

EML4551 – Team 15 – 10/22/15

Sponsor: Dr. Sungmoon Jung – Advisors: Dr. Jung, Dr. Shangchao Lin, Mr. Sean Martin – Instructor: Dr. Nikhil Gupta

Portable Wind Turbine

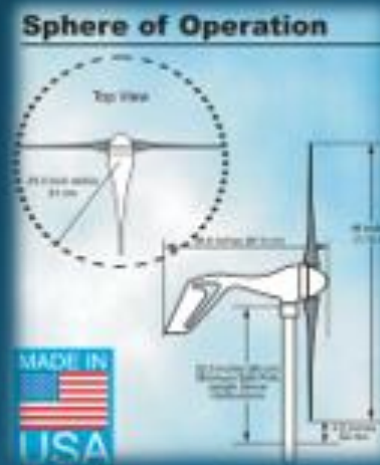
Katelyn Bamundo-Stephen Freeman-Matthew Hutchisson-Stephanie McLellan-Garrett Rosenthal-Rishad Walker

Project Scope and Objectives

- The objective of this project is to create a lightweight, portable wind turbine. The design must be easy to assemble and disassemble so that inexperienced operators may use the device.
- New Objectives/Constraints
 1. Operate in wind speeds of 4 m/s at a maximum height of 2m
 2. Lightweight (200 lb max)
 3. Easy to assemble and disassemble
 4. Budget of \$2,000
 5. Power output of 5W

Project Background

- What has been done before to address the problem?
- Previous projects at COE
- Existing small scale wind turbines



House of Quality

			Engineering Characteristics (EC)							
			Material Type					Weather Resistance		
		C.I. (5 Highest)	Size	<i>Nacelle</i>	Body	<i>Blade</i>	Weight	<i>Corrosion</i>	<i>Strength</i>	<i>Thermal</i>
Consumer Requirements (CR)	Portable	3	9	2	2	2	6	2	2	2
	Safe Assembly	2	6	4	4	4	7	2	2	2
	Easy Assembly	4	5	3	5	4	6	3	5	5
	Cost	5	7	7	8	8	7	6	5	3
	Durable	1	3	8	9	8	5	8	7	5
			97	69	83	78	96	60	62	50
		RANK	1	5	3	4	2	7	6	8

Design Concepts: Blades

Standard



Hybrid



Vertical



Design Concepts: Body

Bodiless



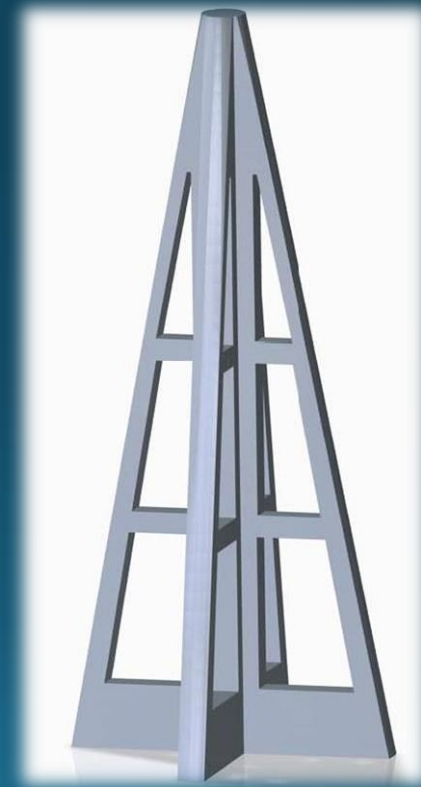
Team 15: Portable Wind Turbine

Cylindrical



Max Height: 2m

Cross



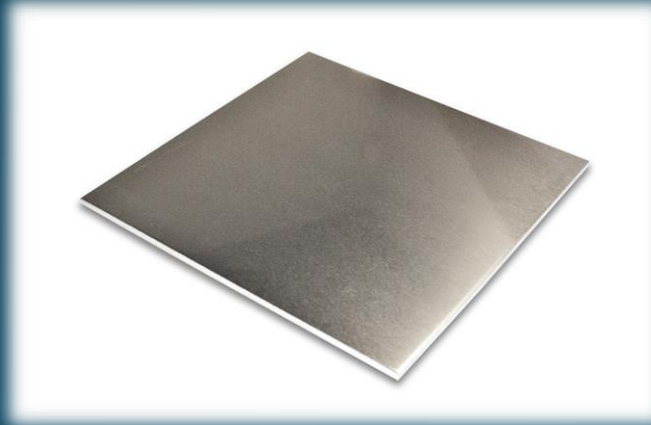
Stephen Freeman

Design Concepts: Base

Tripod



Solid



Anchors



Concept Evaluation

0 = Datum
1 = Better
-1 = Worse

Criteria	Rank	Blades			Body			Base		
		<i>Standard</i>	<i>Hybrid</i>	<i>Vertical</i>	<i>None</i>	<i>Cylindrical</i>	<i>Cross</i>	<i>Tripod</i>	<i>Solid</i>	<i>Anchors</i>
<i>Cost</i>	1	1	-1	-1	1	0	-1	0	-1	1
<i>Feasibility</i>	2	1	-1	-1	0	0	-1	0	0	0
<i>Stability</i>	3	0	0	0	0	0	0	1	-1	0
<i>Assembly</i>	4	0	0	1	1	0	0	0	1	-1
<i>Portability</i>	5	0	0	-1	1	0	-1	0	-1	1
Score		2	-2	-3	3	0	-3	1	-2	1

Moving Forward

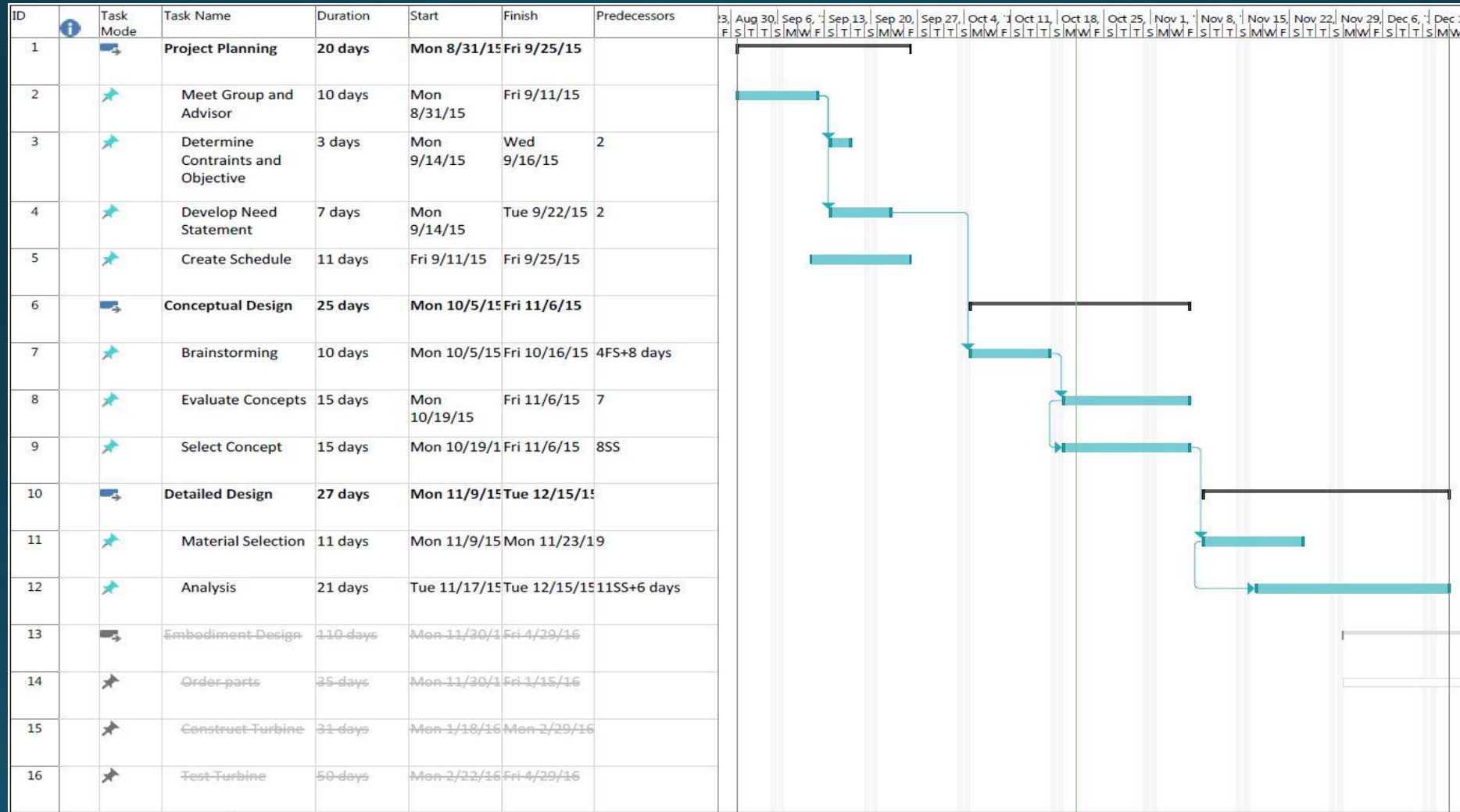
- Design - General
- Design - Specific
- Parts - Select/ Order
- Assembly



Potential Challenges

Challenge	Solution
Budget (\$2,000)	Accounting, Part Selection
Correct Parts	Pre-Order Analysis
Part Availability	Alternatives
Delivery Time	Planning, Scheduling
Assembly (Compatibility)	CAD
Safety	Follow Protocols

Gantt Chart



References

1. AeroVironment. Architectural Wind, Image, Web, Accessed Oct. 8, 2015. <http://www.avinc.com/engineering/architecturalwind1>
2. Southwest Windpower. AirX Marine Specifications, Image, Web, Accessed Oct. 8, 2015. <http://www.reps.fi/datasheetsandmanuals/airx-marine-specs-eng.pdf>
3. Quality To Last. Southwest Windpower Skystream 3.7, Image, Web, Accessed Oct. 8, 2015. <http://www.qualitytolast.com/skystream-37.html>
4. AltE Store. Southwest Windpower Whisper 500 with Controller 24V, Image, Web, Accessed Oct. 8, 2015. <https://www.altestore.com/store/Wind-Turbines/Primus-Windpower-Turbines-Parts/Whisper-500-Wind-Turbines/Southwest-Wind-Power-Whisper-500-with-Controller-24V/p1458/>
5. WindyNation. 28in HyperSpin Aluminum Wind Turbine Generator Blades, Image, Web, Accessed Oct. 21, 2015. <http://www.windynation.com/Blade-Sets/28-inch-HyperSpin-Aluminum-Wind-Turbine-Generator-Blades-Set-of-5/-/651?p=YzE9NQ==>
6. Imageck. Wind Turbine Blade Shape Designs, Image, Web, Accessed Oct. 21, 2015. <http://imageck.com/334835342-wind-turbine-blade-shape-designs.html>
7. Peerless Wind Systems Corporation. The Art of Wind, Image, Web, Accessed Oct. 21, 2015. <http://www.peerlesswindsystems.com/>
8. Explora. Tips on Upgrading to a Professional Video Tripod System, Image, Web, Accessed Oct. 21, 2015. <http://www.bhphotovideo.com/explora/video/tips-and-solutions/tips-upgrading-professional-video-tripod-system>
9. Stainless Supply. 6061-T651 Aluminum Plate, Image, Web, Accessed Oct. 21, 2015. <https://www.stainlesssupply.com/order-metal-online/docs/g3c1067s58ssopo/6061-T651-Aluminum-Plate.htm>
10. PresenterMedia. Running Up Arrow Stairs, Image, Web, Accessed Oct. 21, 2015. <http://www.presentermedia.com/index.php?target=closeup&maincat=clipart&id=5692>

Questions?