

## PREMIUM EFFICIENCY MOTORS – (Q & A)

In spite of the great money and energy saving potential available by using premium efficiency motors, it is amazing that so few motor users are buying these motors. Some reasons for not using them are misunderstandings about the energy saving potential. The following information is presented in a question and answer format to address some of the myths and questions related to premium efficiency motors.

Question: *Can I save money even when I only have relatively small motors in my plant?*

Answer: The energy saving potential of small premium efficiency motors is actually greater percentage-wise than the savings on large motors. The reason is that on small motors, the percentage difference in efficiency between the standard motor and the premium efficiency motor is actually much greater than it is on larger motors. For example, the difference between a standard motor at 3 HP and the premium efficiency motor could easily be 9 or more percentage points. Compare this to a 100 HP motor where the difference between the standard and premium efficiency motors might only be 2%.

Question: *Do my motors have to be fully loaded to realize the savings available in premium efficiency motors?*

Answer: It is usually advantageous to have motors loaded to more than 50% of rated load for optimum efficiency. Thus, it is usually best to resize a motor at the same time it is upgraded to premium efficiency. However, even if this is not done and the motor is oversized, there is still substantial savings to be gained by utilizing a premium efficiency motor. For example, at 25% of rated load, the difference in efficiency between a standard motor and a premium efficiency motor (of 10 HP) would be 80.4% vs. 86.6%. Thus, the premium efficiency motor is still substantially better even at low load levels than a non-premium efficiency motor. Even without resizing, a substantial efficiency improvement can be made.

Question: *How much more do premium efficiency motors cost?*

Answer: Generally, premium efficiency motors cost 20 to 30% more depending upon the size and speed of the motor.

Question: *Why do premium efficiency motors cost more than standard motors?*

Answer: Premium efficiency motors use more and better materials. For example, the lamination material is a higher grade, higher cost steel. In addition, the rotor and stator are generally longer in a premium efficiency motor than in a standard motor. The laminations are thinner compared to a standard efficiency motor. This means there are more laminations. In addition, the lamination slots are larger so more copper can be used in the windings. Finally, premium efficiency motors are manufactured in smaller production lots which also tends to make them more expensive.

Question: *If premium efficiency motors can save lots of money, why don't more people use them?*

Answer: This is a tough question but is probably related to the fact that many people buy on first cost rather than considering operating costs. Also, there seems to be skepticism about manufacturer's claims on performance of these motors. Many power users that have been very active in other energy conserving programs such as lighting, insulating etc., have ignored the energy-saving potential of premium efficiency motors.

Question: *Why can't motor manufacturers make it more obvious that we are going to save money with these motors?*

Answer: Unlike light bulbs that are sold by wattage consumption (input), electric motors are sold by horsepower (output). Thus, subtle differences in efficiency usually appear in the fine print and get overlooked. For example, it is obvious when you buy a 34 watt fluorescent light bulb to replace a 40 watt bulb, that some savings are available. It is less obvious when you buy a 5 HP motor of one design versus a 5 HP motor of a premium efficiency design, that there will be savings on the electric bill. Also, the vagaries of electric bills and the complications involved in the electric billing process with demand charges, energy charges, fuel cost adjustments and occasionally, power factor penalties, create enough confusion so savings are not obvious. But they exist.

Question: *How can I evaluate the dollar savings on premium efficiency motors?*

Answer: There are three items needed to conduct an evaluation. First and most important, is the average cost per kilowatt hour of electricity. The simplest and most direct way to get this is to take the bottom line cost on a monthly electric bill and divide it by the total kilowatt hours used. This gives a net cost per kilowatt hour which is generally the best cost to use in evaluating energy saving equipment. The reason this works is that equipment designed for better efficiency will in general, reduce the demand, kilowatt hours, and fuel cost adjustments in equal proportions. Thus, using the average cost per kilowatt hour is the easiest way of making an evaluation. Next would be the HP size of the motor that is operating and, finally, the number of hours per month or year that it operates. With these three items and the efficiency difference between one motor and the other, it is easy to figure the cost savings. The formulas for doing this are readily available. If in doubt, let us have the information and we'll make the calculations for you.

Question: *How quickly will these motors pay for themselves?*

Answer: This is impossible to answer without all the facts from the previous question but motors operating twenty-four hours a day at or near full load, can be expected to pay for themselves in less than two years. The difference between a standard motor's cost and a premium efficiency motor's cost can be paid off in a few months. One thing is certain: regardless of the operating details, premium efficiency motors will always save money versus lower efficiency units and savings go on for as long as the motor is in operation. In many cases this could be twenty to thirty years. Also, as power costs rise, savings will rise in proportion. The old rule of "pay me now or pay me later" has a corollary when applied to premium efficiency motors which might be "pay a little more now and save some now and more later."

Question: *Are there any other advantages to premium efficiency motors?*

Answer: Yes, because of the superior designs and better materials used in them, premium efficiency motors tend to run at lower operating temperatures resulting in longer life for lubricants, bearings and motor insulation. Another advantage is that, by generating less waste and less heat in the space around the motor, air conditioning and ventilation requirements are reduced, resulting in additional energy savings.

Question: *What is the best way to take advantage of premium efficiency savings potential?*

Answer: Specify the use of premium efficiency motors on new equipment and as replacement units for failures. Some judgement should be used on blanket specifications. For example, it may be impractical to try to specify premium efficiency motors for single phase, fractional horsepower, and specialized motor requirements or where the motor is an integral part of the equipment. Also, on motor installations where infrequent service is required, the extra cost may not be justified. Examples of this would be trash compactors, batch mixers and other equipment that only operate for short periods of time. It might also be difficult to justify the added cost of premium efficiency motors on equipment that operates on a seasonal basis, especially if the season is short.

In summary, it is important to seize the opportunity to move into premium efficiency motor use as soon as possible. If you have questions not covered above, please give us a call. We'll get you the answers.