



Harmonic Drive Systems Inc.

Financial Results for the 1st-Half of the Fiscal Year Ending March 31, 2022

November 19, 2021

Event Summary

[Company Name]	Harmonic Drive Systems Inc.	
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[Event Name]	Financial Results for the 1st-Half of the Fiscal Year Ending March 31, 2022	
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[Venue Size]		
[Participants]		
[Number of Speakers]	3	
	Akira Nagai	President, Representative Director and Chief Executive Officer
	Kazutoshi Kamijoh	Director, Executive Officer, General Manager of Finance Accounting and Tax
	Akira Maruyama	Director, Executive Officer, General Manager of Corporate Planning and ICT promotion
[Analyst Names]*	Yuichiro Isayama Toshiharu Morota	Goldman Sachs Japan Co., Ltd. Okasan Securities Co., Ltd.

*Analysts that SCRIPTS Asia was able to identify from the audio who spoke during Q&A.

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Presentation

Moderator: Ladies and gentlemen, we will now begin the financial results briefing for the first half of the fiscal year ending March 31, 2022, of Harmonic Drive Systems Inc.

I would like to introduce our speakers. Mr. Akira Nagai, President, Representative Director and Chief Executive Officer.

Nagai: My name is Nagai. Thanks.

Moderator: Mr. Akira Maruyama, Director, Executive Officer, General Manager of Corporate Planning and ICT Promotion.

Maruyama: I am Maruyama. Thanks.

Moderator: Mr. Kazutoshi Kamijoh, Director, Executive Officer, General Manager of Finance Accounting and Tax.

Kamijoh: This is Kamijoh. Thanks.

Moderator: Today, Director Kamijoh will give an overview of the financial results and forecast for this fiscal year, and President Nagai will explain the future outlook.

Director Kamijoh, please.

Kamijoh: Thank you very much for taking time out of your busy schedule to participate in our financial results briefing today.

Now, I would like to explain the summary of the financial results for the first half of the fiscal year ending March 31, 2022, and the full-year forecast, in accordance with the material uploaded on our website today.

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Consolidated results for 1H FY03/22 (Vs. original forecasts)

	Original forecasts (announced Aug. 6)		1H FY03/22 (actual)		Vs. original forecasts	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
	(millions of yen)					
Net sales	26,000	100.0	26,341	100.0	341	1.3
Operating income	3,700	14.2	3,527	13.4	▲172	▲4.7
Ordinary income	3,700	14.2	3,565	13.5	▲134	▲3.6
Net income	2,500	9.6	2,218	8.4	▲281	▲11.3
EPS (yen)	25.97	—	23.05	—	▲2.92	▲11.3

Net income (loss) refers to net income (loss) attributable to owners of parent.



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First, I would like to provide an overview of the financial results for the first half of the fiscal year ending March 2022. Now, please look at page 2.

Consolidated results for the first half of the fiscal year ending March 31, 2022, compared to the forecast announced on August 6, 2021, are as you see. The overall results were generally in line with the plan.

Sales in Japan were in line with expectations, but overseas sales were slightly higher than the plan due to the impact of foreign currency translation and other factors. Operating income in each region and at each subsidiary was generally in line with the plan, but the elimination of unrealized profit related to products exported from Japan to overseas subsidiaries was about JPY200 million higher than expected, resulting in slightly lower-than-expected operating income.

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Consolidated results for 1H FY03/22 (year-on-year change)

	1H FY03/21		1H FY03/22		Year-on-year change	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
	Net sales	17,702	100.0	26,341	100.0	8,638
Operating income	▲212	—	3,527	13.4	3,740	—
Ordinary income	85	0.5	3,565	13.5	3,480	4,093.6
Net income	▲16	—	2,218	8.4	2,235	—
EPS (yen)	▲0.17	—	23.05	—	23.22	—
Capital investment	835	—	4,074	—	3,239	387.5
Depreciation	3,622	—	3,933	—	310	8.6
R&D expenses	1,174	—	1,372	—	197	16.8

Net income (loss) refers to net income (loss) attributable to owners of parent.

Depreciation includes depreciation of tangible assets and amortization of intangible assets and goodwill.



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Please refer to page 3. Here are the consolidated results compared to those for the same period of the previous year.

The results for the first half of the current fiscal year showed a significant increase in both sales and profits, and we are back in the black. In the second quarter of last year, we were in a severe business environment due to a decrease in demand caused by the reluctance to make capital investments caused by the coronavirus, as well as the fact that we were in the tunnel of prolonged inventory adjustment.

On the other hand, in the second quarter of this year, supported by a recovery in demand for capital investment as well as an increase in orders due to the completion of inventory adjustments, sales increased in all major regions including Europe and the Americas as well as in Asia, including Japan.

Profits increased due to the impact of higher sales, despite an increase in variable costs as well as fixed costs compared to the same period last year, when we had tightened our cost controls.

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Performance of main group companies in 1H FY03/22

(millions of yen)

	Equity stake	Net sales		Operating income	
		Amount	Year-on-year change (%)	Amount	Year-on-year change (%)
Harmonic Drive Systems Inc.	—	19,025	89.5	3,744	798.8
※2 HD Systems, Inc. (Harmonic Drive L.L.C.) (U.S.A)	100% (100%)	2,989	11.5	251	▲6.6
Harmonic AD, Inc.	100%	1,320	70.1	171	—
※3 Harmonic Drive Systems (Shanghai) Co., Ltd.	100%	2,094	54.2	177	45.9
※4 Harmonic Drive SE (Germany)	100%	6,198	14.0	591	29.7

*1 For overseas subsidiaries, the fiscal year ends December 31.
 *2 Exchange rates: Jan-Jun 2020 1USD = ¥108.27, Jan-Jun 2021 1USD = ¥107.69
 *3 Exchange rates: Jan-Jun 2020 1CNY = ¥15.39, Jan-Jun 2021 1CNY = ¥16.66
 *4 Exchange rates: Jan-Jun 2020 1EUR = ¥119.30, Jan-Jun 2021 1EUR = ¥129.82



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Please see page 4. Here are the results of our major group companies.

First is the US subsidiary. Sales increased due to an increase in demand for semiconductor manufacturing equipment and medical equipment. The new plant, built 2 years ago, started partial operation last year, and with the full transfer from the old plant this spring, it is now in full operation. This resulted in an increase in sales but a decrease in profit due to the increased burden of depreciation and amortization.

Next is Harmonic AD, Inc., a Japanese company that manufactures planetary gears. Both sales and profits increased, and the company returned to profitability due to improved capacity utilization resulting from increased demand for gearheads for motors and semiconductor manufacturing equipment.

Next is the sales company in China. Both sales and profits increased due to an increase in sales to both European robot manufacturers and local robot manufacturers.

Finally, the subsidiary in Germany. Demand in Europe also showed signs of recovery, mainly from robot manufacturers. Sales to the semiconductor manufacturing equipment industry also remained strong.

As a result, sales and profits increased.

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Non-consolidated results for 1H FY03/22 (year-on-year change)

(millions of yen)

	1H FY03/21		1H FY03/22		Year-on-year change	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	10,041	100.0	19,025	100.0	8,983	89.5
Operating income	416	4.1	3,744	19.7	3,327	798.8
Ordinary income	537	5.4	3,832	20.1	3,295	613.4
Net income	388	3.9	2,638	13.9	2,249	578.6
EPS (yen)	4.04	—	27.41	—	23.37	578.6
Capital investment	257	—	3,676	—	3,419	1,325.7
Depreciation	1,404	—	1,586	—	182	13.0
R&D expenses	844	—	1,005	—	160	19.0

Please refer to page 5. As you can see, both sales and profits increased on a non-consolidated basis.

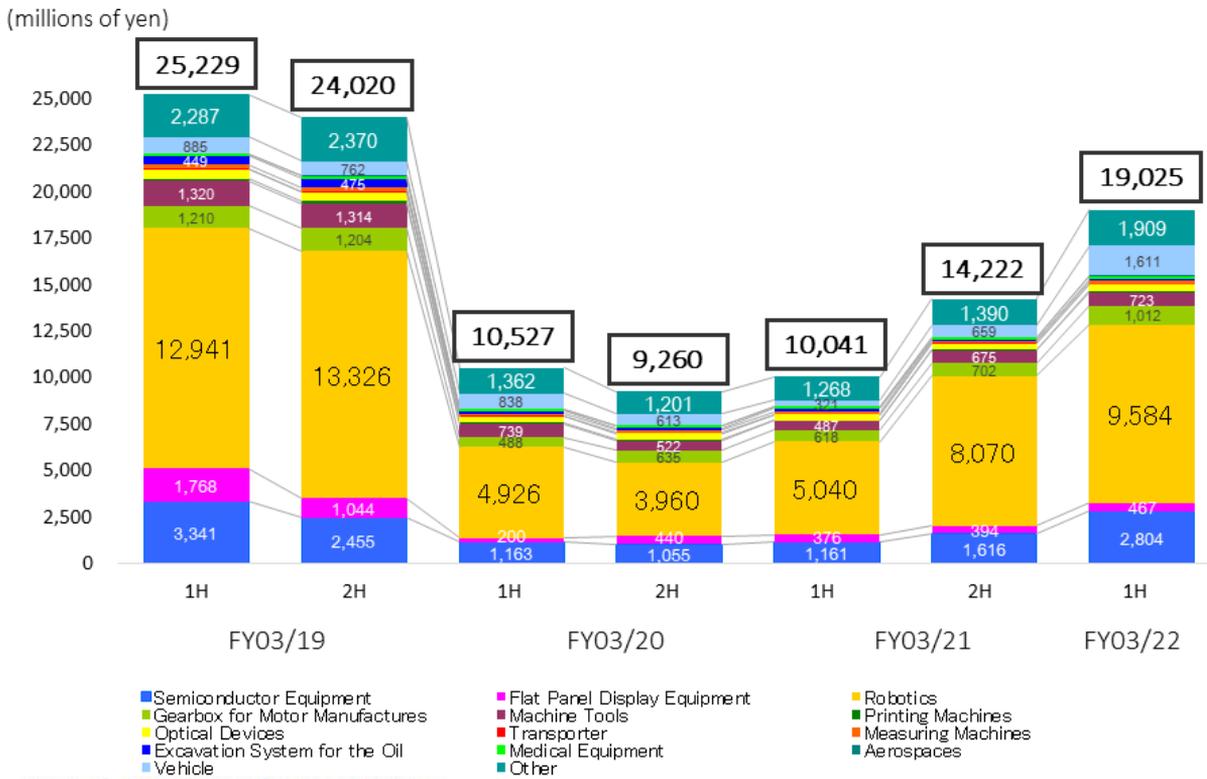
The factors behind the increase/decrease in sales and profit will be explained later in this report.

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Non-consolidated net sales by application



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Next, please see page 6. Here are the non-consolidated sales figures by application.

As you can see, since the second half of the previous year, sales for industrial robots and semiconductor manufacturing equipment have been driving our sales.

For industrial robots, orders for reduction gears for small robots used in manufacturing processes related to digital devices such as smartphones and home appliances increased from robot manufacturers, who are our customers, against the backdrop of rising demand for robots mainly in China, as well as in Europe and North America.

In addition to demand for welding and painting robots, which are mainly used in the automotive industry, demand for reduction gears for small vertical robots and SCARA robots, which have recently begun to be used in battery production processes, has also increased.

For semiconductor production equipment, demand for front-end process manufacturing equipment and wafer transfer robots increased mainly due to the booming semiconductor industry.

Sales of products for automotive use, which are used as automobile parts, increased with the expansion of sales of car models equipped with new engines in which our reduction gears are adopted. In the production of reduction gears for automotive applications, we have made full use of the Ariake Plant, which was completed in 2019, and increased its production capacity by adding a new production line in July of this year.

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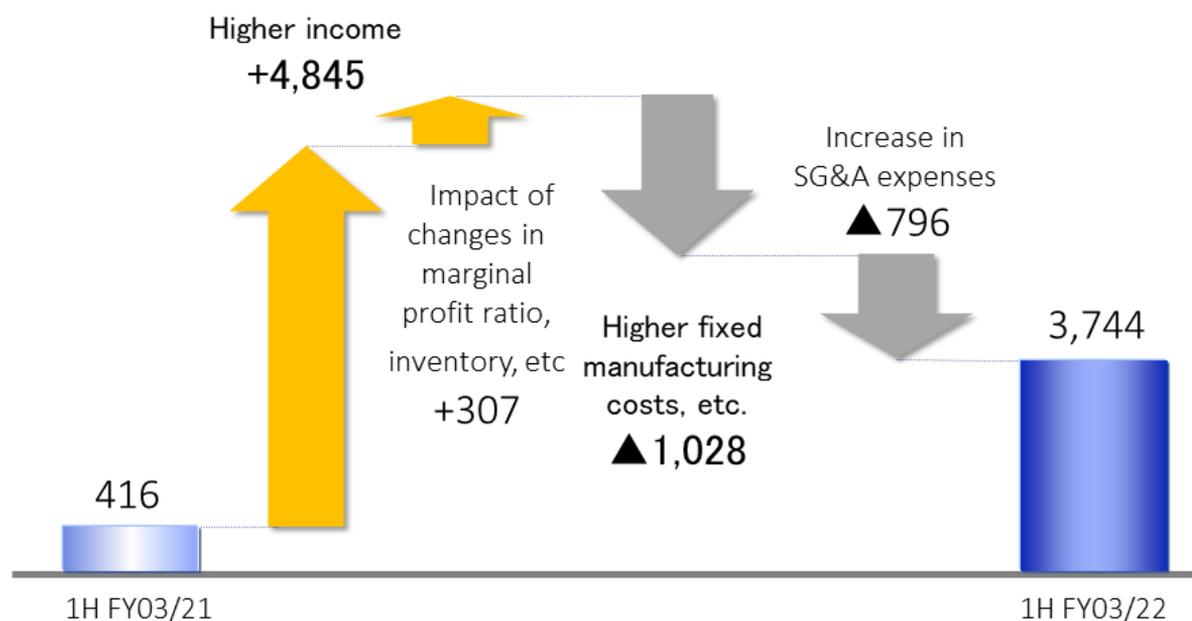
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Breakdown of year-on-year change in non-consolidated operating income

(millions of yen)



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Now, please take a look at page 7. This page shows the reasons for the change in operating income.

First, the impact of the increase in sales was JPY4,845 million. Change in the marginal profit ratio and other factors contributed to an increase of JPY307 million. This was mainly due to the impact of the product mix change caused by an increase in the composition ratio of HarmonicDrive®, the mainstay of our earnings, and the impact of inventory changes.

Fixed manufacturing costs and other expenses increased by JPY1,028 million. This was mainly due to an increase in personnel costs resulting from an increase in the number of employees in the manufacturing division, mainly to raise production capacity, and an increase in performance-based bonuses, as well as an increase in overhead costs due to higher factory utilization.

SG&A expenses increased by JPY796 million. This was due to an increase in personnel costs, an increase in packaging and shipping costs associated with the increase in sales, and an increase in marketing costs.

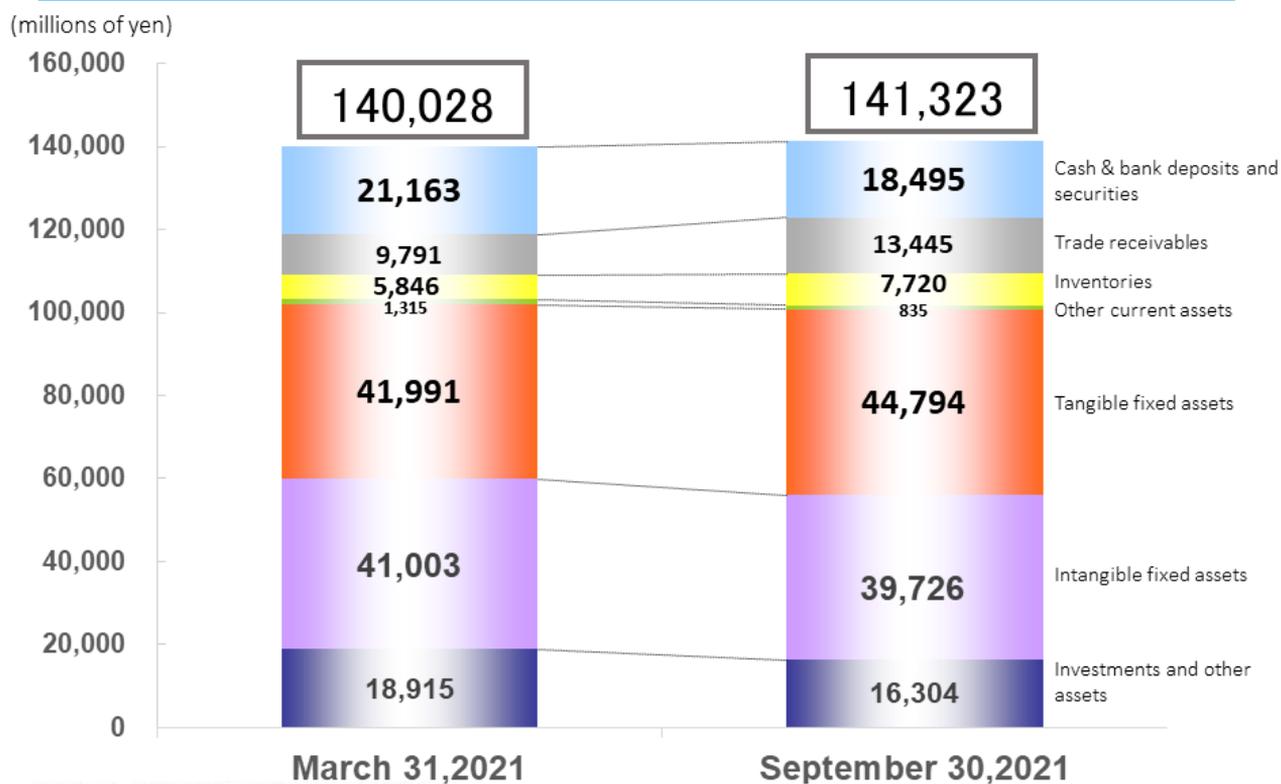
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Status of consolidated assets



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Please refer to page 8. Next is the consolidated balance sheet.

Please check later for details, along with the financial results summary.

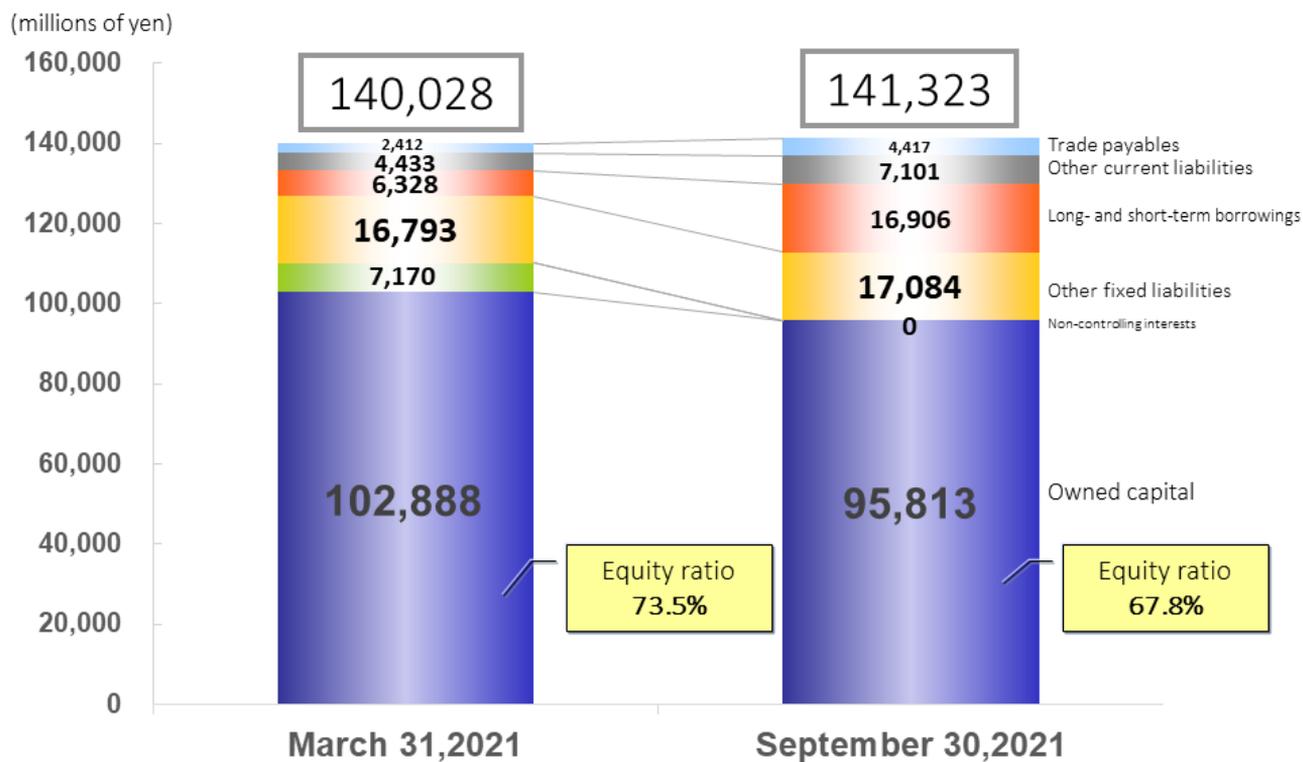
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Status of consolidated liabilities and net assets



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Next, the same applies to page 9.

As previously announced, we made our German subsidiary a wholly owned subsidiary in July of this year for a purchase price of JPY14.7 billion. Borrowings increased by JPY11 billion in connection with this deal, while non-controlling interests and capital surplus decreased by JPY7.1 billion and JPY7.3 billion, respectively.

On the financial side, we have increased debt financing and at the same time reduced equity capital, which we believe will lead to improved capital efficiency.

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Status of consolidated cash flows

(millions of yen)	1H FY03/21	1H FY03/22
Cash flow from operating activities	6,132	4,008
Cash flow from investing activities	▲735	▲16,157
Cash flow from financing activities	▲1,385	9,353
Effect of exchange rate changes on cash and cash equivalents	▲22	339
Net increase (decrease) in cash and cash equivalents	3,987	▲2,455
Cash and cash equivalents at end of period	22,330	17,541

Page 10 is about cash flows. We hope that you will refer to the financial results summary.

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Revisions to consolidated full-year earnings forecasts

【Versus previous forecasts】

(millions of yen)

	Previous forecasts (announced Aug. 6)		Revised forecasts (announced Nov. 12)		Vs. previous forecasts	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	58,000	100.0	56,500	100.0	▲1,500	▲2.6
Operating income	9,500	16.4	8,200	14.5	▲1,300	▲13.7
Ordinary income	9,500	16.4	8,200	14.5	▲1,300	▲13.7
Net income	6,600	11.4	5,500	9.7	▲1,100	▲16.7
EPS (yen)	68.56	—	57.14	—	▲11.43	▲16.7

Net income (loss) refers to net income (loss) attributable to owners of parent.

Assumed exchange rate for FY03/22 forecasts: 1USD = ¥109.50 1EUR = ¥130.00 1CNY = ¥17.00

Reason for revisions

- ◆ Downwardly revised sales forecast for automotive speed reducers due to the impact of production cutbacks by automobile manufacturers as a result of shortages in the supply of semiconductors and other products
- ◆ Profit mainly reflects the impact of the revision in net sales



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I would like to move on to our full-year business forecast. Please refer to page 12.

On November 12, we revised downward our full-year business forecast, which was announced on August 6. This is a revision of net sales mainly due to the fact that our customers, the automobile manufacturers, are expected to reduce production due to the recent tight supply and demand for semiconductors.

For the fiscal year under review, the Company formulated a sales plan for in-vehicle reduction gears based on customers' production plans, with a view to improving conditions in the automobile market and expanding the number of models in which our products are installed, with respect to HarmonicDrive® used in new engines. Unfortunately, however, as we entered the early fall, our customers revised their production plans downward due to the impact of semiconductor components and other factors, and we also revised ours.

In addition, in terms of the impact on the procurement of semiconductors, some of our mechatronics products are becoming difficult to obtain, and we have factored in a certain amount of the risk of delayed shipments as a correction factor, but we expect this impact to be minor.

Demand for production equipment, mainly for industrial robots and semiconductor manufacturing equipment, other than for automotive applications has remained strong, and we have already secured a sufficient order backlog, so please understand that the revision is mostly due to short-term production cutbacks by automakers.

As for the revision of operating income, the impact of this decrease in sales is dominant, but the impact of unrealized gains related to inventories has also been taken into account.

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Revisions to non-consolidated full-year earnings forecasts

【Versus previous forecasts】

(millions of yen)

	Previous forecasts (announced Aug. 6)		Revised forecasts (announced Nov. 12)		Vs. previous forecasts	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	43,000	100.0	41,000	100.0	▲2,000	▲4.7
Operating income	8,800	20.5	7,600	18.5	▲1,200	▲13.6
Ordinary income	8,800	20.5	7,600	18.5	▲1,200	▲13.6
Net income	6,200	14.4	5,400	13.2	▲800	▲12.9
EPS (yen)	64.41	—	56.10	—	▲8.31	▲12.9

Assumed exchange rate for FY03/22 forecasts: 1USD = ¥109.50 1EUR = ¥130.00 1CNY = ¥17.00

Reasons for revisions

- ◆ Same as for consolidated forecasts (see previous slide)



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Next, page 13 shows the revision to the non-consolidated performance forecasts. The main reasons for the revisions are the same as for the consolidated results.

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Consolidated performance forecasts for full-year FY03/22

(millions of yen)

	FY03/21		FY03/22 (forecasts)		Year-on-year change	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	37,034	100.0	56,500	100.0	19,465	52.6
Operating income	865	2.3	8,200	14.5	7,334	847.0
Ordinary income	1,366	3.7	8,200	14.5	6,833	499.9
Net income	662	1.8	5,500	9.7	4,837	730.2
EPS (yen)	6.88	—	57.14	—	50.25	730.2
Capital investment	1,959	—	6,500	—	4,540	231.7
Depreciation	7,389	—	8,000	—	610	8.3
R&D expenses	2,444	—	3,000	—	555	22.7

Assumed exchange rate for FY03/22 forecasts: 1USD=¥109.50 1EUR=¥130.00 1CNY=¥17.00
 Net income (loss) refers to net income (loss) attributable to owners of parent.



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Next, on page 14 is a comparison between the revised forecast and the actual results for the previous fiscal year.

Although we have revised our business forecast, we expect a significant increase in both sales and profits on a consolidated basis for the fiscal year ending March 31, 2022, and we anticipate a favorable business environment for the next fiscal year.

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Performance forecasts on main group companies for full-year FY03/22

		(millions of yen)				
		Equity stake	Net sales		Operating income	
			Amount	Year-on-year change (%)	Amount	Year-on-year change (%)
	Harmonic Drive Systems Inc.	—	41,000	69.0	7,600	195.3
※2	HD Systems, Inc. (Harmonic Drive L.L.C.) (U.S.A)	100% (100%)	6,400	24.3	600	85.7
	Harmonic AD, Inc.	100%	2,900	69.9	330	—
※3	Harmonic Drive Systems (Shanghai) Co., Ltd.	100%	3,800	59.3	280	90.2
※4	Harmonic Drive SE (Germany)	100%	13,400	36.5	1,800	271.5

*1 For overseas subsidiaries, the fiscal year ends December 31.
 *2 Exchange rates: Jan-Dec 2020 1USD = ¥106.82, Jan-Dec 2021 1USD = ¥109.50
 *3 Exchange rates: Jan-Dec 2020 1CNY = ¥15.48, Jan-Dec 2021 1CNY = ¥17.00
 *4 Exchange rates: Jan-Dec 2020 1EUR = ¥121.81, Jan-Dec 2021 1EUR = ¥130.00



Please refer to page 15. Here are the full-year earnings forecasts for the major groups.

The first is our US subsidiary. Net sales are expected to increase by 24.3%. By application, demand for semiconductor manufacturing equipment and medical equipment is expected to remain strong. In terms of expenses, we expect to achieve higher profits for the full year, despite the increased depreciation burden of the new plant.

Next is Harmonic AD, which manufactures planetary gears. Demand for planetary gears remains at a high level, leading to an expected significant increase in sales in the previous fiscal year. Profit is also expected to increase due to improved capacity utilization.

Next is the subsidiary in China. Both European robot manufacturers and local Chinese robot manufacturers are currently experiencing strong demand, and we expect sales to increase from the previous fiscal year.

Finally, the subsidiary in Germany. After bottoming out last summer, orders have been recovering in the current fiscal year. As a result, we expect an increase in sales for both industrial robots and collaborative robots. In addition, with the addition of an increase in the operating rate of the production division, we expect an increase in profits.

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Non-consolidated performance forecasts for full-year FY03/22

(millions of yen)

	FY03/21		FY03/22 (forecasts)		Year-on-year change	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	24,264	100.0	41,000	100.0	16,735	69.0
Operating income	2,573	10.6	7,600	18.5	5,026	195.3
Ordinary income	2,764	11.4	7,600	18.5	4,835	175.0
Net income	1,868	7.7	5,400	13.2	3,531	189.1
EPS (yen)	19.41	—	56.10	—	36.69	189.1
Capital investment	545	—	5,700	—	5,154	944.9
Depreciation	2,872	—	3,300	—	427	14.9
R&D expenses	1,807	—	2,300	—	492	27.2

Assumed exchange rate for FY03/22 forecasts: 1USD = ¥109.50 1EUR = ¥130.00 1CNY = ¥17.00



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Next, please look at page 16. This is a comparison with the previous fiscal year on a non-consolidated basis.

I will explain the factors behind the increase and decrease later.

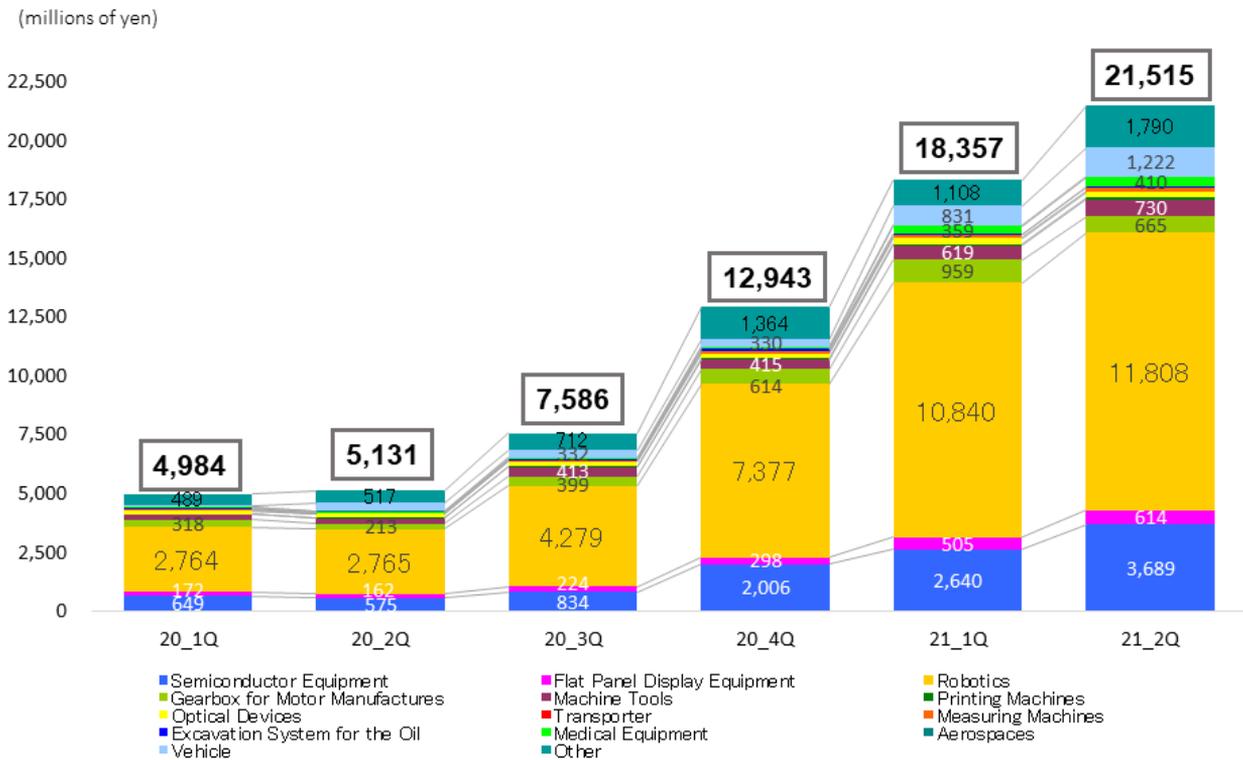
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Non-consolidated orders by application



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Next, please look at page 17. This is the quarterly non-consolidated orders received by application.

As you can see, orders recovered strongly after bottoming out in the first quarter of last year, and the current second quarter results are the highest ever.

Due to the fact that the amount of orders received has been continuously exceeding the amount of sales, the order backlog has been increasing and the lead time of our products has been correspondingly longer, but we have been able to cope with this by adjusting delivery dates through close communication with our customers and distributors.

We also believe that the orders placed with us by our customers and distributors are done in a rational manner based on the production plans for the future.

Although it is very difficult to predict future orders, we expect that the BB ratio will gradually adjust to be closer to 1 as our production capacity is raised and sales increase, since the situation is still firm and no sudden change is seen.

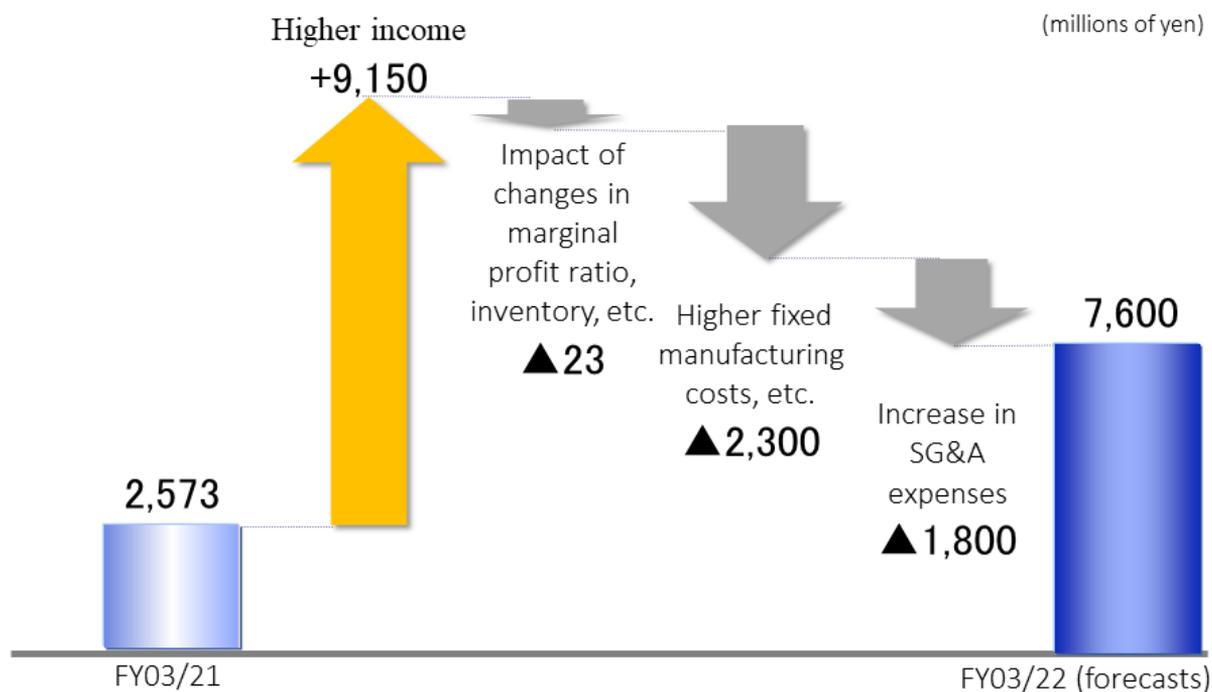
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Factors in year-on-year change in non-consolidated operating income (fiscal year ending March 31, 2022 forecast)



Now, please take a look at page 18. Here are the factors behind the increase/decrease in non-consolidated operating income.

The impact of the increase in sales is expected to be JPY9.15 billion. Changes in marginal profit ratio, inventory changes, and other factors are expected to remain largely unchanged. Fixed manufacturing costs are expected to increase by JPY2.3 billion. Manufacturing expenses and depreciation expenses are expected to increase in line with the full-scale operation of the Ariake Plant. SG&A expenses are expected to increase by JPY1.8 billion. As in the first half of the fiscal year, this was due to an increase in personnel costs, an increase in packaging and shipping costs in line with the increase in sales, and an increase in marketing costs, as well as an increase in R&D investments.

This is the end of my explanation. Thank you for your attention.

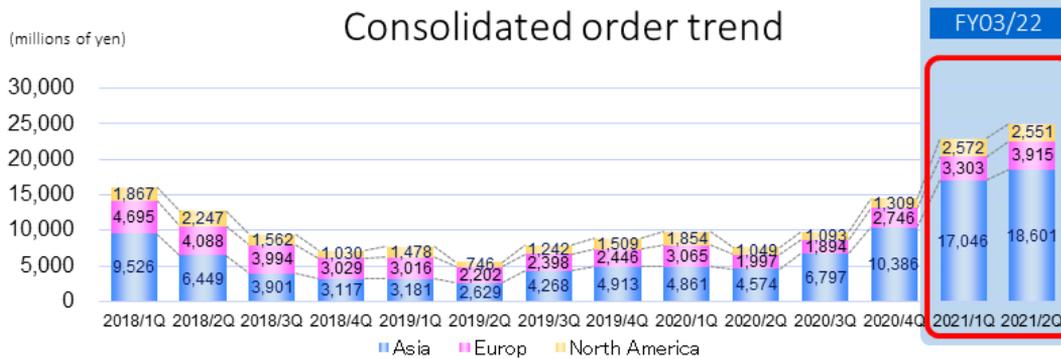
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1-1. Our operating environment

Increased demand for capital investment as economic activity resumes following the COVID-19 pandemic



- Asia** Orders remained high despite the easing of overheated capital investment demand in China
- Europe** Orders recovered in line with normalization of market conditions, especially for industrial robots
- North America** Orders were strong for semiconductor and medical applications, and steady for aerospace applications, while there were signs of recovery in amusement applications



Nagai: I would like to explain our future prospects.

I would like to begin by explaining our perception of the business environment surrounding our company. Please refer to page 21.

As you can see from the graph, the recovery of capital investment in Asia, mainly in China, had been somewhat overheated, but there is now a sense that this has slowed down on the other hand, demand for our products has steadied at a high level.

In Europe, demand from industrial robot and semiconductor equipment manufacturers has been strong due to the normalization after the COVID-19 pandemic.

In North America, along with the recovery from COVID-19, inquiries for semiconductors and, more specifically, for amusement-related products, which had been slow for some time, are now coming in on a large scale.

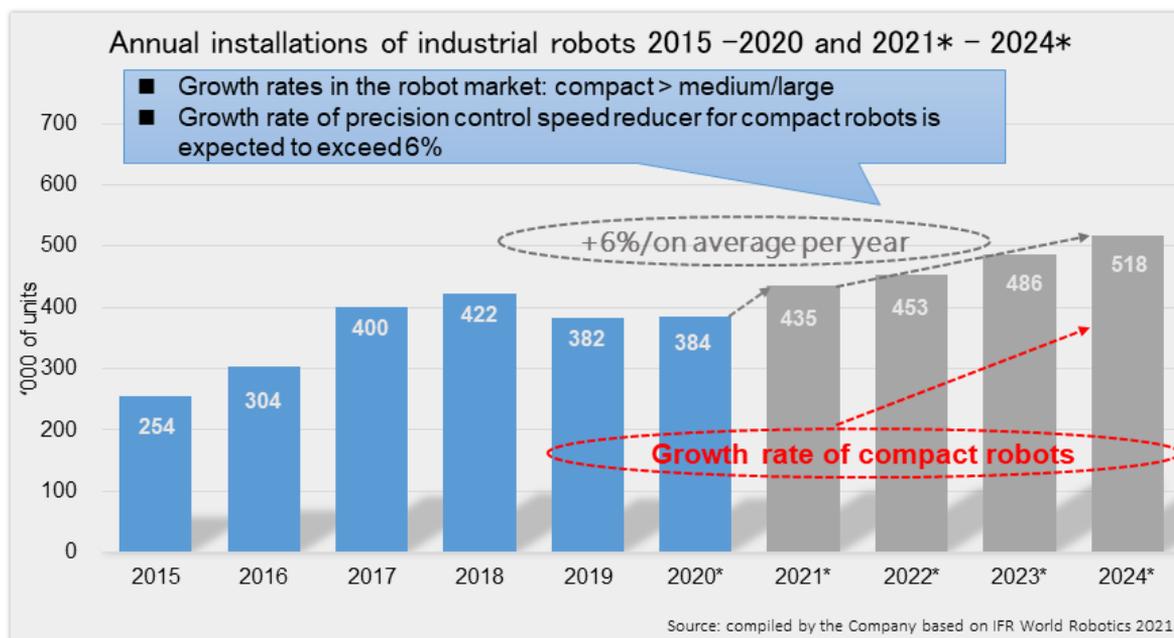
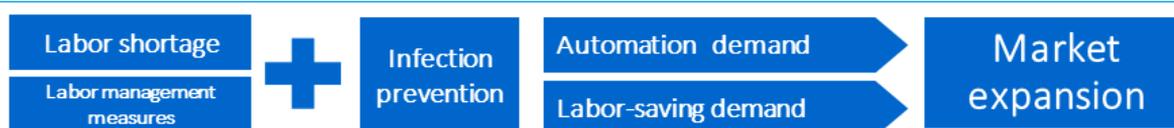
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2-2. Factory automation robot market forecast



Please look at page 23. The main applications of our products remain the same.

The basic structure of the FA robot market has not changed. Due to the shortage of labor in industrialized countries and newly industrialized countries, as well as labor management measures, particularly in China, where more and more advanced electronics are being produced than in the past, installations of robots are expected to increase.

The IFR forecasts a growth rate of 6% per year. Based on the past trend, we believe that the growth rate will continue to be over 6%, unless something unexpected happens. Among these, the growth of small robots is remarkable.

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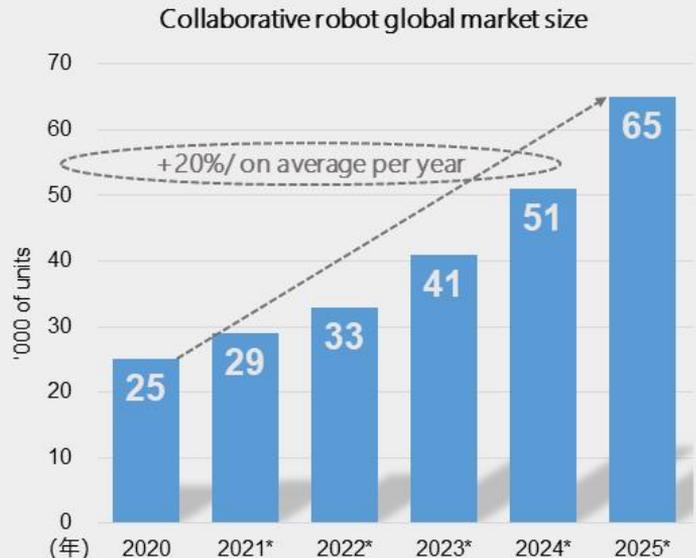
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2-3. Collaborative robot market forecast

- Demand is accelerating for co-bots as a solution for non-contact demand and labor management
- Market expansion is accelerating on the full-scale entry of major robot manufacturers



Courtesy of YASKAWA Electric Corporation



Next is page 24.

Although it is regarded as a type of small robot, the market for collaborative robots is expected to grow at an annual rate of more than 20%, with Universal Robots leading the market, partly because it is a new field. This robot is supposed to contribute greatly to the labor management aspect of FA.

On the other hand, there are some emerging robot manufacturers or ventures that have been proposing the full-scale use of humanoid collaborative robots at workplaces, and we anticipate that our products will be used more and more in this way.

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2-3. Semiconductor manufacturing equipment and surgical robots

Semiconductor manufacturing equipment

- Global shortage of semiconductors driven by the surge in data demand
 - ➡ Large-scale investment by major semiconductor companies to continue beyond 2022
 - ➡ Governments to support the semiconductor industries of their respective countries
- Foundries set to accelerate investment in cutting edge technologies
- Domestic semiconductor production will accelerate in China. Production capacity expansion will lead to higher sales of semiconductor manufacturing equipment.



Automotive: Used in variable compression ratio (VCR) engines

- Achieved improvements in ease of installation, fuel economy, and quietness at high speeds
- This will become the center of Nissan's next-generation engines
- Internal combustion engine, e-POWER
- Production down due to semiconductor shortage
- ➡ No change in total demand



Courtesy of Nissan Motor Co., Ltd.



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Next, for semiconductor production equipment, please refer to page 25.

It is said that large-scale capital investment in semiconductor manufacturing equipment will continue until at least 2022 or 2023, and most recently there is a TSMC/Sony project planned in Kumamoto, which has the aspect of a national project. We are currently working on a list of equipment manufacturers that will be used in this project, as well as a list of our own products.

As Mr. Kamijoh mentioned earlier, due to the impact of semiconductors, Nissan has adjusted its production by approximately 600,000 units, which has had an impact of approximately JPY1.8 billion on us. However, this demand has not disappeared. I am rather afraid that this will put pressure on our company when the semiconductors come back to the automakers in abundance and they start to produce them rapidly. Although we have a system in place to adequately respond to the needs of our customers, delays in delivery and delivery errors are not acceptable, so we are taking a careful approach.

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3-1. Entertainment

CUE, the AI Basketball Robot (Toyota Motor Corporation)

- We cooperated in the development of all the robots up to the latest CUE5
- CUE3 got the Guinness World Records® title for the most consecutive basketball free throws by a humanoid robot (2,020 free throws)
- CUE5's shooting from the half-court line astounded the world
- Our speed reducers were used in a number of the Robots' joints

*Guinness World Records® is a registered trademark of Guinness World Records Limited.



Courtesy of Toyota Motor Corporation

Animatronics

- Harmonic Drive® helps to realistically replicate the movements of people, animals, and fictional creatures
- Major amusement companies are resuming investment as the COVID-19 pandemic begins to subside
- Other companies are actively developing and investing in animatronics products for attractions and shows



Source: Harmonic Drive SE website



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Next, let me introduce new applications. Please see page 27.

In terms of entertainment, as you may have seen on TV, Toyota developed a basketball robot, in which our speed reducers are used in multiple axes.

In the past few years, we have received inquiries for animatronics from 2 famous theme parks in the United States. They had temporarily put their engineers on standby at home due to COVID-19, but they have started to work, and our subsidiary in the US has started to receive large orders. We believe that this is an area that will grow in the future.

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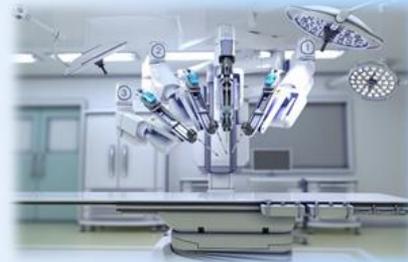
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3-2. Medical care and health care

Surgical robots

- Diverse manufacturers in Japan, the US, and Europe use our products
- Providing total motion control with highly integrated Harmonic Drive®, planetary gear speed reducers, and mechatronics products



Examples of healthcare applications



Medical equipment · Specimen analysis/test equipment/PCR test applications



Assisted suits · Moving into a phase of practical adoption with expanded insurance coverage and subsidies



Electric wheelchairs · Autonomous driving enhances convenience



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Please refer to page 28, which describes medical and health care applications.

Our products have been used in a famous surgical robot for several years now. In the past, there was only 1 robot manufacturer, but now that the patent has expired, major medical equipment manufacturers are entering the market for the same type of equipment, and our products are expected to be used in all of them.

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3-3. Aviation and Space

eVTOL (flying car)

- Electrification of aircraft ➡ CO2 emission reduction
- Our compact and lightweight products are suited to these needs
- Top eVTOL companies are on the verge of commercialization as a product
- What about large aircraft?



Space industries

- Commercial opportunities expand as private companies enter the space field
- Harmonic Drive®, which has a proven track record in space applications, will expand its areas of business



James Webb Space Telescope

- Successor to the Hubble Space Telescope (scheduled for launch this December)
- One NIRCam (infrared camera) unit and two antenna units use Harmonic Drive®

Credit: NASA GSFC/CIL/Adriana Manrique Gutierrez
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The next relatively new field is aviation and space. Please refer to page 29.

The eVTOL theme has recently started to appear in general newspapers at least once a week, and there are quite a few projects, including venture businesses.

We're putting relatively more effort into actually bringing it to market. They are almost at the end of their FAA approval and are just about to start commercial operations.

In space, as I have been saying, Harmonic Drive's products have been used by NASA and other organizations since the 1970s, when they were used for lunar roving vehicles, but now space has become a commercial field, and SpaceX, led by Elon Musk, and other private companies have entered this field. Moreover, space travel used to be reserved for astronauts, but now the general public is enjoying space travel, albeit on a trial basis, and in this sense, space is clearly changing. Since our lightweight speed reducers are used in the space industries, we are aware that we can expect continued growth in this field.

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4-1. Increasing Production Capacity at the Ariake Factory

(Azumino City, Nagano Prefecture)

- We have started to build a production system of 200,000 units per month at the Hotaka Plant and the Ariake Plant, as laid out in the previous mid-term plan (2018–2020)
- Construction of a highly automated production line
- Delivery and installation scheduled from March to August 2022
- Total capital investment: ¥6.5 billion



Increased production capacity

Add 70,000 units
(150,000 to 220,000)

Increased productivity

Improve automation
and save labor

Improve **stable supply capacity**

Improve **price competitiveness**



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As you can see on page 30, 1 of our key tasks for the past few years has been to increase our production capacity.

Due in part to the fact that our existing plants were unable to cope with the huge robot boom of 2017, and also because we recognized that robot demand would continue to rise, albeit slowly, in the future, we had set a goal of producing 200,000 units of industrial speed reducers alone by mid-2020s in the mid-term plan.

We had a difficult time after 2018 due to the US-China issues. However, we built the Ariake Plant, and although it has been empty for a while, we have just announced a plan to increase the capacity of the plant by installing machines from this year.

As you can see here, we will increase the capacity by 70,000 units in total. It is difficult to automate everything due to the unique way of manufacturing HarmonicDrive®, but in the new plant, we have already made considerable progress in automating transportation and assembly. At the Ariake Plant, we are planning to introduce a higher level of automation to improve our price competitiveness.

Support

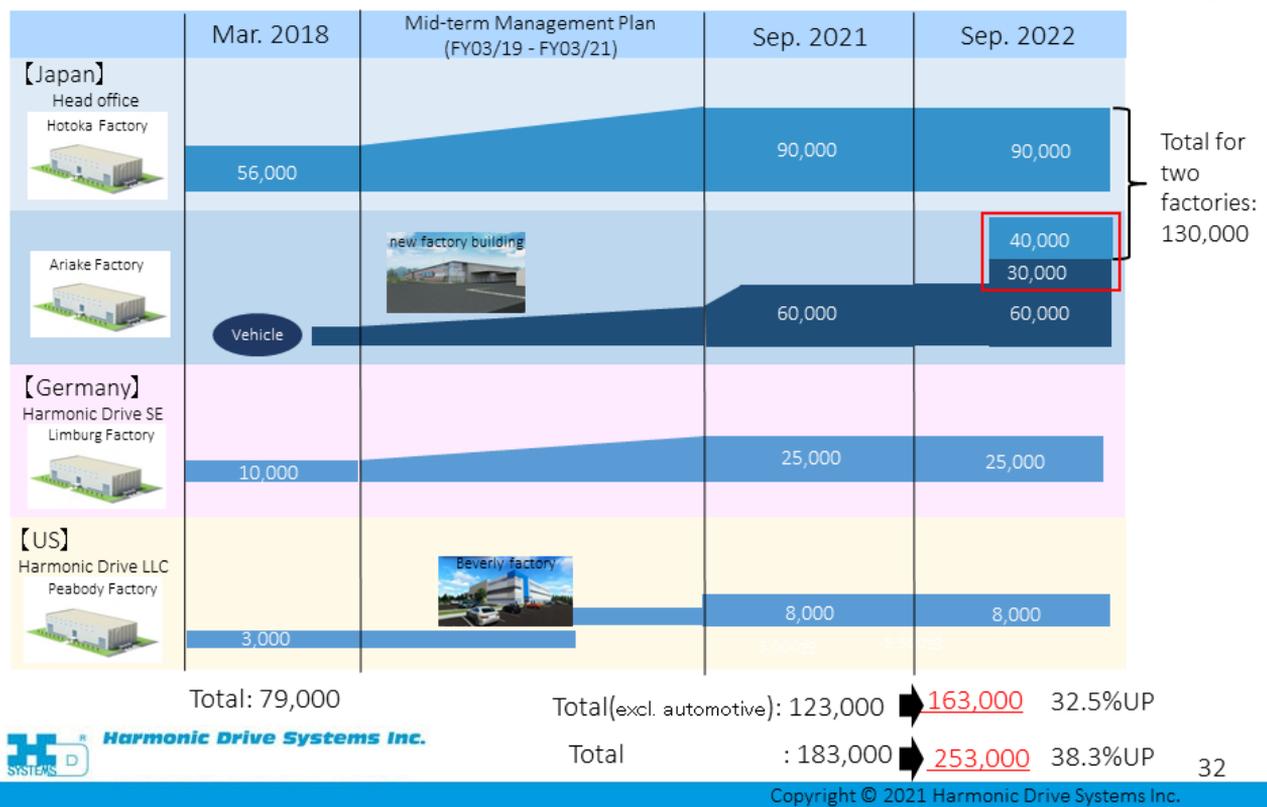
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4-2. Expanding capacity for HarmonicDrive®, of Group companies (production capacity)

(Numbers indicate units produced per month)



What I have just said is written in the table on page 32, so please have a look.

1 of the characteristics of HarmonicDrive® is its light weight and small size, and our technical team is constantly pursuing this and constantly evolving our products, which will contribute to our business continuity. We named this characteristic MINI-MICRO.

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5-1. Development of MINI-MICRO products

Advanced medicine, amusement



Palm sized robots



www.mecademic.com

Courtesy of Mecademic Inc.

Small collaborative robots, semiconductor manufacturing equipment



Courtesy of Techman Robot Inc.



Industry's smallest
Φ5mm



CSF micro series
Starting from Φ10mm



CSF mini series
Starting from □ 20mm



CSF-2UP series
Starting from □ 50mm



CSF-ULW series
Starting from Φ54mm

- Highly-competitive and unmatched products made possible through our Group's unique strengths
- Secure a position as the industry standard in a rapidly growing market

Let me introduce this. If you look at page 34, you will see that our products are used in a variety of applications, such as small robots, which of course go without saying, but also in the world of amusement, and more recently, palm robots, which can fit in the palm of your hand and weigh about 0.5 kg.

To tell you the truth, we have not yet found a use for the 5mm diameter one, but we are confident that it will find new applications in the medical and other fields.

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5-2. Introducing MINI-MICRO Micromotion GmbH



- **Micromotion GmbH (est. 2001)**
 - Established as Harmonic Drive SE (wholly owned subsidiary)
 - Development, manufacture, and sales of ultra-compact gearboxes and actuators using the LIGA process*
- **Micromotion GmbH Products**
 - Ultra-compact wave gears
 - Ultra-compact planetary gear speed reducer
 - Outer diameter: 6mm or more
 - Reduction ratio: 1/40 to 1/1000
 - Zero backlash



micromotion® Demonstration of theory

*LIGA Process

- A microfabrication technology developed in the 1980s at Karlsruhe Institute of Technology in Germany that uses chemical processing
- Microfabrication using X-ray photolithography (**L**ithographie), electroplating (**G**alvanoformung), and forming (**A**bformung)



Page 35 introduces Micromotion GmbH, a subsidiary of the wholly owned subsidiary in Germany, which manufactures ultra-compact speed reducers, not by grinding metal, but by scientifically grinding metal to a certain extent, using the so-called lithography method, as described below. Although the market is still small, we are already receiving inquiries from major smartphone manufacturers on a regular basis, although their applications are still unknown.

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5-3. Application examples of MINI-MICRO micromotion®

Main applications of micromotion® products

Space

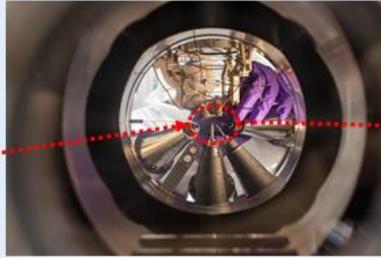
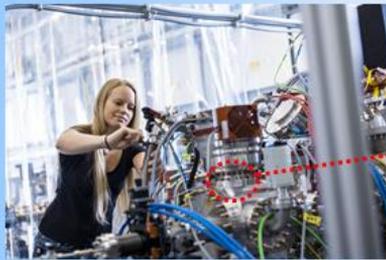
Medicine

Semiconductor

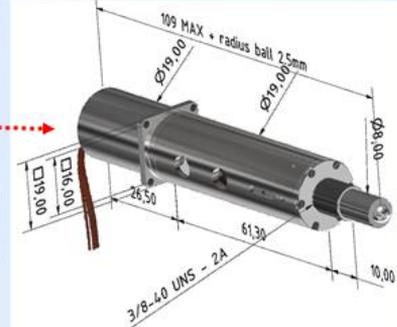
Optical
instrument

Testing
equipment

Case Study: Actuator for Ultra-High Vacuum Test



Courtesy of European XFEL GmbH



- Customer: European XFEL GmbH
- Application: Actuators for experimental machines using X-ray free-electron laser (XFEL) facilities
- Product characteristics
 - Actuators with a diameter of 1.9cm to allow precise movement even in a small lab equipment
 - Actuators that can withstand an ultra-high vacuum (10^{-9} Pa)



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Next, please refer to page 36. The micromotion product is already being used as an actuator in X-ray free electron lasers, which we have recently learned.

As a result, we believe that there is potential for growth in the fields of space, medical, semiconductors, optics, and inspection equipment.

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6-1. Our sustainability initiatives

We will continue to develop and advance Strain Wave Gearing, which is a unique and awesome invention



Last, but not least, is the promotion of sustainable management.

Recently, the world has been talking about ESG and SDGs, and we have been busy responding to them. The mid-term plan that we are currently implementing is based on the definition of what role we have in the society and industrial world. We are just a parts supplier, so it is unlikely that we will be able to create innovations or have an impact on the ecology of society as a whole.

However, our speed reducers will contribute to industrialization, social innovation, and ecology. As I'm sure you know, the HarmonicDrive® itself is lightweight and compact, and this part itself is very eco-friendly. In other words, our products are eco-friendly because they can produce a lot of power with a small motor.

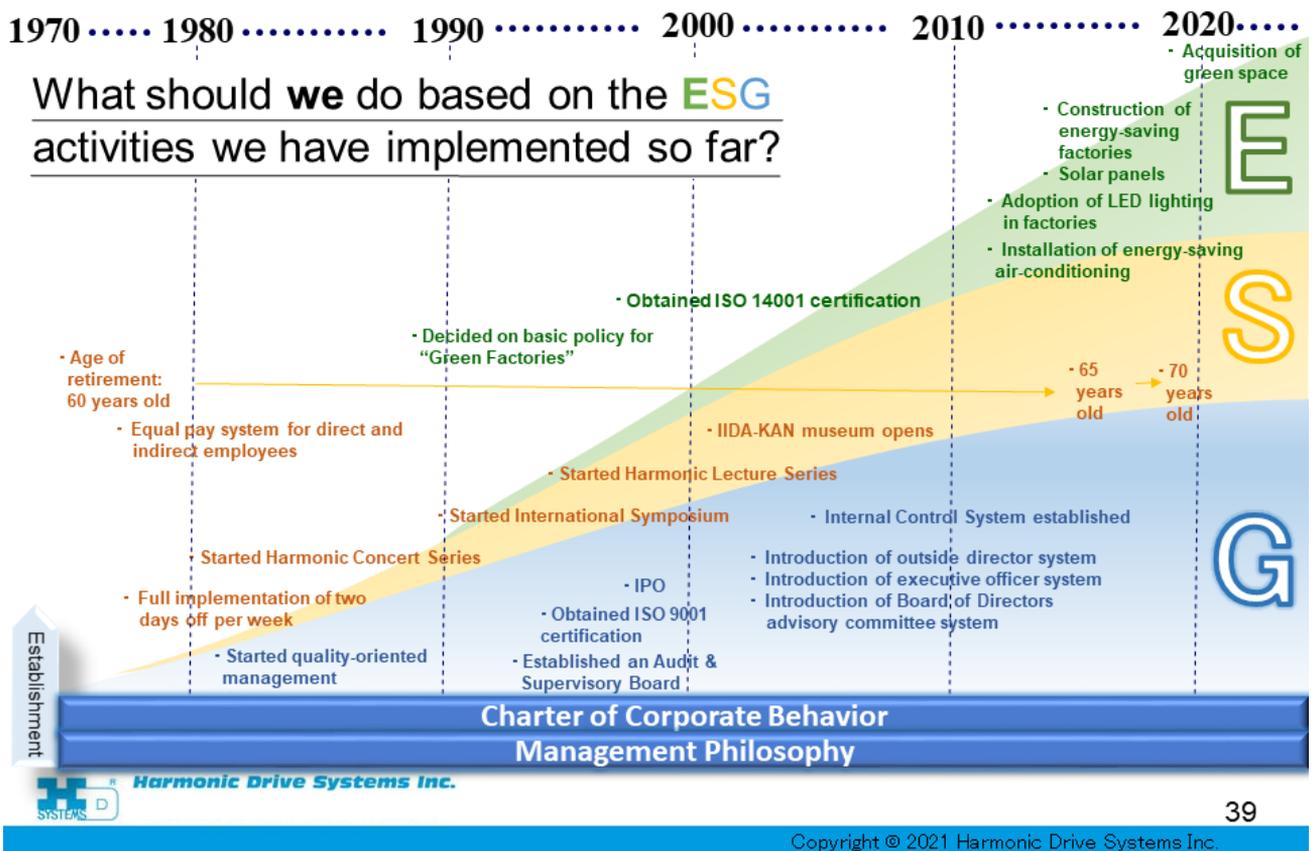
The sustainability of our company is to continue to evolve and create the strain wave gearing, which was invented in the 1950s. There is no sustainability if our company goes bankrupt, so our first priority is to continue to work on this unique invention by our own hands.

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6-2. Our path to sustainability



There are several hurdles to be overcome in order to be listed on the TSE Prime Market, and the ESG field that is required is still in the process of being developed. I don't know if it can be accurately classified as ESG, but here is a list of what we have been doing, rather half-unconsciously.

If you look at the figure, you can understand the general idea, although there may be some misunderstandings. For example, we introduced a mandatory retirement age of 60 in 1975. We have paid blue-collar and white-collar employees the same wages. We always build new plants based on a grand design, and we have been working on the concept of a green factory since 1990.

In addition, we are also working on solar panels, energy conservation, and the recent acquisition of farmland adjacent to the Hotaka Plant to increase the area of green space.

As for the "S" part, we understand that this is something that has been said as CSR for a long time, and we have been holding harmonic concerts for the local community since 1980. Next week, a harmonic lecture will be held in Matsumoto. We have been giving a harmonic lecture and other contributions to the local community.

As for "G," we believe that it is important for us to have strict quality governance, so of course we obtained ISO certification. The good thing about ISO is that it has various requirements not only for manufacturing products but also for the quality of operations. As a result, we had to improve our management system, which led to the talk of introducing J-SOX.

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At present, we are continuing to work on the quantitative targets that we should set for each of the ESG requirements. That's concludes my explanation. Thank you.

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Question & Answer

Moderator: Now, if you have any questions, please ask them in a question-and-answer format.

The first question is from Mr. Isayama of Goldman Sachs Japan Co., Ltd.. Now, please.

Isayama: I am Isayama from Goldman Sachs Japan. Thank you for everything. Let me ask you 3 questions.

The first is about the profit margin. The medium-term target is JPY70 billion in sales and JPY15 billion in operating income, so I think the message is to achieve net sales of over JPY10 billion and operating income margin of 20%.

In the second quarter, you came back to sales of around JPY15 billion, but probably due to some 1-time expenses or production constraints, you haven't reached that level of operating income margin yet. As for the plan for the second half of the year, I think the target figure is still around 15% because of the impact of production cutbacks by a certain car manufacturer.

In the past, you could easily see 20% when exceeding JPY15 billion, but I'm not sure if you can really return to that level. I understand the delay due to the car industry. I am concerned that there may be some waste when you now increase production.

I am worried that you will not be able to return to the high level of the gross profit margin and operating profit margin they used to be or the level set in the medium-term management plan. I would like to know when you think it will be possible. I would like to know what is needed to return to the high profitability of around 20%. This is the first question.

Kamijoh: Thank you for your question. As for your concern about the profit margin, as Mr. Isayama pointed out, in the past few years, we have been investing quite proactively, or a little ahead of schedule, based on our future growth.

We are investing in facilities ahead of the curve, with the construction of 2 large factories in Azumino City, Nagano Prefecture and another in Komagane City, Nagano Prefecture. We are making capital investments looking ahead to the future, including the case of Nissan.

Therefore, I think that the profit margin at the peak was really the maximum figure when the production capacity was at full capacity and there was almost no room for upside. Compared to this, the current profit margin is a little lower depending on the fixed costs. However, we believe that we will be able to return to the 20% profit margin in the not-too-distant future if our sales increase.

This is conditional on maintaining the competitiveness of our products, but we believe that we will be able to achieve such a return in the near future.

Isayama: Thank you very much, Mr. Kamijoh. Just to confirm. I thought that if sales are in the scale of JPY17.5 billion, which is obtained by dividing the JPY70 billion in your company's medium-term plan by 4, the margin will return to 20%. Is it not so easy? Will you have to wait until the next fiscal year or so for the costs to run their course?

Kamijoh: Well, I think we have some certainty in the next fiscal year. Our mid-term plan is moving forward at a pace of about 1 year ahead of schedule this fiscal year, and I believe we have the potential to achieve it ahead of schedule.

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Isayama: Thank you.

The second question is about the trend of the mainstay speed reducer. As you mentioned about the delivery date, there is a concern that the very strong orders may at the same time fall into the bad pattern as in the past.

What are the delivery date requirements and the level of orders from the customers you see now? Are there double orders, or are the orders placed ahead of schedule? Is the reason why the orders were placed so far ahead of schedule due to customers, or due to your company's capacity? I would appreciate it if you could tell us the story behind the strong orders, such as delivery dates, backlog trends, and what kind of things are happening with the customers, from your perspective. That's the second thing.

Nagai: I think you are talking about the situation in 2017 and 2018 when robot manufacturers' inventory had rapidly accumulated, and we could not receive any new orders.

This time, too, there was a sudden increase in orders from the beginning of the year, and we were worried that the same thing would happen as last time. I, myself, wanted to be careful and did a lot of research.

To put it simply, the last time was triggered by the trade friction between the US and China due to Trump's comments. The orders we received are actual demand for us, but in 2017 and 2018, the economy stagnated before the speed reducers that we delivered based on the actual demand were used in robots. As a result, robot manufacturers and distributors accumulated inventories of speed reducers and other parts and materials necessary for robots, and it took a little over a year to digest them.

This time, all of the inquiries and orders that came to us from actual demand were used by robots. If you were to interview the robot manufacturers, you would probably understand that their head offices asked their sales teams to hurry up and get the robots, and they were even selectively accepting orders, so I think that was the biggest difference.

Of course, the main reason for the excessively high level of orders is the real demand from robot manufacturers, as I mentioned earlier. However, it is also true that customers are worried about the situation of our company, whose production capacity declined to about 60% compared to 2018, and are placing orders ahead of schedule.

However, based on our experiences in 2017, major robot manufacturers have been disclosing their production plans to us far in advance, although I think this is very rare case, and we have been receiving orders based on those plans. Unless the Chinese economy suddenly collapses as in 2018 or orders stop completely, our current backlog of orders will not disappear.

As for your concern about whether there will be double orders, for example, 2 companies bid for a major panel manufacturer's project at the same time. We know who is likely to get it, so you can be sure that the majority of the more than JPY30 billion in order backlog does not relate to such cases.

Isayama: Thank you very much, President Nagai.

Let me ask you my last question. Moving away from fundamentals, I would like to ask about stocks. Your company's stock price has dropped by about half compared to last year. Nabtesco sold shares of your company at the beginning of the year, which accounts for 10%, and you chose the TSE Standard market instead of Prime. Since then, there has been a lot of downward pressure on the stock valuation, such as the exclusion of MSCI, and I think the stock valuation has fallen to about the same level as at the beginning of 2019.

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Since this is happening despite the fact that fundamentals continue to improve, I think that you need to address the stock market.

Regardless of what has happened, Nabtesco still has 10%, and it will come up again somewhere in the next year or so. What are your thoughts on this? I also feel that you should examine your company's balance sheet, including buybacks. You can also look for a proper partner. I think the ability to be listed at TSE Prime is also an important factor.

In a broader sense, I would like to know what you think about the stock price, and I would appreciate it if you could share your thoughts on the idea of returns, including buybacks, the search for alliance partners, the Prime market, and what you think you should do in the future. This is the last question.

Nagai: As you pointed out, we are very concerned about the recent decline in stock prices. As you mentioned, our performance is not bad. The share price has fallen despite the rather good performance. The half of about 20% of the shares owned by Nabtesco have already been sold by Nomura Securities. But this has not yet been completely disposed of.

In this situation, if I know that the next half is still coming to the market, if I were an investor, I would wait a little longer. I think this probably has a significant impact. So, I guess the question is whether Harmonic Drive is sitting on its hands for the other half. Basically, it is not our company's property, so we have to rely on Nabtesco's decision.

However, if the stock price falls, Nabtesco will have to sell the other half at a very low price, and in a sense, they have the same interest as us.

Fortunately, we have had a very long relationship with Nabtesco, and they carefully explained the situation to us when they disposed of shares, and for the other half, we hope that they will be bought by a good partner in the business. On a daily basis, we receive many proposals of companies from banks and securities companies, but since it is not our property, it is difficult for us to give an answer.

I believe that the main reason why Nabtesco was forced to let go of the cross-shareholdings based on a relationship of trust and a long-standing business alliance was that there was no actual business alliance. We had a business in the US, but it did not generate much synergy.

So, I tell the securities companies and banks that we should have a partner that have actual business content and are not competitors, and whom we are able to generate synergies with. Based on this, we are now ready to propose to Nabtesco that we would be very happy if they could sell our shares to such a company.

Therefore, there is not much that we can do directly, but we have always been asked by our shareholders whether we will buy back our shares, not just because the share price has fallen or due to Nabtesco's sale, and this is always a subject of consideration.

What we can do now is to introduce a good partner to Nabtesco and ask it to buy the remaining half.

However, business companies own each other's shares does not contribute to liquidity in the market. We are discussing various points of view with the finance department as well.

Isayama: Thank you. Are you also considering the buyback?

Nagai: This is something that we always consider, not only in this case but also in other situations, as necessary.

Isayama: I'm sorry it took so long. Thank you very much.

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Moderator: The next question is from Mr. Morota from Okasan Securities Co., Ltd. Now, please.

Morota: This is Morota. Thank you. I also would like to ask 3 questions.

The first point is related to the previous question. As for the reason for the decline in stock prices, if orders are so strong, I think there are concerns that it will peak out or it will decrease significantly again.

I think you say that the current order backlog is not likely to become distribution stock anymore. You mentioned earlier that you have received various orders from robot manufacturers based on your production plan for the future. How long is this state of plateau likely to last? Don't we have to worry about the same thing as last time, for example, if it peaks out and falls? This may be a little difficult to answer, but I would like to know what you are thinking about this.

Nagai: To be precise, it is difficult for us to really read the future since we are a parts supplier.

To begin with, about 60% of our sales are from industrial robots. This includes collaborative robots, though. Even if there is no surge in this, as I showed you earlier in the IFR data, I am almost certain that it is growing at an annual rate of 6% to 8%. This is due to the decline in population in regions other than Africa, especially the population engaged in production, which is significantly decreasing in newly industrialized and industrialized countries. I understand that the global consensus is that robots are the only way to replace them.

In this sense, although there are naturally competing manufacturers, it is almost certain that our company will be responsible for a large share of the market. In addition, as explained in the document, large industrial robots are constantly inquired about in the capital investment cycle, especially in automobile factories, but robots are becoming smaller and smaller. For small robots, our speed reducers are used for almost all axes.

Because of this, we already know the names of robot manufacturers and what model numbers are used for what kind of robots with what payloads. From that point of view, we can clearly see the application for small assembly robots. I don't think this will go down for the time being.

Unless, as in the case of the last time, China's capital investment suddenly stops due to political problems, but looking at the Biden administration's recent response to such factors, there is a relatively gradual attempt to restore economic relations with China. I don't think we'll suddenly be pushed off a cliff like we were last time.

However, capital investment inevitably slows down at some point, so we are always looking for ways to contribute to new innovations. The plan is to maintain a presence in areas such as the MINI-MICRO I mentioned earlier, the amusement field, which has never existed before, and space and aviation.

In this sense, we believe that we will not be able to withstand the global and future demand unless we build up to 100,000 new products at the new plant in Ariake.

Morota: I understand. Thank you.

I'd like to add a few things. I understand that you set your plans based on it. I know that it is a little difficult for you to comment on individual robot manufacturers, but if you could give us some hints about the future of the robot industry as a whole, such as how long and how much growth can be expected, or whether the industry will continue to be strong, that would be very helpful.

Nagai: As I mentioned earlier, we are just a parts supplier, so we always refer to materials from the Japan Robot Association and IFR. So, as you can see in the document on page 23, the number of robots is available until at least 2024. In the past, there also had been large robots, so for example, if there were 6 axes, Nabtesco

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would handle 3 of them, and we would produce parts for the remaining 3 axes. In such a way, we had set our target production volume.

Now, it is probably around 4.5. From this point of view, we calculated backwards and created a medium-term plan based on the image that Harmonic Drive constantly manufactures 200,000 units of strain wave gears.

Morota: I understand. Secondly, the release says that the production capacity will be increased to 220,000 units for the fiscal year ending March 2022 and onwards, including in-vehicle use. I think it was a bit more in this document. I have the presentation materials for the fiscal year ended March 31, 2018, and the figures are 280,000 units or 430,000 units.

Now, with the company's own production capacity hitting a new record high, and with the future looking solid as well, I would like to ask you about whether there is any message in the fact that the production capacity has been reduced slightly from the previous level.

Nagai: Please see table on page 32. As a matter of fact, in 2017, the Hotaka Plant, shown here in the blue area, was producing up to 130,000 units per month. However, this was an instantaneous wind speed, so I think it is safe to say that the Hotaka Plant has a capacity of about 100,000 units.

I think we have presented a picture of 100,000 units for the new plant. The total will be 280,000 units worldwide. Although the time axis here is shifted a little to the right, as I mentioned earlier, the capacity of Harmonic Drive in Japan remains unchanged at 200,000 units, except for the 2 lines for in-vehicle units.

We have 90,000 units at the Hotaka Plant and 40,000 units at the newly announced capital investment, the Ariake Plant, which total 130,000 units. We will make a temporary capital investment for the remaining 70,000 units while monitoring demand trends. I think that by 2024, as the date from IFR shows, it will probably increase to 200,000 units, if we keep up the current speed.

Morota: The previous figure was 430,000 units.

Nagai: The 430,000 units are for the entire world. This includes in-vehicle parts.

Morota: You don't see that figure yet?

Nagai: If the in-vehicle parts are included, of course, even now it is already 220,000 units, or maybe 250,000 units. In Japan alone, it must be about 220,000 units.

Morota: I understand. Lastly, I would like to talk about IFR, which you refer to as a base.

I participated in the World Robotics on October 28. They mentioned 6% growth this time, but to be honest, I thought the 6% figure itself was a little low, so I asked them about it. When I asked them when they made it and what it reflected, they said that it reflected the disruption in the supply chain. And it's a forecast that was made in August or so. It was suggested to me that they are also quite conservative.

Also, it seems that the forecasts of the Japan Robot Association have also incorporated the IFR figures. We have heard that the Japan Robot Association set slightly higher figures.

In that case, I think the 6% figure itself is quite conservative. How does your company view the 6% figure of the IFR? Don't you consider it conservative?

Nagai: I have been mentioning from 6% to 8% or 9%, and I believe that this is very close to the minimum. IFR's conservative view is probably due to the fact that robot manufacturers are reporting a drop in production due to the shortage of semiconductors, connectors, and plastic parts.

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However, as the case of Nissan, the demand has not disappeared. I am more concerned about whether we will be able to respond to orders when they are postponed and placed later all at once.

Morota: I understand. Thank you very much.

Moderator: Due to time constraints, we will now conclude the Q&A session. Thank you very much for watching until the end.

This concludes the Harmonic Drive Systems conference call for the financial results for the first half of the fiscal year ending March 31, 2022.

Thank you very much for taking the time to join us today.

[END]

Document Notes

1. *Portions of the document where the audio is unclear are marked with [Inaudible].*
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