

EBARA IR 2023 | Day 2 | Dry Vacuum Pump Automated Plant “V7” Tour Q&A Highlights

<Overview of the Q&A session from Day 2 of EBARA IR Day 2023 held on December 5, 2023>

**[Ebara representatives]**

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**Participant 1:** As my first point, on the subject of future production capacity, can you discuss what room you have for expansion? Also, please touch on plant operating rates and utilization.

**Tsuyuki:** On the subject of our room for expansion, inside the V7 plant we have left room for expansion for both automation and assembly lines. With processing facilities, there is the possibility of running out of capacity as assembly capacity increases in the future. In response, we are considering options such as upgrading outdated areas of the Fujisawa District. We are also evaluating plans for certain overseas investments. Processing facilities represent a critical portion of our technology so we are also considering internalizing processes. On the subject of operating rates, due to the current economic environment, operating rates have indeed dropped compared to last year. Conditions do not allow for full operations of assembly lines either. We were at full capacity during February and March of this year. Compared to that period, currently we are at around 70 percent.

**Participant 1:** As my second question, could you provide a breakdown of the models you are currently producing? Please indicate what level of production volume is represented by mainstay products.

**Tsuyuki:** Our production composition is heavily weighted toward products for semiconductors. Among those, the EVX model is widely used in medium-load applications. These products account for roughly half overall. Apart from those, 20 to 30 percent is represented by products for what we consider light-load applications such as load lock or transfer chambers. These processes involve a vacuum feed and usually involve pumps that do not require special gasses. The rest is what we call heavy load, which includes film formation equipment and other devices that produce large volumes of dust. These heavy-use products account for roughly 20 percent. From light to medium to heavy, the pumps gradually get larger. The approach of comparing sales with the number of units sold is not applicable but this represents the balance we are maintaining for production.

**Participant 2:** Please discuss the benefits gained through the launch of this plant. You indicated personnel reductions of 10% and a two-fold increase in production capacity, but I would like you to provide details on aspects like productivity, profitability, or lead time. I am not necessarily interested in hearing about how much volume has increased or about how many shipments you are making. I got the impression that automation had advanced significantly so could you speak a little more

about the effects of this? Please discuss conditions in terms of before and after. I don't know how conditions were before so I would like to know to what extent things have changed.

**Fujiwara:** Advancing automation has allowed us to reduce lead time for assembly and processing. This is about 10% for assembly.

**Participant 2:** As another question, will current production capacity be sufficient if demand increases in the future? Can you continue based on demand levels from FY2022? Are you proceeding with the assumption that capacity will be enough to make it to 2030? Or, do you think you will need to increase production capacity around 2025? Please discuss your assumptions about scheduling for production capacity.

**Fujiwara:** Regarding assembly, we can cover demand through 2030. As for processing capacity, we think we will need to expand our capacity.

**Participant 3:** I have two questions. Increasing production is one thing but what happens if you have to decrease production? For example, if the operating rate falls to 50%, will you have to reduce personnel?

**Fujiwara:** Personnel reductions would be necessary. We use contract employees so, fundamentally speaking, we can control the number of contract personnel on a daily unit rate to match production capacity.

**Participant 3:** In terms of operating expenses, will fixed costs remain the same at around 50%?

**Fujiwara:** That is correct.

**Participant 3:** I would like to ask about the system introduced on Page 14 of the materials. With automated systems, have you already successfully automated the process through production planning after sales receives an order? A moment ago, you stated that production planning is done by people. At present, does automation begin with production? Or, is a production order issued automatically upon receipt of a sales order? Please explain your approach with this system.

**Fujiwara:** From order received through the finalization of production plans, AI calculations are used for the 1st floor processing line. For that work, automation is possible once assembly plans are finalized. As for assembly plans, customer conditions may change so those are worked in after finalization of production plans.

**Participant 3:** Is your goal to establish a system that enables the automated creation of production plans immediately after an order is placed by a customer? Is that difficult?

**Fujiwara:** We think creating the seamless flow through to production plans is difficult. We cannot completely eliminate processes with production planning that involve making adjustments as work proceeds.

**Participant 4:** Looking at Page 6 of the materials, there are two patterns where dry vacuum pumps are used: clean rooms and sub-fab. Does the selection of Ebara equipment come down to a decision by either the chip manufacturer, the SPE manufacturer, or the company that makes the clean room?

**Tsuyuki:** The decision-maker is often the chip manufacturer. In some cases, the equipment manufacturer will make decisions on parts directly embedded into equipment. From the perspective

of the customer, the device manufacturer is the main party although this is sometimes the equipment manufacturer depending on the situation.

**Participant 4:** When formulating production plans, do you converse directly with the device manufacturer.

**Tsuyuki:** Yes. We discuss with customers while also paying attention to the device manufacturer's investment plans.

**Participant 4:** My second question is regarding your outlook for next year. Although these might be competitors, in speaking with other companies in the same industry, they suggest that the second quarter of next year could be the start of a recovery for the semiconductor market. What is Ebara's view of the economy and what are your projections for next year?

**Tsuyuki:** Our view of the economy is that it will take a little while longer before we see signs of a bright outlook. At the same time, we do anticipate that as we head towards the latter half of next year, the economy should improve compared to this year. We think that if the DRAM market improves, then the market will follow that momentum. We will make preparations while paying attention to conditions at customers engaged in cutting-edge logic. However, looking at press releases, customers are still taking a conservative approach. We hope to see movement quickly. We will also focus on the cutting-edge developments in EUV.

We feel things will improve from around the second or third quarter, and we have heard similar sentiment from other equipment manufacturers. That said, this is a rather general sentiment.

**Participant 5:** My question is regarding your approach to supplying overseas. In your explanation earlier, you indicated that you also conduct knockdown production in certain overseas markets. Generally speaking, are you exporting products assembled at V7 or are you assembling certain products overseas? I would like to know the ratio for those processes.

**Tsuyuki:** We do some knockdown production overseas, although the ratio is small at less than 10 percent. This is related to specific needs, so we limit the use of that production style to specific models.

**Participant 5:** When considering costs, is it correct to assume that your current production and assembly methods are based on coming to the conclusion that it is cheaper to do everything in Japan and then ship overseas? Would increasing knockdown production overseas lead to decreased costs?

**Tsuyuki:** Situations are changing due in part to geopolitical conditions and the impact of foreign currency markets. However, generally speaking, the most critical aspect within Japan is processing technology. Our basic stance is to successfully internalize those processes. However, assembly involves various customizations, and we have overhaul (OH) businesses in various countries around the world. Overhauls involve disassembly, internal cleaning, and replacing any damaged parts with new parts, to return the equipment to a like-new condition. Generally speaking, with dry vacuum pumps for semiconductors, customers regularly implement overhauls.

In that sense, we do have the technical skills and assembly knowhow at our overseas plants, so we will take advantage of our overseas assembly capabilities based on assessments of customer situations. We will strengthen our overseas presence by also considering the approach of using local procurement to create cost-competitive products.

**Participant 5:** Another question I have is slightly related to the current topic but I would like to ask about the status of in-house component manufacturing rate at Ebara. How much room do you have to decrease component procurement cost in terms of processing? In which areas can you make improvements?

**Tsuyuki:** Do you mean with rotors and other machined components? We are not at a point where we have achieved 100% in-house manufacturing. Components are different in terms of difficulty. For certain components, we collaborate with suppliers.

**Participant 5:** Are there any areas when you can look to make improvements in the future?

**Tsuyuki:** Our current efforts are on increasing operating rates. We will continue technical evaluations for shortening the time required for each unit. We will work to improve production efficiency and reach our goals for the rate of in-house manufacturing. Moving forward, we want to continue increasing this rate even as the market grows.

Another point is that we are engaged in research towards improving processing efficiency while also giving consideration to materials. We will also consider facility investments in areas where we are lacking. We are advancing preparations from multiple perspectives.

**Participant 6:** I have two questions. First, with your dry vacuum pumps, I would like to confirm the sales ratio for products being produced at the V7 plant.

**Tsuyuki:** This accounts for 60 to 70 percent of new product sales.

**Participant 6:** So, the remaining 30 to 40 percent of sales are not from the automated production lines?

**Tsuyuki:** A portion is exhaust systems for EUV lithography systems. This is also a type of a dry vacuum pump, but they are not being produced using automated manufacturing at V7. We also manufacture larger, specially customized pumps, some of which are produced at plants other than V7. There are also some products that we manufacture overseas. Overall, the ratio is roughly 7:3.

**Participant 6:** With your current portfolio, would it be difficult to conduct all production on an automated production line like V7?

**Tsuyuki:** Rather than it would be difficult, we did not devise plans based on such a concept. We have a range of products so, to a certain extent, we produce multiple types of products on the same line.

**Participant 6:** I would like to ask about the difference in profitability between your company and the competition. For example, a certain company's scope of sales is significantly smaller than Ebara's and Ebara is much more advanced in terms of automation and other initiatives related to production processes. Despite that, I did not feel there was a significant difference in actual profitability. What is the reason behind this? Is it a problem of pricing? They do not disclose actual figures so this is just an observation, but I would like you to explain why your profitability is not improving despite all these initiatives.

**Tsuyuki:** Needless to say, we want to make significant improvements to our profitability. One reason is that we are making up-front investments in various areas, including capacity. We are also focused on R&D. That leads to somewhat of a difference compared to other companies. As for pricing, we have an extremely solid competitive advantage when it comes to pumps for difficult

processes. However, there is price competition in other areas. As such, we are working to revise prices by negotiating with customers to reflect the impact of recent cost increases. Of course, automation is an ongoing progress, so as automation accelerates, we will be able to recover those investments.

**Participant 6:** So now is the time for up-front investments. Will profitability increase over time?

**Tsuyuki:** We will work to increase profitability.

**Participant 6:** Lastly, I would like to ask about demand for dry vacuum pumps. I assume that as the number of chambers, including for etchers, increases, the per-unit number of dry vacuum pumps installed in systems should necessarily increase. At what pace is the number of per-unit installations increasing?

**Tsuyuki:** Etching equipment is based on a multi-chamber system and it is my impression that the number of chambers is increasing. On the other hand, film formation equipment is seeing a trend towards increases in size. Also, with the increase in the number of processes, the number of equipment is increasing. In particular, the number of film formation and etching processes is increasing.

**Participant 6:** Has the number of installations per unit not changed that much?

**Tsuyuki:** This has increased in devices such as etching equipment, but if the question is whether or not this has doubled, then that is not the case.

**Participant 7:** I would like to gain an understanding of profitability. For example, would profitability decline based on the same production volume as 2018, prior to creating V7? This is difficult to assess from the outside looking in. With a 10 percent personnel reduction achieved through automation and with fixed costs increasing, would the same production volume as 2018 mean a decline in profitability? Or, do improvements in other areas like the decrease in coating volume play a factor?

**Tsuyuki:** Compared to 2018, investments and personnel expenses mean that the break-even point has risen.

**Participant 7:** You indicated that the creation of V7 will double production volume. By how much do you need to increase production volume in order for profitability to increase over past performance? Is it the case that profitability will not increase if you don't double production? Or, is it the case that, due to the benefits of mass production, a 30 percent increase over 2018 will increase profitability over past performance? I would like to get a sense of this.

**Tsuyuki:** In reality, profitability is increasing. We have implemented policies to promote increases in profitability compared to the past. Overall, Ebara is bearing an expense burden, but it is not our view that profitability is dropping when looked at on a product-specific basis.

However, we do think that there is room to improve peripheral and after-sales services when considering overseas customers or compared to competitors. Efforts to reduce product costs and increase profitability are not only being made through production technology, but through product development as well. We will work to increase revenue, including from S&S, as we aim to improve profitability.

**Participant 8:** Earlier you spoke about competition and that you have an extremely solid competitive advantage with pumps for difficult processes. What aspects are driving the strength of your competitive advantage? Also, I imagine that the recent automation will not only contribute to operating rates but also make production easier to control and lead to increased volume. In markets with relatively little competition, for example, such factors could influence prices. As a result of automation, the large investment amount has likely created a significant burden in terms of depreciation but, looking ahead, do you expect to be able to generate profits even at lower prices relative to the competition? Is that something that will create a competitive advantage? Although it may require an extended recovery period and results may vary depending on the competition in each domain, what merits or benefits will you achieve as a result of the recent automation? Could you please touch on this matter?

**Tsuyuki:** With products such as film formation equipment, the life of the pump changes greatly depending on the reactions of various gasses. We have a strong track record and are in an advantageous position in terms of addressing needs related to preventing materials coming out of semiconductor manufacturing equipment from solidifying. We receive high praise for the structures and performance capabilities of our various pumps and results achieved in the area of powder performance and preventing pumps from stopping. For the customer, performance is directly linked to downtime, which in turn leads to costs related to switching.

The structure of the pumps is not that different from those of competing manufacturers, so the number of man-hours would not change that much in a human-driven production. The challenge of automation is to increase efficiency and increase competitiveness. This means man-hours and speed. We want to advance automation so that we can differentiate ourselves even further in those areas.

On the other hand, we want to establish the utilization of numerical data gained through automation as another strength. In addition to traceability QC, we also want to identify what type of connection will give what kind of performance. By using this information in assembly, we can use DX to find out whether performance can be improved, or whether we can make some kind of predictions. With that in mind, we are also taking on the challenge of how we can achieve data innovation at the V7 plant.

**Participant 8:** Delivery time and production LT are becoming shorter. Will this become a strength against the competition as you work to meet customer needs? Perhaps this is more of an operational advantage for your company. Rather than being related to the competition, is the key to automation the benefits for Ebara such as smoother transportation and losses reduction?

**Tsuyuki:** When operations rely heavily on people, responding to market fluctuations becomes difficult in other aspects. The aim of automation is to eliminate those aspects as much as possible. As I said in the video, our ultimate goal is to establish a factory that operates even after the lights go out. The other thing is the standardization of our supply chain. Those are the types of areas on which we want to focus.

**Participant 9:** My first question is regarding the effect of operating automated factories. With V7, have you been able to generate synergy within the group? For example, such as technologies coming from companies other than the Precision Machinery Company, or using V7 for other companies? Please discuss your approach in this area.

**Fujiwara:** Our automation efforts represent some of the most cutting-edge initiatives, even for Ebara. There were few examples of automated assembly at other Companies, so, rather than synergy, this was achieved as a new initiative.

While I cannot speak specifically to the ripple effect from here, I can say that we did not automate solely for dry vacuum pumps. We view this as one of the initiatives to increase the competitiveness of the EBARA Group as a whole, and we will continue collaborating and promoting the internal application of these technologies to other Companies.

**Tsuyuki:** On a side note, within our corporate functions, there is also a unit that oversees production technology, and we are also working with that unit. We also use AI in robots for trash incineration. Our organization is functioning in terms of corporate working as a head office function to combine the technologies possessed by each Company and make use of what is available. We are ensuring that all Companies are working in collaboration.

**Participant 9:** During the tour, you mentioned being surprised after returning from Taiwan. Was the source of your surprise the state of external robot manufacturers and system integration, or because of the scope of technological innovations achieved in AI and IoT? I understand that this is the result of individual efforts, but was it because of the large investment amount, or because of the group's commitment? I would like to know what surprised you.

**Tsuyuki:** With robots used in automated assembly, the rotor and casing is managed within a very narrow gap, so a robot cannot provide the same level of tactility achieved when a person conducts assembly. For example, with sealant materials, I questioned whether assembly could really be achieved with robots in that way. I was surprised by the use of each robot and the effort put into figuring out how the robot would grasp the material. I imagine it was something that could not be achieved without the efforts of numerous people, including robot manufacturers. I wasn't on site, so I was surprised at how well it turned out. In particular, humans sometimes forget, but robots never forget. They don't feel that something is heavy or get tired. I want to make more use of that. Also, many of the engineers involved in this work are studying hard and coming up with various ideas on their own and thinking ahead to the next challenges. Engineers I used to know have leveled up, so it was surprising in many ways.

**Participant 9:** As one last point, solar power was introduced in the section about the benefits of automated factories. From an ESG perspective, is this now a sustainable factory? There are various considerations such as automation plus labor saving and energy saving, but how much CO2 has been reduced? There are other aspects beyond solar power generation such as air pressure, making things smaller, and eliminating air leaks, and I imagine the same goes for coating but what do these things look like in terms of before and after? If production can be run 24 hours a day in the future, it seems like that would be a benefit but are you experiencing any momentum like this?

**Fujiwara:** Although we don't have numerical values, at the very least it is an advanced factory, so air conditioning systems and other equipment are energy efficient. We also use the latest equipment for air efficiency, etc. As for whether there will be no downside in the future, that is not the case. We want to reduce CO2 emissions and save energy in factories.