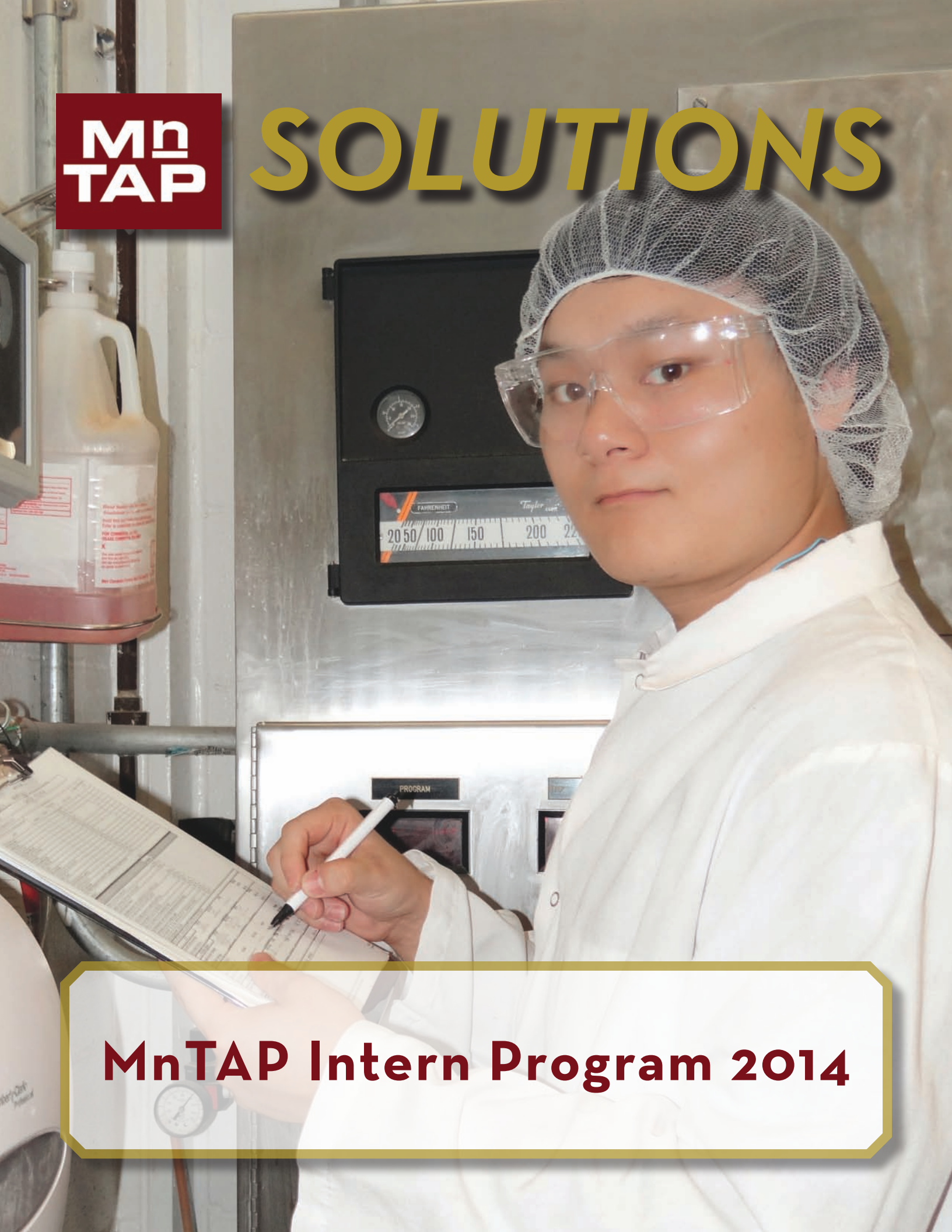
MnTAP

SOLUTIONS



MnTAP Intern Program 2014

MnTAP thanks our generous partners who make this vital work possible. Each of these organizations contributed financially to support at least one intern project for 2014. Their support helps MnTAP increase the number of intern positions available each year and helps maintain our continuing pollution prevention, energy efficiency and water conservation work.

"Minnesota benefits from the MnTAP Intern Program on many levels; businesses address opportunities to improve their operations and environmental performance while students gain experience they can apply in the workforce."

~ Tina Patton, Minnesota Pollution Control Agency

"We are proud to work with MnTAP in finding innovative water efficiency solutions for Twin Cities area businesses."

~ Brian Davis, Metropolitan Council, Water Supply Planning

"The MnTAP intern provided our customer with an additional resource to move energy conservation projects forward."

~ Russ Wagner , Key Account Manager, CenterPoint Energy

"The Commerce Department is happy to fund a Lean manufacturing project within the MnTAP Intern Program – it provides a well-developed format to create, evaluate and implement innovative tools and strategies for business and utility partners to improve the energy efficiency of industrial facilities in Minnesota, and to help the state meet its annual 1.5% energy savings goal."

~ Mary Sue Lobenstein, CIP R&D Program Administrator, Minnesota Department of Commerce, Division of Energy Resources

"Supporting the MnTAP Intern Program helps Xcel Energy build strong relationships with our customers. We appreciate the interns and the value they bring to energy-saving projects year after year."

~ Lori Nielsen, Xcel Energy

"The MnTAP intern program provides a highly qualified, motivated, energetic, and enthusiastic resource who can quickly engage and contribute to important projects that have real impact and benefit to the business."

Scott Bates, Sr. Lean Six Sigma Black Belt, Uponor

The 2014 intern projects were supported by the work of the following MnTAP staff with the projects they advised:

Anna Arkin
Solid Waste Specialist
Minnesota Pollution Control Agency

Laura Babcock
MnTAP Director

Matt Domski
Organic Waste Specialist
Kerry Ingredients

Karl DeWahl
Supervisor
Kraft Foods

Monique Dubos
Solutions Editor/Designer

Michelle Gage
Associate Engineer
ECO Finishing

Mick Jost
Supervisor
TEL FSI, INC.
Gerdau

Linda Maleitzke
Intern Program Administrator
Solutions Writer/Editor

Paul Pagel
Senior Engineer
Intern Coordinator
MGK

Jane Paulson
Senior Engineer
Uponor (2 intern projects)

A.J. Van den Berghe
Engineer
City of St. Cloud
Wastewater Treatment Facility

Jon Vanyo
Associate Engineer
GE Water & Process Technologies

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"Our MnTAP intern enhanced the company's ability to explore meaningful energy conservation and waste reducing opportunities while validating daily kaizen as a viable, heuristic methodology. The additional engineering bandwidth allowed us to create both a foundation and momentum to several deserving and impacting projects."

– Dave Westphal, Engineering Manager, MGK

Director's Note

MnTAP Intern Program: Recipe for Success

Laura Babcock
MnTAP Director

With this issue of *Solutions*, we celebrate the great results of the 2014 intern projects and look forward to new opportunities for the summer of 2015. The best part of the program is the privilege to witness the professional development of the interns themselves.

The MnTAP Intern Program truly is a recipe for success. Mix highly qualified, upper level engineering and science students, add enthusiasm to apply their creative problem-solving and technical skills, stir in business-significant industrial questions and fold in committed company and MnTAP staff mentors. What we get are solutions to challenges faced by businesses in Minnesota and young professionals who are ready and able to take their place as part of a thriving Minnesota workforce.

When interviewed at the end of the program, the students often mention their increased confidence in managing projects and applying their educational knowledge to real industrial challenges. It is truly an honor to be a partner in the training and development of these young professionals.

If you were fortunate enough to attend our Intern Symposium on August 21, you may have noticed a few new features. This was the first year we implemented multiple presentation tracks and a poster session to increase the opportunities for attendees to mingle with and ask questions of the interns about their projects. We look forward to continuing to increase the networking opportunities and share great new ideas.

"Our MnTAP intern's recommendations and the toolkit she created will be of incredible value to the state agencies involved in the project. These resources will also benefit other agencies looking to identify opportunities to reduce their solid waste generation and meet state recycling goals."

~Emily Barker,
Organics and Recycling Specialist,
Sustainable Materials Management Unit, RMAD
Minnesota Pollution Control Agency

As you read through the summaries of the 2014 MnTAP intern projects, we hope you will be motivated to look at your own processes. Are you a business that wants to maximize resource utilization, increase energy efficiency, conserve water, prevent pollution and reduce operating costs? If the answer is yes, apply to participate in the 2015 MnTAP Intern Program today.

2014 Intern-Proposed Solutions

Recommendation	Reduction	Cost Savings	Equivalents (per year)
Water conservation	24,321,500 gallons	$116,555	Water for 1,025 Minneapolis residents
Solid waste	473,510 lbs	$287,085	Weight of approx. 5 Metro Transit light rail cars
Energy	3,375,900 kWh	$257,650	Electricity for 352 Minnesota homes
Energy	105,400 therms	$61,100	CO_2 emissions from 118 passenger vehicles
Other savings	---	$11,355	---
Total Potential Cost Savings		**$733,745**	

MnTAP Intern Program

A History of Success

For 29 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 facilitate 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 92 distinct communities; over 60% of those communities are outstate, while the other 40% are in the Twin Cities metro area.

Companies Reap Rewards

More than 184 companies have participated in the MnTAP program in the past 29 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 followup 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 2014 interns (not pictured: David Binstock, Emily Campion)

Students See Success

The MnTAP intern program is very popular with students as well. In 2014, 147 students applied to the program to fill the 11 summer internship positions. In total, 208 intern positions have been filled over the past 29 years.

Interns have represented 24 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 Twin Cities and the 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 intern project allowed us to take a deeper look than we normally do at how our process uses energy. The MnTAP technical support also helped with the success of the project."

~Clinton Buchner, Business Development Manager, Kraft Foods, Albany

"The outcome of the project has resulted in a minimum of 20% reduction in electrical demand of the aeration system and has created the momentum for even more reductions to occur."

~Tracy Hodel,
Assist. Public Utilities Director,
City of St. Cloud WWTF

"Working with the MnTAP program has helped us create less waste and improve our operations in regard to sustainability. We highly recommended the program."

~Paul Madden, Technical Director,
ECO Finishing

"It was great to work with the MnTAP team - the intern plus staff engineers looked at our process in a new way and found efficient, economical changes to enhance our production."

~David Crisman, Environmental Engineer, GE Water & Process Technologies

"Our MnTAP intern was able to hit the ground running and lead a green project with minimal direction from our team. He was able to identify a plan to reduce energy consumption which resulted in substantial energy cost savings!"

~ Brad Graetz, Lean Manager, Uponor

"By having a MnTAP intern for the summer, Kerry gained a motivated, self-starting professional. We gained a person who was dedicated and focused on problems that have been overlooked or ignored. We obtained real solutions with real numbers that achieved real results."

~Joseph Hrubes
Engineering and Maintenance Manager
Kerry Ingredients & Flavours

MnTAP thanks the companies that hosted an intern project in 2014.

We recognize student success is directly related to company support!

City of St. Cloud

Emily Campion
Chemical Engineering
University of Minnesota Duluth

Company Background

The St. Cloud Wastewater Treatment Facility (WWTF) was established in 1976 to prevent pollution of the Mississippi River. The WWTF treats the industrial, commercial, and residential wastewater from the six-city, 110,000 population area of St. Cloud, St. Joseph, Sartell, Sauk Rapids, St. Augusta, and Waite Park. The treatment process includes bar screen, grit removal, activated sludge biological nutrient removal, primary and secondary clarifiers, ultraviolet (UV) light disinfection, and anaerobic digestion of the solids. The St. Cloud WWTF is dedicated to continuous improvement and meets and exceeds permitted discharge regulations set by the Environmental Protection Agency and Minnesota Pollution Control Agency.

CITY OF ST.CLOUD MINNESOTA
PUBLIC SERVICES SECTION

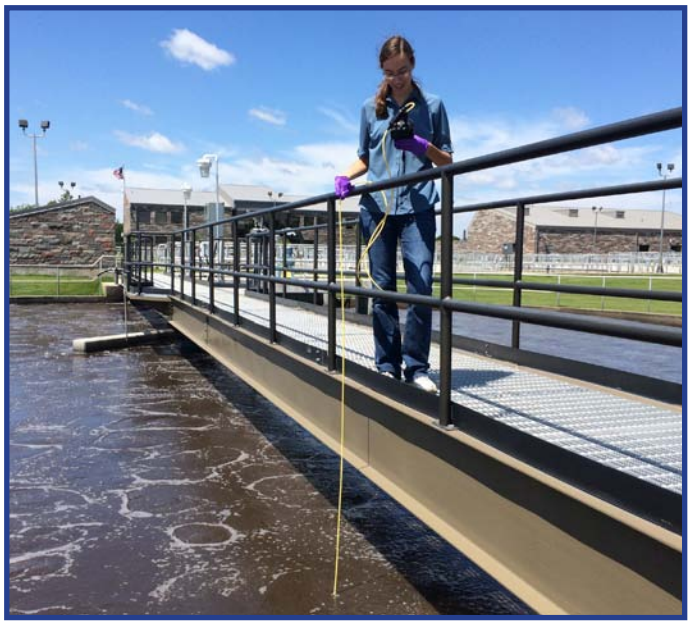
"Working on a collaborative team with maintenance technicians, managers, and operators enabled me to understand the unique operating characteristics of the plant, which was essential to the successful outcome of the new control strategy we implemented."

Project Background

Electrical energy is St. Cloud WWTF's largest operating expense, and the three 600-horsepower aeration blowers are the most electric energy-intensive equipment at the facility. The aeration blowers provide airflow to membrane disc fine bubble diffusers at the bottom of biological nutrient removal (BNR) tanks. Each zone of the BNR tank has a dedicated air valve which is automatically throttled to control the airflow rate to each basin to a specified dissolved oxygen (DO) setpoint. The process control scheme manipulates the blower airflow discharge and throttling valve positions to meet a DO concentration of 2 mg/L while simultaneously providing sufficient airflow to maintain minimum mixing in the BNR tanks.

Incentives To Change

The St. Cloud Wastewater Treatment Facility has declared a commitment to resource recovery and energy efficiency. Increasing aeration blower efficiency would save significant energy because one-third of the plant's total electrical energy consumption is attributable to the aeration blowers.



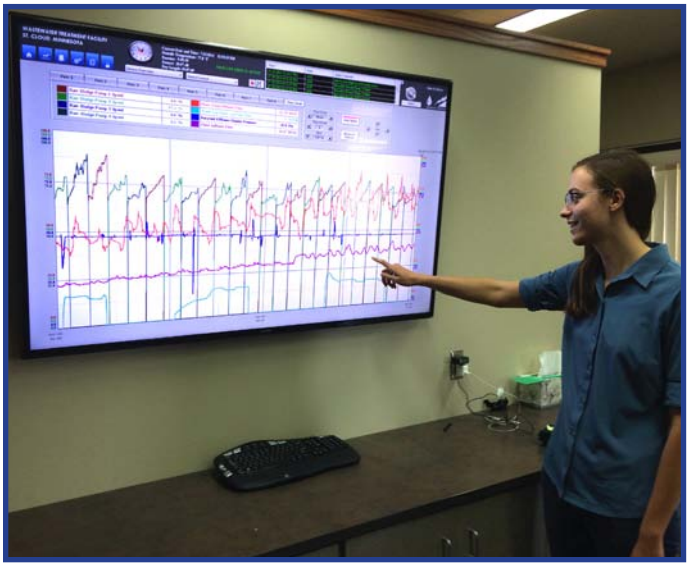
Recently the St. Cloud WWTF has committed to a Resource Recovery and Energy Efficiency Master Plan. This includes recycling biosolids, converting biogas into electricity, utilizing methane digester gas for boiler fuel,

lighting upgrades, and equipment efficiency upgrades. Xcel Energy, the WWTF's energy provider, offers custom rebates of up to 60% of the capital investment for energy efficient upgrades. In addition to the price per kWh of energy consumed, the facility is charged a "firm demand charge" based on the peak monthly power demand. Increasing blower efficiency would reduce costs because one-third of the plant's energy consumption is from the aeration blowers.

Solutions

Most-Open Valve Control Strategy

The most-open-valve control strategy reduced the blower discharge pressure by opening downstream air throttling valves to a mostly-open position to reduce pressure drop. Taking advantage of the fan affinity laws, the reduction in blower pressure enabled the blower to operate at its minimum power capacity, thereby saving power. In addition, the most-open-valve control strategy also eliminated blower surging problems caused by the previously higher pressure due to the less-open valve positions. Adopting this strategy reduced energy use by 392,000 kWh per year, with a savings of $27,000.



Master Control Panel

The Turblex master control panel includes logic programming for most-open valve control, pressure control, and dissolved oxygen control. The master control panel would simplify most-open valve control by automating the optimal valve position. The savings associated with the master control panel are due to decreased blower pressure and better dissolved oxygen control. Installing a master control panel could save 766,000 kWh per year and $54,000.

Recommendation	Reduction	Annual Savings	Status
Most-open valve control strategy	392,000 kWh/yr	$27,000	Implemented
Install master control panel	766,000 kWh/yr	$54,000	Recommended

ECO Finishing

Erik Anderson
Chemical Engineering
University of Minnesota Twin Cities

Company Background

ECO Finishing is an electroplating shop in Fridley was established in 1994 and has about 100 employees. ECO Finishing offers electroplating, anodizing, phosphating, and electroless nickel plating services to its clients. Parts come from a wide variety of industries, including the automotive, aerospace, military, and manufacturing industries. ECO Finishing strives to meet its customer's requirements and demands in both plating quality and lead time.

"This experience gave me a chance to use my classroom knowledge in a real-world setting, improve my communication skills, and manage a project – all while making a positive impact on the environment and the company."

Project Background

Two large production expenses at ECO Finishing (and most plating shops) are water usage and sludge generation. The majority of water usage at ECO Finishing is used in rinse tanks that remove plating and cleaning solutions from parts. Heavy metals end up in the rinse water, and need to be removed before water can be discharged. Through a treatment process, these heavy metals are precipitated and manifest themselves as sludge, which is a hazardous waste that ECO Finishing pays to be disposed of in a landfill. Sludge can also form in process tanks, and this sludge is removed and disposed of periodically as well. I examined ways in which water usage and sludge generation could be reduced and identified four methods that reduce water and waste related costs.

Incentives To Change

ECO Finishing uses nearly 36 million gallons of water per year, and generates approximately 700,000 pounds of electroplating sludge each year, costing $240,000 and $98,000 per year respectively. Additional money is spent to purify some of the water by softening and reverse osmosis (RO). If production expands in the future, there is a risk of exceeding the service availability charge (SAC) baseline for sewering of wastewater. In 2014, one-time SAC fees in the metro region were $2,485 for every 274 gal per day increase.

Solutions

Install Conductivity Control Systems For Rinses

Production is very sporadic on some process lines, so water entering the rinse tank may not clean any parts. Conductivity control monitors the contaminant level in the rinse tank, and activates a solenoid to supply water only when contaminant levels get too high. ECO Finishing could save 1,520,000 gallons of water and $8,600 per year by implementing conductivity control on four rinse tanks. An additional 10 tanks have been identified that would be the next most promising for conductivity control as costs change in the future. If all recommended rinses were implemented, ECO Finishing could save up to 5,810,000 gallons of water and $33,400 per year by installing conductivity control on all 14 rinses.

Convert Cleaner Baths To Soft Water

ECO Finishing currently uses softened water for plating bath make-ups and rinses where ferrocyanide can be an issue. In initial, small-scale experiments, the intern found that making up cleaner baths and cleaner rinses with soft water kept the cleaning chemical in solution more effectively and also led to cleaner parts. Estimates include a reduction of 4,000 lbs of sludge per year, a reduction in cleaning chemical additions, and savings of $6,100 per year in sludge disposal and labor for implementing soft water cleaner baths on three process lines.

Increase Drip-Time Of Parts

Dragout is the process solution that drips into the tank during carryover or adheres to the parts as a thin film. Dragout is the main contributor to sludge in the shop. One test on the small zinc line showed that by waiting 5 seconds for parts to drip before moving to the next tank, there was a 25% reduction in dragout. Implementing this procedural change can reduce ECO Finishing's sludge generation by approximately 116,000 lbs per year which, along with chemical savings, would save about $28,275 per year.

Recycle Hot RO Rinses

ECO Finishing uses RO water for ultrapure, hot, final rinses on six lines. Currently these very pure rinses are being sent down the drain. A currently unused RO system in-house could be used to recycle these hot rinses, saving approximately 1,700,000 gallons of water per year. Additionally, the system would have a heat exchanger that would protect the RO membranes and recover approximately 19,000 therms per year. The system would cost about $14,640 in equipment and labor, and would save the company $25,620 in water and energy.

Recommendation	Reduction	Annual Savings	Status
Install conductivity control systems for rinses	5,810,000 gallons water	$33,400	Testing
Convert cleaner baths to soft water	4,000 lbs sludge	$6,100	Implementing
Increase drip-time of parts	116,000 lbs sludge	$28,275	Implementing
Recycle hot RO rinses	1,700,000 gallons water 19,000 therms	$25,620	Under review

GE Water & Process Technologies

Nikola Trukov
Chemical Engineering
University of Minnesota Twin Cities

Company Background

GE Power & Water Technologies is a division of GE that focuses on providing clean and sustainable sources of power and water to customers by emphasizing efficiency and productivity. On the power side, GE focuses on producing equipment such as generators and turbines. On the water side, the company focuses on water treatment and wastewater purification in order to optimize water resources. With the production of many types of membranes and filters, GE is able to help provide high-quality water to businesses and homes, earning it the award of "Water Company of the Year" by the Global Water Intelligence.

"This MnTAP project provided me the opportunity to apply the knowledge I have gained in the classroom to real-world processes. It was an amazing experience which allowed me to develop project management and communication skills that will be crucial to my future career. It was great to expand my knowledge and gain valuable experience while making an impact by reducing water use and cost for the company."

Project Background

Six different lines are used to produce filters from polypropylene beads. The beads are conveyed to a hopper on top of a heated extruder. Non-contact cooling water controls the extruder bearing and barrel temperature and prevents heat from rising into the hopper. The water flow is extremely important in preventing the polypropylene from melting prematurely and clogging the hopper as it drops into the process. The extruder barrel drives the polypropylene through progressively hotter zones which melt the material. The extruder and the hot polypropylene are driven by several motors to the production machines where the polypropylene is made into a filter. The production machine has a motor and uses non-contact cooling water to remove heat from the newly formed filter.

Incentives To Change

GE is strongly committed to reducing waste production and creating more efficient processes. As part of the production process of depth filters, non-contact cooling water is used in a single-pass cooling system. Being able to analyze and understand the water flow through the process allows for a possible reduction and regulation of the amount of water used. Creating an efficient way to use the water will not only reduce the cost of the overall process, but can also help reduce wastewater. It is a change that will benefit the facility and advance its goal of protecting the environment.

Solutions

Install Metering Valves And Flow Meters

The flow rate of the cooling water is related to the temperature profile throughout the extruder. Currently, a total of 3.3 million gallons are flowing through extruders on lines 1 through 5. By collecting temperature data over a three week period, it was concluded that the flow rate through multiple extruders is high. Installing a metering valve on the water supply pipe on each extruder will provide the ability to control and reduce the water flow. The flow meters will be used to monitor the flow rate and confirm the presence of cooling water. Implementing these changes can reduce water consumption by 1.45 million gallons, providing up to $3,100 in savings.

Install A Solenoid Valve With An Interlock Mechanism

Usually, the lines are constantly operating, so a continuous flow of cooling water is needed. However, sometimes a line can be turned off for a specific period of time. When a line is not operating, there is no need for water flow. A solenoid valve can be used to turn the water flow on and off. An interlocking mechanism consisting of a switch and a relay will connect the solenoid valve to the heaters and ensure that the cooling water is automatically turned on once a line is started up and turned off when the line is powered down. Implementing this change will lead to additional savings of about 173,000 gallons. These savings are hard to estimate because they are dependent on the demand for the product, which changes every year.

Place Thermocouple On The Gear Box

The gearbox is an exposed surface that can cause a serious safety hazard if it overheats. A thermocouple will allow the operators to keep track of the surface temperature and make sure the process is operating around a safe temperature of 120° F as the water flow and water temperature fluctuate.

Implement The Same Changes To Line 6

Right now, tests are being conducted on line 6 to learn about the current state of the line. The flow rate for this line has been recorded. Collecting water temperature data over a three-week period showed there was an opportunity for water reduction. Based on the data collected so far, it has been estimated that the water flow can be reduced by a total of 2 million gallons per year, corresponding to $4,500. More concrete numbers and recommendations can be made when more data has been collected.

Recommendation	Reduction	Annual Savings	Status
Install metering valves and flow meters	1,450,000 gallons water	$3,100	Proposed
Install solenoid valve with an interlock mechanism	173,000 gallons water	$370	Proposed
Place thermocouple on the gear box	N/A	N/A	Proposed
Implement the same changes to Line 6	2,050,000 gallons water	$4,500	Testing

Gerdau

Daniel Sundberg
Mechanical Engineering
University of Minnesota Twin Cities

Company Background

Gerdau is a global steel manufacturing company that specializes in long steel production. The company began operations in Brazil back in 1901 and now operates in 14 countries worldwide. Gerdau is currently the leading producer of long steel products in the Americas and one of the main suppliers of specialty long steel in the world. The mill located in Saint Paul produces long steel products such as rebar and round stock by melting down and recycling steel from scrap material.

"This project gave me my first experience in an industrial setting, which will be invaluable in my future career. Leading my own project gave me confidence and showed me that the knowledge I gained while in school is applicable and relevant to the real world."

Project Background

Steel production is energy intensive. The goal of this project was to determine, evaluate, and quantify savings associated with making processes more efficient. The processes were analyzed to determine possible reductions in electricity, potable water, and natural gas consumption.

Incentives To Change

A major portion of production cost comes from energy used to process it. Reducing this final product cost through greater efficiency allows Gerdau to stay competitive with other steel companies and is thus a major priority for Gerdau. Gerdau has always made sustainability a priority and this is a major reason for their continued success.

Solutions

Install Variable Frequency Drives (VFDs) On The Combustion Air Fans

The reheat furnace, used to reheat the billets prior to rolling, utilizes two 125hp combustion air fans. The flow-rate from these fans is currently controlled using variable inlet guide vanes. This control method is very efficient for top-end trim control (above 90% of the design flow-rate), but inefficient for reducing the flow-rate below 90%. During typical fan operation the inlet guide vanes are set to approximately 30% open. Switching to VFD control, which is much more efficient for low flow-rates, would save approximately $46,100 annually with an implementation cost of approximately $74,200.

Replace Pneumatic Air Blower With An Electric Air Blower

Once the billets have been rolled out to their final dimensions, the bar is over 100 feet long. These bars are cut to length with a large mechanical shear. The clutch that transfers power for the shear gets very hot during use. To keep the machine from shutting down, compressed air is blown through a pneumatic blower to cool the clutch.

Compressed air is a notoriously inefficient power source and an electric blower would be much more efficient. Installing an electric blower could save $6,800 annually for a one-time implementation cost of approximately $5,200.

Duct Cooler Air From Outside To The Main Compressor

Currently the main compressor receives its air supply from inside the compressor room. Measurements indicate that this room is, on average, approximately 13°F warmer than the corresponding air outside. The installation of air ducting from outside could save 2% of the annual electric costs for the compressor. This corresponds to approximately $5,500 in annual savings which could be realized if the ducting were to be installed. The installation of ducting would cost approximately $5,000.

Replace The Compressor Cooling System's Evaporative Cooler With A Dry Cooler

The site's main air compressor is currently cooled through a closed loop evaporative cooler. This cooler consumes an estimated 3,000,000 gallons of makeup water annually due to evaporation, drift, and blow-down losses. Installing a dry cooler would reduce the potable water usage to an estimated 500,000 gallons per year (used only on very hot days for temperature trim control). The potable water savings combined with the slightly increased fan costs would save an estimated $19,700 each year. The installation of a new dry cooler would cost $74,900.

Repair Or Replace The Recuperator On The North Ladle Pre-Heater

Before molten steel can be poured in a ladle, it needs to be heated. The ladles are heated by natural gas-fired ladle pre-heaters. The site's north ladle pre-heater has been fitted with an exhaust gas recuperator that has since become inoperative. Information from when the previous recuperator was installed suggests that replacing the inoperative recuperator with a working one could save $43,500 in reduced natural gas costs annually. The installation of a new recuperator is estimated to cost $140,500.

Shutdown Shredder Electric Motors When Idle

The "shredder" area of the plant is where scrap material is reduced in size through the processing of material through the hammer mill. During typical daily operation, events occur that stop the processing of material. These delay periods can last over an hour, during which the motors are typically left running. Analysis of average delay time and motor running costs suggest $18,400 could be saved annually by shutting the motors down during idle periods greater than 15 minutes. These results could be attained with no implementation cost.

Repair Identified Natural Gas, Compressed Air, And Oxygen Leaks

During a small leak test survey, seven leaks were found and documented. The repair of these leaks is currently in progress and is estimated to save $9,800 annually. Additionally, many of these leaks were noted to take place at torch stations. It has been recommended that the site install a leak testing solution at each of the torch stations to detect these leaks early.

Recommendation	Reduction	Annual Savings	Status
Install VFDs on the combustion air fans	640,000 kWh	$46,100	Under Review
Install electric air blower	103,000 kWh	$6,800	Under Review
Duct cooler air to main compressor	76,000 kWh	$5,500	Under Review
Install dry cooler to cool compressor	3,100,000 gallons water	$19,700	Under Review
Repair/replace recuperator on ladle pre-heater	82,100 therms	$43,500	Under Review
Shut down shredder electric motors when idle	263,000 kWh	$18,400	Under Review
Repair gas, compressed air, and oxygen leaks	6,400,000 ft^3 of gases 9,000 kWh	$9,800	Complete

Kerry Group

Simone Richardson
Bioproducts and Biosystems Engineering,
University of Minnesota Twin Cities

Company Background

Kerry has over 200 sites that supply more than 15,000 foods, food ingredients, and flavors to food manufacturers worldwide. The Kerry Ingredients site in Rochester was purchased in 2004 and currently employs about 100 employees. This site focuses on functional and active ingredients, with a large focus on fermented ingredients, allowing Kerry to provide natural flavors, enhanced textures, and an extended shelf life. Other key manufacturing processes include spray drying, powder blending, and packaging. The ingredients and flavors produced at the Rochester facility may ultimately end up in ready-to-eat meals, sauces, dressings, dairy products, bakery products, or processed and fermented meats.

"This internship provided me with the opportunity to gain engineering experience in a food facility, to lead my own project, and to work collaboratively with various areas of the plant. I am so happy to have had such a positive and valuable experience and am excited to apply what I've learned to my future career."

Project Background

Thousands of gallons of wastewater are released to Kerry's production floor every day following production processes and equipment wash-downs, draining to the sewer. Process materials that end up in the wastewater stream may cause high biological oxygen demand (BOD) and pH excursions that have negative effects on the environment and may require enhanced treatment at the local wastewater treatment facility and result in increased cost to the business. I examined sources of extreme pH and high BOD and how they could be reduced to decrease wastewater loading and conserve overall water use in order to decrease Kerry's total economic cost and environmental impact

Incentives To Change

Wastewater loading limits set by the Rochester Water Reclamation Plant require Kerry to be conscious of what ends up in the water that is discharged to the city. The higher the wastewater loading, the more treatment is required by the Water Reclamation Plant to clean the water and recycle it to the Zumbro River. Recent pH and BOD levels in excess of current permit limits have motivated Kerry to take action and find solutions to these overages. The company is dedicated to pollution prevention and, additionally, has the opportunity to save money through the reduction of wastewater loading and conservation of water.

Solutions

Optimize CIP Processes

Clean-in-place (CIP) systems are frequently used to clean equipment efficiently between product runs. Each CIP involves caustic and acid wash cycles, and the chemicals used in the process eventually flow to the sewer pit, contributing to pH spikes. By optimizing the timing of the CIP cycles, Kerry can decrease the number of pH excursions.

Clean Out Sewer Pit

Kerry's sewer pit collects all of the wastewater from the plant before it gets sent to the Water Reclamation Plant for treatment. Currently, the pit is over half full with sludge, resulting in a lower residence time in the pit with less opportunity for pH neutralization. By cleaning out the solids from the sewer pit, it is estimated that the average hold time in the pit can be increased from 20 minutes to over 4 hours. This will allow the chemicals more time to mix and neutralize, potentially reducing the number of pH excursions each month.

Divert Solids From Spray Dryers

When the spray dryers are cleaned between product runs, a lot of built-up product is washed off the inside walls and ultimately sent to the drain, contributing to high BOD in the wastewater. By diverting the first rinse of each CIP to the effluent silo, close to 74,500 pounds of solids can be removed from the wastewater each year. Alternatively, a filter sock could be attached to the dryer during the first rinse of the CIP to catch a portion of the solids before being sent down the drain, saving about 13,500 pounds of solids per year.

Modify Wet Packaging Line

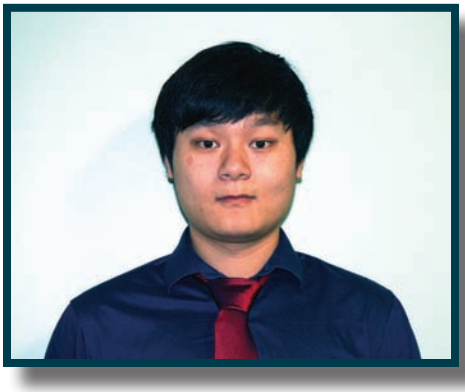
Some packaged liquid product cannot be sent out as product for reasons such as falling onto the floor, having a cap that is not tightly sealed, or not reaching the proper selling weight. The product from these bags is emptied down the drain. By finding ways to prevent product from being wasted, it is estimated that Kerry can save over 7,000 pounds of solids from entering the sewer pit each year.

Fix Water Leaks

There are several water leaks on frequently running equipment, which can cause a large amount of water to be wasted. By fixing various leaks in the CIP units, sterilizer, centrifuge, and dryer, it is estimated that over 943,500 gallons of water can be saved each year.

Recommendation	Reduction	Annual Savings	Status
Optimize CIP processes	Reduce pH excursions	$550	Recommended
Clean out sewer pit	Reduce pH excursions	Unknown	Partially implemented
Divert solids from spray dryers	30,000 lbs of solids	$6,000	Needs further analysis
Modify wet packaging line	7,000 lbs of solids	$30,000	Recommended
Fix water leaks	943,500 gallons of water	$7,000	Partially implemented

Kraft Foods



Boyang Li
Chemical Engineering
University of Minnesota Twin Cities

Company Background

The Kraft Foods plant in Albany manufactures dried cheese products, blends cheese powders with other ingredients, and manufactures a semi-soft cheese. Three spray dryers are a key part of the operation and the plant produces about 43 million pounds annually, serving both internal and external customers. The plant currently occupies 83,800 square feet and employs 69 employees.

"It was an honor working with such a supportive team and to be exposed to real engineering problems in the food industry. Working on this project gave me a better understanding of project management than I could get from a textbook."

Project Background

The goal of the project was to reduce both electrical and natural gas energy consumption to help meet corporate and plant sustainability goals. The dryers use heated air to dry the cheese products and heating this air is the largest fuel use. The primary objective for the project was looking at the mix of steam and direct-fired heating of dryer air. Progress was made in modeling dryer operations in order to optimize dryer air heating, but a means of guiding when to use steam heating versus direct fired heating was not completed and will require further work. However, one fuel-saving measure was identified and recommended for implementation.

Air compressors were a significant load for electrical power and were thought to present opportunities. The 125hp compressor carries the air load during production and was the focus of this effort. The electrical cost of operating this compressor was extrapolated from 10 days of power measurements to be $29,200 per year. Five savings opportunities were evaluated and three were recommended.

Incentives To Change

The plant spent $805,000 on natural gas and $604,000 on electricity in 2013; electric rates increased by 10% in the last 8 years. Both the magnitude of utility spending and the trend toward higher utility rates were incentives to invest in energy conservation.

Solutions

Repair Compressed Air Leaks

Repairing compressed air leaks has the largest potential savings ($6,400/yr.) and the lowest cost. Leak repair has started but needs to be institutionalized as an ongoing effort in order to maintain the savings. The leak rate was measured at 37% of compressor capacity. Efforts should be made to keep the leak rate below 15% of capacity.

Shut Down Dryer 3 Air Preheater

Shutting down the dryer 3 air preheater for at least six warm months of the year is recommended to eliminate fan use and save $900 per year in electricity and $2,400 per year in natural gas use because the preheater is less efficient than the main burners, and because heat is not needed in work areas of the dryer tower as frosting (air restriction) does not occur on the inlet filters during the summer.

Air conveyance of ingredients in dryer 3 was identified as an area with likely potential compressed air savings, but the cost of these operations were not quantified and alternative means of conveying ingredients were not identified or evaluated.

Lower Compressor Pressure

Lowering the compressor pressure from 115psi to 87psi (plant line pressure target is 80psi) is estimated to save $4,400 per year in electrical energy charges and was demonstrated to be feasible for most plant air uses. An operator believed air flow to the dryer 2 vibrators might be restricted at lower pressure. The vibrators are regulated to 60 psi and it was demonstrated that the vibrator pressure was unaffected by lowering plant pressure, but we have yet to prove air flow is unaffected. This change would require adjustment of the compressor spiral valve air modulation control and would cost $2,400.

Retro-Fit Air Compressor With VFD

The compressed air service company Brabazon recommended retrofitting the 125hp compressor with a variable speed drive. They did not estimate or guarantee the savings from this change, but estimates of savings from the compressor performance curve suggest $3,000 per year could be saved with an initial investment of $7,250.

Recommendation	Reduction	Annual Savings	Status
Repair air leaks; maintain at 15% or below	107,000 kWh	$6,400	In progress
Lower compressor pressure	73,000 kWh	$4,400	Pending
Retro-fit air compressor with VFD	49,900 kWh	$3,000	Recommended
Shut down dryer 3 air preheater	11,700kWh 4,300 therms	$3,300	Recommended

MGK

Neil Peterson
Industrial and Systems Engineering
University of Minnesota Twin Cities

Company Background

McLaughlin, Gormley, and King (MGK) is a chemical manufacturer specializing in insect control solutions. Originally founded in 1902 with a focus on botanicals and food spices, MGK evolved its talents, knowledge and business into a respected manufacturer of insect control solutions. Their first insecticide product was launched in 1927 and was based on pyrethrum, a natural insecticide found in a species of the chrysanthemum plant. Since then, MGK has registered more than 300 formulations. Each product seeks to provide a responsible and sustainable solution to help protect people and their environments from the impacts of insects.

MGK® Insect Control Solutions

"The MnTAP internship program was an invaluable opportunity to gain experience and build confidence in working in industry. It was challenging, engaging, and rewarding to be able to lead a project that would bring real benefit to my company."

Project Background

This lean manufacturing project is focused on optimizing the use of solvent for production tank rinsing. Between production runs, tanks are cleaned with a triple rinse of solvent to avoid contamination and comply with industrial regulations.

The current tank cleaning procedure has been in place for over two decades and has been successful; however, increasing customer demand and industry requirements suggest it would be prudent to validate its efficacy. By monitoring the rinse cycles, taking samples of solvent after each rinse, and analyzing the data, MGK can better quantify and understand its rinsing protocols and provide opportunities to reduce solvent use and update their standard operation procedures. Other elements of the project involved taking inventory of all facility motors, evaluating motor system energy conservation opportunities and suggesting improvements in the compressed gas systems.

Incentives To Change

MGK is poised for additional growth, having recently acquired an industry competitor. To comfortably meet the demands of the future, MGK will need to expand its production process expertise. Throughout the years, MGK leadership has fostered a spirit of continuous improvement. Leaders empower their teams to deploy lean methodologies to solve problems and exploit opportunities, with a focus on improvement to process areas. By focusing on eliminating wastes within processes, MGK can continue to thrive in the insecticide market and stay resilient to competition. With the reduction of solvent use, MGK can show strong environmental stewardship and support its corporate sustainability goal of reducing natural resource use.

Solutions

Modify Tank Rinse Procedures

Option 1 - Double Rinse Tanks When Applicable

I worked with the MGK quality team to set a tank cleanliness target in the formulating area with quantitative and qualitative elements. Data collected over the summer indicated that the triple rinse system is often more than sufficient in meeting the current tank cleanliness target. If products are broken down into categories based on active ingredient level, then different cleaning procedures can be in place for different types of products. Data analysis showed that products with an active ingredient level of less than 20% were consistently clean after two rinses. Implementing a double rinse cleaning procedure for these products would reduce the yearly amount of solvent used for tank cleaning by at least 5% and bring at least $4,000 in annual savings.

Option 2 - Shorten Cycle Time Of Third Rinse

While a cleaning process consisting of two rinses is not adequate in certain cases, there is opportunity for reducing the amount of solvent used in the third rinse. The mechanics of the current rinse pumping and piping system are such that the third rinse is generally the heaviest in a tank cleaning process. By the second rinse, the majority of the residue has already been removed from the sides of the tank. Therefore, it is a form of extra processing waste to allow the most solvent to be used in the final rinse. If the rinse system is modified so that the cycle time of the last rinse is halved, solvent waste generated from tank cleaning would be decreased by at least 10% for approximately $10,000 in annual savings.

Option 3 - Reinstate The Recycle Solvent Program

The solvent drained after the third rinse could be reused as the first rinse in a subsequent tank cleaning. This procedure was in place at one time at MGK, but has since lost momentum due to efficiency setbacks. Continued investigation and improved recycle rinsing procedures would bring significant savings, and is an excellent way to make use of what would otherwise be disposed of as hazardous waste. This has the potential to cut solvent usage for tank cleaning by 1/3 and saving an estimated $21,000 annually.

Repair Leaks And Maintain Compressed Gas Systems

MGK uses compressed air and nitrogen in several processes and to power certain equipment. Leaks in systems such as these often go unnoticed since many are not audible or are overpowered by equipment noise. Compressed air and nitrogen leaks around the facility make the systems less efficient and waste electricity. Additional energy is required to compensate for what is lost through the leak. By fixing the leaks and improving the system maintenance program, there is a potential savings of $10,000 per year.

Install Variable Frequency Drives (VFDs):

Certain motors in the facility would benefit from the implementation of a VFD, which adjusts the speed of a motor relative to the amount of power a system calls for. In the facility, several motors run at full capacity and have long run times, though the system has variable requirements. Installing a variable frequency drive on various motors in the MGK facility would bolster the electrical efficiency of the facility. An initial evaluation of VFD implementations shows an annual savings of $16,000.

Recommendation	Reduction	Annual Savings	Status
Modify tank rinse procedures	27,600 lbs solvent	$21,000	In progress
Repair leaks/maintain compressed gas systems	122,400 kWh	$10,000	In progress
Install VFDs	177,400 kWh	$16,000	Under review

Minnesota Pollution Control Agency

Li Guan
Environmental Studies
Macalester College

Agency Background

The Minnesota Pollution Control Agency (MPCA) is a state environmental agency that monitors environmental quality, offers technical and financial assistance, and enforces environmental regulations. The MPCA works with citizens, communities, businesses, all levels of government, environmental groups, and educators to prevent pollution, conserve resources, and help ensure pollution does not have a disproportionate impact on any group of people. The MPCA's St. Paul office is located at 520 Lafayette Road in an area known as Lafayette Park.

"As a MnTAP intern, I developed project management and communications skills as well as gained a deeper understanding of waste management. It was an invaluable experience for me."

Project Background

Pursuant to Minnesota State Statute, every state agency must achieve a 60% recycling rate (where 60% of all waste generated is recycled). The same statute mandates that each state agency must report recycling data annually to the MPCA. In 2012, 71% of agencies in the metropolitan area filed no recycling report, and only 14% of these agencies met the 60% recycling goal. The MPCA recognized the opportunity to improve waste reduction and recycling programs and increase the reporting of data, so they enlisted a MnTAP intern to help achieve these goals at the MPCA and other agencies.

The summer intern project had two major focuses. The first was to provide site-specific recommendations for the four state agencies located in the Lafayette Park area of St. Paul - Department of Human Services (DHS), Department of Labor and Industry (DLI), Department of Natural Resources (DNR), and MPCA, to help them achieve the 60% recycling goal. The second focus was to develop a toolkit containing waste reduction and waste recycling best practices suited to state agencies. The toolkit provides guidance for agencies to increase waste reduction and recycling and to more effectively track and report waste data.

Incentives To Change

In addition to the 60% recycling rate goal set by the state statute, a Governor's Executive Order issued in 2011 also provides incentive for state agencies to reduce waste and recycle more. By reducing waste, agencies can also create a safer and more comfortable working environment, save money, and help establish a positive public image of state agencies as leaders in sustainability.

Solutions

Start Or Improve Organics Recycling Programs

About 35-55% of the trash discarded at each agency was observed to be organics that could be collected for commercial composting. Improving a current organics recycling program or starting a new one will help agencies capture organics from the trash and increase in their recycling rates of up to 14% (DHS), 17% (DLI), and 12% (DNR).

Improve Recycling Program

Currently, many recyclables (around 15-30%) are ending up in the trash at each agency. Improving current recycling programs by setting up centralized waste stations, purchasing color-coded bins, updating signage, and improving education and communications with staff would help agencies divert waste to recycling and achieve higher recycling rates. Implementation of improved recycling programs would result in an approximately 7%, 8%, 7%, and 12% increase in recycling rates for DHS, DLI, DNR, and MPCA, respectively.

Establish Centralized Purchasing And Sharing Of Office Supplies

Each division of DHS and DNR orders its own office supplies. A reuse program would help these agencies effectively meet the demand for office supplies via centralized purchasing, reusing, and circulating extras. It is estimated that DHS and DNR could reduce annual expenses by $23,700 and $15,750 respectively by purchasing fewer supplies as a result of this type of program.

Offer Reusables In The Cafeteria

The MPCA-DNR cafeteria currently provides compostable serviceware, but switching to reusable serviceware would be even more impactful by moving the agencies from recycling to reuse. In addition, replacing disposable takeout containers with returnable ones would further reduce waste. Taking into account the initial investment in a dishwasher, the project could result in a cost savings of $17,410 annually.

Recommendation	Reduction	Annual Savings	Status
Start or improve organics recycling programs	106,440 lbs	$2,570	Recommended
Improve recycling program	76,180 lbs	$5,400	Recommended
Establish centralized purchasing and sharing of office supplies	1,480 lbs	$39,450	Recommended
Offer reusables in the cafeteria	7,700 lbs	$17,410	Recommended

TEL FSI, INC.

David Binstock
Mechanical Engineering,
Washington University in St. Louis

Company Background

TEL FSI, INC. designs and manufactures semiconductor capital equipment. The company specializes in wafer cleaning tools, both dry and wet, single and batch. Products include a single wafer cleaning system, a batch spray system, and a single wafer cryokinetic cleaning system. The company is located in Chaska and employs approximately 245 employees.

TEL FSI, INC.

"With the MnTAP internship I was able to work with a real company and develop real solutions to real issues that I care about – environmental issues of waste, energy and water – which made the end result that much more satisfying."

Project Background

There were two components to this project. The primary objective was to investigate water usage in the facility and make recommendations for reducing water consumption. The deliverables for this portion of the project were an up-to-date facility water schematic and a list of suggested actions for reducing water usage. The secondary consideration of this project was a similar investigation into energy reductions. The deliverable for this portion was simply a list of recommended actions.

Incentives To Change

There were three main incentives for this project. The first was to comply with Tokyo Electron Group's corporate goals of reducing their global environmental impact. The second was financial savings and the final incentive was a desire to reduce SAC (sewer availability charge) units in order to avoid incurring future charges.

Solutions

Reclaim Non-CO_2 DI Water Bypasses

There are a number of de-ionized water bypass lines in the Research and Development (or "Process") Lab that were not being reclaimed. My suggestion was to re-plumb these lines so they are being sent to reclaim instead of the sewer. Estimated savings would be between 2.5 and 4.4 million gallons of DI water per year.

Degas and Reclaim CO_2-Laden DI Bypasses

There are several water lines in the Process Lab injected with CO_2 which cannot be reclaimed by the DI water system. These flows are currently sent to the sewer. My suggestion was to connect these CO_2 water lines through a degasser to remove the residual gas and reclaim the DI water. Approximately 2.2 to 4.7 million additional gallons of DI water could be saved per year.

Disconnect Or Reclaim Unused Equipment DI Water Bypass

A specific piece of equipment in the process lab is not being utilized, yet a constant flow of hot DI water is still directed to it, bypassed and sewered. My suggestion was to first determine if it could be disconnected completely or reclaimed. Water consumption reduction was estimated at 55,000 gallons of DI water per year.

Use City Water For Cooling Water

One piece of equipment is fed with a DI water cooling line. In other similar pieces of equipment, this cooling water is supplied by city water, not DI. My recommendation was to determine if city water could be used instead of DI water. This would save about 275,000 gallons of DI water, which in turn would save 90,000 gallons of city water.

Send Heater Pressure Relief To Reclaim

The pressure relief from the DI hot water heaters in the process lab is also directed to the sewer. This water, though very small in volume, is clean DI water and could be reclaimed through re-plumbing. Savings are estimated at about 25,000 gallons of DI water per year.

Send Production RO-Reject To Pond

While the larger of the two reverse osmosis systems does send its reject water to a retention pond, one of the systems directs its RO-reject to the sewer. By directing this rejected water to the retention pond, no water is saved, but 100,000 gallons are diverted from the drain, avoiding sewer charges and reducing SAC units.

Fix Compressed Air Leaks

Forty-eight leaks were detected in the compressed air system. Fixing these leaks could cut energy use and costs of the system by 30-50%.

Reduce Compressed Air System Pressure

Currently, compressed air pressure is 124 psi coming off of the compressor. Preliminary investigations revealed that compressed air users may not need pressure this high. Reducing this by 10 psi could save 60,000 kWh per year.

Table reflects total water reduction from creating DI water

Recommendation	Reduction	Annual Savings	Status
Reclaim DI water bypasses (non-CO_2)	3,300,000 – 5,700,000 gallons	$14,500 – $25,000	Planned
Degas and reclaim CO_2-laden DI bypasses	2,900,000 - 6,100,000 gallons	$10,400 – $25,000	Recommended
Disconnect or reclaim unused equipment DI water bypass	73,000 gallons	$320	Under review
Use city water for "cooling water"	90,000 gallons	$145	Recommended
Send heater pressure relief to reclaim	32,000 gallons	$150	Recommended
Send production RO reject to pond	100,000 gallons diverted from drain	$355	Recommended
Fix compressed air leaks	640,000 kWh	$35,000	Under Review
Reduce compressed air pressure	60,000 kWh	$3,000	Under Review

Uponor

Christopher Lanari
Mechanical Engineering
University of St. Thomas

Company Background

Uponor Corporation provides plumbing, radiant heating, and fire suppression solutions to both residential and commercial markets internationally through the use of extruded cross-linked polyethylene pipe (PEX). Wirsbo Company was founded in Sweden as a high-quality steel company in 1620. Uponor acquired Wirsbo in 1988. Uponor North America employs approximately 500 employees and is a major player in the PEX extrusion industry. Their products may be used commercially or residentially for plumbing, in-floor radiant heating, and fire suppression infrastructure, in NPS sizes from 1/2-in to 4-in. Uponor also offers pre-insulated piping solutions for long-distance and/or exterior-run pipe.

"Working with MnTAP was a fantastic way to gain engineering and project management experience. Learning about Lean manufacturing principles was also a huge benefit to me, since the ideas of continuous improvement and eliminating wasted time and work can be applied to any job."

Project Background

The overarching project goal was to optimize Uponor's next generation cross-linked polyethylene (PEX) extrusion process in order to bring down operation costs while conserving energy and natural resources. Using lean and green tools to improve the new process that is still in test mode, I managed projects to improve the overall process. In particular, I focused on tracing out all air, nitrogen, water, and electrical inputs, quantifying the amounts needed per hour and per kg of material consumed. I also investigated energy efficiency opportunities not currently part of the line and presented options to the technology and process engineering groups for review. Since this new process is the future technology, the opportunity to provide viable system improvements to future lines is significant.

Incentives To Change

Uponor is finalizing development of a new extrusion process. The major selling point of this new system is greatly increased extrusion output. However, corresponding increases in energy use and operating cost resulted in no net gain of performance versus operating price. The incentive for Uponor to reduce energy, water, and other inputs is to lower the operating cost of the new process in order to widen the profit margin of their PEX pipe production.

Solutions

Optimize Curing Process

One opportunity for optimization is to adjust the curing process to its lowest possible setting while maintaining product cross-linking specifications. The process was designed with all settings at 100% during extrusion operation. Optimization experiments revealed that all settings could be reduced to 70% while still meeting product specifications.

Switch From Nitrogen To Compressed Air

The extrusion system was designed to use nitrogen as the injected gas that prevents the hot extruded pipe from collapsing after leaving the die. Using Uponor's compressed air system, it is possible to replace nitrogen with compressed air. Compressed air generated in-house is much less expensive than purchasing 100% pure nitrogen.

Insulate Extruder Barrel

Insulating the extruder barrel is another possible improvement that would lower energy costs. An insulation blanket with an aerogel core, which possesses an extremely small conductive heat transfer coefficient, was recommended and will be custom-fitted to the extruder barrel. This will greatly reduce the costs associated with start-up and production, since much less heat will escape from the extruder barrel to the production floor via natural convection. Safety will also be improved by protecting employees from the hot extruder barrel.

Remove Redundant Blower

Another improvement opportunity was to rearrange process steps to eliminate unneeded operations. As the extruded pipe passes through the cooling tanks, it is blown dry with an air wipe station twice in order to be measured at two separate locations. The first time is between the second and third cooling tanks, where cross-linking is measured. The second time is at the very end of the process, where the outer diameter of the pipe is measured just before coiling occurs. The recommended solution is to put both of the required-dry measurement machines at the very end of the process, removing the need for multiple air wipes and thus conserving electricity.

Recommendation	Reduction	Annual Savings	Status
Optimize curing process	553,000 kWh	$55,300	In progress
Switch from nitrogen to compressed air	86,400 ft^3/hr N2	$1,300	In progress
Insulate extruder barrel	26,000 kWh	$2,600	In progress
Remove redundant blower	6,500 kWh	$600	In progress

Uponor

Calen Papke
Environmental Sciences, Policy & Management
University of Minnesota Twin Cities

Company Background

Uponor's roots go back to 1620 when the company (formerly Wirsbo) made weapons for the King of Sweden. Today, Uponor is an award-winning, international manufacturer of crosslinked polyethylene (PEX) plastic pipe and provider of plumbing and indoor climate (radiant heating and radiant cooling) solutions as well as residential fire sprinkler systems. Headquartered in Finland, the company employs about 4,100 people in 30 countries. Uponor North America's headquarters and manufacturing plant (244,138 square feet) is located in Apple Valley and employs more than 500 employees. Distribution and processing facilities are located in Lakeville, Minnesota; Calgary, Alberta, Canada; and Brampton, Ontario, Canada.

"The experience you gain from a MnTAP internship is invaluable. People recognize that being a MnTAP intern means something. For me, I appreciated the opportunity to manage my own project, investigate options, and find meaningful solutions"

Project Background

With a strong corporate culture dedicated to continuous improvement, especially relating to efficiency and quality, Uponor is proactive in exploring opportunities to improve efficiency and increase revenues. Uponor wants to reduce scrap in order to increase production yields.

Incentives To Change

Every year, Uponor identifies primary goals that each employee works toward. The primary focus areas in 2014 for those working in production were decreasing weighed scrap and increasing production yield, each by 15%. Uponor has identified a potential for increased efficiency and revenue to increase overall production yield. Scrapped product is a waste of raw materials and energy – both of which affect Uponor's productivity and bottom line. Customer satisfaction is extremely important and high quality products are expected and delivered. A MnTAP intern was enlisted to research and recommend cost-effective ways to decrease product scrap.

Solutions

Opportunities For Improvement In Quantifying And Tracking Waste Recommendation

Implement Maintenance Scrap Tracking Program
Because this was the largest stream of previously unknown or unreported scrap, it is recommended that this be continuously monitored in order to maintain accurate reporting.

Introduce Additional Specific Scrap Codes
By implementing new scrap codes for certain waste-streams, Uponor will have a better baseline understanding of current and past states of scrap for little capital cost.

Include Reason For Scrapping Mix Batches When Transferring Data From Daily Logs To High-Level Spreadsheet
This saves labor hours by eliminatomg the need to manually sort through paper logs. Future continuous improvement project baselines will then be easier to establish.

Opportunities For Waste Reduction

Improve And Standardize Procedures For Central Unit Maintenance
The extruder machines are assembled and repaired by in-house mechanics. It has been determined that there is a direct correlation between machines running out of specification and product yield. The production process could become more efficient if central unit housings, feeding blocks, hydraulic cylinders and extruder sub-assemblies were torqued to a higher value during assembly and maintenance.

Standardize Procedures For Inspecting And Cleaning Parts
Uponor receives machine parts from multiple suppliers. Installation of these parts "as is" has resulted in scrap. By implementing formal procedures for inspecting and cleaning newly received machine parts, a portion of production scrap could easily be eliminated.

Recommendation	Reduction	Annual Savings	Status
Improve and standardize procedures for central unit maintenance	40,000 lbs	$85,000	In progress
Standardize procedures for inspecting and cleaning parts	440 lbs	$950	Implemented

Join the Intern Program in 2015

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 2015. We anticipate supporting up to 15 projects this summer focusing on water conservation, energy efficiency, lean manufacturing, source reduction, and pollution prevention. Applications are being accepted now until February 1, 2015 and will be reviewed upon receipt. Companies will be contacted by MnTAP technical staff within two weeks for additional project development and scoping. We request participating companies to contribute 10% ($3,000) of the total project cost to help support the intern program. These funds are used to offset project costs such as student compensation. Complete an online project proposal or call MnTAP today!

For Students

MnTAP is seeking junior or senior college students to work on water conservation, energy efficiency, lean manufacturing, source reduction, and pollution prevention projects at companies in Minnesota. MnTAP anticipates funding up to 15 projects for the summer of 2015 in locations around the state. The projects are located at different companies and in a variety of industries.

Student Benefits:

- Positively affect a facility's environmental footprint
- Gain hands-on project management experience
- Use your classroom knowledge in a real-world setting
- Earn $15.00/hr and working 40 hours a week during the summer

Applications are currently being accepted for summer 2015 internships. Interviews will begin in January of 2015 and selection of 2015 interns will continue until March 1 or until all positions are filled. 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 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 MnTAP intern really rolled up his sleeves and dug into seeking opportunities for our facility to reduce water usage and electricity. He created benchmark documentation and information for our company to use in supporting our environmental corporate goals."

John Walker
Vice President Operations
TEL FSI, INC.

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

MnTAP SOLUTIONS

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