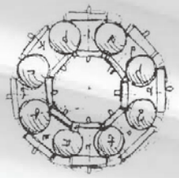
Koyo®

Low-Friction Torque Bearing

LFT-Series

CAT.NO.B1023E



The Evolution of Rolling Bearings

The technology of “moving” and “rolling”
with as little resistance as possible
has evolved since ancient times as an eternal theme,
blossomed as bearing technology and continued to evolve.

Bearings are essential to all industries.
Therefore, reduction of energy loss (torque loss) in bearings through size / weight reduction,
efficiency enhancement, etc. helps reduce CO_2 emissions
across all industries and ultimately
contributes to the prevention of global warming,
which is a reflection of the ancient Japanese saying
“Constant dripping wears away a stone”.

For the future of our planet environment

LFT-Series

Low-Friction Torque

LFT-Series

JTEKT, since its time as Koyo Seiko, has constantly focused on friction and lubrication in efforts to reduce bearing torque and, in the 1980s, successfully developed the world’s first low-torque tapered roller bearing, the LFT. New generations emerged as the product evolved - LFT-II, III and IV, and these have helped to improve the fuel efficiency of automobiles.

Currently, JTEKT applies low-torque technology to other bearing types such as ball bearings and hub units, and offers an extensive LFT bearing lineup.

JTEKT’s LFT-Series of low-torque bearings will continue evolving hereon into the future.

* LFT is an abbreviation for Low-Friction Torque and JTEKT’s registered trademark.

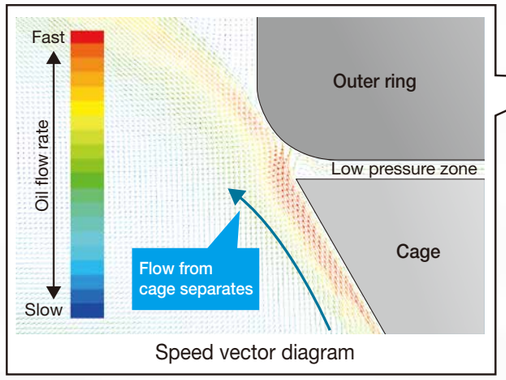
LFT-Series incorporated technologies	TRB-LFT 	BB-LFT 	HUB-LFT 	NRB-LFT 
Lubricant Reduced agitating resistance	○	○	○	○
Reduced in viscous rolling resistance (Bearing ring-rolling element)	○	○	○	○
Reduced sliding friction resistance (Roller-inner ring rib)	○	–	–	–
Reduced sliding friction resistance (Roller-cage)	–	–	–	○
Seal Reduced friction resistance			○	

Super-Low Friction Torque Tapered Roller Bearing (LFT-IV)

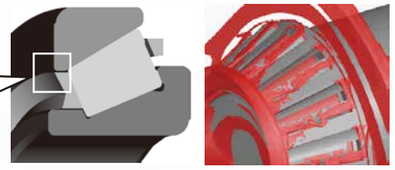
TRB-LFT

Features

In order to optimally control the amount of lubricant that flows through the bearing, this bearing uses resin with a high degree of design freedom for its cage material and has reduced lubricant mixing resistance. Bearing life in contaminated oil has also been improved



Speed vector diagram



<Mechanisms for reducing oil inflow>

- Flow of lubricant in proximity of cage end face separates from cage
- A low pressure zone is generated at lubricant entry point, reducing flow

	LFT-Ⅰ	LFT-Ⅱ	LFT-Ⅲ	LFT-Ⅳ
Evolution of TRB-LFT				
Features	Optimization of shape and roughness at contact portion of rib and roller	Special crowning of inner / outer ring raceways	Controlled volume of oil flow / Optimized internal	Optimal control of oil inflow with a resin cage
Friction torque reduction effect (compared to standard models)	-10% →	-20% →	-50% →	-65%

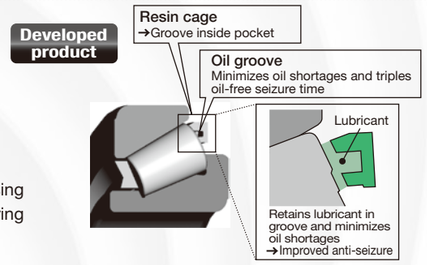
Major Fields of Application and Effects

- Used on the pinion support of differential units to improve vehicle fuel efficiency by **2.5%**

Next-generation high performance product

High performance tapered roller bearing with resin cage (improved anti-seizure)

In addition to low-loss through high degree of design freedom using a resin cage and longer life in contaminated oil (LFT-IV), this bearing offers extended oil-free seizure time



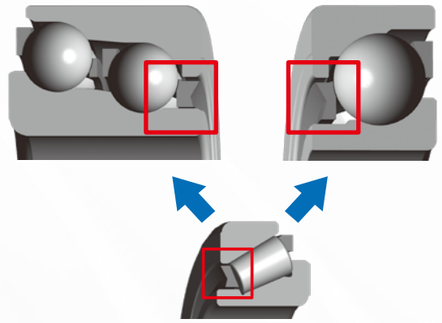
Low-Friction Torque Ball Bearing

BB-LFT

Features

- Horizontal deployment of structure used on super-low friction torque tapered roller bearing to control oil inflow
- By optimizing cage and inner / outer ring shape, oil flow to bearing is restricted and mixing loss is reduced by up to 30% compared to conventional angular contact ball bearings
- Reduced amount of contaminants infiltrating the bearing and improved durability in contaminated oil by 1.5 times


Double row low-friction torque ball bearing for differential pinions


Structure of ultra-low torque tapered roller bearing (LFT-IV) to control oil inflow


Single row low-friction torque ball bearing for differential pinions

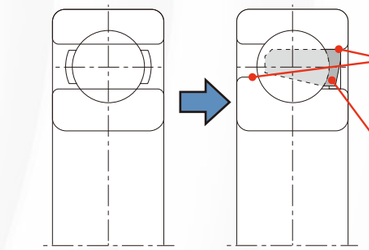
Major Fields of Application and Effects

- Used on the pinion support of differential units to improve vehicle fuel efficiency by **1%**

Next-generation high performance product

Low-Friction Torque Deep Groove Ball Bearing Supporting High Axial Loads

- 10% smaller outer diameter than conventional deep groove ball bearings and improved anti-axial load
- Compared to tapered roller bearings with equivalent load allowance (JTEKT's LFT-II), torque loss reduced by up to 50%

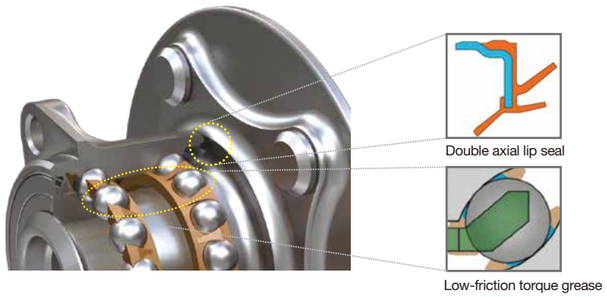


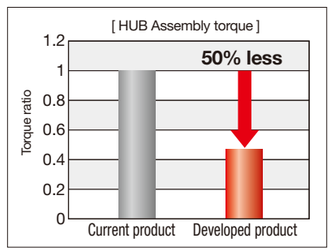
Low-Friction Torque Hub Unit

HUB-LFT

Features

- Optimization of thickener, base oil and additive for hub operating environment, developed new grease achieving the trade-off features of improved bearing life and reduced friction torque
- Adopted a double axial lip seal achieving low-friction torque without adversely affecting sealing performance





Major Fields of Application and Effects

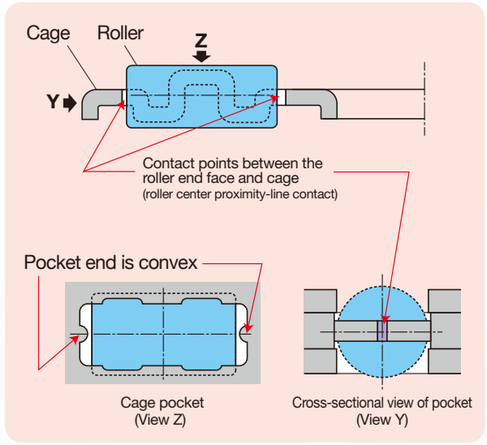
- Used on 4W of vehicles to improve vehicle fuel efficiency by **0.5%**

Low-Friction Torque Needle Roller Thrust Bearing

NRB-LFT

Features

- Reduced sliding resistance between roller end face and cage by optimizing cage shape

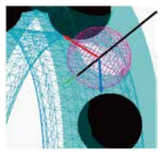


Major Fields of Application and Effects

- Improved vehicle fuel efficiency through adoption on transmission unit (independent friction torque reduction of 50 to 60% depending on conditions)

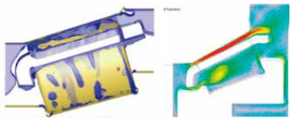
Base Technology Supporting the LFT-Series

Mechanism analysis



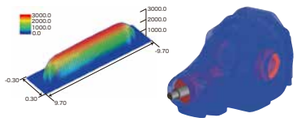
Calculates precise torque by dynamic analysis utilizing a program developed by JTEKT and accounting for ball sliding behavior

Fluid analysis



Analyzes lubricant flow, reduce agitating resistance and reflects results in optimal design

Analysis of axle system



Investigates axis support rigidity, bearing life, surface pressure, etc. for the overall unit then proposes optimal bearings

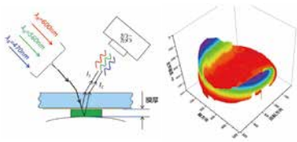
Visualization of oil flow

Simulates lubricant flow under actual operating conditions then proposes low-friction torque bearings

Measuring loss on an actual unit

Evaluation technology that enables accurate detection of torque loss

Oil membrane measurement



Ensure required oil membrane by visualizing oil-membrane state at time of low-friction torque grease and poor lubrication

Actual vehicle evaluation technology

Proving Ground Enables Testing / Evaluations Simulating Roads Worldwide

Fully utilizing our knowledge as a world-leading systems supplier, JTEKT conducts driving evaluations and analyses of products installed in vehicles. We exhaustively pursue the highest standards in product safety and operation on a test course capable of simulating various road and weather conditions of regions around the world. As a total systems supplier, our highest value is to provide our customers with products that deliver outstanding performance and the best quality that help to make automobiles that are more than just fun to drive.

■ Iga Proving Ground

- Site area: 500,000m²
- Course area: 170,000m²
- Combined circuit length: 2,200m
- Dynamics pad area: 54,000m²

- Straight-line track
- Winding track
- Fording track
- Dynamics pad
- Noise evaluation track

Koyo

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