Solar Tracking Design
Problem Definition and Project Plan

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September 24, 2014

Overview

- Introduction
- Client information
- Problem Definition
  - Goals
  - Objectives
  - Constraints
- Testing Environment
- Project Planning
- Conclusions

Introduction

- Make the tracking system of the parabolic trough functional.
  - The current system is inoperable.
- Repair the accumulated damage done to the surface of the parabolic trough.
- Convert absorbed solar energy into a useful form of energy.

Client Information

Source:NAU

Dr. Srinivas Kosaraju

- Professor of Mechanical Engineering at Northern Arizona University
  - Thermodynamics.
  - Renewable Energy.
- Previous Research
  - Florida State University.
    - Wind turbine design, modeling, and experimental validation.

Customer Needs

Currently, the tracking system to move the parabolic trough is inoperative.

Project Goal

Bring the tracking system of the parabolic trough back into service.

Overall picture of the system

Crack in the panel

Gear and motor

Objectives

- Allow maximum energy extraction by rotation of trough about its horizontal length
- Repair surface in order to increase efficiency of energy extraction
- Expand expected lifespan of tracking system and parabolic surface

Objective	**Measurement Basis**	**Units**
Maximize energy extraction	Degree of rotation about its horizontal length	˚Degrees
Inexpensive	Costs of repairing damaged parts in the tracking system	$ -Dollars
Expand lifespan of tracking system and parabolic surface	Lifespan	Years

Constraints

- Must be able to control the tracking system using a computer and if possible a smart phone.
- Must be able to withstand up to 70mph winds
- Operate efficiently between -20 and 100 degrees Fahrenheit
- Operate efficiently under changing weather conditions (wind, snow, rain, etc.)

Testing Environment

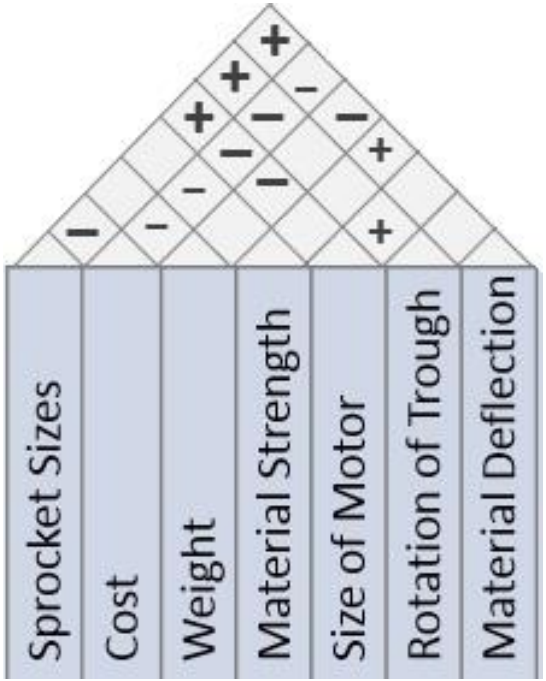
- Tracking system needs to withstand Flagstaff weather conditions
- Surrounding Temperature ranges from -20 to 100 Fahrenheit.
- Not obstructed by other objects

Quality Function Deployment

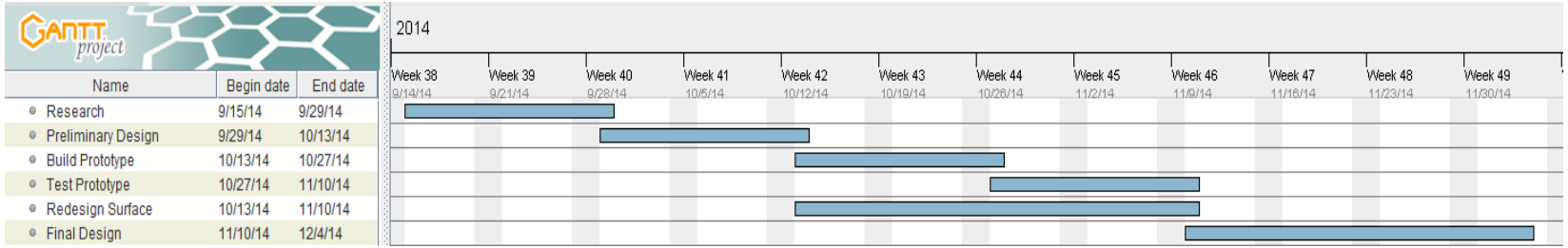
	Engineering Requirements						
Customer Requirements	Sprocket Sizes	Cost	Weight	Material Strength	Size of Motor	Rotation of Trough	Deflection of Material
Inexpensive	X	X	X	X	X		
Looks Good		X					
Lasts a Long Time		X		X			X
Maneuverable			X				
Low Maintenance				X			
Weather Resistant							X
Easy to Use		X					
Lightweight	X	X	X		X		
Efficient Tracking System	X				X	X	
Units	in	$	lb	Psi	hp	°	in

QFD table

House of Quality(HOQ)



Gantt Chart



Gantt Chart Table

Conclusion

- Client Information.
- Need Statement.
- Problem Definition.
- Objective and Constraints.
- Project Planning.

References

- http://nau.edu/CEFNS/Centers-Institutes/Sustainable-Energy-Solutions/Directory-Faculty-Staff/Srinivas-Kosaraju/

Questions?