

Basic Knowledge of Bearings

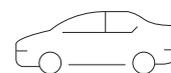
What are bearings?

Bearings—the staple of industry. A surprisingly large number of them can be found all around us. Bearings are used in all kinds of machinery, such as automobiles, airplanes, washing machines, refrigerators, air conditioners, vacuum cleaners, photocopy machines, computers, and even in satellites far away in outer space. Bearings enhance the functionality of machinery and help to save energy. Around 100 bearings are used in the average household and 100–150 or more are in an automobile with an engine. They play an active role in making our lives smoother everywhere in the world, from everyday life to offices, factories, and cutting-edge science laboratories. Bearings are utilized in tough environments and in hidden places, such as inside machinery, so we do not usually get the opportunity to see them. Nevertheless, bearings are crucial for the stable operation of machinery and for ensuring top performance.

Household
Around **100** bearings



Automobile
100–150 or more bearings



In what way are bearings environmentally friendly?

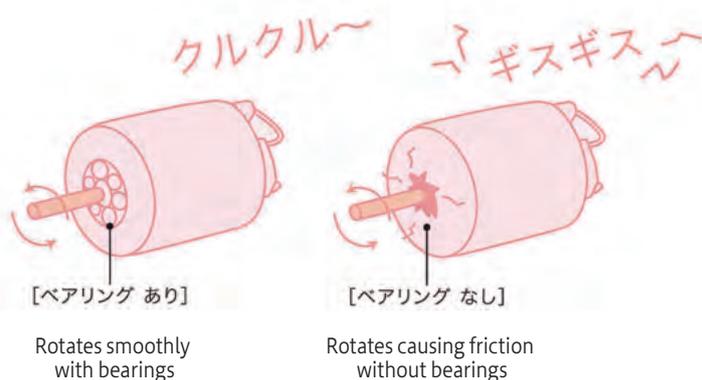
While bearings support our lifestyles, a bearing is also a component that just on its own merit is said to be “eco-friendly.” In this section, we will introduce how bearings are environmentally friendly, together with their functions.

Functions of Bearings

The basic function of bearings is principally to reduce mechanical friction in rotating machinery. Friction is defined as the force that attempts to resist relative motion. Let us consider the example of a motor's housing (the motor's exterior cylindrical covering). Say that the shaft that runs through a hole in the housing begins to rotate. As the shaft steadily rotates, it rubs up against the edge of the hole, on account of the diameter of the hole in which the shaft runs through being barely larger than that of the shaft. This causes friction where the shaft comes up against the hole's surface, and as the shaft rotates while incurring such resistance there is an enormous amount of effort expended.

The role of bearings is to suppress such friction. The installation of bearings keeps in check the friction between the housing and the axle, enabling smooth and continuous motion from the start of rotation.

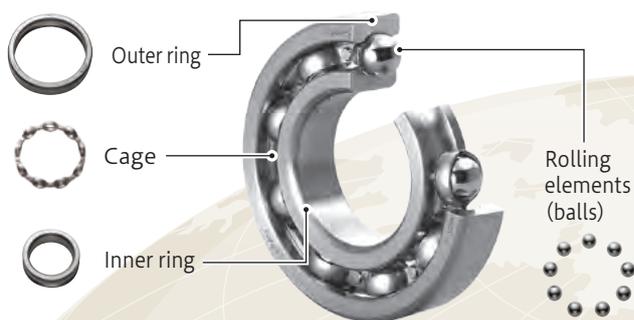
The mitigation of the friction and wear that occurs between materials in relevant motion by controlling lubrication and material surface characteristics is known as “tribology.” This term was coined by Professor H. Peter Jost in a report submitted in 1966 in response to a request by the British government. In his report, Professor Jost calculated that by researching tribology and actually applying it to industry, £500 million a year (equivalent to 1.3% of Britain's GNP at the time) could be saved throughout the country as a result of the energy that would be conserved. Tribology consequently came to be considered an important aspect for industrial development. As a truly foundational technology for bearings, tribology is now one of NSK's “Four Core Technologies plus One.”



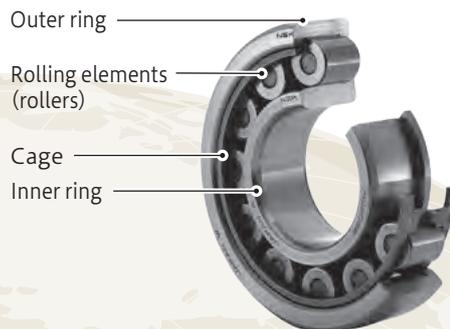
Structure

The ball bearings and roller bearings pictured below represent two typical types of the most basic category of bearings, known as rolling bearings. Rolling bearings have a simple basic structure with four elements—an outer ring, an inner ring, a cage, and rolling elements.

■ **Ball Bearing**



■ **Roller Bearing**



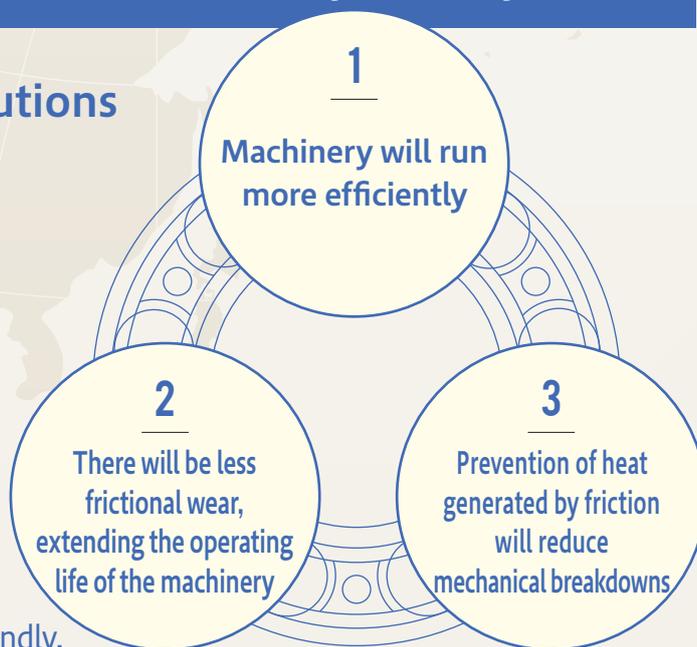
Reasons why bearings are environmentally friendly

Bearings make three contributions by reducing friction.

The illustration to the right shows the three major contributions made by bearings. This content is described in simple terms, although for machinery, this is the reason that the contributions are so central and fundamental.

As we have introduced in the “Functions of Bearings,” bearings reduce mechanical friction and enable smooth operations. This leads to efficiently conveying power. If friction can be suppressed through bearings, together with reductions to mechanical waste, it can give rise to results directly related to energy conservation.

This is why bearings are **environmentally friendly**.



Drawing fully on its concept of Motion & Control™, NSK contributes to preserving the global environment and presenting a diverse range of products the world over, chiefly products that reduce friction and that are leaders in terms of rolling bearing products. Please see the “NSK Supporting Society” on PP. 6–7 and the “Special Feature” on P. 22 for information about our representative products.

Column

The Wisdom of Ancient Peoples

In the distant past of ancient Mesopotamia, circa 8th Century BC, the principles of bearings were utilized to transport gigantic stones. To do this, the ancient Mesopotamians realized that it would be a good idea to place something beneath a heavy object so that it could be rolled along, thus reducing the effort required to convey such a heavy object. As reproduced in the relief, logs are being used under a giant statue. It is thought that such ancient wisdom gave rise to bearings.

