

Research and Development Activities

The Mabuchi Motor Group's R&D activities are led by Mabuchi Motor Co., Ltd., the parent company, and MABUCHI MOTOR (DONGGUAN) CO., LTD. in the Asia segment. Those activities are outlined below.

The organizational structure for the Company's R&D activities was restructured as of the end of March 2019, with the strategic elimination of the Development Headquarters, and the respective spinning off of Product Development Department 1, Product Development Department 2, and Product Development Department 3 to the Consumer and Industrial Product Business Unit, Automotive Product Business Unit 1, and Automotive Product Business Unit 2. This is designed to increase further the Group's competitive superiority in an operating environment that has recently been experiencing drastic changes. By aligning these development departments with their respective sales departments, we are bolstering the development of the business units' activities with swift decision making and timely responses to market changes, enhancing our ability to develop new models for specific applications, and introducing a global approach to customer support and customer service activities.

The Manufacturing Headquarters consists of three departments—Production Engineering Department 1, Production Engineering Department 2, and the Mabuchi Production System Management Department. Production Engineering Department 1 is responsible for designing mass production facilities, supporting manufacturing, and designing molds, while Production Engineering Department 2 is responsible for research on process designs and methods, as well as production technology.

The Technical Research Institute and the Engineering Management Department report directly to the Chief Technology Officer. The Technical Research Institute is responsible for new product development and other high-value-added operations, focusing primarily on the development of elemental technologies and strategic applications, and the Engineering Management Department manages blueprints for mass-produced products and intellectual property rights.

By strengthening technological cooperation across the board, we are restructuring to realign business units and integrating functional units into business units, with the goal of promoting cooperation across divisions to achieve greater operational efficiency and increase added value.

At the same time, the R&D center at MABUCHI MOTOR (DONGGUAN) CO., LTD. is primarily responsible for processing various types of testing requests, component and material evaluations, blueprint preparation operations, and design improvement. The center also supports operations for improving existing products for swift introduction to the local Chinese market and developing new products commissioned by the Company.

We have also identified the following items as matters for urgent consideration and policy development, with the aim of introducing our competitive manufacturing from the perspective of introducing our motors into new fields, strengthening our ability to respond to appropriate applications, and local production for local consumption.

- (1) Development of brushless motors and gear units for mobile applications and technological enhancement of drive circuits
- (2) In addition to conventional labor savings, study manufacturing lines with additional labor savings and enhance manufacturing competitiveness
- (3) Reduce development lead times and reduce and eliminate development man-hours

Next, the following presents the application status of our products. For applications in the core automotive products business and applications to be emphasized going forward, the engineering departments and sales departments will work together within the business division organization.

Mobile Applications (AGVs, robots, etc.)

In 2019, we began selling options for drive circuits, gears, and drive units for brushless motors, and expanded our sales and sales promotion activities for AGVs (automated guided vehicles) and personal mobility. In 2020, we are accelerating our product development in applications for service robots, and will continue to expand our lineup in a broad range of applications that assist with human operations.

Power Window Applications

In 2019, we completed preparations for the mass production of models that will lead to higher sales in China by enabling Chinese automobile manufacturers to develop smaller, lighter vehicles, and are also carrying out and offering additional sales promotion activities and engineering services. We have also received orders from Chinese automakers for lineup models currently being developed to increase sales in China.

Power Seat Applications

Sales and market share are growing as the introduction of small, distinctive, high-torque motors for power seats has led to increased adoption by major automobile manufacturers. Seeking to increase market share further, we are reinforcing our products and carrying out activities to increase sales. In 2019, we prepared to commence the mass production of a derivative motor model for lumbar support. We are also continuing to develop a new type of geared motor for recliners and have begun developing applicable motors for various automobile seat functions.

Engine Peripheral Equipment Application

This application can contribute to energy savings by precisely controlling engines. At the same time, tolerance for higher temperatures and resistance to vibration are required for this application, compared with other applications. In addition to the RS-4F5 and RS-4G5, which are already in mass production, we continue to work to increase sales by adding optional specifications for these models.

Other Small Electrical Equipment Applications

We are developing motors in response to inquiries for new applications to achieve lower fuel consumption and increased convenience, and are moving forward with preparations for mass production.

New Flagship Products

DS-34EC1 brushless motor drive circuit; MS-94BZ# geared motor

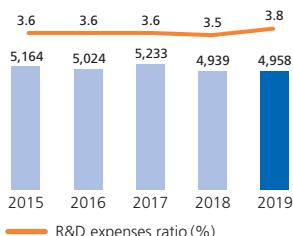
This series of drive circuits and geared motors is for autonomous traveling robots and personal mobility, primarily in light electric vehicles and AGVs. We also offer a lineup of drive units equipped with wheels, brackets, and electromagnetic brakes.

Research and development expenses in fiscal 2019 totaled 4,958 million yen. As of the fiscal year-end, the Company owned a total of 812 industrial property rights (171 in Japan and 641 overseas), and we made a total of 31 new applications (Japan and overseas; patents, utility models, designs, and trademarks) during the year.

To increase product sales and new applications, we are working to maintain our superior competitive position by comprehensively and proactively acquiring and protecting intellectual property rights. In addition to the protection of intellectual property rights, we are implementing a range of measures including training to raise awareness in all Group employees of the risks of divulging or infringing on intellectual property rights.

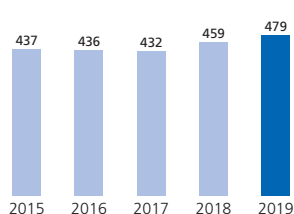
R&D Expenses/R&D Expenses Ratio

(Millions of yen)



R&D Personnel

(Employees)



Number of Intellectual Properties

(Intellectual properties)

