

Senior Capstone Design

Project: **Solar Rocks**

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Design Validation Plan & Results (DVP&R)

Requirement	Test	Test Subject	Target Date	Result	Recommendation
Heat transfer into storage system shall be between 150 and 250 degrees fahrenheit	temperature measurements shall be taken before, after and within storage system. The box will be heated until it reaches a steady state temperature, at which point the heat will be stopped and the time until the temperature reaches it's starting temperature	Initial Prototype	4/7/19	temperature measurements indicate some heat transfer within the first 1/4 of the chamber (two center thermocouples) but otherwise heat transfer is not observed.	differnet patterns for airflow combined with a larger heater could provide more heat evenly to the whole chamber.
Chamber shall be able to contain two meters cubed of gravel.	Fill the table in line with construction schedule. Mathematically determine amount of rock in chamber from order minus leftovers.	Initial Prototype	4/1/19	chamber held the desired amount of gravel.	no action required.
Chamber shall be structurally sound and able to withstand applicable forces.	Carefull attention will be made during the gravel filling stage. Any sign of weakness will be evaluated.	Initial Prototype	4/1/19	no deformation or cracking of chamber was observed. Chamber is structurally sound.	no action required.
In-line heating element shall be able to heat air to a variety of desired temperatures.	Measurements after the in-line heating element shall read temperature data.	Initial Prototype	4/7/19	heater and dimer switch aparatus controls temperature as designed.	no action required. If 240 Volt power is desired, dimmer switch will need to be replaced with a 240 volt version.
Blower shall be able to supply a continuous air flow through the chamber	Run the prototype and check for exhaust velocity	Initial Prototype	4/7/19	exhaust velocity observed, air blower supplies air through the chamber.	no action required.
pipng system shall be able to supply air to the chamber, from the blower and through the heater with minimal loss and no leaks.	soap-water test on all fittings, and pipe temperatrue inspection will determine compliance.	Initial Prototype	4/7/19	pipng system transports heat into the chamber and pipe temperature is minimal. Small leaks around the heater and lower valve observed.	Leaks will be sealed with thermal tape and silicon gaskets. Piping may be insulated at clients discretion.
System shall be able to run independent of operator interaction.	Running the prototype for a complete 3 hour cycle.	Initial Prototype	4/7/19	system currently can be run with minimal to no supervision.	no action required.
Data collection shall be available both instantaneously and for a specific run time.	Collect data for a 3 hour cycle.	Initial Prototype	4/7/19	data collection system displays current temperatures and logs past temperatures up to 32567 seconds	a longer time between samples could fix the limit on sampling duration. Change sampling rate to once a minute and see if issue is resolved.