

# Strength and reliability for the next generation of top drives

SKF Explorer tapered roller thrust bearings





UP TO  
**300%**  
LONGER RATING  
LIFE



# Tougher components for tougher conditions

Oil and gas technology is being pushed harder than ever before. Drilling for deeper reserves in harsher environments means top drives need to be bigger, more powerful and capable of withstanding even greater loads. And when unforeseen downtime can cost up to one million dollars a day, reliability is a valuable asset.

It's up to OEMs to design and manufacture the next generation of equipment that keeps the industry running profitably in today's tough conditions. This means finding components that combine reliability and long service life with the ability to fit into your latest innovations.

The new SKF Explorer tapered roller thrust bearings help top drive OEMs achieve their ambitions – whether it's creating a new generation of more powerful models or optimizing existing top drives for reliability. Redesigned to deliver higher load ratings and with up to 300 percent longer bearing rating life, our bearings help you meet the demands of today's oil and gas customers. And with industry-leading simulation, testing and service capability, SKF can help you push top drive innovation further.



**\$1 m/day**

– POTENTIAL COST  
OF TOP DRIVE  
DOWNTIME



# Optimized performance in demanding environments

The main thrust bearings in a top drive are subject to extreme operating conditions. They need to handle very heavy axial loads, shock loads and temperature extremes. SKF's new generation of The new generation of SKF Explorer tapered roller thrust bearings feature a host of research-driven innovations designed to optimize top drive performance.

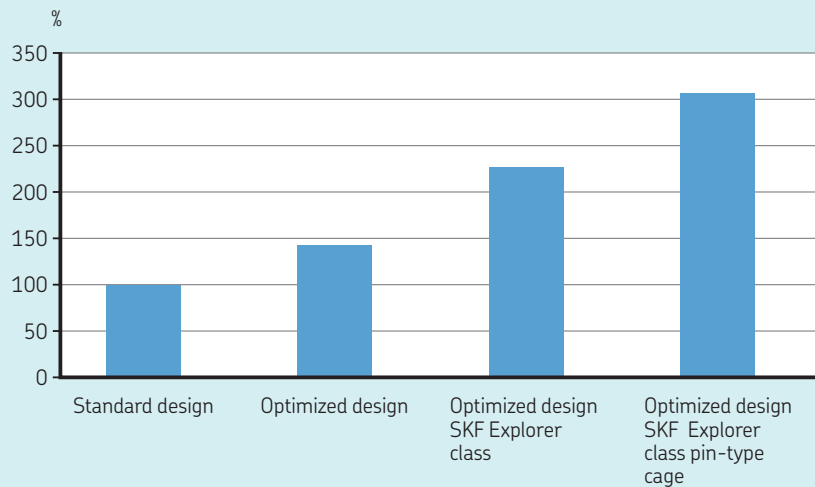
## Longer rating life

Through a rigorous redesign, simulation, testing and manufacturing program, SKF has been able to extend bearing basic rating life by up to 300 percent compared with older tapered roller thrust bearing designs.

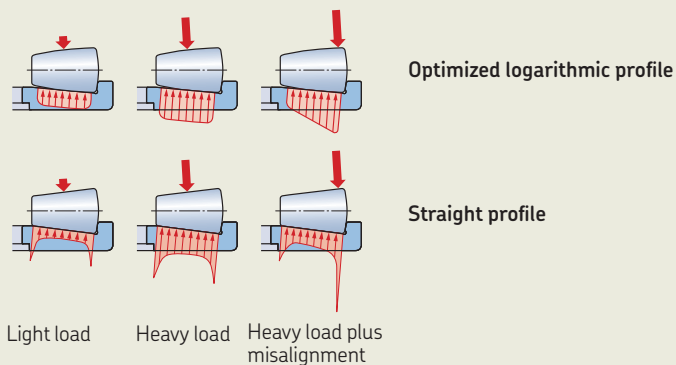
## Higher load rating

The new design increases effective carrying capacity. Rollers are optimized for length and diameter, allowing the maximum number of rollers and providing reserve capacity for rapid load increases due to the drilling process and peak loads. A smooth transition towards the raceway ends avoids sharp edges and stress peaks, while an optimal relationship between the rollers and the raceways' profiles minimizes the risk of edge stresses, and contributes to the bearings' high load-carrying capability.

**Impact of increased dynamic load rating on bearing basic rating life**  
Based on industry reference "T921"



**Roller/raceway contact stresses**

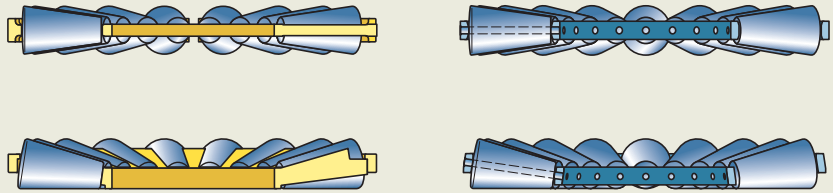


INCREASED  
RELIABILITY

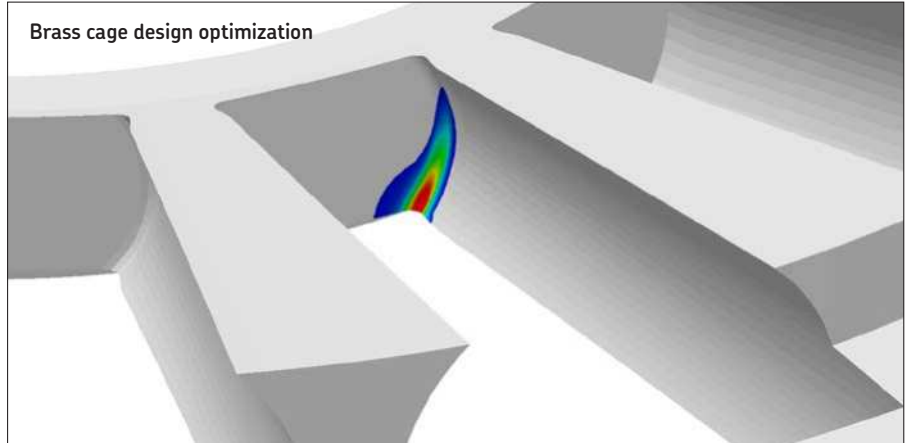
## Choice of cage designs

SKF offers tapered roller thrust bearings in brass and pin-type cages. The availability of symmetrical and asymmetrical designs for both cage types provides a wide variety of options for different needs: the pin-type cage is particularly suited to extreme applications. Cage bar thickness at the brass cage is also optimized for both designs, reducing edge stresses and offering better robustness.

Brass and pin-type cage designs for symmetrical and asymmetrical bearings



Brass cage design optimization

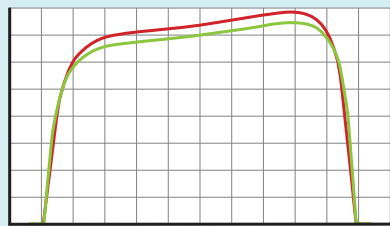


## Best-in-class rollers

Our rollers have very narrow diameter variations and optimized profiles allowing for even load distribution. The high quality rolling surfaces and roller ends are optimized for the formation of a good hydrodynamic lubricant film. For top drives, the result is increased reliability and safety combined with high load-carrying capacity.

Contact pressure over roller length

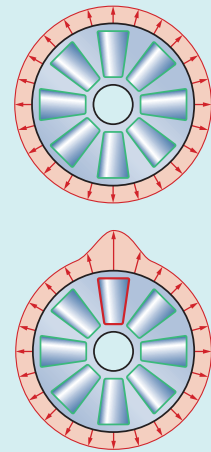
Contact pressure



Roller length

- Without roller diameter variation
- With roller diameter variation

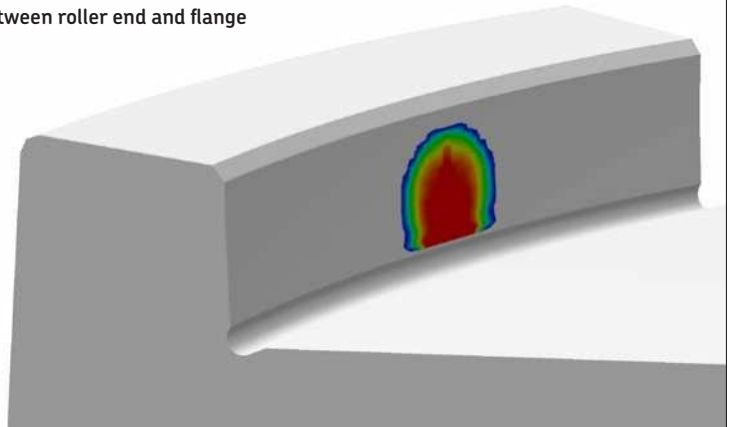
Stress distribution due to roller diameter variation



## Optimized flange geometry

FEM analysis has identified the optimum flange thickness and geometry for the roller end, reducing friction and allowing for better lubrication. Similarly, improved geometry on the flange undercut reduces stresses and fatigue, lowering the risk of breakage at high loads.

Contact zone between roller end and flange



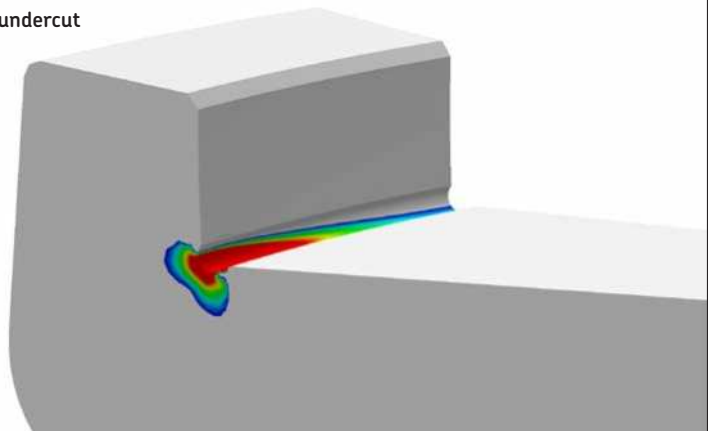
## Strong, carburized case

Carburization minimizes crack propagation and damage from shock loads.

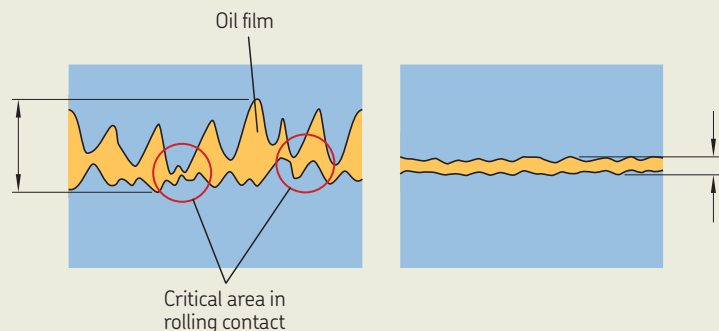
## Smooth surface finish

With minimal surface roughness, lubricant stays close to the surface, allowing for safe start-up and operation in a range of temperatures. Stress peaks are reduced – and service life is longer.

Analysis of flange undercut



Surface topography of rollers and raceway



# Market-leading simulation, testing and support

In an industry that changes fast, SKF can help you stay ahead. With state-of-the-art simulation and testing capabilities, we can create the designs and bearing configurations that emerging technologies demand, showing you how new top drive components interact with each other. And our customer service and support provides expert help when you need it.

## Digital simulation

Including SKF's proprietary SimPro Expert tool, our industry-leading simulation capabilities enable you to analyze system behavior in a virtual environment before prototyping.

## OEM support

Our experts understand the challenges facing OEMs. SKF's industry and application expertise can help you in your quest to improve reliability and efficiency, and develop the next generation of top drives.

## Design for Six Sigma

With this methodology, engineers expand physical models so they can produce bearing designs that are robust and stronger against less predictable conditions. The result is better system optimization.

## Market knowledge and global reach

With over 30 years' experience in the oil and gas sector and a presence in 32 countries around the world, SKF has the proven knowledge and global reach to support OEMs in the industry.

## Discover more

To learn more about SKF tapered roller thrust bearings and our service offering for OEMs, visit [skf.com/oilandgas](http://skf.com/oilandgas)





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