

ET 332b
Homework
Motor Load Torque Speed Curves

Selecting motors in practice requires knowledge of the torque-speed or power-speed characteristic of the load. Simple load examples were given in the lecture. Most motors are used to drive industrial devices such as axial flow and centrifugal flow pumps and blowers. These devices have a torque-speed characteristic given by

$$T_L = c_p \cdot n^2$$

This equation shows that the torque of these devices is proportional to the square of the speed. The graph below shows the characteristics of a three-phase induction motor and a typical axial flow device plotted together. Where the two curves intersect is the operating point for the motor load combination. The motor will drive the load with its torque and speed.

From these plots determine: a.) the maximum torque that the motor can develop, b.) the torque that the motor develops when its shaft speed is zero, c.) the horsepower that the motor must have to drive the pump.

