



Harmonic Drive Systems Inc.

Harmonic Drive Systems Inc.

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

November 16, 2022

This presentation contains forward-looking statements relating to expected future performance as of November 16, 2022. Such statements are based on the views and assumptions of company management and involve risks and uncertainties such as changes in the business environment that may cause the actual results to differ materially from expectations.



Performance Summary for 1H FY03/23

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.

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.

Performance of main group companies in 1H FY03/23

(millions of yen)

(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

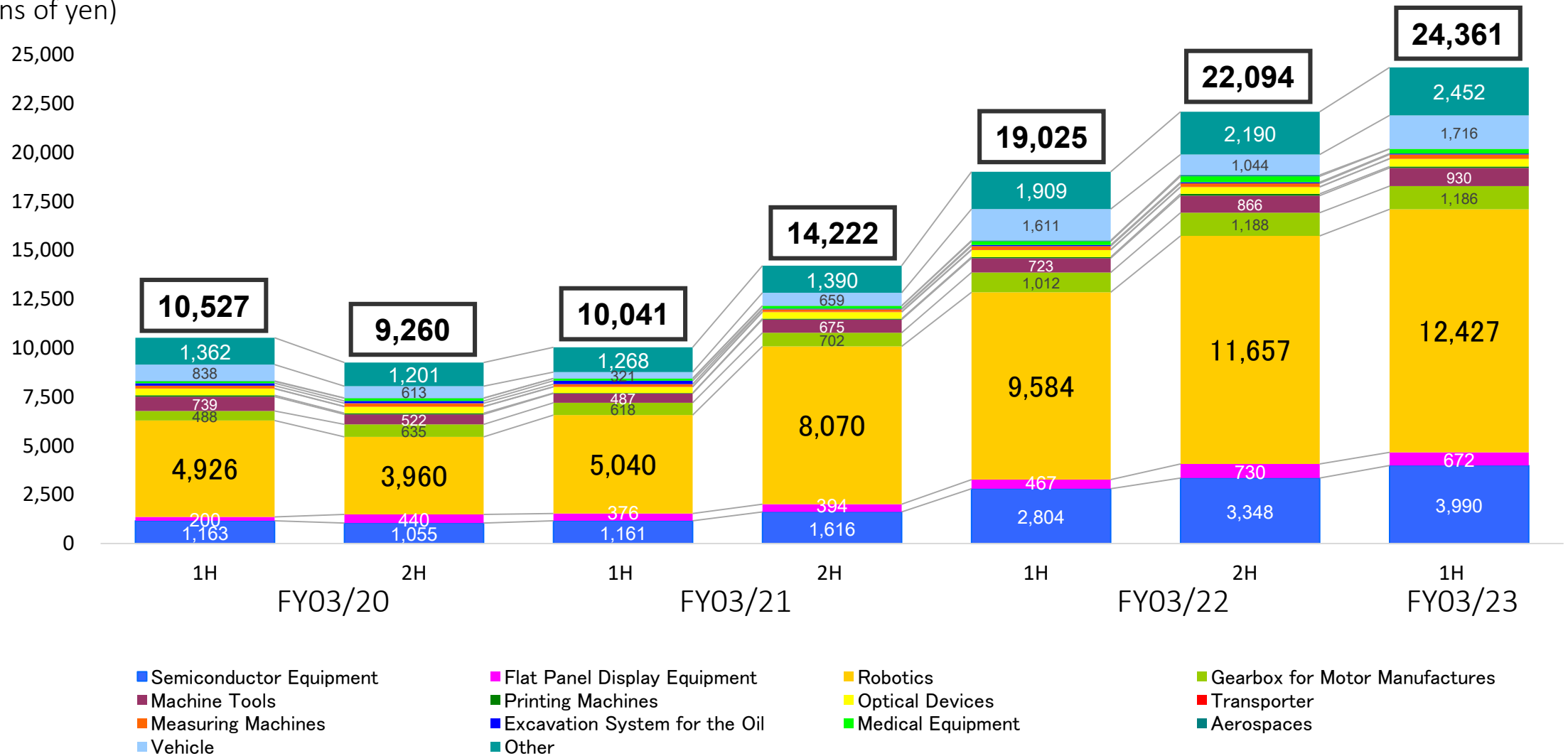
Non-consolidated results for 1H FY03/23 (year-on-year change)

(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

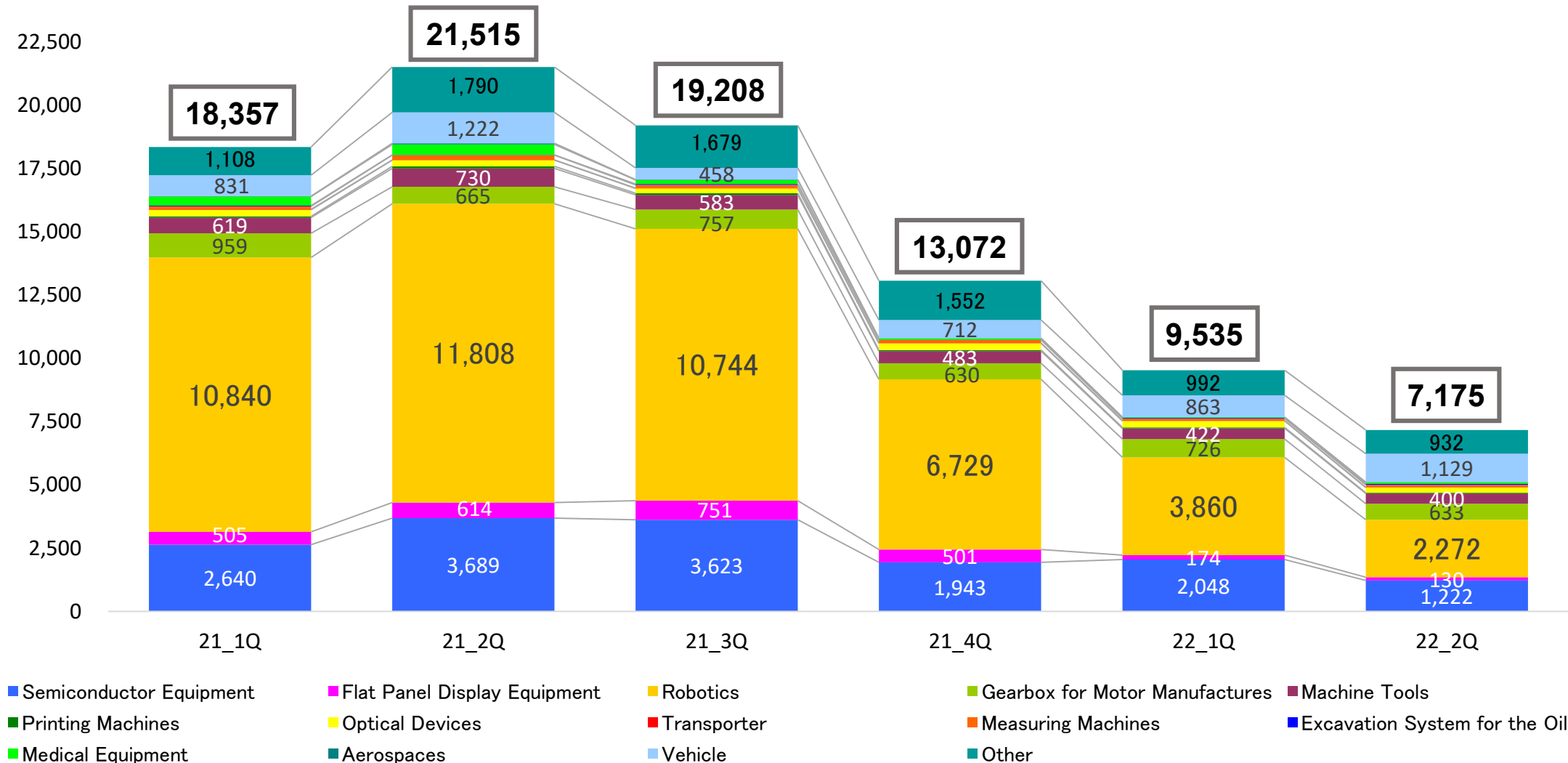
Non-consolidated net sales by application

(millions of yen)



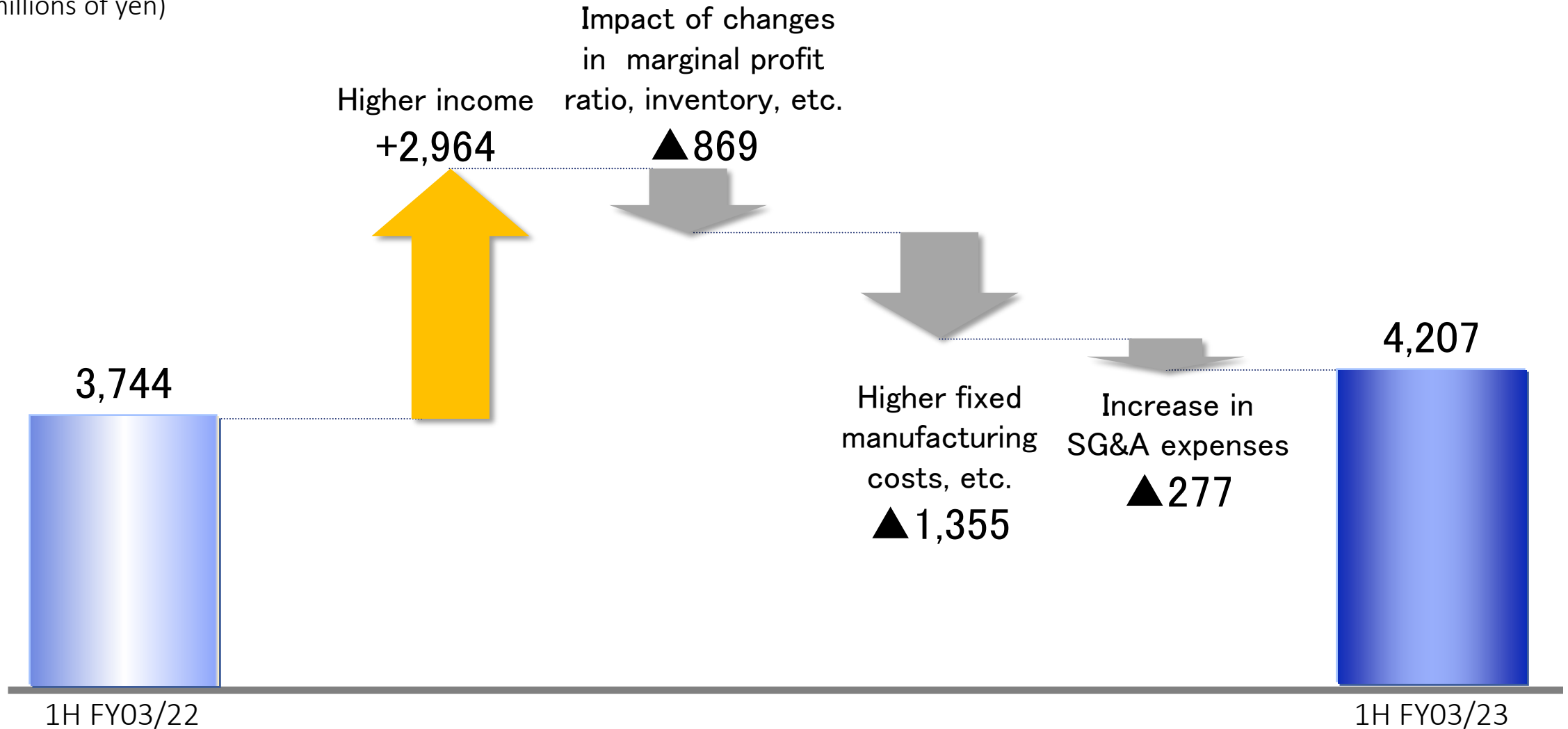
Non-consolidated bookings by application (quarterly)

(millions of yen)

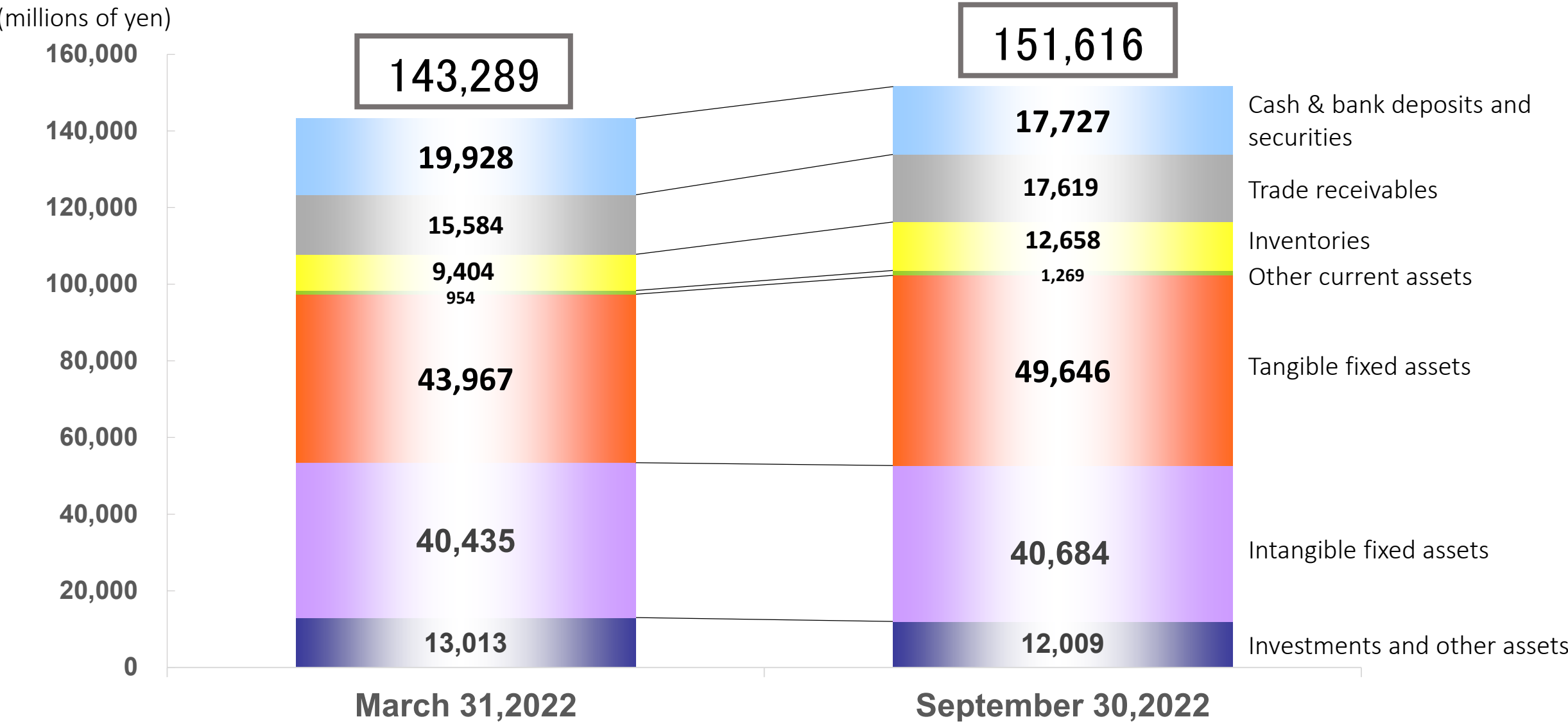


Breakdown of year-on-year change in non-consolidated operating income

(millions of yen)

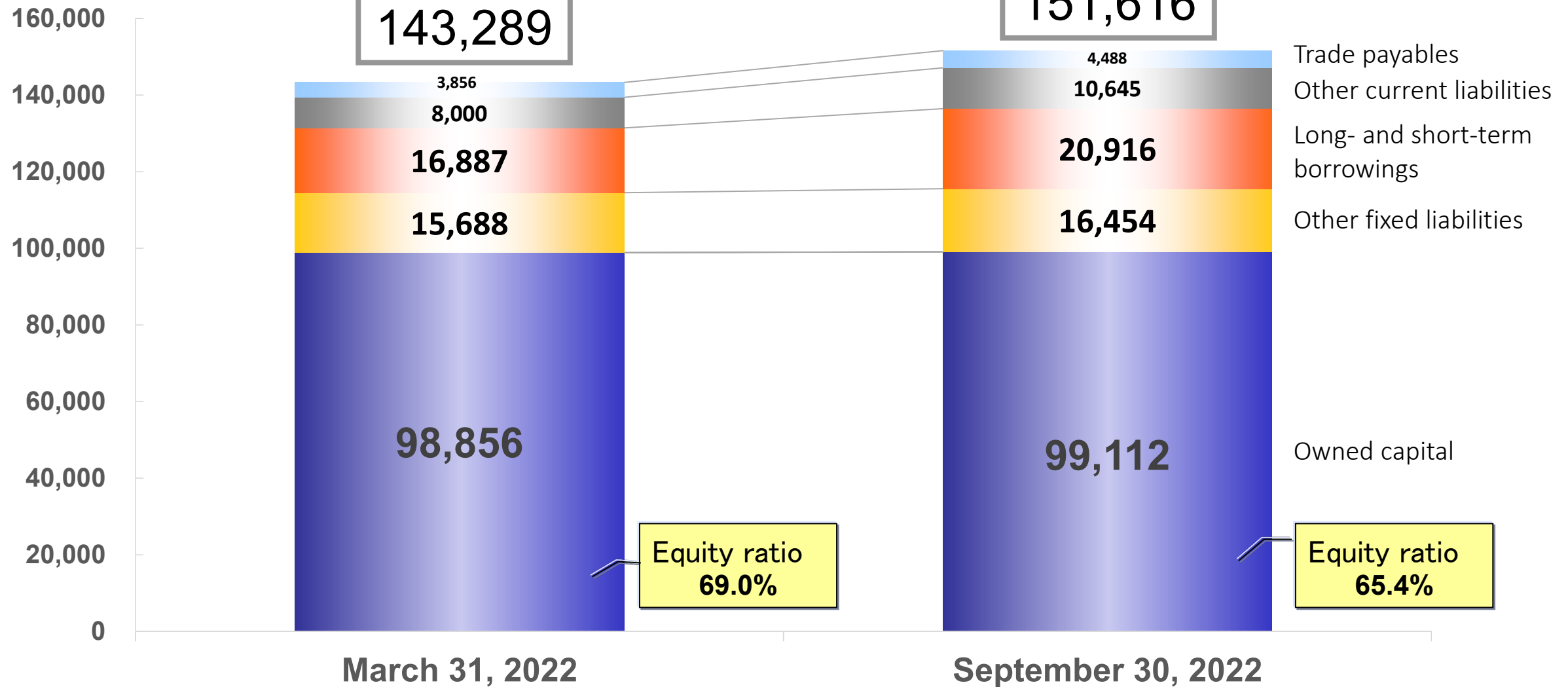


Status of consolidated assets



Status of consolidated liabilities and net assets

(millions of yen)



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

Performance Forecasts for Full-year FY03/23

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.

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)

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.

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(%)
※2	Harmonic Drive Systems Inc.	—	53,000	28.9	9,500	13.7
	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

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

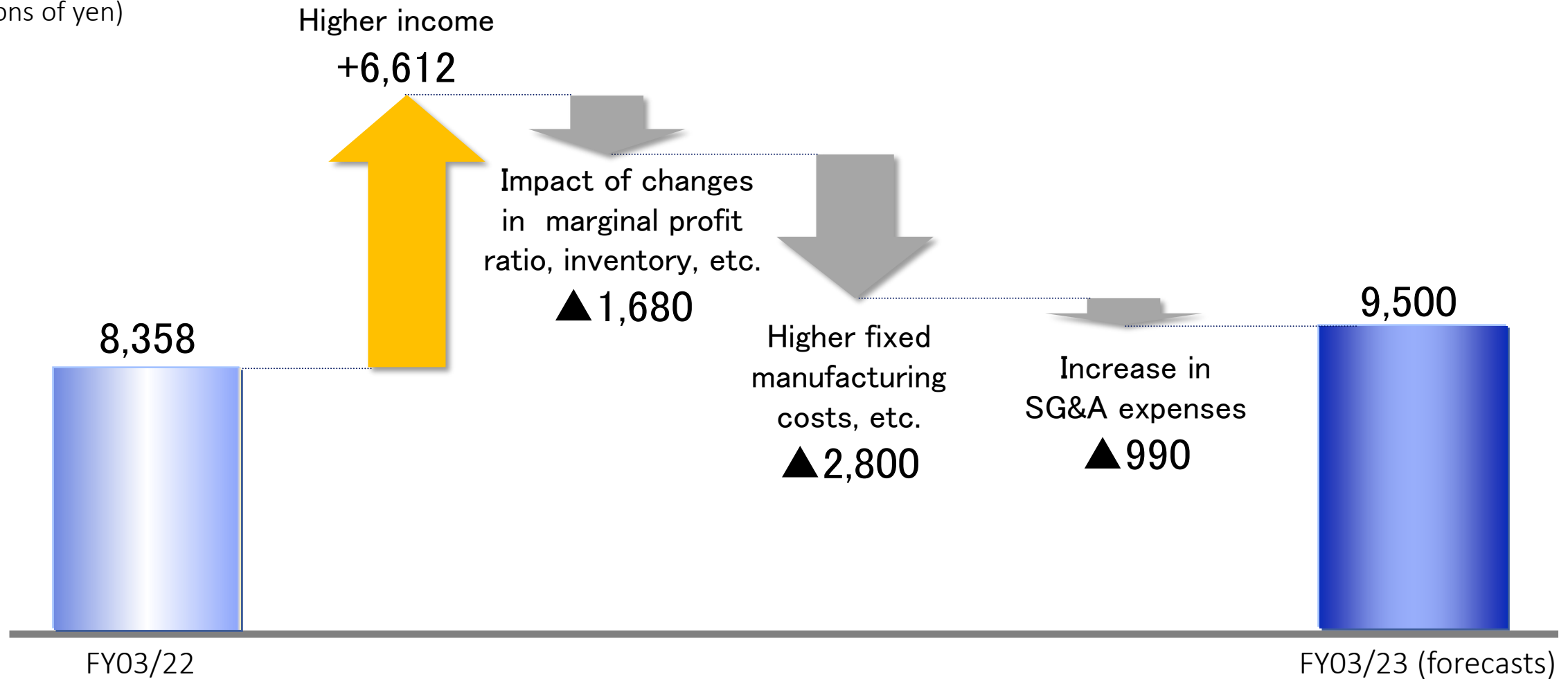
(millions of yen)

	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.

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

(millions of yen)



Future Outlook

1. Current business environment

1-1. Demand for HDSI's products

Outlook

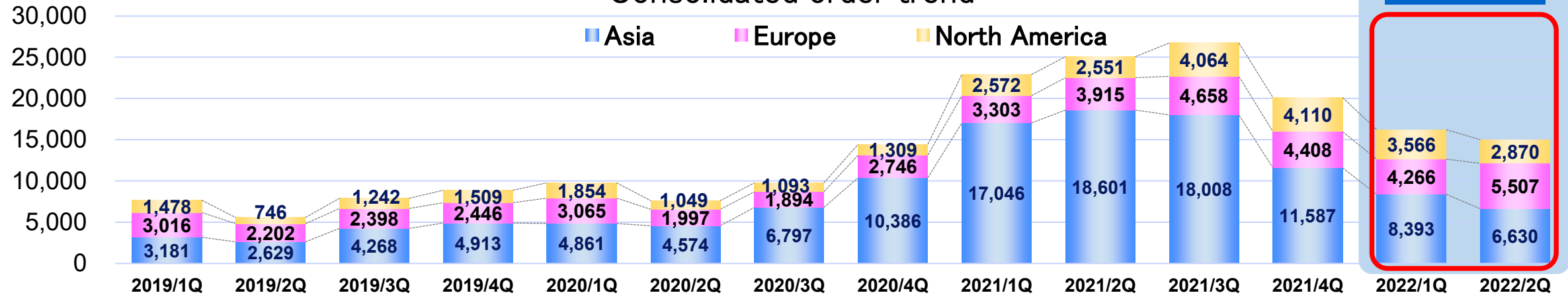
- Persistent investment demand with a view toward medium and long-term growth
- Orders at HDSI to bottom out in 2H

Concerns

- Soaring raw materials and rising interest rates
- Murky outlook for global economy

(millions of yen)

Consolidated order trend



Asia

Capital investment for EVs and semiconductors is expanding, but signs of inventory adjustments are emerging in the factory automation (FA) industry, particularly for applications targeting the 3C market

Europe

The impact of the crisis in Ukraine has been minor, and investment in automation remains firm

North America

Orders were strong for semiconductor and medical applications, and resumed investment in amusement applications



Harmonic Drive Systems Inc.

2.Trends in Main Fields of Application

2-1. Factory automation robot market forecast

Labor
shortages

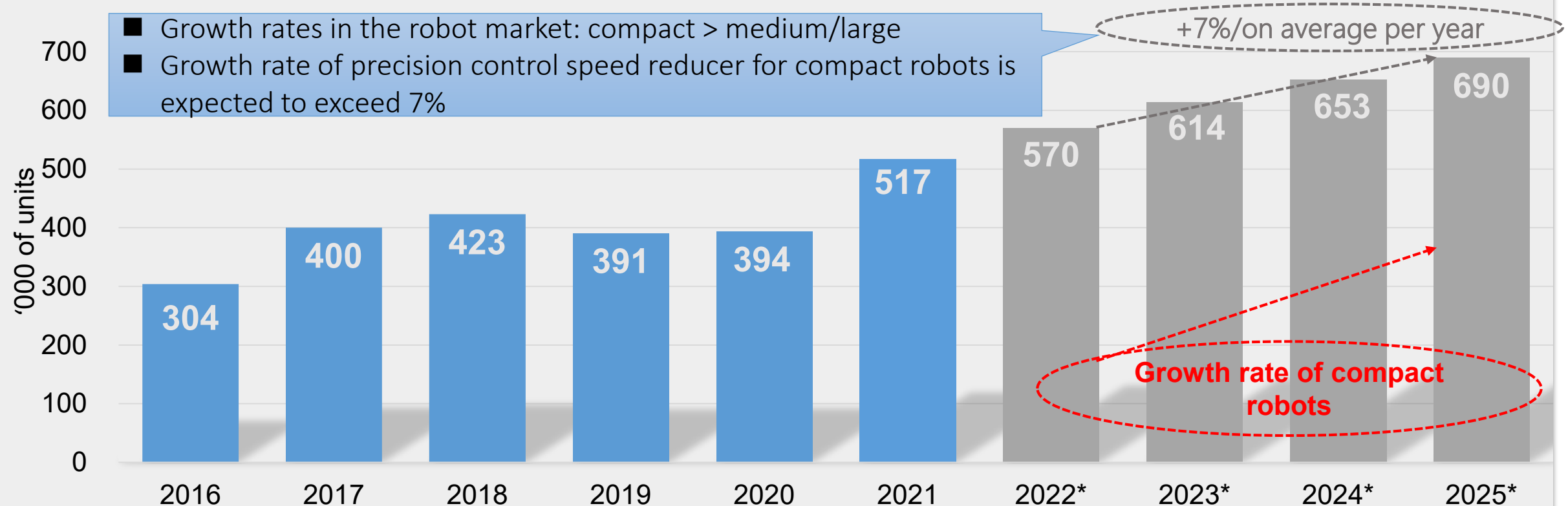


Post-COVID
new normal

Automation demand
Labor-saving demand

Market
expansion

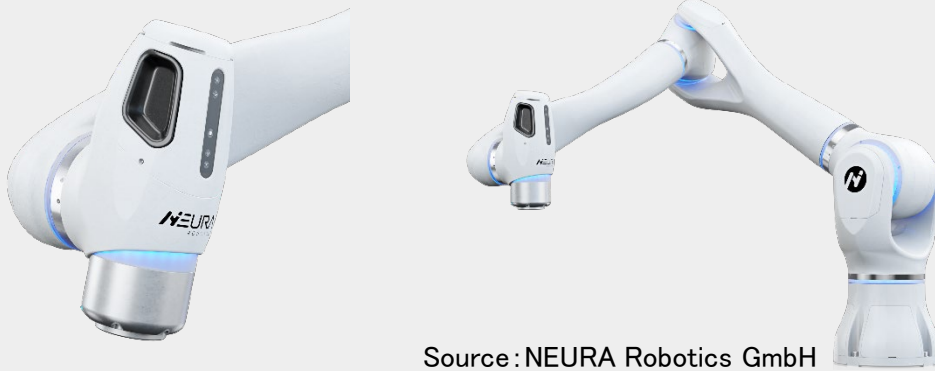
Annual installations of industrial robots 2016 -2021 and 2022* - 2025*



Source: compiled by the Company based on IFR World Robotics 2022

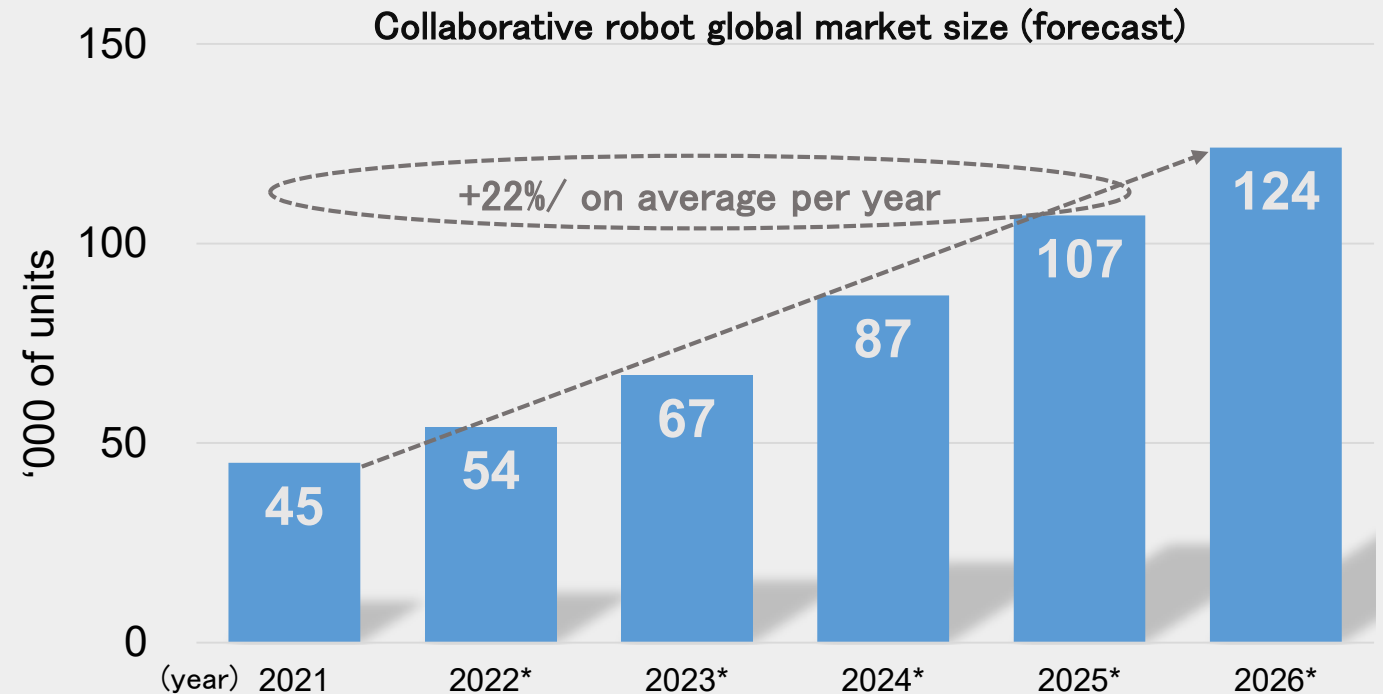
2-2. Collaborative robot (co-bots) market forecast

- 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?



Source: NEURA Robotics GmbH

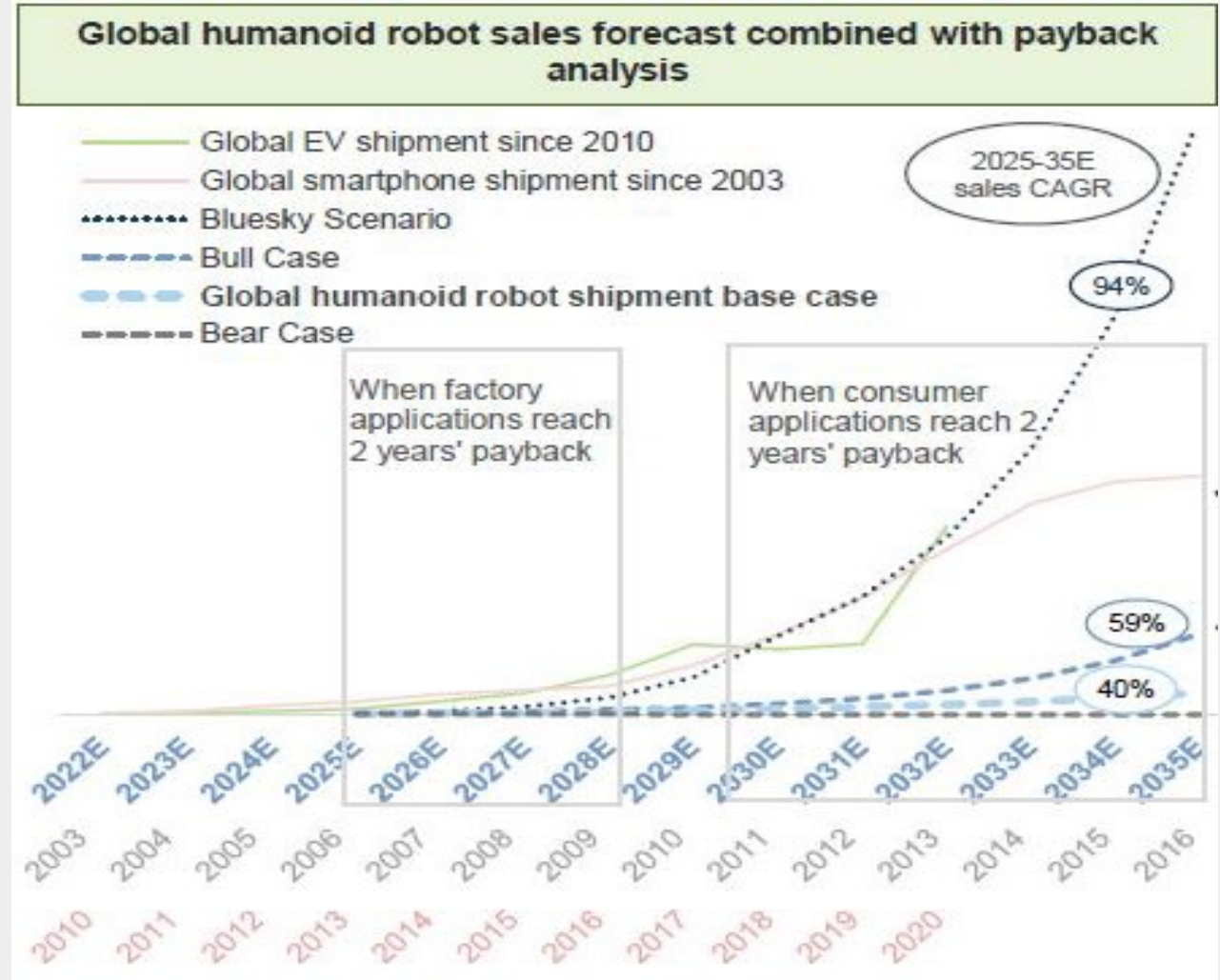
Could humanoid co-bots be on the horizon?



Note: Figures for 2021 are estimates, figures for 2022 and beyond are forecasts, based on the number of units shipped by manufacturers
Source: Compiled by the Company based on "Survey on the Global Market for Collaborative Robots (2021)" published by Yano Research Institute Ltd. on March 28, 2022

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



Source : The Goldman Sachs Group, Inc. "Global Automation_ The investment case for humanoid robots"

2-4. Semiconductor manufacturing equipment and Vehicle

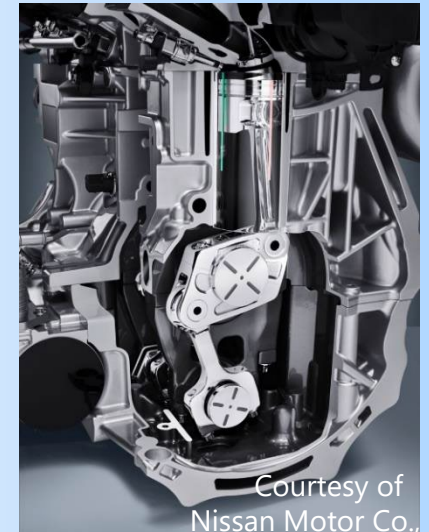
Semiconductor manufacturing equipment

- 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

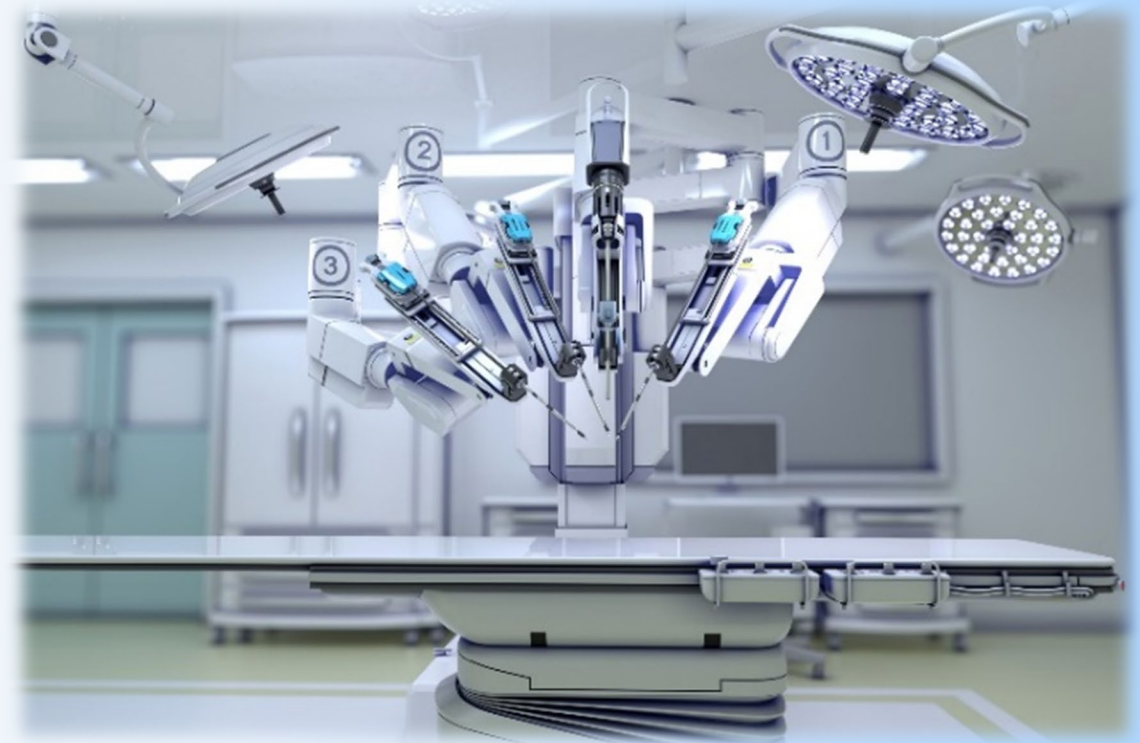


Courtesy of
Nissan Motor Co., Ltd.

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



3. New Applications

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?



3-2. Amusement

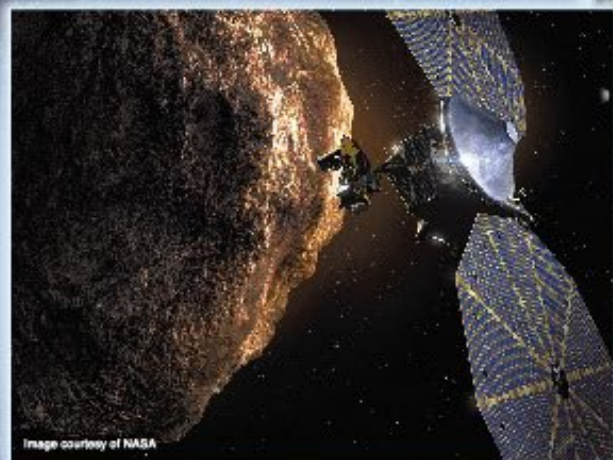
Animatronics

- 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

3-3. Space



HarmonicDrive®

The Hallmark of Hi-Precision

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。



株式会社

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<https://www.hds.co.jp/>

「ハーモニックドライブ」は弊社製品を表示する登録商標です。学術的名称あるいは一般的名称は「波動歯車装置」です。

会社紹介
ムービー公開中！



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

4. Increasing Production Capacity

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



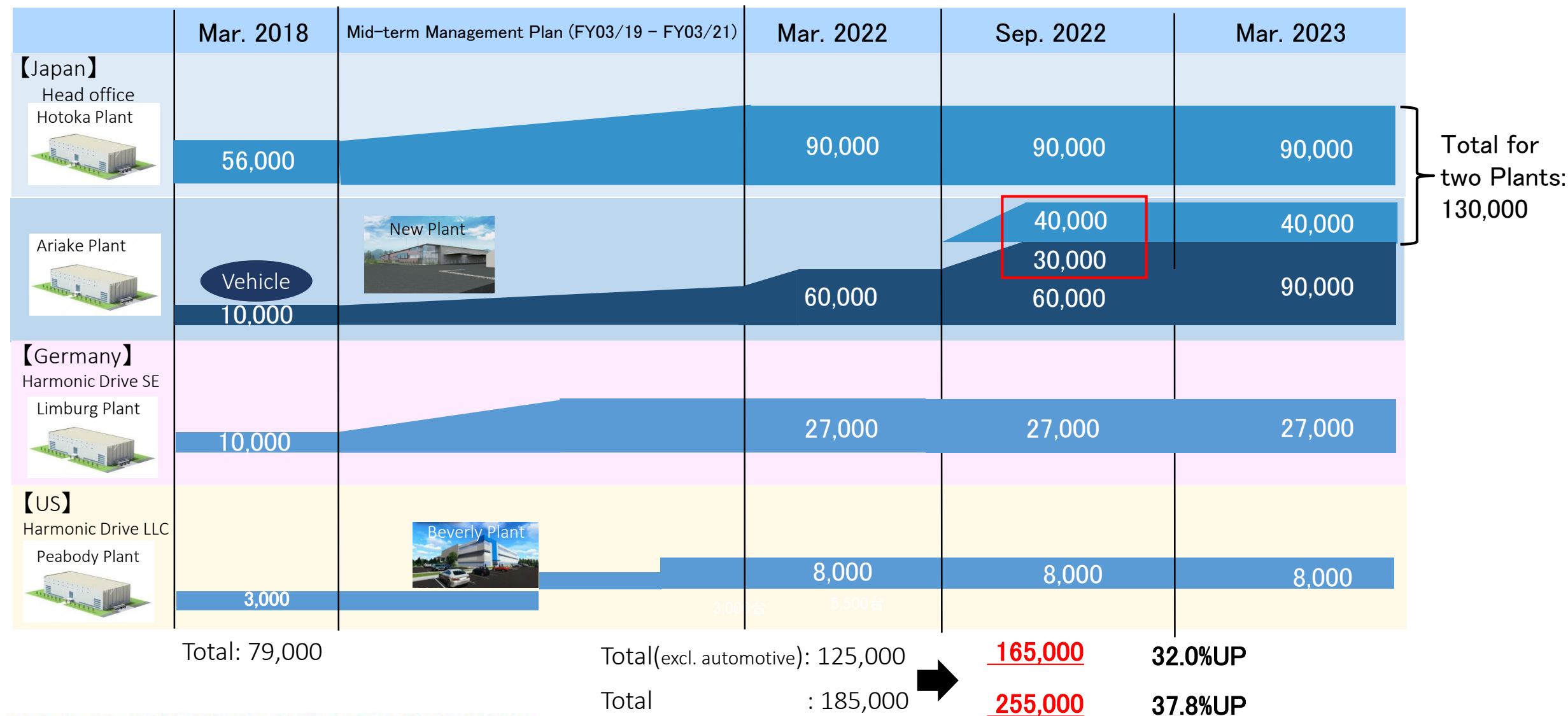
Increased production capacity

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)

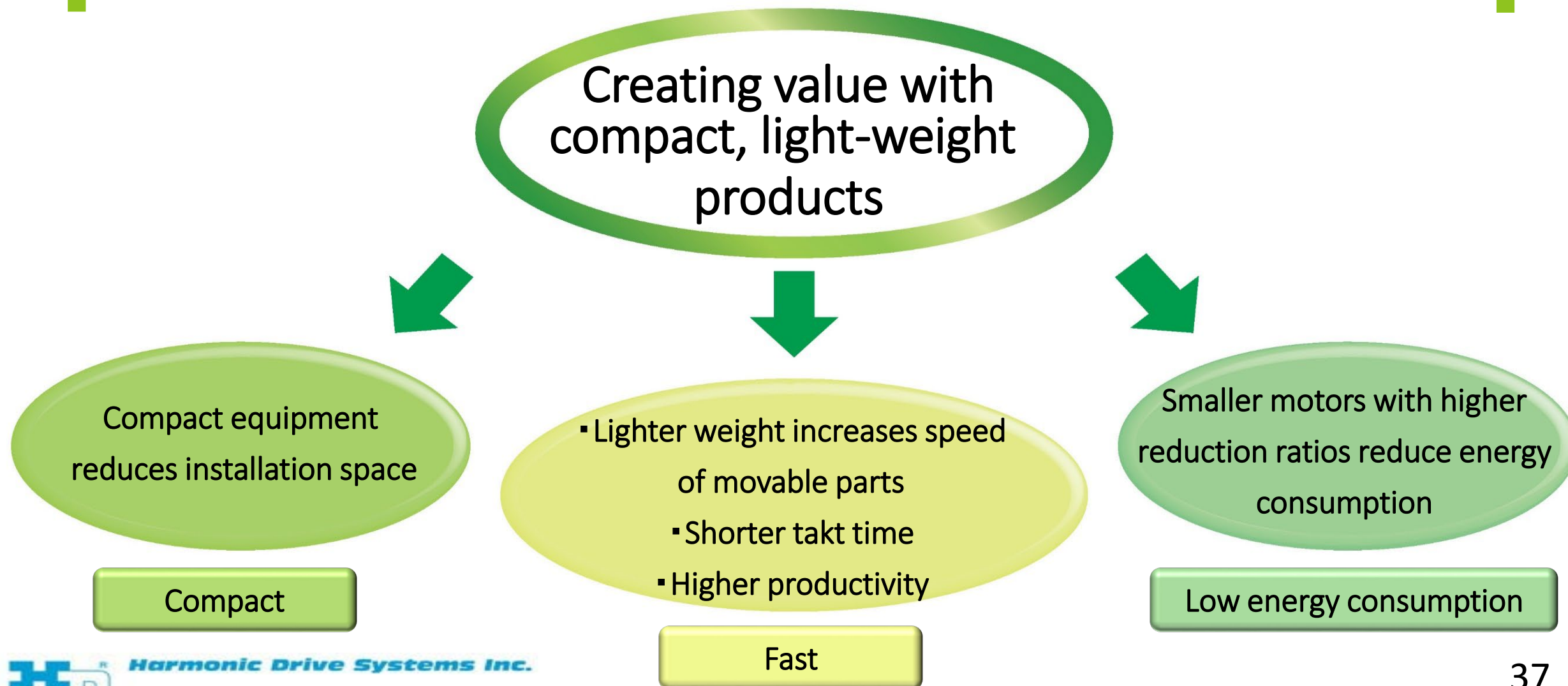
4-2. Increasing Production Capacity



5. Providing Value

5-1. Contributing to energy conservation

↑ Contributing to energy conservation by further reducing size and weight ↑



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



**GOOD DESIGN
AWARD 2022**

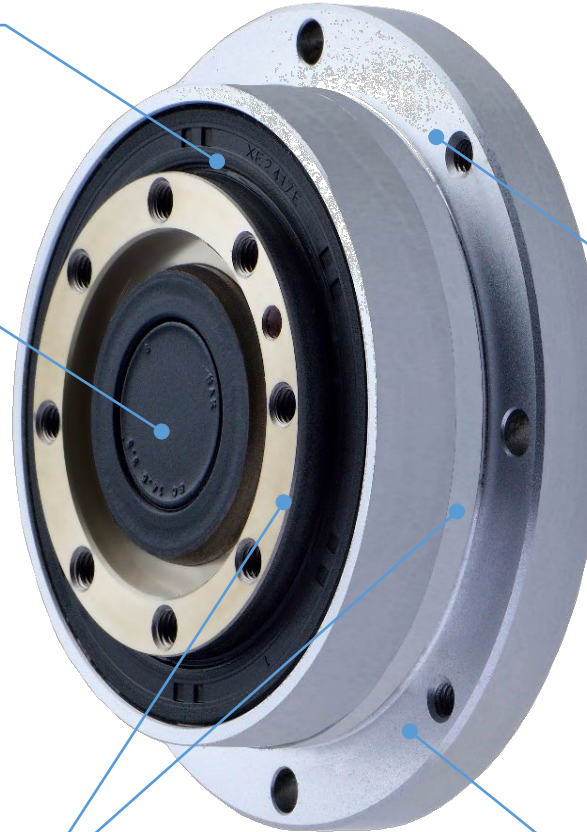
Features bearing with four points
of contact

Employs resin cover

Incorporates fastening technology
suitable for flat and lightweight
design

Optimized design (increased
thickness of various parts)

Made of die-cast aluminum

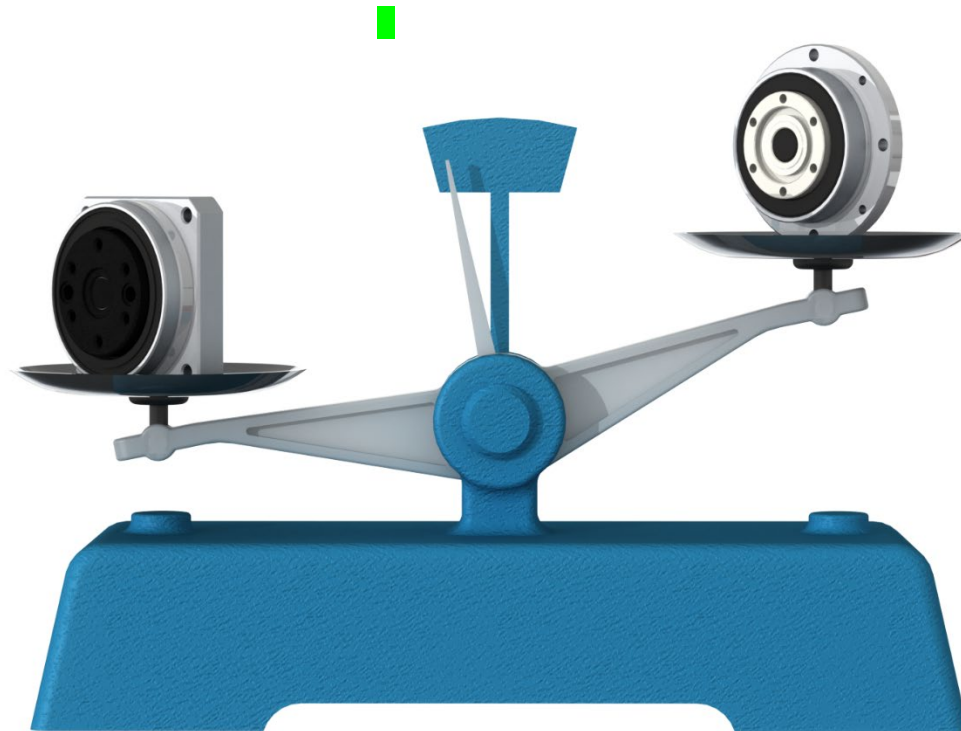


5-3. CSF-ULW: Illustration of weight reduction

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

* Applies to Model 8

CSF-8-2UP
200g



CSF-8-ULW
90g

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



Autonomous mobile
robot (AMR) arm



Power-assist suits



Agricultural robots

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

Core technology that helps customers realize their objectives

Move to plastic cable clamp

Updated motor magnet materials and dimensions

Integration of speed reducer part (wave generator) and motor shaft

Optimized encoder mounting structure

Employs CSF-ULW unit

Die-cast aluminum and speed reducer part (circular spline) created as a single structure



Harmonic Drive Systems Inc.

6. Initiatives for a Sustainable Future

6-1. Toward a sustainable future

Mechatronics Exhibition held jointly by
Three Companies

Dates: August 30–31, 2022

Venue: Tokyo International Forum

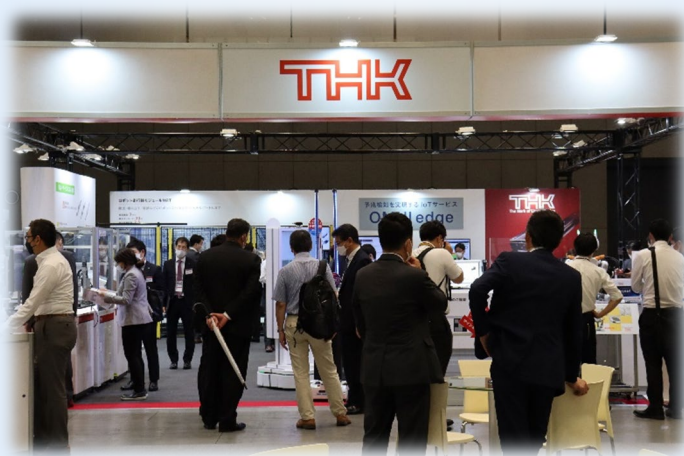
Theme: Toward a sustainable future

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

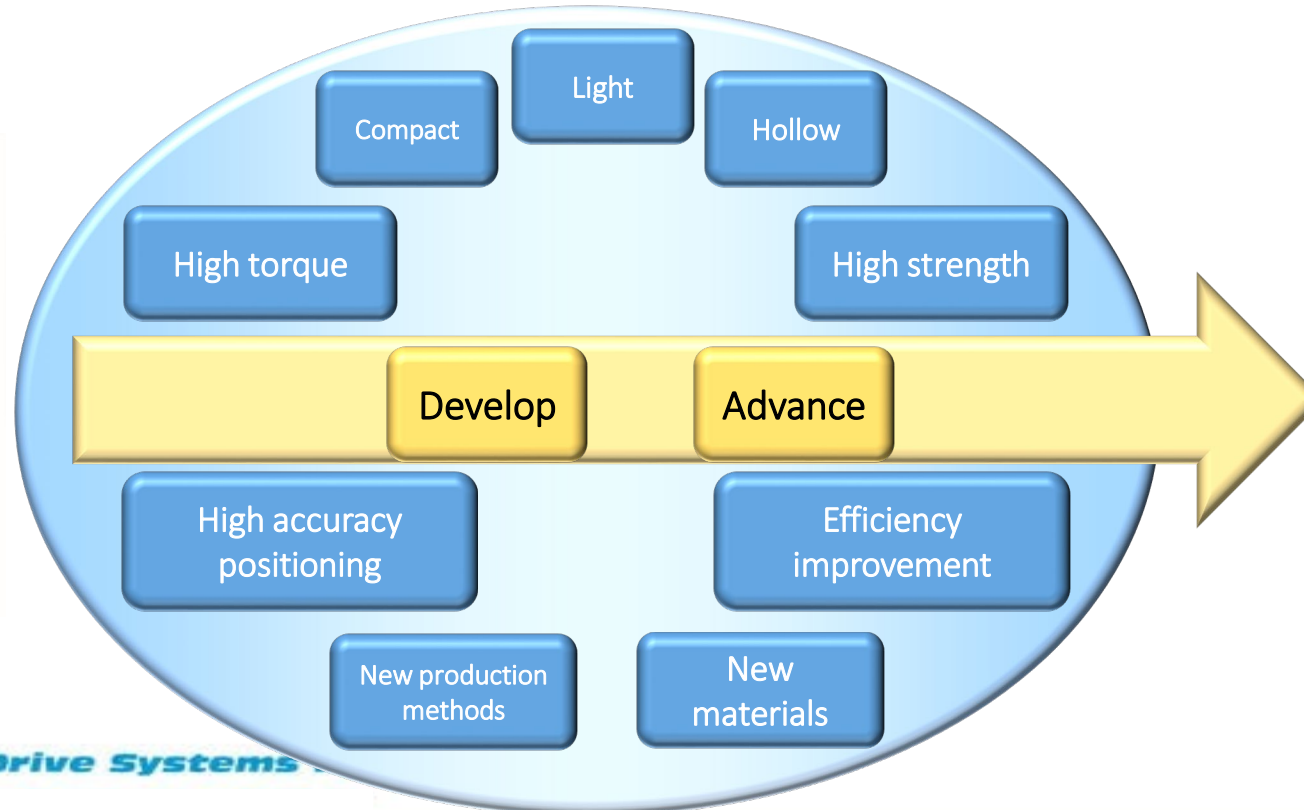
6-2. Seeking harmony with the future

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

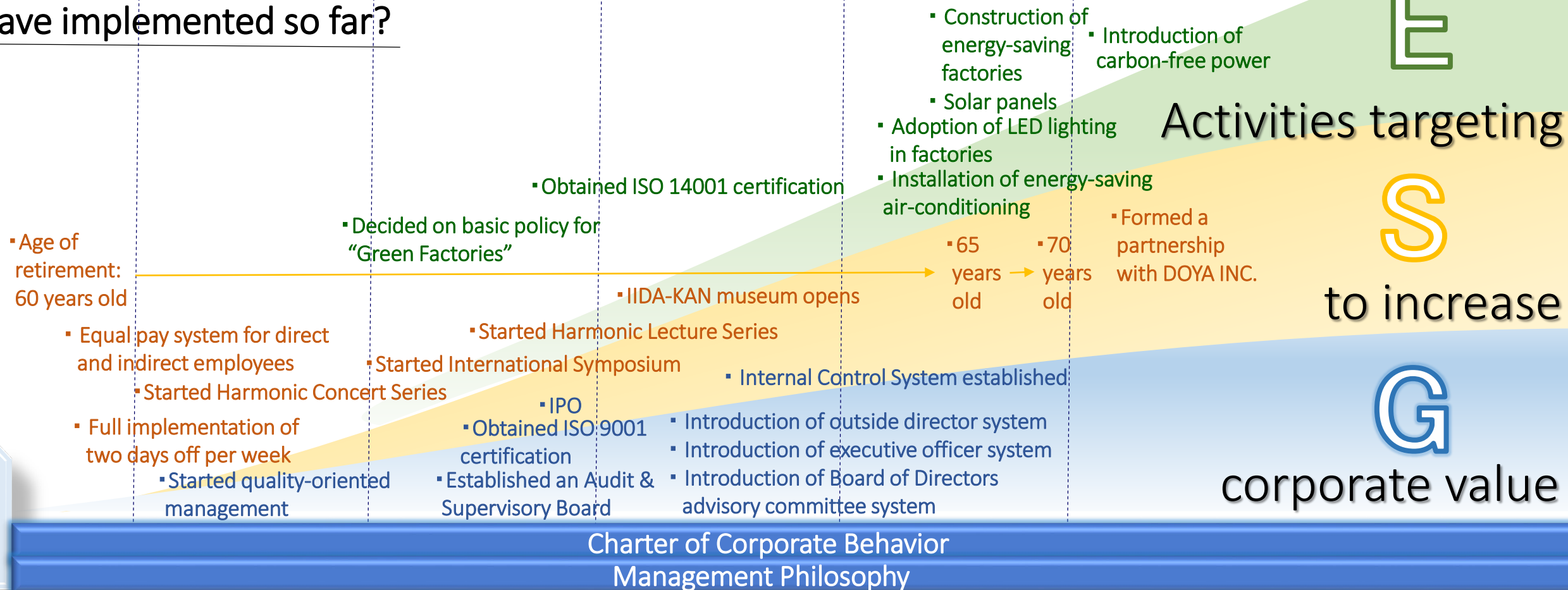


Contribute
to the
Innovation
and
Ecology
of industrial
society

6-3. Our path to sustainability

1970 1980 1990 2000 2010 2020 2050

What should we do based on the ESG activities we have implemented so far?





Harmonic Drive Systems Inc.

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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)

