

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 2020 Fiscal Year

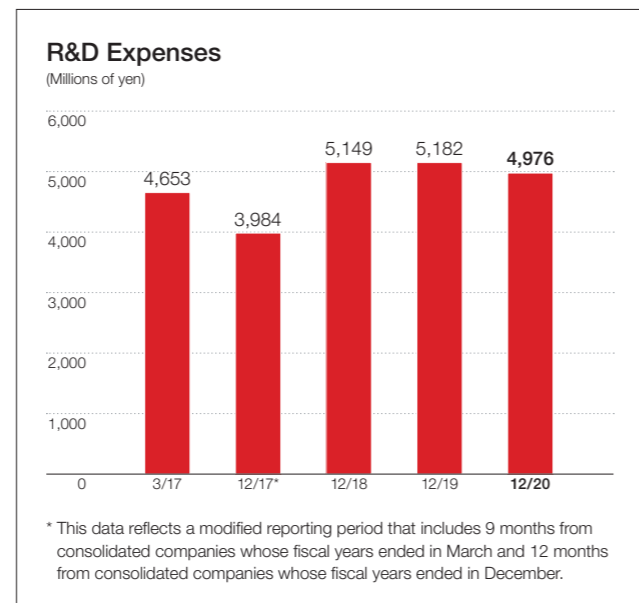
To meet the varied needs of its customers in the industrial machinery field, THK has expanded its lineup of LM Guide and ball screw products and developed a wide array of new products that contribute to the automation of customers' production lines.

In terms of the IoT, the "OMNI edge" IoT service for the manufacturing industry had its full commercial launch in January 2020. This service visualizes the status of LM Guide and ball screw products and enables predictive failure detection. For the next phase of development, the Company plans to make the service available for rotary components of pumps, fans, conveyors, and other devices that use bearings.

With regard to robots, THK developed and introduced the SIGNAS transfer robot to the market. Distinguishing itself from conventional AGVs (automated guided vehicles), SIGNAS features an original autonomous movement control system that achieves a new, never-before-seen guidance method. In addition, the Company developed a thermometric robot that helps reduce the risk of viral transmission through in-person interaction as a way to prevent the spread of the coronavirus.

In 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 products manufactured with this technology have been adopted by both American and Japanese-owned businesses looking to procure items locally. As a second pillar, in addition to its linkage and suspension business, the Company is also developing and mass-producing ball screws for use in CASE-related automatic braking systems. Ball screw products are

also officially being adopted for new suspension-related components, and THK will work to serialize these items 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.



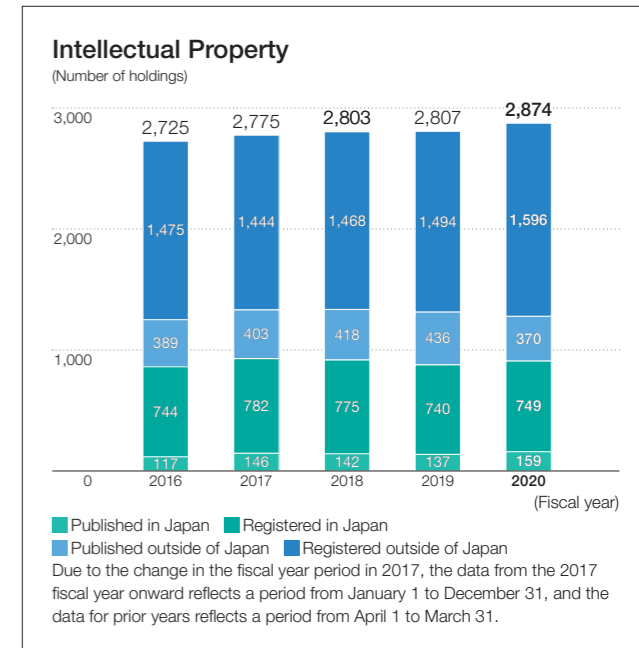
THK's Philosophy on Intellectual Property

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.



Expanding Applications to Consumer Fields

Achieving high load capacity and durability, the Utility Slide ATG is a new product aimed at adoption in logistics and railway fields, where utility grade is required. This product is anticipated to be in demand particularly for the container-fetching mechanisms of transfer shuttles in automated warehouses, open-and-close mechanisms of railway vehicle doors, and sliding mechanisms of aircraft passenger seats. As THK accelerates its development of new business areas, which is one of its growth strategies, the Company will refine its core linear motion system technology and extensive expertise in order to expand the use of its products in logistics, railway, and other consumer fields and provide optimal solutions for the challenges these industries face.



Example Applications

Transfer shuttles in automated warehouses

Railway vehicle doors

Aircraft passenger seats

Storage space for railway vehicle maintenance