

For Customers

We believe that quality is the essence of NTN's corporate brand, and we are constantly working to realize "dramatic increases in quality". By connecting these efforts to product manufacturing, we respond accurately to the diverse needs of the market, satisfying customers' needs and creating trust.

Quality Management

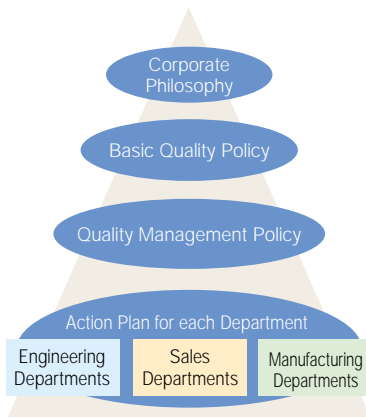
Based on our Corporate Philosophy, NTN has set out a "Basic Quality Policy" in order to earn the trust of our customers and fully satisfy customers' needs.

Basic Quality Policy

"Provide appropriate quality that satisfies the customer's required functions and specifications"

- To respond promptly to changes in customer needs (Conformable quality)
- To be superior in competitive quality (Competitive quality)
- To pursue profit-making quality (Economic quality)

Quality Assurance System



Quality Management Policy

Based on the "Basic Quality Policy", the "Quality Management Policy" is established every year for the engineering, manufacturing, and sales departments to clarify the approach that each department should take to quality.

Engineering departments

"Continuously implementing the idea of 'Design determines everything'"

We will accurately grasp customer requirements to create "Designs that are easy to understand and manufacture and that prevent mistakes."

Manufacturing departments

"Preventing the recurrence of claims and ensuring the quality of new products"

In the course of Monozukuri, we will "build in" quality and develop our personnel by sharing quality techniques and skills to establish a global quality control system.

Sales departments

"To provide what the customer needs"

We will constantly work to grasp subtle changes in customer needs and by sharing these needs within the company improve customer satisfaction.

Quality Improvement Conference for suppliers

NTN holds a yearly Quality Improvement Conference for suppliers in order to provide our customers with products which fulfill their needs. At this conference, top management from suppliers is invited with the objective of quality improvement. A main theme of the conference is set every year and the results of various activities are presented. In 2005, with the theme of "Increasing workplace vitality", both NTN and the suppliers presented the results of activities related to "Using visual controls in the manufacturing workplace", "Improving quality of bought-in parts and materials", and "Activities to reduce quality defects". Moreover, a lecture titled "The role of managers and supervisors in increasing workplace vitality" was presented, and attendees were reminded of the importance of the role of managers and supervisors.



ISO/TS 16949 Certification

Most of NTN's manufacturing facilities have "ISO/TS 16949: 2002" certification, which is a global automotive quality standard. This standard is for the automobile industry and is reportedly the most stringent in the world. It sets out quality system requirements with respect to design, R&D, manufacturing, installation, and service.

The purpose of the standard is to provide high-quality products to worldwide automobile users through kaizen to prevent defects from happening, by preventing supply chain troubles, and by reducing quality variations and waste. As this standard focuses on customer satisfaction, certification in this standard makes us ready to access the automobile industries of the world.



Today, the key words that draw our attention in our everyday lives are "reliability" and "safety". NTN has strived to develop products incorporating these key concepts since its early years. NTN technology, which supports reliability and safety, has produced a variety of product families, and with sure-footed experience in cutting-edge science and technology fields, we continue to receive commendations from customers.

Products that support reliability and safety

Continuing efforts with "high speed and safety"

Ensuring safety in an era of high-speed railways has become increasingly important. NTN's bearing technology excels in railcar bearings, too. These include the "Megaohm" primary motor bearings used in the 'Nozomi' bullet trains, "drive unit bearings" used to properly transmit drive power to the rail car axles, "axle bearings" that promise a comfortable trip, and "RCT bearings" used by railways all over the world. This diverse product lineup continues to ensure the safety of railcars in Japan and worldwide.

We first tackled extreme environments in the 1970s

It was in the 1970s that we first started on the development of a bearing for rocket engine turbo pumps. A bearing that can rotate at an ultra-high speed of 50,000 revolutions per minute in a -253°C liquid hydrogen environment without using oil or grease was the ultimate challenge for extreme environments. Since then, NTN-brand bearings have contributed to Japan's space development and support the success of domestic rocket launches.

We support the reliability of jumbo jet engines

In the engines of jumbo jets that carry over 500 people, you can find NTN-brand bearings. "Three-point contact ball bearings" and "cylindrical roller bearings" provide travelers with a safe and steady trip,

while rotating at 10,000 revolutions per minute in a 200°C environment. Both products are produced at specialized plants, and each and every bearing receives non-destructive testing so that high quality and reliability are achieved. This technical excellence has been recognized, and NTN is Japan's only certified supplier for General Electric Aircraft Engines (GEAE).



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For Customers

New Products that Support the Environment and Safety

"30° PTJ" with World's Largest Operating Angle for Crossover SUVs

High functionality

Largest angle ever for a tripod-type plunging constant velocity joint

In response to the diversifying needs for crossover SUVs and other vehicles, NTN has realized the world's largest operating angle of 30° for a tripod-type plunging constant velocity joint while maintaining the low-vibration characteristics of our PTJ without increasing outer diameter.



"High-Load Capacity Tapered Roller Hub Bearings" for SUVs

Long life

High rigidity

Maximizing the number of rollers to attain long service life and high rigidity

NTN has developed a "high-load capacity tapered roller hub bearing" that provides longer service life and higher rigidity for pickup trucks and SUVs, where conditions are severe.

By increasing the number of rollers to the physical limit while keeping the same outer diameter dimension has resulted in 20% longer service life and 7% higher rigidity over conventional models.



High-Speed, High-Quality "Color Filter Repair Device"

Increased productivity

Making quick, high-quality repairs

NTN has developed a color filter repair device that repairs faulty sections of liquid crystal display (LCD) color filters with improved quality and speed. This device is ideal for larger, higher-precision flat panel displays.

By using our own high-speed repair device and by specially processing the repair coating needle, repair times have been reduced by 70%, and repair quality has been improved.



Cutting-Edge New Product Development

"Monoring™ CVT"

High efficiency

Automotive CVT with a unique, simple, and efficient construction

NTN has developed the Monoring™ CVT, a unique continuously variable transmission (CVT) for automobiles with a unique construction.

The Monoring™ CVT has a unique structure that previous types never had: the gear mechanism consists of a small number of parts, and it does not require an external hydraulic control apparatus for shifting. It is able to achieve high transmission efficiency.



"Magnetic Array-Type Rotation Sensor"

High functionality

Compact size

World's first compact high-precision rotation angle detection sensor

NTN, in cooperation with Shizuoka University, has jointly developed a "magnetic array-type rotation sensor" that is compact yet can measure detect rotation angles with a precision of 0.36 °(1/1000th of a rotation).

The newly-developed sensor has magnetic sensor elements, an AD conversion circuit, and an angle calculation circuit integrated on a 4.2mm square sensor chip to simultaneously reduce size and improve functionality.



Magnetic array-type rotation sensor (left) Ball bearing with magnetic array-type rotation sensor (right)

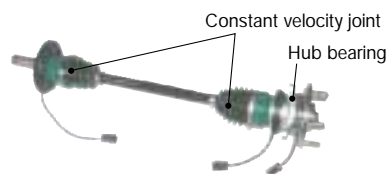
"Intelligent Axle Unit"

Safety

Accurate and detailed vehicle stability control

NTN is currently carrying out the practical application and development of an "intelligent axle unit" made up of sensors used in vehicle safety control systems, a hub bearing, and a constant velocity joint.

By incorporating force detection sensors into the hub bearing and constant velocity joint, the sensor information related to cornering force and drive force can be used to attain more detailed and accurate vehicle stability control.



Research and Development

The center of NTN's global research and development is in Japan, and takes place in the New Product Development R&D Center (Iwata City, Shizuoka Pref.) and the Elemental Technological R&D Center (Kuwana City, Mie Pref.). At the New Product Development R&D Center, the development of next-generation products takes place, while at the Elemental Technological R&D Cen-

ter, fundamental technical development in the fields of tribology and materials science allows NTN's new products and technologies to be transmitted to the world.

Both locations are engaged in developing environmentally focused products and technology; below, NTN's R&D structure and approach are introduced through an interview with Minoru Suzuki, an engineer in-



involved with the "in-wheel motor type axle unit" at the New Product Development R&D Center.

Development of the in-wheel motor type axle unit



Minoru Suzuki
New Product Development Dept.,
New Product Development R&D
Center

Working toward a society of electric and fuel cell vehicles

There seems to be a great deal of interest in fuel cell vehicles and electric vehicles for the next generation of vehicles, doesn't there?

Because of their high environmental performance in terms of "no exhaust" and "energy savings from high energy efficiency", much is expected of electric vehicles and fuel cell vehicles as next-generation vehicles. Part of the drive mechanism that goes into the wheel is a motor called an "in-wheel motor" integrated into each wheel.

What kind of advantages does this have?

The in-wheel motor method has no motor inside the vehicle, resulting in a great deal of interior space. This makes it possible, for example, for someone in a wheelchair to go right into the vehicle. Also, as each wheel can be driven independently, fine driving control will be realized. The result will be increased vehicle safety, so you can say that a high level of safety will be attained.

Are there any drawbacks?

The mass below the springs will increase, so there is a risk that driving comfort will decrease. For in-wheel motors to take off, there is a need to first resolve this problem.

How is development progressing?

We are currently developing an in-wheel motor type axle unit that is made up of a high-speed high-efficiency reduction mechanism and a motor. Our company is proficient in the fields of automotive hub bearings and in bearing technology; these are key technologies for miniaturizing the unit. We want to fully maximize basic technology to develop the products needed for next-generation vehicles.

Please tell us what your ultimate goals are.

They are to increase and develop the performance of vehicles as personal transportation methods and to conserve the global environment. I'd like to see NTN's unique technical strengths contribute to achieving both of these themes.

