



Motors



What is a Motor?

- Converts electrical energy to mechanical energy
- Spinning and stuff
- Types
 - Brushed/DC
 - Servos
 - Unbrushed/"Stepper"



FTC Legal Motors

- Tetrix DC Motor
- AndyMark Neverest 40
- Various Hobby Servo Motors
 - Check manual for more specifics



Key Characteristics of a Motor

- Volume/ footprint on robot
- Electrical Characteristics
 - Operating Voltage; 12V, 24V, etc.
 - Current Draw; measured in amps. Varies with amount of work the motor is made to do
- Torque: rotational force
- Angular Velocity: rotational speed

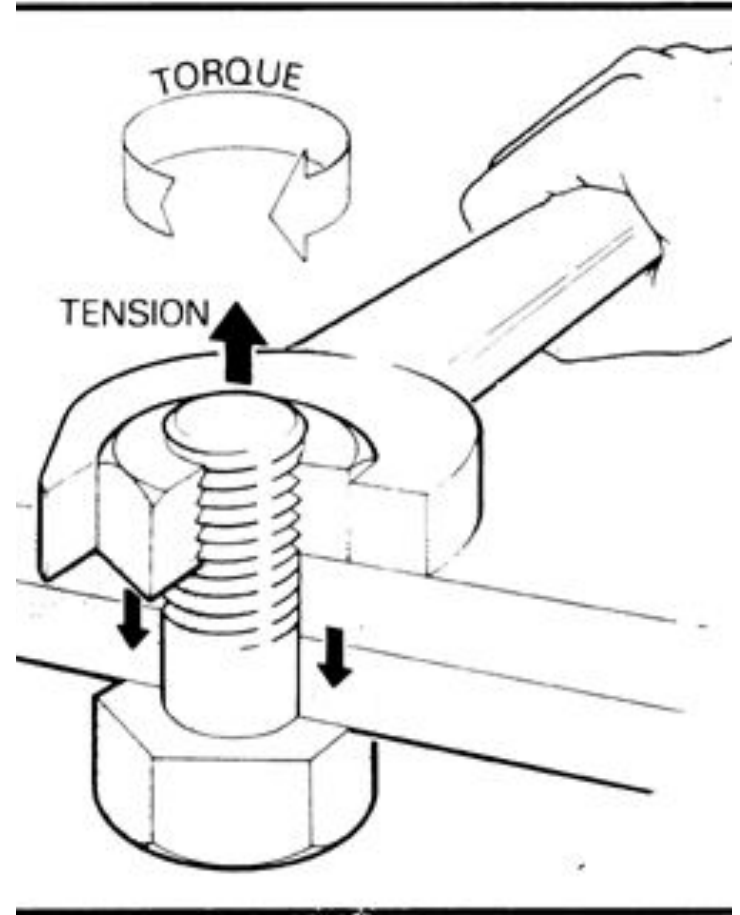
Important Electrical Characteristics for Design

- Voltage
 - Make sure motors work with your battery
 - Stay Legal
- Current
 - Don't kill the fuses
 - Avoid sad/hot/totally on fire wires
 - Don't "burnout" the motors



Torque

- Is Rotational Force
 - Calculated with $\tau = F \times r$
 - τ =torque, "F"=force at a certain "r", "r" is distance from center of output shaft
- Stall Torque (Max Torque)
 - Burnouts if you apply stall torque for long periods of time
 - Found on motor datasheets and specs.



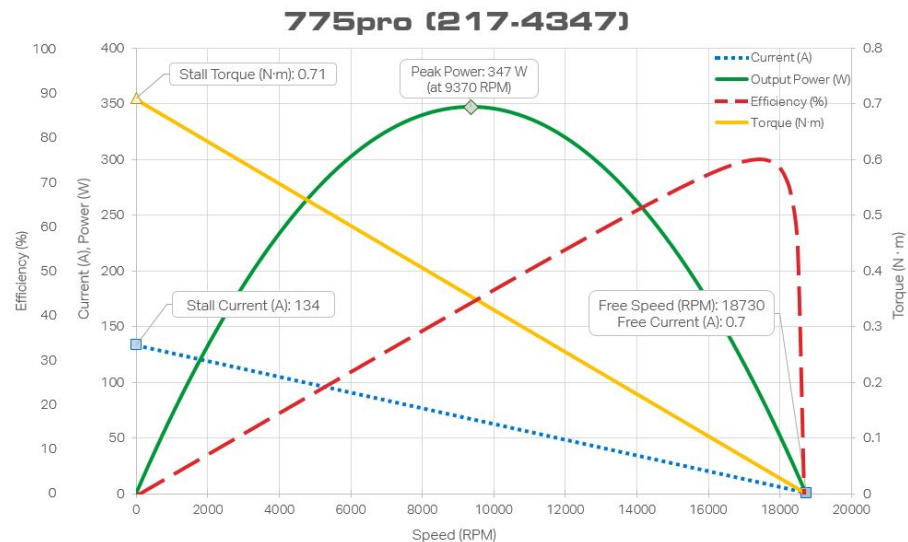
Angular Velocity

- Rotational Velocity (How fast it can spin)
- “Free Speed” - angular velocity when the motor does nothing but spin in air. This is found on motor datasheets and specs.



Motor Curves

- Motor curves are graphs that illustrate how different aspects of the motor change in relation to others
- It allows you to find...
 - Maximum output power
 - Ideal operation torque and speed
 - Peak efficiency
- More details on how to read motor curves can be found online here:
<http://motors.vex.com/introduction>



Note: this motor is not legal in FTC.