

NSK Ltd. Press Release  
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## **NSK Develops Low-Torque Ball Bearings for Hybrid Vehicles**

*-----Designed to Improve Fuel Efficiency in Hybrids*

Tokyo, Japan, June 9, 2009 – NSK Ltd. (NSK; Headquarters: Tokyo, Japan) has developed new low-torque ball bearings for hybrid vehicles featuring a 50-65% improvement in frictional loss compared to conventional bearings. The new product will be featured first in Toyota's latest Prius.

NSK designed the new product specifically for use in hybrid vehicles- a growing market due to improvements in fuel efficiency and rising environmental awareness – and expects annual sales of more than 3 billion yen by 2013.

In recent years, demand for hybrid vehicles has been rising rapidly, thanks to the low fuel consumption and low emissions realized through a more efficient integration of the engine and electric motor. In order to further improve fuel efficiency, there is a growing need to reduce torque loss in the bearings used in the transmissions (drive-trains) of new generation hybrid cars. NSK has met this need with its new low-torque bearings, which dramatically reduce frictional loss. Going forward, NSK expects growing sales to automobile manufacturers of hybrid vehicles in and outside Japan. The new product will be featured first in Toyota's latest Prius.

### **Product features**

To date, most observers considered it too difficult to achieve further reductions in the torque loss of ball bearings. Despite this, NSK has found a way to cut torque by 50-65% compared to earlier products by implementing the unique solutions described below.

### **Optimization of internal design**

The number of balls has been dramatically reduced, and ball diameters, race dimensions, and clearances have been optimized utilizing analysis technology, which has allowed rolling friction losses to be minimized. Another key factor in this success was NSK's development of new manufacturing processes that overcame conventional hurdles to significantly decrease the number of balls.

### **Introduction of low-torque cages**

Losses have been reduced dramatically by agitating the lubricants during rotation via the introduction of specially shaped cages made of resin. NSK has achieved compactness, lightness and low torque for automobiles via its four core technologies (tribology, materials, analysis and mechatronics), which it has cultivated for 90 years, and is determined to push forward with the development of products that will improve the fuel efficiency of automobiles in the future.

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