

MOAS Project: Wind Energy Demonstration

Project Procedure

Wind Energy Systems Inc.

Members

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The goal for this project is to design a wind-energy demonstration for The Mary Brogan Museum of Arts and Sciences (MOAS) in Tallahassee, Florida. The target audience for this exhibit is children; however, all ages should be able to understand and enjoy the exhibit. Various tasks have been outlined in order to complete the design and construction of this exhibit. The general design for the wind energy system will include a wind turbine, generator, fan, and various electronic components. These components sequenced together will create a basic process that will explain to the viewers of the exhibit how wind can be converted into energy. As requested by the customer, the demonstration also needs to be visually appealing. To have a visually outstanding demonstration, the exhibit must look as professionally fabricated as possible. In order to satisfy the customer and have an expertly crafted exhibit, the lists below were created in order to aid with the design and construction of the wind energy exhibit.

Computer Software Needed:

- Pro/E – This software will be used to create a three-dimensional visualization of our exhibit, as well as each individual component. In addition to the three-dimensional drawings, two-dimensional engineering drawings will also be generated to make the concept and design clear for the group members, sponsors, and various manufacturers that will help in the construction of the project.
- Pro/Mechanica – This program will further utilize the three-dimensional drawings generated by Pro/E by creating an animated assembly. This animation will be able to demonstrate the various moving parts of the exhibit and how each component relates to the other. This is a useful animation to have because it will create further confidence that the exhibit will be fully functional once constructed.
- MathCAD – For this project it is necessary to have calculations to find the power output that will be given by a certain wind speed. This tool will aid in making those calculations to give the customer an understanding of the type of power outputs that will be produced by this exhibit, as well as give a general guideline when selecting the fan, generator, and turbine to guarantee that the assembly is plausible.
- Microsoft Word – This program will be the primary word processing software used to generate all documents and deliverables to the customer and the class's professor. These reports are the most functional way to establish the ideas and concepts of the project to the various people to whom it concerns.
- Microsoft Project – By using this program, a calendar will be generated to outline the desired progress of the report. Setting up a schedule at the beginning of the project is the only way to assure that the deadlines will be met on time and that the project will be completed in a timely manner. The calendar that will be followed very closely in order to complete the project at the time desired by the customer.
- Microsoft PowerPoint – Each time that the professor of the course requests an update, this software will be used to create a presentation to accurately depict the progress of the project. Because the design for this exhibit has many various components, it is necessary to have a visual aide so that all people watching the presentation can understand how the design has been oriented. This program enables the professor and other viewers to see pictures, outlines, and timetables that have been established for this project. By utilizing this visual stimulation, it will help to create a more memorable impression to those who view the presentations.

Hardware Needed to Produce Product:

The following pieces of equipment are tools that will be needed in order to manufacture and construct the wind energy exhibit. As explained before, each component of the project must be aesthetically pleasing and professional looking. To satisfy this requirement, it is necessary to employ professional equipment. Therefore, due to the nature of the equipment and the level of skill required to operate the equipment that will have to be used for this project, only skilled professionals will only use the machinery described below. Also, each individual piece of equipment listed below does not yet have a specific function; however because this project will require specialized components, the machine shop experts will be consulted as to which piece of equipment will need to be used to fabricate these specialized components.

- Machine Shop Equipment
 - Lathe
 - Mill
 - CAD/CAM/CNC
 - Etc.
- Handheld Power Tools
 - Drill
 - Circular Saw
 - Sander
 - Drills
- Handheld Tools
 - Hammers
 - Screwdrivers
 - Allen wrenches

Work Division Within the Group

To make the progression of the wind energy exhibit as swift as possible, the various required components of the project will be assigned to various members of the group. After each group member has completed his or her portion of the project, the other group members will all meet together to review the completed work. The group has made the decision to meet every Tuesday in order to keep the project progression as timely as possible. In addition to reporting all completed work to the other group members, each deliverable, report, and presentation will be reviewed and critiqued by each group member in order to ensure that each group member is aware of every aspect and parameter of the project. Also, although each various task has been assigned to an individual group member, responsibilities and assignments may change throughout the year, as needed, for timely project progression.

- Suzanne Shepherd
 - Webpage Design – Creation of the project website is to communicate the progress, purpose, and specification of the project. The various deliverables and presentations for the project will be posted on the website to give a better depiction of the actual progress of the exhibit.

- Communication Consultant – This position was designed in order to ensure that one group member remains in constant contact with the customer. In order to satisfy all of the customer’s needs and desires, it is essential to have this open communication line. This will help to prevent any surprises or shortcomings in the project completion.
- R&D of other Exhibits – Research previously built exhibits to get a general idea of the process, setup, and orientation of already successful exhibits. This research will aid in the design generation of the wind energy exhibit due to the fact that viewing other similar museum exhibits can trigger ideas which will only make this exhibit better and more appealing to a larger audience.
- Victor Fontecchio
 - Team Leader/Coordinator of Efforts – Main organizer of project progression as well as initial contact representative with project sponsor. The sponsor is one of the main help sources when conflict arises, so keeping constant communication can only help to improve the quality of the project. This coordinator position will also be the last to check that each section of the project has been completed in a timely fashion.
 - R&D Exhibit materials – Research possible exhibit building materials in order to have a broad range of materials from which to choose. The exhibit must be visually appealing and professional looking, so only very specific materials will be sufficient; therefore initial research of project materials is vital.
- Bradley Kroger
 - R&D Electrical Systems and Instrumentation – This responsibility entails researching the various available electrical components and instrumentation that will be needed for the exhibit. Not only will it be necessary to select the appropriate electronics, it will be necessary to select a proper electrician to assemble the equipment correctly.
 - ProE/ ProMechanica – As described above, these drawings will visually depict the demonstration and give a better representation of the numerous components of the project. Several members will need to be assigned to this responsibility due to the heavy workload that is promised with creating the large quantity of engineering drawings and animations that this project will call for.
 - Webpage design – Creation of the project website is to communicate the progress, purpose, and specification of the project. The various deliverables and presentations for the project will be posted on the website to give a better depiction of the actual progress of the exhibit.
- Nick Bembridge
 - Artist – This assignment requires a very artistic talent. The initial designs will be hand-sketched in order to create the proper orientation. By sketching the designs by hand, this will help to reduce the amount of redundant computer drawings that may have been generated if the hand sketches were not first initiated.
 - ProE/ProMechanica – As described above, these drawings will visually depict the demonstration and give a better representation of the numerous components of the project. Several members will need to be assigned to this responsibility due to the heavy workload that is promised with creating the large quantity of engineering drawings and animations that this project will call for.

- Michael Sheehan
 - R&D Wind Systems – The last aspect of research and development entails researching different types of wind systems. Although a general design has been generated, further research of other wind systems will help to inspire ideas to make this project more intricate and perverse. This research will help to add specific details and other features to make this exhibit more interactive and interesting.
 - MathCAD – This project required calculations to find the power output that will be given by the wind speed provided by the system. These calculations will then be used to help select equipment as well as to give a general guideline as to the magnitude of the power output and wind velocity that may be produced by the exhibit.

Group Contact Info:

Contact information for each group member was exchanged at the first group meeting. By having this direct communication, ideas and project progression can be shared immediately. This helps to decrease duplication of work as well as to communicate when an aspect of the project needs more work. The main source of communication will be through e-mail. This form of communication will be used to share documents and presentations which will enable all group members to review the report as soon as possible. In addition to utilizing e-mail, phone communication will be used for other communication purposes.

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Final Product: MOAS Project

1) Wind Generation

- Parameters include a variable speed of airflow
- 18-36" fan to produce a sufficient amount of airflow

2) Power Generation

- Two different wind turbines to display different efficiencies
- DC motor run in reverse to act as the generator

3) Electrical Systems & Instrumentation

- Anemometer to display airflow in the cavity
- Power meter to display the output power
- Control dials to make the exhibit more interactive
- Tachometer to show the revolutionary speed of the turbine

4) Exhibit Casing

- Removable plastic casing w/ cover
- Laminated wooden display base to match other exhibits
- Leveling supports to create stabilization

5) Flow Management System

- Nozzle to concentrate the airflow
- Diffuser to slow the exhaust air
- Honeycomb panels to create more even laminar flow
- Flow Re-Direction System to redirect the exhaust air

6) Power Input

- 110V wall source compatible to be useful in the museum