Enhancing Industrial Sustainability by Improving Resource Efficiency

Dillip Thangamani
University of Dayton, stander@udayton.edu

Follow this and additional works at: http://ecommons.udayton.edu/stander_posters

Part of the Arts and Humanities Commons, Business Commons, Education Commons, Engineering Commons, Life Sciences Commons, Medicine and Health Sciences Commons, Physical Sciences and Mathematics Commons, and the Social and Behavioral Sciences Commons

Recommended Citation
http://ecommons.udayton.edu/stander_posters/666

This Book is brought to you for free and open access by the Stander Symposium at eCommons. It has been accepted for inclusion in Stander Symposium Posters by an authorized administrator of eCommons. For more information, please contact frice1@udayton.edu, mshallengen1@udayton.edu.
Enhancing Industrial Sustainability by Improving Resource Efficiency

Dillip Thangamani

Department of Mechanical and Aerospace Engineering

Advisors: Jun-Ki Choi, Ph.D. and Kelly Kissock, Ph.D. P.E.

INDUSTRIAL ASSESSMENT CENTER BACKGROUND

- Sponsored by U.S. Department of Energy (DOE)
  - Began during 1970’s “Energy Crisis”
  - 24 Centers at universities throughout the U.S.
  - 20 no-cost assessments per year for mid-sized manufacturers.
- Goals
  - Help industry be more resource-efficient and competitive
  - Train new engineers in industrial best practices
  - Develop new, innovative solutions for energy and resource efficiency

RESOURCES UTILIZED TO ACCOMPLISH THE GOAL

- Rutgers System
  - Identify and classify Resource efficiency Assessment Recommendations.
- UD-IAC Audits
  - Resource Efficiency ARs from Audits
- EPA Report, Equipment Literature
  - Collected data on new technologies and methodology to improve resource and energy efficiency.

INTEGRATED RESOURCES PLUS PRINCIPLES MATRIX

- IRPM provides a roadmap to increase industrial resource efficiency and provides comprehensive, and repeatable method for identifying resource efficiency opportunities.

RESOURCES SAVINGS PRIORITY AND ITS ANALOGY

- These principles are prioritized according to the magnitude of resource saving opportunity.
- Moreover, the magnitude of resource saving opportunity is also proportional to the energy saving, pollution reduction, and cost saving potential.

RESOURCE EFFICIENCY GUIDEBOOK GOAL

- Create a comprehensive excel-based tool which help industry to improve manufacturing resource efficiency by the following:
  - Pollution Prevention
  - Resource minimization
  - Cost Minimization
  - Reduce Life Cycle Minimization

WHY THESE RESOURCE CATEGORIES?

- Practically all industrial processes use some combination of the following six resources: raw materials, water, chemical agents, equipment, process scraps, and packaging.
- Efficient use of these resources results in cost savings and reduced pollution.

WHY THESE RESOURCE CATEGORIES?

- The main purpose of the tool is offer setting a systematic strategy and tool set for effective resource management.
- To offer a comprehensive and systematic way of improving manufacturing resource efficiency.

WATER RESOURCE PAGE AND BEST-PRACTICE PAGE

- The water resource page, includes example recommendations such as install pH sensor, use skimmer to prevent tramp oil.
- Water best practices page, which includes best practices such as fix leaks and counter-flow rinsing.

RESOURCES SAVINGS PRIORITY AND ITS ANALOGY

- These principles are prioritized according to the magnitude of resource saving opportunity.
- Moreover, the magnitude of resource saving opportunity is also proportional to the energy saving, pollution reduction, and cost saving potential.

RESOURCE EFFICIENCY GUIDEBOOK (REG)

- REG is a free, publicly-available and regularly updated Excel based tool. Figure below shows the main menu of REG; each icon represents a resource and links to best practices and examples.

STRAINED LCA

- Life Cycle Assessment (LCA) provides a holistic view of industrial energy consumption, resource consumption, and environmental emissions.
- The streamlined LCA will perform a tailored life cycle assessment with fixed system boundary, industry specific life cycle inventory (LCI) data, and geographically specific emission data.

WHY REG IS IMPORTANT TO THE WORLD?

- Environmental
  - Reduce need for new landsfills
  - Reduces pollution and carbon footprint
  - Yes, cleaner environment to live
- Financial
  - Increase productivity
  - Increase revenue by recycling
- Social
  - Improve company reputation
  - Attracts more contracts and customers
  - Creates more job opportunity
- Thus far, we have used the IRPM on 22 industrial energy/resource audits and have recommended projects that would result in 1 million dollars per year of savings with average payback of 6 months.

Acknowledgement

We would like to express our gratitude to the U.S. Department of Energy for supporting this work through the Industrial Assessment Center program.