Q&A for Briefing on Sustainability (Summary)
Yaskawa Electric Corporation
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[Speakers]

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Q How does AI Cube view the added value of AI-related products?

A AI Cube's activities are aimed at increasing the added value of Yaskawa's
   products by incorporating its proprietary AI (Alliom) into them, as well as
   realizing the expansion of automation for customers and Yaskawa's workplaces.
   We are also confident that the added value of robots will be significantly
   increased by installing Alliom as a standard feature in the MOTOMAN NEXT,
   which was launched in November 2023, and that synergistic effects such as
   introduction to other companies will be created.

Q Will AI Cube help expand the service revenue?

A As of now, there is no such assumption. It is natural to provide services as part
   of the value chain of the Yaskawa Group's activities, but rather than launching a
   software service only for AI (Alliom), we will update the service by adding AI
   functions.

Q Will NVIDIA's Isaac and AI Cube's Alliom collaborate?

A We will install our AI services in NVIDIA's Jetson (GPU) and provide them to our
   customers. With Isaac we can also leverage NVIDIA's AI technology in the
   process of accelerating user application development. MOTOMAN NEXT does
   not exclusively use AI Cube's AI services, but has an open platform that can
   also use AI ventures' technologies.

Q Is Yaskawa the only company that has been able to put AI into such practical use
   in industrial robots?

A At present, MOTOMAN NEXT is the only product that is equipped with a GPU and ACU (Autonomous Control Unit) which can execute AI as a standard robot controller.

Q With so many companies entering the field of autonomous robots, from what perspective do end users select them? How do they measure cost-effectiveness?

A Since MOTOMAN NEXT takes a new approach to unsolved problems and problems that have emerged in the field of automation so far, there is no comparison standard. In the future, technological development as an industry, including competitiveness, will lead to increased demand. The return on investment depends on the customer's understanding of the value and necessity of automation. Our efforts will be insufficient, if our technology cannot match the cost of automation. Since the evaluation of value is the "benefit" (improvement and evolution) that the customers realize, the autonomous robots can realize automation as hardware itself without the addition of peripheral equipment, and we believe that the return on investment can be expected.

Q How are you considering the production of robots in the U.S.?

A We can only say that the current situation is under consideration. We will announce when, where, and what will be implemented as soon as the details are finalized.

Q Is there a possibility that the amount of investment in the U.S. will increase from 30 billion yen?

A We do not have any plans to increase the investment amount in terms of strengthening our base, but if we look at the overall strategic investment in the U.S. business, there is a possibility that we will increase more.

Q Regarding the value of on-site automation, it seems that there is more value than just saving labor. Is the value difficult to quantify? Is it something that can be measured numerically, such as an increase in profits?

A We do not have quantitative indicators. In the first place, it is not sustainable to rely on human capabilities and tacit knowledge to continue production and service activities. In this case, automation is the solution. With automation, the

same data is shared from management to the worksite, strengthening organizational integration and enhancing the PDCA cycle of efficiency and improvement. What is difficult to sustain by depending on manpower is solved by automation. Leveraging data to drive continuous improvement provides motivation toward automation. If we share this idea with our customers, it will lead to sustainable activities.

Q Do customers understand the true value of automation?
A In the case of customers in the food industry, the motivation for automation is to maintain and improve brand value with quality traceability as a keyword. Instead of automating only for the sake of saving labor, we are promoting automation with the aim of ensuring traceability of work in order to guarantee the high quality of all products based on evidence. I am convinced that the number of customers with similar ideas are increasing, especially in Japan.

Q You mentioned that only a small part of the automation field has been expanded. What is the total amount of the automation field? Conversely, what is the rate of automation so far?
A We don't know anything quantitative. Everything that customers want or need to automate is included. It is difficult to quantify because some people believe that automation is impossible. As a reference, we recognize that even in automobile factories, where automation is said to be relatively advanced, the rate of automation is around 20 to 30%, so the rate of automation in industries other than automobiles would be almost 0%.

Q You said that you will respond to new needs in North America. How will you compete with large competitors in North America?
A There is strong competition in the automotive field, and we will focus on how we can strengthen our responsiveness in areas such as semiconductors, which are expected to grow in the future. Also, since there is abundant expertise in the United States to improve the usability of data, including AI, we believe it is important to secure local responsiveness and commitment centered on MOTOMAN NEXT.

Q Can "Alliom" perform simulations using NVIDIA's Isaac?
A Alliom can create the pseudo data necessary for AI generation from a small

amount of training data and execute AI in a short time. Right now, we aren't able to link this simulation with NVIDIA, but we would like to coordinate and make use of Alliom's results in the future. With regard to data generation, Alliom is good at some areas, such as manufacturing, while Isaac is good at others, so we would like to work together in respective areas of expertise.

Q What are the hurdles for introducing MOTOMAN NEXT?

A There are some technological challenges, but instead of focusing on them, we would like to speed up the process from agreement with customers that the issues can be solved by introducing MOTOMAN NEXT to practical use. There is no doubt that needs are starting to increase, and we have the impression that activities in Europe and the United States are becoming more visible than in Japan. It is important to meet more customers who are interested in automation or understand the necessity of it. We hope that the collaboration with NVIDIA will contribute to the expansion of channels.

Q What brought Yaskawa Electric and NVIDIA closer?

A We started to have contact with each other several years ago. After launching i^3-Mechatronics, they approached us with GPUs as their main products. At that time, we didn't pay much attention to them, but during the development of MOTOMAN NEXT, we became aware of the difference between CPUs and GPUs, and we decided to adopt them because we thought we could verify the performance of GPUs utilization. The current relationship has only been around for the past year. I think the current situation is realized because AI is becoming more practical, we developed MOTOMAN NEXT, and the practical application of GPUs were possible at the same time.

Q There are a lot of AI out there, but what can only be achieved by Alliom?

A There has been progress in simulation-based learning and expansion to robot movement, but we have a feeling that there is still a long way to match the practical application. In AI learning, Alliom overcame the problem that a lot of data needs to be collected on actual machines, and made practical application of AI possible quickly. As data processing capabilities continue to improve, more and more AI will be able to be executed without using actual data. We expect that MOTOMAN NEXT will take on those technologies.

Q Will there be a big difference in competitiveness between conventional robots and robots equipped with AI?

A Conventional robots use a teaching playback method, which guarantees the robot's position in motion for mass production purposes. However, the competitive advantage in this area may be diminished. Since MOTOMAN NEXT is executed by plans made by itself while observing the state of the objects, the response to the operation plan is important. While the interface for creating a seamless digital twin based on motion technology including actuators and ACU (Autonomous Control Unit) will be open, the core technology of motion control will be pursued in-house. As digital twins become the mainstream of factory automation, the competitiveness of motion control will become more important.

Q What is the expected cost reduction effect of insourcing of machining?

A Costs can certainly be reduced compared to purchasing from outside suppliers such as partner factories. In particular, labor costs are almost zero since the factory is fully automated.

Q After the COVID-19 pandemic, the number of suppliers for parts procurement increased. Will the relationship with suppliers change in the future?

A With regard to semiconductors and other parts that have become difficult to procure due to the COVID-19 pandemic, we plan to increase options for suppliers. On the other hand, from the perspective of BCP, there are parts that are now procured from different regions. We have been changing the policy depending on the type of parts.