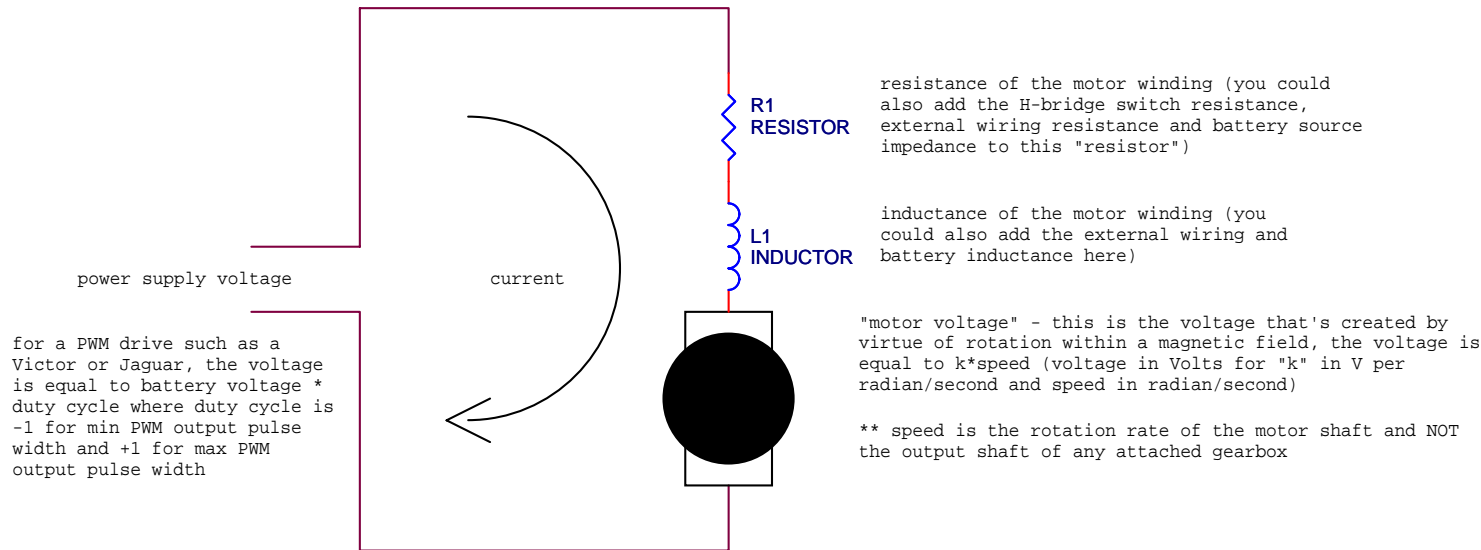


Everything you need to know about DC brush motors



motor output torque = $k \cdot \text{current}$

** this is the torque at the motor output and NOT at the output of any attached gearbox

** k in the torque equation (in units of Newton-meters per Amp) is equal to the motor constant "k" (in units of Volts per radian/second)

** don't forget to account for gearbox efficiency if you try to model the output torque from a gearbox

** don't forget to include inertia of the rotor and load in your calculations (including effects of gearbox on "effective" load inertia)

supplied motor specifications

R = winding resistance

L = winding inductance

k = motor constant (either V per radian/sec or Nm/Amp, same value for both motor torque and voltage calculations)

inertia = inertial "mass" of the rotor

equations

$$V = (I \cdot R) + (L \cdot \frac{dI}{dt}) + E$$

$$E = k \cdot \text{speed}$$

$$\text{torque} = k \cdot I = \text{total inertia} \cdot \text{acceleration}$$

$$V = \text{power supply voltage}$$

$$I = \text{current}$$

$$R, L \text{ and } k \text{ from motor specs}$$

$$E = \text{"motor voltage"}$$

$$\text{torque} = \text{motor shaft output torque}$$

$$\text{total inertia} = \text{motor's rotor inertia} + \text{"effective" load inertia}$$

$$\text{speed} = \text{motor output shaft speed in radians/second}$$

$$\text{acceleration} = \text{motor output shaft acceleration in radians per (second}^2\text{)}$$

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