Squirrel Cage Induction Motors: Mechanical Properties (39:01)

ERROR: Column headings reversed at 2:58 and again at 3:31 Should be poles per phase on left and pole pairs per phase on right. Pole pairs per phase is always half of poles per phase.

Describe the rotor of a squirrel cage induction motor.

Describe how the principle of induction applies to a squirrel cage induction motor.

Identify a key feature of induction motors regarding synchronous speed and rotor speed.

Identify the formula used to calculate slip.

Calculate slip for a motor with a synchronous speed of 1800rpm and a no load speed of 1780rpm.

Determine the mechanical power for a motor rotating at 1780rpm exerting 0Nm of torque in the no load condition.

Determine the slip and mechanical power for a motor rotating at 1710rpm exerting 1.1Nm of torque in the rated condition.

Determine the slip and mechanical power for a motor rotating at 1260rpm exerting 2.2Nm of torque in the maximum or breakdown torque condition.

Determine the slip and torque for a motor rotating at 1364rpm exerting 300W of mechanical power in the maximum mechanical power output condition.

Plot torque and mechanical power for the above motor as a function of rotational speed from 1200-1800 rpm.

Describe the relationship of torque and rotational speed at and around the rated condition.

Identify how a motor's rotational speed changes as one moves from the no load to the rated to the breakdown/maximum torque condition.

Identify how a motor's rotational speed changes as one moves from the breakdown/maximum torque to the rated to the no load condition.

Identify when overloads occur.

Draw extended plots of torque and mechanical power as a function of rotational speed from 0-1800rpm.

Describe how torque and mechanical power behave in the breakdown region.

Determine the mechanical power for a motor rotating at 0rpm exerting 1.4Nm of torque in the locked rotor condition.

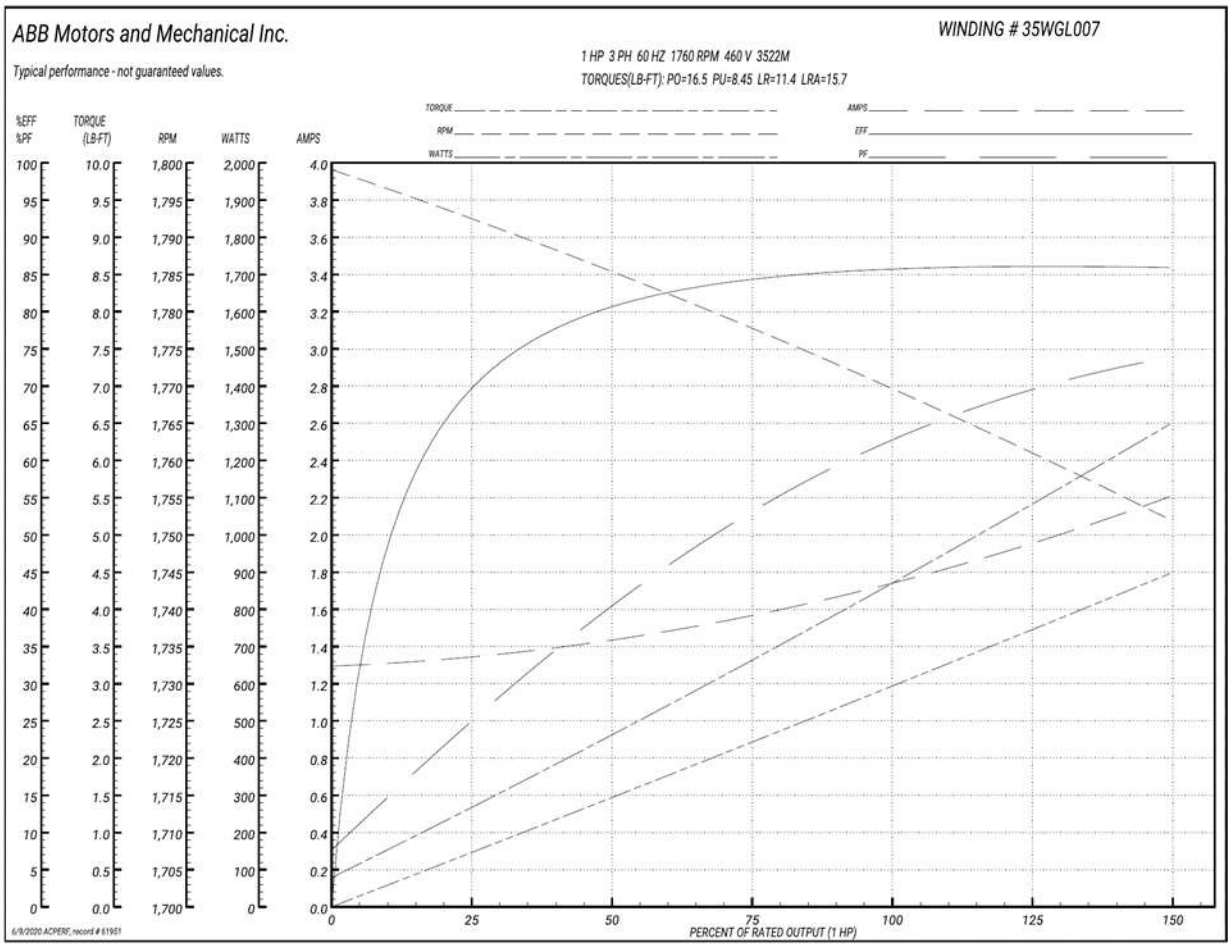
Draw plots of torque and mechanical power as a function of rotational speed for a NEMA design D squirrel cage induction motor.

Identify applications of design D motors. Identify performance and construction differences between design B and D motors.

Differentiate between fractional and integral motors.

Calculate the rotational speed and torque of a design B 2hp motor operating at 3% slip with a synchronous speed of 1800rpm. Estimate breakdown/maximum torque, locked rotor torque, and maximum mechanical power.

Calculate the rotational speed and torque of a design D 3hp motor operating at 10% slip with a synchronous speed of 1200rpm. Estimate locked rotor torque and maximum mechanical power.



Identify the data specified on the horizontal x axis. Identify the rated condition. Identify where data at the rated condition can be acquired.

Identify the rotational speed curve. Determine rotational speed and slip at the rated condition. Identify the upper and lower limits of rotational speed and identify the significance of this range. Identify why rotational speed slopes downward left to right.

Identify the torque curve. Determine torque at the rated condition. Identify why torque slopes upward left to right.

Identify the efficiency, line current, and power factor curves.

Determine mechanical power output, efficiency, and electrical power input at the rated condition

Identify the supplementary data for PO pullout/breakdown/maximum torque, LRT locked rotor torque, PUT pull up torque, and LRA locked rotor amperes.