

## Comparison of Motors

To decide which motor to use for this project, we compared various voltage and current ratings of the AC-50 and AC-51 motors to determine which would have the highest performance in the simulated quarter mile. This was completed by adjusting the mass of the electric engine to 52.5 kg, or approximately 115 lbs, along with adjusting the parameters for rated power and rated torque for each of the electric motors.

These parameters were found from the imperial peak graphs on hpevs.com for each of the respective motor, voltage, and amperage ratings. The imperial peak graph for 96-volts/650 Amps for the AC-51 electric motor is below:

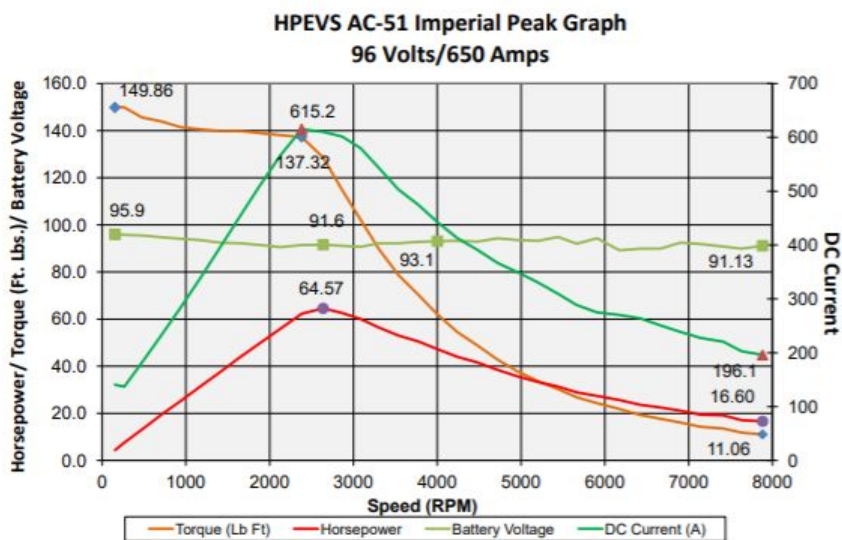


Figure 1. Imperial Peak Graph for AC-51 at 96 Volts/650 Amps from [1].

From this figure, the rated torque is 137.32 ft-lbs, which was converted to 186.76 N-m. The rated power is 64.57 HP, which was converted to 48.169 kW. The converted torque and power were used in the MATLAB CBR500 quarter mile simulation for each of the motors, as seen below:

HPEVS Motor	Motor Voltage	Motor Amperage	Quarter Mile Time
AC-50	48 Volts	650 Amps	12.2 s
AC-50	72 Volts	550 Amps	13.7 s
AC-50	72 Volts	650 Amps	12.3 s
AC-50	96 Volts	650 Amps	12.4 s
AC-50	108 Volts	650 Amps	12.5 s
AC-50	144 Volts	500 Amps	14.9 s
AC-51	96 Volts	650 Amps	10.8 s
AC-51	108 Volts	650 Amps	10.9 s
AC-51	144 Volts	500 Amps	10.9 s

From these results, the HPEVS AC-51 96V/650A electric motor is chosen, as it will give peak performance in a quarter mile race. These motors can be found at:

<https://www.electricmotorsport.com/ac-50-kit.html> for \$4,684.50.

<https://www.electriccarpartscompany.com/ac-50-ev-ac-motor-kit-48-144v-500-650a-34-88-hp-hpevs> for \$2230.00.

<https://electricgt.com/shop/hpevs-ac50-51-systems/> price not listed.

[1] <https://www.hpevs.com/>