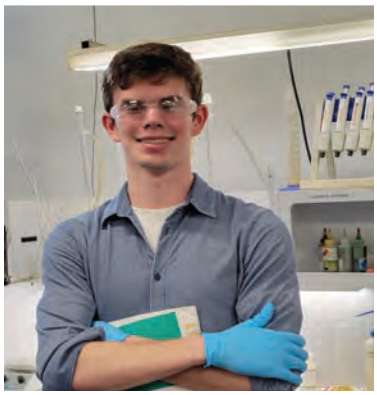
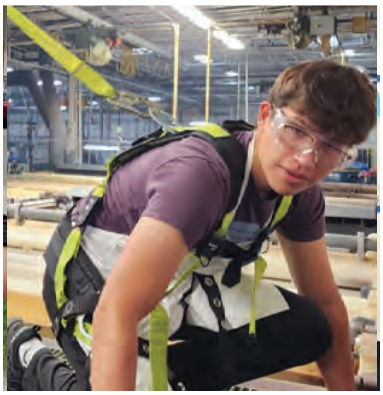
MnTAP

SOLUTIONS

2023 MnTAP Intern Program













"It was inspiring to witness my ideas manifest into tangible change...Through this program I learned to approach engineering with a more creative and holistic perspective and I also developed numerous technical skills."

~ Nile Timmerman, All Flex Solutions Inc.

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Intern Projects

Project Focus Key Chemicals · Electricity/ Natural Gas · Water · Waste

MnTAP thanks our generous partners who make this vital work possible. Each of these organizations contributed financially to the intern program in 2023. Their support helps maintain our continuing pollution prevention, energy efficiency and water conservation work.

METROPOLITAN COUNCIL

"The Metropolitan Council has been a proud partner with MnTAP for over a decade. MnTAP's intern program builds the skills of the next generation and has been of tremendous benefit to the metropolitan region. The innovation of MnTAP interns has helped many area businesses save hundreds of millions of gallons of water and associated costs. In the face of ever-evolving challenges like climate change, MnTAP's interns are making the region's water use more sustainable and improving the resiliency of area water supplies. Our organization is pleased to continue working with this exceptional group of professionals."

~ John Clark, Ph.D., Principal Environmental Scientist
Metropolitan Council Environmental Services

Xcel Energy® RESPONSIBLE BY NATURE®

"The team at Xcel Energy always looks forward to partnering with the MnTAP Intern Program. The student interns infuse fresh energy and innovative thinking into our customers' facilities. The facility studies that result from the internships provide customers with a path forward towards implementing energy efficiency projects and receiving incentives through Xcel Energy's rebate programs. This dynamic collaboration with MnTAP fuels our company's mission of reducing carbon emissions, and gets me excited for a future of passionate industry players!"

~ Madison Hults, Product Portfolio Manager
Xcel Energy

MINNESOTA POLLUTION CONTROL AGENCY

"The 17 projects that made up this year's intern program ranged from health care and medical device facilities to a fluid milk packaging plant that has operated since 1887. Something as simple as reviewing irrigation practices for the grounds at one facility helped conserve 10 million gallons of water per year, while others had potential savings of thousands of dollars annually by simply allowing parts to dry for a few more seconds before moving down the process line. The MnTAP intern program is an excellent way to help ensure your company stays competitive."

~ Mark Snyder, Pollution Prevention Coordinator
Minnesota Pollution Control Agency

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

Funding for two 2023 MnTAP Intern projects was provided by the Minnesota Environment and Natural Resources Trust Fund as recommended by the a Legislative-Citizen Commission on Minnesota Resources.

"The MnTAP internship program is innovative and effective. Project updates to LCCMR always show that significant conservation measures have occurred at the host facilities, and we appreciate getting to watch the development of Minnesota's future workforce unfold in real-time."

~ Legislative-Citizen Commission on Minnesota Resources

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

"MnTAP and its interns have been vital partners in supporting EPA's mission to protect human health and the environment by helping businesses implement pollution prevention measures that reduce their environmental footprint. These efforts not only facilitate EPA's pollution prevention goals, but also fosters our next generation of sustainability leaders who will carry this work forward."

~ Christine Clark, Pollution Prevention Coordinator, U.S. EPA, Region 5

2023 Intern-Proposed Solutions

Recommendation	Reduction	Cost Savings	Equivalents
Water Conservation	68,000,000 gallons	$542,000	Water for more than 3,000 Minnesota residents
Waste	3,600,000 lbs	$729,000	Annual waste from 1,800 Minnesota residents
Chemicals	80,100 lbs	$133,000	160 55-gallon drums
Electricity	1,240,000 kWh	$156,000	Electricity for 130 Minnesota homes
Natural Gas	718,000 therms	$572,000	CO_2 emissions from 800 passenger vehicles
Total Potential Cost Savings	---	**$2,132,000**	---

All table values for Reduction, Cost Savings and Equivalents refer to annual impacts.

Be Part of the 2024 Intern Program

Students:

- Gain hands-on project management experience.
- Use classroom knowledge in a real-world setting, applying your own creativity.
- Learn from host-site and MnTAP staff mentors.
- Make a difference by reducing resource consumption and improving business processes.
- Earn $19.00/hour working 40 hours a week during a three-month project.
- Receive a $1,500 stipend upon successful completion of the project.

Student applications accepted December 2023 through March 2024.

Learn more and apply at:
http://www.mntap.umn.edu/interns/student/

Businesses:

- Work with MnTAP engineers and scientists to scope and tailor a project to your needs.
- Discover process improvement opportunities that impact waste, water and energy efficiency.
- Receive co-supervisory support from a MnTAP engineer or scientist throughout the summer.
- Reduce resource use and cut costs.
- Pay just $4,000 for the 3-month project including follow-up assistance from MnTAP staff.

Applications accepted November 2023 through January 2024.

Learn more and apply at:
http://www.mntap.umn.edu/interns/business/howtoapply/

For any questions and general information on the MnTAP Intern Program, contact Intern Program Manager Matt Domski at 612-624-5119, mdomski@umn.edu or http://www.mntap.umn.edu/interns/

All Flex Solutions Inc.

Nile Timmerman
Chemical Engineering
University of Minnesota Twin Cities

Organization Background

All Flex Solutions was founded in 1977 and manufactures flexible and rigid circuits as well as flexible heaters for a variety of industries, including aerospace, defense, and medical. All Flex Solutions has several locations in and around the metro area. This project was focused on the Northfield location, which is the center of All Flex Solutions' flexible circuit manufacturing.

"My summer with MnTAP and All Flex Solutions was an informative and exciting introduction to the industrial sector. I was impressed by All Flex's openness to new solutions, and it was inspiring to witness my ideas manifest into tangible change. Through this program I learned to approach engineering with a more creative and holistic perspective, and I also developed numerous technical skills. I am incredibly grateful to have had this opportunity. Thank you again to All Flex and MnTAP!" ~NT

Project Background

All Flex Solutions uses over 15,500,000 gallons of water every year at their Northfield facility in the wet room which has the machines that process the circuit boards. Currently, the machines use single-pass cooling for their cooling water lines, which means water is only used once before it is sent to waste treatment. This project involved creating a comprehensive water map and water balance of the wet room at the facility and identifying ways to reduce water use.

A water map of the wet room was created by outlining the floor plan and following the water lines. Flow rates were measured with an ultrasonic flow meter. The rinse water and cooling water flow rates for each process machine were measured. Additionally, the type of water (city water, soft water, reverse osmosis (RO) water) was recorded. Using the flow rates and annual run times estimated based on previous water use data, the annual water use in each machine was determined. A water balance was created based on these quantities which showed how much water was used for different processes.

Incentives to Change

All Flex Solutions is motivated to improve their sustainability including reducing water use. Additionally, the City of Northfield would like facilities to shift away from single-pass cooling in the next 1-2 years. All Flex Solutions is also opening a new facility in Bloomington which provides an incentive to reduce costs and where some of the solutions may also be applied.

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Recycle Cooling Water to RO System

All Flex currently uses 3,300,000 gallons of water each year for single-pass cooling in process machines. To move away from single-pass cooling, recycling the cooling water through an RO system is recommended. The recycling system involves sending the cooling water to a storage tank after it passes through the machines. Then, the water is pumped to a new RO system to be processed when the water level in the RO tank is low. After passing through the RO system, the water collects in the existing RO tank for use. This recommendation would save 3,300,000 gallons of water and $27,000 each year.

Solutions

Reduce Flow Rates and Install Flow Limiters

Reducing the rinse and cooling line flow rates on the machines and installing flow limiters to ensure the flow rates are maintained is recommended. During the internship, testing was completed on three machines to determine the minimum flow rates and the flow rates were reduced to save 1,100,000 gallons of water and $9,500 annually. Flow limiters still need to be implemented. Additional testing could identify other machines with flow rates that are too high.

"All Flex Solutions and I were very excited to have an intern from MnTAP over the summer. During his internship, Nile performed critical analytical data collection for our water usage, defining many areas for water reduction and improvement potential. Nile also designed systems to reuse some of our waste streams creating a significant annual water usage reduction. I was grateful for the opportunity to provide guidance for Nile's internship regarding our water conservation project."

~Jon Gilligan, EHS Engineer
All Flex Solutions, Inc.

Recommendation	Annual Reduction	Annual Savings	Status
Recycle Cooling Water to RO System	3,300,000 gal water	$27,000	Planned
Reduce Flow Rates and Install Flow Limiters	1,100,000 gal water	$9,500	Partially implemented

MnTAP Advisor: Laura Sevcik, Associate Engineer

Allina Health

Olivia D'Sousa
Industrial and Systems Engineering
University of Minnesota Twin Cities

Organization Background

Allina Health is a healthcare system that serves Minnesota and Western Wisconsin. Allina Health has over 90 clinics, 12 hospitals and 20 urgent care facilities with a total of over 29,000 employees. In its hospitals, Allina provides nutrition services.

"I am very grateful to have worked with Allina and MnTAP this summer. I've learned a lot about the importance of reducing food waste and I've grown a lot this summer. I feel like I've made a difference with my work" ~ OD

Project Background

Allina Health made a commitment to sustainable practices with the introduction of its Climate Action Plan, with the goal to reduce greenhouse gas emissions by 50% and reduce and divert 50% of waste going to the landfill or incinerator by 2030, from a baseline of emissions and waste in 2019. The reduction of excess food and diversion of food waste helps with both goals.

Incentives to Change

To reduce food waste, a couple of simple strategies are already in use. First in, first out (FIFO) refers to using the oldest foods first to prevent spoilage of foods in stock. Mercy Hospital - Unity Campus (Unity) has little food being lost to spoilage. Another strategy is to track the amount of food waste produced in the kitchen. Unity has a technology called Leanpath that tracks the weight of the food and food type. Allina wants to expand the use of food waste prevention strategies such as Leanpath and reduce the amount of excess food produced to reduce spending.

"We would never have been able to dig deeply into food waste at Mercy Unity Hospital without the work that Olivia did this summer. Her recommendations give us a way to reduce our waste in this important area."

~Suzanne Savanick-Hansen, Sustainability Manager
Allina Health

SOLUTIONS

Excess Food Reduction

Tracking excess food is key to reducing it. Quick reminders during daily meetings, assigning certain staff to measure excess food, and ensuring staff are trained in how to use Leanpath are all key measures to ensure tracking gets done. The more consistent and specific measurements are taken, the more insight there is into what sorts of foods to order and prepare less of.

A recommendation to reduce the amount of excess food produced, specifically for the At-Your-Request (AYR) service, is to use hospital admittance numbers to estimate demand. The amount of food needed to adequately feed patients is directly correlated to the number of patients admitted to the hospital. If there are 160 patients, cooks should prepare just enough food for 160 people, and scale that number when more patients are present. For the cafeteria, past retail data should be used to forecast the amount of food needed, especially considering weekends and holidays diverge from weekday patronage. This variability is critical to preparing the right amount of food in advance.

For the entire kitchen to reduce excess food, cooks should prepare less food in advance, and if or when certain food runs out, cooks should only make more as

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it's ordered, especially for sandwiches and burgers, as these can be made quickly. Less food would need to be prepared in advance, saving employees time and energy. This ensures that there is less waste at the end of a meal and that customers are getting fresher food. Reduction of excess food has the potential to save Unity Campus up to $28,000 in ordering costs as well as 8 tons of excess food annually.

Food Donation

MealConnect

The Unity kitchen should use MealConnect to donate excess food. MealConnect is an app to connect organizations with extra food to food shelves. The donor initiates a pickup by uploading information like food type, weight, potential allergens, and a picture of the food being donated in the app. The donation is available on the platform until accepted and a pickup time is arranged, or until a total of six hours has passed without anyone accepting the donation. This has the potential to reuse all excess food with little additional cost to Unity.

Food-to-Hogs

For the post-consumer side of food, a food-to-hogs program should be implemented. This captures and reuses post-consumer food waste that is currently sent to the landfill. Five other hospitals within the system have implemented food-to-hogs successfully. United Hospital Hastings Regina Campus has been using the program for over a year and has diverted over 22 tons of food from the landfill.

Unity is in the service area for Barthold Farms, located in St. Francis. Barthold Farms takes care of pickup, cleaning and re-lining of the buckets that store food. Compared to the normal waste hauling costs, having Barthold Farms pick up post-consumer food is $470 cheaper annually. It's also a more sustainable way to manage food waste.

Compost

Another recommendation is to use excess produce to either start a new compost pile or contribute to an existing compost pile in the community gardens on site. There are currently 62 plots and community members have access to it from late-May until October. To easily compost food, it is recommended that only remaining produce from the salad bar and trim scraps from produce are composted. During summer months, from May to September, this could easily recycle 500 lbs of food on site at Unity.

Recommendation	Annual Reduction	Annual Savings	Status
Make-to-order cafeteria and AYR foods	Up to 8 tons	Up to $28,000	Recommended
Donate excess food to MealConnect	TBD	NA	Recommended
Divert post-consumer food waste from landfill to hogs	19 tons	$470	Recommended
Compost salad bar scraps in community gardens during summer months	500 lbs	$0	Recommended
Divert recyclables to recycling (paper, plastic, cardboard)	2.3 tons	TBD	Recommended

MnTAP Advisor: Jon Schroeder, Sustainable Materials Management Specialist

Avtec Finishing Systems

Lucas Clark Burnette
Civil & Environmental Engineering
University of Minnesota Twin Cities

Organization Background

Avtec Finishing Systems Inc. is a metal finishing company located in New Hope, MN. There are currently 116 employees at their 100,000 square-foot facility. Avtec Finishing and its sister company Nico Products constitute The Lindgren Group, which has served as a leader in the plating industry since 1971. At Avtec, heavy investments have been made in their operations to provide customers with a world class metal finishing experience. These investments have resulted in approvals to ISO, Nadcap, ITAR, Federal Firearms Licensing Requirements, and RoHS/REACH Requirements. Some industries served by Avtec include aerospace, defense, agriculture, and general manufacturing.

THE LINDGREN GROUP
AVTEC • NICO
ISO-9001 • Nadcap

"I am grateful to MnTAP and Avtec for providing me the opportunity for this internship. I was able to apply my skills to reduce water and chemical usage in a metal finishing shop, a field I was very unfamiliar with. Over the summer, I became well-versed in the plating process and was made aware of how great water use is on an industrial scale. My greatest takeaway from the summer was learning of all the conservation and pollution prevention opportunities that are available in the industries served by MnTAP." ~ LCB

Project Background

Avtec operates for 20 hours a day, four days a week. During operation hours, rinse tanks receive a continuous flow of water governed only by flow restrictors. Rinse tanks are vital to the metal finishing process as they allow for excess chemicals to wash off parts before they pass to the next process. However, rinse tanks with low flows may experience a build-up of chemicals that are dragged in and negatively affect the quality of parts over time. As a result, many tanks may be receiving far more water than is needed to adequately rinse parts in an effort to avoid a decrease in quality. In total, Avtec uses about 9.85 million gallons of water per year, almost exclusively for rinsing parts.

Incentives To Change

The Lindgren Group was specifically interested in investigating water conservation efforts and reducing overall resource consumption. Avtec Finishing Systems had installed water metering across the facility in advance of this project which provided background information on water use and an increased interest in learning more about how this water was being used in the facility and where there were opportunities to improve.

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Conductivity Controlled Rinses

Conductivity is a measurement that can be used to estimate the quality of water. Conductivity controls for rinses regulate the flow of water to the tanks by automatically adding fresh water and flushing contaminated water once a certain, pre-determined conductivity set point is reached. This enables water to only be used when it is needed. By adding conductivity controls to the six lines with the highest water use, 3.34 million gallons of water and 11,900 lbs of solid waste per year could be saved, with an annual savings of $45,200.

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Tank Covers/Drain Boards

As a rack moves from one tank to the next, it may pass over several other process tanks and unwanted chemicals may drip off the parts and cause cross contamination in the other baths. Similarly, uncovered baths experience heat loss and evaporation. To address these issues, this project recommended installing hinged sheets of PVC affixed to tanks to serve as hurdles and covers in the open and closed positions, respectively. In the open position, these hurdles require operators to extend the drain time over the baths by increasing the time it takes to raise the racks and move it to the next bath. In the closed position, these sheets serve as covers and prevent cross contamination and increase the lifespan of the process baths. Implementation of tank covers to 31 tanks has the potential to save 1.04 million gallons of water, 3,850 lbs of solid waste and $15,500 annually.

"Our MnTAP [project] was a great help expanding our existing water control plan. It is always good to get another set of eyes in the shop and the case studies shared ...were a great resource. The MnTAP program has a schedule to ensure that everyone is on track and is well managed by the supervision team. Overall, a great experience"

~ Travis Johnson, Lab Manager
Avtec Finishing Systems

Recommendation	Annual Reduction	Annual Savings	Status
Conductivity Controlled Rinse	3,340,000 gal water 11,900 lbs waste	$45,200	Recommended
Tank Covers/Drain Boards	1,044,000 gal water 3,850 lbs waste	$15,500	Recommended

MnTAP Advisor: Kelsey Klucas, Engineer

Boston Scientific - Arden Hills

Arun Srinivasan
Industrial & Systems Engineering
University of Minnesota Twin Cities

Organization Background

Boston Scientific is dedicated to transforming lives through innovative medical solutions that improve the health of patients around the world. Since 1979, the company has grown to become a leading supplier of medical solutions, specializing in areas such as peripheral intervention, cardiology, endoscopy, urology, rhythm management, electrophysiology, and neuromodulation products. Boston Scientific has 40 locations around the world, two of which were the focus of MnTAP Intern Projects in 2023: Arden Hills and Maple Grove, MN.

"During my internship at MnTAP this summer, I had the privilege of working at Boston Scientific, where I contributed to their efforts in achieving TRUE® Zero Waste certification. This experience has been incredibly rewarding, as it not only exposed me to innovative environmental solutions but also provided me with the opportunity to work alongside dedicated professionals who are truly making a positive impact on sustainability. I'm leaving this internship with a deeper understanding of environmental challenges and the tools to help find practical solutions. MnTAP has been a valuable stepping stone in my journey towards a career focused on sustainability." ~ AS

Project Background

In line with the company's commitment to sustainability and reducing environmental impact, Boston Scientific has set strong Environmental, Social, and Governance (ESG) goals. One of these goals is for all locations to be Total Resource Use and Efficiency or 'TRUE®' certified by 2030. TRUE® is a zero-waste certification program administered by Green Business Certification Inc. (GBCI). The program is dedicated to measuring, improving, and recognizing zero waste performance, all of which were key objectives of the 2023 MnTAP Intern Project.

Incentives To Change

The primary motivation for working towards TRUE® zero-waste certification at the Arden Hills facility is the company's ongoing commitment to sustainability and its high standards for addressing how operations impact the environment, human health, and the economy.

The Arden Hills facility has strong practices in place when it comes to waste prevention and diversion, but will need to take things a step further in order to achieve 90% waste diversion, a requirement for TRUE® certification.

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Recycle Silicone

In a molding production process, a portion of silicone waste is essential for processing, yet cannot be reused. However, this waste is recyclable and a vendor partnership is being pursued which will divert approximately 3,000 lbs of waste from landfill.

Recycle Copper

A valuable waste stream containing copper wire was discovered in one of the Arden Hills campus production lines. By integrating this waste into an existing recycling stream, the site can divert 2,100 lbs of waste and save $2,900 annually.

Reuse Bubble Wrap

On Boston Scientific's capital equipment production line, bubble wrap is required following final assembly. It was found that many production lines in the same business unit produce bubble wrap waste, which could be collected and repurposed for reuse on the line. Though this change

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prevents just 20 lbs of waste (2,200 sq ft of bubble wrap), it is a creative way to reuse materials on-site and reduces purchase of new bubble wrap, saving $550 annually.

Switch to Compostable Lids in Café Operations

To counteract contamination in the cafeteria compost waste stream, switching to compostable lids for compostable bowls is recommended. This change harmonizes disposal practices, mitigates confusion, and prevents contamination. This change would help divert 360 lbs of waste to composting annually.

Require Paperless Receipts for Café Transactions

Cafeterias at the Arden Hills site currently have equipment that allows digital delivery of transaction receipts. By eliminating the option for printed receipts, paper waste can be reduced by about 170 lbs, saving $380 annually.

Implement Office Supply Reuse Stations

At least one office supply reuse station is in place at the Arden Hills campus, which gives employees the ability to reuse materials and help minimize purchase of new office supplies. The site would benefit from implementing more of these stations across campus, with the potential to reduce 440 lbs of waste, saving $6,000 annually.

Expand Communication and Training

Through the TRUE® waste assessment, it was discovered that a significant portion of waste leaving the site as trash can be reduced or diverted from landfill. Key elements in reducing and diverting more of this material include communication and training. Strategies are underway to address this need, including tabletop resources in cafeterias, a SharePoint webpage dedicated to zero waste, and integrated training for employees. With a 2.5% improvement in waste diversion, the site can divert 28,000 lbs from landfill.

"Arun was able to jump right into learning more about what TRUE® Waste was and identifying ideas of how our organization would be able to contribute to this certification. At a site of our size, it can be challenging to learn the best approach to align with stakeholders, but Arun was able to meet with the right people and started collecting the data that we needed for this internship."

-Nicole Lancaster, Boston Scientific

Recommendation	Annual Waste Reduction	Annual Savings	Status
Recycle Silicone, Copper, and Reuse Bubble Wrap	5,120 lbs	$3,450	Recommended
Switch to Compostable Lids and Paperless Receipts in Café Operations	530 lbs	$380	Partially Implemented
Implement Office Supply Reuse Stations	440 lbs	$6,000	Recommended
Expand Communication and Training	28,000 lbs	TBD	Implementing

MnTAP Advisor: Matt Domski, Intern Program Manager

Boston Scientific - Maple Grove

Emmy Childs
Environmental Engineering
University of Minnesota Twin Cities

Organization Background

Boston Scientific (BSC) is a biomedical engineering and medical device manufacturing company with facilities located in 40 countries around the world. The Maple Grove, MN location is home to both engineering and manufacturing operations for devices such as balloon catheters and stent delivery systems. The site consists of four buildings that house a variety of processes and functions, which include extrusion and braiding, metal laser cutting and finishing, plastic welding, as well as laboratory, office and cafeteria spaces.

"My MnTAP internship allowed me to apply my knowledge from my environmental engineering studies to help a business find pollution prevention and diversion solutions. MnTAP and Boston Scientific were extremely supportive the entire way through!" ~ EC

Project Background

In 2019, an initiative was announced by Boston Scientific's global Environmental, Health, and Safety (EHS) team, committing all facilities to become Total Resource and Usage Efficiency or TRUE® certified by 2030. The TRUE® certification program's goal is to credit businesses for activities that help divert all the facility's solid waste from landfill, incineration, and the environment. To work towards certification, the Maple Grove site set out to take a deeper look at solid waste generation and management. The 2023 MnTAP Intern Project involved a broad assessment of facility processes to determine what best practices are already in place and to identify waste reduction and diversion opportunities.

Incentives to Change

In 2022, four Boston Scientific facilities were chosen as pilot sites to conduct TRUE® certification gap assessments. Gap assessments are used to establish how many credits each site has already achieved, current waste diversion and contamination rates, as well as credit opportunities that help meet TRUE® certification. The Maple Grove facility was not selected as a pilot site, but committed to starting their assessment process early and voluntarily. The facility produced a total of 1,617 tons of non-hazardous waste in 2022 – 51% of which was diverted from landfills and incinerators. Given a target diversion rate of 90% for certification, this project aimed to close the site's gap in diversion rate by accounting for current waste reduction and diversion practices and identifying new solutions. Not only does this work contribute to the TRUE® certification process, it aligns with the company's mission of being a leader when it comes to environmental, social, and governance standards.

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Construction and Demolition Recycling Improvements

Analysis of the construction and demolition (C&D) waste stream revealed some differences across waste haulers in terms of how waste was being managed. To ensure more C&D waste is diverted from landfill, it is recommended to implement a company-approved list of hauling companies that facility teams and contractors will be required to choose from when planning construction and demolition projects. This change has the potential to divert 166,000 lbs of solid waste from landfill annually.

Education and Signage Improvements

Standardizing signage and disposal bin placement has the potential to minimize contamination of waste at the facility. Additionally, education resources have been developed

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through an online portal for Boston Scientific employees to better educate on waste management practices and procedures. Improving signage, bins and educational materials has the potential to divert 34,800 tons of waste.

Reusable Dishware

Compostable dishware is currently provided for employee meals on-site. Given that the facility has some infrastructure in place to handle dishwashing, it is recommended to convert dishware to reusable options, starting with reusable clamshell containers. This first phase of reusable dishware implementation can reduce approximately 38,000 lbs of waste annually.

PPE Reduction and Recycling

Personal protective equipment (PPE) such as hair covers, beard covers, and face masks from manufacturing and lab spaces are currently disposed of as trash. Launderable bouffant caps can replace disposable hair covers and additional PPE can be recycled by coordinating with one of three potential vendors. These changes can reduce waste by up to 30,200 lbs.

Polyethylene Recycling

Polyethylene waste from plastic bags and other films is a consistent waste stream at the Maple Grove site. This waste stream is currently sent to landfill and can be diverted and recycled locally. If implemented, this recommendation could divert 14,700 lbs of waste from landfill.

"We greatly appreciated the opportunity to partner with MnTAP to support our business in identifying environmental improvement related to solid waste lifecycle. The benefits are great on both sides, where the interns come in and get professional and personal experience in an industry setting, and the business sees the environmental sustainability improvements and potential cost savings on operations. Our intern was great and set us on the right path to success for our long-term goal for TRUE® Zero Waste certification."

~ Derek Stark, Sr. EHS Specialist
Boston Scientific

Recommendation	Annual Reduction	Annual Savings	Status
C&D Recycling	166,000 lbs	TBD	Implementing
Education and Signage Improvements	34,800 lbs	$2,000	Implementing
Reusable Dishware	38,000 lbs	$101,400	Recommended
PPE Reduction and Recycling	30,200 lbs	$103,000	Recommended
Polyethylene Recycling	14,700 lbs	$800	Recommended

MnTAP Advisor: Matt Domski, Intern Program Manager

Cemstone

Daniel Monaghan
Chemical Engineering
University of Minnesota Twin Cities

Organization Background

Cemstone is a family-owned concrete company that is headquartered in Mendota Heights, MN. Cemstone takes pride in their sustainability and won the environmental excellence award from the National Ready Mix Concrete Association (NRMCA) in 2022 and has had a plant recognized by the NRMCA Environmental Excellence Awards Program each year since 2015.

"This internship allowed me to develop my engineering skills that are difficult to develop in a classroom setting. These skills include communication of ideas, economic analysis of projects, and analysis of industrial equipment. I'm thankful to MnTAP and Cemstone for giving me the opportunity to grow as an engineer." ~ DM

Project Background

Cemstone and MnTAP had previously partnered together on a water conservation project. The next step was to work on energy efficiency. The Cemstone Companies have many types of facilities across multiple states, so three different facilities were analyzed to maximize read-across potential. A mining site, a ready-mix concrete plant, and a bagging site were all assessed for energy efficiency opportunities.

Incentives To Change

As a family-owned company, Cemstone prioritizes having a positive impact on its local community. This includes continuous improvement and decreasing environmental impact. Additionally, as the concrete industry shifts towards requiring Environmental Product Declarations (EPDs), Cemstone has additional motivation to set and meet aggressive sustainability goals.

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Reduce Mixer Energy Usage (Ready-Mix and Bagging)

Reducing the speed of the concrete mixers by 50% saves a total of 4.5% of the mixers' annual energy consumption. This recommendation can be utilized at a total of 12 facilities. Additionally, the energy usage of the bagging powder mixer can be reduced by reprogramming the batching controls. This will lead to a 95% reduction in idle time. These actions will save a combined 115,000 kWh and $9,400 per year.

Optimize Compressed Air (Ready-Mix and Bagging)

During a compressed air audit at the ready-mix and bagging facilities, 41 cumulative air leaks were discovered. At the bagging facility, the pressure has been lowered, and the temperature of the intake air can be reduced for further savings. Cumulatively, these actions will save 102,500 kWh and $8,680 annually.

Solutions

Insulation of Heating Equipment (Mining, Ready-Mix, and Bagging)

Hot water heaters and storage tanks can be insulated to reduce energy use. This recommendation can be implemented at a total of 43 Cemstone locations. Additionally, savings can be obtained by covering the opening of the sand heater which is currently exposed to the atmosphere. There are six locations utilizing this technology. Savings from insulation recommendations total 400,000 therms, 2,500 kWh, and $318,000 annually.

"Working with Daniel and the MnTAP program was a great success. The real solutions and data we gained through this are valuable and will help the Cemstone Companies move closer to achieving our sustainability goals. Daniel showed that he is a very quick learner and was able to work with a variety of people to achieve all he was asked to do. It was a great experience partnering with MnTAP, and we would encourage other companies to look into it"

~Alex Olin
Environmental, Facilities, and Engineering Manager
Cemstone

Additional Opportunities

Additional energy savings can be obtained by reducing ready-mix conveyor belt cleaning time for sand products to one minute (42 sites) and reducing lighting usage (two sites). Additional cost savings can be found through the installation of capacitors across the three facilities studied in this report. Finally, solar panels can be installed on the roof of the mining front office.

Recommendation	Annual Reduction	Annual Savings	Status
Reduce Mixer Energy Usage	115,000 kWh	$9,400	Recommended
Optimize Compressed Air	102,500 kWh	$8,680	Implementing
Reduce Ready-Mix Conveyor Decontamination Time	380,000 kWh	$31,000	Recommended
Implement Cold-Adaptive Enzymes in Starch Hydrolysis	TBD	TBD	Recommended
Reduce Lighting Usage	14,700 kWh	$1,300	Recommended
Insulate Heating Equipment	400,000 therms 2,500 kWh	$318,000	Recommended
Improve Power Factor	N/A	$35,150	Planned
Install Solar Panels	N/A	$1,300	Future Project

MnTAP Advisor: Gabrielle Martin, Associate Engineer

Coborn's Inc.

Marissa Fleege
Chemistry
University of Wisconsin La Crosse

Organization Background

Coborn's is a Midwest grocery chain centered in St. Cloud, MN. The company owns 77 grocery stores located throughout the entire Midwest but is largely based in Minnesota as 36 of their stores reside in the state. Most grocery stores owned by Coborn's are in rural parts of Minnesota, outside the Minneapolis-St. Paul metropolitan area. Coborn's also owns many gas stations, convenience stores and liquor stores under other brand names, all of which provide a wide variety of goods and services to their customers.

"I was able to gain project management skills, confidence in my abilities, and knowledge that will benefit the remainder of my collegiate career. I am grateful for the opportunity to gain relevant work experience and apply classroom techniques to the industry. I will cherish the numerous values I received with this project as I continue on my journey!" ~ MF

Project Background

In efforts to become more sustainable, Coborn's established a corporate goal for 2023 to reduce the tonnage of waste being sent to the landfill by 10% by store. Six stores in the St. Cloud area were selected for a study of waste generation, management, and diversion. Based on observations made at these locations, recommendations were made for process changes at these six stores. Coborn's intends to use these recommendations to meet their waste reduction goal throughout the organization.

Incentives To Change

On an annual basis, Coborn's produces around 6,000 measurable tons of waste which gets sent directly to the landfill, thus spending over $160,000 on trash removal services. Additionally, $112,000 is being spent annually to remove and dispose of organic waste. Coborn's embarked on this project to reduce the volume and cost of waste being disposed in landfills; determine outlets for reuse, recycling, or diversion of trash and organic waste; and standardize waste handling and diversion practices throughout the company.

SOLUTIONS

The reductions and savings below have been calculated only for six focus stores. Additional savings and opportunities may be achieved through implementation of these practices throughout the rest of the Coborn's locations.

Divert Produce Waste to Donations & Organic Waste

Waste generated from the produce department consists of product typically regarded as bad such as product with scratches, ends cut off, or deformities, as well as overripe, molding, or mushy produce. Most of the waste abides by the donation guidelines set by Coborn's and Second Harvest Heartland, who receives donatable produce from Coborn's. Donatable produce can also be sent to local food shelves for donations. Produce that is ineligible to be donated can instead be sent to organic waste for hog feed.

"Thank you MnTAP for teaming up on addressing waste stream improvements for our company. This effort is only the beginning of changes our company is taking to become good stewards of our resources and land."

~Scott Brooks, Sr. Project Manager, Coborn's, Inc.

Solutions

Divert Bakery Waste to Donations

Food from the bakery is often not saleable if the packaging has been damaged or if it is at or beyond its stated expiration date. This waste produced from the bakery could be donated to local food shelves if the waste aligns by the guidelines of the receiving organization. Additionally, more food would be made available to those experiencing food insecurity.

Divert Deli and Meat Waste to Organic Waste

Deli and meat waste consist of scraps from saleable products, products with compromised packaging, and products at or past expiration dates. All food waste produced from the deli and meat departments can be donated to hog feed, provided that the receiving farm sterilizes the waste according to state and federal guidance.

Divert Dry Grocery Waste to Reclamation Services

Dry grocery products with slightly damaged packaging are less likely to be purchased by consumers and often end up as waste. Coborn's partners with a reclamation service that takes damaged dry grocery waste and redistributes the products to other sources. Using this service at all six stores would ensure that all dry grocery products that are not otherwise saleable can be redistributed for consumption rather than waste.

Recycle Plastic Wrap/Film and Cardboard/Paper

Plastic wrap and film, as well as bales of cardboard and paper, can be transported to Coborn's logistics and recycling center where the products are sold and sent to recycling vendors. Ensuring that these products are recycled in all stores would also generate income from recycling these products.

Diversion Techniques

Improved signage throughout the store, along with methodical receptacle placement, will provide an easier process for the correct waste handling processes. Training, informative reminders, and standard operating procedure guidelines will allow for a clearer understanding of how to properly dispose of different waste.

Recommendation	Annual Reduction	Annual Savings	Status
Divert Produce Waste to Donation or Organic Waste	87,600 lbs of waste 56 MTCO2E	$2,700	Implementing
Divert Bakery Waste to Donations	34,000 lbs of waste 36 MTCO2E	$670	Implementing
Divert Deli and Meat Waste to Organic Waste	35,600 lbs of waste 85 MTCO2E	$1,400	Implementing
Divert Dry Grocery Waste to Reclamation Services	8,700 lbs of waste 10 MTCO2E	$700 + vendor credit	Implementing
Recycle Plastic Wrap/Film and Cardboard/Paper	83,400 lbs of waste 98 MTCO2E	$6,600 + recycling income	Implementing
Implement in-store recycling for glass, aluminum cans, #1/2/5 plastics	24,100 lbs of waste 32 MTCO2E	$1,900	Recommended

MnTAP Advisor: Kevin Philpy, Senior Engineer

Co-operative Plating Co.

Ryan Goepfrich
Mechanical Engineering
University of Minnesota Twin Cities

Organization Background

Co-operative Plating is a single shop in St. Paul, MN that plates various parts for customers from aerospace to agriculture. With 18 lines ranging from anodized to zinc nickel, Co-operative tries to offer all options to its customers. Started in 1923, the shop was purchased by the Rosenblum family in the 1940s who moved it to its current location off Snelling Ave in the late 1960s. The Rosenblum's still own the 39,000 sq ft shop which now employs around 125 people and plates over 100 million parts annually.

CO-OPERATIVE PLATING
Top Quality, On Time

My experience working with MnTAP and Co-operative Plating has helped me gain experience in a professional setting as well as a reassurance that I am moving down the right career path. It also opened my eyes to the countless saving opportunities beyond energy in an industrial setting, giving me an appreciation for the coordination and people that it takes to implement those savings." ~ RG

Project Background

The plating and preparation processes consume a large quantity of water and chemicals, with much of this water used for the 3-5 rinse tanks on each line. Each of these rinse tanks uses a steady flow of water to clean off parts and reduce chemical buildup in the tank. The rinse tanks use approximately 25.4 million gallons per year.

Opportunities were also identified to save water, gas, and chemicals in the pre-plating and post-plating processes. A major focus is the replacement of a vapor degreaser that uses 405,000 gallons of water, 92 therms, and 14,500 pounds of solvent each year.

Incentives To Change

Co-operative, like many other companies before, strives to improve its operations and overall sustainability. Reducing resource utilization, minimizing waste generation, or upgrading equipment and processes, can also lower costs and increase profitability.

Co-operative's residential location in St. Paul also brings an added responsibility, encompassing not only the well-being of its employees but also the welfare of the surrounding neighborhood it is a part of.

SOLUTIONS

Switch to an Aqueous Cleaning Solution

Currently a vapor degreaser is used to remove oil/grease from incoming parts as well as to remove a red stop-off lacquer used in the parts masking process. This machine uses n-Propyl Bromide (nPB), a costly chemical, recently designated as a hazardous air pollutant. It is recommended to switch to AquaVantage® 815 QR-NF aqueous detergent in a heated ultrasonic immersion parts washer for removing oil/grease, and a small, unheated acetone tank for removing the masking lacquer. Testing of a peelable masking lacquer is in progress, which may eventually eliminate the need for the acetone solvent.

"In partnership with MnTAP and Ryan Goepfrich (intern), several key improvement projects were developed. As a result, we expect lower usage levels of water and cleaning solvents in our metal finishing processes. The MnTAP intern program has provided significant benefits to our business going forward."

~ David Birkemeier, President & CEO
Co-operative Plating

Solutions

This recommendation will save 14,400 pounds of chemicals and 225,000 gallons of water. It will result in a reduction in both chemical quantity and chemical hazard level.

Insulate Exposed Steam Pipes

Steam pipes are used throughout the shop to heat up plating and rinse tanks. It was estimated that there are 930 feet of exposed steam pipes around the facility, with pipes ranging from 1 to 3 inches in diameter. It is recommended that pipes be insulated, saving 11,300 therms and $11,500 annually with a payback time of 5 months.

Increase Drain Time

During the plating process, dragout of chemical and water on the rack or parts can occur if there is insufficient drain time spent over the process tank. This dragout can lead to tanks being cross contaminated, which increases chemical and waste disposal costs.

Increasing drain times over the identified tanks to at least 15 seconds will save 6,400 lbs of chemical and $16,300 dollars in chemical purchasing and waste disposal costs and also allow for more consistency in the plating process.

Fix Compressed Air Leaks

Compressed air is used to dry off parts after the plating process. Nine audible leaks were identified and addressed. These fixes have an estimated savings of 48,600 kWh and $6,300 with an implementation cost of only $400.

Add Counterflow Rinse

It was identified that a counterflow rinse tank could be added to the zinc nickel hand line. The addition of the new rinse tank allowed for an overall flow rate reduction on the line from 0.625 gallons per minute (gpm) on one tank to 0.325 gpm on both tanks combined. This change would save 90,000 gallons of water, and $1,200 per year. Further investigation is needed to determine implementation cost for the project.

Recommendation	Annual Reduction	Annual Savings	Status
Switch to Aqueous Cleaning	14,400 lbs of nPB 225,000 gal water	$59,500	Recommended
Insulate Exposed Steam Pipes	11,300 therms	$11,500	Recommended
Increase Drain Time	6,400 lbs chemical 780 gal water	$16,300	Recommended
Fix Compressed Air Leaks	48,600 kWh	$6,300	Implemented
Addition of a Counterflow Rinse	90,000 gal water	$1,200	Needs Further Investigation

MnTAP Advisor: Jane Paulson, Senior Engineer

Grede Foundry

Huy "Henry" Vo
Mechanical Engineering
St. Cloud State University

Organization Background

Grede Foundries, Inc. was founded in 1920 when William J. Grede purchased Liberty Foundry in Wauwatosa. The company specializes in ferrous metal including gray iron, ductile iron, and steel castings. The company operates nine foundries and one machining facility across the US. Grede - Saint Cloud has over 360 employees and produces roughly 80,000 tons of product each year.

"Through my time at Grede - Saint Cloud, I was given all the help and support [needed] from MnTAP staff and my onsite supervisor Don Scheele, to complete my tasks and achieve my goals. I have learnt that I could make a difference and I did. This internship has given me a better understanding of the industry, a foundation and confidence for my future career." ~ HV

Project Background

Grede - Saint Cloud consumes approximately 39 million gallons of water and discharges around 31 million gallons of water each year.

The company had partially mapped out water usage and distribution previously in the plant. Single pass cooling and cooling towers were known to be two major causes of water consumption. Hence, these were the focuses of the project.

Incentives To Change

Grede has always seen sustainability as one of the pillars of its long-term growth. Grede is committed to environmental sustainability and limiting the environmental impact of their activities, products, and services. Consequently, the company engages in water conservation efforts to reduce impact and costs.

SOLUTIONS

Install Air-Cooling Units on Core Machine and Impactor

Single-pass cooling is currently utilized for a core machine and the impactor. By installing air-cooling units, approximately 2,900,000 gallons of water and $23,000 can be saved each year.

Turn Off Core Machine on Non-Production Days

The cooling fan for the core machine has been purchased but cannot be installed until December. Meanwhile, another temporary recommendation was made to ensure the core machine is properly shut down during non-production days. This is projected to conserve 250,000 gallons of water and save $4,000.

Reuse Water from South Sand Chiller in Sand Room

The south sand chiller is near the sand room. The discharge water from this unit still has sufficient cooling capacity for reuse. Thus, it is recommended the discharge water be rerouted to the sand room to replace the incoming city water. This recommendation is estimated to

conserve 1,900,000 gallons of water and save around $15,000 per year.

Connect Cooling Tower to BMD Hydraulic Cooling System

The BMD hydraulics cooling system has the highest water consumption in the plant. Since there is an unused cooling tower that is still operable, it is possible to connect the two units. This will eliminate the use of around 5,800,000 gallons of water and save roughly $46,000 annually.

Install Additional Air-Cooled Heat Exchangers for Cooling

A properly designed air-cooled heat exchanger will use no water. Replacing current systems with air-cooled heat exchangers can reduce water consumption by 14,400,000 gallons each year. Additionally, chemical treatment use will be reduced by 4,300 lbs In total, this will save around $121,000.

Install Deduct Meters on Cooling Towers and Bentonite Recovery System

Since water is not discharged directly into the sewer in bentonite recovery and evaporates in the cooling towers, the water that is not discharged can be deducted from the sewer bills. If deduct meters are installed, approximately $6,000 will be saved every year. An additional $32,000 will be saved if deduct meters are installed but the cooling towers are not replaced with air-cooled heat exchangers.

"I was pleased to host a student intern this summer... The student was eager to learn and get involved with our operations and identified several projects focusing on cooling water usage. This is a great program to get students involved in industry and make a positive difference."

~ Don Scheele, Environmental Project Engineer
Grede – St. Cloud

Recommendation	Annual Reduction	Annual Savings	Status
Install Air-Cooling Units fon Core Machine and Impactor	2,900,000 gal	$23,000	Implementing
Turn Off Core Machine on Non-Production Days	250,000 gal	$4,000	Implementing
Reuse Water from South Sand Chiller in Sand Room	1,900,000 gal	$15,000	Recommended
Connect Cooling Tower to BMD Hydraulic Cooling System	5,800,000 gal	$46,000	Recommended
Install Additional Air-Cooled Heat Exchangers for Cooling	14,400,000 gal 4,300 lbs chemicals	$121,000	Recommended
Install Deduct Meters on Cooling Towers and Bentonite Recovery System	N/A	$6,000	Recommended

MnTAP Advisor: Gabrielle Martin, Associate Engineer

Kemps Minneapolis

Sean Sticha
Mechanical Engineering
University of St. Thomas

Organization Background

Kemps is a dairy company that was founded in 1914 in Minneapolis by William Kemps and Walter Lathrop. The company started as just an ice cream company but expanded to produce multiple dairy products. Kemps' Minneapolis facility produces packaged milk and cream and opened in 1979. There are currently 120 employees at this facility, and there are 1,200 employees located throughout the Midwest at various Kemps facilities.

"Over the course of the summer, working as a MnTAP intern was a very rewarding experience. I enjoyed working with industry professionals and learning more about the manufacturing industry. I am grateful for the opportunity MnTAP and Kemps-Minneapolis have given me and the chance to lead a project and see the positive impacts my work has made." ~ SS

Project Background

Through regular operations, Kemps discharges approximately 1,200,000 gallons of milk annually to the wastewater drains; and 233,000 gallons of milk to human food by-product at a cost of over $500,000 a year. The goal of this project was to focus on product conservation, and identifying where there is product being lost. Recommendations were also to be formed to work on reducing significant areas of product loss.

Incentives to Change

Currently, there is a large amount of product that is lost and goes down the wastewater drains. This project will look at key processes where milk is lost to focus on reducing the amount that goes down the wastewater drains. Milk has high levels of chemical oxygen demand (COD) and total suspended solids (TSS), so reducing the amount that is going down the drain can decrease the strength charges imposed by the local wastewater regulator.

SOLUTIONS

Implement Best Practice for Filler Shutdown

The process for shutting down a Federal filler varies between operators, which can lead to a significant amount of milk being dumped down the wastewater drains if the filler is not shut down properly. It is recommended that best practice sharing is implemented to have the more experienced operators help train the less experienced operators on how to properly shut down the Federal fillers at the end of a run. Implementing this solution will reduce the amount of milk that is discharged to floor drains, allowing for greater packaging of milk for sale and the potential for reduced costs associated with wastewater strength charges.

Install Conductivity Probe Prior to Filler Bowl

The current process for starting up the Federal fillers is to run sanitizer through the filler and follow the sanitizer with milk as a rinsate. The milk pouring out of the filler is then tested manually by the filler operator to determine when all the sanitizer is out, and the operator manually

Solutions

turns off the pump for the filler once it is determined that the sanitizer has been removed. Kemps could install a conductivity probe inline prior to the filler bowl that will automatically shut off milk from pumping into the filler once it senses that there is no longer any sanitizer left in the filler bowl. Installing probes on the lines leading to the four Federal fillers would lower milk loss to floor drains and increase profitability while decreasing high-strength wastewater discharges.

Implement Tag System to Improve Oversight of Reworkable Product

Reworkable product is currently moved to the rework area once a week, during reset days, and is marked by a flipped-over bottle. When the amount of rework exceeds the size of the rework area, reworkable product is stored elsewhere in the cooler, often sitting in the cooler for too long and causing reworkable product to be missed and require off-site reprocessing as human food by-product. MnTAP recommends that Kemps implement different colored and shaped tags to mark rework and slop, so that rework can be easily seen throughout the cooler rooms and brought to the correct area. An additional employee may be necessary to ensure that reworkable product is handled appropriately; however, reworking the product that is currently reprocessed off-site would significantly reduce costs and environmental impacts associated with the process.

"Like our Farmer Owners, we strive to be as sustainable as possible while delivering the highest quality product to our consumers. Our operation is complex, and Sean was thorough and detail-oriented when learning our operation and creating solutions to fight our biggest battles in the war on waste."

~ Tony Gorman, Production Manager
Kemps, Minneapolis

Recommendation	Annual Reduction	Annual Savings	Status
Implement Best Practice for Filler Shutdown	29,000 gal milk	Revenue: $35,000 Strength Charges: $11,700	Recommended
Install Conductivity Probe Prior to Filler Bowl	94,000 gal milk	Revenue: $114,000 Strength Charges: $38,000	Recommended
Implement Tag System to Improve Oversight of Reworkable Product	233,000 gal milk 1.24 metric tons of CO_2	$123,000 + $284,000 product saved	Recommended

MnTAP Advisor: Kevin Philpy, Senior Engineer

Nico Products

Daniel Gubrud
Environmental Engineering
Michigan State University

Organization Background

Nico Products is a metal plating company located in Minneapolis, MN. There are currently 120 employees at their 100,000 square-foot facility. Nico Products and its sister company Avtec Finishing Systems comprise the Lindgren Group, which has served as a leader in the plating industry since 1971. At Nico, heavy investments have been made in their operations to provide customers with a world-class metal finishing experience. These investments have resulted in approvals to ISO, Nadcap, ITAR, Federal Firearms Licensing Requirements, and RoHS/REACH Requirements. Some industries served by Nico include aerospace, defense, agriculture, and general manufacturing.

THE LINDGREN GROUP
AVTEC • NICO
ISO-9001 • Nadcap

"This internship really pushed me intellectually and socially. I met a lot of smart, interesting people that taught me a lot about each part of the electroplating process. This summer gave me a lot of valuable experience that I will use in my career and day to day life." ~ DG

Project Background

On an annual basis, Nico Products uses 23 million gallons of water per year (gpy) and has 16 plating lines that offer a wide range of different metal plating options. There are over 400 tanks across these lines with approximately 25% heated. These tanks use 15.7 million gallons of water per year and lose about 2.2 million gallons to evaporation.

Nico Products did not have a complete water map at their location prior to the start of the internship. As part of this project, the MnTAP intern provided a detailed flow map for the company which in turn allowed for specific recommendations and their associated payback periods.

To reduce water consumption, this project investigated methods to reduce dragout, improve rinse water usage, and reduce evaporation. The recommendations associated with these methods have the potential to save Nico Products $73,000 and 3.3 million gpy of water, along with 2,500 lbs of solid waste and 11,000 therms.

Incentives To Change

The Lindgren Group was specifically interested in investigating water conservation efforts and reducing overall resource consumption. As the parent organization to both Nico Products and Avtec Finishing Systems, the respective projects provided a unique opportunity to investigate opportunities at both locations and share the associated learnings. This partnership allows The Lindgren Group to apply the associated water conservation methods across the organization and share collective success.

"This was my first summer working with MnTAP. The program is well organized and run by professionals. The intern they selected for us was very personable, eager to learn and dove right into projects we don't have the manpower for. We hope to take his findings and better ourselves at conserving water and overall make our facility a better steward to the environment."

~ Alan Tousley, General Manager
Nico Products

Solutions

Increased Drain Times with Drainboards

To reduce the chemical loss and cross contamination of the tanks, it was recommended that Nico Products implements increased drain times and installs drainboards. Increasing the drain times will allow the racks to drip dry for longer. For manual lines, employees will need to be trained and coached to allow at least 5 seconds of drain time for each rack or barrel. For auto lines, this increase in drain times will need to be programmed into the system. Drainboards will help with returning liquid back to the original tank. By adding drainboards and extending drain times, 111,600 gpy of water and 2,500 lbs of solid waste could be saved with an annual savings of $25,100.

Install Conductivity Controls

Conductivity controls test the conductivity of the rinse water with an electrode. Once the conductivity reaches a pre-set value, the controller will add water to the tank via a solenoid valve. Currently, Nico uses flow restrictors to regulate flow. Adding conductivity controls has the potential to save 3.2 million gpy of water with an annual savings of $38,600.

Plating Floats for Barrel Line

The barrel line at Nico has an opportunity to implement plating floats for evaporation control. These floats sit on the surface of the tank as a flexible cover and allow barrels to pass through the barrier while reducing fumes, surface area, and surface temperature of the tanks. When the barrel leaves, they move back into place. The line was chosen for this recommendation because the barrel provides a protective layer from the floats to and prevents interference from the floats on the plating process. Adding the plating floats to the barrel line has the potential to save 19,200 gpy of water and 11,000 therms with an annual savings of $9,300.

Recommendation	Annual Reduction	Annual Savings	Status
Increased Drain Times with Drainboards	111,600 gal water 2,500 lbs waste	$25,100	Recommended
Install Conductivity Controls	3,200,000 gal water	$38,600	Recommended
Plating Floats for Barrel Line	19,200 gal water 11,000 therms	$9,300	Recommended

MnTAP Advisor: Kelsey Klucas, Engineer

Olympus Surgical Technologies

Noah Roe
Physics
University of Minnesota Duluth

Organization Background

Olympus Surgical Technologies America is located in Brooklyn Park, MN and manufactures various surgical instruments. These medical devices are used to cut tissue, seal tissue and even break apart kidney stones. The facility is 180,000 square feet and has approximately 350 employees. Olympus was founded in Japan in 1919 in order to produce microscopes and has grown into a leading optical and medical device manufacturer.

"My time working with MnTAP allowed me to utilize my talents in technical problem solving. I was able to make new connections, manage projects, and develop a new appreciation for environmental conscientiousness" ~ NR

Project Background

Olympus is continuously improving their energy efficiency through adoption of new technology, better process design, and fostering an environmentally conscientious work environment. Energy is mostly used in HVAC, motors, lighting, and production machines. Recent audits by Xcel Energy and CenterPoint identified energy efficiency opportunities. Humidification and irrigation were the key focus areas for water conservation.

Incentives To Change

Olympus has set the goal of achieving carbon neutrality by 2030 with all manufacturing sites reducing their carbon footprint to zero. Another key goal is conformance with ISO 14001 Environmental Management System certification standards. The Brooklyn Park facility also has a water reduction goal of 25% for 2023. Overall, Olympus seeks to become a leader in the global push for environmental conscientiousness and sustainability.

SOLUTIONS

Install Warehouse Energy Recovery Ventilators

Due to potential EtO residues from sterilized products, the warehouse is constantly ventilated to meet OSHA employee exposure limits. Since exhaust air has already been humidified or dehumidified and brought to a set temperature, this creates a big opportunity for Energy Recovery Ventilation (ERV). ERVs transfer humidity and thermal energy between intake and exhaust ducts, allowing for large energy savings. By implementing this technology in the warehouse, Olympus will recover about 280,000 kWh/yr which equates to about $30,000.

Optimize Compressed Air System

Pneumatic systems are known for being inefficient. Olympus has three air compressors on site, each delivering about 100 cfm of air at 135 psi. An ultrasonic leak detector was used to audit the facility, with 54 leaks detected. Leak detection procedures and training were created and implemented, including a recurring work order to ensure the system will be audited at least once a year. Repairing these leaks will save about 200,000 kWh and $22,000 per year.

The compressed air system is set to 130 psi in order to accommodate one packaging sealer that requires 120 psi. Replacing that sealer and reducing the overall system from 130 psi to 100 psi would save an additional 15% of the system's energy use.

"Noah's hands-on approach and dedication helped our efforts for greener energy and water conservation. Our partnership with the University of Minnesota has been an invaluable asset, and we look forward to future interns like Noah!"

~ Keith Jacobson, Sr. Facility Manager
Olympus Surgical Technologies America

Solutions

Shut Off Unused Equipment

Two opportunities were identified for energy savings due to equipment being left on when not in use. Several machines in the molding room are left idling at all times even when not used. Electrical current measurements found that shutting this equipment off during weekends would save about 18,000 kWh/yr. Steam humidifiers were found to be idling and boiling water in the summer when no humidification was needed. Manually shutting these down during the summer months saved another 18,000 kWh.

Water Softener Optimization

Soft water is heavily used in the humidification system at Olympus during winter months. Resin bed tanks typically deteriorate about 1-3% each year. Since the current tanks are 9 years old they have deteriorated about 9-27%. It is recommended that the tanks be replaced with new, larger volume tanks, which will significantly reduce unnecessary salt use.

Irrigation Optimization

The irrigation system at Olympus accounts for about 2/3 of the total water use during summer months. Following an irrigation system audit, several solutions were implemented to reduce water waste including: early winterization, reducing run times, installing a rain detection sensor, reorienting sprayers, repairing leaks, and creating recurring maintenance work orders. These solutions reduced water use by almost 40% while maintaining lush green grass.

Reroute Reverse Osmosis Water

Reverse osmosis water is a highly filtered and purified water which is atomized to humidify the air supplied to the cleanroom. This process is the largest water use (30-50%) during the winter months. Not all of the water gets absorbed into the air stream. Currently the excess is sent to the drain. Collecting this excess RO water and rerouting it back into the humidification system would reduce both water use and the energy associated with this expensive water. Olympus plans to further investigate this opportunity this winter.

Recommendation	Annual Reduction	Annual Savings	Status
Install Warehouse ERVs	280,000 kWh	$30,000	Planned
Compressed Air System Optimization	264,000 kWh	$29,000	Partially Implemented
Shut Off Unused Equipment	36,000 kWh	$4,000	Partially Implemented
Water Softener Optimization	13,000 lbs salt 5,000 gal water	$2,000	Implemented
Irrigation System Optimization	980,000 gal water	$4,400	Implemented
Reroute RO Water	240,000 gal water	$12,000	Investigating

MnTAP Advisor: Jane Paulson, Senior Engineer

Seacole Specialty Chemicals

Jayaditya Reddy Jillella
Industrial & Systems Engineering
University of Minnesota Twin Cities

Organization Background

Seacole, a chemical manufacturing company in Plymouth, Minnesota, specializes in producing chemicals for diverse sectors. Led by CEO Gregg Elliott, Seacole aims to enhance water efficiency to improve product quality and innovation.

"Embracing the MnTAP internship, I've learned that impactful changes start with small steps. Witnessing how innovation and sustainability align to create a brighter future has been truly inspiring. The projects with Seacole have not only enhanced my skills but also instilled a deep appreciation for responsible resource management." ~ JRJ

Project Background

The project aims to optimize water use at Seacole's chemical facility, reducing costs and environmental impact. Similar successful projects in the industry indicate a high probability of success. This project aligns with Seacole's values and serves to maximize resource efficiency.

Incentives To Change

Seacole seeks to enhance water management due to rising consumption. Improved water efficiency aligns with Seacole's values and serves to improve environmental resilience against resource challenges.

"We were very pleased to have Jayaditya Reddy Jillella at Seacole Specialty Chemicals this summer. We wanted to focus on the quantity of water used, distribution within the plant and ideas for water reduction and reuse. Jay not only completed these objectives but also suggested improvements for water saving projects that we are in the process of reviewing and implementing"

- Sara Ethier, Regulatory Manager
Seacole

Solutions

New Hand Spray Nozzle (6 gpm) for Manual Cleaning Processes

The implementation of a new hand spray nozzle with a 6 gpm flow rate, comparable to the existing 10 gpm flow rate cleaning nozzles, across manual cleaning processes for dry mixers (DM) and liquid mixers (LM) promises substantial benefits. This transition would result in a total water consumption reduction of approximately 75,100 gallons per year which cuts down the cleaning water usage by 40%. A survey was conducted to test the new nozzle in action and most of the operators have had a positive response to its installation.

Siphon Gun for Dry Mixers

Exploring the integration of a new hand spray nozzle with a 16 gph (0.26 gpm) siphon flow rate exclusively for the final cleaning stage of DM mixers presents opportunities for enhanced water efficiency. Siphon guns function by using minimal water volume through the utilization of air vacuums. However, the adoption of this approach necessitates addressing potential new challenges, including dust generation, dust collector accommodation, operator safety measures, and the provision of suitable personal protective equipment (PPE). Thorough investigation into these concerns is crucial before proceeding. When all the challenges are addressed, this equipment can save approximately 31,100 gallons for dry mixer cleaning, with additional savings potential if utilized for other cleaning processes.

Reverse Osmosis (RO) Reject Water Recovery

The company generates an annual volume of 157,500 gallons of RO reject water, constituting a substantial 23% of its total water usage. As of now, this reject water is channeled directly into the sewer system, resulting in elevated sewer charges. This water can be stored and used to adjust the pH of the wastewater tanks instead of using soft water. This could allow us to find a purpose for the untapped RO rejected water and also avoid the use of conventional soft water for this process. This recommendation assumes we can successfully capture 100,000 gallons of this reject water.

Recommendation	Annual Reduction	Annual Savings	Status
Use 6 gpm Industrial Spray Nozzles	75,100 gal	$680	Implementing
Implement Siphon Guns for DM Mixer Cleaning	31,100 gal	$220	Recommended
Reuse RO Reject	100,000 gal	$900	Recommended

MnTAP Advisor: Jon Vanyo, Senior Engineer

St. Paul Beverage Solutions

Zach Bahrke
Mechanical Engineering
University of St. Thomas

Organization Background

St. Paul Beverage Solutions (BevSo), formerly Schroeder Milk Company before being purchased by Dairy Farmers of America (DFA) in 2019, has been operating for 139 years. There are currently 284 employees working in the 200,000-square-foot facility. The primary product produced by BevSo is milk including Extended Shelf Life (ESL), High-Temperature Short-Time (HTST), and Ultra-High Temperature (UHT).

"This internship not only allowed me to grow in my field of work, but it also allowed me to grow as a person and learn from those around me and the experiences I had. I am very grateful to both MnTAP and St. Paul Beverage Solutions for supplying this opportunity and wonderful learning environment." ~ ZB

Project Background

At BevSo, water is used primarily for cooling and cleaning and can be found almost anywhere you look. The primary focuses of the project were changing single-pass cooling to closed-loop where possible, modifying the current bottle washer systems, and optimizing the Clean-in-Place (CIP) systems. The current water use of these three processes adds up to 21,000,000 gallons of water annually.

Incentives To Change

The primary incentives to change were eliminating excess water use at the facility, optimizing procedures and automating simple systems, such as a changing a manually-operated valve to a solenoid valve triggered by a motion sensor.

SOLUTIONS

Automate Bottle Washers and Install Flow Orifices

The purpose of bottle washers within the facility is to clean off any excess product that may have spilled onto the cartons or bottles as they were filled. Installing solenoid valves, motion sensors, and flow orifices would eliminate the need for employees to operate hand valves and create a controlled, consistent flow rate throughout the system. BevSo is planning to implement this solution which would save 1,200,000 gallons of water and $10,600 annually. Additionally, BevSo could save up to $2,700 each year in sewer availability charge (SAC) reductions.

Utilize Existing Ammonia Chiller to Chill Aseptic Liquefier

The aseptic liquefier is used to blend flavors such as chocolate for production. Currently, the aseptic liquefier uses single-pass cooling. Connecting the aseptic liquefier to the existing ammonia chiller with insulated piping is recommended and would eliminate almost all water use associated with cooling except minimal amounts of water lost to cooling tower blowdown and evaporation. Implementing this solution would save 1,500,000 gallons of water, $9,200 overall, and up to $3,400 in SAC reductions annually.

"We are profoundly grateful for our collaboration with MnTAP. The insights and initiatives worked on and proposed by Zach during his internship have been invaluable, paving the way for significant operational improvements and sustainability measures. His collaboration with our engineering and plant teams to gather and analyze information was exemplary."

~ Travise Beaton
Snr. Manager, Maintenance and Engineering
St. Paul Beverage Solutions

Solutions

Decrease Post-Rinse/Intermediate Rinse Times for CIP Systems

Post-rinses and intermediate rinses are used to eliminate any detergent in tanks and lines from CIP wash steps. Decreasing the run time of post-rinses and/or intermediate rinses when possible is recommended. The run time of the rinses can be reduced for multiple circuits on each CIP system. The recommended run time was determined based on conductivity data. Implementing this solution would save 3,000,000 gallons of water, 4,240 therms of natural gas, and $32,300 each year. Resulting SAC reductions could save up to $6,600 each year.

Decrease Pre-Rinse Times for CIP Systems

Pre-rinses within CIP systems are used to remove the majority of loose sediment before sending a wash through to eliminate the rest of the scale and fouling. There are no turbidity sensors in the CIP systems (turbidity sensors measure the amount of suspended particles within a liquid) so there was no data to create a recommendation with. Reducing the pre-rinse times to the new post-rinse or intermediate rinse times (whichever was longer) was proposed. This would still allow for the water to clear out the loose sediment, as the majority of the sediment can be removed very quickly. Annually, this solution would save 3,900,000 gallons of water, 7,520 therms, and $45,600 overall with the potential to save up to $8,900 in SAC reductions.

Recommendation	Annual Reduction	Annual Savings	Status
Automate Bottle Washers and Install Flow Orifices	1,200,000 gal water	$10,600	Planned
Utilize Existing Ammonia Chiller to Chill Aseptic Liquefier	1,500,000 gal water	$9,200	Recommended
Decrease Post-Rinse/Intermediate Rinse Times for CIP Systems	3,000,000 gal water 4,240 therms	$32,300	Recommended
Decrease Pre-Rinse Times for CIP Systems	3,900,000 gal water 7,520 therms	$45,600	Recommended

MnTAP Advisor: Laura Sevcik, Associate Engineer

VA Hospital Minneapolis

Sarah Zins
Environmental Engineering
University of Minnesota Twin Cities

Organization Background

The VA Medical Center - Minneapolis (VAMC) provides healthcare to veterans, trains future healthcare providers, and conducts medical research through a program connected with the University of Minnesota. The medical center was founded more than 100 years ago in 1921. The hospital employs a staff of 4,800 and has 1.5 million square feet. They offer a wide range of services for veterans including surgery, mental health care, neurology, cancer treatment (oncology), dentistry, addiction care, and many others.

"I was very thankful that I had the opportunity to work at the VAMC this summer. This internship allowed me to apply technical knowledge and refine my problem-solving skills. It's rewarding to know that my work will contribute to sustainable changes within the VAMC. I'm thankful for this opportunity that has not only honed my skills but also reinforced my passion for sustainable solutions." ~ SZ

Project Background

The VAMC is a large facility serving patients 24/7. Consequently, the facility consumes a large amount of water to maintain operations. They are looking for areas where water use can be reduced to save money and improve sustainability. It is important to decrease the amount of irrigation water as it is sourced from a local well, and over-pumping aquifers can lead to numerous environmental risks.

Additionally, the facility produces three meals a day for the hospital's inpatients. The VAMC kitchen has tried many methods in the past for managing food waste more efficiently; however, each was ultimately untenable.

Incentives To Change

The VAMC places a high emphasis on sustainability. The VAMC has won numerous awards for its sustainable practices, and there is an aim to continue this trend. As a healthcare facility, protecting public, patient, and employee health is part of the VAMC's mission statement. To protect human health, environmental health must be protected as well.

SOLUTIONS

Install Ozone Laundry

Washing laundry with ozone can sanitize fabrics without the use of additional chemicals. This eliminates the need for rinse cycles, saving water. Ozone performs most effectively in cold water, so there are also energy savings. Installing ozone laundry could save up to 1,600,000 gallons of water, 28,000 therms, 42,000 lbs of detergent, and $85,000 annually.

"Through examining water use from multiple angles, Sarah was able to identify problems and inefficiencies that our facility engineering team were unaware of. Some... had been recognized before but never communicated to the people who could fix it, others were because of people's tendency to focus on how an issue affects their own work but not the downstream effects."

~ Dalton Albers, Environmental Engineer
VA Medical Center - Minneapolis

Solutions

Update Faucets to Low Flow

An audit found that 29% of the faucets in public bathrooms have not been converted to low flow. Updating these faucets to a flow rate of 0.5 GPM could save 1,600,000 gallons of water and $19,000 annually.

Repair Cooling Tower Automatic Blowdown

The cooling tower is currently constantly blowing down because of a broken valve on the automatic blowdown system. This results in additional water used for make-up. Repairing the blowdown system would save 730,000 gallons of water and $8,700 annually.

Optimize Irrigation

The grass at the facility is being watered three times more than recommended. It is suggested that the VAMC reduce the watering rate to 1 in/week by reducing sprinkler cycle times and tracking weekly water usage. Additionally, the irrigation season can be reduced from 24 weeks to 17 weeks. Lastly, the moisture sensors on site are not working and can be replaced. These three actions will cumulatively save up to 8,330,000 gallons of water and $1,030 per year.

Replace Moisture Sensors

The VAMC has three moisture sensors over the irrigated areas. However, these moisture sensors have not been functioning. The moisture sensors should be replaced to avoid overwatering when there is precipitation. This would save 1,300,000 gallons of water and $170 alone; however, if the irrigation season is also reduced, it will save 760,000 gallons of water and $100 annually.

Eliminate Excess Food and Divert Food Waste

To reduce excess food waste, it is recommended to implement just-in-time prep (JITP). This would involve producing meals to a live patient count and increasing production if there is additional demand. This would use less inventory and limit the production of excess food by 130,000 lb. per year.

The organics from the post-patient plate waste can be diverted through donation to a local farm. The farm will pick up the organics, heat treat them, and use them as feed for pigs. This recommendation would divert 160,000 lb. of organics from the trash.

Recommendation	Annual Reduction	Annual Savings	Status
Install Ozone Laundry	1,600,000 gal water 28,000 therms 42,000 lbs chemicals	$85,000	Recommended
Update Faucets to Low Flow	1,600,000 gal water	$19,000	Recommended
Repair Cooling Tower Automatic Blowdown	730,000 gal water	$8,700	Recommended
Optimize Irrigation	8,330,000 gal water	$1,030	Recommended
Eliminate Excess Food Production	130,000 lbs food	$270,000	Recommended
Divert Food Waste	160,000 lbs organics	TBD	Recommended
Donate Excess Food (if applicable)	110,000 lbs food	TBD	Recommended

MnTAP Advisors: Gabrielle Martin, Associate Engineer and Jon Schroeder, Sustainable Materials Management Specialist

Ventura Foods LLC

Allicia Petrich
Chemical Engineering
University of Minnesota Duluth

Organization Background

Ventura Foods was formed as a privately held joint venture between Mitsui & Co., and CHS, Inc. following the merger of Wilsey Foods and Holsum foods in 1996. They have eleven plants in the US and three in Canada with offices in Singapore, Toronto, Texas, and Mexico City. This project focused on the location in Albert Lea, MN with 200 employees. In Albert Lea, they package mainly margarine, shortening, and lard products for companies and everyday consumers.

"This summer I got the opportunity to apply concepts I learned in the classroom to help save energy and water. I am so grateful for the support and kindness I got from MnTAP and the Ventura Foods team. Through this opportunity, I've been able to grow my skills and become a more confident engineer. I'm excited to use what I've learned for my future career." ~ AP

Project Background

The plant uses large amounts of both fuel and water in their production processes. Most of this water is heated to high temperatures for both production and sanitation. Since this facility has products with kosher certification, a lot of heated water is used to maintain this standard. This project team believed a lot of opportunity to conserve water and fuel could be found in this process. A lot of fuel savings could also be explored through insulation of tanks and pipes.

Incentives To Change

Over $2 million is spent on utilities annually at this plant. The price of natural gas has also risen causing a lot of these projects to be under a two-year pay period or more. Since sewer rates are also increasing, the team wants to limit the amount of water sent down the drain. A large percentage of this water is still clean or can be easily treated and reused. On an annual basis, Ventura Foods-Albert Lea is sending 69% of its incoming water down the drain. Sanitation is the cause of most of this due to rigorous cleaning processes.

SOLUTIONS

Insulate Hot Oil Tanks

There are 38 uninsulated tanks at the plant with an average surface temperature of 120 °F. Over 10% of the plant's natural gas usage is being discharged as heat due to lack of insulation on these tanks. The insulation selected for this project was closed cell spray foam insulation with DC315 fireproof paint. Natural gas will be reduced by 74,000 therms resulting in a savings of $52,200 annually.

Install Control Valves on Thermolines

The thermolines are currently heating all the time, but product is not being made over the weekend. There is energy savings opportunity to turn off this heat source when it is not in use. One of the lines isn't in use 300 days per year which costs over $14,000 annually. Out of the six lines, five of them are cost effective to put control valves on.

Repair Steam Traps

A steam trap audit was done, and 27 traps were not working properly. Leaks were calculated and found over 5

Solutions

million lbs of steam was heating up production areas and going down the drain. The quote selected puts this project under a year payback period.

Replace Holding Tank 14

A holding tank for butter is currently leaking over 19 gallons per minute (gpm) of water when in use and 0.8 gpm when not. A fix was attempted that got the leak down from 38 gpm to 4 gpm but it was broken again. A newer tank of similar size is recommended to replace it. Since the capital costs are covered by a replacement tank already on site, an estimate of $5,000 for installation of the tank is the total project cost. The annual savings were calculated based on the current leak of 19 gpm. This gave a savings of 4.5 million gallons of water and 35,700 therms.

"Having Allicia as a MnTAP intern was a great experience this summer. She was tasked with water and fuel savings, which was a large and complex undertaking. Alicia quickly broke down the large task into manageable projects and found easy solutions to our misuse of water and fuel. Her efforts far exceeded our expectations and achieved both her goals and ours."

~ Wade Nelson
Maintenance Manager, Ventura Foods

Install Spray Ball Systems on Remaining Churn Tanks

The north and south churn tanks get sanitized every Sunday to comply with kosher certification. Currently, the tanks are overflowed with boiling water to sanitize them. Based on other mix tanks that have a spray ball system installed, an estimate was formed on savings associated with no longer overflowing and instead using the spray balls for cleaning. This project will save about 50,000 gallons of water and a little over 600 therms annually.

Recommendation	Annual Reduction	Annual Savings	Status
Insulate Hot Oil Tanks	74,000 therms	$52,200	Implementing
Install Control Valves on Thermolines	44,000 therms	$37,900	Recommended
Repair Steam Traps	55,000 therms 600,000 gal	$46,000	Implementing
Replace Holding Tank 14	35,700 therms 4,500,000 gal	$69,000	Implementing
Install Spray Ball System for Remaining Wash Tanks	635 therms 50,000 gal	$1,150	Recommended

MnTAP Advisor: Jon Vanyo, Senior Engineer

Wholesale Produce Supply

Thomas Leibert
Chemical Engineering
University of Wisconsin Madison

Organization Background

Located in Minneapolis, Wholesale Produce Supply Co. is a local produce wholesaler that employs 300 people. Founded in 1964, the company began as a produce supplier, wholesaler to wholesaler, to deliver fruits and vegetables to retailers across nine states in the Midwest and parts of Canada. With a facility of over 134,000 square feet, Wholesale Produce is a place of constant movement, with production, shipping, and sanitation operating seven days a week.

"Over the summer, I was able to experience first-hand the rewards and challenges of working at a large, high-production facility. I was able to talk to so many people about so many different opportunities, and I was truly happy to see my efforts align with my values of sustainability. I am forever grateful to MnTAP and Wholesale Produce for this experience." ~ TL

Project Background

Wholesale Produce is continuously making investments to improve its production line while maintaining a high level of food safety and quality. Water and chemical usage are critical aspects of many production steps, whereas food waste disposal and energy efficiency are crucial to ensuring high-quality products. The goal of this project was to measure the environmental impacts of its production, and whether certain aspects could be improved.

Incentives To Change

Due to all the moving parts with 24-hour production, sanitation, and shipping, Wholesale Produce was drawn to the MnTAP intern project to better understand where it could improve as a company, particularly in the fields of water conservation, food waste, energy efficiency and chemical use. The benefit would be to have better outcomes with its waste programs, water and chemical use, and refrigeration system, and to hopefully reduce some of its spending.

"[Thomas was] a very personable person to work with, professional and polite. The potential savings he discovered in our business will be utilized for the most part. We will be implementing some of his ideas on water saving soon."

~ Bruce Jorgenson, VP of Operations
Wholesale Produce

SOLUTIONS

Replace Tomato Spray Nozzles and Hoze Nozzles in Fresh Cut

Tomato processing lines spray water to rinse debris and potential chemicals off the tomatoes. The current nozzles have a high-water flow rate, which not only uses water unnecessarily, but the excess water on the tomatoes can also lead to spoilage in transit, leading to a lower-quality product. The replacement spray nozzles not only have a lower flow rate, but they also have a tighter angle to prevent spray overlap, further reducing the chances of excess moisture in shipping. Overall, this recommendation would save 513,000 gallons of water and $6,090 a year. Additionally, current hose nozzles in fresh cut use 5.8 gpm, and new low-flow nozzles are recommended. The new nozzles offer the same range of pressures and are easy to install. This recommendation would save 323,000 gallons of water and $3,830 annually.

Solutions

Install Metal Guards on Flume

The flume leaks water, because as it runs, water splashes out at the ends, which not only wastes water, but it presents a health risk as well. Installing a metal guard on the end of the flume would stop most of the water from splashing out. Not only would this save roughly 4,680 gallons of water annually, which equates to $55 of savings, but it would also improve sanitary conditions on the production floor. It would also pay for itself immediately.

Reduce Run Time of Greens and Flume Rinses

The flume and greens rinses are nozzles that spray debris from conveyor belts leading to the flume and greens packing stations, respectively. These nozzles are turned on during changeovers to prevent cross contamination and are left on for the entirety of the changeover. It is recommended to only have the nozzles run for one rotation of each conveyor belt to prevent unnecessary water consumption instead of the full duration of the changeover. This recommendation would result in a water reduction of 281,000 gallons of water per year, and savings of $3,340 a year.

Divert Food Waste from Landfill to Organics Dumpster

Currently, all of the food waste from the splits packaging area is being sent to landfill. This is due to the close proximity of the landfill dumpster to the splits room, and to the lack of a way to transport the food waste across the building to the organics dumpster. The installation of a large garbage bin on wheels in splits is recommended to allow for the transport of food waste to the organics dumpster.

Implement Upcycling Opportunities

Wholesale Produce is currently sending its food waste to be used as feed for hogs. However, there is potential for this food waste to be turned into consumer products for humans. This recommendation entails a collaboration with NetZro, a food valorization company, to investigate potential business opportunities to reutilize this food waste, whether in the form of veggie broth or even pharmaceuticals. This is a long-term project that could take years to implement; however, it has the potential to completely repurpose all of Wholesale Produce's food waste off the production line.

Recommendation	Annual Reduction	Annual Savings	Status
Replace Tomato Spray Nozzles	513,000 gal	$6,090	Recommended
Replace Hose Nozzles	323,000 gal	$3,830	Implementing
Install Metal Guards on Flume	4,680 gal	$55	Recommended
Reduce Run Time of Greens and Flume Rinse	281,000 gal	$3,340	Recommended
Divert Food Waste from Landfill to Organics Dumpster	700,000 lbs	$18,000	Recommended
Implement Upcycling Opportunities	6,200,000 lbs	TBD	Investigating

MnTAP Advisor: Jon Schroeder, Sustainable Materials Management Specialist

MnTAP SOLUTIONS

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. Services in addition to the intern program include site visits, team facilitation and phone assistance.

MnTAP is funded by a 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 and other grant and partner sources. MnTAP has no regulatory responsibilities or obligations and our work is confidential.

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McNamara Alumni Center • University of Minnesota
200 Oak Street SE • Suite 350-1 • Minneapolis, MN • 55455
612-624-1300 | www.mntap.umn.edu