

Harmonic Drive Systems Inc.

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

November 19, 2021

This presentation contains forward-looking statements relating to expected future performance as of November 19, 2021. 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 FY03/22

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

(millions of yen)

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

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

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

	(millions of yen)					
	1H FY03/21		1H FY03/22		Year-on-year change	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	17,702	100.0	26,341	100.0	8,638	48.8
Operating income	▲212	—	3,527	13.4	3,740	—
Ordinary income	85	0.5	3,565	13.5	3,480	4,093.6
Net income	▲16	—	2,218	8.4	2,235	—
EPS (yen)	▲0.17	—	23.05	—	23.22	—
Capital investment	835	—	4,074	—	3,239	387.5
Depreciation	3,622	—	3,933	—	310	8.6
R&D expenses	1,174	—	1,372	—	197	16.8

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

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

Performance of main group companies in 1H FY03/22

(millions of yen)

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

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

*2 Exchange rates: Jan–Jun 2020 1USD = ¥108.27, Jan–Jun 2021 1USD = ¥107.69

*3 Exchange rates: Jan–Jun 2020 1CNY = ¥15.39, Jan–Jun 2021 1CNY = ¥16.66

*4 Exchange rates: Jan–Jun 2020 1EUR = ¥119.30, Jan–Jun 2021 1EUR = ¥129.82

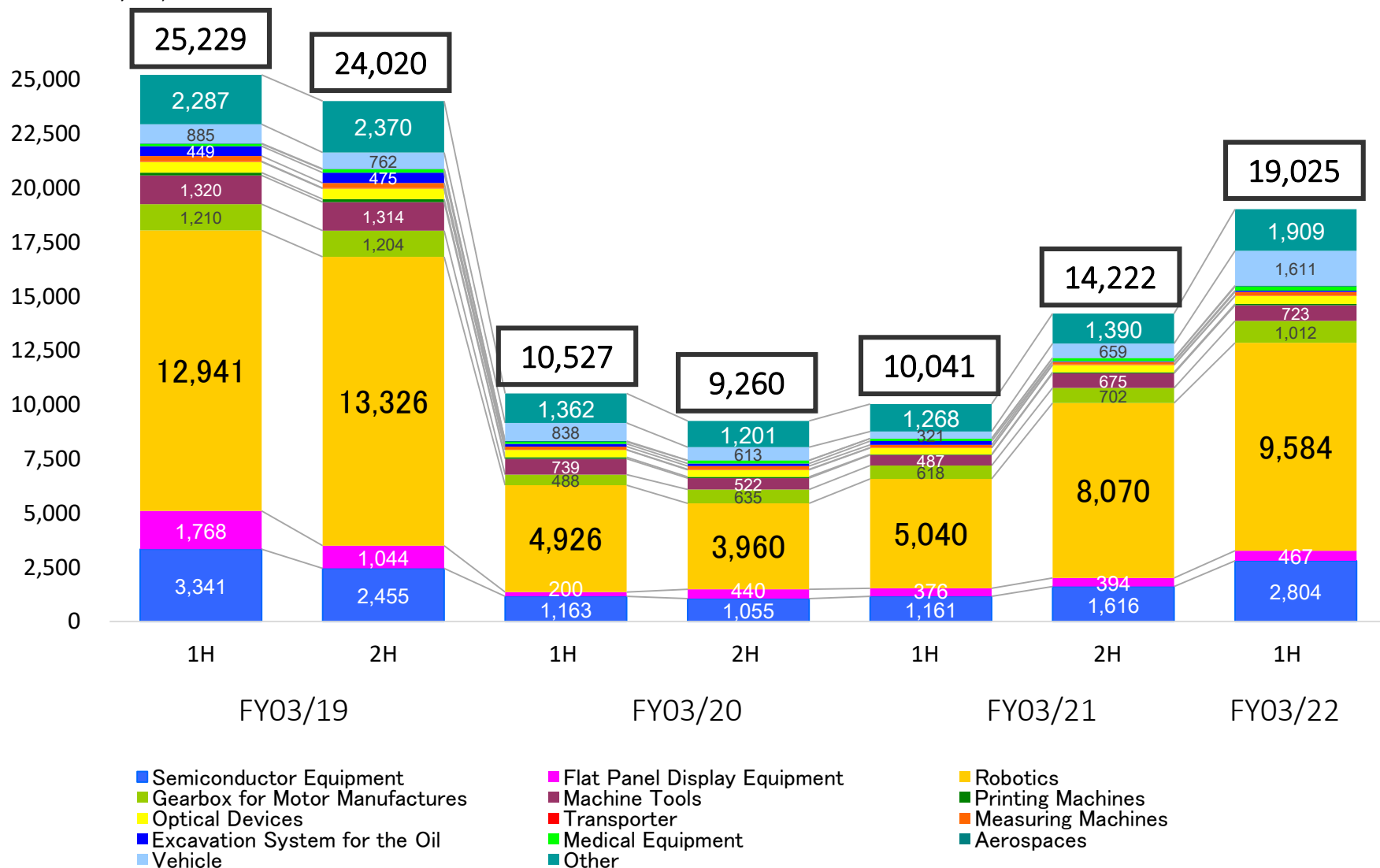
Non-consolidated results for 1H FY03/22 (year-on-year change)

(millions of yen)

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

Non-consolidated net sales by application

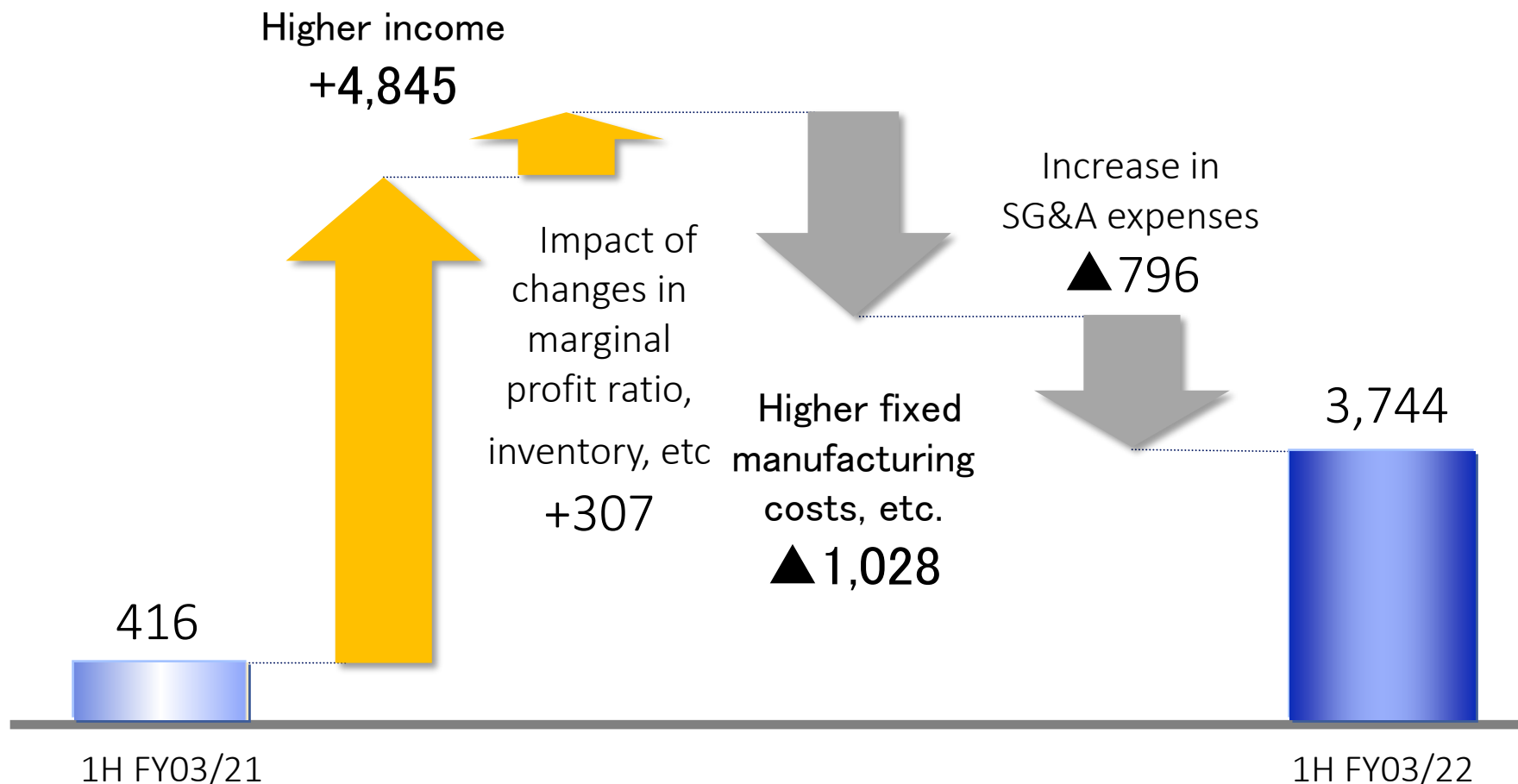
(millions of yen)



Harmonic Drive Systems Inc.

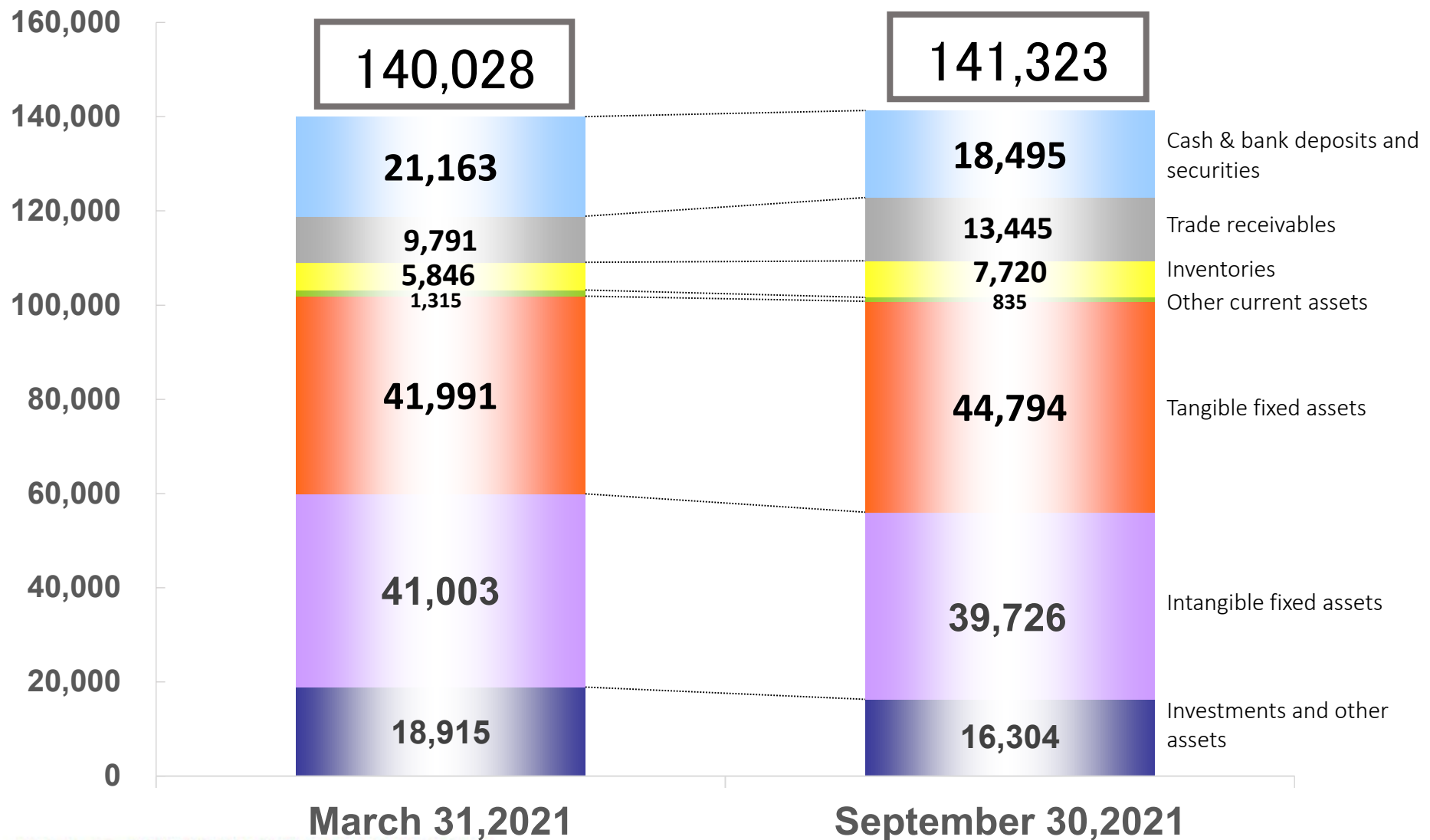
Breakdown of year-on-year change in non-consolidated operating income

(millions of yen)



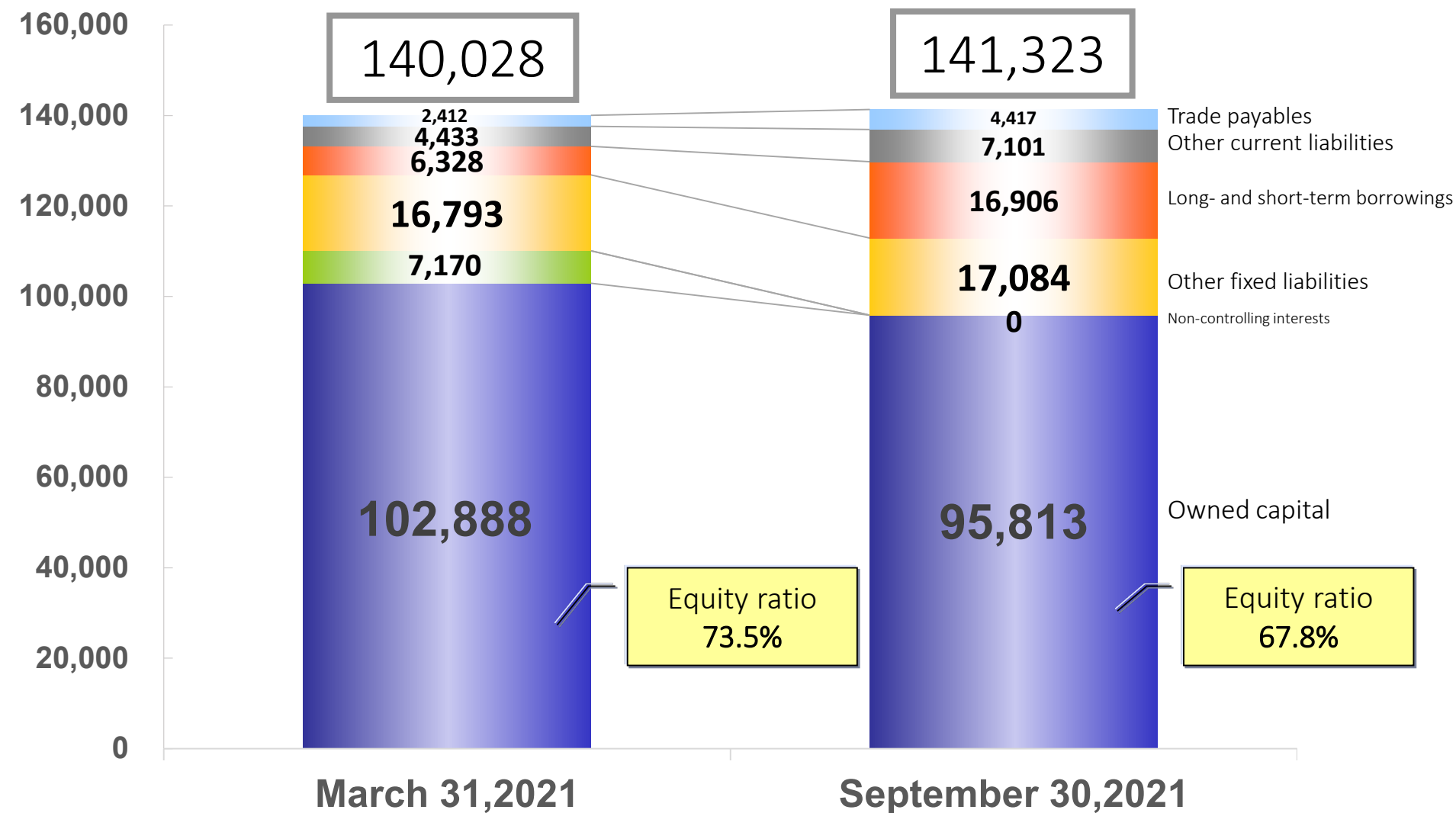
Status of consolidated assets

(millions of yen)



Status of consolidated liabilities and net assets

(millions of yen)



Status of consolidated cash flows

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

Performance Forecasts for Full-year FY03/22

Revisions to consolidated full-year earnings forecasts

【Versus previous forecasts】

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

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

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

Reason for revisions

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

Revisions to non-consolidated full-year earnings forecasts

【Versus previous forecasts】

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

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

Reasons for revisions

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

Consolidated performance forecasts for full-year FY03/22

(millions of yen)

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

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

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

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

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

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

*2 Exchange rates: Jan–Dec 2020 1USD = ¥106.82, Jan–Dec 2021 1USD = ¥109.50

*3 Exchange rates: Jan–Dec 2020 1CNY = ¥15.48, Jan–Dec 2021 1CNY = ¥17.00

*4 Exchange rates: Jan–Dec 2020 1EUR = ¥121.81, Jan–Dec 2021 1EUR = ¥130.00

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

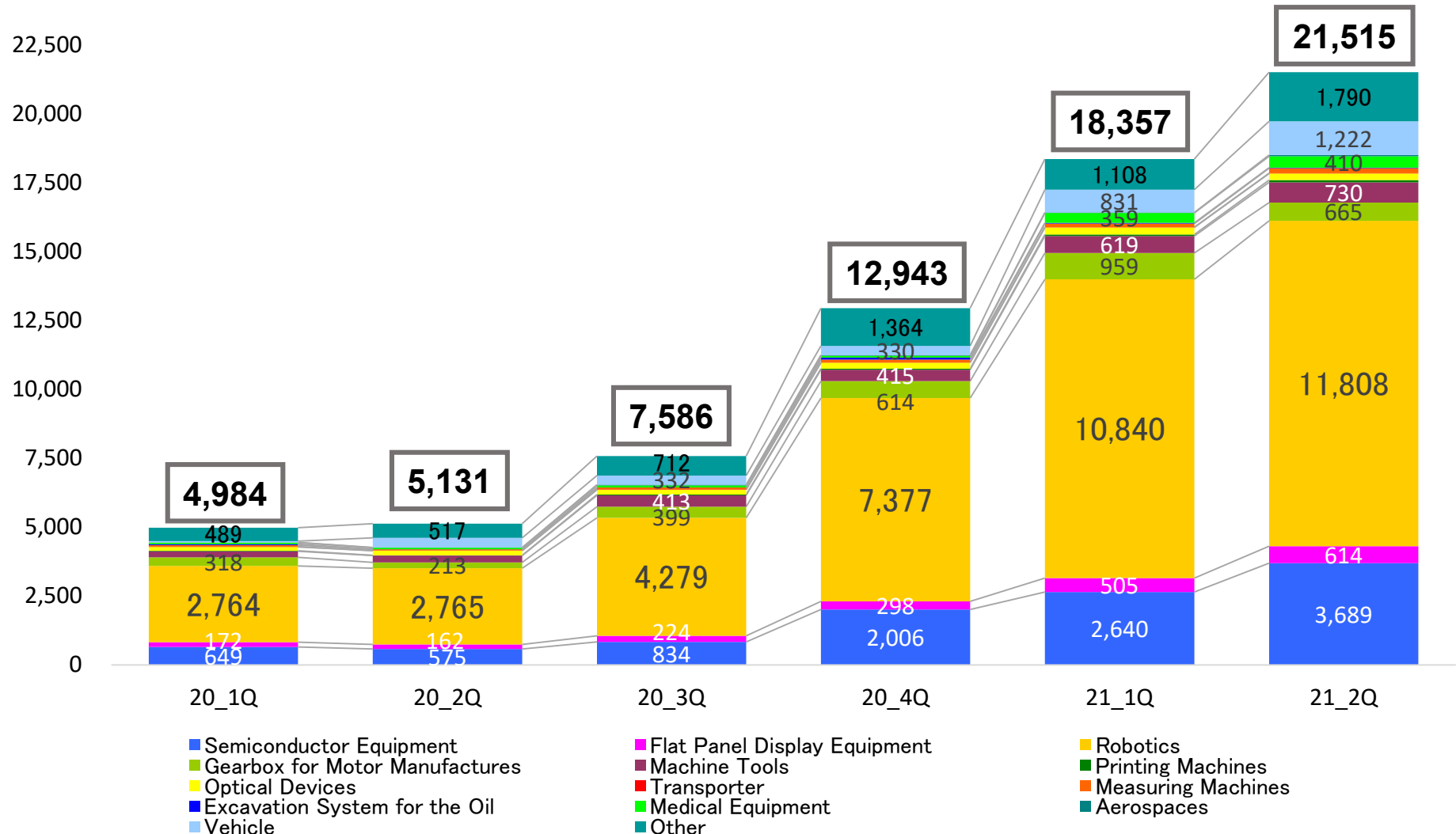
(millions of yen)

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

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

Non-consolidated orders by application

(millions of yen)



Harmonic Drive Systems Inc.

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

Higher income

(millions of yen)

+9,150

Impact of
changes in
marginal
profit ratio,
inventory, etc.

▲23

Higher fixed
manufacturing
costs, etc.

▲2,300

Increase in
SG&A
expenses

▲1,800

2,573

FY03/21

7,600

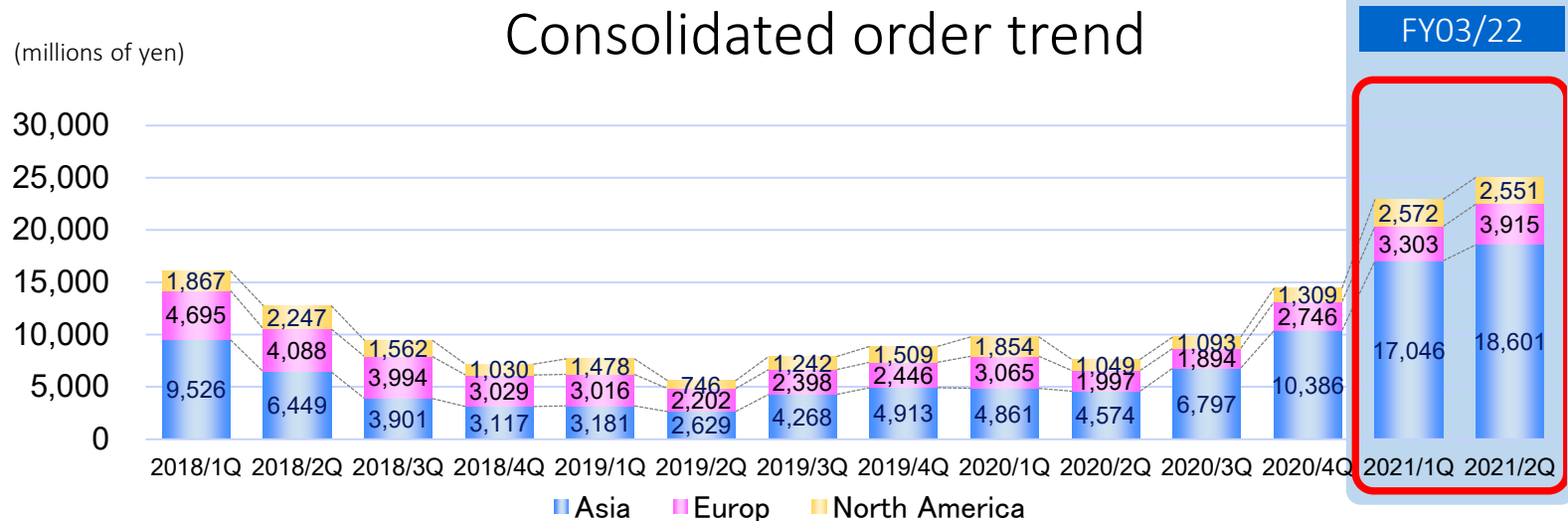
FY03/22 (forecasts)

Future Outlook

1. Current business environment

1-1. Our operating environment

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



Asia

Orders remained high despite the easing of overheated capital investment demand in China

Europe

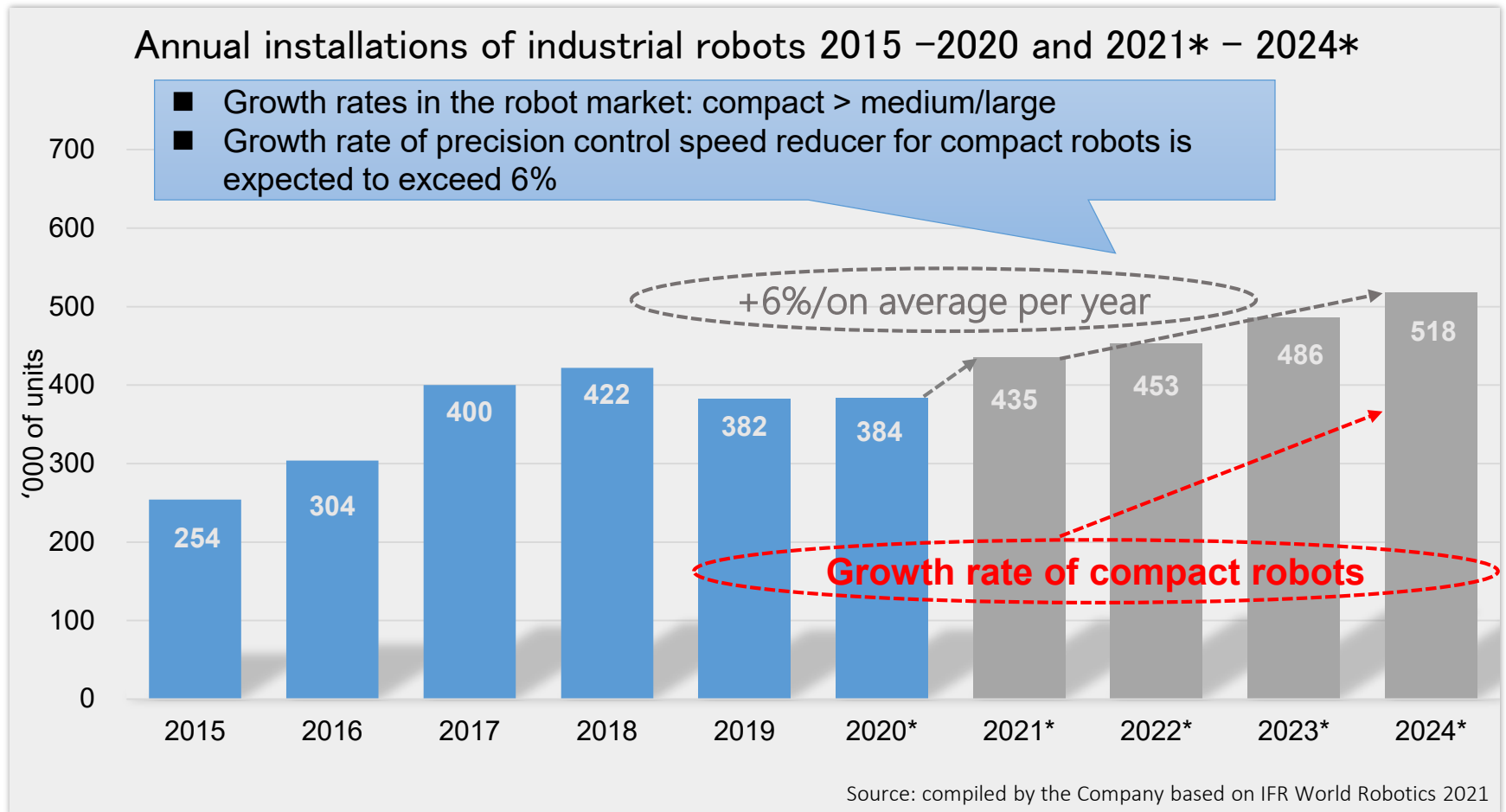
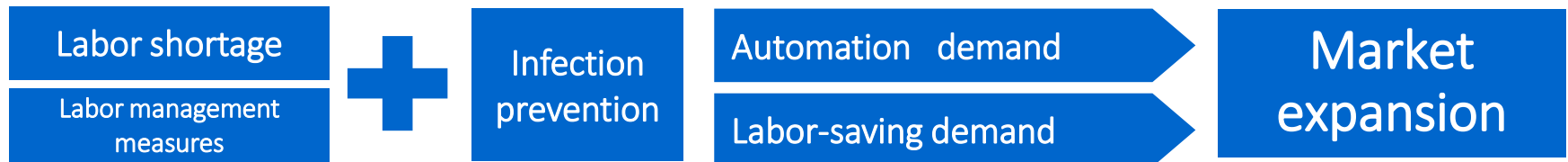
Orders recovered in line with normalization of market conditions, especially for industrial robots

North America

Orders were strong for semiconductor and medical applications, and steady for aerospace applications, while there were signs of recovery in amusement applications

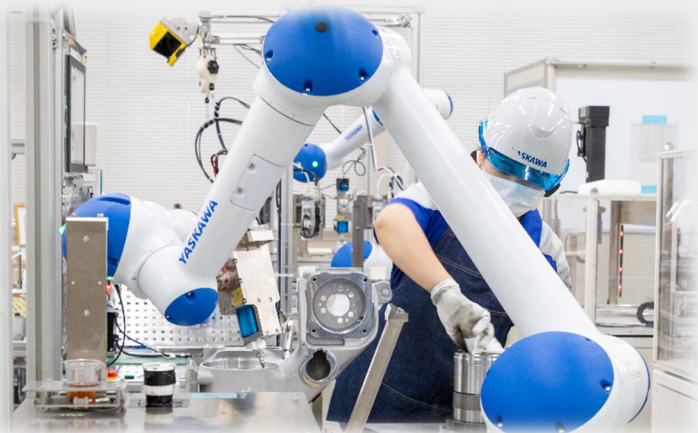
2. Main Fields of Application

2-2. Factory automation robot market forecast



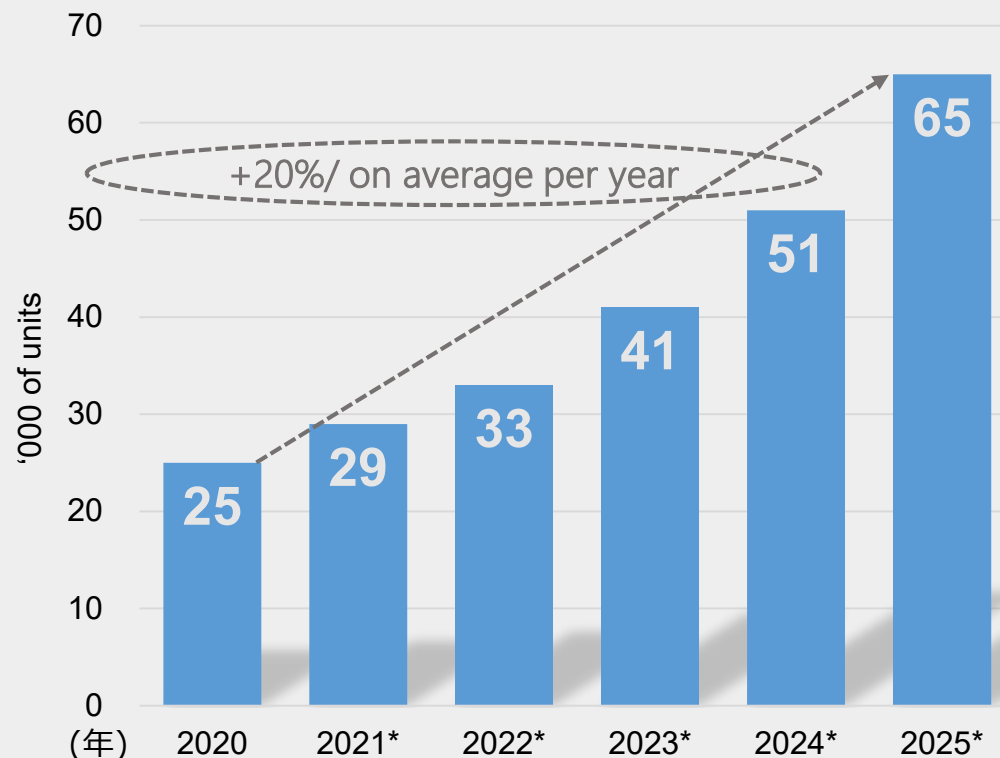
2-3. Collaborative robot market forecast

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



Courtesy of YASKAWA Electric Corporation

Collaborative robot global market size



Note: Figures for 2020 are estimates, figures for 2021 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 (2020)" published by Yano Research Institute Ltd. on February 12, 2021

Could humanoid co-bots be on the horizon?



2-3. Semiconductor manufacturing equipment and surgical robots

Semiconductor manufacturing equipment

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



Automotive: Used in variable compression ratio (VCR) engines

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



Courtesy of Nissan Motor Co., Ltd.

3. New Applications

3-1. Entertainment

CUE, the AI Basketball Robot (Toyota Motor Corporation)

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

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



Courtesy of Toyota Motor Corporation

Animatronics

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

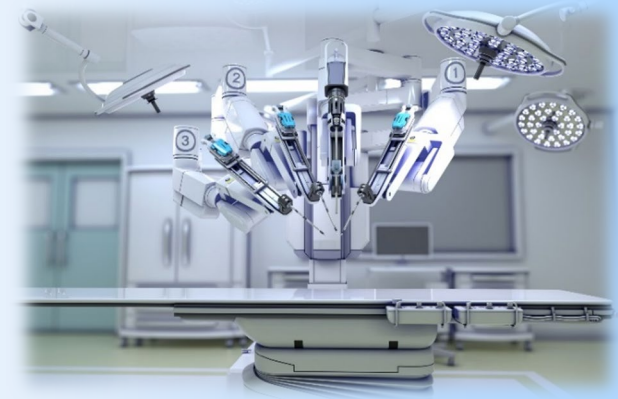


Source: Harmonic Drive SE website

3-2. Medical care and health care

Surgical robots

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



Examples of healthcare applications



Medical equipment

- Specimen analysis/test equipment/PCR test applications



Assisted suits

- Moving into a phase of practical adoption with expanded insurance coverage and subsidies



Electric wheelchairs

- Autonomous driving enhances convenience

3-3. Aviation and Space

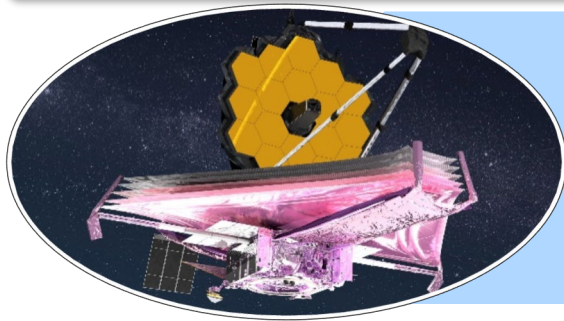
eVTOL (flying car)

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



Space industries

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



James Webb Space Telescope

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

Credit: NASA GSFC/CIL/Adriana Manrique Gutierrez

4. Increasing Production Capacity

4-1. Increasing Production Capacity at the Ariake Factory

(Azumino City, Nagano Prefecture)

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



Increased production capacity

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

Improve **stable supply capacity**

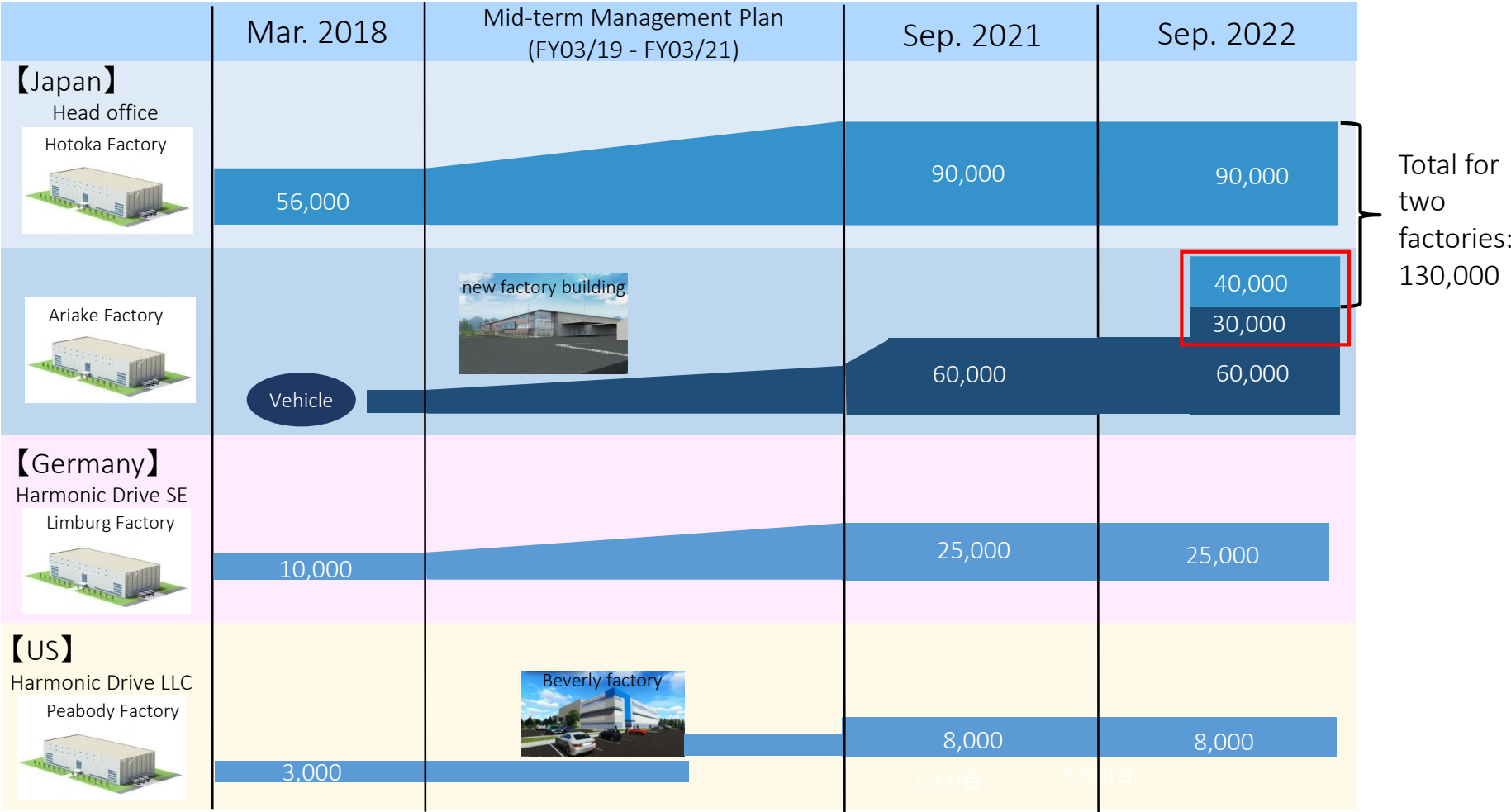
Increased productivity

Improve automation
and save labor

Improve **price competitiveness**

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

(Numbers indicate units produced per month)



Total: 79,000

Total(excl. automotive): 123,000 ➡ 163,000 32.5%UP

Total : 183,000 ➡ 253,000 38.3%UP

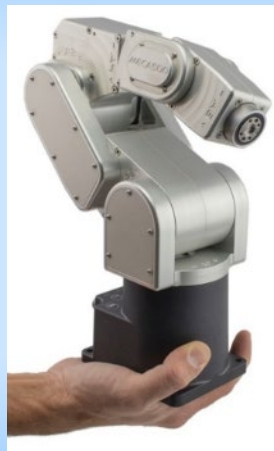
5. Pursuing MINI-MICRO Products

5-1. Development of MINI-MICRO products

Advanced medicine, amusement



Palm sized robots



www.mecademic.com

Courtesy of Mecademic Inc.

Small collaborative robots, semiconductor manufacturing equipment



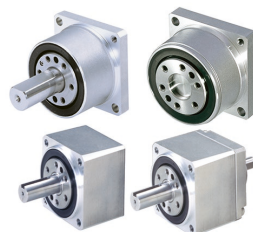
Courtesy of Techman Robot Inc.



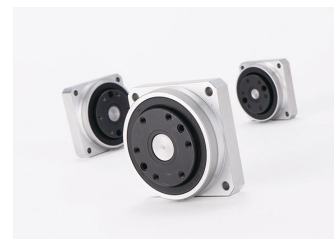
Industry's
smallest
Φ5mm



CSF micro series
Starting from Φ10mm



CSF mini series
Starting from □ 20mm



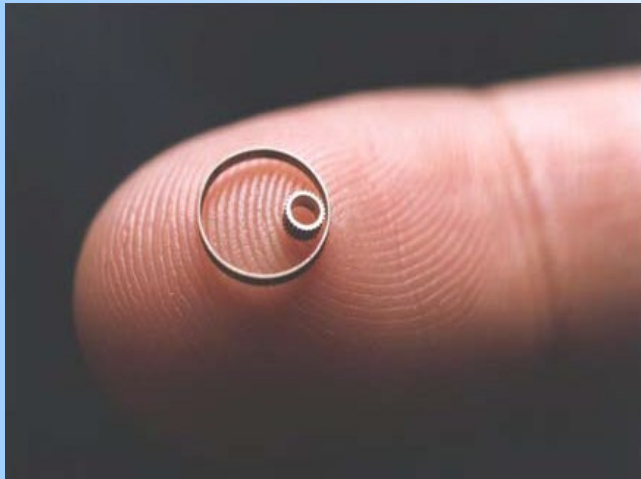
CSF-2UP series
Starting from □ 50mm



CSF-ULW series
Starting from Φ54mm

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

5-2. Introducing MINI-MICRO Micromotion GmbH



■ Micromotion GmbH (est. 2001)

- Established as Harmonic Drive SE (wholly owned subsidiary)
- Development, manufacture, and sales of ultra-compact gearboxes and actuators using the LIGA process*

■ Micromotion GmbH Products

- Ultra-compact wave gears
- Ultra-compact planetary gear speed reducer
- Outer diameter: 6mm or more
- Reduction ratio: 1/40 to 1/1000
- Zero backlash



micromotion® Demonstration of theory

*LIGA Process

- A microfabrication technology developed in the 1980s at Karlsruhe Institute of Technology in Germany that uses chemical processing
- Microfabrication using X-ray photolithography (Lithographie), electroplating (Galvanoformung), and forming (Abformung)

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

Main applications of micromotion® products

Space

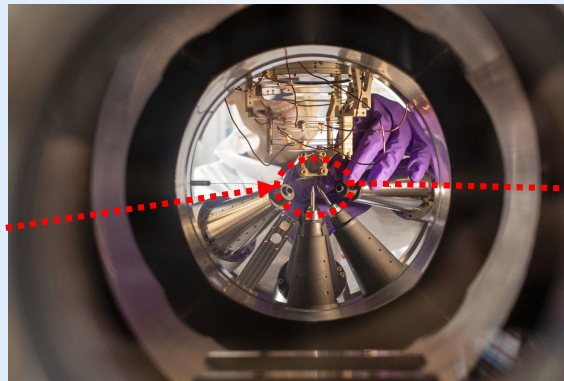
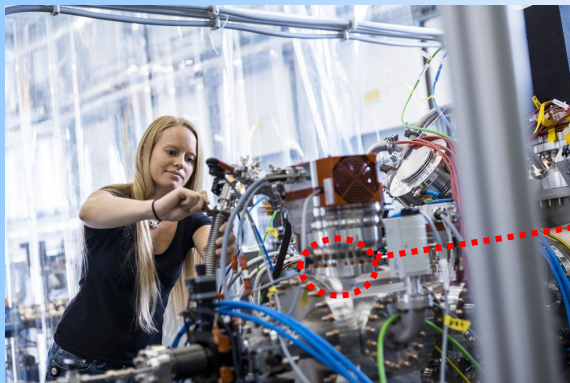
Medicine

Semiconductor

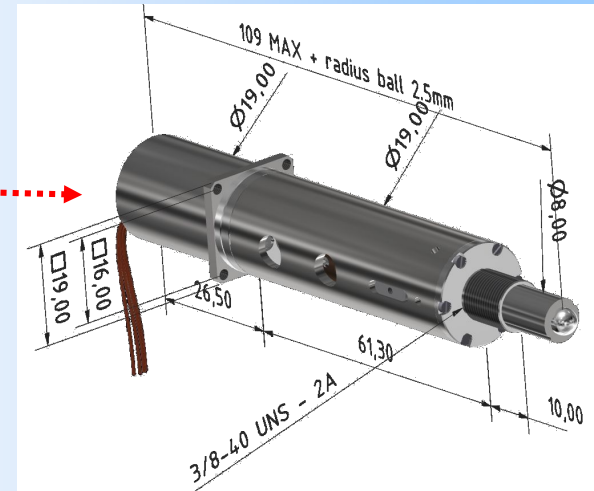
Optical
instrument

Testing
equipment

Case Study: Actuator for Ultra-High Vacuum Test



Courtesy of European XFEL GmbH



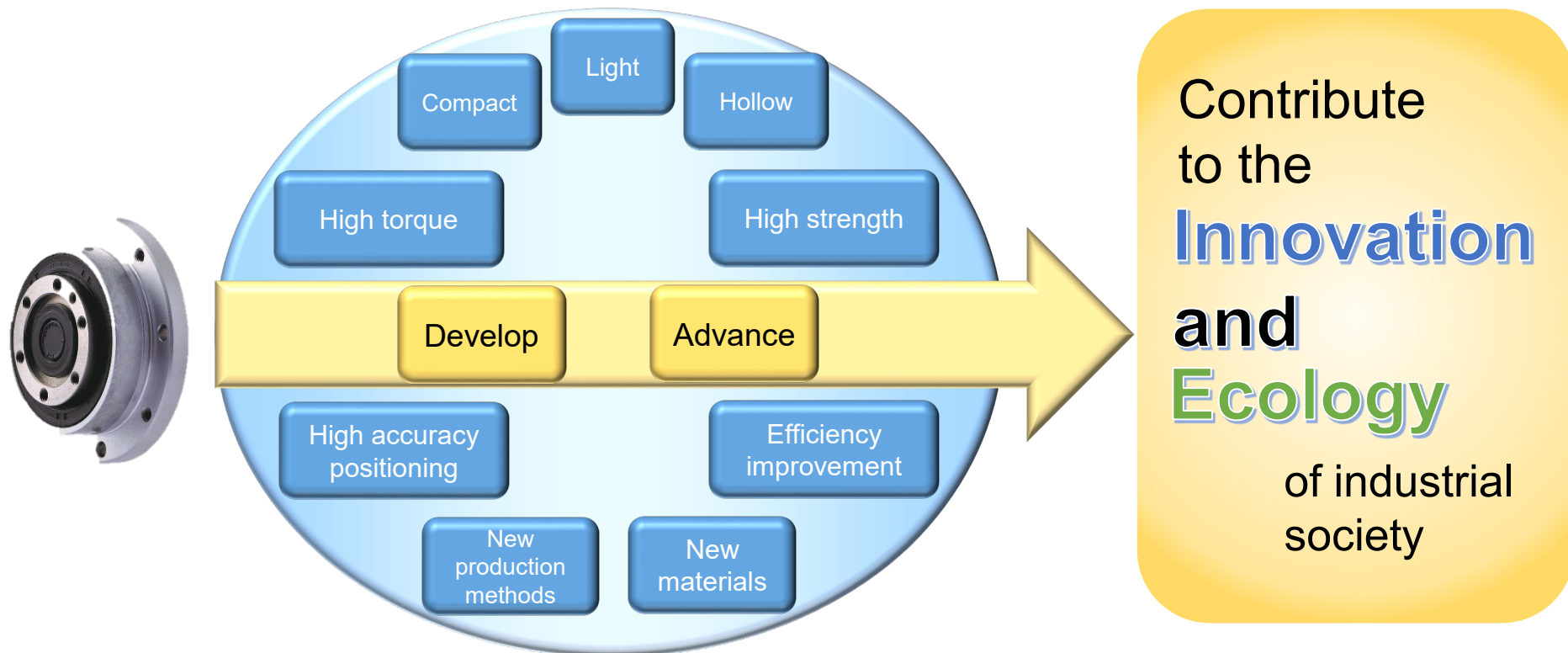
- Customer: European XFEL GmbH
- Application: Actuators for experimental machines using X-ray free-electron laser (XFEL) facilities
- Product characteristics
 - Actuators with a diameter of 1.9cm to allow precise movement even in a small lab equipment
 - Actuators that can withstand an ultra-high vacuum (10^{-8} Pa)

6. Promoting Sustainable Management

6-1. Our sustainability initiatives

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

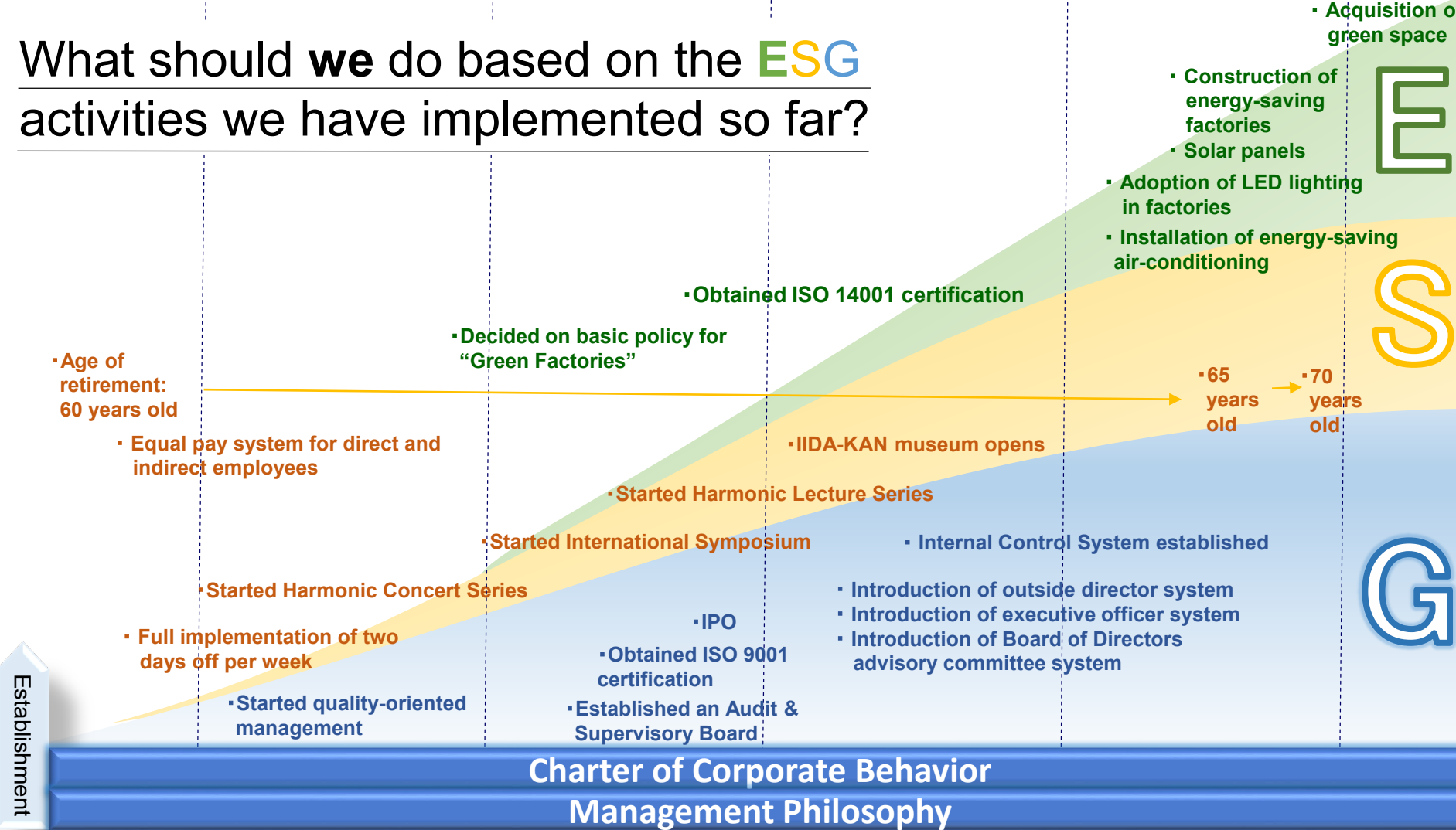
Our mission



6-2. Our path to sustainability

1970 1980 1990 2000 2010 2020.....

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





Harmonic Drive Systems Inc.

