ELECTRICAL AUTOMATION SYSTEMS TOWARDS INTELLIGENT AND ENERGY EFFICIENCY APPLICATIONS

Musse Mohamud Ahmed

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APPLICATIONS

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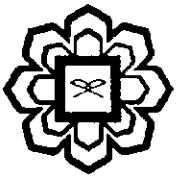

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CHAPTER 27

ENERGY CALCULATIONS

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27.1 Introduction

By using the same power factor and voltage rated, the synchronous speed of each motor has been calculated by using Eq. (6) and using Eq. (5) we verified the percentage of slip of each motor. The differences of the efficiency are calculated as below using the Eq. (7) in chapter 25. Using the result obtained from the calculation we plot the curved of energy efficiency vs load, as we noticed that to plot the motor efficiency curves we need to have percentage of efficiency at 25%, 50%, 75% and 100% full load of the motor but from the calculation we only can verified the energy efficiency for the 100% full load, so for the other full load of the motors we get approximate data from the manufacturers.

27.2 Hanning Motor

Energy Efficiency Calculations of Hanning Motor:

The following calculations represent the practical energy efficiency calculations of Hanning motor:

$$Ns = \frac{120f}{p}$$

$$Ns = \frac{120(50)}{4} = 1500$$

$$Slip = \frac{Ns - Nb}{Ns} \times 100$$

$$Slip = \frac{1500 - 1450}{1500} \times 100 = 3.33$$

$$Pi = \frac{V \times I \times PF \times \sqrt{3}}{1000}$$

$$Pi = \frac{400 \times 15.3 \times 0.84 \times \sqrt{3}}{1000} = 8.904kW$$

$$efficiency = \frac{Pout}{Pi} \times 100$$

$$efficiency = \frac{7.5}{8.904} \times 100 = 84.23\%$$