

Solar Tracking Structure Design Progress Report Presentation

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January 31, 2014

Overview

- Introduction
- Goal Statement and Objectives
- New Design
- Cost Analysis
- Structural Analysis
- Competition Update
- Electrical Team Contributions
- Project plan
- Conclusions
- References

Introduction

- Sponsored by Dr. Tom Acker
- Project Description: Design and build solar tracking structure
- WERC: A Consortium for Environmental Education and Technology Development competition
- Participants in competitions: different universities
- PV cells operate at maximum efficiency when pointed directly at the sun. But, solar tracking can be expensive and require a lot of maintenance.

Goal Statement and Objectives

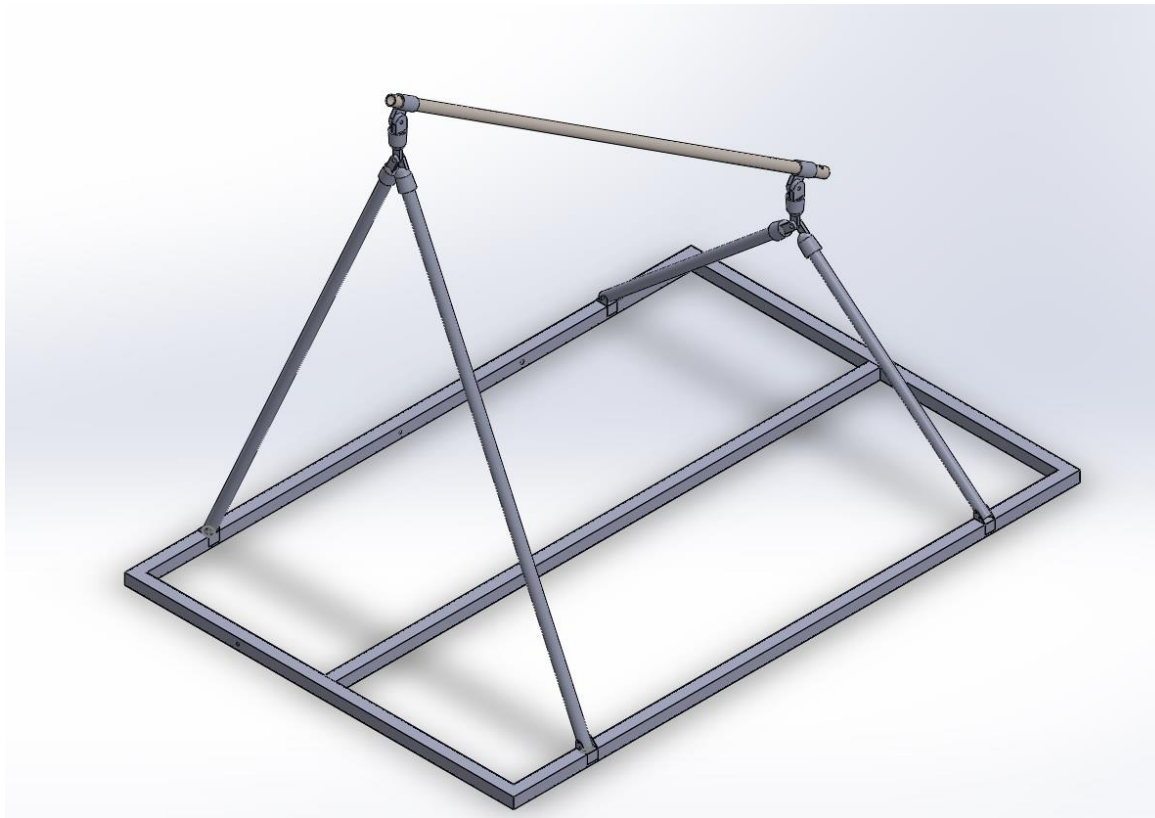
Project Goal:

- To build a rigid and durable and design a system that maximizes amount of sun being absorbed while minimizing the cost of operation and maximizing the reliability.
- Satisfy the client and stakeholder needs and requirements.

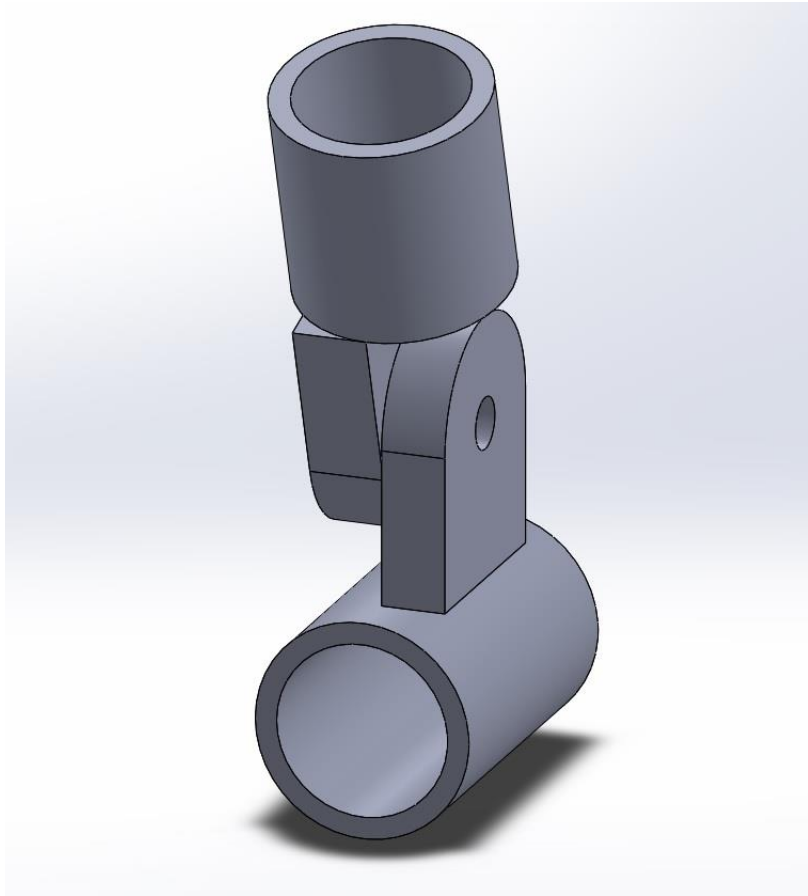
New Design

- Our team members have worked throughout the winter with the EE team and found a solution to replace the motor and modify the design.
- This resulted in different parts to be selected.
- These new parts will provide better tracking and less cost while still achieving our desired goals.
- The new system will be supported by a steel frame and an aluminum mount, creating stable and rigid base for the structure.

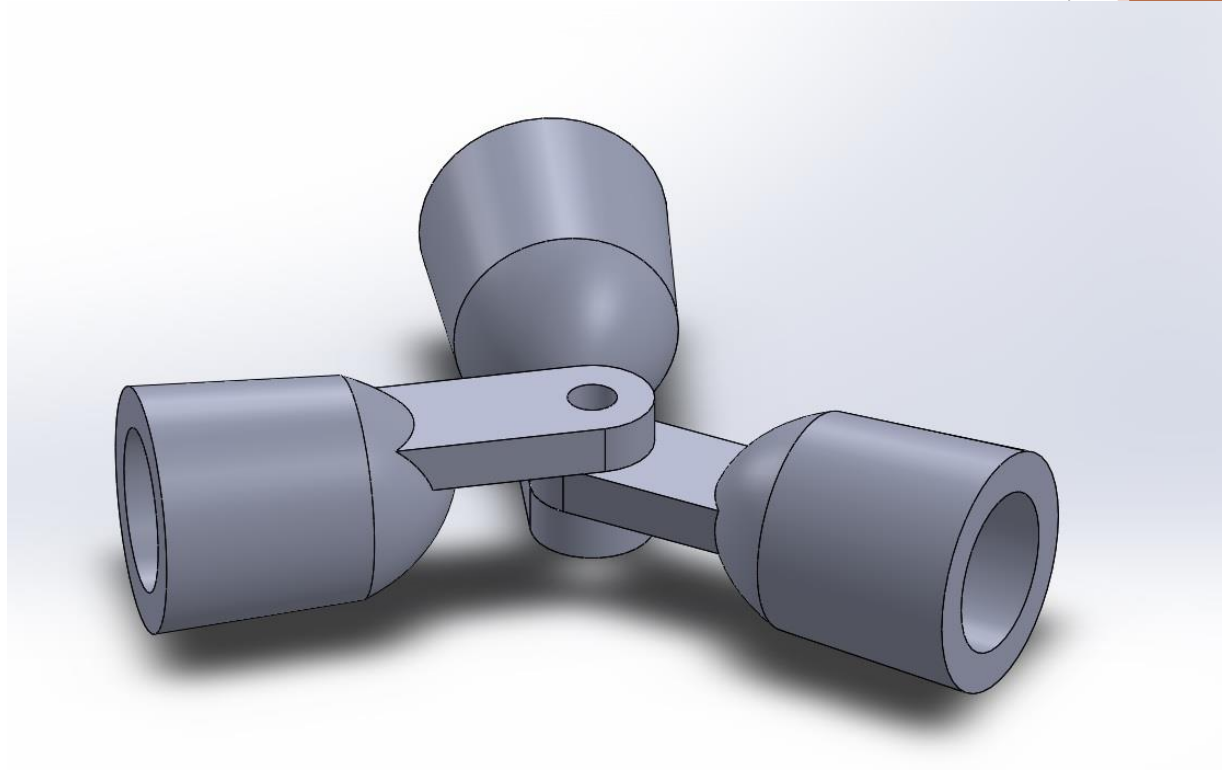
New Design (Base Structure)



Key Components

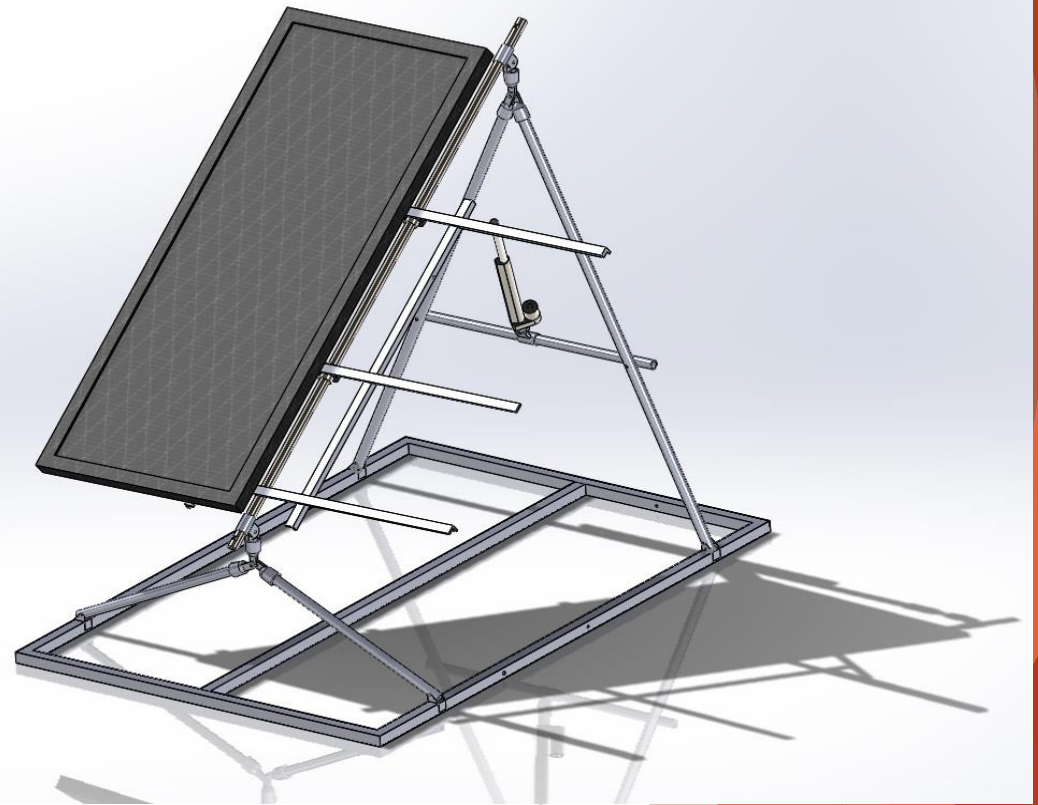
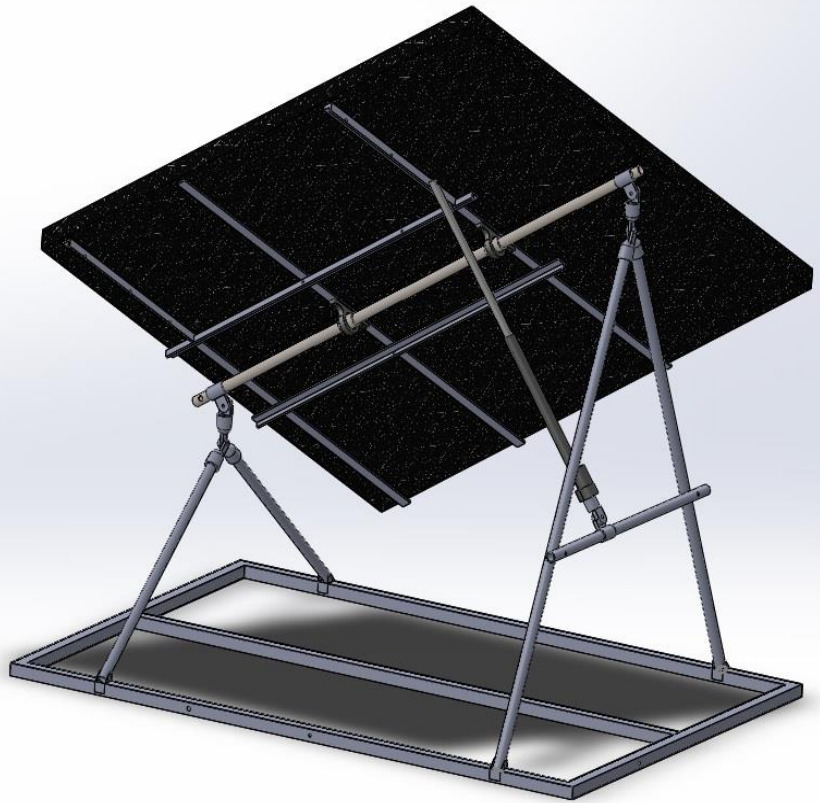


Roger



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Complete Design



Cost Analysis

Part	Price (\$)	Count	Total (\$)	Source
1" Pillow Bearing	11.25	2	22.5	VXB.com
18" Linear Actuator	99	1	99	EBay - In Route
1" Adjustable Elbow	11.99	2	23.98	EBay
1" Adjustable T	33.1	2	66.2	EBay
3/4"x48" galv. Steel pipe	16.98	3	50.94	Home Depot
36"x1.25"x1/8" Flat Steel	5.74	3	17.22	Home Depot
Square Steel Tube	16.21	2	32.42	Home Depot
Σ			312.26	

Structural Analysis

Location	Yield (kpsi)	Max Stress (kpsi)	F.O.S.
3/8" Bolt in Elbow	25	0.905	27
Support Bar	50	25.8	1.94
Bottom Brackets	50	0.226	221

Competition Updates

Important Dates:	
Contest Registration	January 6, 2014
Entry Fee	January 14, 2014
Safety Summary, MSDS Sheets, and Flow Sheet	March 19, 2014
Written Report	March 21, 2014
Equipment Transportation Form	March 28, 2014
Opening Ceremonies/Safety Meeting (mandatory)	April 6, 2014 – 6:30 pm

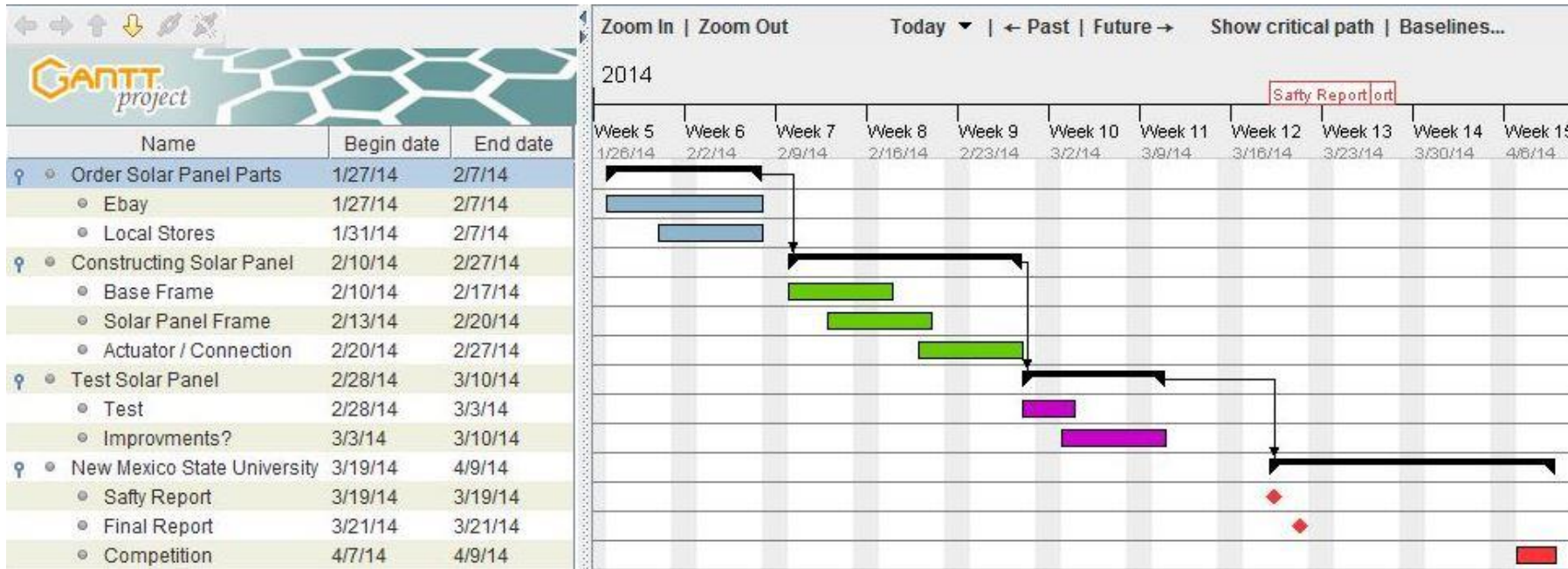
Electrical Engineering Team

- Adjustable Chronological Tracker (Inputs are Longitude and Latitude)
- Output Display.
- Manual Override.
- Inverter.

Parts Order Status

- Actuator: Purchased from EBay and is expected to be delivered by February 7th.
- Bolts: Purchased from EBay.
- Panels: Located at NAU Engineering Shed.
- Steel/Aluminum: Local Stores/Online.

Project Plan- Spring 2014



Conclusion

- Structure has been modified to use a much stronger, free standing base.
- Replacing the motor with a linear actuator to increase product life and decrease cost.
- All the parts have been located and in the process of ordering.
- The team will start building the framework as soon as possible, meeting with the EE team to start testing when everything is complete.

References

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Questions ?