

## Application of Lubrication to Cylindrical Roller Bearings

Lubrication is an essential component in the reduction of rolling friction within rotating mechanical components. Lubrication helps to create a film between the rolling element and the raceway. The film thickness and lubricant properties help to decrease the amount of rolling friction within a bearing. It is very important to review the requirements and system parameters of your specific application before selecting an appropriate lubricant. Two important considerations in selecting the proper lubricant are temperature and the operating environment the bearing will be used in.

The main types of lubricants used for bearings are oil and grease. Open type bearings typically use grease as a lubricant. Lubricants are applied to bearings through different methods. Table 1 shown below describes some of the most common grease application methods. Equipment and greasing methods are usually based on the preference and experience of the installer.

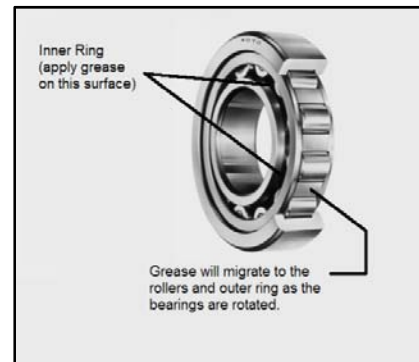
Equipment	Benefits	Drawbacks
<b>Grease Packer</b>	Relatively clean and fast process with 100% grease fill.	Grease fill must take place pre-mounting. Difficulty in controlling fill amounts.
<b>Grease Gun</b>	Grease nozzle input attachment. Controlled grease amount.	Slightly dirty process.
<b>Grease Syringe</b>	Used in small spaces between cage and inner ring. Pre and post mounting usage.	Requires steady hand application. Only relatively small amounts of grease applied per syringe.
<b>Hand or knife application</b>	For use in low cost application when above options are not available or capable.	Accuracy of grease fill is low. The process is very dirty.

Table 1

Below is a picture of two Cylindrical Roller Bearings. The bearing on the lower right has a brass cage.



Depending on the cage type of the bearing in use you may find different dimensional distances between the cage and the inner or outer rings. If it is difficult to insert a grease gun or grease syringe between the cage and the outer ring, the installer should utilize a hand packing process. Apply a layer of grease to the inner ring and all of the rolling elements before mounting. A generous amount of grease can be applied to the inner ring and rolling elements. The graphic below illustrates the region that the grease should be applied to.



As a best practice apply a grease layer to the inner and outer rings. Due to dimensional clearances you may be able to access only one raceway. For areas with tight clearances try using a bearing syringe. When the area is too small for even a syringe you will have to rely on excess grease being applied manually. Carefully rotate the cage and roll the bearing elements to start the migration of the lubricant. As the bearings are rotated and begin operation the grease will work into other areas of the bearing assembly. As the temperature of the bearing's inner ring, outer ring and rolling elements increases the grease will flow between the bearing and the housing.

### Grease Filling Process

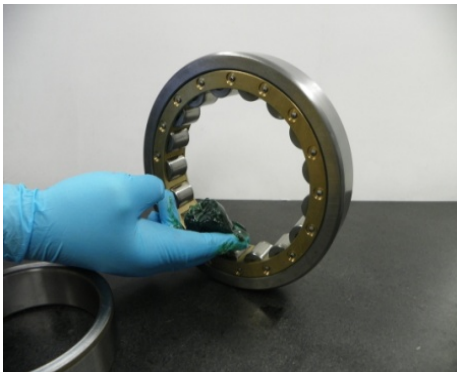
Before any lubrication is applied to the bearing itself you must consider the safety implications involved with handling bearings. Depending on the size of the bearing you are working with make sure that you have properly supported the bearing. Also utilize gloves to protect against oxidation on the bearing.

Please consult the Koyo Engineering Team for further information about lubrication and bearing selection.

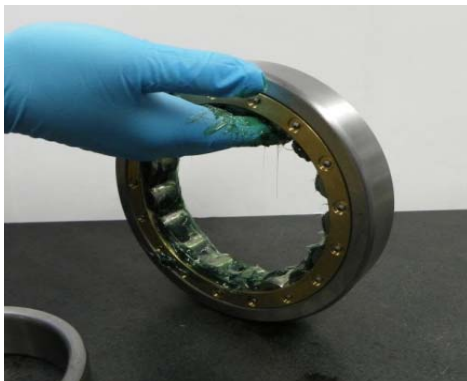
### 1. Pre-lubrication process of the bearings.



Remove inner ring from the bearing.



Obtain lubricant and apply with a method from *Table 1* from the previous page.



Suggested grease fill between 30 to 50%. Open bearings can allow for a larger percentage of grease fill as the grease will migrate outward during operation.

### 2. Mount Bearings on the shaft.

Depending on the ID bore size you may need to utilize an induction heater to install the bearing. As the bearing is being installed try to allow a space in the housing for grease to flow in and out of the housing.

### 3. Check bearing grease fill levels.

Approximately 30 to 50% grease fill is desired after being mounted on the shaft. Visual observation is used to approximate the percentage of grease fill.

### 4. Additional grease fills after mounting.

If grease levels are low, attempt to fill the bearing from a side that has the easiest access. It is often very difficult, impractical or impossible to fill from both sides. Depending on the spacing and geometry it may be necessary to utilize a bearing grease syringe or grease gun for additional lubricant. When syringe or grease guns are inadequate you will have to rely on the hand packing process.

### 5. Rotate the bearings.

As the shaft is rotated grease will migrate throughout the bearing. Temperature of the rolling elements will increase in operation and transfer heat throughout the bearing. As this temperature increase takes place the grease will flow over the rolling elements and moving surfaces.

### Note to Installers:

When filling the bearings with grease you may not always cover every rotational surface of the bearing. It is ideal to cover with a thin layer on contact surfaces. After installation and lubrication have been confirmed it is suggested that each of the bearings are included in a scheduled maintenance plan. The maintenance plan will have scheduled re-lubrication intervals depending on the operating conditions and the particular lubricant that is selected.

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