The Pennsylvania State University
University Park Campus

SUSTAINABILITY PROPOSAL
Aluminum: Sustainable Solutions

Design Team 2
Duas Consilum Bigas
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Submitted to:
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In order to block the sunlight entering the Hammond building, we plan to implement an aluminum blind system on the windows. The angle of the blinds can be changed throughout the day to maintain their efficiency with the changing angle of the sun. These blinds would block an optimal amount of the sunlight and as a result keep the hallway from overheating.
SECTION 2  INTRODUCTION

2.1  LOCATION. The Penn State University Park campus is located in the middle of the state in Centre County, PA.

2.2  CAMPUS SETTING. The Penn State University Park campus is a large and rural campus.

2.3  WHAT IS SUSTAINABILITY. A method of harvesting or using a resource so that the resource is not depleted or permanently damaged, (Merriam-Webster Dictionary).

2.4  BENEFITS OF ALUMINUM. Aluminum is capable of being entirely recycled, as well as being lightweight and cheap.

2.5  SUSTAINABILITY OF ALUMINUM. Aluminum is strong, lightweight, durable, and corrosion resistant. During its life, aluminum can help decrease emissions and fuel use and at the end of its life, is capable of being entirely recycled.

2.6  CURRENT PRACTICES. Aluminum on campus is used in cans, buses, cars, buildings, and airplanes.

2.7  GUIDING PRINCIPLES. To propose a project that takes advantage of aluminum’s intrinsic properties.

2.8  STAKEHOLDER ENGAGEMENT. The stakeholders in this proposal are the people who work and take classes in the Hammond Building. As a result of this proposal, these people would be exposed to less heat and sunlight when walking the halls of the building.
3.1 SPONSOR BACKGROUND. Alcoa is the world’s leading producer of primary and fabricated aluminum. Alcoa invented the modern-day aluminum industry 125 years ago and since has been behind major milestones in many markets including Aerospace and Packaging.

3.2 PROJECT OBJECTIVES. To identify opportunities across the campus to take advantage of aluminum’s intrinsic properties in order to increase the efficiency/sustainability of products and product systems.

3.3 PROJECT BACKGROUND. Aluminum is a lightweight strong and versatile material. Since an economically efficient method was discovered for producing aluminum in 1888 its use has increased in many markets. Aluminum is highly recyclable and over 70% ever produced remains in use today.

3.4 SCOPE OF THE PROPOSAL. Our design team chose to better control the temperature of the Hammond Building by installing aluminum shades on the South side of the building. This will decrease the temperature in the hallways on the South side. In order to allow regulation of the hallway temperature our shades will include bars at the bottom of the shades to change the angle off the building, which will increase or decrease the amount of sunlight able to enter. The shades will be attached to the window frame at the top and mid-section of the frame.
SECTION 4 QUALIFICATIONS

4.1 CREDENTIALS. Our design team is all enrolled in the engineering program at The Pennsylvania State University. We have experience in both math and sciences, as have also used Solid Works.

4.2 DESIGN TEAM MEMBERS.

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SECTION 5  METHODOLOGY

5.1  GOALS. The goals of this proposal are to produce long-lasting, strong blinds to reduce the amount of sunlight entering the Hammond Building.

5.2  METHODS. To develop our proposal, we built a model of the blinds on SolidWorks. Data such as the lengths of the blinds were measured by hand from the windows and all possible angles of the blinds were calculated based on the amount of sunlight they would block throughout the day.

5.3  IMPROVEMENTS. Aluminum blinds are very efficient in blocking out heat from the sun. Compared to vinyl blinds, aluminum blinds do a better job of reflecting the sun's rays versus absorbing them. Also, aluminum is very durable, and capable of withstanding the outdoors. In terms of production of aluminum shades, it will be easy to create the exact angles we want because aluminum can be shaped fairly easily. These shades will effectively reduce the temperature of the Hammond building, and students will be more comfortable in their learning environment, while professors similarly will be more comfortable in their teaching environment. This provides better focus, and attention to detail compared to an uncomfortable room.

5.4  IMPACT. The implementation of these blinds in the windows of the Hammond Building would result in a dramatic decrease in the amount of sunlight and therefore heat entering the building. This would create a more comfortable work and learning environment.

5.5  ESTIMATED COSTS. Costs for the shades will be $35 a window. Installation costs will range from $800 - $1400 per hallway depending on how many windows are in that hallway, and the contractor considering he sets his own price.

5.6  MODEL. We designed an aluminum shade with slits to block most of the sunlight that passes through the windows. The angle of the shade is adjustable between 37.68 degrees to 67.37 degrees allowing various amounts of light into the hallway.
5.7 IMPLEMENTATION. We plan on installing these shades with the help of a local contractor. The supplies needed to undertake the project will be provided by ALCOA. These blinds will be fairly easy to install and will require little installation space and little heavy equipment. This will ensure the busy Penn State campus can continue to function unhindered.

5.8 SCHEDULE. We plan on installing these shades with the help of a local contractor. The supplies needed to undertake the project will be provided by ALCOA. These blinds will be fairly easy to install and will require little installation space and little heavy equipment. This will ensure the busy Penn State campus can continue to function unhindered.
These aluminum shades effectively block sunlight and therefore lower the temperature of the hallway. Due to aluminum’s intrinsic properties, they are strong, lightweight, durable, corrosion resistant, and easily recycled. With this being said we expect these shades to greatly reduce the energy costs of the building, and pay for themselves within the first year of installation.
SECTION 7 SUMMARY

Our proposal will benefit Penn State very much. It will help to greatly lower the energy costs of the Hammond Building, as well as adding a sleek look to its aging façade. The major strengths of our proposal are that it will work as designed, is very cheap, and will last for a long time. The only real downfall is the limited angle of which the blind can be adjusted. However the fact that the blinds only change this much allowed us to create a much simpler design, which is much more reliable and easier to construct. To obtain a wider range of angles we would have needed to include many more supporting rods which would complicate what is intended to be a simple solution to the problem at hand.

Although these blinds were tailored just for the Southward facing windows of the third floor Hammond hallway, the design could be easily adjusted to fit any sized window. Since aluminum is such a durable material, these shades could even be used to protect windows from high winds during storms with minor alterations. We recommend these blinds be considered in any similar circumstance as they are sturdy and long lasting.