5 Easy Steps to Slashing Bearing Failures

Written By: Doug & Jeff Gribble
UVLM, Inc.

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Step 1. Proper Bearing for Application

1. Type of Bearing – Procuring the correct bearing for your application is critical. Often, the replacement bearing is not compatible with the equipment it is being installed in. Depending upon the age of the equipment, advances in bearing technologies may exist that make the OEM bearing obsolete. Knowing the limits of your equipment and what bearing best suits the application will save time and money.

2. Load – Determine the maximum load the bearing will be subjected to. This is important vertically and horizontally.

3. Speed – Determine the minimum and maximum speeds the bearing will run under. This will help determine the correct lubricant and bearing for your application.

4. Environment – Determine before hand, all possible environmental conditions to which the bearing will be exposed.
    A. Temperature – Very hot or cold environments often require varied bearing specifications. This may in turn change the type of lubricant and re-lubrication requirements as well.
    B. Moisture – 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.
    C. Chemicals –Bearings that operate in caustic environments may require special seals and care. Pay special attention to seal manufacturer's recommendations regarding handling and care.

Step 2. Storage & Handling of Bearings

1. Prior to Purchase - If possible, determine when a bearing was manufactured and if that bearing was properly stored before being purchased. Ask your bearing distributor what their storage and handling procedures are. It might be prudent to have a representative from your company visit your bearing distributor, in person, to confirm how bearings are being stored. Example: A tapered roller bearing should be stored with the taper down and never stacked, one on top of another.
2. Attitude - 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 that bearing is called into service and reducing the risk of startup damage begins with proper storage.

3. Handling – 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

4. Earthquake Effect – Consider the proximity of your storeroom to areas of the plant that are affected by vibration. Could your storeroom be affected by a railroad mainline? Does your 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 your stored bearings from any vibrations they may be subjected to.

5. Clean Storeroom - Always store bearings in a clean and sterile environment. Keep them free of moisture, dust and chemicals.

Step 3. Installation & Handling of Bearings

1. Removal – Take care when removing old or damaged bearings from their shafts and housings. Be careful to not damage holders or surfaces the new bearing will be installed in or on.

2. Clean Area – Clean all housings, shafts, holders, keyways, etc. before attempting to install a new bearing. Inspect the shafts and equipment for damage before attempting to install a new bearing. Install new bearings in as clean and dry environment as possible. If possible, use sterile gloves to prevent contamination. Contamination at this stage will ensure a shorter life cycle for your bearing.

3. Inspection of New Bearings – Carefully inspect the new bearing for any obvious damage that may have occurred during shipping, storage or manufacture. Inspect bearing to determine if all parts are present. Bearings have been known to ship from factory missing roller elements and other parts. Also, check for factory lubricant. Lack of lubricant from factory can cause rust.

4. Alignment – Properly align bearings with shafts. Do not assume the original bearings were properly aligned, even in motors.

5. Never push or pound on bearing surfaces. Use only safe installation methods accepted and approved by the manufacturer.

Step 4. Initial Bearing Lubrication Procedures

1. Never assume the manufacturer has properly lubricated the bearing from factory. 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.
2. Determine lubrication level by using sound analysis or vibration monitoring methods. Remember, a “dry” or under-lubricated bearing will sound louder or “scratchier” than a “quiet” or “smooth” sounding properly lubricated bearing.

Step 5. Lubricating Bearings

1. Choosing the Proper Grease for the Application - Your lubrication supplier and bearing supplier should have the most current data and be able to recommend the proper lubricant for your application. As in selecting the proper bearing for the application, the conditions under which the lubricant will be subjected, must be considered.

2. Storage of Grease - The manner in which grease waiting for future use is treated and stored will be a key factor in the life expectancy of your equipment. Lubricants should be stored in moisture and temperature controlled environments, free of dust and chemical exposure.

3. Transfer of Grease into Grease Guns – 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.

   Refilling Grease Guns

   1. Scoop or Paddle from a Container - This is the oldest technique for refilling grease guns. 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.

   2. Tube Refills – This 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 canister and handle assembly before installing a clean, new tube of grease. Perform this task in as clean and dry environment as possible.

   3. Refilling from a Storage Container using Mechanical or Hydraulic Pumps – In this method, grease is pumped mechanically from a main 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.

4. Methods Assuring Correct Grease is Introduced into Bearings

   1. Coding System - Labels, numbers, tags or color-coding on bearing housings indicating what type of grease being used can be very helpful to the Lubrication Technician. Ensure that grease guns are matched up with 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 non-compatible greases into the bearing.

2. Clearing and Cleaning of Grease Tubes and Zerk Fitting Connectors – 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.

5. Grease Gun Calibration – Different manufacturers of grease guns 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 may also vary dramatically. This lack of industrial 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.

6. Re-lubrication Schedule – In order to properly re-lubricate a bearing, certain information must be obtained beforehand. To help determine the correct time and amount-based schedule of re-lubrication, you must combine data obtained from manufacturer's recommendations on re-lubrication intervals, Reliability teams and experience.

7. Training – 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 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 a Lubrication Engineer, these individuals are being provided the necessary resources to perform their job function. The Reliability & PdM groups are increasingly relying upon the Lube Tech's knowledge and skills, which are a critical cog in the wheel of maintenance.

8. A New Method of Grease Lubrication – Recently termed "Acoustic Analysis" or "Sonic Analysis", is a rapidly growing method in preventing over and under-lubricated bearings. This equipment uses sonic sound technology and listens to the noise generated by the vibration of the bearing in the sonic range (20Hz – 20kHz) to decipher when and if a bearing requires greasing. By listening to the "voice" of the bearing, the Lube Tech 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 Lube Tech when sufficient grease is present. This eliminates the need to calibrate a grease gun as the amount of grease the bearing requires is determined at that point in time. By implementing this proactive method of greasing, Lube Tech's are now able to customize existing time/amount-based lubrication schedules. Example: A bearing that had a previous schedule of two shots of grease every two weeks, may only require one shot every two weeks, and the extra shot of grease every two weeks was over-greasing the

bearing. Customizing or adjusting the lubrication schedule to fit the actual bearing requirements slashes bearing failures.

Conclusion

By implementing these five, common sense steps, your company will save time, effort and costs. These steps and methods are certainly not inclusive of all possible means to slashing bearing failures, but hopefully will provide some original ideas or provoking thoughts about ways to change current maintenance systems and practices in your company. No two companies operate exactly the same and maintenance tasks are often performed differently. However, an attempt has been made in this paper to generalize the most common scenarios and practices, based on current information and experience. 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.

Author Doug Gribble has worked in the Predictive/Preventive Maintenance field for over 30 years with Ultrasonic Predictable Maintenance, an industrial maintenance service company. Having observed the constant problem of over and under-lubrication over the course of his career, prompted him to find a way to change that problem. His original concept of "listening" to a bearing and lubricating based on sound allowed him to invent and patent the first device to do just that. He also feels strongly that credit has been due to the people performing the daily routine of lubrication, for the difficult and important task they perform. He desires to use his common sense knowledge and experience to help make a Lubrication Technician's job easier, simpler and more rewarding. Doug is interested in hearing from you if these steps have helped your company operate more efficiently. He is also interested in hearing about ways your company has handled the subjects discussed here. Comments or questions may be directed to him at douglas_g@attbi.com.