Wheel end maintenance

Complete guide to trouble-free handling of bearings, seals, hubcaps, lubricants and more.

A systems approach to total wheel-end maintenance

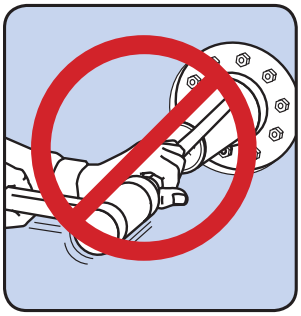
SKF's Trouble-Free Operation (TFO®) Program is a proven systems approach to heavy duty maintenance. By providing fleets with detailed instructional materials, and making hands-on training available to your technicians, this program has made a significant contribution to many fleets' overall productivity.

This Wheel-end maintenance guide, central to the TFO program, is based on our core experience with bearings and seals over several decades and literally billions of over-the-road truck miles.

Through our investigation of thousands of premature seal leaks and/or bearing failures, we've learned that improper removal and installation are by far the leading causes of these premature failures. Armed with the right information and tools, and using the step-by-step procedures in this manual, you can extend the service life of bearings and seals, protect your trucks from costly damage, and make your fleet safer in the process.

Why a systems approach?

Improper procedures during the removal, disassembly, and replacement of wheel end components



Removal of bearings and seals with incorrect tools causes damage to spindle or hub which can be undetected and lead to future problems.

Personal lack of cleanliness in handling components allows particles and dirt to cause bearing and seal damage.

Use of improper or damaged installation tools can damage new components.

Lack of understanding the important role of lubricants can lead to future problems.

Lack of knowledge about critical end-play adjustment can cause premature or even catastrophic wheel end failure.

Improper mounting procedures can damage new components.

Lack of knowledge concerning bearing and seal failures prevents corrective action.
Lack of training or unskilled personnel can lead to any of these causes of failure.

Warranties under the TFO® program

In addition to helping your fleet reduce wheel-end maintenance and its associated costs, you can also benefit from special extended warranties on selected products when certain requirements are met. The following warranties are provided for the SKF line of Scotseals purchased under the TFO program.

	Scotseal Classic	Scotseal Longlife	Scotseal PlusXL
Tractor	1 year or 100,000 miles	2 years or 150,000 miles	3 years or 300,000 miles
Trailer	1 year Unlimited	2 years Unlimited	3 years Unlimited
Severe Service	1 year or 50,000 miles	1 year or 100,000 miles	1 year or 150,000 miles

The following conditions are required for warranty coverage under the TFO program:

- **SKF hubcaps must be used**
- **Coverage applies to genuine SKF Scotseals and Hubcaps only**
- **User must follow current TMC maintenance procedures**
- **SKF representative to conduct training at each fleet maintenance facility**
- **Wheel end maintenance records are to be monitored by SKF and fleet**

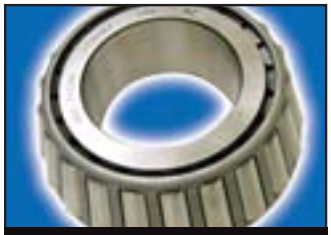
Note: For further details on the warranty program, contact your local SKF representative.

Caution: Beware of counterfeit seals.

Unscrupulous manufacturers are flooding the global market with poorly engineered and cheaply manufactured seals that have deliberately been made to resemble premium quality SKF Scotseals. Most obvious is the use of green paint (not Bore-Tite®) that can flake off and enter the hub, actually causing bearing damage. The warranties detailed above apply only to genuine SKF brand Scotseals. A few words of caution:

- A seal's running surfaces are critical to performance. Historically, the running surfaces of counterfeit seals have been demonstrated to be well below SAE standards.
- Testing has shown these counterfeit seals to be of substantially inferior quality and highly questionable reliability.
- Premature seal failure can lead to unexpected wheel end failures that can cause vehicle downtime and damage, serious personal injury and even fatalities.

The TFO® wheel end solution
Overview

Subject	Situation/problem
 Seals	Just as the equipment needs of long haul commercial fleets vary from those of heavy duty construction fleets, so does the matchup of the right seal for the driving environment. A “good” seal can fail prematurely if used in the wrong application.
 Bearings	Handling wheel bearings correctly at every stage is critical to trouble-free operation. A bearing that fails unexpectedly can be not just inconvenient, but costly and dangerous.
 Hubcaps	Hubcaps work through the constant exposure of the environment, including hot, cold, wet, dry and road salt conditions. Some of the hubcap’s roughest treatment comes from inside due to lack of lube or an over-tight bearing adjustment, causing a cooked hub and permanent damage.
 Failure analysis	You can tell a lot about why a bearing or seal has failed prematurely by examining the failed component. This guide provides photographs of failed bearings, hubcaps and seals, along with explanations for the failures.
 Tooling	Tools for removal and installation of wheel end seals are as critical to seal performance as they are to other tooling issues (imagine how wrong it would be to install a new piston with a sledge hammer). Related tools such as wheel dollies and end-play calibrators also play a role in the correct or incorrect installation process.
 Training	Professional training of the shop personnel is the “silver bullet” to improved maintenance efficiency and the reduction of premature seal and bearing failure. To put training in its proper perspective, as much as 90% of all wheel end seal failures are a result of improper installations.

TFO® solution

SKF recognizes the need for more than one type of seal for every purpose. The TFO Program analyzes seal matchup to your fleet's needs and recommends the optimum seal selection for your operation.

The TFO Program details the proper removal and installation of bearings, including procedures for cleaning, lubricating and assuring correct end-play adjustment.

SKF offers replacement hubcaps that are approved by all major OE truck and most trailer builders, and are compatible with all popular oils and greases. The TFO program outlines the importance of proper hubcap installation, and details the process of matching the correct hubcap with the lubricant being used on a specific application.

Over the years, SKF has examined thousands of damaged seals (from all manufacturers) and has analyzed the major causes of the damage. This knowledge has been distilled into our documentation called Failure Analysis. Part of the TFO Program includes inspection and analysis of your fleet's wheel-end failures and a recommendation of steps needed to avoid similar failures in the future.

SKF's specialized tooling is designed for errorless, damage-free removal and installation of seals, with procedures that can be easily understood. These tools, and the training on how to use them properly, are part of the TFO Program's implementation process.

The TFO Program puts appropriate emphasis on training, with the goal of issuing "TFO® Qualified" certificates to participating shop maintenance personnel. Training is conducted by knowledgeable and experienced SKF personnel, with hands-on learning, tooling demonstrations, videos and User Manuals. Education on the importance of wheel end systems and their critical role in the safety and productivity of the vehicle is an important part of the TFO Program implementation.

General procedure overview

Basic guidelines of the TFO procedures for removal.
For more detailed information, see pages 18 and 19

Removal procedures

A Removal of the wheel assembly should always be done with a wheel dolly.

B Grease or oil seals should be removed with a special seal removal tool to avoid damage to the hub. New seals must always be used in replacement.

C Bearings and seals should be inspected for wear or signs of probable failure. These signs, and the likely causes of failure, are described in the Failure Analysis section of this manual.

Basic guidelines of the TFO procedures for installation.
For more detailed information, see pages 20 thru 26

Installation procedures

D Bearing cups should be installed using a special bearing installation tool. A hammer should never be used directly to drive bearing cups into position!

E Scotseals should be seated in the bore using a special installation tool with centering plug. Never use direct hammer blows on the seal – it will destroy the seal's ability to contain lubricants and protect the bearings.

F Re-mounting of the wheel assembly on the spindle should always be done using a wheel dolly. Be careful in moving the assembly onto the spindle because it is necessary to avoid damaging the seal.

G Spindle nut torque adjustment should follow the manufacturer's specification on TMC RP618. End-play adjustment should be verified using a portable dial indicator.