1.1 Study of TEG characteristics:

The TEG we got from Virginia Tech is tested in our lab to study its characteristics and its experimental set up is shown in Figure 1. The TEG is placed on a square piece of wood which will be acting like thermal isolation. A 100 watt heater is used to heat up the TEG and the heater is powered by the 110 V energy source by a power chord connected to it. Thermal grease is applied on the heater before switching on the power supply. A multimeter is connected to the output terminals of the TEG to read the output voltage and current during heating process. Two thermocouples are attached to hot and cold side of the TEG to read the temperature and the temperature difference during the experimentation. The heater is switched on and the temperature of the hot side with time, temperature difference between hot side and cold side is tabulated and plotted as shown in Figure 2 (a) and 2 (b). At the same time the output voltage and output current were also noted and plotted as shown in Figure 2(c). After an hour of operation the temperature of the hot side of the TEG is about 130 degrees and the cold side is about 85 degrees.

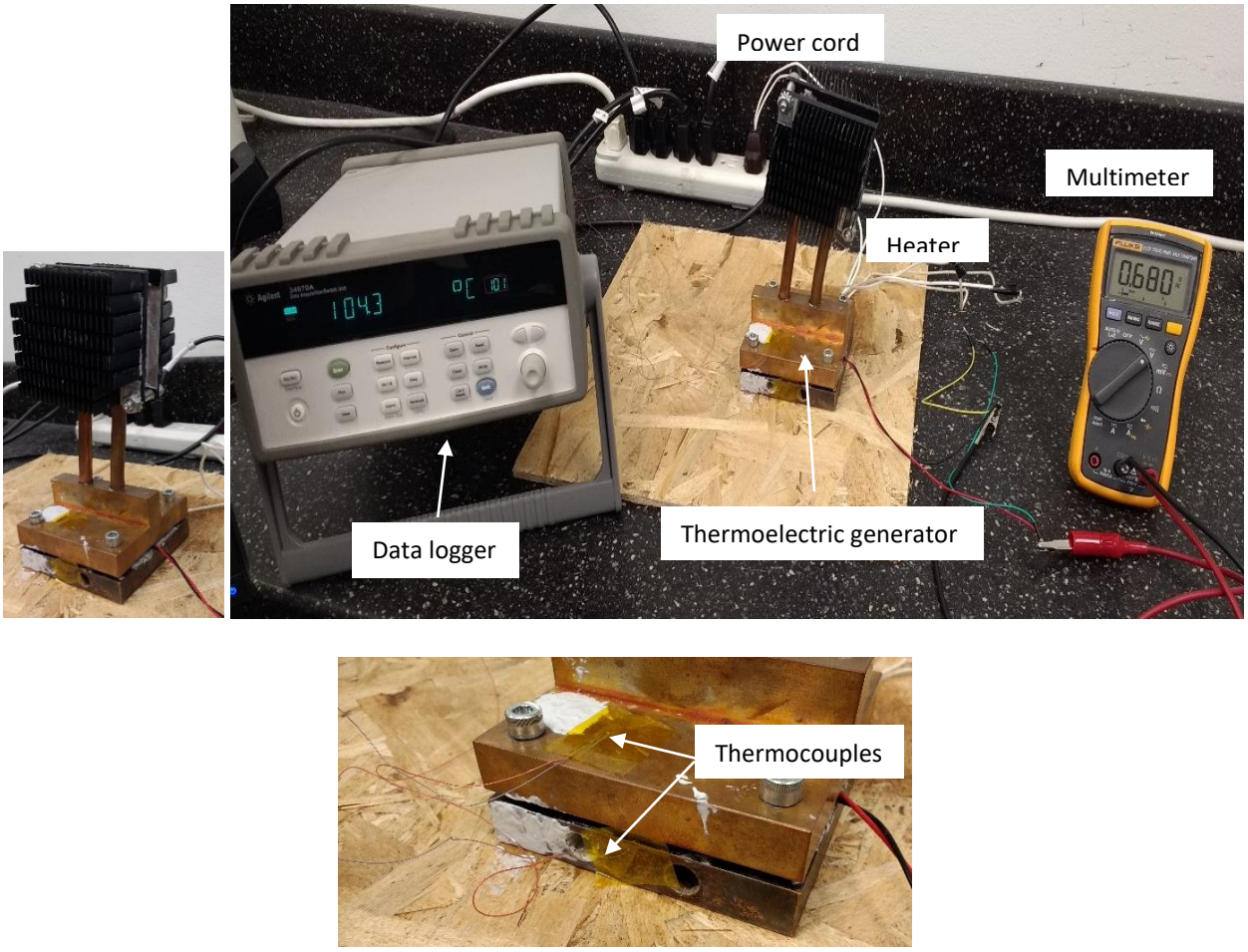
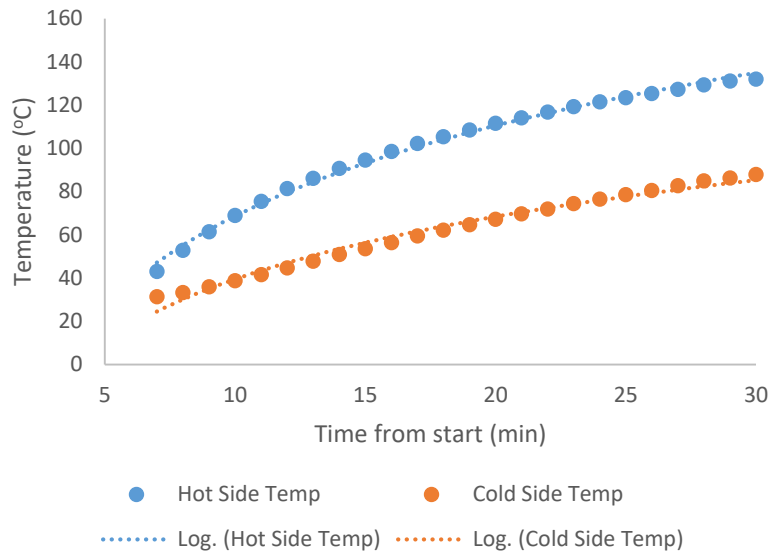
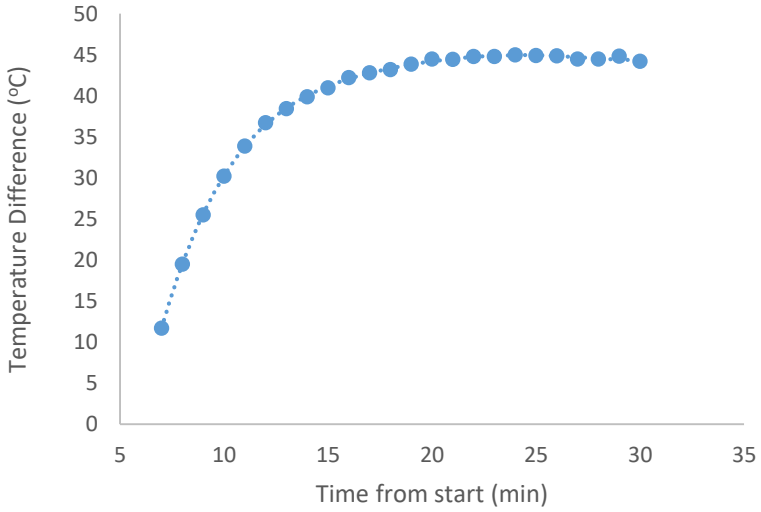


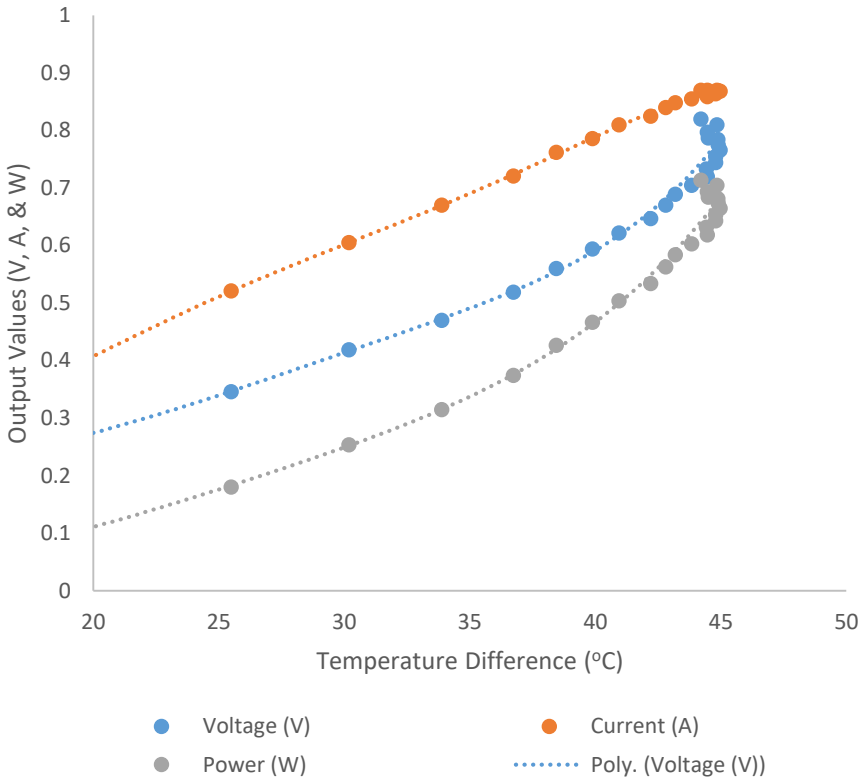
Figure 1. Experimental setup for thermoelectric generator (TEG) testing


160
140
120
100
80
60
40
20
0
Temperature (°C)
5
10
15
20
25
30
Time from start (min)
Hot Side Temp
Cold Side Temp
Log. (Hot Side Temp)
Log. (Cold Side Temp)

(a)


50
45
40
35
30
25
20
15
10
5
0
Temperature Difference (°C)
5
10
15
20
25
30
35
Time from start (min)

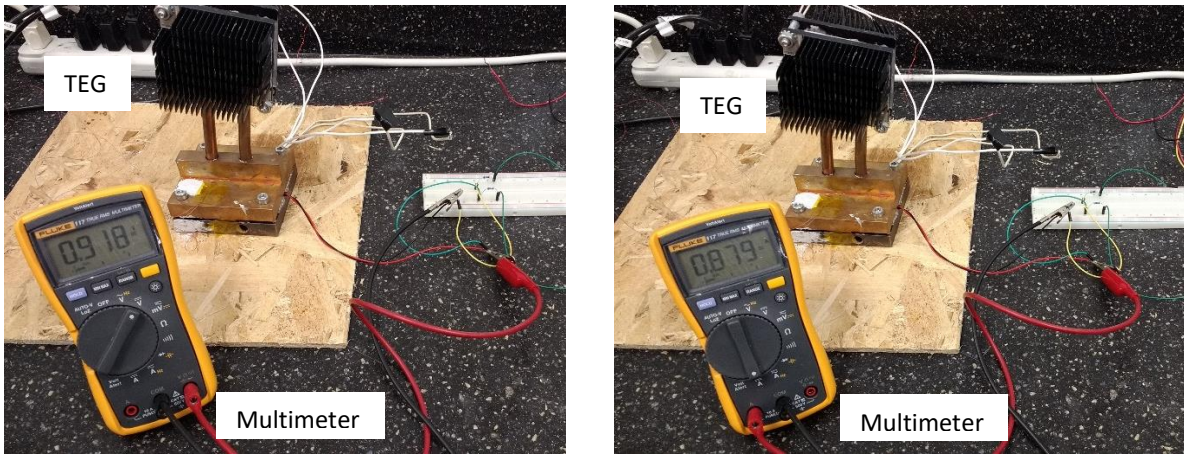
(b)



(c)

Figure 2. Characteristics of the TEG (a) Temperature vs time (b) Temperature difference vs time (c) Temperature vs electrical output

At the steady state ie after an hour of operation the TEG is able to generate a steady output voltage of 918 mV with an output current of 879 mA giving an output power 0.8 watt and the readings of the multimeter connected to the output terminals of the TEG are shown in Figure 3. The internal resistance of the TEG was found to be nearly equal to 1 ohm.



(a) (b)

Figure 3. Steady output from TEG after one hour of operation (a) voltage (b) current