Reducing Bearing Failures

Implementing these common sense methods and practices will save time and effort, and lower costs.

By Doug Gribble, UVLM

No two companies operate exactly the same way, and maintenance tasks are often performed differently. However, this article will present the most common scenarios and practices on how to reduce bearing failures, based on current information and experience. These methods are certainly not all-inclusive but they may provide some original ideas or provoke thoughts about ways to change your current maintenance systems and practices.

Bearing selection

• Procure the correct bearing for the application. Often, the replacement bearing is not compatible with the equipment where it is to be installed. Depending upon the age of the equipment, advances in bearing technologies may exist that make the OEM bearing obsolete. Knowing the limits of the equipment and what bearing best suits the application will save time and money.
• Determine the maximum load for the bearing. This is important both vertically and horizontally.
• Determine the minimum and maximum running speeds for the bearing. This will help determine the correct lubricant and bearing for the application.
• Determine all possible environmental conditions to which the bearing will be exposed. Very hot or cold environments often require varied bearing specifications. This may, in turn, change the type of lubricant and relubrication requirements as well.

Bearings exposed to wash ups or moisture-heavy environments need to stay well sealed and seals must be kept in proper condition to protect the rolling elements. Bearings that operate in caustic environments may require special seals and care. Pay special attention to the seal manufacturer's recommendations regarding handling and care.

Bearing handling and storage

• If possible, determine when a bearing was manufactured and if it was properly stored before being purchased. Ask the bearing distributor about his storage and handling procedures. It might be prudent to have a representative from your company personally visit the bearing distributor to confirm how bearings are being stored. For example, a tapered roller bearing should be stored with the taper down and never stacked, one on top of another.
• Store bearings in an attitude "angle" that will reduce or eliminate the possibility of damage to rolling elements and raceway. It may be weeks or months before the bearing is called into service. Reducing the risk of startup damage begins with proper storage.
• Bearings are manufactured with extremely tight tolerances and therefore require special care when moving or handling. Consider them fragile at all times and make the effort to treat them as such.
• Consider the proximity of the storeroom to areas of the plant that are affected by vibration. Could a railroad

main line affect the storeroom? Does the plant have equipment that vibrates nearby buildings? Bearings subjected to even minor daily vibrations can become damaged while in storage. Take the necessary steps to insulate stored bearings from any vibrations.
• Always store bearings in a clean and sterile environment. Keep them free of moisture, dust, and chemicals.

Bearing installation and handling
• Take care when removing old or damaged bearings from their shafts and housings. Be careful to not damage holders or surfaces where the new bearings will be installed.
• Clean all housings, shafts, holders, keyways, etc., before attempting to install a new bearing. Inspect the shafts and equipment for damage. Install new bearings in as clean and dry an environment as possible. If possible, use sterile gloves to prevent contamination. Contamination at this stage will ensure a shorter bearing life cycle.
• Carefully inspect the new bearing for any obvious damage that may have occurred during shipping, storage, or manufacture. Inspect bearings to determine if all parts are present. Bearings have been known to ship from the factory missing roller elements and other parts. Also, check for factory lubricant. Lack of lubricant from the factory can cause rust.
• Properly align bearings with shafts. Do not assume the original bearings were properly aligned, even in motors.
• Never push or pound on bearing surfaces. Use only safe installation methods accepted and approved by the manufacturer.
Initial lubrication procedures
• Never assume the manufacturer has properly lubricated the bearing. The new bearing may have been shipped with a limited amount of lubrication inside. This level may not be enough to form the necessary film between the inner race and rolling elements.
• Determine lubrication level by using sound analysis or vibration monitoring methods. Remember, a dry or underlubricated bearing will sound louder or scratchier than a quiet or smooth sounding properly lubricated bearing.

Ongoing bearing lubrication
• Your lubrication supplier and bearing supplier should have the most current data and be able to recommend the proper lubricant for the application. As in selecting the proper bearing for the application, the conditions to which the lubricant will be subjected must be considered.
• How grease waiting for future use is treated and stored will be a key factor in the life expectancy of equipment. Lubricants should be stored in moisture- and temperature-controlled environments, free of dust and chemical exposure.
• Contamination entering grease will likely happen during transfer from one point to another. Failure to exercise care in this process will nullify the attention given previously. There are a number of ways to properly refill grease guns. Using a scoop or paddle from a container is the oldest technique. It involves spooning grease from a storage container and tamping it into the grease gun to remove air bubbles. This method is most likely to introduce contaminants into the grease, especially when performed in the field. It is not a recommended method except in the most dire of circumstances.

Using tube refills is the most common method of refilling a grease gun. It involves removing the empty tube and installing a new, compatible tube of grease into the grease gun. Take care to clean dirt and old grease from the canister and handle assembly before installing a clean, new tube of grease. Perform this task in as clean and dry an environment as possible.

When refilling from a storage container using mechanical or hydraulic pumps, grease is pumped mechanically from the storage container directly into the portable grease gun. When care is taken to clean off the port on the grease gun and delivery hook up from the pump, this is the fastest and safest method of grease transfer.

• Assuring that the correct grease is introduced into bearings may involve coding systems. Labels, numbers, tags, or color-coding on bearing housings that indicate what type of grease is being used can be very helpful to the lubrication technician. Ensure that grease guns are matched up with the coding system on equipment. New employees should be trained on the matching system before any lubrication task is performed. This is an easy system to implement and minimizes the chances of introducing noncompatible greases into the bearing.

When it becomes necessary to switch delivery tubes from one grease gun to another, make certain to clean dirt and grime from the tube and then purge all the grease from the tube to prevent mixing of incompatible grease types. Clean and purge grease zerk fitting connectors as well.

• Different grease gun manufacturers allow varying amounts of grease to be applied by a pump or shot of grease. (A pump or shot of grease is one full stroke of the grease gun lever or trigger.) The amount of pressure each grease gun or grease delivery system contains also may vary dramatically. This lack of an industry standard has made it difficult to determine the amount of grease actually being delivered and therefore creates problems using a time- and amount-based lubrication schedule. It is important to calibrate each grease gun and note the volume of grease each gun delivers with one full pump.
• To properly relubricate a bearing, certain information must be obtained. To help determine the correct time- and amount-based schedule of relubrication, data from the manufacturer's recommendations on re-lubrication intervals must be combined with reliability knowledge and experience.
• Traditionally, the job function of lubrication is an entry-level position in maintenance. Much was required of these important individuals with little or no specific training provided. Fortunately, this is changing. Companies have invested in maintenance technologies and training to prevent and predict machinery failure. Companies are learning to invest in standardized training for lubrication practices and in the tools necessary to perform the job in a skilled and efficient manner.
While the importance of performing lubrication tasks has not changed, awareness of the importance of the individual performing these tasks is changing. As skill and training criteria standards evolve, the oiler becomes a skilled lubrication technician and analyst. Also called lubrication engineers, these individuals are being provided with the necessary resources to perform their job function. Reliability and predictive maintenance groups are increasingly relying upon the lubrication technician's knowledge and skills.
• Acoustic analysis or sonic analysis is a rapidly growing method in preventing overlubricated and underlubricated bearings. This equipment uses sonic sound technology and listens to the noise generated by the vibration of the bearing in the sonic range (20 Hz-20 kHz) to decipher when and if a bearing requires greasing. By listening to the "voice" of the bearing, the lubrication technician is able to make a direct determination of the grease requirements of the bearing.

As grease is slowly injected into a bearing, the change in sound or lack of sound change informs the technician when sufficient grease is present. This eliminates the need to calibrate a grease gun as the amount of grease the bearing requires is determined as it is being lubricated. By implementing this proactive method of greasing, lubrication technicians are able to customize existing time/amount-based lubrication schedules.

For example, a bearing that had a previous schedule of two shots of grease every two weeks may require only one shot every two weeks. The extra shot of grease every two weeks was overgreasing the bearing. Customizing or adjusting the lubrication schedule to fit the actual bearing requirements slashes bearing failures.

Program improvements

Take a close look at how your company operates its maintenance program. Decide if any of these steps have room in your program. Changing the way things are done often takes time and perseverance, but be diligent about making a change that has a positive impact.

Doug Gribble is technical services director at UVLM, 815 Sunrise Ln., Centralia, WA; (800) 736-3757