

## Planning for Motor Failure

When a motor fails in an industrial setting, it is often the first of two failures. The second is the (usually panicked) choice of a replacement for the failed motor. Research from the U.S. Department of Energy (DOE) shows that only 11 percent of U.S. corporations plan for motor contingencies, and energy efficiency is infrequently among the criteria used in that decision-making process. When a motor fails, the cost of downtime is usually the predominant concern. Future operating costs are often only vaguely understood and are therefore unlikely to be considered. Yet the financial and environmental ramifications of these decisions can be huge, considering that motors may remain in service for 20 or 30 years.

### WHY ADVANCE PLANNING IS SO IMPORTANT

---

this section

A few facts should help put these ramifications into perspective:

- Electric motor systems account for 23 percent of all electricity consumed in the U.S. and almost 70 percent of the electricity consumed in the manufacturing sector.
- Motor electricity consumption can approach 90 percent of some industries' total electric bill. (The oil and gas extraction and mining industries are good examples.)
- The average motor easily consumes electricity worth 50 to 60 times its initial purchase price within 10 years of service, meaning that first cost is often less than 2 percent of a motor's lifetime cost.
- Motors complying with the NEMA Premium™ efficiency standard (established by the National Electrical Manufacturers Association) are 1 to 3 percentage points more efficient than standard motors, and, given that motors often operate 40 to 80 hours per week, even small efficiency improvements can yield tremendous energy savings.
- For every new motor sold, approximately 2.5 motors are repaired.
- Improper repairs can reduce motor efficiency by as much as 5 percent, but most motors

can be restored to their original efficiency if best practices are used in the repair process.

Developing a motor management plan in advance of motor failures can help your company's bottom line by ensuring that the right decisions are made and that the right resources will be available when a motor fails. Putting a plan in place and working with your local motor service provider ahead of time will minimize downtime, ensure that you make the best decisions about repairing or replacing a given motor, and help you identify the best motor to specify if replacement is the way to go.

## DIFFERENT TYPES OF MOTOR MANAGEMENT PLANS

---

this section

Motor management plans can range from very simple to quite complex. The most appropriate plan will differ depending upon the number and variety of motors in your facility and the resources available for developing the plan. But even the simplest plan can help you select the best motor for your particular application, saving you time and money when a motor fails. Consult with your motor service professional to determine the right motor management approach for your facility's particular needs. No matter what approach you take, your plan should include information on the types of motors in your facility (nameplate capacity, speed, enclosure type, and efficiency), the load profile each motor serves, local electricity prices, and the cost of repairing or replacing each motor covered by the plan.

**Developing a basic motor management plan.** The simplest approach is to lay out basic decision-making rules that would apply to all motors in your facility. For instance, you might decide to replace all failed motors below a given horsepower threshold with the highest-efficiency models available. You might also specify that all motors above this threshold should be repaired unless the cost would exceed 50 percent of the price of a replacement motor. In either case, you would want to work with your local motor distributors to ensure that they will have appropriate energy-efficient replacements available.

Because a simple motor management plan does not consider the specifics of each motor in your facility, it may result in less-than-optimal decisions in some cases. However, it does have the advantage of being easy to develop and easy to implement. The guide on [Making Motor Repair or Replacement Decisions](#) provides information and resources for determining the horsepower threshold that's appropriate for your facility.

**Focusing on critical motors.** Another approach to motor planning is to focus solely on the largest motors or those that are most critical to your operations. After collecting detailed information on each of these motors, you would decide ahead of time whether to repair or replace each of these motors should they fail. In some cases, you may find that it makes economic sense to replace one or more of these motors with a higher-efficiency model immediately, without waiting for failure to occur.

The survey of critical motors should collect the following information:

- Motor horsepower
- Design and code letter—for example, type A, B, C, D, or E—to define inrush current and torque, respectively
- Type of enclosure—for example, totally enclosed fan-cooled (TEFC) or open drip-proof (ODP)
- Frame size and special mounting features—for example, C-face
- Full-load efficiency
- Full-load speed
- Voltage
- Where the motor is located
- Motor application
- When the motor was put in service
- When the motor was last repaired
- The name of the shop that last repaired the motor
- How many times the motor has been repaired or rewound, and why
- Motor loading and operating hours

**Creating comprehensive motor inventories.** This is the most demanding type of motor management plan, because it requires recording nameplate and operating data for every motor in a facility. Software tools, such as MotorMaster+, which was developed by the U.S. Department of Energy's (DOE's) Office of Industrial Technology, are very useful for this purpose. In addition to making it easy to record motor data, MotorMaster+ contains a frequently updated database of available motor models plus tools that will help you make repair/replace decisions in advance of motor failure. MotorMaster+ is available free of charge from [the DOE website](#) .

## TO LEARN MORE

---

this section

A consortium of motor industry manufacturers and service centers, trade associations, electric utilities, and government agencies have developed a project called Motor Decisions Matter. The project seeks to raise awareness among end users about the energy implications of the decisions they make when motors fail. Visit the [Motor Decisions Matter web site](#) for additional information about motor planning and some useful tools that can help you with the process.

All content copyright © 1986-2017 E Source Companies LLC. All rights reserved.

---

**Source URL:** [https://tva.bizenergyadvisor.com/BEA1/OMA/OMA\\_Drivepower/OMA-18](https://tva.bizenergyadvisor.com/BEA1/OMA/OMA_Drivepower/OMA-18)