M1.04 - AWG

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Project Description

- Our project is to utilize SOLIDWORKS to design and optimize an Atmospheric Water Generation (AWG) test platform using Peltier devices or TEC. Multiple configurations and heat transfer mechanisms are to be considered to produce the maximum amount of water using a minimum amount of electrical power.

Background Information

- Atmospheric Water Generation (AWG) is nothing new. In fact, there are many different ways to achieve it. The most common and efficient way to do so is with a HVAC system containing refrigerant, which produces harmful emissions at the cost of water generation. Our project is not going to use refrigerant, or any means that create pollution. Our product will have zero carbon footprint and should be able to be powered by a solar panel, meaning it can go anywhere there is sufficient sun light.

Visualization

Figure 1. Three of the different configurations of heatsinks we plan to test

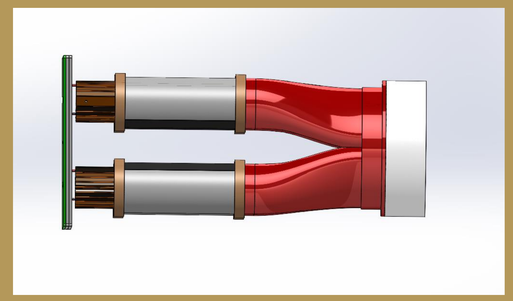


Figure 2. Side view of the 4 TEC sub assembly

*Not Pictured, Peltier or TEC Devices, under the condensation plate

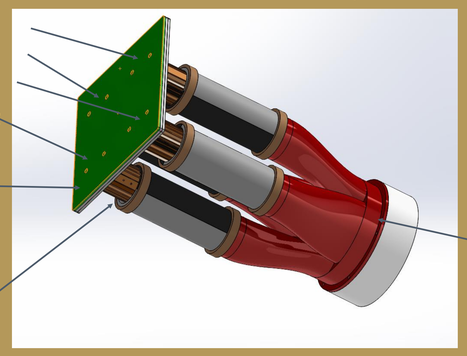
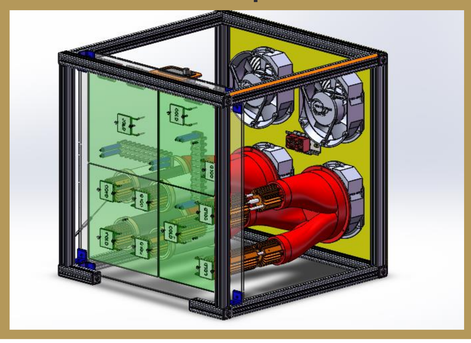


Figure 3. Bottom view of the 4 TEC sub assembly

Process

To test and get data we plan to use SOLIDWORKS and its tools.
We will need to develop and create assembly models of what we plan to make and then run Flow Simulations to model what will happen to the designs. Based on our testing, we hope to find the optimal configuration of the parts and build those for the AWG device.
Heat Transfer Mechanisms:

- Conduction – Heat Sinks
- Convection – Air Flow
- Phase Change – Heat Pipes
- Radiation – Not Considered



Metrics

- We want to make the condensation plate stay at a stable 38-40°F, if we can we achieve a cooler temperature above 32°F that will be even better!
- We want to do this by using as little power as possible.

Conceptualization

- We were given an initial design, made by Mr. Mark Summers. Our task is to build upon his initial design.
- We plan to test the efficiency of different configurations of the TEC – heatsink assemblies — and use the optimal combination for our final design.
- Accomplishing the above will consist of simulating a number of combinations of TEC module quantities, heat sink variations, and air flow systems.