



Team Phoenix

Small scale low/no-cost incinerator for Ile-a-Vache, Haiti



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Project Sponsor

Naval Sea Systems Command (NAVSEA)

Background: In the fall of 2013, contact was established with the Magistrate (mayor) of a small island in the southwest of Haiti called Ile-a-Vache (pronounced ee-lah-vash). The Magistrate, Fritz Cesar, stated that one of the most significant challenges facing his office was solid waste disposal, both from households and from the island's main market in its largest town, Madame Bernard. Globalizing influences have caused an increase in consumption, production, and a change in the composition of trash on the island. For example, potable water is transported to the island in plastic containers. Once empty, there is no means of disposing of these containers. Thus, solid waste management has become an increasing concern for the local government.

Anecdotally, it is understood that residents either discard their trash in unapproved locations (i.e. litter) or burn it in piles. Trash piles, often located close to markets and residences, rot, creating a breeding ground for disease and can contaminate the local water supply. Burn piles, especially when they include plastic, produce noxious fumes because they burn at relatively low temperatures. These low temperatures are insufficient to achieve complete combustion or to break down particularly hazardous combustion products. Clearly, both methods of disposal have significant negative impact on the health of the residents and their environment.

Objectives: The goal of this project is to design, build, and test an incinerator which uses the combustion of household waste to provide energy for the production of a commodity. The commodity should either be especially useful or profitable to the people of Haiti, thereby enabling and incentivizing the proper disposal of waste.

Results: To this end, Team Phoenix interviewed two customers, Ms. Lise Charlier and Professor Thomas Lennon. Lise Charlier is the Academic Dean of the Severn School in Severna Park, Maryland, and she was born in Haiti. Following an initial interview with her, the team drafted a list of customer requirements based mainly on her input. Thomas Lennon is a professor at Massachusetts Maritime Academy and a retired Coast Guard Captain who has several years of experience taking college students to work on projects in Haiti. Upon interviewing him for the first time, the team made some small revisions to the customer requirements and a slight change in the approach to the project. Partnerships with engineering colleges and NGO's in Haiti have not yet been formalized, but the team strongly desires to make such partnerships to promote the longevity of the project. The most important customers, by far, are the people of Haiti themselves.

Important customer requirements that were determined through interviews with the customers mentioned above include the use of cheap/readily available parts, low emissions, quick disposal of a large amount of trash, simple to learn/operate/maintain, and the ability to provide a valuable product.

Team has surveyed possible incinerator designs and building materials and has selected three general formats – an existing medical waste incinerator design, a survival fire design, and a stoker incinerator design – to test and evaluate based on the customer requirements. The general design that proves most likely to satisfy customer requirements will be optimized for performance and revised to use low- or no-cost parts to the maximum extent possible. In a later stage of the project, the team will tackle the issue of producing a commodity.

The final product for this project is a set of easy-to-read instructions on how to build and operate the incinerator and an accompanying video. An initial design, designed to be constructed from cinder blocks, is shown below (Figure 1).

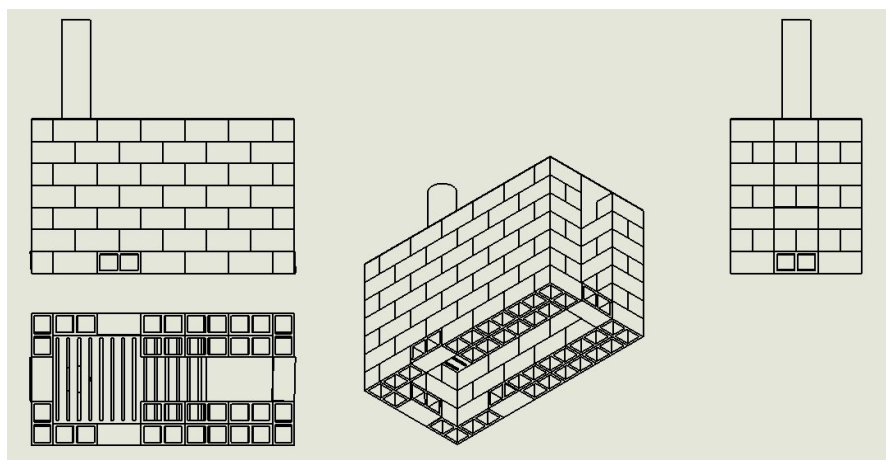


Figure 1: CAD Model of the cinder block incinerator - the first design that will be prepared for testing.

Exactly what materials are available in Ile-a-Vache is still unclear. In the event cinder blocks are not readily available or are cost prohibitive, the team is also investigating the possibility of using mud brick (Figure 2). Testing will include the suitability of this mud brick for use in an incinerator design.



Figure 2. A mud brick created by the team, potentially used in place of cinder blocks.



Figure 3. Team Phoenix, ready for incinerator testing!