

# Smarter rail

The lubricant link, Regreasing railway bearings & Get smart about grease storage



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## About SKF Railway

**Today, SKF solutions and services for the railway industry deliver global solutions for rail around the world.**

From contributing design expertise and providing advanced axlebox bearings, to installing lubrication systems, validating reliability and safety requirements, mounting bearings and more, SKF helps increase railway vehicle safety, reliability, efficiency and service intervals

SKF offers customers unique insights into railway vehicle bogie system operations by drawing on our unmatched combination of railway bearing design and manufacturing expertise and cutting-edge condition monitoring and application knowledge. By collecting and analyzing data throughout the operational life of the train, we're helping to enhance the next generation of railway vehicle designs in ways not previously possible.





# The lubricant link

Railway bearing life? It may come down to grease!

Did you know that something as simple as grease condition can significantly affect maintenance intervals for railway cars? It's true – and the more you know about grease lubricants, the more you'll realize how complex, and how critical, correct grease selection can be.

Technology and innovation in railway components have resulted in wheels and bearings capable of delivering service life far greater than was previously possible. But, whilst bearing components have been optimized through new and better materials, innovative design engineering, bearing performance is affected primarily by the grease within the bearing.

## The importance of grease

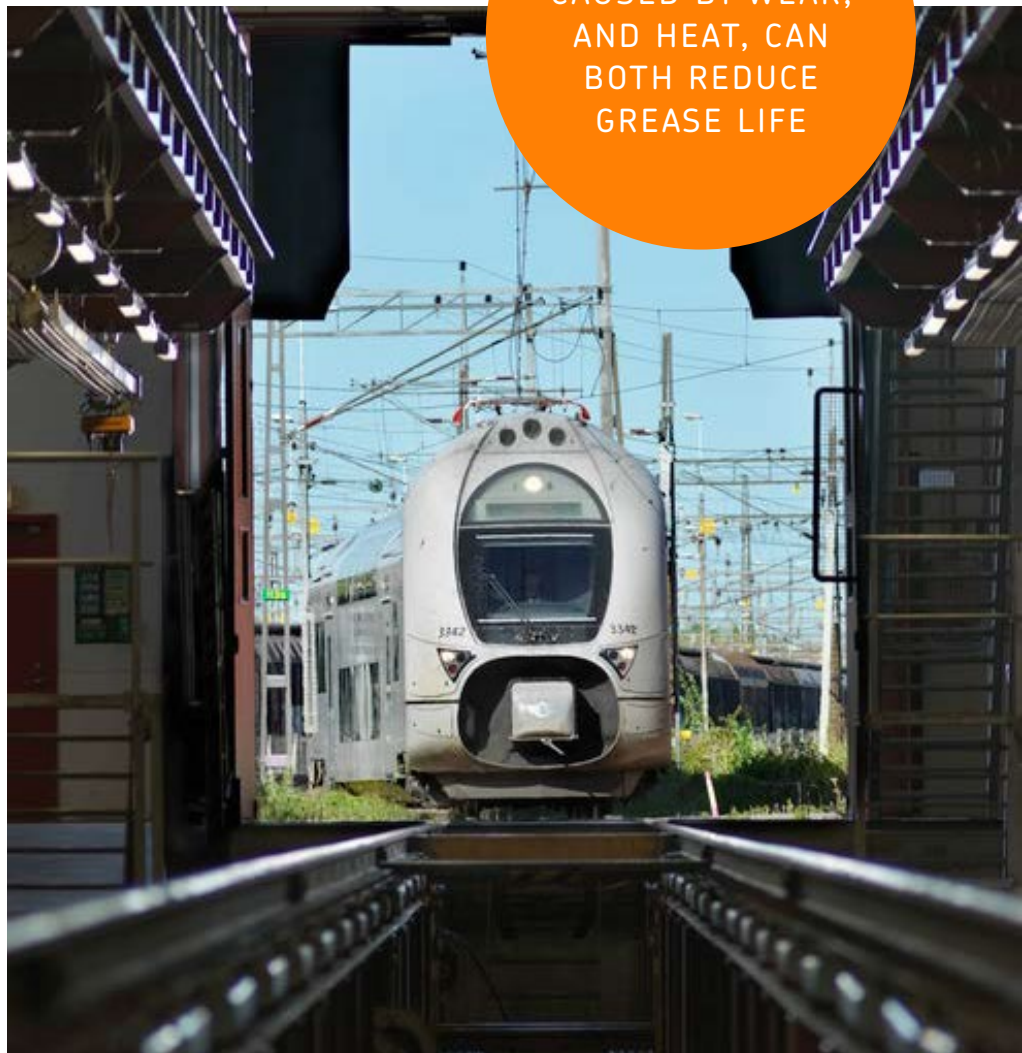
Under the weight of the railway vehicle, grease prevents metal-to-metal contact inside the bearing between the rolling elements, raceways and cage. It also protects the bearing surfaces against corrosion and helps to seal the bearing against contaminants. Railway specific grease formulations are designed to address operational and environmental challenges so that bearing performance can be optimized – and maintenance intervals can be extended. Railway bearing life? It may come down to grease!

## What's affecting your grease?

Many factors can influence grease life and these include application and environmental factors such as operational temperatures, cage material and design, rotational speed, bearing size, external contamination, seal material and design, lubricant degradation and changes in chemical composition, vibration, load and the presence of electric currents.

Lubricant life can also be affected by the design of the bearing itself. Contamination caused by wear, and heat caused by friction, can both reduce grease life. Bearings designed with smoother rolling surfaces, optimized geometry and advanced, highly robust materials can significantly improve lubricant life.

CONTAMINATION  
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## Right grease. Right amount.

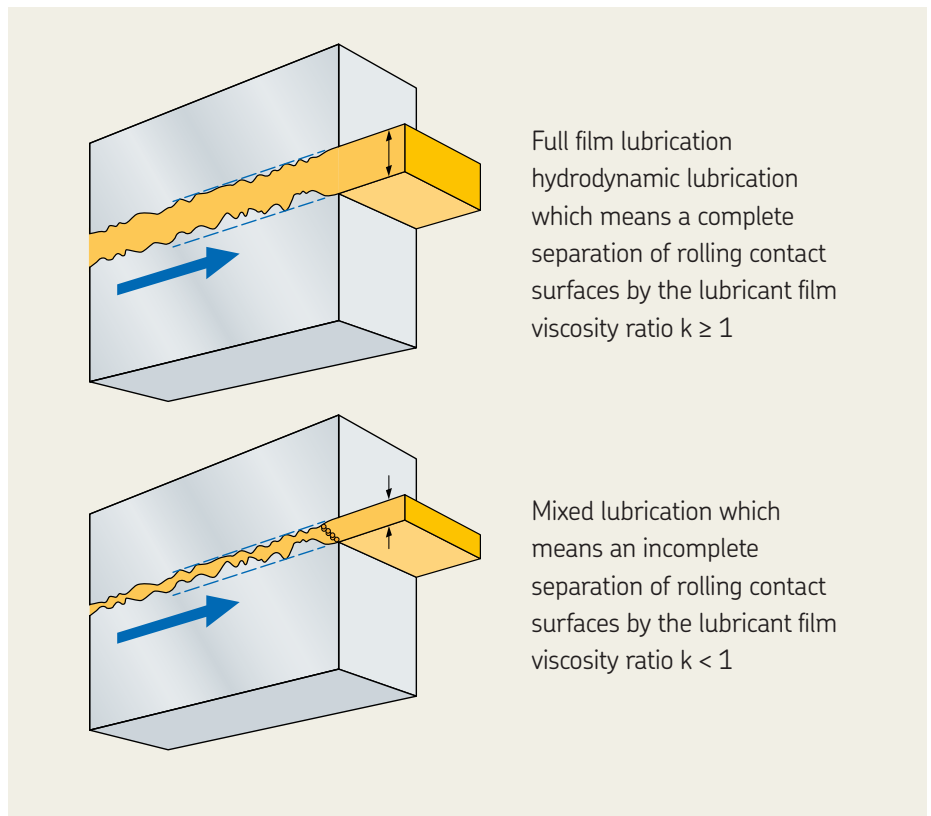
How do you choose the right grease for your application? That will depend on the operating conditions, where the primary factors considered are the load, temperature range and speeds as well as the influence of the surroundings. Lubricant manufacturers and railway companies have invested a lot of time into developing robust products for railway applications.

- Grease consistency
- Base oil viscosity
- Mechanical stability
- Drop point (the temperature at which grease changes to a liquid)

Consistency forms the basis of the grease classification, and ranges from very soft greases (000) to very hard greases number 6 correct consistency. Environmental and climate conditions should also be considered. Hard greases, for example, don't usually work well in cold climates.

The viscosity ratio of grease is another critical factor. The effectiveness of a lubricant is primarily determined by the degree of surface separation of the rolling contact surfaces. For an adequate lubricant film to form, the lubricant must have a given minimum viscosity when the application has reached its normal operating temperature.

In addition to choosing the right type of lubricant, it's also important to know how much lubricant to apply. Too much grease can cause a bearing to overheat, while too little can cause it to fail before the planned maintenance stop and reduce the effectiveness of the seals.



## Limit your risk in lubricant selection

Sometimes, it's the small things that count – and that's obviously the case with railway bearing grease. But, “small” does not necessarily mean “simple.” Selecting the right grease takes careful consideration of many factors. Done correctly, it can pay off in the cost and time savings of extended maintenance intervals. SKF can help. To learn more about how SKF is supporting railway maintenance and developing better lubricants, visit:

[www.skf.com/railways](http://www.skf.com/railways).

# Regreasing railway bearings: Why expertise matters.

In railway applications, the element that can have the greatest impact on bearing life may also be seen as the easiest to manage. That element is grease. But, optimizing it in regreasing operations is far more complex – and much more critical to bearing performance – than it may seem.

There's no question that railway bearings will require fresh grease at some point, because the grease life is significantly lower than the life of the bearing itself. Done correctly, delivery of a new lubricant into the bearing can help extend bearing life and optimize performance. But, it is a delicate process and there are pitfalls to avoid. Overfilling, insufficient cleanliness or the use of an incorrect grease type can significantly affect bearing performance, leading to higher costs and unplanned downtime.

Here are a few key points to keep in mind for minimizing risks.

## Where and when to equip the bearing with fresh grease

The optimum time to revive a bearing by applying fresh grease is when the bearing has been removed from the railcar and sent to an expert facility for remanufacturing. This process assures that all old grease is removed from the bearing, and replaced with an amount and type of grease that

is exactly in accordance with bearing manufacturer specifications. Expert remanufacturing in a dedicated facility with a controlled environment offers the best way to assure that risks are minimized.

However, while refilling the bearing with fresh grease at the time of remanufacturing is ideal. Sometimes, regreasing in the field is necessary. In the North American-field regreasing is controlled by AAR standards (the American Association of Railroads).

EXPERT  
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In certain applications, regreasing in the field is an option. To add grease properly to an in service bearing, it's necessary to have a dedicated highly skilled and knowledgeable staff with the correct equipment. Retaining staff competence in-house can increase manpower expenses and restrict staff flexibility. An alternative is to establish a maintenance partnership with a third-party expert.

## Risks of field relubrication or non-expert refurbishment

Why is in-field regreasing, or refurbishment by non-expert staff, so problematic? It's because improper greasing can directly impact bearing performance and service life, increase risks and therefore costs of operation and maintenance, and decrease rail transport reliability. Common mistakes include:

### Over filling

It may seem logical that, when in doubt about the correct volume of grease to add, it's better to have too much than too little. But the fact is that overfilling can cause the rotating bearing elements to begin churning the grease, resulting in energy loss and rising temperatures. This can cause a chain reaction of issues leading to bearing failure due to grease degradation and accelerated wear of the rolling elements.

### Insufficient cleanliness

Bearing manufacturer specifications state how much grease should be used. But the bearing regreasing hole is not always easily accessible or clean and often the fresh grease must be transported to the bearing through the axlebox groove. In this case it's difficult to determine the precise amount of grease to inject, because it is hard to know how far the grease is filling the spaces inside the axlebox assembly. In cases where the grease is to be injected through the greasing nipple in the axlebox housing,

the grease needs to travel a long way from the greasing pistol through the nipple, through the axlebox wall to the circumferential groove in the axlebox bore, and eventually to the bearing unit outer ring and bearing unit interior. This can introduce fretting debris into the bearing from the axlebox bore reducing grease and bearing life rather than extending it.

### Risks:

Overfilling

Insufficient cleanliness

Grease distribution

Grease condition and contamination issues

Wrong grease



## Grease distribution matters

Adding to the challenge is the fact that it takes time for the new grease to be redistributed in the bearing. Often, the bearing temperature rises after in service lubrication, before the grease has made its way throughout the bearing. Adding smaller amounts, more frequently, can help minimize the heating issue.

## Grease condition and contamination issues

Grease condition and contamination issues are major concerns and typical issues in railway refurbishment workshops. Proper storage practices are key to assuring that grease is in optimum condition to support bearing performance. Temperature and environment, storage methods and inventory control can all affect grease quality. Of course, grease also must be kept clean as it moves from the storage container, to application tool, and into the bearing. Contaminants carried into the bearing with the grease will ultimately compromise bearing performance.

A major contamination issue when it comes to field relubrication is the risk of the grease collecting fretting corrosion. Fretting corrosion results from the loose fit of the bearing unit outer ring

in the axlebox bore, a fit which is often preferred for mounting reasons. Because the outer ring can move in the axlebox bore, surface asperities, and oxidation can occur – all of which are referred to as fretting. When grease passes through the bearing unit, fretting particles can be trapped and carried along with the grease to the bearing interior.

While fretting could be reduced with the use of anti-fretting paste, this paste may not be compatible with the grease. Additionally, the paste could also be picked up by the grease, creating an additional contamination issue.

## Wrong grease

All greases are not the same and cannot always be mixed inside a bearing assembly. Grease selection requires a thorough understanding of the application, the railway operating conditions, and other technical data. Choosing the right grease for your application will depend on the operating conditions, with the primary factors being the temperature range and speeds as well as the influence of the surroundings. Greases are classified by their consistency and blended to add performance enhancing characteristics in a variety of areas, including:

- Grease consistency
- Base oil viscosity
- Mechanical stability
- Drop point (the temperature at which grease changes to a liquid),

Most importantly, it is essential to follow the manufacturer's recommendations.

## Expertise assures performance

Considering the importance of bearing performance and the impact of railway car maintenance downtime, it's essential that railway staff is well trained and equipped in bearing maintenance, especially in the area of field regreasing. As a strategy for minimizing costs while optimizing performance, skills enhancement is well worth the investment. For the most expert and reliable refurbishment, the task should be left to specialized refurbishment workshops.





# Get smart about grease storage!

Correct grease storage is important for reliable bearing performance.

With so many factors to consider in maintaining railway bearings, how to store your grease may not be at the top of the list. But, it should be. That's because proper storage methods can assure that the grease you're using is in optimum condition to support bearing performance. Grease that degrades due to poor storage practices can do just the opposite – and result in more headaches and maintenance costs down the road. Here are some tips to help you get smart about grease storage.



## Temperature and environment

Follow the manufacturers storage instructions

- Store grease in a cool, dry, indoor area.
- Avoid lubricant storage in extreme temperatures.
- Do not store lubricant in areas where the temperatures fluctuate significantly.
- Keep lubricants away from areas with high humidity.
- Keep grease away from direct sunlight.

## Storage containers

- Keep grease in its original container, and keep it closed until needed.
- Reseal containers immediately after use.
- Store the lubricant container in a position where the bung (the plug to the container opening) can be easily accessed.

## Inventory control

- Monitor the lubricate date codes, to guarantee the lubricant shelf life has not been exceeded.
- Follow a first in, first out policy, rotating the lubricants to be sure that the first lubricant into storage is the first lubricant to be pulled for use.
- Verify grease quality if stored for more than 24 months.



SKF is committed to making your job easier – and your maintenance intervals longer. To learn more about grease storage and handling for optimum railway bearing performance, visit:

[www.skf.com/railways](http://www.skf.com/railways)



[skf.com/railways](https://skf.com/railways)

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