

## Bearing Grease Replenishment Intervals

Written by Special To LMT From NSK Corporation  
Wednesday, 11 April 2012 12:04

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***In simple terms, here's what one respected bearing manufacturer has to say about a very basic, but critical, topic.***

Increased operating costs, unplanned downtime and loss of productivity can all result from premature bearing failure. Although such events can occur for a number of reasons, one of the most common is lubrication failure. Following a proper lubrication schedule and using the correct lubricant type can improve performance and extend bearing life.

Lubrication reduces friction and wear by providing an oil coating that adheres to the rolling elements and raceways of bearings that are constantly in contact. The oil film separates the contact surfaces and prevents metal-to-metal contact, which reduces wear. Proper lubrication also helps prevent foreign material from entering the bearing and guards against rust and corrosion.

### **Grease lubrication schedule**

Over time, grease will deteriorate due to physical and chemical degradation. The reduced lubrication properties will negatively impact bearing performance. Efforts must be made to renew the grease through replenishment. Figure 1 below reflects the replenishment time intervals for various bearing types running at different speeds. Charts (1) and (2) in the figure are applied based on the use of high-quality lithium soap-mineral oil grease, a maximum bearing temperature of 70 C and a normal load ( $P/C = 0.1$ , meaning 10% of the bearing dynamic load rating  $C_r$ ). Replenishment is ONLY an option if the bearings are not sealed and provisions exist in the equipment for adding grease. Shielded bearings must be re-lubricated

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carefully. Damage can occur if excessive pressure is used, causing bearing deformation.

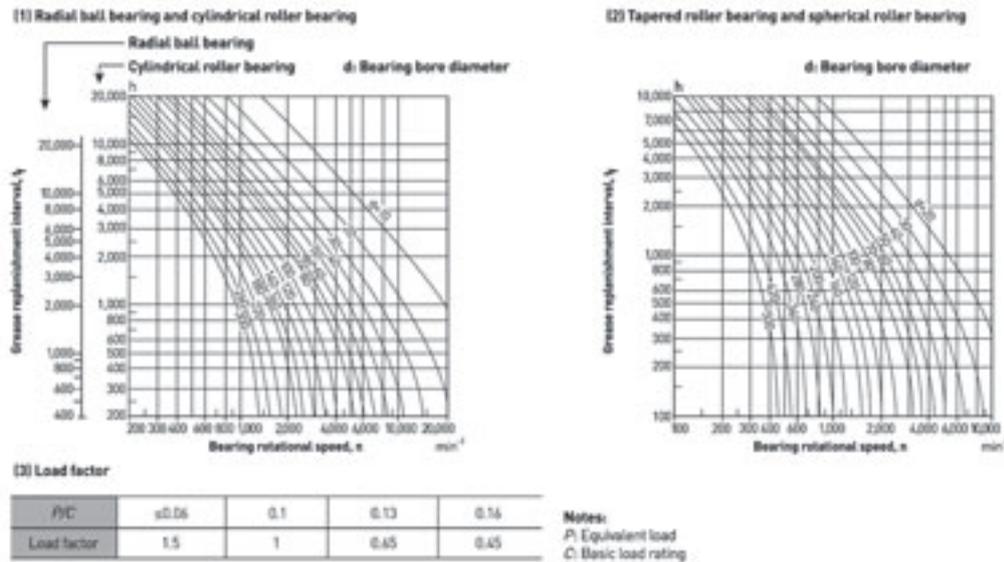


Fig. 1. Grease replenishment intervals [\(click to enlarge\)](#)

## Factors affecting replenishment intervals

Grease replenishment time intervals are subject to factors that vary the recommendation—*factors that can either extend or diminish the period of acceptable grease performance.*

These include:

- Bearing operating temperature
- Grease type
- Load
- Presence of dust and moisture
- Shock loads and vibration

Bearing operating temperature greatly influences lubrication life. As a general rule, if the bearing temperature exceeds 70 C, the replenishment time interval must be reduced by half for every 15

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C degree temperature rise of the bearing.

Consider this example of two electric motors: One unit operates indoors in an ambient environment of 25 C, with bearing temperatures of 60 C. The other motor operates outdoors in the Southwest United States in an ambient environment of 45 C, with bearing temperatures of 100 C. The hotter motor will require re-lubrication four times more often than the first motor to maintain the lubricant. Why four times? The motor running at a higher bearing temperature is 30 C above 70 C, meaning the replenishment interval is cut in half two times (or one quarter of the time).

Grease base oil and thickener types have an impact on how often re-lubrication is necessary. For instance, a ball bearing might use grease with the same lithium soap thickener as referenced on the interval chart (shown below), or it might use a synthetic mineral base oil that can last about twice as long. Other thickeners, such as diurea, polyurea and PTFE, have properties related to operating temperature and resistance to shearing, as well as an ability to release and re-absorb base oil—

*which can also modify replenishment recommendations.*

Load factor is a determinant of lubrication replenishment in that it corresponds to the equivalent load (P) on the bearing shown in chart (3) of Fig. 1. The equivalent load *at the bearing* is determined from the radial and axial loads along with relationships detailed in the manufacturer's catalog for each bearing. For loads less than or equal to 6% of the bearing dynamic load rating (Cr), the replenishment interval increases by a 1.5 multiplier. As load increases, the load factor drops to less than one, which calls for more frequent lubrication. Should P/C exceed 0.16, it's advisable to consult the bearing manufacturer.

Environmental factors may reduce recommended replenishment intervals. Elevated vibration levels within the bearing increase the release of base oil, reducing the number of times before oil must be renewed. Dust, dirt or application contaminants such as wood fibers or metal shavings can become trapped in the grease and come into contact between the rolling elements and raceways of a bearing. These contaminants break through the oil film, which creates more friction. Ultimately, friction damages the raceways and reduces grease life. Another important and common environmental factor is the presence of moisture. It can occur by direct spray, vapor or condensation within the bearing. Depending on the magnitude of water present, the re-lubrication interval can be reduced by half—*or more*. **LMT**

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*To learn more about bearing lubrication and replenishment intervals, visit [www.nskamericas.com](http://www.nskamericas.com) and download  
[m](#) *NSK's* Lubrication  
Interval Guide  
or contact your local NSK representative.*