Grease problems and solutions

Executive Summary

Lubrication problems involving grease tread a common path, according to TLT readers responding to this month's Sounding Board questions. In too many cases, readers say, end-users make the grease-selection decision without adequately analyzing the machine component, its function or working environment. Over-greasing tends to be the default solution favored by many end-users, followed by a commonly shared opinion that all greases are alike. One reader even described a situation where the customer combined all its greases into a common keg and applied the resulting mixture. Asked to list the most important factors when selecting a grease, readers cited viscosity, load, temperature, stickiness, pumpability, compatibility and water resistance. Beyond the grease chemistry itself, readers stressed delivery system and a consistent maintenance schedule as critical factors.

Q.1 Describe a lubrication problem that involved grease and how you solved it.

Have found many issues with over-greasing of pillow block bearings on conveyors of gravel-crushing equipment. This was thought to be the cause of bearing failure due to the seals rupturing from the portable electric grease guns used on site for other equipment. Turns out the molybdenum disulfide in grease caused the bearing failure. We put a specific lithium-based grease in the grease gun and implemented scheduled grease intervals. Problem with bearing failure went away.

Coupling gear ran out of grease. We moved from lithium-based to calcium sulfonate synthetic grease.

Caking in wheel bearing and failure of bearings. By replacing calcium sulfonate complex with lithium complex.

Applied grease on spindle valve exposed to dusty environment. Installed dust bonnet to prevent dirt ingress.

The most common lubrication problem I encounter is wrong grease selection. Customers take chances with what they have available instead of selecting and using the correct lubricant for the conditions of the application.

Bearing failure on a food-processing conveyor. Switched to a synthetic-based grease with a higher-quality thickener. Better resistance to washout occurred.

Ester-based grease was dissolving polyacrylate seals. Worked with seal manufacturer to develop an ester-resistant compound.

Dry lubrication on account of separation of oil from the finished product when the surface is not leveled uniformly after collection from a keg. Advised maintenance personnel to level the surface once sample is taken.

Controlling the amount of grease applied. Installed a centralized lubrication system.

Industrial flue fan in harsh conditions needed bearing replacement every few months. Analysis of operating conditions and surrounding parameters resulted in a new grease with much lower base oil viscosity and using a thickener with better inherent lubricity. The bearing is now overseen once a year, and the self-induced temperature is reduced to less than half.

Bearing failures due to high temperature. Solved by changing from a lithium complex grease to a polyurea grease.

Our customer, a meat-processing plant, was using an oil to lubricate their chains and trolleys, but the oil would not stay in place. We recommended a semi-fluid grease that could be easily applied and contained sufficient thickener to remain in place.

An overhead crane in a steel hot strip mill was leaking gear lubricant. We formulated an NLGI #000 lithium grease that matched the gear oil's performance specification, and the leak problem was solved without costly equipment replacement.

Current grease was unable to stay in place for specific interval. Changed to a different thickener technology to address the issue.

Accurately calculating the grease amount for rolling bearing.

Pillow block bearing on a conveyor in a paper mill needed replacement frequently. The problem was that the lubricators were overlubricating and blowing out the seals, which ultimately led to bearing failure. We installed spring-loaded caps on the grease plugs, which prevented the internal pressure problem and eliminated the bearing failures.

Bearing contact on the raceway. Increase the viscosity of the grease.

Channeling of the grease. Went to an NLGI #2 from the NLGI #3 grease and a lighter base oil.

We had large overhung fans with pillow block bearings that kept overheating. We switched from a mineral-based grease to a synthetic-based grease.

Feed mill application requiring food-grade grease with excellent AW, EP and viscosity. Used a full synthetic calcium sulfonate grease.

Grease penetrating through the bearing and entering the gearbox oil-lubrication system affecting the oil's quality. Was managed by installing a dehydration unit to remove the grease.

Grease was running out of a rotational gear set on a forklift for heavy paper rolls. Wear had increased and caused added damage. We asked to see the customer's product and discovered they had collected various greases from different suppliers, added to a keg and used the mixture. The mixture was incompatible and softened. After training the users and documenting our findings, the issue was resolved.

Supply of grease with nanoparticle to bearing of test stand without agglomeration.

Added an aerator with a constant stream to a container with grease.

Grease purchases from specialty suppliers resulted in a wide mixture of greases with non-compatible thickeners. A complaint of purging/clean-out of affected equipment and the replacement with appropriate grease reduced grease-related failures by more than 95% and saved significant money in grease purchases.

Reduced bearing life and reclaim rate. Introduced our new-technology grease into the application and immediately solved the problem.

We had problems with the grease that had water contact. Replaced by one with a calcium sulfonate complex.

Machinery components in food industry. Bio-degradable and compatible grease.

Never! Tribology is much more than grease! This is what is wrong with TLT. Every issue is about the same grease or oil contaminants idea. Tribology is perhaps the broadest discipline in science, yet you all stick to your albeit huge market with stories about gear oils and grease. I want to see something interesting about tribology every issue that is cutting-edge science unrelated to grease and oil or is simply a fantastic tribology story, still unrelated to grease and oil.

A big area of research in 2009 in the base oils and lubricants industry was railroad lubrication. My summer intern and I at Chevron were proposed a common problem with railroad friction. We brainstormed conventional methods and alternatives to arrive at a unique solution that optimized economic, practical and formulation factors.

Compatibility. Changed grease.

Grease in motor-operated valves was going hard. Solved by using a calcium sulfonate-thickened grease.

Motor bearing filled with wrong grease. We flushed/cleaned bearings and filled with proper grease.

An application had grease thinning and flowing out. Found out there were two different types of grease and they were incompatible with each other.

MIL specification requirements referenced obsolete testing methods, so we developed replacement ones or found commercial alternatives.

Motor bearings driving a mill were screaming when lubricated. They were overlubricated, and the grease was too high in solids. Switched to a more suitable grease, increased the lubrication frequency while reducing the re-lubrication volume to compensate.

A very high-temp application required a clay thickener vs. lithium based.

Construction equipment experiencing accelerated wear on pins and bushings using a simple lithium soap ISO 100 grease. Switched over to an ISO 220 aluminum complex with higher levels of solid additives to reduce wear and return greasing intervals to OEM recommendation.

Coupling heating up, replaced generic EP2 grease with a synthetic-based moly EP2 and heat dissipated to normal range.

Eliminated grease by using a self-lubricating composite bearing.

The recommended lithium grease was getting washed out in a saltwater application. The system was cleaned and flushed and a calcium complex grease instituted.

Excessive wear in sugarcane mills.

Grease exhibited poor water resistance. Water spray off was improved by adding grease polymers.

Failing exhaust fan motors. Found hardened grease in auto-lube delivery piping.

Wet/dirty environment. Recommended calcium sulfonate thickener technology.

Q.2 Describe the most important criteria in selecting a lubricating grease for a particular application.

Compatibility to base metals in or around the application. Method of application automatic or manually distribution.

Work load and temperature resistance.

Kinematic viscosity for rolling bearings. Followed by penetration.

Drop point.

OEM approved. Does it meet the required specifications?

Viscosity at operating temperature. Mixability and compatibility with current grease regime.

Penetration number followed by drop point.

(1.) Does it do what I expect? (2.) Pumpability in a system.

Viscosity and NLGI grade.

Compliance with the requirements for penetration during the entire life cycle of the bearings. Second, homogeneity of the composition and consistency (no delamination).

Suitability for the application in terms of required characteristics under all operating conditions. A long service life.

Operating temperature of the application to help determine the type of grease thickener system to use. Speed and load to determine NLGI and base oil viscosity needed. ▶▶▶

Performance under working conditions (ability to reduce wear and energy consumption). Cost-performance (life in use, cost to replace, overall equipment operating cost).

Possible contact with water. Dropping point.

Speed-load.

Make an active choice; do not just pick a grease that is easily available. Analyze all the conditions of the machine element to be lubricated and select the grease from these operating conditions. If you are in the design phase: Always consider the grease to be an integral part of the machine element and choose/design the grease in parallel.

The base oil viscosity and friction properties are of primary importance. Second, the optimum consistency (penetration) and rheological properties of the finished grease is necessary for efficient lubrication.

Performance.

The first criterion is viscosity followed by the amount.

Viscosity then EP.

Matching the correct grease to the application. Waterproofing. Thickener type relating to heat transfer ability. Temperature range. Base oil. Viscosity to suit application. No molybdenum on high-speed applications.

Soap builder.

(1.) Viscosity of the grease. (2.) Thickener.

Grade of grease, temperature.

Working temperature and viscosity of the base oil.

The most important criterion is the viscosity of the fluid portion of the grease needed for the application. The second most important criterion is the correct thickener type.

(1.) Stickiness (must stay in place). (2.) Water washout.

(1.) The type of part being lubricated. (2.) The operating conditions (speed, temperature, moisture and location or accessibility).

Base oil viscosity is appropriate for speed and load of application. Second is thickener chemistry.

Temperature and NLGI grade.

Viscosity, heat resistance.

(1.) Base oil viscosity (2.) Grease consistency (3.) Thickener type. (4.) Additives.

Degree of penetration (grade) of the grease needed, type of grease required (lithium, silicone, etc.).

One that won't leach oil out in storage.

Base oil viscosity. Thickener compatibility and additive group per application.

Water washout resistance.

Viscosity. Application detail dictates everything.

Work temperature. Behavior with respect to contact with water.

Compatibility. Type.

Base oil viscosity. Thickener type.

Most important criterion is how to replace it with a self-lube bearing.

(1.) The performance requirements of the application. (2.) The ability of the grease to meet those requirements.

Base oil viscosity and soap type.

(1.) Thickener type. (2.) Viscosity.

Client's specification.

(1.) Grease consistency grade (000-5). (2.) Tackiness or feel.

Correct fit for application purpose. Second is cost.

Viscosity, soap, NLGI grade.

Base oil viscosity is the most important factor in determination for a particular application. The second most important criterion is the combination of base oil type and additives.

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