



Harmonic Drive Systems

Financial Results for the 1st-Half of the Fiscal Year Ending March 31, 2023

November 16, 2022

Event Summary

[Company Name]	Harmonic Drive Systems Inc.	
[Company ID]	6324-QCODE	
[Event Language]	JPN	
[Event Type]	Earnings Announcement	
[Event Name]	Financial Results for the 1st-Half of the Fiscal Year Ending March 31, 2023	
[Fiscal Period]	FY2022 Q2	
[Date]	November 16, 2022	
[Number of Pages]	48	
[Time]	10:00 – 11:12 (Total: 72 minutes, Presentation: 43 minutes, Q&A: 29 minutes)	
[Venue]	Webcast	
[Venue Size]		
[Participants]		
[Number of Speakers]	3	
	Akira Nagai	President and CEO
	Akira Maruyama	Representative Director, General Manager of Corporate Planning Division
	Kazutoshi Kamijoh	CFO, Director and General Manager of Finance Accounting, Finance and Tax Division
[Analyst Names]*	Yuichiro Isayama Goldman Sachs	
	Graeme McDonald	Citigroup Global Markets
	Hikaru Mizuno	UBS Securities

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

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Presentation

Moderator: We will now begin the financial results briefing for the H1 of the fiscal year ending March 31, 2023 of Harmonic Drive Systems Inc.

To begin, I would like to introduce today's speakers. President & CEO, Akira Nagai.

Nagai: I am Nagai. Thanks.

Moderator: Representative Director and General Manager of Corporate Planning Division, Akira Maruyama.

Maruyama: I am Maruyama. Thanks.

Moderator: Director and General Manager of Finance Accounting, Finance and Tax Division, Kazutoshi Kamijoh.

Kamijoh: I am Kamijoh. Thanks.

Moderator: In today's presentation, Director Kamijoh will provide an overview of the financial results and the forecast for this fiscal year, and President Nagai will provide an outlook for the future.

Today's presentation materials are available on our website, and today's presentation will also be available via audio webcast.

Director Kamijoh will begin the presentation.

Kamijoh: Thank you for taking time out of your busy schedule today to attend our Q2 financial results briefing.

I will explain the summary of the H1 financial results and the forecast of the full year financial results in accordance with the documents uploaded on our website today.

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Consolidated results for 1H FY03/23 (Vs. original forecasts)

(millions of yen)

	Original forecasts (announced May. 13)		1H FY03/23 (actual)		Vs. original forecasts	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	35,000	100.0	33,451	100.0	▲1,548	▲4.4
Operating income	5,500	15.7	4,640	13.9	▲859	▲15.6
Ordinary income	5,500	15.7	4,924	14.7	▲575	▲10.5
Net income	3,500	10.0	2,938	8.8	▲561	▲16.0
EPS (yen)	36.36	—	30.74	—	▲5.62	▲15.5

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



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First, this is a summary of our financial results for H1 of the fiscal year on page two.

The consolidated financial results for H1 of the fiscal year and comparisons with our forecast announced on May 13 are shown here. Net sales and profits fell short of the forecast.

About JPY850 million of the shortfall versus our net sales forecast is attributable to the parent company, which is the core business of the Japan segment, and about JPY700 million of this amount is due to lower-than-expected sales of HarmonicDrive® for passenger car engine parts.

The shortfall in HarmonicDrive® sales is attributable to lower-than-expected production volume of automakers due to semiconductor procurement difficulties and other factors.

Overseas, net sales were roughly in line with the plan in North America, but fell short of the plan by about JPY300 million each in China and Europe. The shortfall in China was due to the lockdowns, while the shortfall in Europe was caused by robot manufacturers that cut back production due to supply chain issues.

Operating income also came in below the forecast mainly due to the shortfall in sales versus the original plan.

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Consolidated results for 1H FY03/23 (year-on-year change)

(millions of yen)	1H FY03/22		1H FY03/23		Year-on-year change	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	26,341	100.0	33,451	100.0	7,110	27.0
Operating income	3,527	13.4	4,640	13.9	1,113	31.6
Ordinary income	3,565	13.5	4,924	14.7	1,359	38.1
Net income	2,218	8.4	2,938	8.8	720	32.5
EPS (yen)	23.05	—	30.74	—	7.69	33.4
Capital investment	4,074	—	7,293	—	3,218	79.0
Depreciation	3,933	—	4,420	—	487	12.4
R&D expenses	1,372	—	1,629	—	257	18.8

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 see page three. This page explains our consolidated results compared to the same period last year.

We achieved increased sales and profit in H1 of the current fiscal year supported by an abundant order backlog.

We have continued to operate at near full production capacity at our facilities in Japan, the US, and Germany, and have increased production capacity month after month, mainly by increasing personnel and changing production shifts. As a result, sales in all regions increased YoY.

Profits also increased in all regions due to higher sales.

In terms of profitability, net sales and operating income margin improved only moderately. This was due to an increase in variable costs related to mechatronics products resulting from higher semiconductor prices, an increase in labor costs in response to increased production, and an increase in preparation costs associated with the start of operation of new production lines.

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Performance of main group companies in 1H FY03/23

(millions of yen)		Equity stake	Net sales		Operating income	
			Amount	Year-on-year Change(%)	Amount	Year-on-year Change(%)
	Harmonic Drive Systems Inc.	—	24,361	28.0	4,207	12.4
※2	HD Systems, Inc. (Harmonic Drive L.L.C.) (U.S.A)	100% (100%)	4,570	52.9	491	95.3
	Harmonic AD, Inc.	100%	1,223	▲7.4	87	▲48.8
※3	Harmonic Drive Systems (Shanghai) Co., Ltd.	100%	2,450	17.0	253	43.2
※4	Harmonic Drive SE (Germany)	100%	7,789	25.7	1,120	89.6

*1 For overseas subsidiaries, the fiscal year ends December 31.

*2 Exchange rates: Jan-Jun 2021 1USD = ¥107.69, Jan-Jun 2022 1USD = ¥122.89

*3 Exchange rates: Jan-Jun 2021 1CNY = ¥16.66, Jan-Jun 2022 1CNY = ¥18.94

*4 Exchange rates: Jan-Jun 2021 1EUR = ¥129.82, Jan-Jun 2022 1EUR = ¥134.25



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Please see page four. These are the consolidated results of our main group companies.

Listed second from the top is our US subsidiary. Demand for semiconductor manufacturing equipment and medical equipment increased significantly, resulting in increased sales at this subsidiary. The subsidiary responded to the increase in demand by increasing production at its new plant, which began full-scale operations last fiscal year. Despite higher labor costs and fixed costs such as depreciation and amortization, the increased sales helped the Company achieve higher earnings.

Next, below that is Harmonic AD, which manufactures AccuDrive®, planetary speed reducer in Japan. Planetary speed reducers are mainly used as gearheads for servomotors. Meanwhile, Harmonic AD's customers are facing a bottleneck in servomotor delivery due to long delivery times, and they have been postponing or curtailing orders for gear reducers accordingly. As a result, Harmonic AD posted lower sales and profits.

Next, below that is our Chinese subsidiary. Sales fell short of the initial forecast due to lockdowns but increased from the same period last year.

On the bottom is our German subsidiary. Sales increased mainly to robot manufacturers. The subsidiary also maintained strong sales for semiconductor manufacturing equipment and general small-lot projects. As a result of these factors, the subsidiary achieved increased sales and profits.

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Non-consolidated results for 1H FY03/23 (year-on-year change)

(millions of yen)	1H FY03/22		1H FY03/23		Year-on-year change	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	19,025	100.0	24,361	100.0	5,335	28.0
Operating income	3,744	19.7	4,207	17.3	462	12.4
Ordinary income	3,832	20.1	4,633	19.0	800	20.9
Net income	2,638	13.9	2,889	11.9	250	9.5
EPS (yen)	27.41	—	30.39	—	2.98	10.9
Capital investment	3,676	—	6,277	—	2,600	70.7
Depreciation	1,586	—	1,924	—	337	21.3
R&D expenses	1,005	—	1,173	—	168	16.8

Next, on page five, you can see that we posted increased sales and profits on a non-consolidated basis as well.

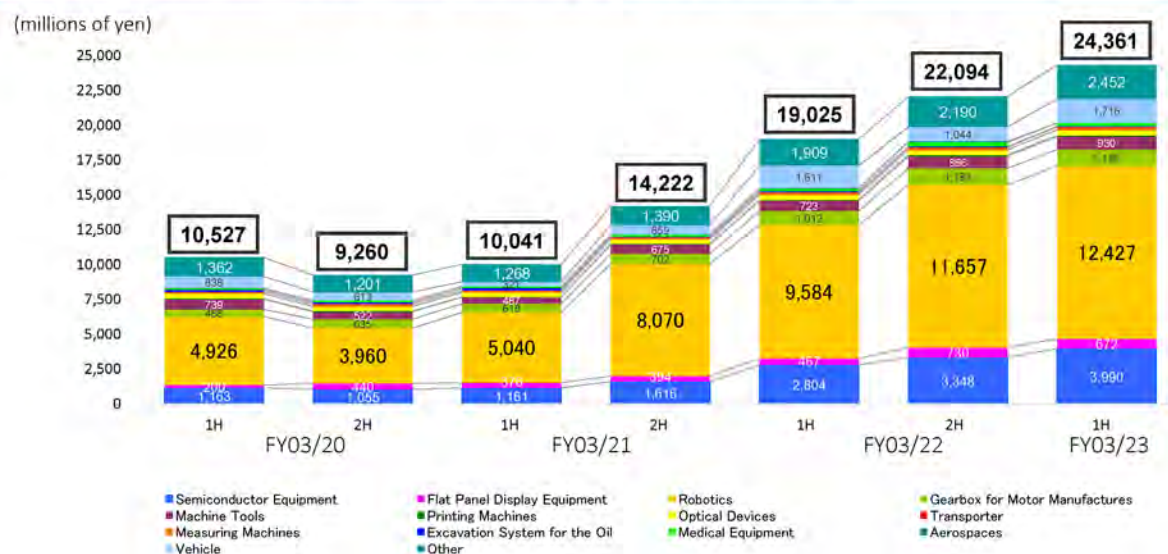
I will explain the factors behind the increase in sales and profits later on.

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Non-consolidated net sales by application



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Next, please see page six. This is the performance trend for sales by application on a non-consolidated basis.

As you can see, since H2 of the previous fiscal year, demand for industrial robots and semiconductor manufacturing equipment has increased, driving sales growth.

As for industrial robot applications, sales of HarmonicDrive® for small robots used in manufacturing processes related to digital devices and home appliances increased from robot manufacturers.

Demand also increased for HarmonicDrive® for small vertical robots and SCARA robots, which are also used in battery production processes, in addition to those for welding and painting robots used mainly in the automotive industry.

With regard to semiconductor manufacturing equipment, demand increased mainly for front-end manufacturing equipment and wafer transfer robots.

As for our automotive HarmonicDrive®, which are used as components for automobiles, sales did not reach the level assumed at the time of our initial forecast. However, sales for the current fiscal year have once again increased due to the sales expansion of car models equipped with new engines in which HarmonicDrive® are used and the improvement of the semiconductor procurement situation of our customers.

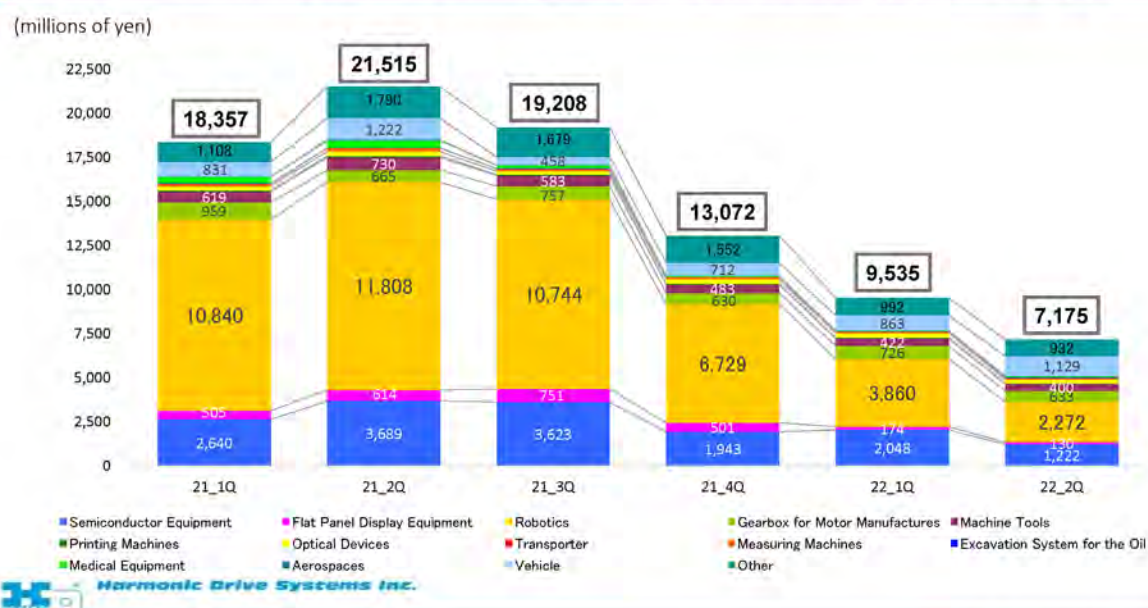
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Non-consolidated bookings by application (quarterly)



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Next, please see page seven. This is the quarterly order trend by application on a non-consolidated basis.

As you can see, orders received have been on a downward trend for four consecutive quarters since Q3 of the previous fiscal year.

We believe that this is mainly due to order adjustments in reaction to the high level of orders received in the previous fiscal year, including anticipatory orders, rather than a decline in demand due to a slowdown in the factory automation equipment market, including industrial robots and semiconductor manufacturing equipment.

In the beginning of the current fiscal year, in addition to the reaction of customers placing orders in advance, the trend of orders received during the current fiscal year showed that orders with long lead times have calmed down as the prospect of improved lead times in conjunction with our production capacity expansion has become more widely known among customers. We had assumed that orders would gradually adjust in a healthy manner, and the trend was generally in line with this expectation.

In addition, as we have already announced, we had about JPY1.2 billion in cancellations in Q2. However, since these cancellations were requested by customers as part of their inventory adjustments, we consider them to be a healthy adjustment.

Although it is very difficult to predict future trends in orders, we expect that orders, which have been restrained by customers and distributors, will gradually increase. Therefore, we believe that monthly orders will bottom out between the end of this year and the beginning of the new year.

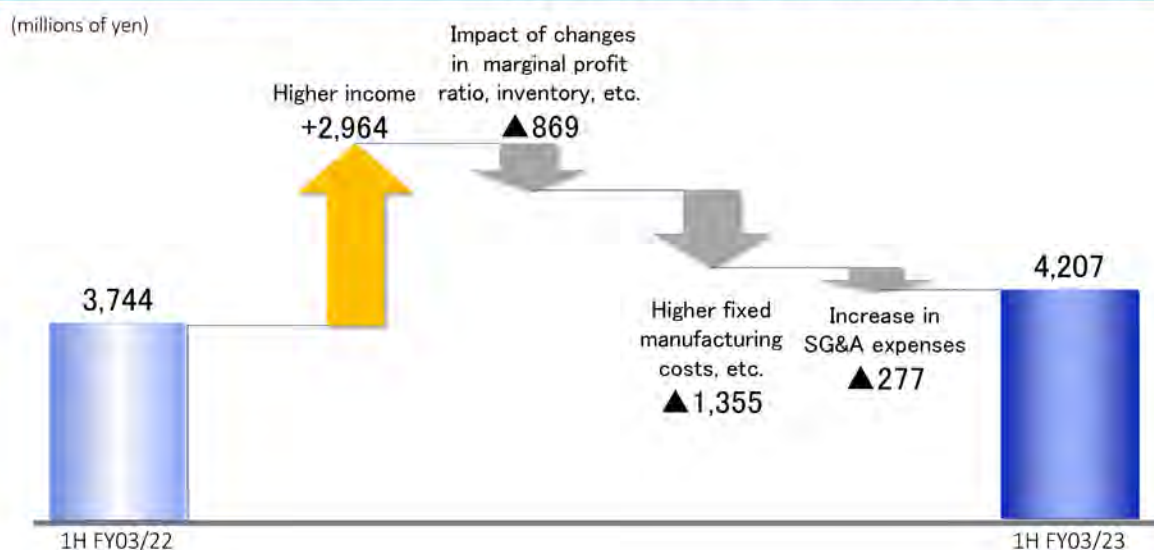
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Breakdown of year-on-year change in non-consolidated operating income



Next, please see page eight. This page shows the factors behind the change in non-consolidated operating income.

Higher sales increased income by JPY2,964 million.

Changes in the incremental profit ratio and inventories reduced income by JPY869 million. Approximately JPY500 million of this amount is due to lower profit caused by an increase in semiconductor prices. The remaining impact came from changes in the sales mix, higher prices of metals and other materials, and changes in inventory of work in progress.

Higher fixed manufacturing costs and other costs reduced income by JPY1,355 million. This was mainly due to an increase in personnel costs resulting from an increase in personnel in the production division in an attempt to raise production capacity and an increase in performance-linked bonuses, as well as an increase in overhead costs associated with higher factory capacity utilization.

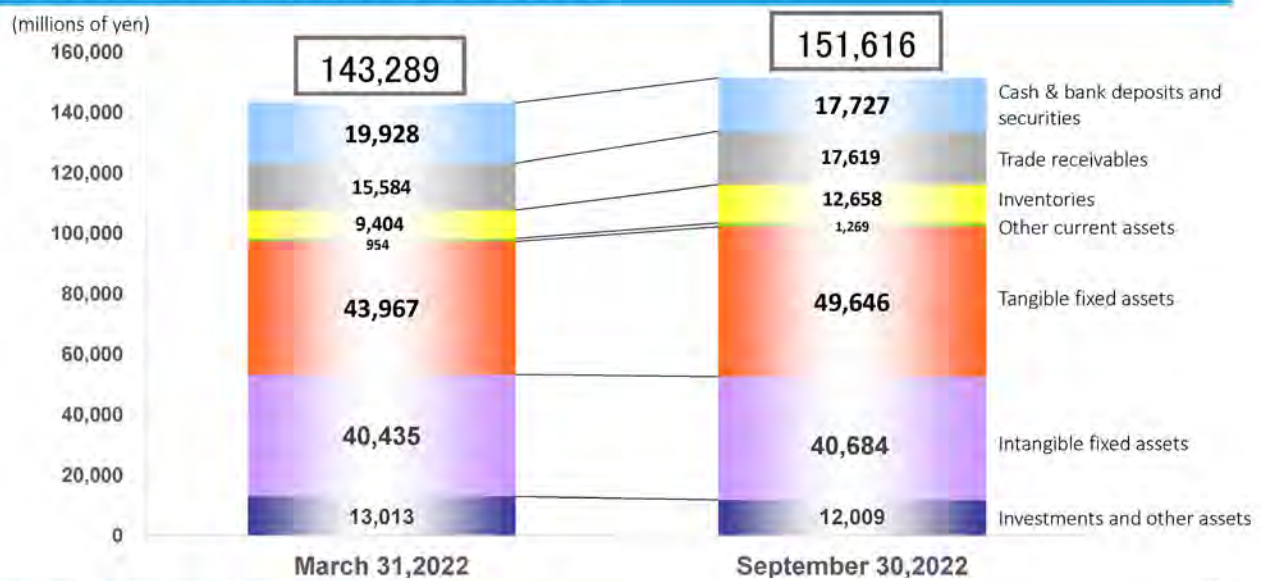
Higher SG&A expenses reduced income by JPY277 million. This was due to an increase in personnel costs, an increase in packaging and shipping costs associated with higher sales, and an increase in marketing costs.

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Status of consolidated assets



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Next, the consolidated balance sheet is shown on page nine. Please check the details later on in conjunction the earnings report.

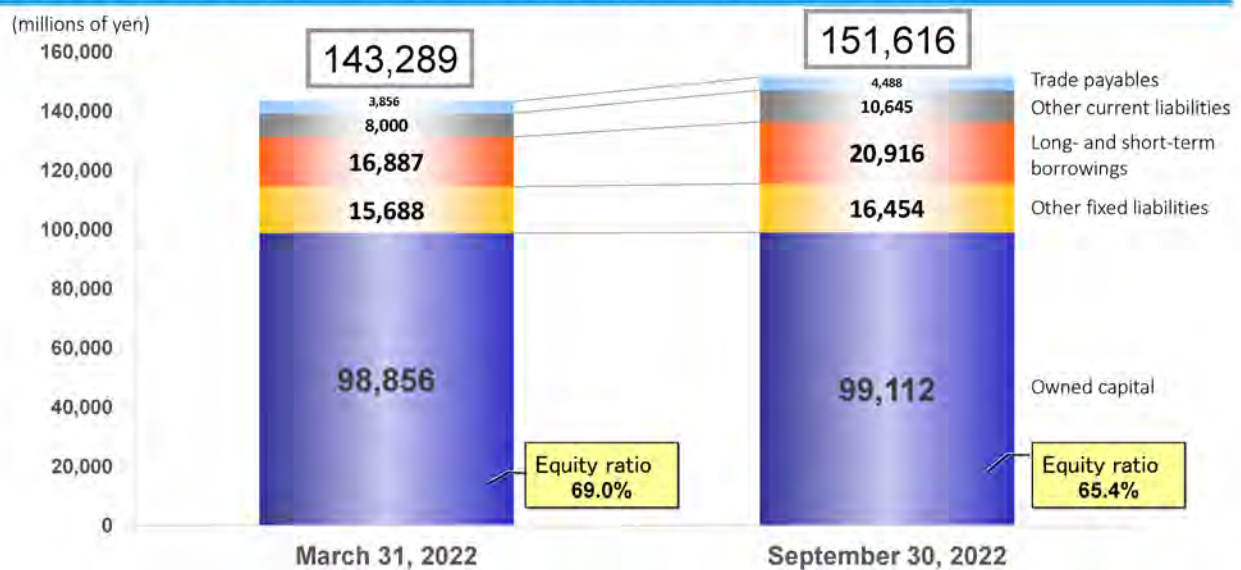
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Status of consolidated liabilities and net assets



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The same applies to page 10. As for the capital adequacy ratio, we conducted a JPY5 billion share buyback in H1 of this fiscal year, so the capital adequacy ratio declined by 3.6 percentage points.

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Status of consolidated cash flows

(millions of yen)	1H FY03/22	1H FY03/23
Cash flow from operating activities	4,008	2,298
Cash flow from investing activities	▲16,157	▲3,275
Cash flow from financing activities	9,353	▲2,280
Effect of exchange rate changes on cash and cash equivalents	339	490
Net increase (decrease) in cash and cash equivalents	▲2,455	▲2,767
Cash and cash equivalents at end of period	17,541	16,000



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Please see our cash flows on page 11. I hope you will check the details later along with the earnings report.

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Revisions to consolidated full-year earnings forecasts

【Versus original forecast】

(millions of yen)	Original forecasts (announced May. 13)		Revised forecasts (announced Nov. 8)		Versus original forecast	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	75,000	100.0	74,000	100.0	▲1,000	▲1.3
Operating income	13,000	17.3	11,000	14.9	▲2,000	▲15.4
Ordinary income	13,000	17.3	11,300	15.3	▲1,700	▲13.1
Net income	9,000	12.0	7,500	10.1	▲1,500	▲16.7
EPS (yen)	93.49	—	78.67	—	▲14.83	▲15.9

Assumed exchange rate for FY03/23 forecasts: 1USD = ¥132.00 1EUR = ¥138.00 1CNY = ¥19.50
Net income refers to net income attributable to owners of parent.

Reason for revisions

- ◆ We have revised down our outlook for sales of automotive speed reducers as we now expect production levels at automakers—our customers—to remain below our initial assumptions due to the impact of semiconductor procurement difficulties and other factors.
- ◆ We also lower our profit forecast to reflect the impact of the downward revision to our net sales forecast, higher procurement prices for electronic parts, and other factors.



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Next, I will explain our earnings forecast for the full year. Please see page 13.

We lowered our full-year earnings forecast on November 8. The main reason for the downward revision of net sales is that our customer automakers are expected to reduce production compared to the assumption at the beginning of the period, due to the ongoing difficulty in procuring semiconductors, as well as the fact that the H1 results were below the initial forecast. We have lowered our non-consolidated net sales forecast in Japan, the core of our Japan segment, by JPY2 billion, of which JPY1.7 billion is due to this downward revision for the automotive segment.

Meanwhile, sales in overseas operations, mainly in North America and Europe, are generally in line with plans. With the addition of the effect of currency translation due to the yen's depreciation, we expect sales in the overseas business to exceed our initial forecast.

Accordingly, taking into account the downward revision of the Japan segment, the upward revision of the Overseas segment, and the increase in internal eliminations, we have revised our full-year forecast downward by JPY1 billion.

In the Japan segment, we expect the downward revision to the non-consolidated sales of the parent company, which has the highest profitability in the Group, to have a large negative impact on operating income. In addition, although all sales have been eliminated, the downward revision to operating income of domestic subsidiaries has also had a negative impact. As a result, we have revised our operating income forecast downward by JPY2 billion, which is larger than the revision to net sales.

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Revisions to non-consolidated full-year earnings forecasts

【Versus original forecast】

(millions of yen)	Original forecasts (announced May. 13)		Revised forecasts (announced Nov. 8)		Versus original forecast	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	55,000	100.0	53,000	100.0	▲2,000	▲3.6
Operating income	11,000	20.0	9,500	17.9	▲1,500	▲13.6
Ordinary income	11,200	20.4	10,000	18.9	▲1,200	▲10.7
Net income	7,500	13.6	6,700	12.6	▲800	▲10.7
EPS (yen)	77.91	—	70.48	—	▲7.43	▲9.5

Assumed exchange rate for FY03/23 forecasts: 1USD = ¥132.00 1EUR = ¥138.00 1CNY = ¥19.50

Reason for revisions

◆ Same as for consolidated forecasts (see previous slide)

Please see page 14 for the revision to our non-consolidated forecast.

I have already explained the reasons for these revisions earlier.

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Consolidated performance forecasts for full-year FY03/23

(millions of yen)	FY03/22		FY03/23 (forecast)		Year-on-year change	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	57,087	100.0	74,000	100.0	16,912	29.6
Operating income	8,739	15.3	11,000	14.9	2,260	25.9
Ordinary income	9,108	16.0	11,300	15.3	2,191	24.1
Net income	6,643	11.6	7,500	10.1	856	12.9
EPS (yen)	69.02	—	78.67	—	9.65	14.0
Capital investment	5,690	—	12,400	—	6,709	117.9
Depreciation	8,254	—	9,500	—	1,245	15.1
R&D expenses	3,012	—	3,500	—	487	16.2

Assumed exchange rate for FY03/23 forecasts: 1USD = ¥132.00 1EUR = ¥138.00 1CNY = ¥19.50
 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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Next, please see page 15 for a comparison of our revised full-year forecast and the results for the previous fiscal year.

Although we have revised our earnings forecast downward, we expect our consolidated sales and income for the fiscal year ending March 31, 2023 to increase from the previous fiscal year. In H2 of the fiscal year, we expect that the new production line at the Ariake Plant, which has started operation, will contribute to the increase in sales.

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Performance forecasts on main group companies for full-year FY03/23

(millions of yen)		Equity stake	Net sales		Operating income	
			Amount	Year-on-year Change(%)	Amount	Year-on-year Change(%)
	Harmonic Drive Systems Inc.	—	53,000	28.9	9,500	13.7
※2	HD Systems, Inc. (Harmonic Drive L.L.C.) (U.S.A)	100% (100%)	11,000	65.2	1,300	70.5
	Harmonic AD, Inc.	100%	2,300	▲16.8	100	▲72.7
※3	Harmonic Drive Systems (Shanghai) Co., Ltd.	100%	4,800	18.8	300	12.9
※4	Harmonic Drive SE (Germany)	100%	16,300	22.6	2,400	56.6

*1 For overseas subsidiaries and affiliates, the fiscal year ends December 31.
 *2 Exchange rates: Jan-Dec 2021 1USD = ¥109.80, Jan-Dec 2022 1USD = ¥132.00
 *3 Exchange rates: Jan-Dec 2021 1CNY = ¥17.03, Jan-Dec 2022 1CNY = ¥19.50
 *4 Exchange rates: Jan-Dec 2021 1EUR = ¥129.89, Jan-Dec 2022 1EUR = ¥138.00



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Next, please see page 16. This is the full-year forecast for the Group.

As for the US subsidiary, we expect sales to increase by 65% YoY. By application, we expect sales growth to be driven by semiconductor manufacturing equipment and medical equipment. On the cost front, there will be a commensurate increase in fixed costs, including an increase in labor costs and the depreciation burden of the new plant. However, we expect sales to absorb these costs, resulting in an increase in profit.

Next, at Harmonic AD, as in H1, the outlook for demand for planetary speed reducers in H2 is severe, and we expect demand to remain flat. Therefore, we expect a decrease in sales compared to the previous fiscal year, and accordingly, we also expect a decrease in profit.

Next, we expect sales of our Chinese subsidiary to recover moderately in H2 of the fiscal year compared to H1, which was significantly affected by lockdowns. However, the situation will not allow us to be optimistic, given the lack of strong activity in smartphone investment projects and other areas.

Finally, we expect an increase in sales at our German subsidiary due to relatively strong demand from manufacturers of industrial robots and cobots, as well as from machine tool manufacturers. In Europe, costs for electricity are higher than in Japan, but we expect that these effects will be offset by the increase in sales, resulting in an increase in profit.

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Non-consolidated performance forecasts for full-year FY03/23

(millions of yen)	FY03/22		FY03/23 (forecast)		Year-on-year change	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	41,120	100.0	53,000	100.0	11,879	28.9
Operating income	8,358	20.3	9,500	17.9	1,141	13.7
Ordinary income	8,702	21.2	10,000	18.9	1,297	14.9
Net income	6,545	15.9	6,700	12.6	154	2.4
EPS (yen)	68.00	—	70.48	—	2.48	3.6
Capital investment	4,589	—	9,600	—	5,010	109.2
Depreciation	3,502	—	4,300	—	797	22.8
R&D expenses	2,251	—	2,500	—	248	11.1

Assumed exchange rate for FY03/23 forecasts: 1USD = ¥132.00 1EUR = ¥138.00 1CNY = ¥19.50
 Depreciation includes depreciation of tangible assets and amortization of intangible assets and goodwill.



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Next, please see page 17. This is a comparison of our non-consolidated earnings forecast with the results for the previous fiscal year.

I will explain the factors behind the change in profit after this.

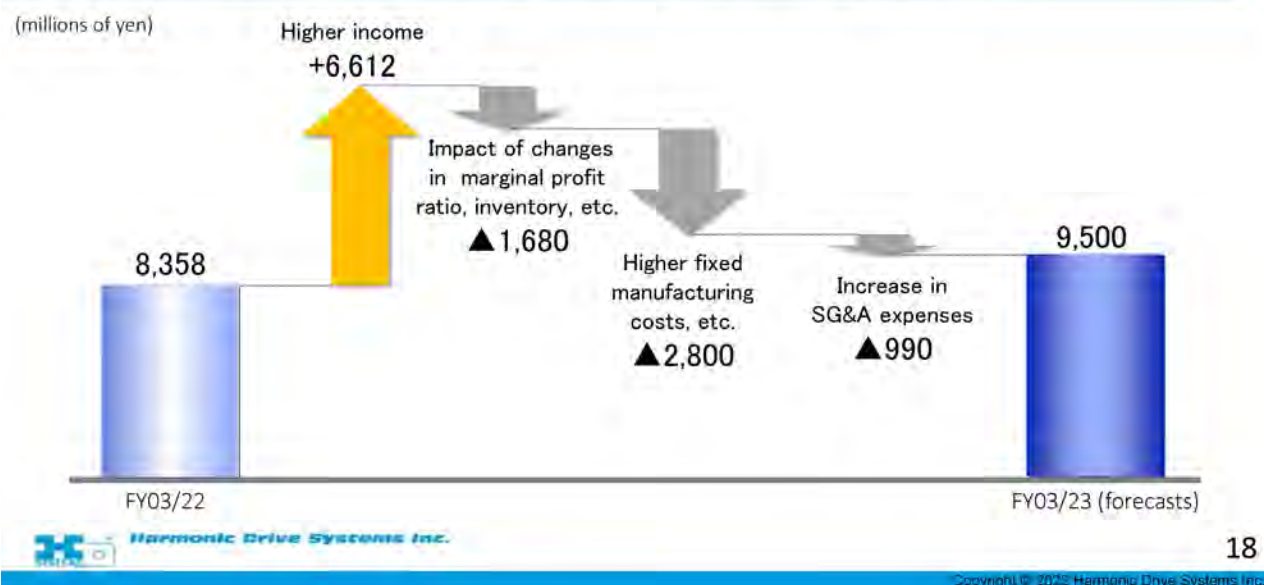
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Factors in year-on-year change in non-consolidated operating income (fiscal year ending March 31, 2023 forecast)



Please see page 18. This is an analysis of the factors behind the change in non-consolidated operating income comparing operating income in the previous fiscal year with our full-year operating income forecast.

We expect higher sales to increase operating income by JPY6,612 million.

Meanwhile, we expect the deterioration in incremental profit margin and other factors to reduce operating income by JPY1,680 million. Of this amount, about JPY1,300 million is the result of higher procurement costs for semiconductors and other components used in mechatronics products as in H1.

We do not expect a large change in selling prices.

We expect manufacturing fixed costs to reduce operating income by JPY2,800 million. This is mainly due to an increase in personnel costs, including an increase in the number of manufacturing personnel and bonuses, and an increase in depreciation expenses associated with the construction of a new automated line.

We also expect higher SG&A expenses, due to factors such as an increase in personnel expenses and R&D expenses, which will negatively impact operating income by JPY990 million.

This concludes my brief explanation of our financial results. Thank you for your attention.

Moderator: Thank you, Director Kamijoh. President Nagai will be next to give a presentation.

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1-1. Demand for HDSI's products

Outlook	<ul style="list-style-type: none"> Persistent investment demand with a view toward medium and long-term growth Orders at HDSI to bottom out in 2H 	Concerns	<ul style="list-style-type: none"> Soaring raw materials and rising interest rates Murky outlook for global economy
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Nagai: From here, I will explain our future outlook.

Please see page 20. I will reflect on the current environment surrounding the Company.

I believe you can see this on page 21 of the material, but the concerns we have on hand, as you know, is the rising price of raw materials and the increase in interest rates. But this is not unique to our company.

In addition, the global economy is clouded with uncertainty. The industry in which we operate uses the shipments of machine tools as a leading indicator, and this indicator has slightly declined.

We were at JIMTOF the other day and talked with machine tool manufacturers, including those that manufacture machine tool robots, and they said that demand for robots continues to be strong.

However, the same cannot be said of all robot manufacturers. There are some that have gotten off to a slow start, partly due to the impact of lockdowns in Chinese cities, including Shanghai. Although the situation varies from one company to another, the fact is that overall machine tool shipments are falling. Machine tool shipments are a leading indicator of robot and FA tool shipments. So, this is a point that requires caution.

I also have a bad feeling about the decline in housing prices in the US. Personal consumption accounts for over 60% of GDP in the US. Home prices are the basis for personal consumption. I am worried that a decline in home prices will also lead to a slowdown in the US economy.

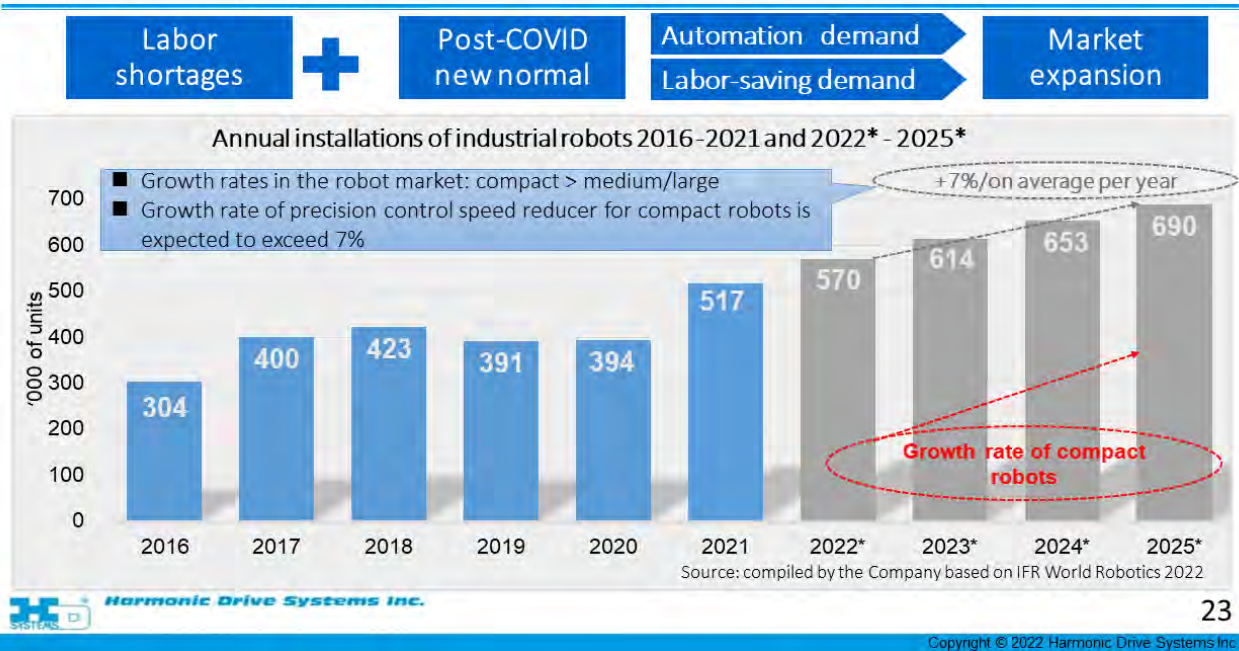
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2-1. Factory automation robot market forecast



Next, please see page 23. The FA robot industry is the main target industry of our products.

This data is from IFR World Robotics Report 2022. The number of annual installations of industrial robots is expected to increase at an annual rate of 7%. Our growth rate exceeds this figure, as I will explain later.

Various challenges arose amidst the COVID-19 outbreak, such as sales activities being restrained. However, the coronavirus also led to the widespread adoption of new ways of business and life. As a result, robots are also being installed at an accelerated pace, and this is especially true of small robots. Small robots are our forte, and we expect the growth rate in this domain to be significant.

The next material is only available to those in the audience. This is our own analysis. The blue diagonal line below shows the growth rate of 7% estimated by IFR World Robotics Report 2022. Our company's growth has been 12% over the past years.

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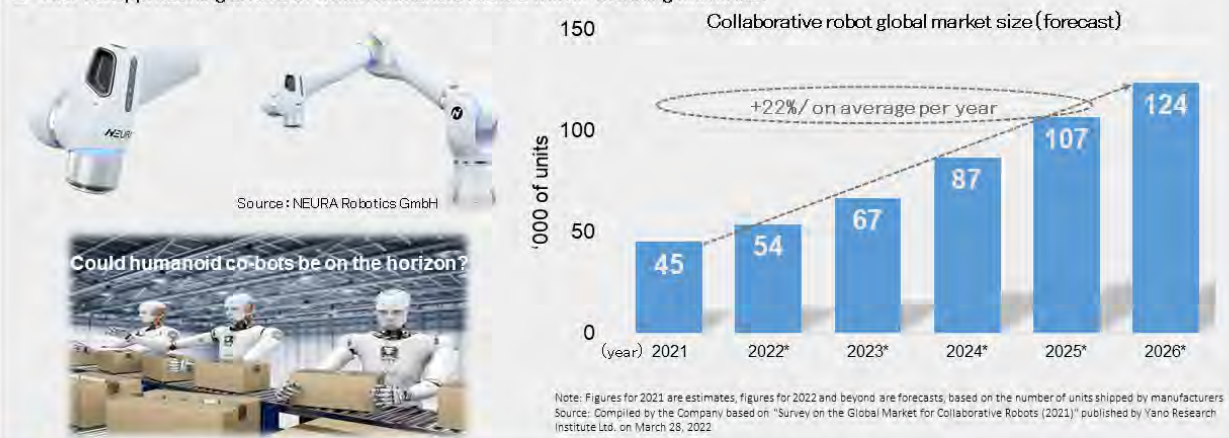
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2-2. Collaborative robot (co-bots) market forecast

- Demand is accelerating for co-bots as a solution for non-contact demand and labor management
- We have developed a speed reducer equipped with a torque sensor (for a specific company), and our speed reducers have been adopted in a company's actuators equipped with torque sensors.
- Going forward, the rollout of co-bots with integrated AI systems should facilitate the adoption of such robots by casual users.
- Are we approaching an era in which humanoid robots will be manning factories?



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Next, please see page 24.

We expect strong growth in collaborative robots (cobots) in the industrial robot industry. Demand for cobots will be spurred by labor shortages.

The most important point about small cobots is that they must be able to operate safely, because they will be used in environments without a safety fence. As written here, we believe that HarmonicDrive® with torque sensors will be embedded in the joints.

Development activities are underway within the Company, and a customer has already launched an actuator with a torque sensor that uses our product.

Another hot topic in the media recently is humanoid robots, which can be considered an extension of cobots.

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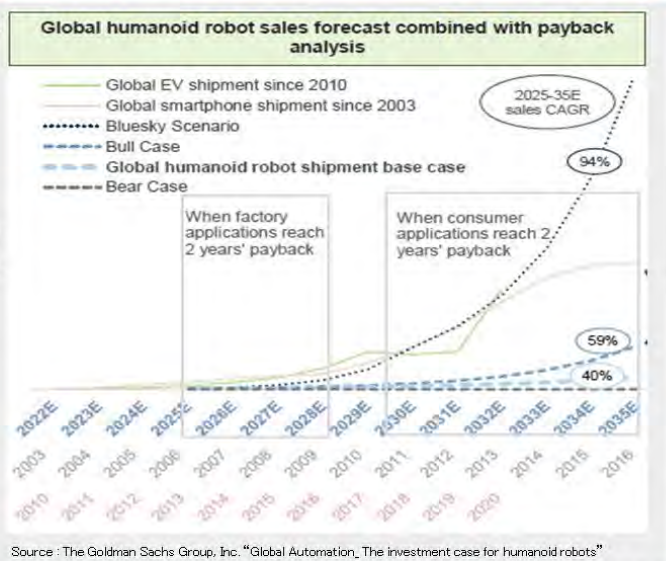
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2-3. Anticipating growing demand for humanoid robots

- Demand for humanoid robots is gaining momentum
 - Tesla has unveiled its "Optimus" robot
 - Saudi Arabia plans to deploy humanoid robots in its Smart City Project
- Relentless pursuit of superior human mobility
- Harmonic Drive® possesses technologies that can help make these trends a reality
- While there are still many hurdles to overcome with respect to technology, pricing, and ethical concerns, humanoid robots may become the next "big thing" after smartphones and EVs



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Please see page 25.

There has been a lot of talk about humanoid robots, such as in newspapers, about Tesla's Optimus and for Saudi Arabia's smart cities.

From our perspective, it is still unclear what entirely is the intended purpose of these humanoid robots. In the case of Tesla, they say that human clones will carry out factory work just like humans. But from our viewpoint as a parts supplier, they need to think of the upper and lower body of these robots differently. In terms of the upper half, the concept is similar to a cobot as explain in the previous page.

However, the difference is the hand. If you are using a cobot to move cardboard boxes, you do not need fingers. However, as you can see in the photo here, these humanoid robots have fingers. Therefore, there is a possibility that there will be some kind of breakthrough in the hand, especially the fingers.

We have heard over and over again about people talking about humanoid robots. As you all know, Honda made ASIMO, which reached the point of jumping up and down, but it isn't ready to work in a factory.

Therefore, unless we have a breakthrough from the shoulder to fingers, I do not think these humanoid robots will gain widespread adoption. Included in our company brochure for some time now is a module for three fingers. We have developed this module quite a while ago and aim to win orders in this domain. However, this will also depend on customer plans.

Recent moves by some manufacturers have been influenced by Tesla's announcement, while all kinds of analyses and reports have been announced by mass media about humanoid robots. However, according to some robot experts, there is a tremendous amount of work that needs to be done to recreate the movements of the human hand. At least 70 speed reducers will need to be used in the arm alone in order to recreate the movements of the human hand. On top of that, this expert said that the movements from the wrist to the fingers must move like humans in order for these robots to be called humanoid robots in the true sense.

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I believe the recent talk about humanoid robots has been stimulated in part by the rapid advancement of AI. I assume that there has been progress in reflecting human movements directly to robots through the use of AI.

I encourage you to read the report by Goldman Sachs, which we refer to here, for more details.

2-4. Semiconductor manufacturing equipment and Vehicle

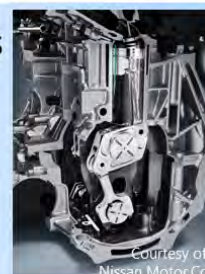
Semiconductor manufacturing equipment

- Semiconductor (memory device) shortages are expected to dissipate from 2H 2022
- Advances in automated driving and the metaverse to drive long-term demand growth
- Large-scale investment by major semiconductor companies to continue beyond 2023
- Governments to support the semiconductor industries of their respective countries
 - China is promoting domestic production of semiconductors
 - Japan also launched a next-generation semiconductor production company Rapidus



Vehicle: 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
- Also used for e-POWER in exclusive power generator engines
- Semiconductor shortages are keeping production volume flat



Courtesy of
Nissan Motor Co., Ltd.



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Next, please see page 26. Another application for which we expect demand for our products is semiconductor manufacturing equipment, as before.

I already talked about this in the previous briefing meeting, but the market is almost saturated for memory chips, while there is still a clear shortage of logic chips in Japan. The government has also been backing this industry, such as through the inauguration of Rapidus Corporation, a next-generation semiconductor manufacturing company, as reported in newspapers the other day. As a side note, Mr. Koike, a member of our Advisory Board, became the first President of Rapidus Corporation. However, this does not mean it will be advantageous for us.

As for automotive applications, sales have come to a standstill because of the sluggish growth in car production volume caused by semiconductor shortages, as explained earlier by Kamijoh in the section about our financial results.

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2-5. Medical care

Surgical robots

- Very few companies supply parts to the major manufacturers of surgical robots in Japan, the US, and Europe, giving rise to a near oligopoly
- HDSI provides total motion control (high-level integration of Harmonic Drive®, planetary gear speed reducers, and mechatronics products)
- More companies are joining the field as digital transformation gains pace in medical settings and treatment fields continue to expand



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Please see page 27.

Medical equipment and surgical assisted robots have recently seen an increase in the number of players. Most of them require HarmonicDrive®.

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3-1. Aviation

eVTOL (flying car)

- Electrification of aircraft
 - ➡ CO2 emission reduction, quieter operations
- Our compact and lightweight products are suited to these needs
- Top players in eVTOL have entered the commercialization stage
- Aerial travel to suburbs to become more widespread thanks to aerial ride sharing services
- What about large aircraft?



Please see page 29. A new application for our products introduced on this page is eVTOL.

Many reports have been issued about eVTOL by university research labs and the private sector. In Japan, it has become quite realistic to fly it during the Osaka-Kansai Japan Expo. However, I do not think it will be part of our daily lives anytime soon. For example, even if these flying cars are sold for JPY100,000, there aren't many people who have a license to fly the car, so it will take time until it gains traction.

Meanwhile, in the US, there is a startup that has IPOed and is considered a frontrunner in this industry. They have long been working to commercialize flying cars, and they will likely be the first ones to do so. Our gear reducers will play a very important role in the flying cars manufactured by this company.

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3-2. Amusement

Animatronics

- Harmonic Drive® helps to realistically replicate the movements of people, animals, and fictional creatures
- Major amusement companies are restarting investments with a view toward society “With COVID” and “Post-COVID”
- Animatronics products for attractions and shows are actively developed and invested



Source: Harmonic Drive SE website

Please see page 30. HarmonicDrive® are also used for amusement applications, as explained before.

These are not string puppets that you might imagine seeing in an amusement park in the past. Amusement companies are now meticulously recreating the movements of CG used in movies. To do so, they must use the proper machines. These machines use compact HarmonicDrive®, which allow them to fine-tune position.

There were many headwinds in this business amidst COVID-19, such as the closure of theme parks and layoff of engineers, but now that we are coexisting with the coronavirus, investments have resumed.

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3-3. Space








Our Challenge Never Ends.

1971年、アポロ15号の月面車に始まり、
2022年7月、最初の観測データが公開された
『ジェームズ・ウェッブ宇宙望遠鏡 (JWST)』に至るまで、
多くの宇宙用機器にハーモニックドライブ®が使われてきました。
これからも長年培われた技術と技能を活かし、人類の宇宙への夢を実現するために、
私たちの挑戦は、決して終わることはありません。





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Next, I will explain the aerospace applications.

Please see page 31.

This is an advertisement that we ran on the Nikkei.

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3-4. Space: Manned Pressurized Rover to explore lunar surface

Joined research to develop a steering unit as part of the Manned Pressurized Rover joint research project (FY2019–2021) led by the Japan Aerospace Exploration Agency (JAXA) and Toyota Motor Corporation



Source: JAXA, Toyo Motor Corporation

Please see page 32.

Our company's history dates back to the Apollo program in the 70's. This is a new lunar exploration vehicle. As you know, Toyota is leading the research and development of this new vehicle, and we are participating in the research at two locations in the steering unit.

I have also sated this before, but space used to be primarily a research field. We also saw it only as a research domain. However, space is now becoming a commercial field.

We have not included this in the presentation material, but there are many players involved in the space business, including Elon Musk's Space X and many others who are serious about living on Mars. The development of such projects will require the use of our products.

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4-1. Increasing production capacity and enhanced productivity at Ariake Plant

- Completed investment to expand production capacity at Ariake Plant: total investment of 6.5 billion yen
- Digitize various data and promote introduction of IoT



Before



After



Introduction of AGV

Increased production capacity

Additional 70,000 units
(Industrial: 40,000 units; Vehicle: 30,000 units)

Increased productivity

Improve automation and save labor
(more than doubled the productivity per employee from the previous line)



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Next, I will explain about our production capacity. Please see page 34. This is the same content as what we shared in May regarding the enhancement of our production capacity.

We aim to raise productivity not only by increasing personnel or expanding locations but also by incorporating automation.

This is the Matsumoto Factory where we make our cross-roller bearings, and we are currently bringing in consultants to help us introduce AGVs. Recent consultants take pictures of the factory, put them into a 3D CAD system, and make various proposals.

There has been much talk about automation, but we have already made considerable progress in automating our workflow. This includes the automation of tasks of each worker as a result of their ingenuity and efforts. However, we still have room to improve the seamless integration of these automated tasks. In other words, we have had difficulty creating the route maps and timetables of AGVs. Therefore, we brought in consultants to help us solve these issues.

Needless to say, we also aim to introduce automation at our Ariake Factory, so the results of our automation efforts at the Matsumoto Factory will be horizontally deployed at the Ariake Factory as well.

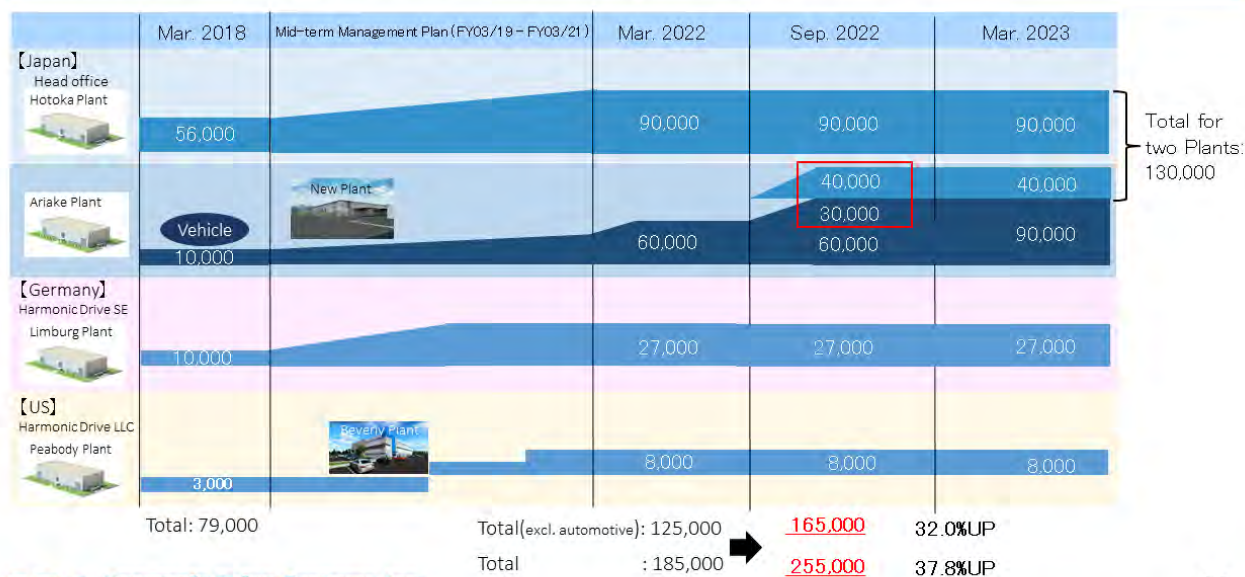
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4-2. Increasing Production Capacity



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Please see page 35. We share this information at every meeting.

As a result of our efforts, we aim to achieve a global production capacity of 165,000 units per month. In particular, we aim to realize a monthly production capacity of 130,000 units at our two Factories combined for general industrial machinery such as industrial robots in Japan, as shown on the right. We expect to achieve this in the near future.

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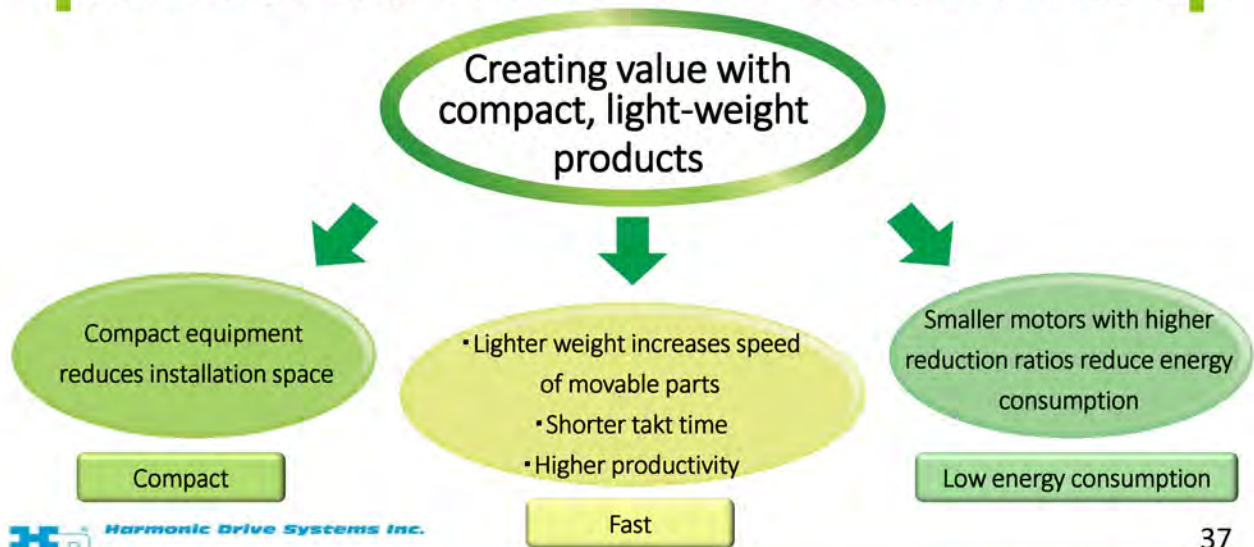
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5-1. Contributing to energy conservation

Contributing to energy conservation by further reducing size and weight



Next, on page 37, I will explain about our value proposition.

We have not emphasized this point too much in the past, but the basic premise of our products is that they are compact, light-weight, and eco-friendly. After discussing internally about the value that we add, we came up with the three points shown on this page as our value proposition.

To put it simply, our products are used in compact machines that save space. Above all, our speed reducers are compact and light-weight, so the motors that use our speed reducers also become compact. We believe this is an important value that we add, and it also has an impact on conserving energy consumption.

In this way, the small size and light-weight we have achieved are contributing to industrial society.

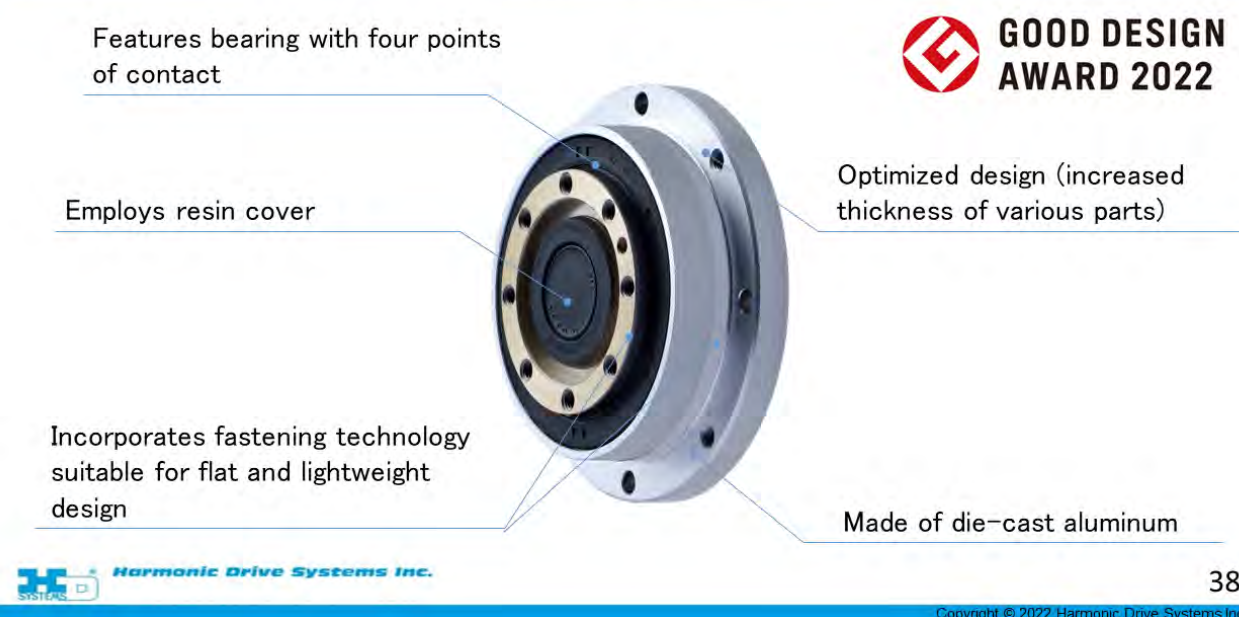
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5-2. CSF-ULW : Core technology underpins lightweight and flat design



Please see page 38. A typical example is the CSF-ULW (Ultra-Light Weight) series that we have recently developed.

As you can see, the conventional flat type is used, and the bearing is also made into a four-point contact bearing to reduce weight. The case is also made of die-cast aluminum to reduce weight considerably.

This product also received the Good Design Award this year.

Also, although this is a bit local, we won the Grand Prix this year at the Monozukuri Grand Prize NAGANO.

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5-3. CSF-ULW: Illustration of weight reduction

Achieved **approx. 55%** reduction in weight compared to the previous model!

* Applies to Model 8



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Please see page 39. The specific difference of this product is that it is almost twice as light as the conventional product.

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5-4. CSF-ULW: Applications of lightweight design



Autonomous mobile robot (AMR) arm



Power-assist suits



Agricultural robots

Please see page 40.

As for the specific applications of this product, it is used in the arm of devices that are attached to the human body and cobots. If the arm is light, the load on the lower part of the vehicle body can also be light. I believe that the lighter weight will lead to new applications or to different evaluations by customers even for the same application.

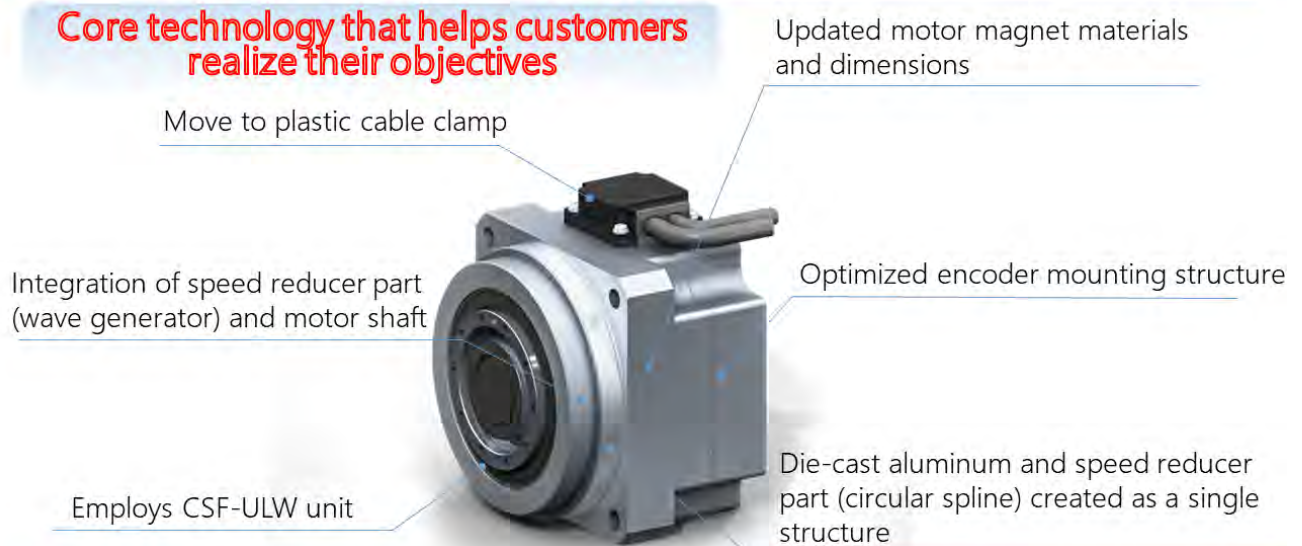
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5-5. FHA-mini-ULW : New mechatronics product (reference)

Core technology that helps customers realize their objectives



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Please see page 41. Our FHA-mini-ULW is not only HarmonicDrive® but also an actuator, motor combined with HarmonicDrive®.

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6-1. Toward a sustainable future

Mechatronics Exhibition held jointly by Three Companies

Dates: August 30–31, 2022

Venue: Tokyo International Forum

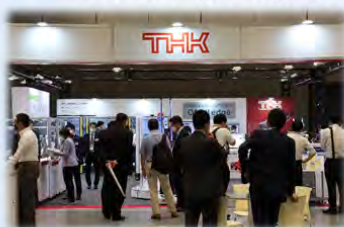
Theme: Toward a sustainable future

Visitors: Approx. 1,200 people

- First private showcase held jointly by the three market share leaders in the industry: SMC Corporation, THK Co., Ltd., and Harmonic Drive Systems Inc.)
- Presented cutting-edge automation technologies based on a vision for future factory automation (FA) underpinned by collaboration and the mutual sharing of strengths
- Objective is to create solutions for customers in areas such as labor-saving, energy conservation, and carbon neutrality



SMC Corporation booth



THK Co., LTD. booth



HDSI booth



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Please see page 43. This page is about the efforts we are making for a sustainable future.

Sustainability is a word that is popular with the media. We have held a private exhibition in collaboration with SMC and THK at the end of August 2022.

We held this event based on discussions between top management of each company. We agreed that although we were aware that we are leaders in each of our industry, there is a limit to what we can do on our own. We thought that it would be better to collaborate. However, we have not concluded an agreement. We are starting with a casual alliance, and that is how this exhibition came to be.

Each company deals with very different products, so we have no intention to collaborate in marketing. Rather, we hope to work together toward labor-saving and energy-saving to realize a carbon neutrality and sustainability. We hope to carry out activities together that would contribute to the SDGs, and we have begun doing so through this exhibition.

That said, I am sure you saw this if you came to the exhibition, but a bi-armed robot made by Kawada Industries that THK was exhibiting uses the parts of all three companies.

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6-2. Seeking harmony with the future

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

Basic Policy of Sustainability (approved on March 25, 2022.)

As a technology and skills-based organization in pursuit of Total Motion Control, the HDS Group aims to enhance corporate value and realize a sustainable society by contributing to technological innovation for the betterment of society. We intend to achieve these goals based on our management philosophy comprising four pillars: **Respect for individuals, be a meaningful company, coexistence and co-prosperity, and contribution to society.**

Our mission



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Next, please see page 44. This is also the same slide as shared in May. We announced Basic Policy on Sustainability in March, and we have once again defined our corporate mission.

Since we only make one product, HarmonicDrive®, our mission is to further deepen and evolve this invention of more than 50 years ago. As I mentioned earlier, we believe that the effect of this will be to show how small and lightweight products contribute to industrial society.

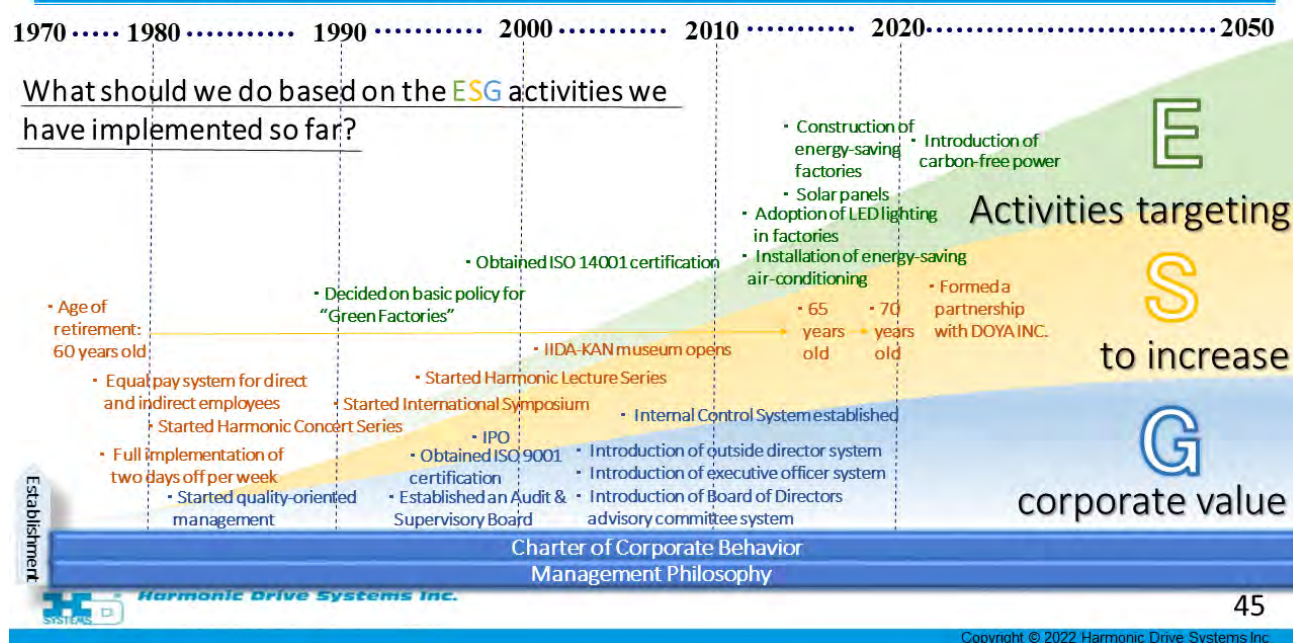
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6-3. Our path to sustainability



Next, please see page 45.

We have been using the same figure in past materials, but the newly added part here is our efforts to promote partnerships, Goal 17 of the SDGs, which we started by holding the International Robot Exhibition 2022.

We have also formed a partnership with DOYA (NON-PROFIT ORGANIZATION CLOUDY), which makes apparel in Africa and markets its brand in Japan. We were told that the policy of this non-profit organization is not to simply donate money, but rather to donate a portion of the sales proceeds to support the establishment of a vocational training school to promote their self-reliance. We have formed a partnership with them, and we purchase their products and use them as the uniforms of our exhibition staff, and we distribute amenity goods to visitors.

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Topics in FY2022

April: Introduced CO2-free power at Ariake Plant

June: Harmonic Drive SE obtained the ISO50001 certification

October: CSF-ULW won the Good Design Award

October: Won the Grand Prize at the Monozukuri Grand Prize Nagano 2022

January: Plan to hold the 37th Harmonic Concert (in Azumino City, Nagano Prefecture)



This is the last page of the presentation. We list what happened this year.

Many of these events are related to the SDGs. We introduced carbon-free electricity at the Ariake Factory.

Our German subsidiary acquired ISO 50001 certification.

We were awarded the Good Design Award 2022 and Monozukuri Grand Prize Nagano 2022.

Next year in January, we plan to hold a Harmonic Concert. We had not been able to hold this concert for a long time due to COVID-19, but we hope to resume the concert.

This concludes my presentation. Thank you.

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Question & Answer

Moderator [M]: Thank you, President Nagai.

We will now move on to the question-and-answer session. If you have any questions, please state your affiliation and name.

The floor is now open for questions.

Isayama [Q]: Thank you for the presentation. I am Isayama of Goldman Sachs. I would like to ask three questions.

First, I would like to ask about the bottoming out of orders as explained by Mr. Kamijoh. In the near term, I understand that your distribution inventory, or inventory at distributors, will be exhausted soon. However, we must also be mindful of the decline in real demand, as seen in the production cuts at SCARA robot manufacturers amounting to tens of thousands of units. You also mentioned that demand is also falling for machine tools and ST.

I would like to confirm what you had meant in your comment about demand bottoming out in the year-end or around the start of next year. Did you mean that demand is expected to return at your company, because distribution inventory will soon be exhausted? Or did you also mean that you expect real demand to be bottoming out soon? I expected demand to return around the end of this year or early next year, but there is recently talk about stagnant demand. Could you tell us when you expect orders to bottom out at your company, as well as when you expect real demand to bottom out?

Maruyama [A]: This is Maruyama. I will answer your question about the timing of orders bottoming out. In addition to the explanation by Kamijoh at the beginning, the President also explain about order fluctuations during his presentation.

To put it simply, we believe our customer inventories will bottom out around December of January. Considering the balance between order backlog and the amount of inventories held by customers, we believe that orders will begin to gradually return from December onward.

We understand that the situation at our company probably differs from real demand.

Isayama [Q]: Thank you. Do you expect real demand to recover around the end of spring?

Maruyama [A]: It is difficult to give a definitive answer. However, in terms of our own business environment, we believe that order backlog that had accumulated due to long delivery times will normalize 100% by the end of the current fiscal year.

The business environment in H1 of the next fiscal year will likely determine real demand. We currently believe that the demand at our company will be linked with real demand as early as the end of the current fiscal year or around Q1 of the next fiscal year.

Isayama [Q]: Thank you. Second, I would like to ask about humanoid robots. It is said that the key to the broad implementation of humanoid robots is price. What is the added value that your company will provide?

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I understand very well that gear reducers are indispensable. However, there will also need to be considerable innovation in cost. President Nagai explained earlier about the technological hurdles in the area from the shoulder to the fingers. How do you intend to promote innovation while balancing it with price?

Will you consider using different materials or will you develop products for humanoid robots even if it means you will have to reduce the quality? Or do you think that your products will remain expensive because of the specifications required for parts used in the fingertips? And would that mean the price of robots will go up?

Please share us your views on the direction of technological innovation in terms of humanoid robots.

Nagai [A]: As described in the presentation material, there are many high hurdles to clear, including price and safety.

Regarding your question about price, we are not in the position to sell these robots. When people tell us that our products are too expensive during the development stage, I ask our sales staff to first tell the customers that we want to make high-quality products with them.

In short, we do not intend to lower the quality for the sake of price. However, you also mentioned using different materials. This is possible through the use of carbon or by using aluminum housing for our products such as ULW. I think it is possible to make our existing No. 3 and No. 5 parts a little lighter.

Lightness is the key factor in parts that will be used from the shoulder to fingers, according to our engineers. Although existing products will suffice if the robot arms are moved slowly, each part will need to be lighter if the robot arms were to move at the same speed as humans. We will tackle the challenge of developing parts for robot applications by pursuing weight reduction and downsizing in addition to our usual position precision and zero backlash.

We have not received specific inquiries at this point. However, as you also pointed out in your report, these sort of discussions have been popping up recent. And we already have finger modules using No. 3 and No. 5. Therefore, our stance is to make company-wide efforts to tackle this challenge.

Isayama [Q]: Thank you. Lastly, I would like to ask a question unrelated to business operations. Last year, Nabtesco announced that it will be disposing their shares in your company, and this share disposal was commenced yesterday. Your share price has fallen in response to this news. This was something that was unavoidable, but do you intend on taking any countermeasures in the beginning of the next fiscal year depending on share price trends, such as share buybacks?

I understand that the disposal will continue for about a year, and this will likely have a negative impact on your share price. Although this is regrettable, how do you plan to respond? What kind of measures will you take in response to the change in the supply and demand of your shares? Also, please tell us anything about what happened leading up to Nabtesco's decision.

Kamijoh [A]: First, I will explain the history. Nabtesco originally held 20% of our shares. They had already disposed half of it from last year to this year, and they had announced that they plan to dispose their remaining shares as well. There is no particular surprise that their plan has been put to action.

We had established a very positive relationship with Nabtesco based on business collaboration. However, we had dissolved the collaboration last year. This was not because of a difference in views or other negative factors. We continue to have a very positive relationship with Nabtesco. They had talked to us in advance about the method of disposing their shares. That is what happened in the lead-up to yesterday's disposal.

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There are various ways to look at the positive and negative aspects of the disposal method, and we may investigate further into it, but it was in neither of our interest for our share price to fall. We and Nabtesco shared the same interest and were on the same page in this regard. Against this backdrop, Nabtesco decided that the current method would be optimal. Since this is Nabtesco's decision to sell their own assets, we chose to respect their decision.

Share buybacks will obviously be on the cards if our share price were to slump or we believe that they are excessively undervalued.

On the other hand, as explained earlier, we are still in the growth stage of our development, and there are many capital investment needs that lie ahead of us. Although our decision will depend on the business circumstances at that time, our priority in terms of capital allocation to enhance shareholder value is to ensure that we continue to invest in our future growth. Therefore, we will make the appropriate decision while carefully assessing market conditions.

Isayama [M]: Thank you.

Moderator [M]: Thank you. Please raise your hand if you are in the audience and have questions, or press the "raise your hand" button in the lower left corner of the screen if you are attending via the web. We also accept questions via chat.

McDonald [Q]: This is McDonald of Citigroup Global Markets. Thank you for the presentation today. I have several dozen question, but I will summarize them into two questions.

As you explained earlier, I understand that the Company has potential in various areas and this will require investments in growth. On the other hand, I would like to confirm about the cancellation in orders. First, could you confirm whether these cancellations were in China or Japan? Also, please tell us about the reasons for the order cancellations. You mentioned that there were inventory adjustments at your customers. Were these adjustments in Japan, or were they overseas?

Maruyama [A]: Most of the order cancellations were from our main robot manufacturer customer. These robot manufacturers are now in a phase of inventory adjustments in response to the demand environment. However, orders from these manufacturers were strong up to now.

However, these manufacturers have been facing difficulties in the procurement of electronic components, similar to how we are facing procurement difficulties in our mechatronic products. As a result, their production timetables have been delayed.

Last year, we received a very large order from customers. As a result, they have a sufficient amount of gear reducers for their production plans. However, they are unable to gather the other necessary components. Due to this situation, they have a surplus of gear reducers compared to other inventories. Companies who have a shortage of other components and have built an inventory of gear reducers exceeding their tolerable levels have asked us for our cooperation to cancel the orders they had already placed.

Rather than forcing our customers to hold more inventories, we are sharing information with them to make sure they are not holding an unreasonable amount of inventories. These adjustments are taking place mainly in Japan, between us and our customers as well as our distributors.

McDonald [Q]: I understand that your overseas subsidiaries have fiscal years ending in December. Therefore, the April to June quarter overseas is recorded as part of the Group's Q2 results. Now that we are in November, I believe you already have the July to September results at your overseas subsidiaries, which will be recorded

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as part of the Group's Q3 results. I would like to know if you expect to record similar order cancellations in Q3.

Maruyama [A]: We already know the Q3 results of our overseas subsidiaries, but we cannot disclose that publicly. However, to get to your point, there have been virtually zero cancellations overseas.

McDonald [Q]: On a separate note, I would like to ask about your automotive business. I believe that the downward revision to your automotive business was partly unavoidable. However, I would like to check one point about your production capacity for automotive applications, as described on page 35 of the presentation material. On this slide, it says that your monthly production capacity for automotive applications will be approximately 90,000 units by March 2022. However, when looking at your non-consolidated order and sales trends on pages six and seven, the composition ratio of automotive parts do not seem to match your production capacity. Please tell us about the capacity utilization of your automotive plant, and when we can expect it to reach full production capacity.

On a longer time horizon, for example, in the next five years or so, how much will automotive products account for in total sales? The reason why I ask this is because I am still in doubt about the profitability of your product mix and production mix. It appears to me that the profitability of automotive parts is low.

I understand that many changes are taking place at your plants, including automation. However, do you really believe that this automotive business will have the same kind of added value for Harmonic as the robot, medical, or semiconductor manufacturing equipment businesses? I am still in doubt about these points, so please share us your views on the current production capacity and the expected composition ratio of automotive sales few years down the line.

Maruyama [A]: The production capacity of 90,000 units shown here is the capacity of dedicated facilities. We need to start preparing about one year and a half before production starts at the stage of having received our customer's plans. The decline in capacity utilization ratio is ultimately due to this time lag. Honestly, we have not been able to operate at full capacity. We are generally operating at around 30%.

However, we have also made adjustments in personnel in the FA-related production lines, so we have not allocated unnecessary personnel.

Regarding your question about the future outlook, we cannot give a definitive answer because we still do not know if the semiconductor shortage will be resolved. However, if you look at the business from a longer-term time span, we believe this 90,000-unit capacity can be fully utilized based on the plans we have received from customers so far. There is still some uncertainty around how close we can get to full capacity utilization, but we are confident that this 90,000-unit capacity will not become overcapacity from the perspective of one, two, or three years in the future.

As for your question about profitability, capital investments will weigh heavily on profits, but our automotive products have a very high in-house production ratio. Therefore, almost all components can be manufactured in-house, except for the raw materials.

As a result, the amount of money generated from the automotive business will be significantly greater than our FA-related business. In other words, the incremental revenue ratio (the profit we gain on higher sales) will be much higher. As long as we can secure a good amount of volume, we believe that the added value of this business will not be low by any means.

McDonald [Q]: Thank you. Lastly, I would like to ask my question to President Nagai. You explained at length about technological advancements and innovation in your presentation. If I recall correctly, you had also

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talked about abacus drive several years ago. I had all sort of doubt about whether it would be positive or negative to your business in the future. But I stopped hearing about it from there on.

I believe you were developing abacus drive through all kinds of partnerships, including with Stanford University. Could you give us an update on the development status of abacus drive?

Nagai [A]: We are still developing abacus. This principle has been proven to be correct in our actual equipment. In other words, it has proven to be more efficient than wave gears.

However, just as it took 50 years for HarmonicDrive® to become what it is today, it will take time to commercialize this rare invention. Our role is to make more and more actual machines, but it is difficult to translate the ideas of the inventor into actual blueprints and products.

Also, we are a bit behind schedule due to our busy schedule. However, we have not stopped this project, and we are still continuing joint development with SRI International.

The same inventor has also invented a very unique continuously variable transmission, the patent for which has already been published. We are also involved in this at the same time as abacus drive. This presentation was given at IROS2022, an international conference on intelligent robots and systems held in Kyoto last month, so please check it out. This is an invention that no ordinary person would have thought of.

We believe that if this is done well, it can be used for robot joints. As I mentioned earlier, humanoid robots and cobots do not have safety fences, so safety is important. If a stepless transmission can be used here, we believe it will be safe even if humans bump into a robot.

Alternatively, we envision that this technology could be used as a transmission part for small personal mobility applications. Thus, we are collaborating on this new invention solely for robotic and small mobility applications.

Moderator [M]: Thank you. Since we are running out of time, the next person will be the last to ask a question. The person at the front of the center row, you may ask your question.

Mizuno [Q]: I am Mizuno of UBS Securities. I would like to confirm a few points. First, please let me confirm about inventory adjustments at customers. Do you think there is a possibility that the current adjustments seen at certain robot manufacturers expanding to multiple other manufacturers?

The reason why I ask this is because the strength of orders in this cycle is uneven depending on the robot manufacturer. For example, orders are still very strong at Fanuc.

I wonder if this is because of their end-market exposure. For example, some robot manufacturers may have a higher exposure to EVs. I would like to know whether this would ultimately increase the risk of inventory adjustments spreading to your other customers as well. I would appreciate it if you could give us some hints.

Maruyama [A]: I explained earlier that non-consolidated sales were mainly concentrated in the automotive business. However, my impression is that cancellation have already run their course. We have already factored in those risks into our forecast. Therefore, it is difficult to comment on whether there is a possibility of cancellations spreading further. The numbers we have presented already incorporate those risks to a considerable degree. Therefore, we do not expect a greater expansion of cancellations beyond what we have already factored into our forecast.

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Mizuno [Q]: Out of the JPY1.2 billion in cancellations in Q2, I believe some were for industrial machinery. Have you already incorporated the possibility of several more cancellations for industrial machinery in your revised forecast?

Maruyama [A]: Yes, we have.

Mizuno [Q]: Okay. But you cannot tell us if there have actually been such cancellations at this point, right? That's fine. I understand.

My other question is about your share price. When I was talking with investors this morning, they were all concerned about how your share price would react to your financial results and other announcements.

What I want to ask about today is your equity holdings. Based on the securities report filed at the end of the previous fiscal year, you have sold part of your shares in business partners, especially your shares in banks. However, I believe the amount was small.

You also have equity holdings remaining in NACHI and Nabtesco. For example, I believe you still have about JPY10 billion of shares in Nabtesco. Have you considered selling your shares in Nabtesco and using that for share buybacks? Perhaps you may not be able to give us the details, but could you at least share your approach on how you intend to deal with these equity holdings going forward?

In addition, please comment about how you plan to deal with your shares in Nabtesco. This may overlap a little with previous questions, but please explain this point to us one more time.

Kamijoh [A]: Our stance regarding equity holdings in business partners is to reduce the amount, and I believe this is a common issue to be tackled by all publicly listed companies.

However, our position in NACHI is not that large, and we have a very close business relationship with them. Therefore, we categorize our holding in NACHI's shares as sufficiently meaningful, and plan to continue to own shares in the Company.

On the other hand, our business relationship with Nabtesco has been dissolved, as explained earlier. Therefore, our basic stance is to reduce our shares in Nabtesco to zero at the right timing. We will decide on how to use the funds that are raised as a result of the sale depending on the circumstances at that time.

Mizuno [M]: Thank you. That's all.

Nagai [A]: I would like to follow up on your first question about cancellations due to inventory reasons spreading to other robot manufacturers. As you know, each robot manufacturer excels in certain domains. While there are manufacturers that excel in SCARA robots, there are also manufacturers like Fanuc that handle robots ranging from large-sized to compact robots. As you say, Fanuc has established a dominant position, but that does not mean inventory adjustments in one company will necessarily spread to the robot manufacturing industry as a whole. Each company's inventory varies depending on application and field.

More importantly, I believe the common issue facing all robot manufacturers is the uncertainty around the global economy, as I stated at the beginning. I look forward to reading your reports about how those factors could affect our business. If the world economy were to enter a serious recession, then inventory adjustments would likely take place regardless of the robot manufacturer, including SCARA robot manufacturers.

Moderator [M]: Thank you.

We will now close the Q&A session. Thank you for your kind attention to the end.

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This concludes the financial results briefing for the H1 of the fiscal year ending March 31, 2023.

Thank you very much for your participation.

[END]

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