West Virginia University-
Industrial Assessment Center

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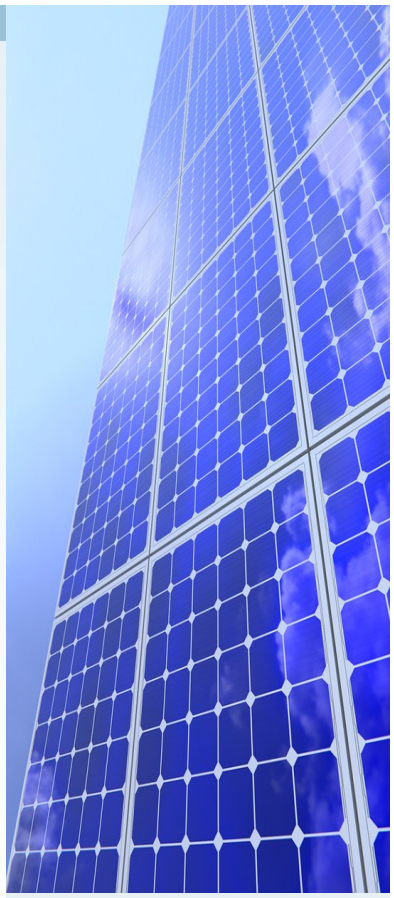

Newsletter

Executive Information

The West Virginia University Industrial Assessment Center (WVU-IAC) is an integral part of the US DOE Industrial Assessment Center program that supports University based centers to provide no-cost energy, productivity, water and waste, and smart manufacturing assessments to small and medium sized enterprises (SME) nationwide and train the next generation of engineers imparting them with knowledge and experience and preparing them for a career in sustainable development.

Preface

The work described in this newsletter is for the period of 05/01/2017 to 08/15/2017 based on the activities of the West Virginia University Industrial Assessment Center (WVU-IAC). The project is funded by the U.S. Department of Energy – Office of Energy Efficiency and Renewable Energy (EERE), Advanced Manufacturing Office (AMO) with overall project management provided by the Center for Advanced Energy Systems (CAES) at Rutgers, The State University of New Jersey.

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The newsletter is prepared by Mr. Praneeth Reddy Araka in collaboration with the IAC students.

Inside this issue

A Glimpse of this Cycle

- Since 09/01/2016, seventeen on-site assessments have been completed and most reports are uploaded to the DOE database.
- All the students working with WVU IAC were awarded tuition scholarships for Fall 2017.
- Sricharan Reddy Kommera, an MSIE student and Corey Crumm a BSIE student have joined the WVU IAC from Summer 2017.
- Alexandra Davis has completed BSIE degree and started her MSIE degree and is continuing with WVU IAC.

Energy Efficient technologies approved by DOE

The following are some energy efficient technologies developed and approved by DOE which saves energy and cost for the manufacturing industries

1) Compressed Air Systems
2) Steam Systems

More energy efficient technologies can be found at the following link

Energy efficient technologies for different industries

Recommendations from On-site Assessments

The WVU-IAC has conducted an assessment at a manufacturing plant in West Virginia. The primary product of the plant is non metals. The team has given several energy efficient and innovative recommendations to improve the functionality of the plant.

Non metal components

Sample Recommendations

1. Installation a CHP System

A packaged Combined heat and power system (CHP) is installed to utilize the waste heat released from various places in the plant. The installation measure would result in production of electricity by the CHP system and would reduce the electricity consumption and costs associated with the existing utility company.

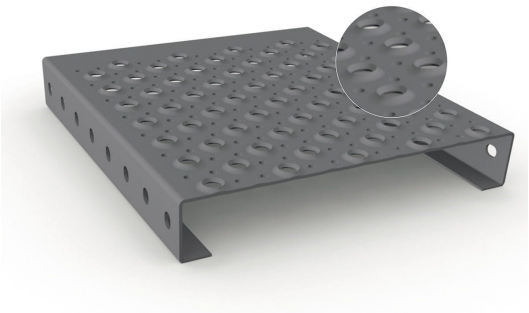
Energy Savings: 12,144,359 kWh electricity utilization is reduced as a result 26,596,146 lbs of CO_2 emission is reduced.
CHP Installation Cost: $1,455,300
Savings per year: Electric cost savings: $491,847/ yr
Expenditure on Operating and Maintenance: $36,433/yr
Total Savings: $455,414/yr
Payback Period: 39 months

2. Improve controls on Furnace

A Programmable Logic Controller (PLC) is an industrial computer control system that continuously monitors the state of input devices and makes decisions based upon a custom program to control the state of output devices. This type of control system can control and also can enhance any type of production line or machine process. By installing PLC control on the furnace the optimum temperature control is achieved using an independent furnace sensor.

Energy Savings: 827,820 kWh electricity utilization is reduced as a result 1,812,926 lbs of CO_2 emission is reduced.
Implementation Cost: $125,526
Savings per year: $50,032
Payback Period: 31 months.

The WVU-IAC has conducted an assessment at a manufacturing plant in West Virginia. The primary product of the plant is Hot Dip Galvanized Steel. The team has given several energy efficient and innovative recommendations to improve the functionality of the plant.



Aluminum Galvanized Steel

Sample Recommendations

1. Install Sensor to Detect Degradation and Improve Life of Pot Hardware

The steel sheets are coated by continuous hot dipping in a molten bath of zinc and aluminum. The process is carried out in the plant with the help of sink roll and stabilizing roll. It is recommended to use a smart sensor to identify the degradation in life of the sink roll and the stabilizing roll immersed in the zinc pot, so as to increase throughput as well as reduce the amount of rejected product.

BestPractices Tools used:

- Galvanizing Energy profiler and Decision Support System (GEPDSS)

Energy Savings: 1,690 MMBtu Natural gas utilization is reduced as a result 554,166 lbs of CO_2 emission is reduced.
Implementation Cost: $100,000
Savings per year: $60,138
Payback Period: 20 months.

2. Heat Recovery from Exhaust to Utilize in Absorption Chiller

In absorption chillers the cooling effect is essentially driven by heat energy. A heat source is used to generate chilled water rather than the electrical source. It uses the heat to create the pressure difference. It can utilize the waste heat. This unique advantage is used in this recommendation. The waste heat from the RTS exhaust is utilized in an absorption chiller to be used for office cooling.

Energy Savings:

- 151,639 kWh electricity is saved and as a result 332,089 lbs of CO_2 emission is reduced.

Implementation Cost: $72,000
Savings per year: $29,320
Payback Period: 30 months.

The WVU-IAC has conducted an assessment at a manufacturing plant in Maryland. The primary product of the plant is Hand-blown Glassware. The team has given several energy efficient and innovative recommendations to improve the functionality of the plant.

Hand-blow Glassware

Sample Recommendations

1. Incorporate Smart Controls on the Glass Furnace

A Programmable Logic Controller (PLC) is an industrial computer control system that continuously monitors the state of input devices and makes decisions based upon a custom program to control the state of output devices. This type of control system can control and also can enhance any type of production line or machine process. A PLC based control system is installed to adjust KVA, based on feed rate automatically on the Glass furnace.

Energy Savings: 101,310 kWh of electricity utilization is reduced per year as a result 221,869 lbs of CO_2 emission is reduced.
Implementation Cost: $25,500
Savings per year: $7,947
Payback Period: 39 months.

2. Install Insulated Strip Curtains on the Lehrs

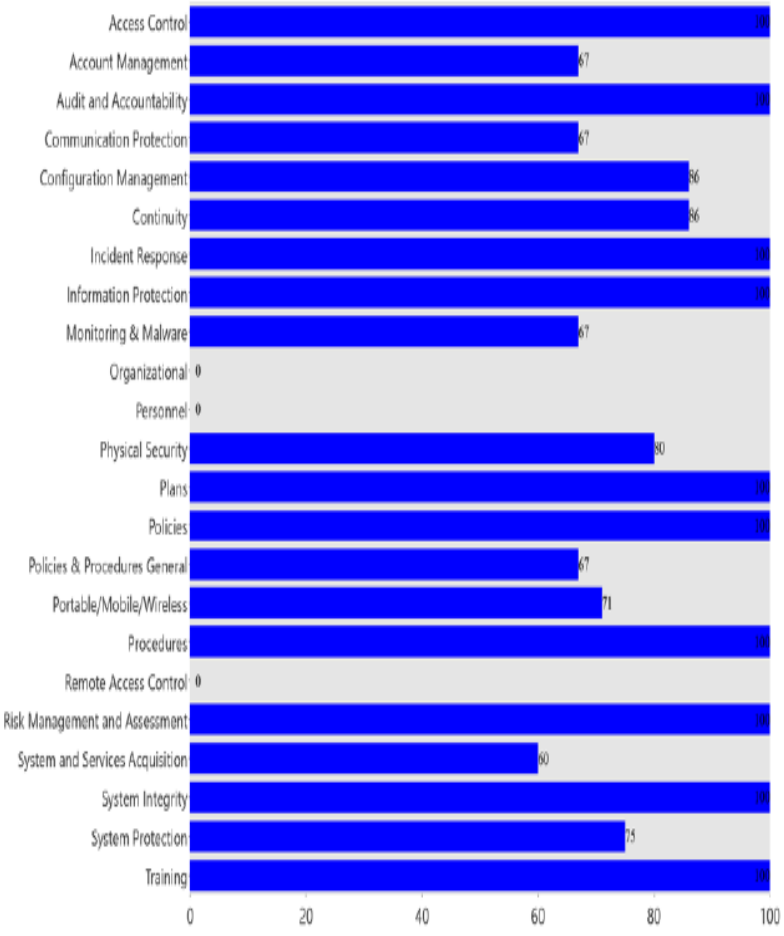
Install a strip curtains on the either side of the Lehrs to reduce heating load. Insulated strip curtains will prevent heat from escaping the Lehrs and reduce heating load. They reduce infiltration, while accumulating the warm air that naturally rises toward the top. They prevent exterior cold drafts from entering through openings and prevent heated air from escaping.

Energy Savings: 245 MMBtu Natural gas utilization is reduced as a result 9,153 lbs of CO_2 emission is reduced.
Implementation Cost: $2,700
Savings per year: $1,360
Payback Period: 24 months.

Cyber Security

Cyber terrorism is a real and growing threat. Standards and guides have been developed, vetted, and widely accepted to assist with protection from cyber attacks. WVU-IAC has conducted cyber security assessment for one of the participating SMEs using the Cyber Security Evaluation Tool (CSET). The CSET includes a selectable array of available standards for a tailored assessment of cyber vulnerabilities. Once the standards were selected and the resulting question sets answered, the CSET creates a compliance summary, compiles variance statistics, ranks top areas of concern, and gener-

Results obtained using CSET



Recommendations given based on the results

Area of concern: Access Control:

- Employ multifactor authentication for remote access and for access to privileged accounts.
- Grant access to the system based on a valid need-to-know or need-to-share that is determined by assigned official duties and satisfying all personnel security criteria and intended system usage.
- Authenticator's content must be protected from unauthorized disclosure and modification.

Area of concern: Personnel Security:

- Update and review access agreements periodically.

Area of concern: Physical and Environmental Security:

- Review Physical access logs frequently.
- Coordinate the results of reviews and investigations with organization's incident response capability.

Area of concern: Security Awareness and Training:

- Provide basic security awareness training to all the users before authorizing them into the system.
- Review the effectiveness of security awareness training at least once a year.
- Define and document system security roles and responsibilities throughout the system development cycle.

Area of concern: Incident Response:

- Coordinate incident handling activities with contingency planning activities.
- Implement incident handling capability for security incidents that include preparation, detection and analysis, containment, eradication and recovery.
- Perform backups of a user level information on a defined frequency.

Student Successes

- Six students have received certificates from DOE since the project started in September 2016.
- Hari Jammulamadaka successfully finished his thesis on “Energy Efficiency of Heated Glass Windows” as a result of his work on this special project.
- Alexandra Davis expanded and refined her report on energy efficiency of Morgantown WV city buildings and will be presenting her work on this special project in front of the Mayor and city council members.
- Vivek Komarina, Koushik Mandlem and Sricharan Reddy Kommera successfully passed the Fundamentals in Engineering Examination.
- The work of Sivakumar Rangaswamy, a former WVU-IAC student was published as a peer reviewed journal publication on the topic of energy efficiency and computer aided process planning.
- The work of Amir Abolhassani, a former WVU-IAC lead student was accepted for publication in the International Journal of Production Research on the topic of energy in the automotive sector.

Awards and Accomplishments

- Yogesh Mardikar, a former WVU IAC student has won the WVU alumni award of the year, for the year 2017.
- Hari Jammalamadaka was accepted as a PhD student at Pennsylvania State University.

Upcoming/ Conducted events

- The all-day ISO 50001 and SEP training took place on May 18th, 2017. The training was conducted by Dr. Edward Crowe of the Manufacturing Extension partnership of West Virginia (WVMEP). Dr. Crowe is a CPEnMS and has actively participated in ISO 50001 projects.
- Training assessments for students will be conducted at various industry and commercial business sites in West Virginia

Peer-Reviewed Papers Published through Assessment Inspired Research

1) Kaiser, J.J., Nimbarte, A.D., Davari, D, Gopalakrishnan, B., and He, X. “Study of skin conductance and perceived discomfort of the hand/finger system under controlled atmospheric conditions.” Theoretical Issues in Ergonomics Science: In press.
2) Amir Abolhassani, Ky Layfield, Bhaskaran Gopalakrishnan , "Lean and US manufacturing industry: popularity of practices and implementation barriers", International Journal of Productivity and Performance Management, Vol. 65, Issue 7, pp. 875 – 897, 2016.
3) Hasan H. Latif, Bhaskaran Gopalakrishnan, Ashish Nimbarte, Kenneth Currie, Sustainability index development for manufacturing Industry, Sustainable Energy Technology and Assessments Journal, https://doi.org/10.1016/j.seta.2017.01.010, 2017.
4) Al-Shebeeb, O. and Gopalakrishnan, B., “Computer Aided Process Planning Approach for Cost Reduction and Increase in Throughput”, Proceedings of the 2016 International Conference on Industrial Engineering and Operations Management Detroit, Michigan, USA, September 23-25, 2016.

The Team of IAC

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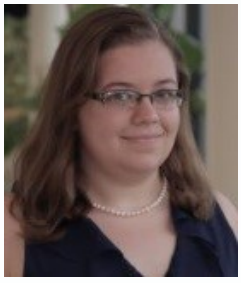
Lead Student

Mr. Koushik Mandlem
Co– Lead Student

Mr. Omar Al-Shebeeb

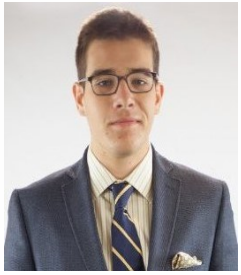


Ms. Alexandra Davis

Mr. Hari Jammalamadaka

Mr. Nathaniel Smith

Mr. Goutham Kumar Reddy Challa



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