

Meeting 4 Feb 2013- Due Feb 18th!

Proposal: Smooth Paraboloid Reflector Testing

Statement of Problem: In order to design a solar-powered appliance with the ability to cook foods which require more heat and less time, our group will take the parabolic reflector approach and complete a series of tests to determine the most efficient shape for success.

Introduction : paragraph that describes what we want the final project to look like (hopefully), then go into specifics about what we hope to accomplish this semester

give examples of case studies examined-- describe pros and cons and how they affect project as a whole.

This project team has in the past made two attempts at creating a paraboloid reflector, both of which were impotent. Paraboloid reflectors are an essential solar cooking technology because they can achieve much higher temperatures at one focused point than a solar oven of similar size. We will compare the old piecewise paraboloid reflectors to three smooth paraboloid reflectors, one of which is completed but needs minor maintenance and the other two we will have to build. We will also attempt to determine experimentally the amount of solar energy necessary to power a useful griddle.

Objectives:

- develop oven that works in northern climate (~40 degrees N latitude)
- griddle surface capable of cooking tortillas
- complete testing on parabolic reflectors to determine optimal reflector shape
 - hope to achieve optimal shape by end of semester
- use mathematical programming to establish best mirror shape for more northern climate

Plan of Action (Design and specifications):

- Test sheet metal bending technique for producing a paraboloid?
- Test fiberglass molding technique?-(as shown in youtube video?)
- 2 testing goals:
 - to compare the different methods of creating the reflectors: define the best method
 - compare previous designs to new ones and decide best course of action
 - the amount of heat you will need to run a griddle: will determine the final size of reflector in design -- testing with a griddle (what effect does this have on the cooking power of the reflector)
- Design Goals for finished project:
 - Because this has been done before, our objective is to create a griddle that is safe and as user friendly as possible. This includes creating a stand that allows

for the user to adjust the heating element and therefore adjust the temperature. Also to increase the safety of the griddle, we plan to implement safety walls to prevent glare and burns from the focal point.

Management Plan (Materials list and budget):

- use wok and/or dish as template for mirror shape
- sheet metal as initial testing material for mirror
- fiber glass mirror if sheet metal is insufficient

Conclusion:

By the end of the semester we hope to have firmly established the details on how to design a fully functional parabolic reflector which can be built and rebuilt again. With a solid reflector, we can then turn our focus to the design of the rest of the griddle in which tests need to again be conducted in order to create the safest and most efficient final product.

References: