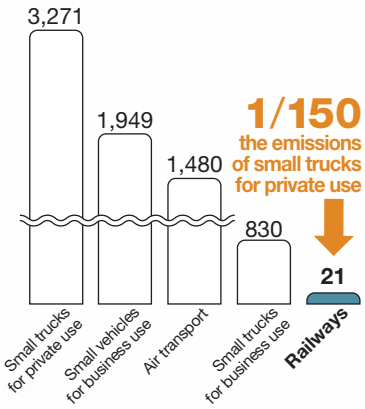
Feature Article 2

## Encouraging a Modal Shift with Tribology

**$CO_2$ emissions by mode of transportation**
(g-C/tonk)




Source: Joint meeting materials from Council on Domestic Countermeasures for Global Warming

### Double the product life with increased speed / Three features that control wear by controlling temperature increases

With an increasing focus on a modal shift away from trucks and airplanes to transportation with less energy usage and $CO_2$ emissions, rail transport has recently become a star alternative. That being said, rail transport competes with other modes of transport for customers and has a growing need to **reduce costs and increase speed**.

NTN has been supplying critical parts for trains in the form of bearings for the main motor, bearings for the drive system, and bearings for axles.

In 2006, responding to the needs of society and requests from railroad companies, we developed the **"New High-speed Bearing Unit for railroad journal applications" (new RCT* bearing)**. We increased the durability of the part, doubling its life. We were also successful in lowering the running costs by extending the maintenance period and ensuring safety even at high speeds.

### Three new features were used in this product to double its life

The RCT bearing is a sealed double-row tapered roller bearing, and is the newest version of the tapered roller bearing for railroad journal applications.

The first feature was replacing the steel cage used to evenly spread out the tapered rollers with one made out of a special plastic. This controls the generation of particles from wear, allowing smooth rotation to continue. It also increases shock resistance.

The second feature was adopting a spacer that reduces the wear caused by the slight friction between the inner ring and the end cap.

By putting in a rubber lip, we have prevented the particles that are worn off from going inside the bearing.

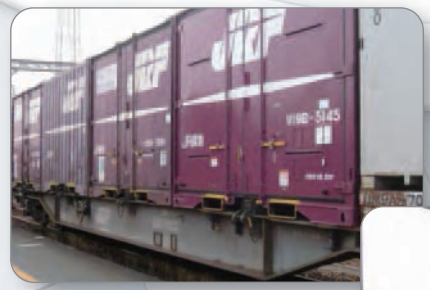
The third feature was an improved seal shape. These improvements have allowed heat generation to be controlled while maintaining the seal, decreasing the temperature rise of the seal by 20°C at a speed of 345 km/h in comparison with conventional products.

# Extending the life of railcar bearings to make rail transport faster and more environmentally friendly

**Rail transport is a high-volume mode of transportation that has a low environmental impact. NTN technology contributes to its spread and development in Japan and around the world.**

### Participating in the world's largest rail transport trade show

Since 2004, NTN has participated in the world's largest rail transport trade show.
We plan to participate in 2008 as well.



## Meeting the needs of railways around the world

The new RCT bearing allows the maintenance interval period to be extended from once every 450,000-600,000 km to once every 1.2 million km – double interval of the conventional product.

This bearing is intended not only for the Japanese market but also the European market, where there is heightened concern for environmental problems and where the railway network is growing with an increased emphasis on high-speed rail transport. We are aiming the RCT bearing at other parts of Asia as well, particularly China, where there is a great deal of infrastructure growth and where high-speed rail transport is expanding.

This new RCT bearing is being used already in medium-speed trains in China and commuter trains in North America.

Rail transport is a high-volume mode of transportation with a low environmental impact. NTN is working to reduce costs, support increased speeds, and ultimately **contribute to a world-wide modal shift** with our products.

* RCT bearing: Rotating end cap tapered roller bearing.

**Bearings for driving gears**

This is used in the gearbox, which transmits the power from the motor to the shaft.

**Bearings for wheel axles**

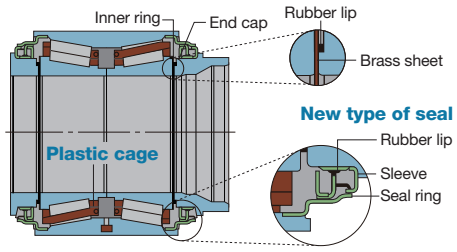
These are built into the wheel axles, which bear the weight of the railcar.

**Insulated bearings for main electric motors**

These are installed to prevent electric pitting

### New High-speed bearing unit (new RCT® bearing) for railroad journal applications

By putting a spacer between the inner ring and end cap, the slight friction between them was reduced. Also, a rubber lip prevents wear particles from going into the center of the bearing.




**Ryutaro Oka**
Global Application Manager (Railroad)
Industrial Sales Headquarters

## NTN achieves both increased speed and an extended maintenance periods

Currently, high-speed trains (more than 300 km/h) are being developed all over the world. There is a demand for cost reductions by extending the maintenance period for these trains. To meet both of these needs, NTN developed the new RCT bearing for railroad journal applications.

Our new RCT bearing builds on the high-speed technology that we have accumulated with the bearings for the Shinkansen (Japan's bullet train), and by incorporating a newly developed plastic cage with a fretting-resistant sheet, allowing us to meet not only standards in Japan but also the EN standard used by both Europe and China.

We will continue our R&D for improving the reliability of bearings, which are one of the most important parts found on a train.