

Aluminum Blinds



Introduction to Engineering Design 100
Section 15

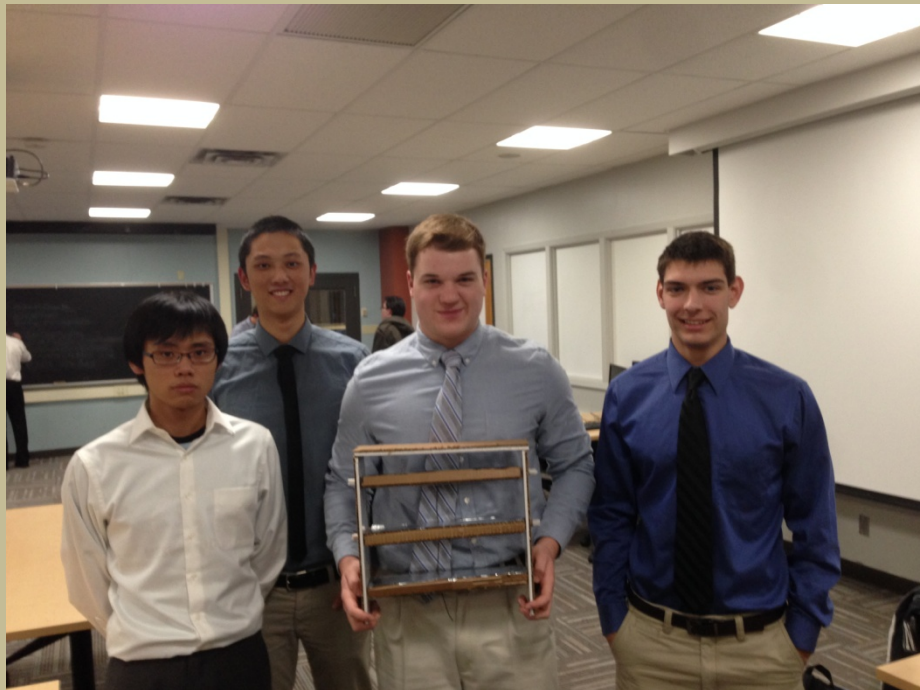
Team 6:

[Christian Hohl](#)

[Tyler Zehr](#)

Zicheng Li

[Charles Wang](#)



Abstract

Students will be using aluminum to enhance the sustainability of the campus. Students must find different and unique ways to implement aluminum in order to increase sustainability. After agreeing on a design, students will work in groups to evaluate the effectiveness of their project as they present their idea and design to the class.

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Introduction

In this design project, students are working together to implement aluminum into pre-existing products to improve sustainability around the Pennsylvania State University campus. First, students were to evaluate the properties of aluminum and see how it can be applied to various situations and objects. Then, students decide their final design and begin to work on their prototype and working drawings. After evaluating the effectiveness of their project design, students present their design to the class.

Description of the Design Task

Problem Statement

The problem is that certain systems are not energy efficient or sustainable. Some of these systems are vastly damaging the environment.

Mission Statement

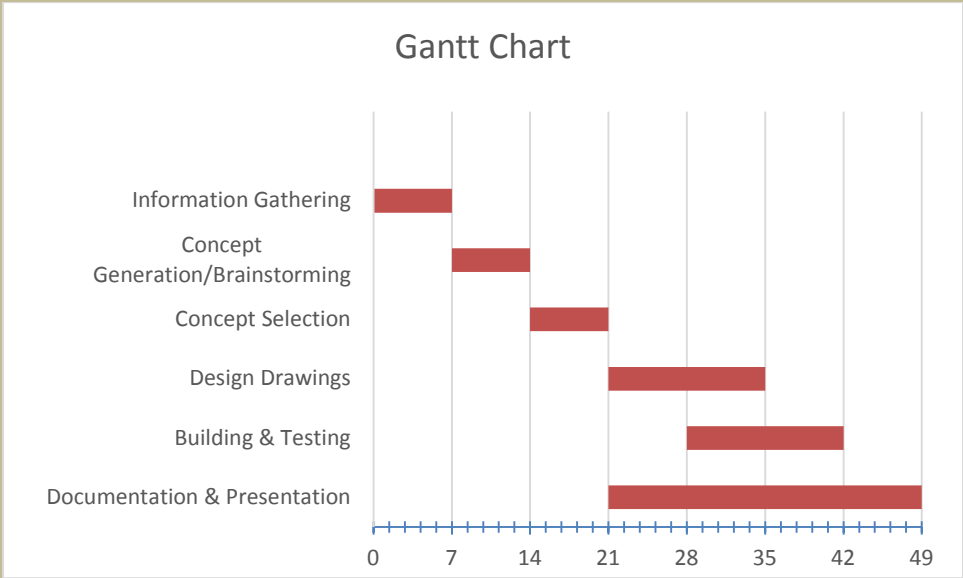
The mission is to implement aluminum into a pre-existing design to reduce energy consumption and limit negative environmental effects.

Design Specifications

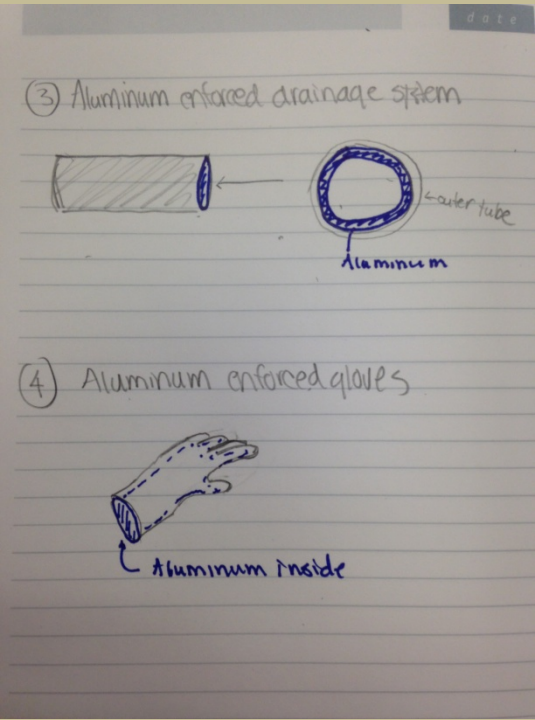
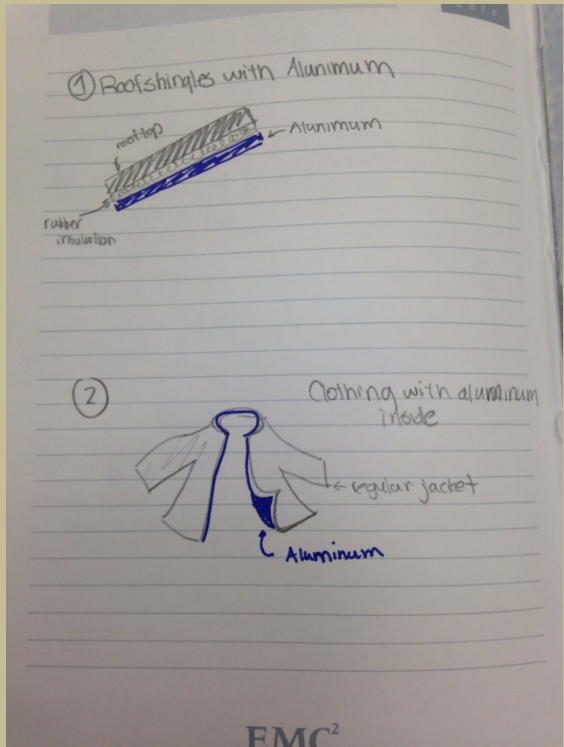
- The blinds are able to rotate an entire 360 degrees for full user control.
- The blinds can be built to adapt to any window size.
- Every blind can be rotated by one knob that the user can turn in any direction.
- The blinds are all connected by a rotating belt.
- The knobs that are used for turning increase with size towards the middle of the window to increase maximum traction between the knob and the rotating belt.

Design Approach

Gantt Chart



Concept Generation



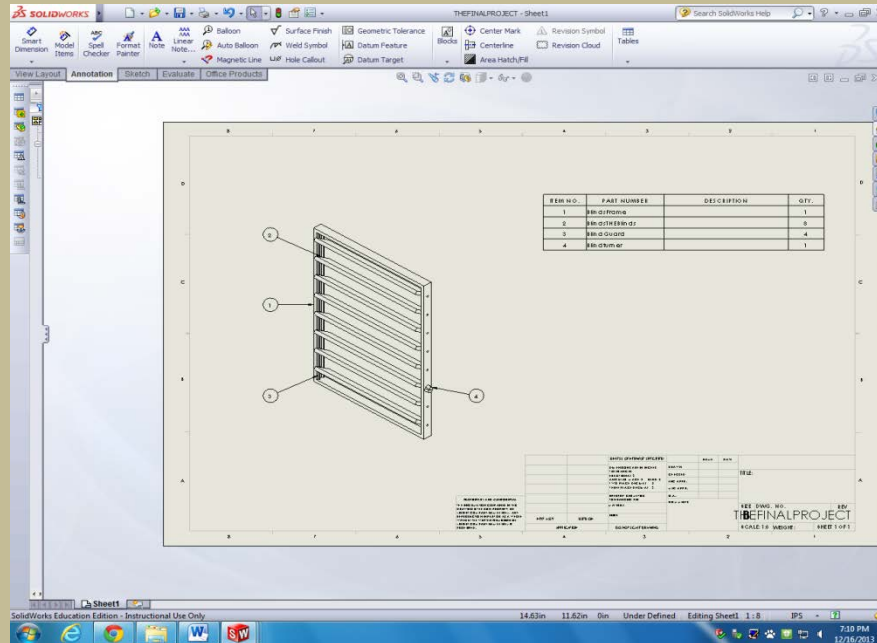
Trade Studies

The frame of the blinds would be produced in a wood manufacturing company and the aluminum blinds would be produced by Alcoa. Trades can be done with China to produce the small parts of the blind including the knob and the rotating belt. Distributing this product to people who need it would be done through company agreements.

Best Design

The aluminum blinds were selected because in the average room, a lot of heat and light escapes through windows. Windows were a big target for this project design. The application of aluminum blinds were user friendly and easy to use.

FIG. 1 Prototype



1:1 scale



Design Features:

- The blinds are enclosed in an aluminum frame.
- The controlling knob can be attached onto any of the blinds.
- One side of the blinds is aluminum and the other side is a rubber insulator.
- The blinds can only fit on square windows.

Analysis

Sustainability is the involvement of methods that do not completely consume or destroy natural materials. In this project, energy sustainability is emphasized.

Why this product?

A lot of heat and light are lost through windows in the average building. These blinds will help prevent that loss in the first place and as a result, increase the sustainability of the building. Since the blinds can be rotated an entire 360 degrees, the user can control the amount of heat and light escaping the room. The blinds can also completely block light and heat out with the rubber side insulating the heat and the aluminum side reflecting the light. In dorm rooms, these blinds are both easy to use and effective.

Installation and Maintenance

The blinds are fixed by an aluminum frame that can be built to fit the window size of the average dorm room. After the appropriate size of the window is determined, the manufacturer can make the frame according to that window size. Each individual blind and the rotating belt can be replaced and restored for maintenance.

Evaluation of Efficiency

Since the blinds give 100% control of the amount of heat and light that gets in the room, the efficiency of the blinds is very high. The reflective properties of aluminum and the insulating properties of rubber allows for high efficiency of energy sustainability.

Implementation

The blinds would start being implemented in dorm rooms where the window sizes are consistent. First, the design would have to be accepted by the engineers of Penn State and after that, a cost analysis would have to be preformed to make sure that the project to practical. Agreement upon Penn State officials would be the last step before the idea is fully implemented.

Summary and Conclusions

The aluminum blinds are a very practical design. Windows are implemented in almost every room now. These blinds allows for complete control of how much light enters the room from the windows. The implementation of this plan would take a lot of time. The frames and dimensions of the window must be taken first before.

The team worked effectively and was able to follow the planned project schedule.

Engineering Design

Project 2: Alcoa

Aluminum

Charles Wang
Christian Hohl
Tyler Zehr
Zicheng Li

Instructor: Dr. Xinli Wu
Section 15, Team 6

Problem Statement

- The problem is that certain systems are not energy efficient or sustainable. Some of these systems are vastly damaging the environment.

Mission Statement

- The mission is to implement aluminum into a pre-existing design to reduce energy consumption and limit negative environmental effects.

Our Idea

- Using aluminum on basic household blinds.



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Our Design

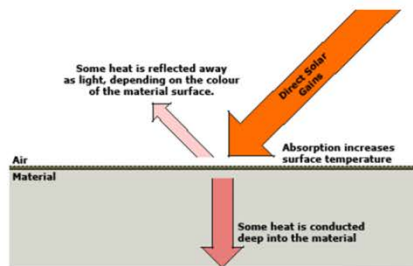
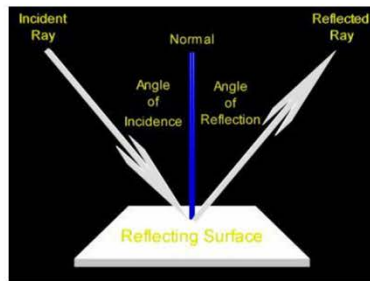
- Every blind has an aluminum side and a rubber side.
- Each blind is attached to the frame by 2 knobs that attach to the outer frame
- There is one controlling knob that turns all blinds.
- The knob can be turn in any direction.



Design Specifications

- The blinds fit in an average household window.
- The blinds can be rotated 360 degrees.
- The blinds are enclosed in a frame.
- The frame is 0.99 meters x 0.5 meters.

How is it sustainable?



<http://naturalfrequency.com/files/nf/articles/thermalsolargains/surface-heat.gif>

Summary

- The blinds can be used in any kind of building, therefore spreading its sustainability in many places.
- The blinds are easy to use and effective in any climate.
- The blinds are multi-purpose.
- The blinds are easy to use and maintain

