

LUBE

TECHNI-GRAM



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PINPOINTING BEARING OVERHEATING PROBLEMS

Overheating is a major indicator, along with vibration and noise, of an underlying problem affecting a bearing or related components. Because normal operating temperatures vary widely from one application to another, no single temperature is a reliable sign of overheating in every situation. By observing an application when it is running smoothly, a technician can establish a benchmark temperature for a particular bearing arrangement. Wide deviations from this accepted norm generally indicate troublesome overheating.

Unfortunately, at the first sign of overheating, in many cases the lubricant or lubricant supplier becomes the first suspect. Actually, the list of possible causes of overheating ranges from out-of-round housings and oversize shaft diameters to excessive lubrication and bearing preloading. These causes fall into two major categories: improper or faulty lubrication and mechanical problems, such as incorrect fits and tolerances.

LUBRICATION PROBLEMS

A bearing must be lubricated correctly to function properly. Lubrication provides a thin film between a bearing's rolling elements and raceway, protecting against metal-to-metal contact, which increases friction and causes heat build up.

Lubricant quantity is a definite factor in overheating. Excessive lubrication can cause a condition called "churning," leading to a sharp temperature rise in all but exceptionally slow speed bearings. In the case of oil bath lubrication, the static oil level should be reduced to the center of the lowest ball or roller. If grease is used, the lower half of the housing should be half full.

The opposite problem, insufficient lubrication, can cause bearing temperatures high enough to produce discoloration and softening of bearing steel. If this occurs, the bearing should be replaced. To prevent this type of damage from reoccurring, fill the bearing housing with grease or oil to recommended levels.



... to keep it running

Problems can arise in the lubricant delivery system. If lubricant return holes in the housings seal areas are blocked, the pumping action caused by certain types of seals causes oil to leak. The oil level is reduced, allowing heat to build up. The blockage should be removed, the used oil drained, and the housing refilled with the proper amount of fresh lubricant.

External oil sight gauges can have clogged vents. This blockage causes inaccurate readings with the gauge showing a greater amount of oil than is actually present in the system. Over time, the bearing oil level drops, and damage occurs without the operator's knowledge. Oil gauges should be checked and cleaned regularly.

MECHANICAL CAUSES

Overheating is often a symptom of problems within a bearing arrangement's basic mechanical components. If lubrication is correct, troubleshooting should focus on bearing shaft fits, housing fits, internal clearances, and housing and shaft seals.

Bearings with inadequate internal clearances are prone to overheating. This is often due to faulty bearing clearance selection. The appropriate clearance can be misjudged, for example, in cases where external heat is conducted through the shaft, expanding the bearing inner ring. To ensure correct internal clearance, the replacement bearing should have internal clearance specifications identical to manufacturer's specifications.

Insufficient bearing internal clearances can be caused by excessive shaft interference. A cylindrical bore bearing mounted on a shaft with an oversized diameter can result in excessive expansion of the bearing inner ring, reducing clearance in the bearing. To correct this situation, have the shaft diameter ground to obtain the specified fit between bearing and shaft.

Too little clearance in tapered bore bearings can occur when the bearing is forced too far along the tapered shaft. To resolve this, loosen the lock nut, dismount the bearing, and remount it properly, following the bearing manufacturer's installation instructions for retightening. The lock nut should secure the bearings on the sleeve, but allow it to rotate freely.

Another potential problem can occur when rotating seals rub against a bearing's stationary parts. This results from insufficient clearance in labyrinth seals, or from seal misalignment. Check the running clearance of the troublesome seal and correct it. Realign the seals to eliminate rubbing.

Contact seals may also be excessively tight, leading to a build up of heat. Tightness occurs when composition seals have excessive spring tension or have dried out. Replace tight seals with those of lower spring tension. If the seals are dry, lubricate them.

HOUSING RELATED MALFUNCTIONS

Heat-producing mechanical problems are not confined to bearings and seals, but can also be caused by the housing. These problems include out-of-round and undersized housings, oversized housings, and housings enlarged by wear. In most cases, the best solution for these problems is to replace the housing.

