

## Review of Operations

# Automotive Business

### Business Overview

Comprised of the two categories of automotive bearings and automotive components, the Automotive Business delivers various products that support the three critical elements of automobiles, namely running, turning and stopping.

Automobiles utilize many different types of NSK bearings, including hub unit bearings and needle roller bearings. As automobiles have evolved, automotive bearings have come to demand a greater level of performance, including less friction loss, smaller size, lighter weight, higher speed and less noise. Through more sophisticated automotive bearings, including bearing grease and seals that leverage its core technologies of tribology, materials and numerical simulation, NSK continues to develop products that contribute to the evolution of automobiles.

Meanwhile, in the automotive component field, NSK delivers a

wide range of core functional components, including electric power steering (EPS), automatic transmission (AT) products, as well as ball screws for electric brake boosters. In addition to the primary column-type EPS, the Company is promoting the development of a rack-type EPS to expand its product lineup. AT products are seeing greater demand against the backdrop of improved automobile fuel efficiency and comfort, whereas ball screws are seeing greater demand against the backdrop of improved safety.

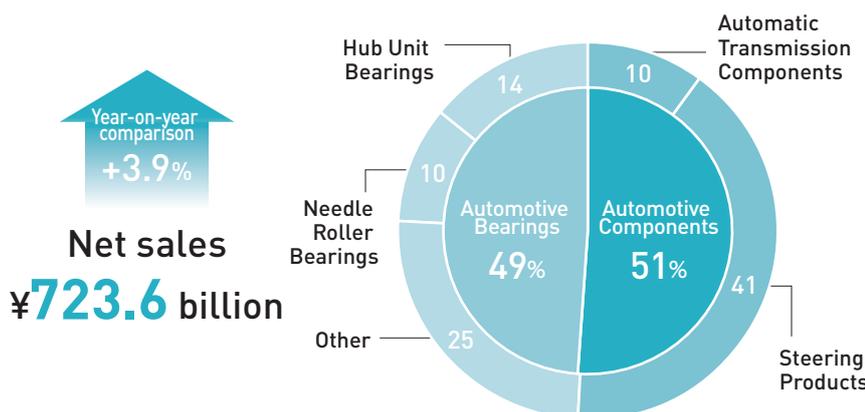
Structural changes in automobiles from a technical standpoint, such as power source diversification and the evolution of vehicle dynamics controls geared toward autonomous driving, are currently accelerating. By building on the elemental technologies the Company has accumulated thus far and by developing new technologies, NSK will contribute to technical innovation for automobiles.

### Specific Features of Automotive Business

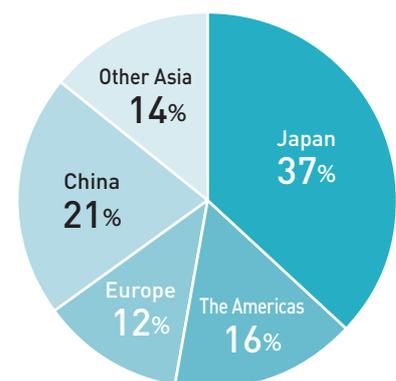
Refer to page P. 15 for information on the shared features of the Industrial Machinery Business and the Automotive Business.

|   |  |
|---|--|
| <b>Customers</b>                                | <ul style="list-style-type: none"> <li>● Automakers in Japan and overseas</li> <li>● Auto component manufacturers in Japan and overseas</li> </ul>   |
| <b>Features of Customers and NSK Businesses</b> | <ul style="list-style-type: none"> <li>● In principle, opportunities to win new orders arise when automakers introduce new vehicle models or undertake a full model change. According to the schedule of each customer's new vehicle project, NSK cooperates on development after being nominated as a development supplier. Development suppliers are generally also responsible for supplying mass-produced products, and prepare mass production in accordance with the launch schedule for the new vehicle.</li> <li>● The delivery volume required for a single project has been on the rise as customers employ common platforms and planned production volumes grow.</li> <li>● NSK's net sales are affected by the sales volumes of the car models on the market. In principle, deliveries are based on the just-in-time system, so inventories are light. However, customers often require that manufacturing take place near the regions of demand, meaning that the local production ratio is relatively high.</li> </ul> |
| <b>NSK's Competitive Advantages</b>             | <ul style="list-style-type: none"> <li>● Diverse business relationships/customer base among automakers and first-tier auto parts makers</li> <li>● Global supply capabilities</li> <li>● Developmental capabilities/technological response capabilities for advances in automobile functions</li> <li>● Global management systems to focus on meeting the needs of non-Japanese customers</li> </ul>   |

Sales Breakdown by Product (Year ended March 31, 2018)



Sales Breakdown by Region (Year ended March 31, 2018)





## NSK Products: Supporting Automobile Running, Turning and Stopping

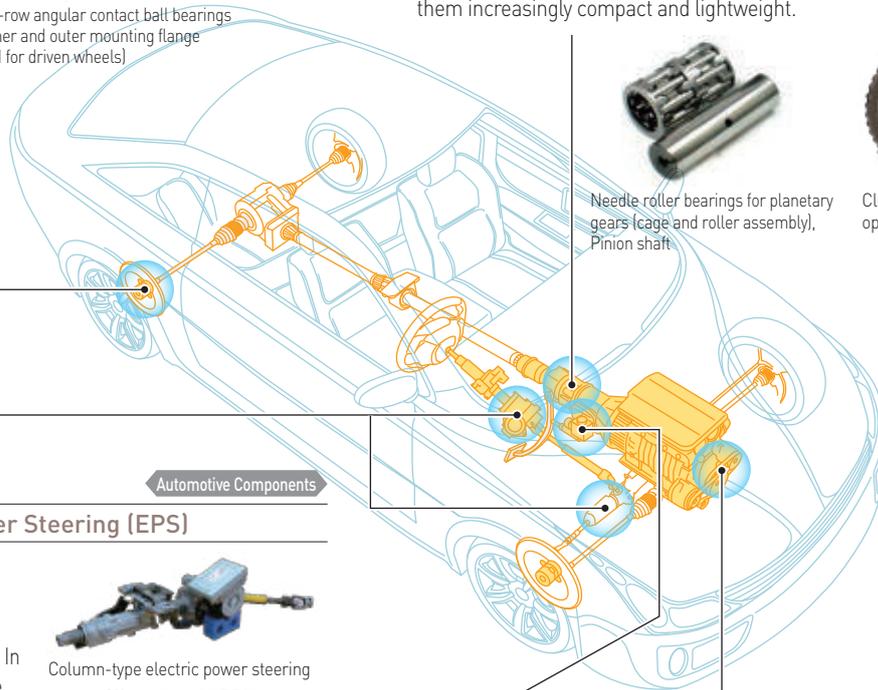
Automotive Bearings

### Running Hub Unit Bearings

Hub unit bearings are fundamental components that support the chassis while facilitating the rotation of the wheels. They are exposed to rainwater, mud, snow and other elements, and under such extreme environments realize excellent durability and smooth rotation.



Double-row angular contact ball bearings with inner and outer mounting flange (HUB III for driven wheels)



Automotive Bearings Automotive Components

### Running Transmission Products

In efficiently conveying engine power to the tires, critical to the transmissions that need to operate smoothly and with flexibility are the products of NSK. We engage in four core technologies, namely tribology, materials, numerical simulation and mechatronics, and offer products that enhance the efficiency of transmissions, making them increasingly compact and lightweight.



Needle roller bearings for planetary gears (cage and roller assembly), Pinion shaft



Clutch assembly optimized high efficiency

Automotive Components

### Turning Electric Power Steering (EPS)

With the recent trend in advanced driving assistance and autonomous driving, electric power steering systems are increasingly important. In addition to the primary column-type EPS, the Company is making progress on the development of a rack-type EPS that puts to use NSK's technological excellence. This is contributing to a broad product lineup and driving that is safe and comfortable.



Column-type electric power steering



Rack-type electric power steering

Automotive Bearings

### Running Bearings for Power Source/Electric Components

Against a backdrop of the demand for greater environmental performance as a social issue, there is an ongoing shift toward the electrification of automotive components and a growing demand for bearings to perform in new positions. NSK is seeking growth by leveraging its strengths in the electrical components field where an ever-more sophisticated level of technology is required.



Bearings for alternators



Bearings for in-vehicle motors

Automotive Components

### Stopping Ball Screws for Electric Brakes

Along with the trend of making it mandatory to equip vehicles with automatic emergency braking, there is an increasing shift toward electrification at the point of brake booster function. The ball screw is a promising type among several types of electric brake boosters. NSK, putting to use its global No. 1 share of ball screw technology, will continue to contribute to raising the level of safety in the brake field.



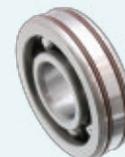
Ball screws for electric brakes

Automotive Bearings Automotive Components

### Running Products for Hybrid Systems

Against the backdrop of stricter environmental regulations in countries throughout the world, the demand for improved automobile fuel efficiency and power saving performance has led to the expanded introduction of new energy vehicles (electric vehicles, hybrid vehicles, plug-in hybrid vehicles).

NSK provides advanced bearings and a newly developed pawl-type one-way clutch as the power transmission system for hybrid vehicles.



Next generation of Creep-Free™ bearings for hybrid and electric vehicles



Pawl-type one-way clutch

# Review of Operations

## Automotive Business

### The Fifth Mid-Term Management Plan: Initiative Status and Initiatives for the Final Fiscal Year

To address the rapid advancements of innovation in automotive technology, at the start of the Fifth Mid-Term Management Plan NSK reorganized its Automotive Business structure from an organization based on its products into the following two-division HQ system: the Automotive Powertrain Division Headquarters, which oversees business related to the electrification of components and improving power transmission efficiency, and the Steering & Actuator Division Headquarters, which oversees business in fields related to vehicle dynamics control. The Powertrain Business is working to expand business in fields related to automatic transmission, for which demand is increasing, and is working to capture new demand that is arising from the spread of component electrification. Meanwhile, the Steering & Actuator Business is working to expand the EPS customer base, enhance the product lineup and develop new core products for the future.

#### Key Initiatives

##### Reinforce Profit Base and Establish Platform for Future Growth

###### Operational Excellence

- Expand drivetrain business, achieve growth with accompanying profitability
- Expand customer portfolio for EPS

###### Innovate and Challenge

- Respond to technology evolution (high efficiency, electrification, autonomous driving)
- Develop lower-assist EPS

#### Measures Geared toward Key Initiatives

##### ① Powertrain Business

The Company will bring about the further evolution of its elemental technologies for bearings and automatic transmission (AT) products. With regard to the latter, the Company is anticipating sales expansion boosted by multistep AT and an increase in business from customers that handle unit products. Against the backdrop of the spread of electrical components for automobiles, the Company is also aiming for growth by developing new products in the field, such as electrical chargers and in-vehicle motors.

##### ② Steering and Actuator Business

The Company has positioned the period of the Fifth Mid-Term Management Plan as the time for sowing the seeds for the next generation of growth. Aiming to expand the customer base of its mainstay column-type EPS, the Company will link this to growth over the duration of the next mid-term management plan by further developing its rack-type EPS. The Company will also utilize the mechatronics technologies accumulated in its EPS business to advance the development of new core products, such as actuators for electric brakes.

#### Initiative Status

The AT Business has been expanding against the backdrop of a higher ratio of automatic transmission equipped vehicles and the shift to multistep transmissions. In response to the continuation of strong demand for the future, NSK constructed a needle roller bearing plant in South Korea and an AT component plant in Mexico, which went into operation in 2017. Specifically, these plants were built to enhance production capacity and ensure stable supply. In heading toward the next stage of growth, the EPS Business has been working to expand the customer base for column-type EPS while at the same time advancing the development of rack-type EPS. As one of its new core products, NSK kicked off mass-production for new projects related to electric brake booster ball screws in 2018.

##### Operational Excellence

To further enhance efficiency, the performance required by AT-related products has become more sophisticated. Moreover, the progress of component electrification has led to the emergence of the need for high-performance bearings designed for new in-vehicle motor applications. By developing new products that harness the unique technological capabilities of NSK, the Company is working to capture expanding demand and link this to growth that adds to earnings. Moreover, in terms of EPS, NSK has been improving quality design and efficiency by standardizing the development process and enhancing productivity through the automation of plants based on the use of robots. NSK also is working to enhance cost competitiveness and product appeal, capture new orders, develop new customers and establish a foundation for renewed growth.

##### Innovate and Challenge

One of NSK's moves on the organizational front has been to establish the Automotive Technology Development Center, which has taken charge of advanced developments and product design, to more quickly and precisely address the rapid developments in automotive technology. Similarly, the Company is moving beyond the conventional frameworks that exist for each product and application to develop products that envision the entire vehicle.

While increasing the number of orders for electric brake booster ball screws, mentioned earlier, NSK also has received orders for hub unit bearings that leverage low-friction technologies for a new electric vehicle mass production model. In addition, the Company is progressing with the development of new technologies and products that anticipate the shift to electric vehicles (EVs) and the development of autonomous driving. In this light, NSK exhibited the Traction Reducer, Wheel Hub Motor Fit and Parallel Link type Active Suspension among other items, at motor shows as a way of making proposals for a new era of automobiles.

#### Initiatives for the Final Year and the Next Mid-Term Management Plan

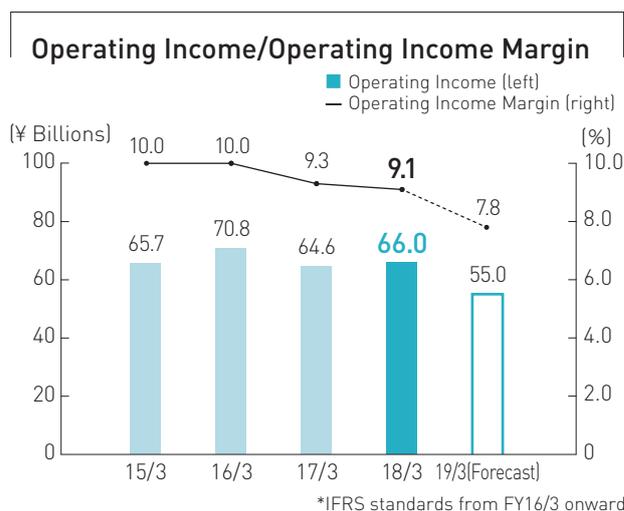
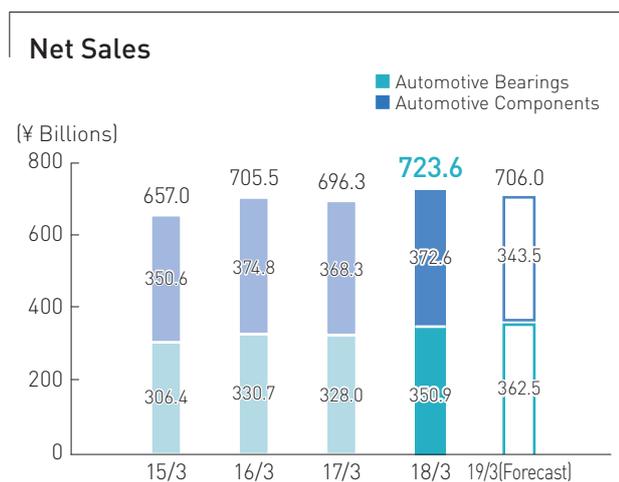
The global automotive market is expected to grow approximately 3% year on year. In this light, NSK will promote continued growth in the Automotive Business, with a focus on the powertrain business and enhance profitability through greater productivity and lower fixed costs. As a means of addressing growing demand, the new facility under construction (scheduled for completion in the fall of 2018) at the Haruna plant in Gunma Prefecture, Japan will serve as a base for the needle roller bearing manufacturing division, as well as a base for the development divisions for press processing technology and needle roller bearing manufacturing technology. In bringing together several design development and manufacturing engineering departments, NSK is driving greater efficiency and shortening development cycles, developing new products that capture a new set of needs on the automotive market and advancing manufacturing innovation.

NSK is also accelerating development of applications for rack-type EPS to capture orders at an early stage. The Company is working to further expand orders for electric brake booster ball screws in response to the outlook for greater demand stemming from global trends, such as the movement to make automobile emergency braking systems mandatory and to equip these as standard items on all vehicles.

As ongoing initiatives for technological development in anticipation of the next Mid-Term Management Plan and beyond, NSK is aiming to expand business by contributing to the shift to electric vehicles, autonomous driving and other new automotive technologies.

## A Look Back at the Business Conditions for the Year Ended March 31, 2018, and the Forecast for the Year Ending March 31, 2019

Pursuing net sales that exceed the mid-term targets during the year ending March 31, 2019, following on the record high net sales achieved during the year ended March 31, 2018



Although the global automotive market remained at the same level as the previous year during the year ended March 31, 2018, as a result of the positive trend in the powertrain business in Japan, the Automotive Business recorded its highest levels of net sales to date. Despite higher material prices and such leading to cost increases, efforts to enhance productivity and reduce expenses enabled NSK to maintain an operating income margin in 9-percent-plus range.

Looking at regions outside of Japan, the Americas saw lower earnings as a result of a slowdown in the U.S. automotive market. Meanwhile, Europe saw higher earnings in response to solid automobile sales. In China, the increase in sales was slight, partially due to a change in product mix. Meanwhile sales in other Asian countries rose, primarily in India.

As a result, net sales in the Automotive Business totaled ¥723.6 billion (a year-on-year increase of 3.9%), operating income totaled ¥66.0 billion (a year-on-year increase of 2.1%) and the operating income margin reached 9.1%.

During the year ending March 31, 2019, NSK expects to see net sales of ¥706.0 billion (a year-on-year decrease of 2.4%), operating income of ¥55.0 billion (a year-on-year decrease of 16.6%) and an operating income margin of 7.8%. Despite an outlook for sales decline in EPS as a result of model changes and increased R&D and other expenses, NSK will continue to work to ensure steady earnings through the powertrain business and undertake productivity enhancing initiatives.

## Business Risks and Opportunities, Future Policies

### 1 Structural Changes in the Automotive Industry

The industrial structure for automobiles has entered an era of upheaval. In terms of power sources, the industry is expected to see diversification away from only gasoline and diesel vehicles of the past, to hybrid, plug-in hybrid, electric and fuel cell vehicles. The technologies related to autonomous driving also continue to evolve, with an outlook for progress in establishing the environment for commercialization. Moreover, links between automobiles and communication devices and networks will create new businesses, while more options will emerge for the way in which automobiles are used. For example, the concept of sharing in place of ownership already has begun to proliferate.

Although these changes in the business structure encompassing automobiles could pose risks for NSK, at the same time they can also be interpreted as an opportunity for business expansion. In response to the comfort, safety and environmental performance demanded in association with the increased sophistication of automotive technologies, NSK is adding to its expertise and wide-ranging technologies accumulated over 100 years of business operations through continued research and development aimed at achieving further growth of the Automotive Business.

### 2 Product Liabilities Arising from Recalls and Other Factors

NSK Group products are utilized in many industrial fields and end products. Particularly for automobiles that require high functionality, in the event of defects that lead to product liability, there is the risk that this could lead to the incurrence of significant costs or a decline in the Company's social responsibility. In recognition of the importance of quality, the NSK Group has established systems designed to ensure high quality and utilizes insurance that allows a certain level of risk coverage. Continuing to redouble its efforts regarding quality and safety in the years to come, the Company's policy is to give these areas sufficient consideration.