TECHNI/TIPS

A Publication of the Lubrication Engineers technical Department

LEADERS IN LUBRICANTS NUMBER 71

LUBRICATION OF EQUIPMENT FOR THE FOOD PROCESSING INDUSTRY

In spite of electronics, automated equipment, computers and other modern technology, people are still responsible for lubrication and maintenance in the Food Processing Industry. They are constantly beset with plaguing problems of the operating environment, as well as problems inherent in complex equipment. Some of these are discussed and pinpointed on the following pages.

Moisture is an always present destroyer of lubrication and detrimental to good maintenance. The water or steam present is due to the necessity for constant cleanliness of the machinery and surrounding areas. It may also be part of the process itself. This moisture can wash out lubricants, cause emulsions of both grease and oil, cause rust and corrosion and increase and hasten deterioration of the lubricant.

Heat very often is one of the more serious problems. High temperatures may come from drying and sterilizing processes, or from steam and hot water used in cleaning. Higher temperatures can cause greases to melt and run out of bearings, and will speed up oxidation of both greases and oils, thereby shortening their life.

Conversely, in some plants there may be refrigerated areas or coolers, which require low temperature mobility in greases and low pour points in oils. Wear can result from channeling of the lubricant. These areas may also create moisture problems because of excessive condensation.

Shock loading or impact may be a factor in many areas. The lubricant may be pounded out of an area leaving metal-to-metal contact with consequent damage to surfaces. Grease may lack cohesion or adhesion, oil may be light or won't penetrate to critical areas.

Long life of both the equipment and the lubricant is another challenge. Some operations run constantly around the clock, twenty-four hours a day. Again, these operations may be hot, wet, cold, or subject to contamination, creating doubly severe conditions. Greases may "shear down" or be-come very soft or liquid, oils oxidize rapidly and become contaminated. Both greases and oils may harden or thicken in service, creating increased power demands.

One of the most severe requirements imposed on lubricants is the demand for purity and the necessity of nontoxicity. The United States Department of Agriculture, the US Food and Drug Administration and various other agencies concern themselves with controlling the possible effects of lubricants on beverage and food processing and packaging. There are stringent and very restrictive regulations in effect, which often limit a lubricants ability to perform well.

An often ignored problem in the built-in environment of a particular plant is the effect of chemicals in the process - mild acids and alkalines in juices, syrups and other components, citric acid, carbonic acid, various salts, sugars, malts and alcohols often have their own peculiar deteriorating effect on lubricants. These are usually recognized as a fact of life and not something that better maintenance and/or lubrication might be able to overcome or at least alleviate.

Other chemicals are involved in the cleaning process. Again, acids and alkalis, but also some severe materials such as cleaner lubricants (generally soaps of some type) for conveyors, sodium hypochlorite, polyphosphates, silicates, acid detergents, sanitizing solutions, iodine sanitizers, spray insecticides, foaming additives and conditioners for algae, slime and bacteria. Often the interaction of these products are unknown or unrecognized, to the severe detriment of lubrication and maintenance.

LUBRICATION COMPONENTS OF FOOD PROCESSING EQUIPMENT:

In spite of the size and appearance of this vast family of equipment, all of the complicated machinery can be broken down into three basic divisions for lubrication purposes. These are bearings, gears and slides. Chains will also be discussed because of certain differences, but technically they consist of bearings and slides.

Plain or friction bearings are basically two surfaces contacting. They can be flat, but typically are shafts riding in a journal. Lubrication can be either oil or grease. Oil will flush and clean, and sometimes cool better, but a tacky grease will form a collar to keep out contaminants. Lubrication is not complex, but as in all applications, quality lubricants designed for the specific application will prolong life.

Antifriction bearings are so named because of the considerably reduced friction from plain bearings. They are divided into ball bearings and roller bearings, but they will be discussed together, as their lubrication problems are similar.

Antifriction bearing lubricants lubricate any contact between the races and rolling elements, which is not true rolling, and lubricate the retainer and its contacts. The lubricants also protect highly finished surfaces and seals out contaminants. Heavily loaded bearings and low speeds require heavy oils. Lighter loads and high speeds require lighter oils. Use the lightest oil that will safely carry the load for least power consumption.

You should grease bearings carefully with high pressure guns. High pressure can damage bearings, can easily overgrease and damage seals. It will also waste grease and contribute to over-heating. Applications exist where it will be necessary to use either more or less grease. Where low torque is a requirement, the bearings may be lubricated with a very small amount of grease. With low speeds or exposure to dirt or moisture, the bearings may be nearly full. High speed and high temperature require more frequent greasing.

Most gears found in the Food Processing Industry are spur and bevel. Normally, these will give excellent results with turbine oils. If they are heavily loaded and/or subject to shock loading, then gear oils with extreme pressure additives should be used.

Typically, helical or herringbone gears will only be seen in a power take-off gearbox from a steam turbine and are normally lubricated with turbine oils.

Many worm gears are found in the Food Processing Industry. They are used to drive many types of equipment. They are quiet, efficient and usually have fairly large speed reductions. An outstanding feature is that if and when they fail, they do so without destroying the gearbox. The bronze wheel is replaced, and full performance is restored to the system. In this application, many manufacturers recommend compounded oils for lubrication, but a mild extreme pressure (EP) gear oil is often also suitable.

Slides perhaps could be classified as plain bearings, but many times they do not have matching surfaces, so they are generally considered simpler and rougher than bearings. In the Food Processing Industry, one of the primary considerations might be chains sliding in guide rails. These would require a minimum amount of oil or a light coating of grease to reduce friction between chain and rail, possibly to prevent noise and prevent binding of the chain links.

A critical area might be in the positioning of cams and gibs. Careful attention should be given to these areas, using minimal amounts of high quality industrial oils, light, tacky greases or gear lubricants.

In noncritical areas such as the sliding of cases into position for loading, the considerations might be only keeping the surfaces clean and nonsticky. Other noncritical areas may be lubricated by overflow, overspray or drip from other lubricated areas.

Chains are treated briefly, and separately, only because they are a rather different idea of bearings and slides. One of the most important concepts in chain lubrication is penetration. The lubricant must be forced into, or creep into very restricted areas of pins and bushings and side plate clearances.

In other instances, the application can be very loose - simply a coating of lubricant to allow various shapes of metal to slide in some kind of a restricted channel.

Power drive chains may be critical and the requirements should be carefully analyzed, so as to reduce both friction and power consumption. They need to be carefully installed, maintained and lubricated in order to get the best service and longest life. Power drive, roller chains are usually lubricated with high quality light turbine oils, and heavier oils as speed decreases.

In certain areas, semifluid greases are satisfactory. Occasionally, mild extreme pressure gear lubricants should be used because of additional load bearing capacity, and also because some of them have tackiness additives.

Cleanliness in chain drives is of utmost importance. Fine abrasives entering the fine clearance between pins and bushings will rapidly destroy them. Because of possible high temperatures and constant water/steam washing, lubricants must possess good rust and oxidation characteristics. Wear-reducing functions are of value in all applications.

Automatic lurbication systems may be manual (a better name would be multiple – does nto include automatic timing) ari-operated, electric or hydraulic. In any one system, various types of applivations can be handled, antifriction bearings, slides,chans and conveyors.

The practical aspect, perhaps most important, is (1) the regularity of delivery of the proper amount of lubricant to a critical bearing area, without relying on human memory and (2) alarms to signal nondelivery.

A typical automatic lubrication system consists of lubricant, pump, air and electrical connections, feed lines, timer and injectors. Systems can be as simple as a block of injectors on the side of a machine, to complicated systems lubricating thousands of bearings, using long piping runs, bulk lubricants and all monitored by a computer.

MAINTENANCE TIPS AND RECOMMENDATIONS FOR EQUIPMENT

Wipe grease fittings before adding grease. This prevents abrasives from entering system.

Wipe grease fittings after adding grease. This prevents excess grease from dripping.

Adding grease may force old grease out. Check and wipe clean to prevent dripping.

Lubrication reservoirs should be cleaned occasionally to remove possible accumulations of process material.

Equipment should normally be lubricated after washing and cleaning to remove moisture from bearings and protect against rust and corrosion.

Screens and filters should be checked regularly to remove moisture and other foreign contaminants.

No flammable or explosive solvents should be used for cleaning.

Power should be off and machinery not moving when lubricating. Warning signs may be necessary at machine controls. Use lock out devices.

Check manuals and note locations of hidden fittings. Use checklist to make sure all areas are lubricated.

Follow manufacturer recommendations until it has been established that longer intervals are feasible.

Check equipment periodically for worn parts, loose bolts and nuts and proper adjustment. Keep equipment in first-class condition to secure best operating results and low maintenance cost.

Store lubricants in clean containers and areas. Keep containers closed and in a cool area.

The use of LE's high quality QUINPLEX® Food Machinery Lubricants, attention to detail and careful housekeeping will result in both long equipment and long lubricant life.

LUBRICATION ENGINEERS,® Inc.
300 Bailey Ave, Fort Worth, TX 76107 | 817-834-6321 | 800-537-7683
fax 817-834-2341 | http://www.le-inc.com