

Research and Development

Guided by the corporate philosophy of providing innovative products to the world and generating new trends to contribute to the creation of an affluent society, THK continually strives to create original products as a company focused on creation and development.

A Global R&D System for the Next Generation

THK conducts R&D at the Technology Center and its new headquarters established in October 2017 in Tokyo. At these locations, the Company is endeavoring to use its core linear motion system technology and expertise to develop its mainstay linear motion systems, mechatronic devices such as XY precision stages and linear motor actuators, and products in fields related to consumer goods such as automotive parts, seismic isolation and damping systems, and medical equipment.

In 2010, the THK Group established the R&D Center in China. This facility, which was THK's first R&D facility outside of Japan, began full operation in 2012. With the addition of TRA's German R&D facility in 2015, the THK Group is on its way to building R&D structures oriented toward the Americas, Europe, and Asia in order to more accurately meet the needs of customers around the world.



Headquarters (Tokyo)



Technology Center (Tokyo)



R&D Center (China)

Initiatives During the 2019 Fiscal Year

To meet the varied needs of its customers, THK's industrial machinery business has expanded its lineup of LM Guide and ball screw products and developed a wide array of new products that contribute to the automation of customers' production lines.

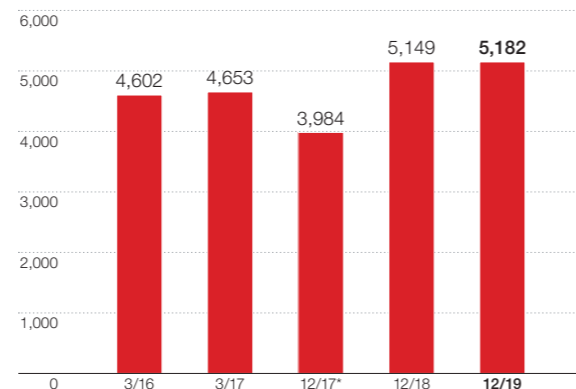
In terms of the IoT, the Company has begun to operate its OMNI edge service, which has networking capabilities, introducing a system that can diagnose LM Guide failures and lubrication status. THK has also begun recruiting for a free trial of a system to diagnose preload loss on ball screws. The Company endeavors to provide continuous service covering predictive failure detection through replacement part procurement.

Furthermore, as automation and robotization progress in every field, many visitors came to the 2019 International Robot Exhibition held in December, where the Company displayed demos and products that contribute to automation and robotization in various areas, all highlighting the theme of "Supporting people with motion technology."

For its automotive and transportation business, in response to the shift towards electric automobiles, THK has utilized new production methods to introduce aluminum products to the market in order to expand sales and meet customer needs for more lightweight components. The Company has also developed aluminum hot forging technology in-house in North America and delivers products manufactured with this technology to customers. As a second pillar in addition to its linkage and suspension business, the Company is also developing and mass-producing linear motion products for use in CASE-related autonomous driving, and is working to serialize these products and

expand sales. Furthermore, as a third pillar, the THK Group will promote the development of next-generation products incorporating multiple technologies in development departments in Japan and overseas by looking forward five or ten years and anticipating needs customers might not be aware of yet while also working to expand the Company's product lineup to meet current customer needs.

R&D Expenses (Millions of yen)



* This data reflects a modified reporting period that includes 9 months from consolidated companies whose fiscal years ended in March and 12 months from consolidated companies whose fiscal years ended in December.

THK's Philosophy on Intellectual Property

Basic policy

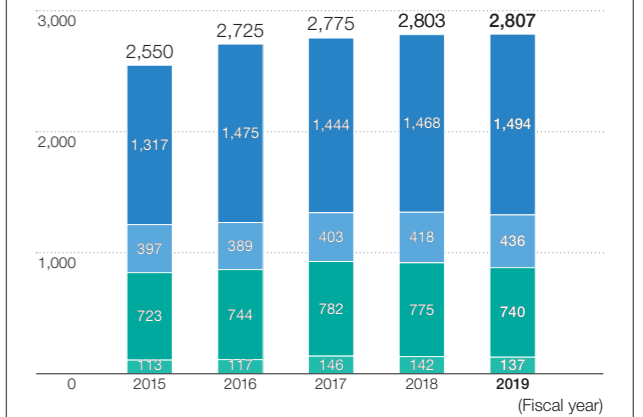
As a company focused on creation and development, THK values and promotes the creation and full utilization of its intellectual property to continue contributing to the development of its customers around the world and to the creation of an affluent society through the development of innovative products.

By applying for patents and preserving its specialized knowledge, THK exercises exclusive rights to its linear motion technology and eliminates imitations. At the same time, to avoid infringing upon the patents of others in the industry, THK works with its planning and development departments to conduct thorough patent searches while still in the development stage, and the Company internally educates its employees so that they respect the patent rights of third parties to avoid patent infringement.

Through full-scale globalization and other means, THK is striving to expand the breadth of its preservation of effective intellectual property rights that contribute to industry.

Intellectual Property

(Number of holdings)



Due to the change in the fiscal year period in 2017, the data from the 2017 fiscal year onward reflects a period from January 1 to December 31, and the data for prior years reflects a period from April 1 to March 31.

Efforts to Support Automation and Labor Savings

Here are some of the items contributing to automation and robotization that were displayed at the 2019 International Robot Exhibition.



Adaptive Hand

A versatile end effector that adapts to various production line applications.



Picking Robot Hand System Model PRS

A versatile robot hand that adapts to various logistics picking applications.



Autonomous Movement Control System "SIGNAS"

A robot that navigates easily through various kinds of terrain for construction sites.