the program to fill the nine summer and one fall positions that were available. In total, 186 students have filled 193 intern positions over the years.

Interns have represented 22 different majors and more than 20 colleges and universities. Chemical engineering and mechanical engineering are the most common majors, and the majority of the interns were students at the University of Minnesota and University of Minnesota-Duluth.

The bottom line is, no matter where a company is located or where their intern has studied, MnTAP intern projects result in impactful solutions that save businesses money and reduce waste and energy use.

Company Testimonials

"The MnTAP intern allowed Northern Star Co. to focus specifically on water conservation opportunities without the typical day-to-day interruptions any internal resource would have inevitably encountered."
~Shane Menefee, Corporate Environmental Director, Northern Star Co.

"With the help of our MnTAP intern, Schwing America was able to facilitate lean manufacturing changes on the production floor."
~Mark Moschkau,
Director of Operations,
Schwing America

"Our intern did a fantastic job. She took the initiative to learn the facility and operations and was very passionate about seeing necessary changes take place."
~ Lori Stephan,
Environmental & Safety Engineer, FCC

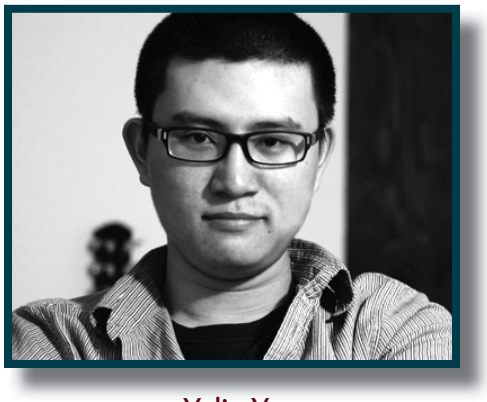
"It's fun to work with an engineer that hasn't been exposed to the things I've seen for years. The new perspective and fresh insight drags me out of the box that I've put myself in."
~Jim Trudeau, Facilities Manager, CPP

"Our MnTAP intern dug into our company's waste data as well as our actual trash. She produced a comprehensive report of what materials in our facility become by-product waste and how it is disposed of. We will use this information to define our waste baseline to track and measure our efforts to reduce our waste to the landfill."
– Stan Mierzejewski, Senior Manager, Sustainability, Tennant Company

"Through our MnTAP intern, St. Luke's studied energy savings ideas and found opportunities that allowed the development of an actionable plan to continue our cost savings efforts."
~Pat Earley, Director, Facilities Management ,
St. Luke's Hospital

MnTAP thanks companies that hosted an intern project in 2013 - student success is directly related to company support!

City of Hutchinson



Yulin Ye
Master of Science in Bioproducts and Biosystems Science, Engineering and Management, UMTC

Company Background

Hutchinson Wastewater Treatment Facility (WWTF) is administered by the Department of Water and Wastewater, City of Hutchinson. Built in 1988, the plant is designed to treat an average wet weather flow of 5.43 million gallons per day (MGD) and an average dry weather flow of 3.28 MGD. In 2008, plant upgrades were made in response to community growth and industrial expansion, as well as to meet a tighter regulation on phosphorus. From 2010-2012, the typical daily inflow was approximately 2.0-2.7 MGD.

"I really enjoyed the challenge of this project. The internship also gave me an opportunity to apply what I learned in school and to gain hands-on experience in an industry that I am interested in. I now have a clearer image of the everyday responsibilities of a process engineer in a facility like this."

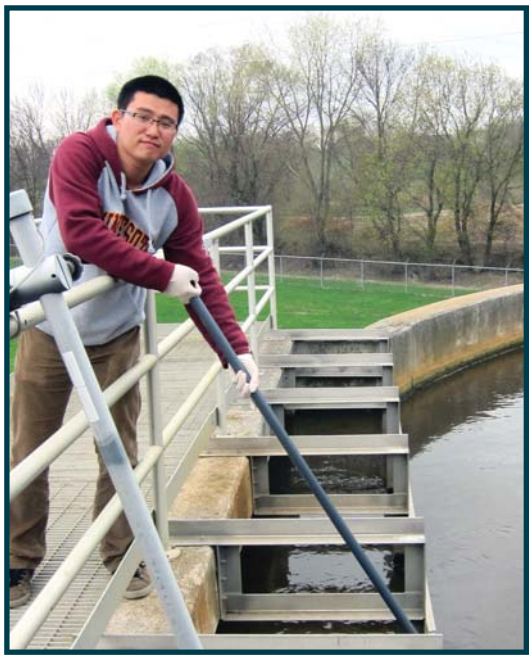
Project Background

The facility is equipped with two oxidation ditches and a membrane bio-reactor (MBR) with a total treatment capacity of 7,000 lbs. biological oxygen demand per day. This project was initiated to evaluate changing the aeration strategy in the oxidation ditches, with the goal of both reducing energy costs and nitrate level in effluent without capital investment.

Incentives to Change

Aeration in the activated sludge system is generally the biggest energy consumer in wastewater treatment plants. The oxidation ditch of Hutchinson WWTF employs extended aeration. This means oxygen is over-supplied to ensure that biological processes such as organics decomposition and nitrification are complete. This strategy provides constant and good effluent quality; however, it is not energy efficient.

Before the project began, typical plant-wide electrical consumption was between 8,000 and 10,000 kWh per day. The plant was running two surface aerators 24/7 in each ditch. One of the two aerators is on a variable frequency drive (VFD), which changes aerator speed and power draw in response to operator input based on dissolved oxygen readings. The average speed of the VFD rotor was approximately 45% of full speed. The other rotor was not on VFD and ran at full speed. Two wall-mounted mixer-aerators were on a timer and only operated four hours a day. Running these devices drew 3,080 kWh/day (30-40% of the plant's total electricity usage), costing $95,000 per year.



By optimizing aeration, there are opportunities to reduce the plant's energy bill. There also is a trend in Minnesota toward tighter nitrate limits in effluent. If it were possible to reduce nitrate levels voluntarily, tighter limits requiring capital plant changes might be delayed.

Solutions

Adopting Single-ditch Operation to Save Energy

Two plant trials were conducted to test the energy and nitrate reduction feasibility. Plant Trial 1 explored the feasibility of integrating an anoxic zone into the existing west oxidation ditch by converting its operation to the Modified Ludzack-Ettinger (MLE) process, while the east ditch was kept unchanged as an experiment control. Plant Trial I succeeded in achieving a 50% reduction in nitrate concentration and a 10% reduction in energy consumption, but within two weeks, the operation became unstable with signs of the activated sludge settling out and becoming septic.

In Plant Trial 2, the two ditch (parallel operation) was stopped and all wastewater flow was diverted to the east ditch, which had an anoxic zone. This trial resulted in a 43% reduction in energy consumption, but while there was evidence of denitrification occurring, the rate was not fast enough for a measurable reduction in nitrates.

The plant continues to run in single-ditch operation with electricity consumption reduced by 1860 kWh per day, which results in $39,230 yearly electricity savings, and biological operation appears to be improved. There is a question of whether single ditch operation will be effective during the coldest weather, so true yearly savings have yet to be determined.

Meeting Future, Strict Nitrate Regulation

Although nitrate is only required to be monitored under the current discharge permit, a more stringent discharge limit is likely in the future.

Options for Meeting Stricter Nitrate Limits

A separate anoxic reactor could be constructed before the oxidation ditches (using the MLE process); and there are two likely ways to operate a anoxic zone within the existing ditches that could be investigated for feasibility in the plant. The potential ways to maintain an anoxic zone in the existing ditches are to improve the non-aerated mixing in parallel ditch operations or use alternating aerated and anoxic periods with improved non-aerated mixing. In addition, a simple chemical, like methanol, could be added to the anoxic zone of either single or double ditch operation to speed up the biological denitrification reaction rates.

Recommendation	Reduction	Annual Savings	Status
Single-ditch operation	1860 kWh per day	$39,230	Implemented

Consolidated Precision Products

Anshul Gupta
Mechanical Engineering, UMTC

Company Background

Consolidated Precision Products (CPP) is an aerospace sand casting company. It produces high-precision aluminum and magnesium castings for NASA rockets, military and commercial aircrafts and helicopters, to name a few. CPP has 19 facilities across the United States, Mexico, and Europe. From product concept to sub-assembly and kitting, CPP is the largest aerospace-qualified manufacturer capable of producing both investment and sand castings. Founded in 1991, CPP's Bloomington operation employs approximately 550 employees working two shifts.

"The internship allowed me to use the engineering knowledge I have gained from school and put it to use in a real-world manufacturing setting."

Project Background

The project involved gathering performance data on CPP's heat treat ovens, quench tanks, and fluidized bed systems. This data included parameters like energy and waste throughput and efficiency analysis. Based on this analysis, new opportunities for energy use reduction were identified and efficiency improvements were suggested. Finally, the recommended changes were prioritized using simple payback calculations.

Incentives to Change

Reduction of energy costs, resources used, operation costs, and improvement in the environmental conditions for employees were among the many incentives for change. CPP utilizes a variety of ovens, both electric and gas, for heat treating and aging products after they are cast. Exhausts from these ovens, especially the sealed-tube gas ovens, are high temperature and high flow rate, with the ovens running at low efficiency. Increasing efficiency has the potential for substantial energy and monetary savings. In addition, CPP has been looking at ways to increase quench tank efficiency over the past few years. The fluidized bed used by CPP has 800 degree F exhausts running 24/7 year-round, and there is enormous potential for energy harvesting to reduce energy costs. A majority of parameters for the processes can be monitored on a

computer which is connected to a server that retrieves real-time information from the equipment. This data could be used to quantify savings.

Solutions

Install Plug-in Recuperator in Oven 4

Oven 4 is a sealed-tube gas oven that runs about 6,000 hours annually. I suggested using a plug-in recuperator to preheat combustion air to over 600 degrees F to utilize the 1,400 degree F exhaust temperatures. This would increase efficiency from 60% to 71% and save $5,711 annually, with a one-time implementation cost of $15,600. This project qualifies for rebates from CenterPoint Energy.

Install Lower-Powered Burner in Quench Tank 19

The quench tank for Oven 19 suffers from an over-powered burner, which results in very high temperature flue gases that are damaging the custom exhaust stack. I recommend installing a lower powered burner setup, downsizing from 20 therms/hour to 8.3 therms/hour. Apart from the replacement cost of a new exhaust stack, this would save $1,247 annually, with a one-time implementation cost of $3,870.

Install Heat Exchanger to Fluidized Bed

The fluidized bed is used for taking sand off of castings and exhausts 805 degree F flue gases continuously. To harness this massive source of wasted energy, I recommend installing a heat exchanger. This will direct the flue heat to the aluminum-pour region, replacing the makeup air unit currently used for heating in the winter. It would save $20,465 annually with a onetime implementation cost of $40,000. This project qualifies for rebates from both Xcel Energy and CenterPoint Energy.

Insulate Magnesium Pour Ladles

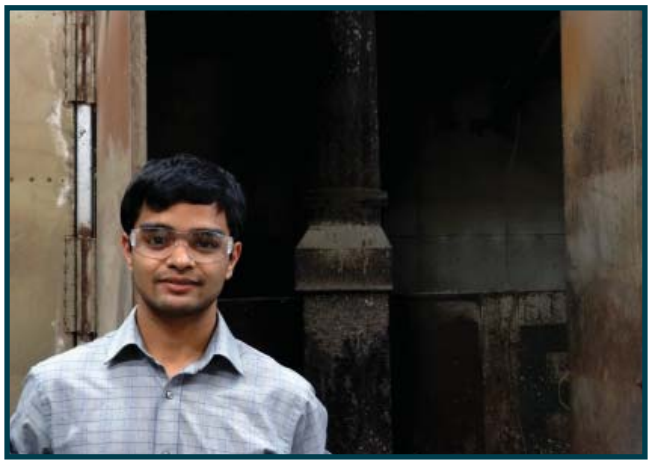
It is recommended that the tipper ladles used to pour molten magnesium into molds be insulated with 2-inch ceramic blankets. This would allow for an increase of 15-20 minutes of pouring time for the magnesium. An additional advantage is gas savings from not having to heat up smaller magnesium pots, instead replacing them with one larger pot. This would also save labor costs and eliminate the need for electric heaters on tipper ladles to maintain temperature.

Manage Magnesium Pour Time

I noted that magnesium melting burners are switched on early (at 3:00 a.m.), while most pots are not poured for 2-3 hours after they reach optimum temperature. This leads to wasted use of natural gas. Better managing magnesium pour time to reduce this delay is recommended, as it would save $19,408 annually with zero implementation costs.

Repair Compressed Air Leaks

There are many compressed air leaks at the facility. Flow rate meters have been installed on the compressors and programmed to display the flow rate and power consumption on a personal computer to allow for remote monitoring. By measuring activity at a time when the facility is not operating, leaks can be quantified. Initial readings suggest waste of approximately $30,000 annually, though more data is needed for assured numbers. A compressed air audit is scheduled for later this year and I recommend repairing any leaks that are identified.



Recommendation	Reduction	Annual Savings	Status
Install plug-in recuperator in Oven 4	12,690 therms	$5,700	Under review
Install lower-powered burner in Quench tank 19	2,771 therms	$1,250	In progress
Install heat exchanger to fluidized bed	38,980 therms	$20,470	Under review
Insulate magnesium pour ladles	170,040 kWh	$13,600	Under review
Manage magnesium pour time	43,130 therms	$19,400	Under review
Repair compressed air leaks	--	--	Under review

CSM Bakery Products

Zachary Metz
Chemical Engineering, UMTC

"This project gave me my first experience in an industrial setting, which will be invaluable in my future career. It gave me confidence by assigning me my own personal project and seeing it to its conclusion. It also gave me confidence in approaching co-workers, superiors, and vendors with questions and concerns. Finally, it showed me that the knowledge I gained while in school is applicable and relevant to the real world."

Company Background

CSM Bakery Products is a products distributor with three main areas of business: ingredients, sweet goods and bakery distribution. The ingredients supplied include fillings, toppings, and frozen dough, while the sweet goods include cookies, brownies, and cupcakes. The company is a wholly-owned subsidiary of Amsterdam-based CSM, the global leader in the bakery products and natural food preservation/green chemicals arenas. CSM operates in 60 locations, with over 9,500 employees worldwide. The Eagan facility employs approximately 300 employees.

Incentives to Change

This project is a result of CSM's desire to reduce its energy and water consumption. The Eagan plant currently uses about 8 million gallons of water, 140,000 therms of natural gas and 7 million kWh of electricity annually. The majority of the water and a large portion of the energy used by the plant result from sanitation processes. For this reason, the sanitation processes are the main focus of this project.

Project Background

A significant amount of water is currently used to clean several production areas in CSM's Eagan plant. They have recently questioned the need for using so much water, as well as the overall effectiveness of cleaning procedures. This project focused on exploring alternate cleaning procedures or optimizing procedures already in place. Over the past three years, CSM's Eagan plant has used an average of just over 8 million gallons of water per year. The water strength charges over this time period have averaged over $52,000 per year. CSM is pursuing this project with the hope that the results will show a reduction in water use and a reduction, or elimination, of water strength charges.

Solutions

Implement Water Conservation Training Program

This program will encourage the use of dry cleaning equipment, such as brooms and squeegees, while discouraging wasteful practices, like pushing food scraps with a hose across the floor to the drain. The program will reduce the amount of water used while cleaning, automatically reducing the amount of energy used to heat the water. The program will also reduce the amount of food scraps sent to the drain, which will reduce fees from wastewater with a high content of suspended solids. This will also allow more food scraps to be reused as animal feed. I recommend that this solution be implemented as soon as possible.

Replace Hand Washing Faucet Aerators With Low-Flow Model

This is a simple solution that will save approximately 92,000 gallons of water per year at only a $25 cost to the company. It has been recommended that this solution be implemented as soon as possible.

Replace Hose Nozzles With Low-Flow Model

Replacing hose nozzles with low-flow nozzles would use approximately 25% less water, which would save the company about 950,000 gallons of water annually. This would also save the company 3,400 therms of natural gas energy used to heat the water. Unfortunately, testing revealed that these new nozzles were heavy and cumbersome, and employees did not like them. It has been recommended that this solution be implemented only if a new, lightweight model is introduced or if a new vendor is found.

Adjust 'Kettle Room' Sanitation Standard Operating Procedure (SSOP)

The cleaning process for this room is the single most water-consuming process in the plant. Implementing a new, optimized procedure would save the company about 760,000 gallons of water every year, as well as 9,400 therms of natural gas energy used to heat the water. It has been recommended that the proposed procedure continue to be tested and, if proven viable, implemented immediately.

There are other ideas beyond the scope of this project that could be investigated in the future. The first is to replace the cleaning chemicals in the plant with electrolyzed water. The second is to change some of the cleaning procedures to dry cleaning methods, such as dry ice blasting.

Recommendation	Reduction	Annual Savings	Status
Implement water conservation progam	Needs analysis	--	--
Replace hand washing faucet with low flow model	92,000 gallons water 650 therms	$400 water $460 energy	Under review
Replace hose nozzles with low flow model	950,000 gallons water 6,200 therms	$4,100 water $4,400 energy	Delayed
Change kettle room SSOP	760,000 gallons water 9,100 therms	$3,300 water $6,400 energy	Testing

Federal Cartridge Company

Kaylea Brase
Chemical Engineering
Calvin College, Michigan

Company Background

Federal Cartridge Company (FCC) is a small arms ammunition manufacturer located in Anoka. Since 1922, Federal Premium® Ammunition has been providing hunters and shooters with high-quality shotshell, centerfire and rimfire ammunition. A wholly-owned subsidiary of ATK, Alliant Techsystems, the company employs nearly 1,800 employees. The facility is located on 175 acres in Anoka County and spans the border of Anoka and Coon Rapids, with half a million square feet of manufacturing space.

FEDERAL PREMIUM® AMMUNITION

"Through the MnTAP program, I developed the initiative and confidence needed to work with others to help the company and the environment. The job is almost like being a detective, trying to identify problems, meet the people involved, track the history of the situation, brainstorm solutions, and implement changes. The best part is seeing the numbers add up at the end, both in waste reduction and cost savings."

Project Background

Small arms ammunition manufacturing involves many metalworking operations, including pressing, stamping, annealing, and washing of the ammunition jackets and cases. Because many of the metalworking operations are automated, the metal components require tempering and lubrication steps. The process chemicals and lubricants must be rinsed before proceeding to the next step, so large rinsing processes are employed.

Water is used for cooling, washing, rinsing, and hydrating explosive material. The water piping system has suffered from scale and deposits from the dissolved minerals and rust in the hard water, which can clog nozzles and alter valve settings. Most of the equipment is designed to reuse water in a closed loop system or to fill on a timed-rinse basis; however, many of the settings and valves have been by-passed due to clogging. Valves are typically manually adjusted based on operator experience.

Incentives to Change

By reducing the amount of water FCC uses in the manufacturing process, the company can lower operating costs, improve efficiency of the on-site wastewater treatment plant, reduce environmental impact, and avoid SAC charges. The Sewer Availability Charge (SAC), equivalent to 274 gallons of water per day on average, is a measure of wastewater volume. Every three years, a charge is assessed by Metropolitan Council Environmental Services (MCES) for each SAC unit above the assigned baseline for a facility. To avoid heavy SAC charges, FCC applied for a MnTAP intern to identify water conservation opportunities and aid in implementation.

Solutions

Install Timed Rinse Faucets

Faucets run continuously in areas where explosive material, or primer mix, is charged into the primer cups. The faucets are used to clean the charging equipment and to prevent explosive material from collecting in the piping system. Nine faucets run continuously at high flow rates, representing approximately 8% of the industrial water use at FCC. A significant amount of water could be saved by installing faucets that turn on for one minute and turn off for one minute. Installation would result in approximately $40,900 in savings annually.

Install Wash Tub Spray Nozzles

FCC has approximately fifty wash tubs throughout the facility, which constitutes about 16% of the overall industrial water use. Water is dumped on the components via an open pipe end. The process could be improved if a wider fan spray pattern were used to impact a larger area of the components inside the tub. Spray nozzles would allow the pressure to be increased, while the flow would be decreased. About $2,500 in annual water savings could be realized if only two of the spray nozzle opportunities were implemented.

Recycle Effluent

The on-site wastewater treatment plant uses a continuous flow of water to clean the sand filters, which act as a polishing step to remove suspended solids from the wastewater. If a portion of the exiting water is recycled back to the sand filters to assist with cleaning in lieu of using city water, a total of $28,300 could be saved annually. This process would allow effective cleaning and circulation of the sand filters, reducing the high cost of water.

Install Automatic Shut-Off Valves

The inline washers represent about 37% of FCC's industrial water use. Water continuously flows over the rinse tank cage at approximately 5 GPM, at times without product in the cage. By installing valves that would automatically shut off the water flow when product is no longer running through the machine, $11,400 could be saved annually.

Install Chiller

The condenser for an environmental test chamber is cooled by de-ionized water, flowing at 5 GPM. This water is sent directly to the drain. Instead, the water could be recycled by installing a chiller to return the water to initial temperature. In addition to reducing maintenance and upgrade costs to the de-ionized water delivery system, the chiller would save about $11,700 annually in water costs.

Recommendation	Reduction	Annual Savings	Status
Install timed rinse faucets	2,803,000 gallons water	$40,900	In progress
Install wash tub spray nozzles	173,000 gallons water	$2,500	In progress
Recycle effluent	1,752,000 gallons water	$28,300	In progress
Install automatic shut-off valves	778,500 gallons water	$11,400	In progress
Install chiller	54,750 gallons water	$11,700	Under review

Gedney Foods Company

Ryan Venteicher
Civil Engineering, UMTC

"The internship was a great experience. It provided me with real-world engineering experience and allowed me to run my own project, do my own research, and test out new ideas to see if they work. Plus, it's hard to beat free pickles on Thursdays!"

Company Background

The Gedney Foods Company is a pickling plant based out of Chaska. Established in 1881, Gedney is one of Minnesota's oldest food companies and employs approximately 200 employees. The company produces an assortment of goods, including relishes, condiments, preservatives, fermented pickles, and fresh pack pickles. Cucumbers from all over the world are brought in from the receiving dock or tank yard, washed and desalted, packed into jars along with brine and various spices, and then pasteurized, completing their transformation into a pickle.

Project Background

Water use at the plant has risen due to an almost doubling of the plant's production outputs. In addition, some salt used while making products unavoidably ends up in the wastewater stream, thereby

increasing the strain the company puts on its surrounding environment. I examined ways to reduce water and salt use within the plant in order to lessen Gedney's consumption of raw materials and also to reduce the company's environmental impact.

Incentives to Change

The Gedney Company has long been concerned with reducing its impact on the environment. Gedney draws its water from two wells and has endeavored for years to reduce its overall water usage. The company's water usage, and the impact its wastewater stream has on the surrounding ecosystem, is of high concern. Gedney also has a limited wastewater treatment system. Permits stipulated by Minnesota regulatory agencies prevent the discharge of wastewater until environmental requirements are met. If Gedney cannot discharge its wastewater, production would be shutdown. As such, Gedney must conserve water so its waste disposal system does not reach capacity. Also, reducing the salt usage for the plant would lessen the consumption of a costly ingredient and would reduce the strain felt on the company's wastewater stream. I was hired by MnTAP to research and recommend water and salt saving suggestions.

Solutions

Reroute Pasteurizer Overflow

Pasteurizers are important components in the pickle producing process, as pasteurization is necessary to ensure food safety. Pasteurizers for two separate production lines run parallel to one another. One utilizes steam while pasteurizing, the other hot water. The steam pasteurizer has excess hot water discharging from it.

By reusing the hot overflow water from the steam pasteurizer as makeup water for the hot water pasteurizer, both energy and water can be saved. It is estimated that 22,000 therms of energy and 3,085,000 gallons of water can be saved per year through this change.

Reuse Fermentation Tank Brine

Cucumber fermentation occurs in outdoor tanks before the cucumbers are sent to the production line. Through research and consulting with representatives from other companies, it was determined that reusing tank fermentation brine may be an option for Gedney to reduce salt and water demand. Reusing brine for additional fermentation processes will reduce salt and water usage by an amount of 213,400 lbs. of salt and 214,500 gallons of water per year.

Reduce Salt Storage Level

The product in the tank farm is currently stored at a salt level of 12% in order to prevent the growth of product-harming enzymes and tank freezing during the winter months. Through research and contacting other pickle companies, the idea emerged that this salt level may

be lowered to directly reduce salt use and indirectly, lessen the water used by the plant. Additional testing and research is needed in different climate conditions; however, calculations indicate that if the salt storage level is reduced to 7%, the plant's salt and water use would drop by 364,500 lbs. of salt and 383,000 gallons of water.

Reduce Fermentation and Salt Storage Level

Since reusing fermentation brine and reducing salt storage levels are both modifications to the same process, calculations were made to estimate the savings achieved if both recommendations are implemented. If both a brine reuse system is implemented and procedures are changed so that the salt storage levels were reduced, savings would equal 460,500 lbs. of salt and 543,200 gallons of water.

Fix Water Leaks

Water leaks in the plant often go unnoticed and as a result, a large amount of water is being wasted. It is estimated that about 2.2 million gallons of water can be saved per year by fixing water leaks in the plant. Instituting a culture of water conservation with the employees at Gedney will also make a big impact on reducing water losses for the plant.

Recommendation	Reduction	Annual Savings	Status
Reroute pasteurizer overflow	22,000 therms 3,085,000 gallons water	$10,600	Under review
Reuse fermentation tank brine	213,000 lbs salt 214,500 gallons water	$21,300	Testing
Reduce salt storage level	364,500 lbs salt 383,000 gallons water	$36,450	Under review
Reduce fermentation and salt storage level	460,500 lbs salt 543,200 gallons water	$46,500	Under review
Fix water leaks	2,220,400 gallons water 790 therms	$380	Under review

Northern Star Co.

Alex Hoppes
Civil Engineering, UMTC

Company Background

Northern Star®, a leading producer of refrigerated potato products, was founded in 1951. Located in Chaska, the company specializes in a variety of refrigerated (but never frozen) potato products, such as the Simply Potatoes product line, for both the foodservice and consumer markets. The Chaska plant employs approximately 260 people. In 1987, Northern Star joined the Michael Foods family of businesses, which offers a full line of dairy case and refrigerated potato products and is the world's largest supplier of processed eggs.

"The internship gave me hands-on experience in an industry, allowed me to be in charge of a project, work with all levels of employees, and make a real difference in terms of water conservation and cost savings."

Project Background

The goal of the project was to find economical solutions to conserve water, reduce wastewater, and save money. The focus was in three main areas of the facility: receiving, peelers/scrubbers, and the clean room.

Incentives to Change

Water is used in some amount, large or small, in just about every aspect of production. On a daily basis, the facility processes approximately 1,000,000 pounds of potato products. Well water is used to wash, prepare (peel, slice, dice, and mash), transfer, and cook the potatoes, as well as to clean and sanitizie. Reducing water use or reusing water in certain process steps would improve plant efficiency and help avoid the cost of permitting and drilling an additional well. Water conservation also reduces expenses for water treatment, pumping, and sewering. The availability of extra water would allow the company to expand their business and increase production.

Solutions

Lower Water Level in Potato Washer

Maintaining the appropriate water level in the potato washer is necessary to ensure capture of floating debris and continous potato flow through the washer. At the onset of the internship, the water level was set at 27.5 feet and the vessel was constantly overflowing. After interviewing workers, I found out that the level is controlled from the operating room. I decided to experiment with the level by dropping it in half-inch increments and making sure the process was still effective. As a result of dropping the level two inches, the washer overflows less often.

Replace Float in Basket Washer

During the facility walk through, I noticed that the basket washer was overflowing significantly; a float that should control the water level was lying at the bottom of the tank. In addition to the missing float, I learned the operator has a large impact on the amount of water entering the machine. A flow meter was used to measure the flow to the basket washer at different valve settings. The valve allows the water to flow from 3 to 20 gallons per minute. The operator now adjusts the valve to the lowest setting, which reduces the amount of overflow significantly.

Reduce Peeler Exhaust Spray Time

The peeler exhaust spray is necessary to keep the exhaust tank cool and to knock down particulate. The machine was recommended to be run much lower than the 40-50 seconds it was set at upon my arrival. The time has now been lowered to around 30 seconds, which should save 93,000 gallons of water annually.

Replace Leaking Solenoid

Peeler #2 appeared to be regularly overflowing. Research into this situation led to the discovery that a solenoid, an electronic device that signals when to open and close a valve, was no longer working and needed to be replaced. This may be a harsh environment for the solenoid and it will need to be checked more frequently so that water is not being wasted.

Reuse RO Reject Water

The reverse osmosis (RO) system generates reject water, which is stored in a tank. The water can be used for certain steps in the process, such as potato washing and peeler exhaust spray. The tank can store up to 5,000 gallons. The potato washer was originally selected as the only machine to receive the reject water. Since the reject water storage tank was not running dry, we diverted the reject water into peeler #2 exhaust spray, which saves approximately 15,000 gallons of fresh water a day.

Reuse Scrubber Water

The biggest water users in the plant are the scrubbers. Not only do they run at over 30 gallons per minute, they also run almost constantly - close to 20 hours a day. The water they use becomes laden with potato waste and grime and is sent down the drain. Filtering this water and reusing it in the scrubber is an option to consider.

Install Auto Fill Valves on Pump Tanks

There are two pump tanks located on the peel floor. The tanks must have water in them or the pumps will become plugged. The valves filling the tank are manually operated and flow at around 50 gallons per minute. If the valves on the tanks are not monitored, they constantly overflow, resulting in a significant amount of wasted water. An auto fill valve could greatly reduce overflow.

Optimize Surge Bin Water Level

The surge bins store the potatoes before they are sent to the blancher or cutter. Once the potatoes are added, the surge bins need to be filled with water to prevent the potatoes from rotting. Currently, the operators fill the surge bins before the potatoes reach them, resulting in overflow once the potatoes are added. The water level should be regulated so that it is full enough for the potatoes, but not so full that it overflows.

Recommendation	Reduction	Annual Savings	Status
Lower water level in potato washer	2,800,000 gallons water	--	Implemented
Replace float in basket washer	6,700,000 gallons water	--	Implemented
Reduce peeler exhaust spray time	93,000 gallons water	--	Implemented
Replace leaking solenoid	1,400,000 gallons water	--	Implemented
Reuse RO reject water	5,250,000 gallons water	--	Implemented
Reuse scrubber water	8,250,000 gallons water/scrubber	--	Under review
Install auto fill valves on pump tanks	4,200,000 gallons water	--	Under review
Optimize surge bin water level	1,900,000 gallons water	--	Under review
Total		**$166,300**	

Schwing America

Paul Senne
Mechanical Engineering, UMD

Company Background

Schwing America is a member of the Schwing Group, a worldwide designer, manufacturer and distributor of premium concrete production and handling equipment, headquartered in Herne, Germany. Schwing America's 400,000 square foot manufacturing plant in White Bear, one of seven production facilities in the global Schwing Group, produces concrete pumps, truck mixers, batch plants, reclaimers, and genuine parts for distribution throughout the world. Established in 1974, Schwing employs approximately 200 full time employees.

"The best part of the internship was the positive reaction to the recommendations I made and seeing some of the recommendations get implemented."

Project Background

The objective of this project was to help facilitate a lean manufacturing approach to the production process in a way that consciously links the goal of reducing waste from the lean perspective with environmental sustainability goals, such as materials and energy efficiency. The lean manufacturing principles naturally lead to sustainability improvements, both in energy, water, and materials use reduction and in terms of decreasing energy intensity of a product when production rates increase. Lean manufacturing typically uses a host of process analysis and improvement methods to classify and minimize non-value added steps and processing and resource usage. Schwing engaged with Enterprise Minnesota, the NIST Manufacturing Extension Partner for Minnesota, to provide training to employees in GreenLean® methodology. This training enabled everyone, from the executive sponsor to assembly workers, to work together to identify, communicate, and quantify opportunities for improvement and implementation.

Incentives to Change

Due to significant swings in the construction market, Schwing has seen a fluctuation in its business over the past five years and is now growing at a fast pace in response to the recovery of that sector. This growth positions its manufacturing centers to re-examine and optimize their layout and procedures in light of a growing and changing business. Through lean manufacturing analysis, a broad range of opportunities were found to improve the manufacturing process. Organization of work cells was found to be a priority that could improve the efficiency of the increasingly busy assembly workers. This included defining work spaces; providing visual clarity and standardization of where products, tools and parts belong, and organizing small parts into kits for each product, thereby minimizing mistakes and unnecessary movement of people and materials. Once a job on the assembly floor begins, the goal is to have all required tools and materials accessible within 30 seconds, instead of minutes.

Solutions

Optimize Work Cells

Using the 5S method, an array of work cells across one of the production buildings was optimized, resulting in clearly lined floors, removal of clutter, and tools and materials placed in standardized locations.

This enabled the floor to be fully utilized and prevented underutilizating work spaces due to sprawling jobs. Travel times for assembly workers were minimized by eliminating confusion about the parts needed and reducing time spent searching for parts, thereby increasing production efficiency. The method of using bulk parts bins was re-examined and it was recommended that kits be assembled for each bill of material to minimize potential for small part spillage and incorrect part selection. As part of this process, the bills of material were audited and updated as required. This suggestion highlighted the importance of applying lean as part of a supply chain philosophy and, in some cases, it was found that vendors had the capability to provide the required pre-assembled kits, allowing Schwing staff to focus on higher value activity.

Identify Patterns Using Root Cause Analysis

By observing the assembly process, I found that rework was the result of materials defects. I used root cause analysis to research any patterns in the defects and to identify the appropriate changes that could be implemented. This analysis enabled the production floor supervisor to accurately determine what portion of quality improvement they could implement by changes within the production cell and to what degree communication with the design staff or sub-assembly suppliers was necessary in order to gain improved quality and minimize time and materials spent on rework.

Optimize Paint Booth Loading Patterns

Another project focus area was energy savings in the paint room due to the significant energy required to maintain clean air within the building and the air exchange required to heat and cure the product. By analyzing the energy use in paint booths at multiple Schwing production sites, I was able to quantify and recommend loading patterns between paint booths that would minimize unnecessary energy usage. This recommendation could result in thousands of dollars of electrical and gas savings annually.

Repair Compressed Air Leaks

A system air leak analysis was performed in the areas utilizing significant amounts of compressed air. I worked with maintenance to recommend a regular testing method as well as to repair existing leaks. This was conservatively estimated to save over $2,000 per year in electrical costs.

Reduce Forklift Travel

I constructed a spaghetti diagram of forklift travel to examine travel patterns and load utilization of fork lifts between areas in the facility and to identify areas where one-way loads were common. I then recommended a staging area system that would reduce forklift travel. The new system could save over 390 gallons per year of propane fuel and reduce wear and tear on the equipment.

Recommendation	Reduction	Annual Savings	Status
Optimize paint booth loading patterns	24,150 kWh/yr 2,530 therms/yr	$2,600 $2,040	Under review
Repair compressed air leaks	21,000 kWh/yr	$2,125	In progress
Reduce forklift travel	390 gallons propane/yr	$975	In progress

St. Croix Forge

Amanda Spencer
Electrical & Biomedical Engineering
Washington University, St. Louis, MO

Company Background

St. Croix Forge was founded in 1984 by Curt Carlson in Forest Lake. Through the 1990s, the company developed into one of the largest horseshoe manufacturers in North America. In 1999, it was bought by Mustad Hoofcare, a company that originated in Norway in 1832 making small metal objects. Mustad has since acquired other companies and merged to become Delta Mustad Hoofcare Center. Each part of the company is focused on horseshoes and/or horseshoeing implements. They operate in 16 countries, and St. Croix is one of 11 affiliated factories. Mustad products are sent to nearly 100 countries worldwide. Today, St. Croix Forge produces steel horseshoes for racing, sport, and all-around riding. They employ about 50 people at the plant.

ST. CROIX FORGE

"This internship allowed me to transition from the hypothetical to the real application of my knowledge under real world conditions. Not only did I gain experience putting my knowledge into practice, I also learned about aspects of engineering that I had little exposure to in my major-specific classes."

Project Background

The goal of the project was to identify, evaluate, and justify ways to reduce process energy and material use at the forge. The project focused on the utilization and optimization of pumps used in a process cooling application, improvements to the utilization of an air compressor, improved process lubrication, and minimization of steel use in a product.

Incentives to Change

The primary motivation in pursuing the intern project was to reduce material consumption and energy usage. The forge uses, on average, 4,600,000 kWh of electricity and 7,465 therms of natural gas per year.

Solutions

Optimize Process Cooling Pumps

Four water circulation pumps are used to keep the forge induction heaters and electronics cool in a fairly complex piping system. I modeled the current operations and several alternative configurations all of which used existing components as much as possible to minimize the capital cost of recommended changes.

My analysis showed the system can operate much more efficiently with just two of the existing pumps, new variable speed drives, and valves to allow flow only to forges that are operating. This can reduce pumping cost by 80%.

Based on the magnitude of savings identified, a contractor was invited to submit a proposal, and they suggested rebuilding the circulation system. Though this is a more costly option, it would significantly simplify the piping, reduce friction losses, and correct some short-comings of the original system.

Disable Older Cooling Tower Fans

In the hydraulic cooling system, after the water returns from the production lines, it is sent to the cooling towers to discharge some of its heat energy. St. Croix has three cooling towers: two older towers and one newer tower, which has two fans. The older towers have had their spray water capacities disabled and now have only two modes of operation: fans on and fans off. Tests showed having the fans on made almost no difference in the cooling capabilities of the old towers. At my recommendation, these two 5hp fans were disabled. Once a PLC is put in place, I also recommend experimenting with turning on the newer, 10hp fans one at a time.

Reduce Grease Application Rate

Grease is used to lubricate multiple moving parts on each forge. It is distributed through blocks, which eject fixed volumes to ten locations on each forge, for each one to

two horseshoes produced. The used grease coming out of forge contact areas was still clear, indicating that less grease might be sufficient. Since the volume of grease applied by the blocks cannot be decreased, we ran a test reducing the frequency of the grease application by 35%.

Grease analysis showed no metals present from wear and grease application was reduced by another 20% on the test forge. If the used grease comes back clean again, I recommend decreasing the other five presses by 55% and setting the rate of the test press to 1 stroke per 18 cycles (36% of the baseline grease application rate). This will have the immediate effect of saving $12,510 per year. If after further testing the reduced rate press has too much wear, it can be set back to 1 stroke per 12 cycles. In this case, the savings are less, but still significant at $11,190 per year.

Replace Evaporator

The evaporator is used to separate oils and possibly metals from air compressor condensate and wastewater from various pressure washers. This reduces the volume shipped for safe disposal. The current evaporator is heated electrically (draws 20.8 kW), is expensive to operate, and can only evaporate about 5 gallons per hour. St. Croix evaporates about 4,000 gallons of water per year. There are two gas-fired replacement options, one bigger and one smaller. I recommend purchasing the smaller, 15-gallon evaporator. Both new gas-fired evaporators would use the same amount of energy at the same operating cost, and both evaporate faster and at a lower cost than the current electric unit. But the smaller evaporator has a lower initial investment. The current evaporator is operating at a slower rate than promised by its specifications and will likely continue to slow the longer it is used.

Recommendation	Reduction	Annual Savings	Status
Optimize process cooling pumps	242,400 kWh	$20,580	Under review
Disable older cooling tower fans	6,520 kWh	$550	Implemented
Reduce grease application rate	5,700 lbs grease	$11,190+	Testing
Replace evaporator	913 kWh	$1,020	Under review

St. Luke's Hospital

Benjamin Wagener
Mechanical Engineering, UMD

Company Background

St. Luke's Hospital in Duluth is a healthcare facility serving approximately 500,000 residents in a 17-county region spanning into three states. The facility employs 2,592 people and 365 physicians. The main hospital building was built in 1923 and has completed many additions and joint buildings, including the Clinic, Medical Office Pavilion, Building A, and Northland Medical Center, increasing the energy consumption of the entire campus. The facility meets its thermal energy needs by purchasing steam from the Duluth Cooperative Steam Association. The steam is then used for space heating, domestic water heating, autoclave sterilization, and laundry operations.

"My internship project was one of the best, most rewarding experiences of my college career. I learned a lot about analyzing real systems and data, as well as common business practices. Not only did I benefit, but I was able to reduce energy consumption and ultimately save the hospital money."

Project Background

The electrical cost of lighting contributes significantly to St. Luke's total electricity bill. The hospital has been working to reduce lighting energy consumption and is in the process of completing a retrofit project, exchanging T12 fixtures with T8 lamps and electronic ballasts and exchanging incandescent lamps with compact fluorescent lamps. I examined the status of this retrofit as well as exchanging these lighting fixtures and others with more energy efficient lighting options. I also considered installation of occupancy sensors to further reduce lighting energy consumption. In addition, the hospital asked for an inspection of the steam traps for undetected failures.

Incentives to Change

St. Luke's Hospital has been interested in reducing its energy consumption to counter rising utility costs. Electricity usage had increased by 6% from 2010 to 2012, while the overall cost of electricity increased by nearly 5%. During this same interval, steam consumption actually decreased by nearly 5%. However the rate per unit of steam increased by 26%, resulting in an overall higher utility bill. The Conservation Improvement Program has also provided the incentive for St. Luke's Hospital to receive energy audits, look into purchasing more efficient equipment, and receive rebates from the local electricity company, Minnesota Power.

Solutions

Replace Incandescent and CFLs With LEDs

The hospital is in the process of exchanging incandescent lamps for compact fluorescent lamps (CFLs). A savings of 120,983 kWh per year can be obtained if they instead exchange incandescent lamps and CFLs with LED equivalent lamps. The implementation cost is approximately $23,146, for an expected return in 1.5 years when both expected energy and maintenance savings are included. Installing occupancy sensors in offices, bathrooms, employee break rooms, and storage closets will increase electrical energy savings to 122,063 kWh per year, with a cost of $26,582 for implementation and a payback period of 1.9 years through energy and maintenance savings.

Retrofit T12 and T8 Fixtures

The hospital is in the process of retrofitting all 48 inch T12 fixtures with T8 lamps and electronic ballasts. I recommended that the hospital retrofit both 48 inch T12 and T8 fixtures with 28W T8 lamps with electronic ballasts. This exchange would result in a savings of 585,291 kWh per year and a return on investment in 1.4 years when rebates and energy and maintenance savings are included. Adding occupancy sensors to offices, bathrooms, employee break rooms, and storage closets will further reduce electrical energy consumption by 704,241 kWh per year. With occupancy sensors installed in these designated areas, the expected payback period is 1.9 years.

Replace Northland Parking Ramp Light Fixtures

The lights in the Northland Parking Ramp have some of the original lighting fixtures. These fifty-four 150 watt high pressure sodium (HPS) fixtures cost about $4,800 per year to operate. Replacing these 54 fixtures with T8 vapor-tight fixtures can save 61,495 kWh per year with an associated $3,293 in annual utility savings. Implementation will cost approximately $9,115, with a return on investment of 1.1 years when rebates and potential, energy and maintenance savings are included.

Replace/Repair Failed Steam Traps

I performed steam trap testing for failures because no regular inspection had been completed on these systems. Through the inspection, I found that 13 traps were blown through, leaking, rapid cycling, plugged, or flooded, resulting in an estimated loss of 14,890,666 lbs. of steam and $256,715 in steam utility cost. Repairing or replacing these traps is estimated to cost $3,510, allowing the hospital to save all of the steam that is lost, with a payback period of only 0.2 years.

In summary, there are alternative options for each of the lighting system recommendations, typically with and without automated controls. The summary table below reflects the option that would achieve the highest level of energy savings within each lighting recommendation area.

Recommendation	Reduction	Annual Savings	Status
Replace incandescent & CFLs with LEDs	122,063 kWh/yr	$9,376	Under review
Retrofit T12 & T8 fixtures	704,241 kWh/yr	$57,444	Planned
Replace Northland Parking Ramp lights	61,495 kWh/yr	$6,975	Under review
Replace/repair failed steam traps	178,126 therms/yr	$256,715	Implemented

Tennant Company

Jaclyn Thomes
Environmental Sciences, UMTC

Company Background

George Henry Tennant founded a wood products company in 1870 and transitioned to manufacturing floor cleaning equipment in the 1930s. Since then, Tennant has expanded to employ 2,932 people in facilities around the world. Its products are used to polish floors in schools and healthcare facilities, clean airport and retail carpets, and sweep factory floors, city streets, and public parks. Tennant manufactures durable floor sweepers, scrubbers, and industrial floor coatings and has been recognized as a leader in innovation. Headquartered in Golden Valley, the company has seven buildings: Headquarters/Plant 1, Coatings Technical Center, Corporate Woods, Innovation Center, Orbio® Technologies, Services Center, and Solutions Center.

"This internship gave me the opportunity to lead my own project, research waste reduction opportunities, and network with people in the sustainability sector."

Project Background

The intern project was focused around two goals: solid waste reduction and water reduction. The waste project involved the development of an inventory of all waste streams at Tennant's Minneapolis facilities. Waste streams include all materials brought into Tennant's facilities that do not ship out as part of sellable product. The ultimate goal was to create a waste map for the Minneapolis sites and use this map to identify waste streams that have the potential to be source reduced, reused, or recycled insted of going to the landfill. The project also involved developing a plan to optimize waste vendors, dumpster sizing, and pull frequency. The water project looked at Tennant's reverse osmosis unit to optimize efficiency and reduce the amount of water being used, as well as to investigate possible uses for reject water.

Incentives to Change

Tennant's sustainability department was interested in finding opportunities related to waste and water reduction at their Minneapolis locations in order to augment existing sustainability initiatives. Tennant partnered with MnTAP to hire an intern to find opportunities for waste reduction, reuse, and recycling,

which could result in decreased material usage and waste as well as cost savings. Tennant was also interested in analyzing the reverse osmosis water system to identify opportunities for improving efficiency and reducing water usage.

Solutions

Waste Reduction & Diversion

Tennant Company's headquarters produces a significant volume of paper waste in offices, food waste in the café, paper towels in restrooms, and outdated electronics. In the plant area of the facility, waste streams expand to include cardboard, plastic banding, plastic film, pallets, scrap-metal, and hazardous waste, such as used absorbents, fork lift batteries, and used oil.

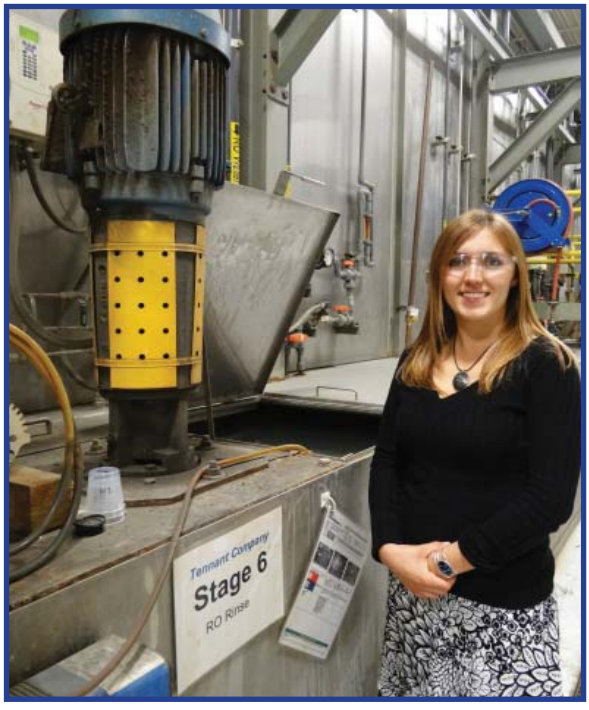
A number of recommendations were made to reduce, reuse, and improve recycling of these waste streams. These recommendations were quantified and prioritized using data from a waste sort that was conducted by Minnesota Waste Wise (MWW), an outside contractor, midway through the intern project. MWW sorted Tennant's waste into various categories like mixed industrial materials, food, paper towels, cardboard, and paper and then weighed each category. The largest waste stream was "true trash," which is comprised of difficult-to-recycle items like sanding disks, Styrofoam cut-outs, and air filters. The next largest waste stream was compostable material at 15% by weight. This included food scraps, compostable food ware, and paper towels from the restrooms. The next largest waste streams were cardboard, paper, and industrial plastics. The information from this process helped Tennant identify areas on which to focus their waste reduction and diversion efforts.

The wastes produced by a facility aren't always found in the trash, but rather in the pocket book. At many of Tennant's buildings, dumpsters were considerably larger than the volume of waste produced. By right-sizing the trash and recycling dumpsters, Tennant could save $6,400 in fees and taxes per year. In addition to right-sizing dumpsters, Tennant could save $3,100 in empty drum ordering costs by collecting metallic dust from laser cutting in 55-gallon drums instead of 30-gallon drums.

RO Unit Efficiency

At Headquarters/Plant 1, the company uses water for irrigation, domestic applications, and production. The paint wash system uses both fresh city water and reverse osmosis (RO) water. The RO unit pre-treats and filters city water before it is pumped across filtration membranes. The process produces discharge water, the volume of which is dependent on the efficiency of the overall system and the quality of the incoming water.

By right-sizing the RO unit pump, Tennant could reduce nearly 490,000 gallons in reject water annually, with a 9 month payback. In addition, by installing proper pre-treatment equipment, Tennant could nearly double the life of the RO membranes and spend less on maintenance costs, for a savings of $3,600 per year.



Recommendation	Reduction	Annual Savings	Status
Waste reductions	56,670 lbs	$44,930	Under review
RO unit efficiency + other water recommendations	1,600,000 gallons water 929 kWh	$18,390	Under review

ST Specialty Foods

Rahul Dhuria
M.S., Industrial Engineering, UMTC

Company Background

ST Specialty Foods was formed as an entrepreneurial start-up company in 1992. The company has an exclusive niche in the value-added dinner and side-dish segment of center store retail. The Brooklyn Park manufacturing facility mainly produces packaged pasta products, such as macaroni & cheese. The company also produces boxed potatoes, prepared dinners, meal cups, noodles and sauce, skillet dinner mixes, and instant rice and rice mixes.

Project Background

ST Specialty Foods is a growing low-cost pasta producer that must be sustainable and waste-free in order to maintain its competitive position in the industry. The executive team has identified lean manufacturing improvements as a priority for this site in particular. The intern's projects will strategically enable the company to both grow and reduce waste.

Incentives to Change

The ST Specialty Foods management team is striving to implement a lean manufacturing program focused on 5S improvement, setup time reduction, and process control. If sales forecasts are realized, production orders will increase 10-15%, which would require operating the plant on weekends, increasing the energy intensity of the process. Another opportunity for process improvements is reducing waste product going to animal feed.

Focus areas of the internship include:

- Leading and assisting with a 5S improvement process implementation that standardizes work areas and reduces employee and equipment downtime
- Providing systematic procedures for processes in a visual manner
- Measuring the impact of these improvements through observation of plant operations
- Conducting a lean process value stream analysis to prioritize opportunities to reduce unnecessary product waste or reprocess
- Working with maintenance staff to immediately implement changes that can be achieved with in-house staff
- Leading a lean setup time reduction effort for die changes and product changes that require mechanical adjustment to the process
- Reducing energy and materials usage in the product packaging process by researching and implementing an improved weight control scheme for packaging

Partner Perspectives

"The MnTAP Intern Program is an important outreach tool for Minnesota businesses, providing high quality on-site assistance for pollution prevention, efficient resource utilization, and cost savings."
- Tina Patton, Minnesota Pollution Control Agency

"Xcel Energy appreciates the high quality of work the interns provide and the commitment of MnTAP staff members who support them."
- Lori Nielsen, Xcel Energy

"The MnTAP intern did a great job identifying significant natural gas energy efficiency solutions in new and creative ways for our customer."
- Matthew Dean, CenterPoint Energy

"The innovative work of the MnTAP interns in the industrial water conservation assessment project has resulted in large implemented savings at several companies."
– Brian Davis, Metropolitan Council, Water Supply Planning

Join the Intern Program in 2014

For Companies

Do you have a pollution prevention or energy efficiency project that you'd like to tackle, but are pressed for time? Would you like to help a science or engineering student advance their technical skills while providing them with a real-world opportunity to use their classroom knowledge? If so, consider hosting a MnTAP intern.

Your business may be able to address waste reduction and energy efficiency projects sooner and faster with the help of a MnTAP intern. An intern can make suggestions that improve efficiency, save money, reduce waste and material usage, or decrease your regulatory compliance burden. Also, an intern has the time and creativity to research alternative equipment, procedures, chemicals, and raw materials. As with all of MnTAP's projects, proprietary information at your facility is kept confidential during and after the intern project.

Company Benefits:

- A new set of eyes looking at your waste or energy project
- Your intern being mentored and guided by a MnTAP engineer or scientist
- A full report and presentation detailing the intern's work and next steps for your company
- MnTAP managing the recruiting, hiring, and training process

Now is the time to start thinking about developing a project for the summer of 2014. Company project proposals are due on February 1, 2014. Proposals will be reviewed upon receipt, and companies will be contacted within two weeks for additional project development and scoping. We request participating companies to contribute 10% ($2,500) of the total project cost as a cost-share to help support the intern program. These funds are used to offset project costs such as the student stipends that are issued at the end of the projects. Complete an online project proposal or call MnTAP today!

For Students

MnTAP is seeking junior or senior college students to work on waste reduction and energy efficiency projects at companies in Minnesota. MnTAP anticipates funding up to nine projects for the summer of 2014 in locations around the state. The projects are located at different companies and in a variety of industries.

Student Benefits:

- Having an opportunity to positively affect a facility's environmental footprint
- Gaining hands-on project management experience
- Using your classroom knowledge in a real-world setting
- Earning $13.85/hr and working 40 hours a week during the summer

The application deadline for summer 2014 internships is March 1, 2014. Selection of 2014 interns will begin in February and continue into the spring until project assignments are finalized. Selected applicants will be matched to a project based on academic background and performance, relative experience, and technical skills. To apply for an internship, complete the online application form or Microsoft Word document and submit it with your cover letter, resume, and unofficial transcript.

Company Intern Proposals and Student Intern Applications are available online now at:

http://www.mntap.umn.edu/intern/index.htm

About MnTAP

MnTAP is an outreach program at the University of Minnesota that helps Minnesota businesses develop and implement industry-tailored solutions that prevent pollution at the source, maximize efficient use of resources, reduce energy use, and reduce costs to improve public health and the environment.

MnTAP provides technical assistance tailored to each business. By reducing waste and increasing efficiency, businesses in Minnesota can save on disposal and raw material costs, decrease regulatory compliance burdens, and make working conditions safer for employees.

MnTAP is funded primarily by a pass-through grant from the Minnesota Pollution Control Agency's Resource Management and Assistance Division to the University of Minnesota School of Public Health, Division of Environmental Health Sciences. MnTAP has no regulatory responsibilities or obligations.

""Our experierience with MnTAP and our intern was extremely positive. The wealth of information and economic benefits to the City of Hutchinson from this internship program will be realized for many years to come."

~Brian Mehr
Wastewater Superintendent,
City of Hutchinson

For more information about the intern program or how to participate, please contact MnTAP intern coordinator, Linda Maleitzke, at 612.624.4697 or lmaleitz@umn.edu.

MnTAP SOLUTIONS

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