

Building JTEKT's new value

We spoke with five managing officers in charge of technology development, new businesses, and other areas on the theme of "Building JTEKT's new value."



Changes in the business environment

Moderator: What are your views on the advent of CASE¹ and the kind of transformation in the automotive industry that is said to happen only once in a century?

Miyazaki: As someone who has spent many years in the automotive industry, the major changes in the operating environment precipitated by CASE and MaaS² are close to home for me. Evolving its technologies to adapt to changes is a pressing issue for JTEKT. It is therefore critical to always gather the latest information and quickly implement the cycle from the formulation of new strategies to their execution. We therefore view the transformation in the automotive industry to be an opportunity to advance our business rather than a risk.

Segawa: JTEKT has the leading share globally in electric power steering (EPS), so the shift toward electric vehicles (EVs) is a tailwind for the EPS business. In addition, we were involved from an early stage in steer by wire³, so I think this will bear fruit going forward in the era of autonomous driving vehicles.

We do not have any concrete strategy as yet for how we will approach business in the connected and sharing economy. But we will view this risk as an opportunity and continue to consider our approach going forward.

Makino: In the area of autonomous driving, we have partnered with DENSO CORPORATION, Aisin Seiki Co., Ltd., and ADVICS Co., Ltd. to establish J-QuAD DYNAMICS Inc., a new company that develops integrated vehicle motion control software⁴. We will clarify our roles within our external alliances and work toward approaches that join together players involved in products and those involved in services.

Hayashida: This type of open innovation⁵ is becoming more important, and it is clear that the trend away from go-it-alone strategies will accelerate even further. We need to tie-up and collaborate with industry players, academia, and government bodies, including universities and research institutions, in the pursuit of advanced technologies that we cannot build out only with our own resources. As an example of open innovation with a public-sector organization, in April 2019 we announced the establishment of the JTEKT-AIST (National Institute of Advanced Industrial Science and Technology) smart factory collaboration

research laboratory. We have been collaborating with third-party research organizations in the area of materials and components. But our efforts in such fields as IoT⁶ and data analytics⁷ have room to develop, and I believe we should be promoting tie-ups particularly in these areas going forward.

Miyazaki: Up to now, we basically focused on uncovering new technologies in-house while collaborating with universities on an individual basis. But with the pace of technological change in the world today, we are entering alliances not individually but comprehensively and strategically, as research for example in AI⁸ requires tie-ups with universities and public-sector organizations both in Japan and abroad.

1. Acronym that stands for Connected, Autonomous, Shared, and Electric
2. Mobility as a Service: Automobile or other transportation method offered as a fee-based service used only when needed
3. A mechanism that transmits the rotation of the steering wheel to the tire electronically rather than mechanically
4. Software facilitating integrated control of electronically controlled components in multiple units rather than individual units
5. Consolidation of knowledge and technology across organizational frameworks when developing new technologies, new products, and new business models
6. Internet of Things: Automated recognition, control, and remote measurement of information and communications equipment, including not only computers but also every other electronic device with communications functions that are connected to the internet and communicate with each other
7. Extraction of specific patterns and correlations hidden in data using analysis methods and algorithms
8. Artificial reproduction of some "intellectual behaviors" performed by humans using a computer program

Use of AI, IoT, and other digital technologies

Moderator: Please explain how AI, IoT, and other digital technologies will be utilized.

Hayashida: JTEKT is using AI, IoT, and other digital technologies both in its manufacturing processes and in its products. As an example of using AI in the manufacturing process, we have deployed automated inspection equipment that uses image-processing technology to replace the human eye. Meanwhile, as examples of using AI in the machine tool field, we are developing a PLC⁹ that incorporates edge computing¹⁰ as well as an autonomous grinder. We think this will lead to unprecedented improvements in productivity and service levels in both fields.

Segawa: To be part of the commercialization of autonomous driving vehicles, we have begun R&D on deploying AI in steering

system controls. We believe this will be a new way of providing value to our clients. We are also thinking about measuring direct load as part of input sensing that sends road condition data to EPS by affixing sensors on the hubs¹¹ that are attached to tires.

Makino: We view the aging of the population under way globally as an opportunity to create new businesses. Specifically, we have developed such products as Power Assist Suit and Electric Assist & Training "Walker," which support human movement. These products are the result of advanced research into resolving issues in the welfare and long-term care fields. I think leveraging AI in these types of products will also be effective.

Segawa: Power Assist Suits are products that support human movement like muscles do. Yet each person has a different timing when they move and when they exert force. So, if AI technology can be used to create control tailored to each individual, movement will become smoother and users will be able to perform tasks more naturally and comfortably.

9. A control device that controls equipment by outputting a signal according to an arbitrary program in response to a signal from an input device such as a switch; generally called a sequencer
10. Computers distributed near terminals (equipment) that process data to reduce the load on the host systems and prevent communication delays
11. A part in the center of a wheel that connects the wheel to the axle and knuckle

On JTEKT's strengths

Moderator: What strengths do you feel JTEKT should develop further going forward, given the rapid advancement of digital technologies and the dramatic transformation under way in the social environment?

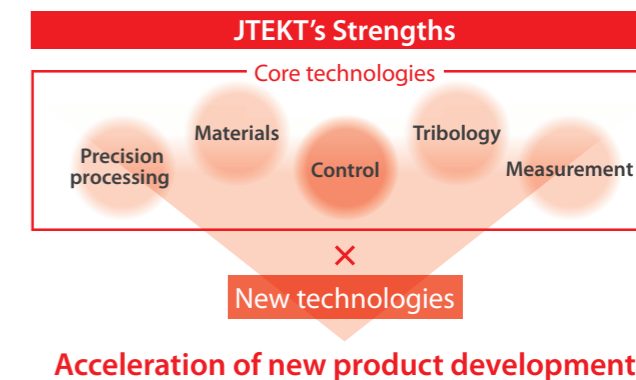
Segawa: JTEKT's strengths are in materials, tribology¹², precision processing, control, and measurement technologies. Commanding these five core technologies makes developing new products based on them possible. In addition, control technology in EPS has become a new strength, and it is very significant that we are able to leverage this technology to enter the autonomous driving market. Further, our ability to expand this technology laterally in other fields is a major strength. Up to now, we have used our core technologies to develop a range of products, but going forward I believe our control technologies will be particularly valuable within the five core technologies as vehicle electrification progresses.

Miyazaki: Autonomous driving, in particular, requires the use of various controllers, and this has placed our control technologies firmly in the spotlight. I think this is our biggest strength when you consider it can be used in new business fields, such as Power Assist Suits.

Our involvement in a wide range of businesses is another of our strengths. In addition to our four main business lines, we have companies in the JTEKT Group involved in the development of electronic components and the manufacture of hydraulic dampers, among other businesses. Led by our No. 1 market share in steering, each of our businesses interacts with a broad range of customers, which allows us to collect a massive amount of know-how and information. This in turn becomes the basis for thinking about how to address the future needs of our customers and is the wellspring of ideas for growth. JTEKT thus has the elements to consider what technologies and products based on our existing technologies should be provided at what time to create significant value. Moreover, our largest strength is the wealth of experience held by the JTEKT Group as a whole, including its Group companies.

Ootomo: Our global manufacturing network is another one of our strengths. We have established manufacturing bases around the world and are thus able to supply our customers in a timely manner. In addition, since we are deploying the manufacturing lines developed in Japan at overseas manufacturing bases, we can conduct *monozukuri* (building excellent products) under the same standards and quality globally. I would like to also note that this manufacturing system has won high praise from our customers.

12. Technical areas involving friction, wear, lubrication, etc., between objects



Contributing to resolving the issues faced by society

Moderator: In the era ahead, I believe companies will be expected to contribute to resolving the environmental issues and other issues faced by society.

Miyazaki: There are two perspectives to responding to environmental protection. The first is how much we can contribute through our products. While a number of our products contribute to environmental protection, the most significant contribution is made by EPS, which greatly improves a vehicle's energy efficiency and lowers the load on the environmental burden. Another of our strengths is the ability to develop and provide bearings that offer low torque¹³ and are gentle on the environment. These bearings reduce friction, which translates directly into reduced CO₂ emissions. The second perspective is saving energy and lowering the environmental impact not in products themselves but in their manufacturing processes.

Ootomo: JTEKT manufactures machine tools and other manufacturing equipment and thus can also contribute to reducing the burden on the environment in the manufacturing field. One of JTEKT's strengths is having Group companies that make machine tools and thermal processing equipment, which are tested in the manufacture of JTEKT's own products. By providing products to customers that have undergone repeated testing and improvements, we are able to contribute to the reduction of CO₂ emissions and waste liquids and oil, not only at our own plants but also on the manufacturing floor of our customers.

In the era ahead, we must consider how we can contribute to achievement of the SDGs¹⁴. As a manufacturer, we must think beyond just making products and consider how we can contribute more broadly to resolving the important issues facing society. First of all, dealing with the declining birthrate and the shift to an aging population is a pressing issue in Japan. JTEKT is working toward more highly productive *monozukuri* and leveraging IoT. From a global perspective, in contrast to Japan, the population is growing and causing shortages of food and water. Going forward, as a global company, I believe it will become critical to view issues on a global scale and prepare for the necessary development from a broad perspective.

Makino: JTEKT has formulated the "Beyond Medium-term Business Plan," which looks beyond the current medium-term business plan. Through this plan, we are creating a concrete vision for what value JTEKT can provide toward addressing social issues and building a framework for product development through backcasting. I believe building such frameworks will become one of our

strengths.

Segawa: In formulating the "Beyond Medium-term Business Plan," we held discussions at executive workshops regarding the JTEKT ideal in 2030 and policies related to business development. The technologies necessary to bring this to fruition are deliberated at Technology Management Meetings. The twin engines of company policy and technology are necessary for the company to move forward with new businesses, and I have the impression both meetings are functioning well toward that end.

Hayashida: We are a *monozukuri* company, but going forward we need to change our approach to business.

As a new business, in April 2019 we launched a matching service called "Factory agent"¹⁵. New business models like this that help to resolve social issues will become more vital in the future. I would like to point out the AI is just one method. In my opinion, we need to consider what to use in combination with AI in our R&D in order to create new value.

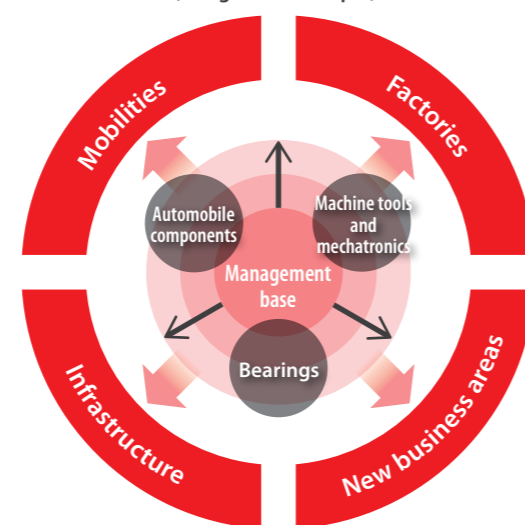
13. Ability to move objects with less force (agrees with low friction)

14. Sustainable Development Goals: International objective composed of 17 goals and 169 targets for realizing a sustainable world, as described in the 2030 Agenda for Sustainable Development adopted at the United Nations Summit in September 2015

15. Please see page 22

"Bone Policy 2030" (Image)

Expand the strengths of existing businesses and create new value (things and concepts)



Vision for JTEKT in 2050

Moderator: Looking further beyond the image of 2030 set forth in the "Beyond Medium-term Business Plan," what do you envision the world will look like and what kind of company will JTEKT be in 2050?

Makino: It is very difficult to imagine society in 2050. That said, only companies that are always looking to the future, comprehending the issues of that era and finding solutions for them, will survive. JTEKT must become that kind of company.

Miyazaki: I think it is important to gauge carefully how society will evolve from a global perspective and how to respond to those changes by collecting information from a variety of perspectives and news sources not limited to Japan.

Ootomo: On that point, the JTEKT Group has bases worldwide that can serve as sensors and antennae to capture trends and changes in each region. I believe it is necessary for us to anticipate trends and changes in each region by compiling this information in Japan, considering and deciding on our response, and then taking action.

Segawa: It is said AI will surpass human intelligence in 2045, and beyond that in 2050 we do not know if the automobile itself will still exist.

That said, even if such an age were to come, we must apply the know-how we have accumulated to develop products that society needs. In addition, no matter how much society transforms, people will still need air and water, food, energy, and other essentials to

continue living. Therefore, I would like to see JTEKT remain a company needed by society through its involvement in such areas.

Miyazaki: I think talent development is critical. We will continue with development, manufacturing, and sales that utilize our strengths. In development, in particular, we will need to strengthen our ties with external parties, such as our alliances with partners from industry, government, and academia. At the same time, we will need to develop diverse talent that can adapt flexibly to changes in society. I believe it is critical that we develop people under alliances that go beyond organizational frameworks both in Japan and abroad.

Segawa: We are currently strengthening our talent base in data analytics and AI. Meanwhile, we have a robust training system for technology with a vast array of seminars targeted at the company as a whole. Within this technology training, we have educational curricula designed to improve the quality of our development, and as a result, we have expanded the number of experts and higher-grade staff in each part of our organization. In addition, the Human Resources Department provides training on problem-solving methodologies, which provides a base to support the company.

Miyazaki: "No. 1 & Only One" is the vision for the JTEKT Group. Going forward, there will be shift from *monozukuri* to *kotozukuri* (value creation). Yet even if this transition does occur, I think it is important that we continue to have pride as a manufacturer and preserve the attitude of developing and providing "No. 1 & Only One" products.

