MOAS Project: Wind Energy Demonstration

Museum Proposal

Members

Nicholas Bembridge  Victor Fontecchio
Bradley Kroger  Michael Sheehan
Suzanne Shepherd
Outline

- Project Definition
- Concept Generation
- Component Selection
- Final Design Specifications
- Budget Analysis
- Future Work
Project Definition

- The Mary Brogan Museum of Arts and Sciences (MOAS) is adding new exhibits showcasing alternative energy sources.
- Our group was given the challenge of designing an exhibit for the museum that would educate the public about wind as an alternative energy source.
Exhibit Expectations

- Child friendly
- Entertaining for all ages
- Durable
- Interactive
- Visually Appealing / Professional Looking
- Safe
- Budget of $5000
- Project must be completed by April
Concept Generation

- Before reaching a final design for the exhibit, it went through many iterations.
- Ideas and suggestions came from both our sponsors as well as from group members.
Final Design

• Pros
  – Multiple Wind Turbines
  – Variable Angle Of Attack
  – Power Meters
  – Flow Control

• Cons
  – Limited Visibility due to metal casing

This became the final design concept
Component Selection

- Exhibit Casing
- Fan
- DC Motors for Turbines
- Electronics
- Honeycomb
- Pulley System
Exhibit Casing Selection

- **80/20 – Aluminum Frame Manufacturer**
  - Extruded Aluminum Modular Frame
  - Clear Polycarbonate Sheets to Fill the Openings and Provide an Unobstructed View to the Exhibit
  - Adjustable Leveling Feet
  - PVC Coated Wire Mesh, covers end openings allowing air to enter and exit exhibit
  - Casing cost = $1500
Wind Generation Selection

- To create a wind stream in the exhibit an electric fan needed to be selected.
- Qmark LDC20 - 20” fan
  - 3 speeds
  - 110V wall source compatible
- Wind generation cost = $415.25
Power Generation Selection

- We were unable to find wind turbines on such a small scale, therefore the turbines must be custom built.
- Many of the parts needed to construct the wind turbines can be purchased at Hobby Town USA, and from McMaster.
**Power Generation**

- **Two Types of Wind Turbines**
  - Vertical Axis
  - Horizontal Axis

- **Support Base**
  - Single vertical pole similar to real world applications

- **Power Generation cost** = $352.64
Electronics Selection

- Purchasing Light Towers from McMaster
- GT Electric will build circuits that will run the light towers from the DC motors
- Hot Wire Anemometer to display the wind speed
- Kill Switch that will turn off the fan, a specification of the museum
- Electronics Cost: $1502.37
Power Meter Electrical Circuit
Honeycomb

- Used to create a laminar wind flow
- Located in front of wind generation fan
- Honeycomb cost = $100.00
Pulley Selection

- On the control panel there will be a knob that will allow a guest to rotate the turbines within the exhibit.
- The rotation is made possible through the use of pulleys purchased from McMaster.
- Pulley System Cost = $148.53
Final Design Specifications

- **Project Analysis**
  - Exhibit Dimensions and Frame Design
  - Frame Material and Building Options
  - Cabinet Maker
  - Wind Generation & Velocity Measurement
  - Electrician
  - Budget Analysis

- **Components**
  - Wind Turbines
  - Power Meters
  - Start Buttons
  - Kill Switch
  - Honeycomb
  - Fan
Budget

- Wind Generation $415.25
- Power Generation $352.64
- Electrical Systems $1502.37
- Flow Management $100.00
- Exhibit Casing $1500.00
- Pulley System $148.53

Subtotal $4018.79

Total (With 20% Cushion) $4822.55
Future Work

- Formal Presentation to the Museum
- Begin Ordering Parts
- Deliverables for the Museum 1/28/05
- Start the Assembly of the Exhibit
- Testing of components
- Final Product Delivery to the museum
Acknowledgments

- Ms. Heather Whitaker – Director of MAOS
- Dr. Li - EE Department
- Dr. Cartes – ME Department
- Dr. Hollis – ME Department
- Mr. Jason Schmidt – 8020 Representative
- www.Inspeed.com - Free Vertical Axis Rotor
Any Questions?