Solar Sausage for Water Desalination

Restated Scope and Project Plan

Team 7

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Abstract

The main objective of this project is to use the Solar Sausage to create a solar desalination system. The scope of the project required the team to focus on the business aspect of engineering by developing a cost efficient system capable of being easily massed produced. The team has modified the design presented last semester by adding additional components. This includes the saline water storage tank, which filters and preheats the saline water. The team has procured the necessary items to build the structure and has spent 10% of the $5,000 budget. For the months of January and February the team will focus on the machining and construction of the trough and stand. Trouble shooting of the system will be begin in March upon completion of the trough. During trouble shooting and testing the team will encounter the risk of burns due to the high temperatures created by the Solar Sausage. Prior to beginning testing, the team will need to develop safe handling procedures and protocols in the event that an injury is sustained.

1 Brief Work Statement and Project Scope

The main objective of this project is to apply the Solar Sausage, an inflatable solar concentrator, to the need of potable water in developing countries.

Moving forward from the previous work of last semester, the group objectives begin with the construction of the system. Designs of the system as a whole have been finalized and corrections will be made as deemed necessary upon construction. Following the construction of the system, testing will be completed to determine if our design is successful as well as determining any other changes that need to be made. Upon completion of a working prototype, there is the opportunity to further business development of the product in tasks such as pricing, packaging, instructions, and other business aspects necessary in following through with an entrepreneurial project.

2 Lessons and Challenges

Many minor challenges arose during the last semester. The design had to have minor adjustments made on multiple occasion. This project is an entrepreneurship project and unique as it requires foresight in the design so that it can be further developed as a business venture. The project had to not only satisfy the engineering-based specifications but also had to use a design that allowed for the business potential in the future. During the initial construction of the Solar Sausage on Florida State University, commute became a minor issue as extra time had to be allocated for commute and parking. Also during the construction of the Solar Sausage, the manner in which the material is folding during construction is crucial to avoid fluid leakage during implementation. The Solar Sausage utilizes a tri-fold technique that must be precise requiring more time and attention. To manage time effectively, the team had to find the best manner to complete group assignments. It was found that to most effectively complete group assignments, the team needed to meet and delegate tasks. Each member had their own tasks to complete that contributed to the final assignment. The team worked cohesively and autonomously toward a common end while remaining time-efficient.

New challenges are anticipated as with any assignment. The main concern at this point in time will be the storage of the prototype during construction and upon completion. The final prototype will be a little over 10 feet long and 4.5 feet tall with a width of approximately 3 feet. It must be stored appropriately so that the Solar Sausage remains intact.

3 Modifications and Corrections

Modifications necessary for this semester relative to the fall semester of 2014 include a smaller storage tank for the saline water. This will be small, capable of holding around 3.5 gallons of saline water, and attached to the trough. The storage tank will include a flow valve allowing a worker to monitor the saline water flow to the trough through a pipe, this is the mustard colored pipe shown below. It will also be painted black to allow for preheating before entering the trough but be filled with enough saline water to prevent evaporation occurring prematurely. Other changes within the system will be determined during the construction and testing as they come to the attention of the group.

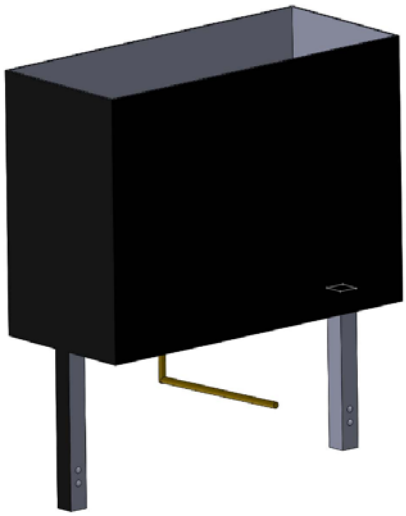

Figure 1 Saline Water Storage Tank

4 Procurement and Schedule

The group has decided that all the ordering and machining will take place in January and February since the sunlight during these months is not optimal. Most of the experimental process will take place in March when the amount of sunlight is increased. The machining of the trough and the condenser will be contracted through a third party in order to ensure efficiency.

4.1 Procurement Progress

Current

As of the beginning of the Spring semester of 2015, Team 7 has completed and sent purchase orders for multiple materials required for the future construction of a working prototype. Purchase orders were sent to McMaster-Carr and Metals Supermarket. These are the two primary vendors used to date. The materials ordered are primarily raw materials and include: an Aluminum angle, Aluminum square bar and tube square, Aluminum plates, Aluminum channels, foam tape, as well as cap screws with corresponding Aluminum-coated hex nuts. The Aluminum angles and channel are composed of Aluminum 6063. All other materials ordered are Aluminum 6061. Both types of Aluminum have good corrosion resistance and are comparable and cohesive to one another. These materials will be used to construct and complete the support structure for the Solar Sausage and the saline holding trough. The subtotal for these items comes to $499.71. This accounts for 10% of the $5,000 budget provided by the FAMU-FSU College of Engineering.

Future

Within the next two weeks, purchase orders will be sent with regards to the solar tracking system, storage tanks, and filtration system. The cost must remain below the provided budget. In order to stay below the provided budget, all future purchases and expenses must remain below $4500.29. This must also include any construction expenses that may incur including welding, machining, and packaging.

4.2 Gantt Chart

The Gantt chart is included below detailing the proposed schedule for the upcoming semester and how the time will be conducted in order to complete the project objectives decided upon by the group.

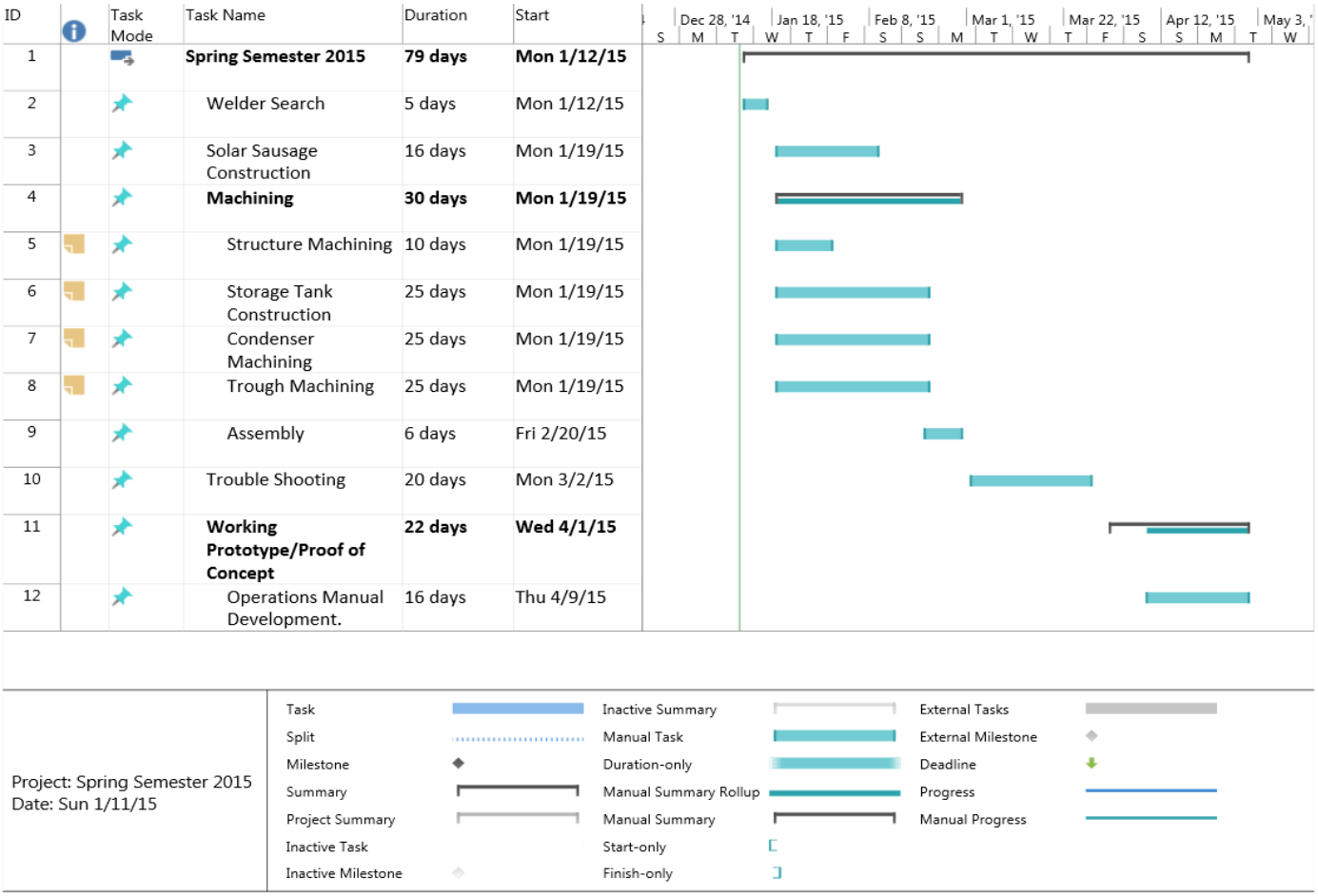

Figure 2. Gantt Chart

5 Risk

The Solar Sausage is capable of concentrating large quantities of solar radiation to a small 3/8 inch wide strip. This results in the high temperatures that will be used to desalinate the water. With these high temperatures come the risk of burns to the operators if they improperly handle the equipment and fires if the Solar Sausage's focal point is inadvertently focused on an object capable of igniting. Thus it is necessary prior to testing for the team to establish basic safety procedures and protocols in the event that an injury is sustained. The safety procedures developed will be included in the operations manual that the team develops during April.