

Wildi Industrial Problem 4

(practical level)

Annual cost of running an electric motor

The annual cost of supplying power to a motor can run into hundreds of thousands of dollars. The efficiency of the motor is then an important consideration. Modern motors are built to meet high efficiency standards. The following example illustrates the costs that are involved, and the savings that can be made.

Technical data and relevant questions

A 300 hp, 440 V, 60 Hz, 3-phase, 1788 r/min induction motor has an efficiency of 94 % at full load. The motor runs at full load 24 hours per day, and electricity costs 5 ¢ per kWh.

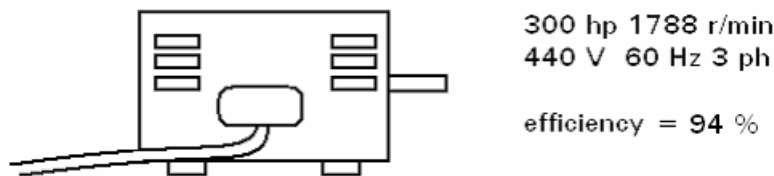


Figure 4

Calculate:

- The active electric power consumed by the motor [kW]
- The energy consumed by the motor per year [kWh]
- The cost per year of running the motor [€]
- The savings per year if the motor was replaced by another one having an efficiency of 95 %.

References:

Electrical Machines, Drives and Power Systems, 5th edition
Sections 3.4, 3.5, 3.7, 27.1

Answers to Problem 4:

- a) 223.8 kW b) 2 085 668 kWh c) \$ 104 283 d) 1098 \$/year

Solution to Industrial Problem 4

don't peek until you've done your best to answer the questions by yourself !

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