Alcoa – Sustainability

Statement of Work

EDSGN 100: Intro. to Engineering Design
Fall 2013 Client-Driven Design Project
Penn State

Project Objective:

Identify opportunities across the campus to take advantage of aluminum's intrinsic properties for the purpose of increasing the efficiency or sustainability of products and product systems.

Project background

Aluminum is a lightweight, strong, and versatile material. Since the discovery of the process to economically produce aluminum in 1888, it has played an important role in many markets. From the Wright flyer to the Boeing 787 Dreamliner, from cookware to high performance automobiles, aluminum has been the material of choice. Today, increasing the efficiency of energy usage and seeking solutions that are increasingly sustainable are of extreme importance, and aluminum can provide solutions to meet these critical needs. Its strength and light weight allow aircraft and ground vehicles to save fuel while providing us with the performance we need. Aluminum is highly recyclable, allowing new products to be created with a fraction of the energy use without sacrificing performance. In fact, over 70% of the aluminum ever produced remains in use today.

Sponsor Background:

Alcoa (www.alcoa.com) is the world's leading producer of primary and fabricated aluminum, as well as the world's largest miner of bauxite and refiner of alumina. In addition to inventing the modern-day aluminum industry 125 years ago, Alcoa innovation has been behind major milestones in these markets:

- Aerospace
- Automotive
- Packaging
- Building and Construction
- Commercial Transportation
- Consumer Electronics

Alcoa employs approximately 61,000 people in 30 countries across the world.

Project Description:

This project involves the design and application of aluminum products to improve the efficiency of energy use and/or increase sustainability of the campus. Students should take clues from current applications to formulate ideas for the use or promotion of aluminum. The teams are encouraged to look for opportunities throughout the campus to substitute aluminum for other materials, to think about recyclability and recycled material content, and/or how the introduction of a new aluminum product can help reduce energy consumption in existing systems.

1. Identify a campus opportunity that will benefit from the introduction of aluminum or the increased use of aluminum products.
2. Examine your element as a system and examine at all inputs and outputs.

    a. Consider the connections to the Borough of State College and Centre County (and the region, state, country if need be)
3. Utilize readily available material to help formulate product solutions for the selected opportunity.
4. Investigate behavior—how will people share the vision you are proposing?
5. Ensure that the solutions meet all applicable performance requirements, satisfy relevant regulatory codes, and is economically viable.

Project Deliverable:

Note: Your instructor will clarify her or his expectations for these deliverables and respective due dates.

- Technical report containing the following elements
    - Team-generated definition of sustainability
    - Rationale for the selection of the product, product system, or the campaign aimed at improving efficiency or sustainability of the campus through the use of aluminum
    - Description of alternative concepts and their evaluation
    - Equipment/installation/maintenance cost estimate
    - Assessment of the efficiency advantage gained as well any calculations showing that the solutions are in compliance with performance or regulatory requirements
    - Implementation plan
- Model or prototype of the system

Additional Resources

- EDSGN 100 Project Website: http://sedtapp.psu.edu/design/design_projects/edsgn100/fa13
- Sustainability Penn State: http://sustainability.psu.edu/
- Alcoa website http://www.Alcoa.com