

Intellectual Capital

Expanding Intellectual Capital on the Strength of Our Unique Core Technologies



Director, Managing Executive Officer and Chief Technology Officer
Shinichi TANIGUCHI

Core technologies unique to our company

Mabuchi Motor's technologies include many areas of advantage: magnetic circuit technologies, brush and commutator contact technologies, and brushless motor control circuit technologies. We have made numerous improvements to magnetic circuit technologies, which are positioned as central to our core technologies. How to direct magnetic force and how to perform switching using copper wire, iron cores, and magnets are simple topics, yet the deeper we delve into these, the more these areas yield new discoveries. For that reason, we have accumulated a wealth of knowledge.

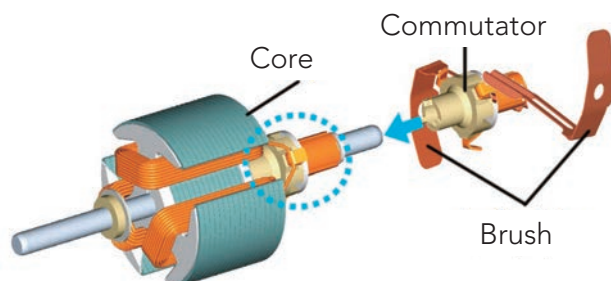
Even using the same magnets, a motor will have different characteristics depending on the arrangement, angle, circuit control, etc. of the motor. These technologies are common in brush motors and brushless motors alike. In regard to the contact points between brushes and commutators, technology that prevents friction of the components to produce as little sparking as possible during switching boosts durability and decreases electric noise, resulting in longer motor life.

As brushless motors do away with the physical contact involved with brushes, control circuitry is required. We perform optimal control for each motor and also enable fine control matched to the

application, enabling maximization of customers' product value.

Once electric vehicles (EV) have become mainstream, the voltage applied to motors may increase from 12V to 48V. Equipped with the accumulated knowledge in our core technologies, we can adapt successfully to this development.

Gear design technology is another of our strengths. Our company is able to maintain durability even when switching gear material from metal to plastic, to achieve lightweight, low cost, low noise, and high efficiency.



Building intellectual capital

As a dedicated motor manufacturer, motors and motor technologies represent a large share of our know-how and intellectual capital. We intend to build

upon this strong foundation and to keep ahead of the accelerating technological progress in the world, by developing the core technologies I mentioned above through intellectual exchanges with outside parties. For example, we receive proposals from business partners for materials, equipment, and so on, and in other cases we engage in industry-academia joint research. The world until now has been one in which experience gained through trial and error has held sway, but with the advance of IT, simulations have become easy to perform. The speed of research and development has picked up considerably as a result. Through external collaboration, too, we can resolve technical challenges faster. In making decisions about internal manufacturing vs. outsourcing, we aim for efficiency that is balanced with technical value and competitive advantage.

Unitization and solution proposals

Since our basic approach has been to refrain from entering the business domains of our customers, we have taken a cautious view of unitization. However, requests from customers for single packages have been increasing and we've developed and are selling unit products utilizing our core technologies of gears, fans, and rotational position detection mechanisms. We were able to meet an extremely short deadline in response to a request for fan unit motors for air cleaning equipment in transport vehicles for COVID-19 patients, an achievement that I believe was made possible by our strong development, production, and sales capabilities combined with our basic technological capabilities. In addition to meeting around 120% of our customers' requests, we hope to develop solution proposals that will enhance customers' products with added value possible only through our technological capabilities.

Talent who creates intellectual capital and manufacturing capital

Since the global pandemic has prevented us from visiting our overseas production bases, opportunities to support our bases via IT technology have multiplied. In the early days of the pandemic we experienced some confusion, owing to time zone differences especially with production bases in

Poland and Mexico, but after a few months we found our stride. We believe that remote support, which we had positioned previously only as an alternative method, speeds decision-making by allowing the participation of many voices from Headquarters in Japan. As an example, for difficult issues that cannot be decided by one or two people traveling to the location, technicians from several related departments can attend meetings remotely and can make decisions more easily through a broader exchange of ideas.

We conduct 100% of our production overseas, and there are great distances between Headquarters in Japan and our overseas bases. We believe that while Headquarters can provide oversight and creation of new technologies, it is the on-site work that is essential for learning and applying those new technologies. When the pandemic subsides, we want to send more of our young employees overseas and bring more of our people from overseas bases to Japan so as to encourage and optimize exchange of approaches and experiences.

Regarding IT utilization, our introduction of AI-based inspection systems is tackling the quality disparities of inspections that rely on human eyes, and ears. Increasing the use of AI in conducting inspections has also led to a rapid deployment of factory workers into the production process. By making use of the latest IT technology therefore, we can upskill our talent and upgrade the content and quality of the work our people perform.

Global R&D activities

Our research and development activities take place not only at our Headquarters in Japan but also overseas, such as in China and Europe. As a result, by actively and comprehensively acquiring and protecting intellectual property rights, we secure competitive advantages, expand sales and develop new applications for our products.

As of the end of 2020, our company held 789 industrial property rights (162 in Japan, 627 overseas), with 60 additional new and pending applications.