



American-Made Solar Prize 4  
Team **“Mobile TES”**  
Technical Assistance Request

1. **Trough manufacturing accuracy:** Aircle has an in house CNC VMC that is able to machine a parabolic curve at the required accuracy for our parabolic trough design in a scaled down prototype version. However, for full scale manufacturing we need a laser cutting or water-jet CNC machine system with a control capable of cutting to an input equation (parabolic curve mathematics). We are able to program the path in long-hand as point to point. Having a control that can simply take an input formula will save much time and potential mistakes in manufacturing.
  - a. **NOTE:** we are currently working with Capital Machine who represents several companies that offer laser and water-jet systems but have not validated any machines at this time.
  - b. If no controller/machine is found we request assistance in modifying a control to perform in-line mathematic calculations to create a path from a given formula. This will be important as we reach a production stage to provide trough design flexibility.
2. **Trough Reflectance:** The Team is working with Capital Machine to achieve a micro smooth finish on metal panels and a process to produce a mirror with protective coatings to fully weatherize the reflective surface. Help with different coating technics and their manufacturing processes will be very helpful to this team.
3. **EP Engine design:** The Team has a near mature engine design with most components detailed ready for manufacture. However, the team would like some help with defining/writing a software program that will quickly perform simulations on cylinder pressure, stress loads, expected torque, and output power with p/V and T/Θ charts or graphs to use in defining the most efficient displacement of both the high and low pressure cylinders.
4. **Axial Flux Alternator:** The Team has a preliminary design for a functional axial flux alternator. An expert in this type of magnetic apparatus will be needed to help confirm the design operation and help with developing the most efficient flux path utilizing permanent magnets and armature windings.
5. **Grid Interface:** Team has extensive experience with electrical controls. The Technology provides a means to vary both voltage and phasing. Help will be needed in confirming the team’s concept of direct interconnection to a grid or power system with respect to back feeding a power meter and safety lockouts during a modes of operation.
6. **Energy flow design:** Sounding board or validations of our computations concerning stress to the system; maximum water/steam flow; and, maximized heat retention of the steam is requested.

7. **General advisement** : The team will appreciate any additional advise, direction, questions, and/or observations that will help us be successful in boring, casing, and achieving a geothermal (steam vent) hole.