

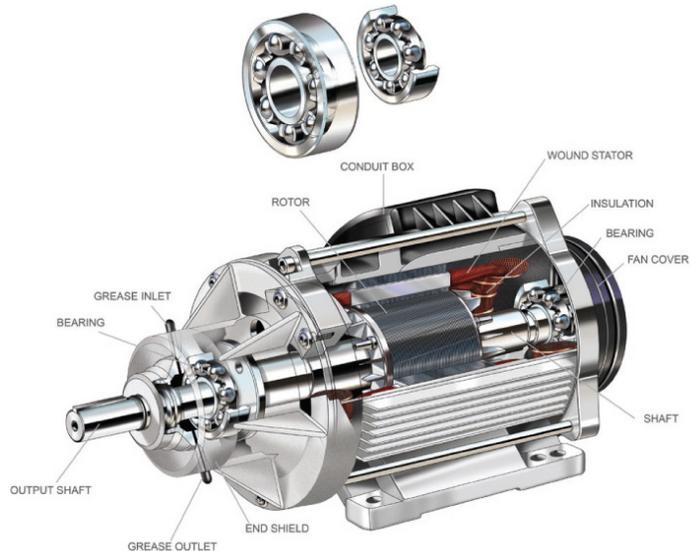
Electric Motors — Care & Maintenance

A vital piece of equipment in today's modern manufacturing processes, the electric motor is found in practically every type of operation. Its simple and reliable operation makes it rather easy to overlook during every-day maintenance practices. Unfortunately, it's often too late to employ minor repairs when an electric motor begins to show signs of neglect.

This Technical Topic outlines several standard maintenance tools and practices that are easy to implement and help keep electric motor rebuilds and replacements at a minimum.

Ensure New and Rebuilt Motors are in Prime Condition

- **Perform Vibration Checks.** Make sure to perform vibration checks for defects. The recommended limit is no more than .05 inch-per-second overall (0-120,000 cpm).
- **Request Mechanically Balanced Motors.** Always ask for mechanically balanced rotors, especially on applications using high-efficiency/high speed models. Acceptable limits can be found in the International Standards Organization (ISO) specifications. Specifications are provided in G-6.3 for lower horsepower (under 100) or less severe motors, and G-2.5 for high horsepower, vertical or critical motors.
- **Store Motors Properly.** The best way to prevent moisture from entering the bearing cavity and causing corrosion before installation is to store motors with the bearings fully packed with grease. If your motors are lubricated with oil, make sure you discuss proper storage with your supplier.
- **Rotate Stored Motor Shafts.** Make sure new and rebuilt motors are in prime condition by rotating the rotor by hand every month. This will prevent fretting corrosion, a wear process that produces "false brinelling" (evenly spaced depressions in the bearing races that may appear to have been formed by indentations due to shock loading).



Handle Replacement Bearings With Care

- **Store Bearings in Original Packaging.** The best ways to store bearings is horizontally in a dry place and in their original, unopened package. Never place bearings on a dirty surface.
- **Rotate Bearings While in Storage.** For greased bearings, periodically turn over sealed and shielded bearings to prevent the grease from settling on one side.
- **Replace With Identical Bearings.** Use identical bearings for replacements. If needed, contact your authorized bearing distributor or manufacturer for interchange information.
- **Never Wash New Bearings.** Never wash new bearings before installation. The bearing manufacturers take great care to package and ship bearings that are dirt-free and ready for lubrication. There's really no need to wash them or remove protective slushing compound.

Ensure Proper Installation and Repair Practices

- **Handle With Care.** Be sure to handle bearings with care. Never pound directly on a bearing or ring. If a bearing is dropped, it is best not to install it. If using a vise to assist mounting, protect the shaft with a sheet of soft metal.
- **Inspect Carefully.** Inspect the shaft and housing for size and damage. Remove any nicks and burrs with emery paper. If shaft or housings show obvious signs of wear or damage, then replace or repair.
- **Avoid Overheating.** Never bring a flame in direct contact with the bearing and never heat beyond 230°F. During heat-mounted operations, place the bearing against the shaft shoulder until it cools and locks in place to ensure the bearing does not creep away from the proper position.
- **Use the Right Tools for the Job.** It is really important to use the right tools for the job. Using the right tools can lower the possibility of damaging the bearings and will certainly help speed the installation process. Talk with your bearing supplier to for help in selecting the proper tools.
- **Pay Attention to the Bearing Press Fit.** Ensure the bearing's proper fit by applying even pressure to the outer race with a press. A bearing that has an outer diameter of less than 4 inches should be installed in this way. Uneven pressure on the ring without a bearing press will damage the raceways.

- **Adopt Stringent Alignment Limits.** Another cause of electric motor failure is misalignment. There are many methods to use to align the motor and the component it's driving, but what is most important is to align to tight tolerances. Remember, the bigger and faster the motor, the tighter the tolerances need to be.
- **Follow Good Housekeeping Practices.** Don't let dirt or process materials build-up on the motor — it can act as insulation and generate unnecessary heat, which impacts bearing life. The following photo is a prime example of poor housekeeping. Yes...believe it or not, there's an electric motor driving a gear reducer under all this mess. When the deposits were removed, the operating temperature dropped by more than 25°F.



Adopt Best Practices For Lubrication and Condition Monitoring

- **Proper Lube is CRITICAL!!** For grease-lubricated bearings, the lubricant does more than prevent wear, it protects rolling elements against rusting and helps seal out dust, dirt, waste and other atmospheric contaminants. Mobil™'s two primary recommendations for electric motor lubrication are Mobilith SHC™ 100 and Mobil Polyrex™ EM. Be sure to talk with your Mobil™ engineer about the recommendation that's right for your operation, especially for those motors that require oil instead of grease.
- **Use Correct Lubrication Practices.** Over 90% of electric motor bearing failures are due to overgreasing. Overgreasing also causes seals to burst thus allowing grease to bypass the bearing and go straight into the motor windings. Please see our Technical Topic titled "Regreasing Rolling Element Bearings" for more in-depth guidance on this subject.
- **Lastly, Watch for Danger Signs and Determine the Cause(s) of Failures.** Keep alert for the three sure signs of improper bearing lubrication: excessive noise, vibration and temperature. Assuring proper vigilance for these signs will go a long way in maintaining up-time. Bearings are built to last, so you need to question the cause of motor bearing failures. Frequent failures may point to an installation or lubrication problem. Ask your bearing supplier for help from their experts and include your Mobil™ engineer in identifying root cause and preventing future failures.