IAC INDUSTRIAL ASSESSMENT CENTERS

A Program of the U.S. Department of Energy

Beginning in 1976, the Industrial Assessment Centers (IACs) have provided small and medium-sized manufacturers with site-specific recommendations for improving energy efficiency, reducing waste, and increasing productivity through changes in processes and equipment.

SPRING NEWSLETTER **2020**

IN THIS ISSUE

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or contact your nearest center.

PROGRAM HIGHLIGHTS

INDUSTRIAL ASSESSMENT CENTER ACTIVITIES DURING COVID-19

During these challenging times, the Industrial Assessment Centers (IACs) are deploying new and creative ways to continue to help small and medium-sized manufacturers improve their energy efficiency and train the next generation of energy-focused engineers.

In addition to conducting assessment activities when possible, the IACs have engaged in a range of valuable activities, including report writing, energy-systems training, applied research, utility and other stakeholder interaction, implementation calls, website updates, and more.

The IACs have also hosted webinars on energy-efficiency topics, ranging from efficiency options for wastewater treatment plants, to combined heat and power, to energy-management systems.

Manufacturers are critical to the country's economic recovery. The IACs offer a valuable, no-cost resource to help manufacturers cut costs and improve their competitiveness through energy efficiency. The centers will continue to work creatively to provide assessment opportunities to their regions and support the students in their programs.

Here are just a few examples of the actions the IACs and their students have taken since of the beginning of the COVID-19 pandemic:

IUPUI
INDIANA UNIVERSITY–PURDUE UNIVERSITY INDIANAPOLIS

The Indiana University-Purdue University Indianapolis (IUPUI) Industrial Assessment Center has developed protocols for restarting energy and cybersecurity audits, with due consideration of social distancing and Personal Protective Equipment (PPE) protection, to ensure more student involvement and quality assessment. The protocols involve virtual interviews by the entire team and limited personnel for on-site data collections. The cybersecurity team also created a Remote Risk Assessment Framework (RRAF) in order to conduct risk assessments remotely with IAC clients. The RRAF is based on industry standards and will allow for continued assessments during the pandemic.

A major challenge for small and mid-size manufacturers finding cost-effective ways to monitor energy consumption, detect issues, and make corrections. To help, IUPUI has been exploring an advanced manufacturing system for energy management and developing a testing bed (see Figure 1). The system consists of internet-integrated sensors placed on the significant energy uses of the testing bed, data acquisitions,

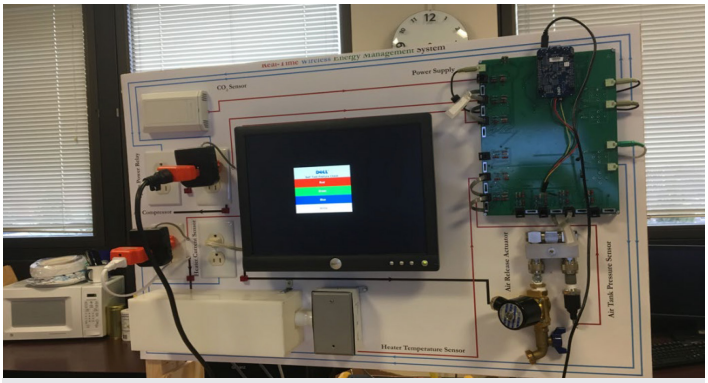

Figure 1. The testing bed consisting of a compressor, a motor, and a heating device for demonstrating the features and effects of the remote energy management system.

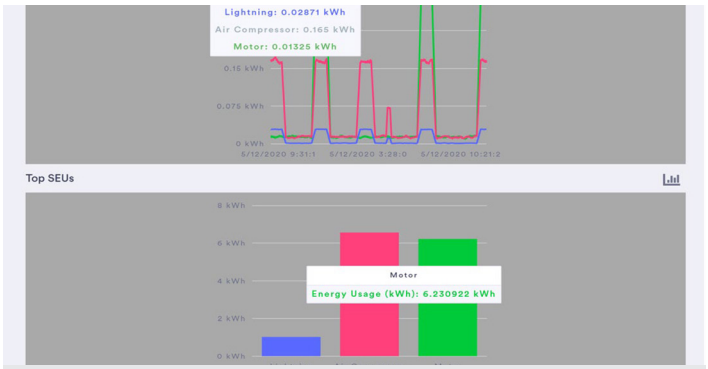

Figure 2. The main dashboard showing the energy consumptions of the "plant" and significant energy uses in real-time.

remote servers, database, energy system models, intelligence, and graphic interfaces (see Figure 2). This enables real-time monitoring of energy use, reporting malfunctions, predicting potential system issues (like demand peak) from legacy data through machine-learning technology, providing options with predicted outcomes for decision-making, implementing the selected option, and performing real-time assessments.

LEHIGH UNIVERSITY

The Lehigh University IAC is offering clients a choice between in-person or virtual assessment activities. Depending on the needs of the client, the Lehigh IAC team proposed the following protocol for distanced assessments:

- **Phase 1:** The initial interview and the virtual plant tour will be conducted during phase one, either via a prerecorded video or a live video tour.
- **Phase 2:** The second phase will include the second-round virtual interview with the client. This interview will be scheduled after the IAC team comes up with the recommendations based on the information provided during the initial interview and virtual plant tour.
- **Phase 3:** If additional measurements for any of the chosen assessment recommendations are needed, a small Lehigh IAC team will visit the plant with appropriate PPE to collect the required data. Phase three is not virtual and will only be carried out if the measurements are necessary for calculations, and with permission from plant personnel.

Georgia Institute of Technology

Faculty at the Georgia Tech IAC Center are working hard to keep students engaged in training and pre-assessment activities. Georgia Tech IAC students have also enrolled in Introduction to ISO 50001:2018 and Fundamental Concepts of Energy Management as additional training.

Although one assessment was postponed, the Georgia Tech IAC now has a number of companies waiting to take advantage of IAC assessments. Students are working to gather and process as much information as possible from these companies.

Although new students have not been able to conduct as many in-person assessments, their understanding of the assessment process has improved.

CLIENT TESTIMONIALS

Oklahoma State University

"The OSU IAC program is a valuable resource for small manufacturers such as ourselves with limited resources. The team was able to identify areas that we often take for granted due to being immersed in the facility on a daily basis. Through the use of a moderate-sized team of OSU graduate students, led by an industry energy expert in Dr. McCombs, the team was able to evaluate our operations with a fresh set of eyes. After the team collected and analyzed the data, they developed an easy-to-read report with energy-saving recommendations, providing tangible data that can be used to achieve real savings and reductions on energy usage to our facility's bottom line. I look forward to using this resource again in the future to provide further insight into energy-saving opportunities for our operations."

– **Travis Schifferns, Plant Manager, Franklin Electric, 05/05/2020**

Arizona State University

"The ASU team did an excellent job with their energy assessments of our manufacturing facilities. The team was very professional and sensitive to our safety and confidentiality expectations. The report provided several significant savings opportunities that we have already implemented. We would highly recommend the IAC to others."

– **Matt Herbert, Engineering Manager, International Flora Technologies, 04/13/2020**

CLIENT SPOTLIGHT

ENERGY SAVINGS OPPORTUNITIES FOR SOGEFI USA, INC.

The IAC at West Virginia University (WVU) discovered opportunities to decrease energy use and enhance corporate competitiveness for Sogefi USA, Inc., a global supplier of original parts for automotive industries located in Prichard, WV. The assessment team focused on the manufacturer's plastic-molding machines, as well as the tempering ovens, to identify most of its energy-savings opportunities.

Sogefi has already implemented two of the 13 energy-efficiency recommendations from the team, with six slated for implementation in 2021 and one in 2022. The implementation of these nine energy-efficiency measures will result in an annual electricity savings of 1,278,616 kWh, annual energy savings of 62 MMBtu, and annual cost savings of $76,749.

Lighting and Occupancy Sensors

The assessment team suggested replacing existing lighting with LED lamps and installing occupancy sensors in designated areas to increase the efficiency of the lighting system. Occupancy sensors would reduce the electrical use for lighting during unoccupied periods. Similarly, daylight sensors would reduce the intensity and quantity of lighting in areas that have adequate sunlight during the day.

Process Equipment

For further savings, the assessment team identified the following process equipment recommendations:

- Reduce the facility's compressed air use by lowering the overall pressure delivered to compressed-air-consuming equipment and processes.
- Use automatic controls to sequence the facility's five air compressors.
- Install economizers for the rooftop HVAC units, which are duct and damper systems that allow fresh outside air to be used directly for space cooling whenever the outdoor air has a lower total heat content (enthalpy) than return air.
- Install a capacitor bank to improve the power factor to at least 90%, thereby reducing the total electrical charges for the plant.
- Replace ordinary nozzles with vortex nozzles to reduce compressed air requirements for the facility.

Natural Gas Savings

The assessment team recommended that the facility insulate hot surfaces on the burner assembly and casing of the oven, resulting in a projected annual savings of 62 MMBtu of gas and $1,270.

Preventive Maintenance Savings

As electrical motors are widely used equipment in manufacturing facilities, the assessment team recommended the use of a repair/replacement policy for motors. By performing motor analysis regularly, motor efficiency can be improved, thereby reducing energy use.

The team also suggested that the facility repair air leaks in compressor air lines regularly by replacing seals around air filters, repairing breaks in lines, and shutting off airflow during the period with low usage.

Assessment Savings Tabulated

The following table presents the annual cost savings as a result of the IAC's recommendations at Sogefi USA. The energy conservation measures will reduce annual electric usage by 1,278,616 kWh and gas usage by 62 MMBtu. This translates into an annual cost savings of $76,749 and an annual reduction in CO_2 emissions of 2,807,175 pounds. ■

IMPLEMENTATION OF RECOMMENDATIONS

Planed Assessment Recommendations	Annual Conservation (MMBtu)	Annual Conservation (kWh)	Total Annual Savings ($)	Capital Costs ($)	Simple Payback (months)
Add Economizers on the HVAC Units	–	452,685	22,091	28,000	16
Replace the Existing Lighting with LED and Install Occupancy and Daylight Sensors in Designated Areas	–	355,454	19,827	15,605	10
Install a Capacitor Bank to Reduce the Power Cost Adjustments	–	–	10,950	36,000	40
Install a Sequencer for the Existing Compressors in the Plant	–	193,167	10,700	5,225	6
Replace Ordinary Nozzles with Vortex Nozzles	–	131,420	6,413	2,438	5
Establish Repair/Replace Decision Policy through Motor Management System	–	55,469	2,587	575	3
Repair Compressed Air Leaks	–	31,760	1,730	1,251	9
Insulate the Hot Surfaces to Reduce the Heat Losses	62	36,961	1,270	427	5
Reduce Compressor Pressure Set Point	–	21,700	1,181	75	1
Total	**62**	**1,278,616**	**76,749**	**89,596**	**14**

IAC Program Quarterly Results

Between July and September 2019, IACs conducted 138 assessments (Table 1). As a result, IACs made 901 recommendations that identified nearly $19.7 million in potential cost savings.

IDENTIFIED SAVINGS

Total Assessments	138	
Total Recommendations	901	
	Total Recommended Annual Savings	**YTD**
Energy Savings	19.7 M Therms	89.9 M Therms
Electricity Savings	159,991,250 kWh	712,128,328 kWh
Generation Reduction (approx.)	18.26 MegaWatts	81.29 MegaWatts
Natural Gas Savings	3.5 M Therms	15.1 M Therms
CO_2 Reduction	0.12 Tons	0.54 Tons
TOTAL Cost Savings	$18.14 Million	$80.33 Million
- Energy Related Savings	$13.64 Million	$62.79 Million
- Productivity Savings	$4.15 Million	$15.00 Million
- Waste & Water Savings	$0.35 Million	$2.35 Million

Table 1. July – September 2019

LOCATIONS

Plants assessed were located in 33 states (Figure 3). The assessed plants represent a broad range of industries, with fabricated metals and food being the most common (Table 2).

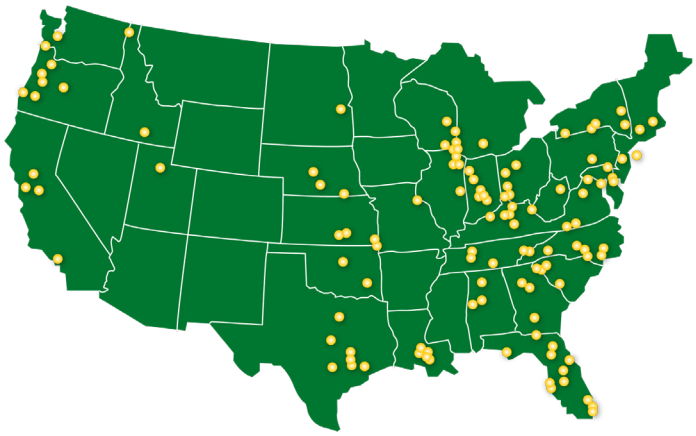

Figure 3. IAC Assessments Nationwide, July – September 2019

PARTICIPATION

A total of 335 engineering students were active during the quarter in the IAC program across the 31 centers, nearly 20% of whom were new to the program.

INDUSTRIES

Industrial Category (NAICS #)	Assessments
Fabricated Metal Product Manufacturing (332)	19
Plastics and Rubber Products Manufacturing (326)	16
Food Manufacturing (311)	15
Chemical Manufacturing (325)	12
Transportation Equipment Manufacturing (336)	7
Machinery Manufacturing (333)	7
Primary Metal Manufacturing (331)	6
Beverage and Tobacco Product Manufacturing (312)	5
Furniture and Related Product Manufacturing (337)	5
Computer and Electronic Manufacturing (334)	4
Wood Product Manufacturing (321)	4
Paper Manufacturing (322)	3
Printing and Related Support Activities (323)	3
Nonmetallic Mineral Product Manufacturing (327)	3
Petroleum and Coal Products (324)	2
All Other Manufacturing	8
Others	19

Table 2. July – September 2019 Assessments by NAICS Industrial Category

U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

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