# Concentrated Cooker Subteam Fall 2010

## Concentrated Cooker Subteam

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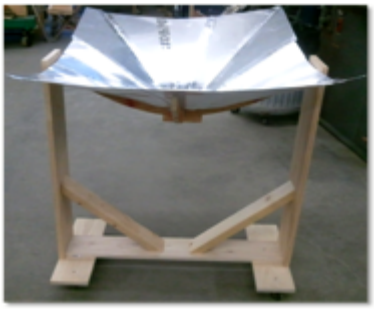
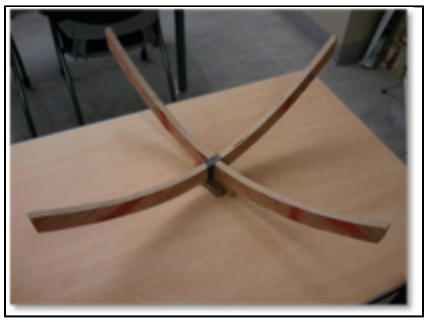
This past semester, the concentrated cooker sub-team has spent much of it's time researching past successful parabolic cookers and both designing and constructing its own concentrated cooker. Past teams' attempts at building non-conventional box-cookers have been relatively unsuccessful. Therefore, our team's goal was to build a parabolic cooker that effectively reached high temperatures of 250 degrees Celsius needed to fry tortillas (a staple food in Nicaragua).

We used a "petal" approach to build the reflector. We cut multiple petals into a flat aluminum metal sheet, curved each petal upward and overlapped the edges to form a parabolic surface. Each petal was adhered together using reflective tape. After the paraboloid was completed, a wooden framing system was built to support the reflector. The framework was designed so that it could tilt the parabolic cooker to directly face the sun at any angle in the sky. In addition, the support system is mobilized on wheels so that it can rotate a full 360 degrees.

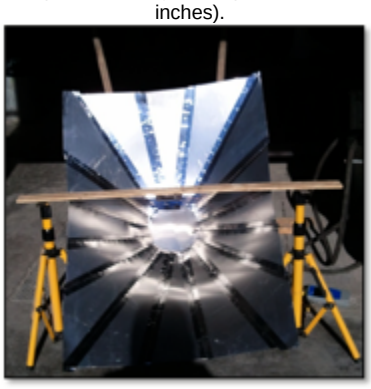


Parabolic Reflector and Frame



Reflector Base-Support System

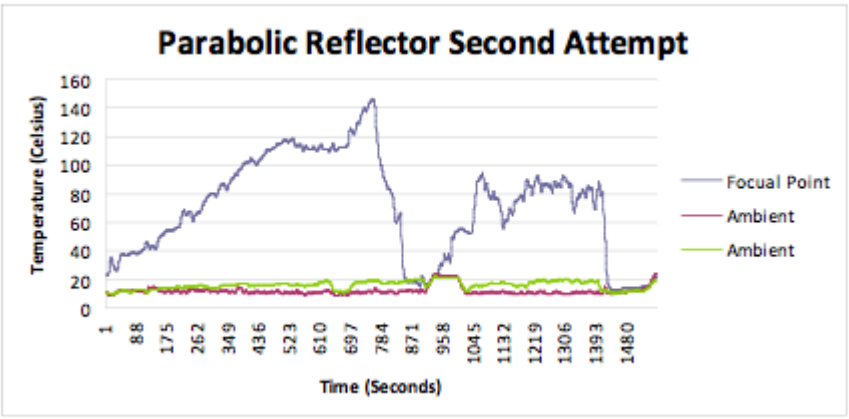
When we tested our system, the wooden framework had not been constructed. Therefore, our experimental setup involved a propped wheelbarrow that served as a support for the reflector. Two tripods were used to support a wooden rod that was placed directly across the reflector. Attached to the rod with black duct tape was a small metal corner that could easily absorb heat, and attached to this metal piece was a thermal couple used to record temperatures. This metal piece and thermal couples were placed directly at the paraboloid's focal point (which was measured to be approximately 10 inches).



Reflector Sitting on Wheelbarrow

Thermocouple Attached to Metal Plate

The testing showed very promising results, as the peak temperature (achieved within minutes) was 145 degrees Celsius. However, testing was not completely conclusive since halfway through testing, the tape holding the black metal piece to the wooden rod melted. Hence, the thermal couple fell out of the reflector's focal point and began reading ambient air temperatures instead.




Data from Most Successful Testing

Given the portion of the successful data that we have, we can conclude that our prototype has definite potential to reach temperatures of 250 Celsius. The temperature at the focal point was steadily increasing at the time of failure due to the melted tape. Before failure had occurred, the linear trend in data estimates that a temperature reading of 250 Celsius may have occurred after approximately 25 minutes, and may even occur faster in non-windy, winter conditions.

This past semester allotted no time to build the cooking surface upon which a pot can be placed. Next semester's work on this project should prioritize this task along with another attempt at successful testing.

### For More Information:

- *Project Proposal*
- *Mid-Semester Short Technical Update*
- *Final Report*