



Technical Topic

Grease-Lubricated Plain Bearings and Grease Application System

Fluid film lubricated plain bearings (**Figure 1**) are designed for generous lubricant feeds. During running, the bearings operate on lubricant films thick enough to completely separate the load-carrying surfaces. Friction during normal operation, due only to the shearing of the lubricant films, is at a practical minimum, and wear does not occur since there is essentially no surface-to-surface contact.

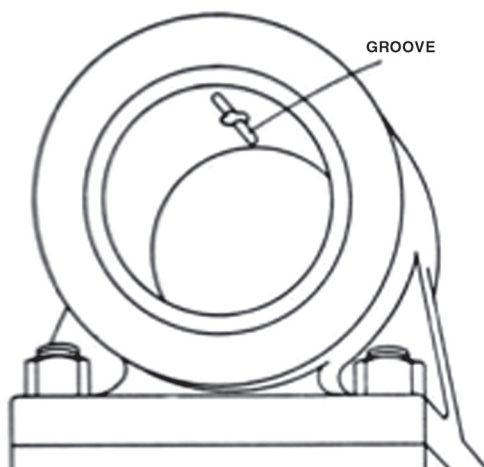


Figure 1: Plain Bearing. Groove helps distribute grease in the bearing.

In some applications, the bearings may be lubricated in such a manner that they require no additional service throughout the life of the equipment. However, in the majority of cases, correct lubrication is the most important factor in obtaining good performance from plain bearings, if they are properly designed and installed.

Plain bearings lubricated with grease have some advantages compared with those lubricated with oil.

- As a result of the lower end leakage, the amount of lubricant required to the bearing is lower.
- When a grease-lubricated bearing is stopped for any period of time with the flow of lubricant shut off, the high apparent viscosity of the static grease reduces end leakage sufficiently so that the grease usually does not completely drain or squeeze out.
- Some grease remains on the bearing surfaces so that a fluid film can be established almost immediately upon start-up. As a result, torque and wear during the starting phase may be greatly reduced.

- During shutdown periods, retained grease also acts as a seal to prevent the entry of dirt, dust, water, water vapor, and other environmental contaminants and, thus, protects the bearing surfaces against rust and corrosion.

A disadvantage of grease-lubricated fluid film bearings is that the lower flow of lubricant will not provide as effective cooling, so that higher operating temperatures may occur. In general, therefore, a shift to oil for lubrication is made whenever high speeds or high loads impose a need for external cooling. However, where temperature rise poses no limitation, grease finds increasing use for the lubrication of plain bearing surfaces in such applications as small blowers, conveyors, and slow-speed components of construction machinery.

Grease Application Systems

The systems used to supply grease-lubricated fluid film bearings are essentially all-loss systems. The grease in a bearing is displaced as new grease is added, with the excess being forced out of the ends of the bearings. Thus, the grease is not subjected to long-term service that might result in breakdown due to oxidation. On the other hand, the grease may be subjected to high operating temperatures while it is in the bearing, since grease-lubricated bearings tend to run at higher temperatures than equivalent oil-lubricated bearings. Moreover, severe mechanical shearing of the grease occurs, particularly as it passes through the clearance at the point of minimum film thickness. However, if the basefluid viscosity is adequate to support the load under the speeds and pressures prevailing, the major effect of any permanent softening that might occur as a result of high shear will be increased end leakage.

The amount of lubricant fed to each bearing is a function of several factors, including the clearance in the bearing, type of loading, flow characteristics of the grease, and environmental conditions that may necessitate greater rates of grease flow.

The grease must be replenished at the correct frequency and in the proper amount so that there is always a sufficient amount of grease to maintain fluid films. Grease may be applied by hand-operated grease guns, screw-down or spring-loaded grease cups, or centralized grease systems.

- **Grease Guns** — Grease guns may be a hand-operated lever or push type, or where larger quantities of grease are needed, air- or electric-power guns may be used.

Plain bearings usually require regreasing at least once each shift — particularly on mobile equipment chassis and pivot points. Apply grease as follows:

1. Wipe grease fitting clean before applying grease.
2. Apply the recommended grease until new grease appears at each end of the bearing. Under dirty and wet conditions, flush the bearing thoroughly.
3. Leave a collar of grease at each end of the bearing to seal out contaminants.
4. Where two or more types of greases are needed, the use of different types of grease fittings and separate grease guns for each grease will reduce the risk of misapplication.
5. Where two or more types of greases are needed, use greases that are compatible (if possible) in the event they are mistakenly inserted in the wrong grease gun or application.

- **Grease Cups** — Screw-down or spring-loaded cups are used on many slow-speed plain bearings. Grease cups hold a small supply of grease to resupply bearings over a period of time. Screw-down grease cups require hand turning of the screw cap to force grease into the bearing. To refill the cup, unscrew the cap and refill by hand. Spring-loaded grease cups force the grease into the bearing as needed by spring pressure. Some spring cups have a clear plastic dome to reveal the quantity of grease while others may have a visible pin indicator for the lubricant level. Most spring-loaded grease cups have a grease fitting on the side for refilling the cup; otherwise the cup must be removed and refilled by hand. Springs for the grease cups are available in light, medium, or heavy tension to regulate the rate of flow for different operating conditions or different grease consistencies.

Service spring-loaded grease cups as follows:

1. Check the supply of grease in the cups at least once per week and refill as needed. Wipe grease fitting clean before filling the cup. Make sure only the recommended grease is used.
2. Inspect bearings for proper supply of grease. Adjust feed rates as necessary.
3. Replace damaged cups and fittings.

Caution! Grease guns, cups, and some grease-filling equipment have spring-loaded plungers that apply grease continuously. This may cause oil to bleed from the grease and, if grease is allowed to remain under these conditions for an extended period of time, enough oil may bleed out to leave the grease too hard for dispensing or use. Remove grease cups and clean out any hard deposits annually.

- **Centralized Grease Systems** — Where a piece of equipment has many bearings requiring frequent application of grease, a centralized grease system is usually installed (**Figure 2**). Grease is supplied from a reservoir to the bearings via a pump, pipes or tubing, and metering valves.

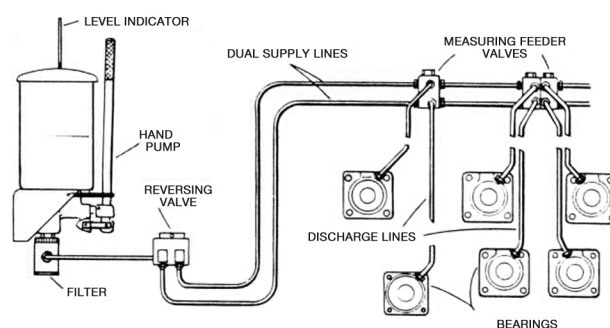


Figure 2: Centralized Grease System.

Please refer to our Technical Information Sheet titled “Centralized Oil or Grease Lubrication Systems” for more information on this topic.

If you're in doubt or want to know more about ExxonMobil greases, contact your ExxonMobil Technical Help Desk or Field Engineer for assistance.

For more information on all Mobil Industrial Lubricants and services, contact your local company representative or visit mobilindustrial.com.