POLLUTION PREVENTION

INTERN PROGRAM

2016 ANNUAL REPORT

Ten upper-level engineering students teamed with the Department of Natural Resources' (DNR) 2016 Pollution Prevention Intern Program to help companies meet their environmental objectives. The Intern Program is an extension of DNR's Pollution Prevention Services, a non-regulatory program that offers confidential technical assistance to Iowa business and industry.

Working on site at top Iowa companies, interns identify strategies to reduce solid and hazardous waste, water and energy use, air emissions and greenhouse gases. Interns research and recommend process improvements that will lower operating costs and improve the environmental performance of host companies. The interns offer a fresh perspective and innovative solutions while gaining valuable experience.

This year, the interns identified opportunities totaling more than $3.26 million annually. Of these, projects estimated to save $1.6 million annually were implemented or in progress at the completion of the internship.

The program offers both 12-week and 24-week projects each year. An intern at CF Industries completed a 24-week project in 2016. Additional time on site allows interns to conduct more in-depth research, collect data over time and evaluate systems through varying conditions.

The results of the 2016 projects continue to demonstrate that actions to increase environmental stewardship can also reap financial benefits. We thank the 2016 host companies for their partnership and commend them for their continued pursuit of environmental excellence.

2016 IMPLEMENTED SAVINGS

CATEGORY	REDUCTION	COST SAVINGS
WATER CONSERVATION	1,116,012,980 GALLONS	$1,215,740
SOLID WASTE	1,215 TONS	$32,530
ENERGY	1,207,809 KWH 221,375 THERMS	$70,783 $95,395
OTHER		$231,886
		TOTAL: $1,646,034

CONVENTIONAL AIR POLLUTANTS DIVERTED IN METRIC TONS

SO_2	NOX	VOC	PM_{10}	CO_2
7.03	4.88	3.60	1.21	3,006.26
$MTCO_2E$	**CH_4**	**N_20**	**CFC**	
4,220.23	805.98	127.61	15.95	

Note: Air emissions and greenhouse gases represent life cycle estimates and include external utilities. Totals do not solely represent emissions generated at the plant sites.

Life cycle air emissions and greenhouse gas estimates for all sectors except solid waste are calculated using Carnegie Mellon University Green Design Institute, Economic Input-Output Life Cycle Assessment (EIO-LCA).

Greenhouse gas estimates for solid waste projects are derived from U.S. EPA Waste Reduction Model (WARM).

PROJECT AREAS IMPLEMENTED

- Renewable Energy
- Heating and ventilation effectiveness
- Air conditioning usage
- Compressed air efficiency
- Water usage and wastewater treatment
- Solid waste reduction and management
- Process improvements
- Replacing hazardous chemical with less toxic alternatives

COMPANY TESTIMONIALS:

"The intern project met our objective of building a solution for water savings. Our experience with this program was excellent in ho w it revealed a lot of information and state regarding our current processes. Hormel expects to see significant utility cost savings."

*— Christen Geremesz, **Hormel Foods Corporation***

"The real value of the intern program has been to obtain a talented engineering student to compile data and provide an in-depth technical analysis, with actionable recommendations. The results from our P2 projects have helped us to make informed decisions that improve our efficiency and reduce our operating costs."

*— Todd Fails, **Zoetis***

FULL CASE STUDIES MAY BE VIEWED AT:
WWW.IOWAP2INTERNS.COM

Iowa Department of Natural Resources

SUMMARY OF 2016 PROJECTS

MONICA HEMINWAY
CHEMICAL ENGINEERING, UNIVERSITY OF IOWA

ALCOA, INC
DAVENPORT, IOWA

Alcoa, Inc. has been a global leader in the aluminum industry since 1888 and this facility supplies aluminum and aluminum alloys to various industries including food packaging, air travel, automotive transportation and space exploration.

The intern established an effective point-of-generation collection system to improve the efficiency of solid waste segregation and handling processes.

ANTHONY GREGORIO
MECHANICAL ENGINEERING, UNIVERSITY OF IOWA

BRIDGESTONE AMERICAS TIRE OPERATIONS
DES MOINES, IOWA

Bridgestone Americas Tire Operations is a premier global tire manufacturer. Bridgestone's Des Moines facility is the largest agricultural tire manufacturing plant in the country.

The intern explored strategies and provided a financial analysis for feasible options to reduce the amount of steam required in production processes and to reduce heat loss in the steam piping.

GRAHAM YOUNG
CHEMICAL ENGINEERING, UNIVERSITY OF IOWA

CF INDUSTRIES
SERGEANT BLUFF, IOWA

CF Industries is a leading nitrogen fertilizer manufacturer producing ammonia, urea liquor, urea ammonium nitrate, diesel exhaust fluid, and granular urea.

The intern explored strategies to recycle water between production processes at the plant and assisted with meeting corporate reduction goals for water and associated energy costs.

JACOB HOOGENSEN
MECHANICAL ENGINEERING, IOWA STATE UNIVERSITY

CITY OF BLOOMFIELD
BLOOMFIELD, IOWA

The City of Bloomfield is located in Davis County and is home to the Davis County Community School District. This internship resulted from Bloomfield's partnership in Iowa's Economy, Energy, Environment (E3) project. E3 is an EPA sponsored program that brings together multiple agencies to support improvement projects in communities and manufacturing facilities.

The intern conducted energy audits of targeted systems at the school buildings and made recommendations to improve energy efficiency and reduce utility costs.

CALEB GIBSON
MECHANICAL ENGINEERING, ST. AMBROSE UNIVERSITY

CITY OF CLINTON
CLINTON, IOWA

The Clinton Regional Water Reclamation Facility is responsible for the collection, transport and treatment of wastewater for the cities of Clinton, Camanche and Low Moor. The city's new state of the art facility utilizes an advanced aerobic process that results in superior water quality, but is more energy intensive.

The intern conducted a feasibility study and cost analysis for the use of alternative energy sources at the wastewater treatment plant.

ANDREW DAVIS
INDUSTRIAL ENGINEERING, IOWA STATE UNIVERSITY

HACH
AMES, IOWA

Hach Company develops, manufactures, and distributes products and reagents worldwide for faster, simpler, greener, more informative, and user-friendly water testing and analysis.

The intern documented the Impacts of targeted environmental aspects to support ISO 14001 certification and recommended strategies to reduce or eliminate targeted waste streams.

BRETT OVERTON
MECHANICAL ENGINEERING, ST. AMBROSE UNIVERSITY

HORMEL FOODS CORPORATION
KNOXVILLE, IOWA

Hach Company develops, manufactures, and distributes products and reagents worldwide for faster, simpler, greener, more informative, and user-friendly water testing and analysis.

The intern documented the impacts of targeted environmental aspects to support ISO 14001 certification and recommended strategies to reduce or eliminate targeted waste streams.

ANNABEL SEELING
INDUSTRIAL ENGINEERING, UNIVERSITY OF IOWA

PRINCIPLE FINANCIAL GROUP
DES MOINES, IOWA

Principal helps people and companies around the world to build, protect and advance their financial well-being with retirement, insurance and asset management expertise.

The intern conducted a waste stream analysis on the corporate campus and identified opportunities to reduce generation and increase diversion of landfilled materials.

LOGAN CLARK
CHEMICAL ENGINEERING, IOWA STATE UNIVERSITY

WELLS ENTERPRISES, INC.
LE MARS, IOWA

Wells Enterprises, Inc. is the largest privately held, family owned ice cream and frozen treat manufacturer in the United States.

The intern provided updated drawings of the compressed air system piping and made recommendations to reduce energy usage and associated costs.

ZAC SCHANAU
MECHANICAL ENGINEERING, UNIVERSITY OF WISCONSIN PLATTEVILLE

ZOETIS
CHARLES CITY, IOWA

Zoetis develops, manufactures and commercializes a diverse portfolio of animal health medicines and vaccines.

The intern evaluated the efficiency of the chilled water system and identified opportunities to reduce energy usage and associated costs.

DANIELLE DILKS
INTERN PROGRAM COORDINATOR
POLLUTION PREVENTION SERVICES

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KIM SCHERBER
CIVIL ENGINEERING, IOWA STATE UNIVERSITY

TYSON DELI, INC.
CHEROKEE, IOWA

Tyson Foods, Inc. is a major producer of chicken, beef, and pork products for consumers globally. This facility receives and processes raw meat into ready-to-eat products. The intern completed a water balance and investigated water reduction opportunities at the facility to meet corporate reduction goals. Strategies included production and operational improvements that will significantly reduce the amount of water and energy used in the wastewater pretreatment process.

CALLIE SCHULTES
CHEMICAL ENGINEERING, IOWA STATE UNIVERSITY

UNITYPOINT HEALTH–DES MOINES
DES MOINES, IOWA

UnityPoint Health-Des Moines prides itself on the treatment it provides in the areas of cancer, cardiology, trauma and emergency, physical rehabilitation, maternity care, behavioral health, orthopedics, weight loss, pediatrics, sports medicine, and radiology. The intern conducted an audit of the hospital's hazardous waste streams, focusing on the pharmaceutical waste collection program. Increasing the segregation of this waste stream and reducing the amount of pharmaceutical waste being generated will significantly reduce purchasing and disposal costs.

LUCAS BLACK
MECHANICAL ENGINEERING, UNIVERSITY OF WISCONSIN-PLATTEVILLE

WEST LIBERTY FOODS, LLC
WEST LIBERTY, IOWA

West Liberty Foods, LLC has been certified as a landfill free facility. The company continually seeks to increase its environmental stewardship and is now is working to reduce energy consumption. The intern identified leaks in the compressed air system at two plant facilities. He then evaluated the control and distribution portions of the system and made recommendations to improve storage opportunities and add variable frequency drives and load controls to help optimize the system.

NICHOLAS ZAHNER
CONSTRUCTION ENGINEERING, MECHANICAL EMPHASIS
IOWA STATE UNIVERSITY

WESTERN IOWA TECH COMMUNITY COLLEGE
SIOUX CITY, IOWA

Western Iowa Tech is a comprehensive community college with five campuses in northwestern Iowa. More than 70 degree options are currently offered. The intern developed a profile of energy use and assessed reduction opportunities of the mechanical systems at the main campus in Sioux City, Iowa. A window retrofit was also evaluated that would reduce heat-flow and help maintain ambient temperature reducing the load on mechanical equipment.

ANDREW JARVEY
INDUSTRIAL ENGINEERING, IOWA STATE UNIVERSITY

WINNEBAGO INDUSTRIES, INC.
FOREST CITY, IOWA

Winnebago Industries operates the largest facility for motor home production in the United States (U.S.) and is a leading U.S. Class A and Class C recreational vehicle manufacturer. The intern conducted a waste stream analysis and identified new markets to increase the amount of recyclable material diverted from the landfill. The intern also recommended process improvements to streamline the collection and shipping of recyclable materials to generate cost savings.

BRYCE NEUMAN
MECHANICAL ENGINEERING, UNIVERSITY OF WISCONSIN PLATTEVILLE

ZOETIS
CHARLES CITY, IOWA

Zoetis develops and manufactures animal health medicines and vaccines designed to meet the real-world needs of veterinarians, farmers and companion animal owners. Vaccines for cattle, swine, poultry and companion animals are produced at the Charles City facility. The intern conducted a water balance and evaluated process improvements to reduce water consumption at the facility. Strategies included hot water recovery, set-point adjustments, flow-control switches and a closed-loop cooling system.

DANIELLE DILKS
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ZACH CARTER
MECHANICAL ENGINEERING, THE UNIVERSITY OF IOWA

GOLDEN CRISP PREMIUM FOODS, INC.

SIOUX CENTER, IOWA

Golden Crisp Premium Foods, Inc, a division of Patrick Cudahy LLC, processes fresh pork bellies into smoked, sliced, cooked and ready-to-eat bacon products for both food service and retail customers. The intern conducted a comprehensive analysis of the facility's landfilled solid waste streams. Programs were developed and implemented to divert many of those materials from the landfill which will move the company closer to achieving zero landfill status.

DANIELLE UNDERWOOD
INDUSTRIAL ENGINEERING, IOWA STATE UNIVERSITY

GRINNELL COLLEGE

GRINNELL, IOWA

Grinnell College is a private, liberal arts college founded in 1846. The mission of the College is to provide students with a broad, deep, and life-enhancing education. The intern developed a comprehensive spreadsheet documenting the lamp use, type, location and wattage of the various lamps that will help manage and control inventory. Recommendations for upgrades to the lighting system and the addition of sensors and controls are expected to considerably impact annual energy costs.

NICOLE UNDERWOOD
MECHANICAL ENGINEERING, IOWA STATE UNIVERSITY

GRUNDY COUNTY MEMORIAL HOSPITAL

GRUNDY CENTER, IOWA

Grundy County Memorial Hospital was founded 61 years ago and now serves four counties. The hospital has a regional reputation for its orthopedic services and offers a variety of outpatient services. The intern evaluated ways to increase efficiency of the boiler and steam system. Strategies included reducing boiler pressure, optimizing the air-fuel ratio, and heat recovery methodologies to preheat intake air. Thermographic imaging equipment was utilized to identify leaks and heat loss in the steam system.

JOHN BAUMHOVER
MECHANICAL ENGINEERING, THE UNIVERSITY OF IOWA

HORMEL FOODS

ALGONA, IOWA

Hormel Foods produces the top selling brand of pepperoni in the nation, including both classic *Hormel*® brand pepperoni as well as specialty-recipe pepperoni. The intern first conducted a lighting assessment of targeted areas in the facility. He then identified potential markets for critical waste streams to support a corporate initiative for landfill diversion. The additional diversion of waste from the landfill will provide significant cost savings and improve environmental performance.

KELSEY OLSON
INDUSTRIAL ENGINEERING, BRADLEY UNIVERSITY

JELD-WEN WINDOWS

GRINNELL, IOWA

JELD-WEN formerly known as WENCO was started in 1969. JELD-WEN Windows manufactures vinyl windows and sliding patio doors for new construction and remodels for residential markets. The intern recommended process improvements to reduce the amount of scrap generated during the manufacturing process. The intern worked with personnel and management to improve the efficiency of recycling collection within the production lines and reduce cross contamination of recyclable materials.

AARON STRAND
MECHANICAL ENGINEERING, UNIVERSITY OF WISCONSIN-PLATTEVILLE

JOHN DEERE DAVENPORT WORKS

DAVENPORT, IOWA

John Deere Davenport Works includes a production plant, a training center and a shipping facility. The plant houses five product lines: skidders, wheeled feller-bunchers, four-wheel-drive loaders, articulated dump trucks and motor graders. The intern completed a motor survey and identified opportunities to reduce energy usage at the plant. Recommendations included upgrading to synchronous belt drives and premium efficiency motors and strategies to reduce run time.

ROBERTO JESUS GARCIA
MECHANICAL ENGINEERING, IOWA STATE UNIVERSITY

JOHNSON CONTROLS, INC.

RED OAK, IOWA

Johnson Controls Inc. is a global corporation comprised of three divisions: building efficiency, power solution and automotive experience. The Red Oak facility is part of the Power Solutions division and specializes in production of battery grids. The project examined free-cooling technology at the plant to reduce energy usage. The intern also evaluated filtration technologies for process cooling water to improve production, extend equipment life and reduce costs.

BRIANI CAREY
MECHANICAL ENGINEERING, THE UNIVERSITY OF IOWA

STANLEY ENGINEERED FASTENING

DECORAH, IOWA

Stanley Engineered Fastening provides fasteners for use in a diverse range of applications including automotive and commercial technologies, electronics, construction and industrial use. The intern conducted an audit of the compressed air system using ultrasonic leak-detection equipment to identify and quantify leaks and made recommendations to improve the operating efficiency and reduce costs. An an ongoing leak detection plan was also developed that will help keep the system operating efficiently.