

T.I.P.S.

TECHNICAL INFORMATION AND PRODUCT SHEETS

AC INDUCTION MOTORS IN INDUSTRY

Electric motors use over 85 percent of the energy needed by industry. Most of this electrical energy is converted to mechanical energy used to drive industrial equipment like pumps, fans and compressors.

Depending on the size of the motor, 4 to 15% of the electrical energy input is lost due to the inefficiencies of the conversion process. These inefficiencies include resistance losses in the rotor and stator windings, losses due to hysteresis and eddy currents in the motor core, friction losses in the bearings, windage from the cooling fan and the rotating core, and stray load losses.

Design improvements can reduce each of these types of losses and improve the overall efficiency of the motor. Invariably, these "high-

efficiency" designs include a corresponding price premium.

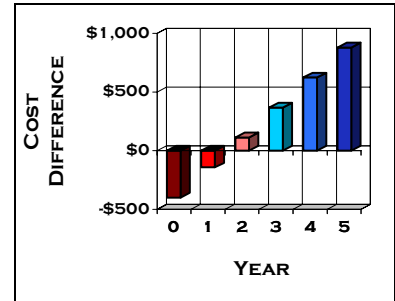
OPTIMIZED TO PRODUCE HIGHER EFFICIENCIES

High-efficiency motors are designed to produce the same brake horsepower with less electrical power input. These energy efficient machines contain more copper and iron and have lower friction and windage losses than their standard design counterparts.

The result of these design modifications is a 2 to 10 percentage point increase in efficiency, depending on the size of the motor. The efficiency improvement is greatest for smaller motors, and decreases as the rated HP increases (see figure below).

Although high-efficiency motors typically cost more than standard motors, the benefit of lower operating costs can often

offset the price premium in the first year.



Cumulative cost difference between a 50 HP HE and a 50 hp standard motor. After 5 years, the HEM costs almost \$900 less.

FEATURES

Some of the features of high-efficiency motors include:

- More copper in stator coils
- Thinner laminations and low-loss silicon steel
- Longer rotor core
- Optimized air gap
- Improved bearings and seals
- Higher quality insulation
- Optimized fan and air flow

BENEFITS

In addition to lower operating costs, high-efficiency motors offer:

- Improved power factor
- Greater reliability
- Lower maintenance costs
- Longer life
- Reduced transformer loading
- Better tolerance to harmonics

