Testing Section

Heat Sink Thermal Analysis Section

Material selection was provided by our sponsor in the form of several CNC machined aluminum heat sinks. Each of these heat sinks will be tested in the following way with stringent data logging to ensure Team Moto-cool utilizes the optimum heat sink for our design.

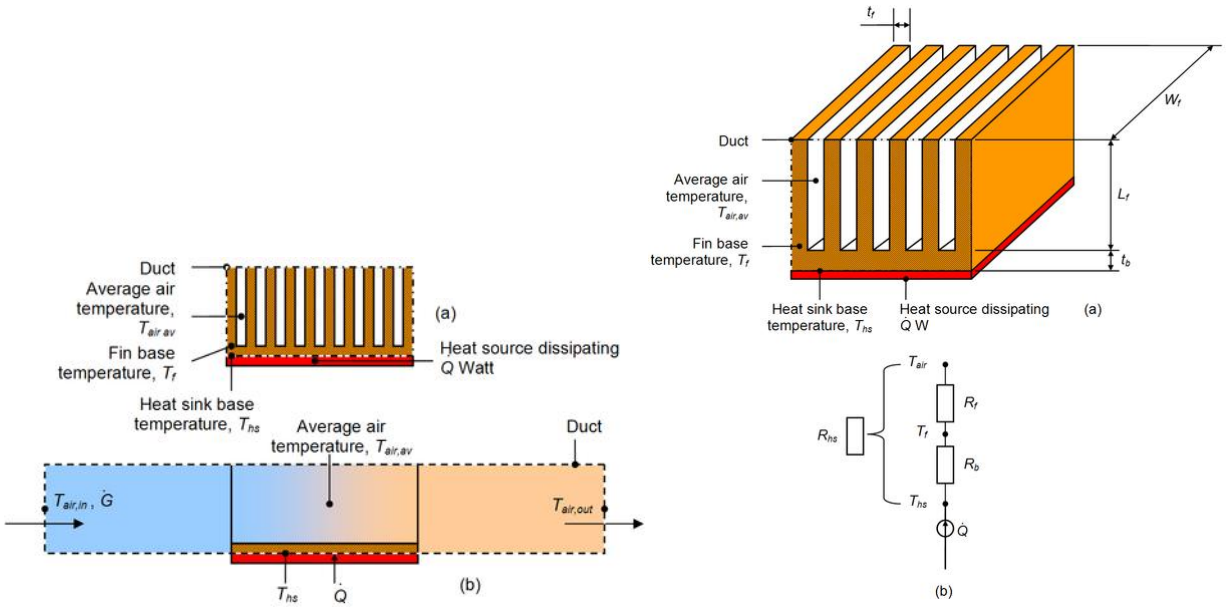
1. Characterize all heat sink properties including transfer coefficients (Added to aid selection process)

2. Take initial temperature measurements both of Heat sink base temperature, the ambient air temperature Material base temperature

3. Run power across a resistor to match power lost though a MOSFET at 500AMPs.

4. Using a temperature sensor, take temperature every five minutes for half an hour

5. After recording temperatures, examine which material is optimal for dissipating heat



The optimum heat sink will be the one best able to dissipate heat for prolonged periods. Ideally it will have a linear heat dissipation making it highly reliable and predictable. If need be, further tests can be run for our client in different environmental conditions to better understand how the heat sink will perform in real world conditions. If none of the heat sinks can withstand the power then we will either purchase a heat sink or have one machined for us.

Programming and Hardware Integration Test

In order to properly test the circuit, we need to build a real life test the connections and ensure that our schematic is correct; this will be done on a breadboard. This will ensure that there will not be any mistakes in the PCB when we have that sent out to be built.

1. Construct the circuit on a breadboard
2. Program the microcontroller to run the circuit
3. Test the circuit to ensure proper operation (We have now allotted time specifically for this)

If there are problems in the circuit, the issues will be corrected in the schematic and the pcb. Often times the circuit router on the PCB creator makes incorrect decisions, so all of the routing will be done by hand to ensure that everything is compliant. We also plan on looking at the gerber files to make sure that all the routing was done and there are no mistakes. If there are mistakes in the PCB after having it printed, we will be using a breadboard to build the circuit.

Testing:

Functionality Test : Ensures that the program and external components work correctly, this will be done using a solder-less breadboard. This test will be finished by March 20th.

PCB Testing: After the pcb has been sent out for manufacturing the circuit will be tested with all the components soldered on. This test will ensure that no mistakes were made using eagle cad. If the circuit does not work at this point we will be hand soldering the circuit together using a proto-board. This test will be done in early April as soon as we get the pcb delivered.

Final Assembly Test: This test will be done after the heat-sink analysis has been done and all the mosfets and diodes have been mounted, and the pcb is running correctly. This test will ensure that our product is worthy of the open road. It will be done over the extent of 2-weeks to ensure that the controller can handle the power requirements and draw from the motor. This test will be done some time in mid-April.