Harmonic Drive Systems Inc.

Presentation on Business Results for the 1st-Half of Fiscal Year Ending March 31, 2017

November 17, 2016

This presentation contains forward-looking statements relating to expected future performance as of Nov. 17, 2016. 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.

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Performance Summary

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1st-half consolidated results (versus original forecasts for the period)

(millions of yen)

	Original forecasts (announced May 13)		1st-half FY ending Mar.31,2017		Vs. original forecasts for the period	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate(%)
Net sales	14,700	100.0	14,550	100.0	▲149	▲1.0
Operating income	4,000	27.2	3,978	27.3	▲21	▲0.5
Ordinary income	4,300	29.3	4,163	28.6	▲136	▲3.2
Net income	2,850	19.4	2,752	18.9	▲97	▲3.4

※ Net Income refers to net income attributable to owners of parent.

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1st-half consolidated results (year-on-year change)

(millions of yen)

	1st-half FY ended Mar.31,2016		1st-half FY ending Mar.31,2017		Year-on-year change	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	13,919	100.0	14,550	100.0	631	4.5
Gross profit	6,793	48.8	6,896	47.4	103	1.5
Operating income	4,005	28.8	3,978	27.3	▲26	▲0.7
Ordinary income	4,034	29.0	4,163	28.6	129	3.2
Net income *1	2,594	18.6	2,752	18.9	158	6.1
EPS（yen）	28.32		30.05		1.73	6.1
Capital investment *2	1,599		1,671		72	4.5
Depreciation costs	698		817		118	17.0
R&D costs	691		671		▲19	▲2.8

*1 Net Income refers to net income attributable to owners of parent.

*2 Capital investment amounts are the amounts of tangible and intangible fixed assets acquired in the term.

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Performance of main group companies for 1st-half of fiscal year ending March 31, 2017

(millions of yen)

		Equity stake	Net sales		Net income	
			Amount	Change(%)	Amount	Change(%)
	Harmonic Drive Systems Inc.	—	12,843	8.4	2,486	0.3
*2	HD Systems, Inc. (Harmonic Drive L.L.C.) (U.S.A)	100% (51%)	2,301	▲4.3	123	▲18.9
	Harmonic AD, Inc.	100%	1,150	▲0.1	66	▲27.2
*3	Harmonic Drive Systems (Shanghai) Co., Ltd.	100%	921	▲30.6	▲17	—
*4	Harmonic Drive AG (Germany)	36.8%	5,590	7.9	932	804.9

Percent change(%) indicates increase or decrease from same period of previous fiscal year.

*1 For overseas subsidiaries and affiliates, the fiscal year ends December 31.
*2 Exchange rates: Jan. – Jun., 2015 1US$ = 120.23 yen, Jan. – Jun., 2016 1US$ = 111.81 yen
*3 Exchange rates: Jan. – Jun., 2015 1CNY = 19.32 yen, Jan. – Jun., 2016 1US$ = 17.07 yen
*4 Exchange rates: Jan. – Jun., 2015 1€ = 134.17 yen, Jan. – Jun., 2016 1€ = 124.62 yen
*5 Net income of US subsidiaries (consolidated) is after excluding minority interests.

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1st-half non-consolidated results

(millions of yen)

	1st-half FY ended Mar.31.2016		1st-half FY ending Mar.31.2017		Year-on-year change	
	Amount	Percent(%)	Amount	Percent(%)	Change	Rate(%)
Net sales	11,848	100.0	12,843	100.0	994	8.4
Gross profit	5,090	43.0	5,365	41.8	274	5.4
Operating income	2,988	25.2	3,180	24.8	191	6.4
Ordinary income	3,550	30.0	3,521	27.4	▲28	▲0.8
Net income	2,478	20.9	2,486	19.4	8	0.3
EPS（yen）	27.06		27.15		0.09	0.3
Capital investment *1	1,153		1,418		265	23.03
Depreciation costs	405		526		121	29.9
R&D costs	685		657		▲28	▲4.2

*1 Capital investment amounts are the amounts of tangible and intangible fixed assets acquired in the term.

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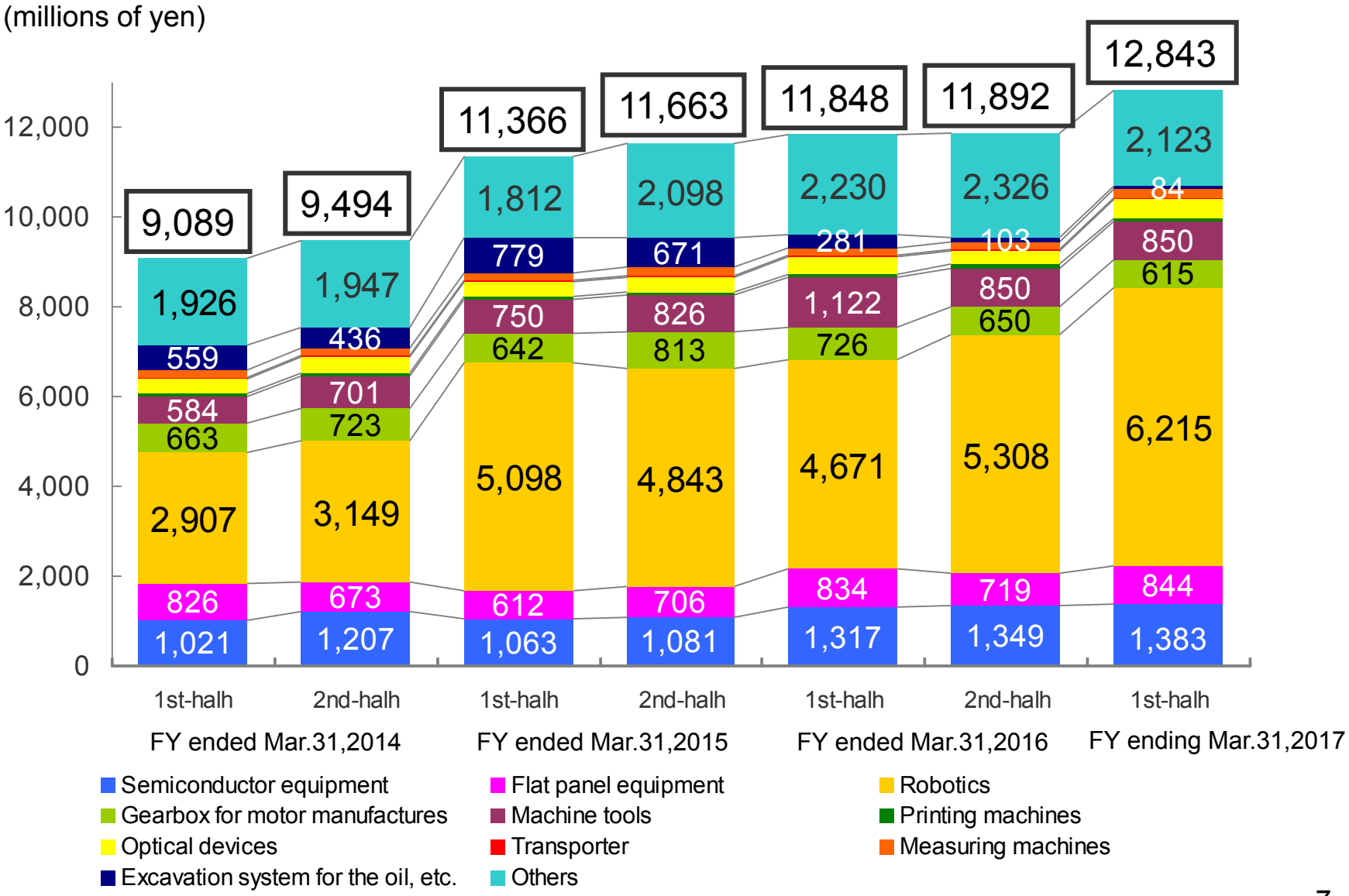
Net sales by application (non-consolidated)



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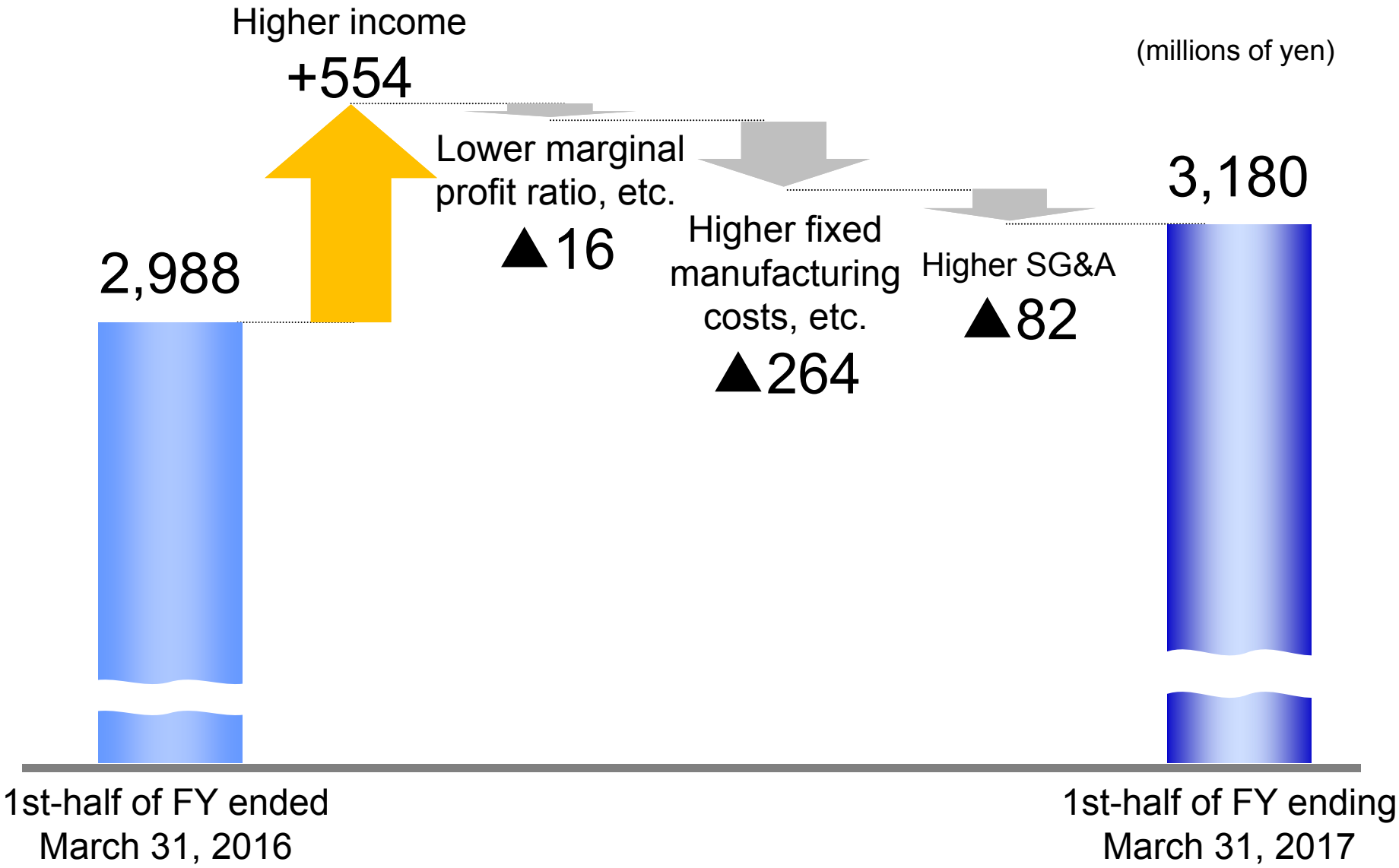
Factors in year-on-year change in 1st-half non-consolidated operating income



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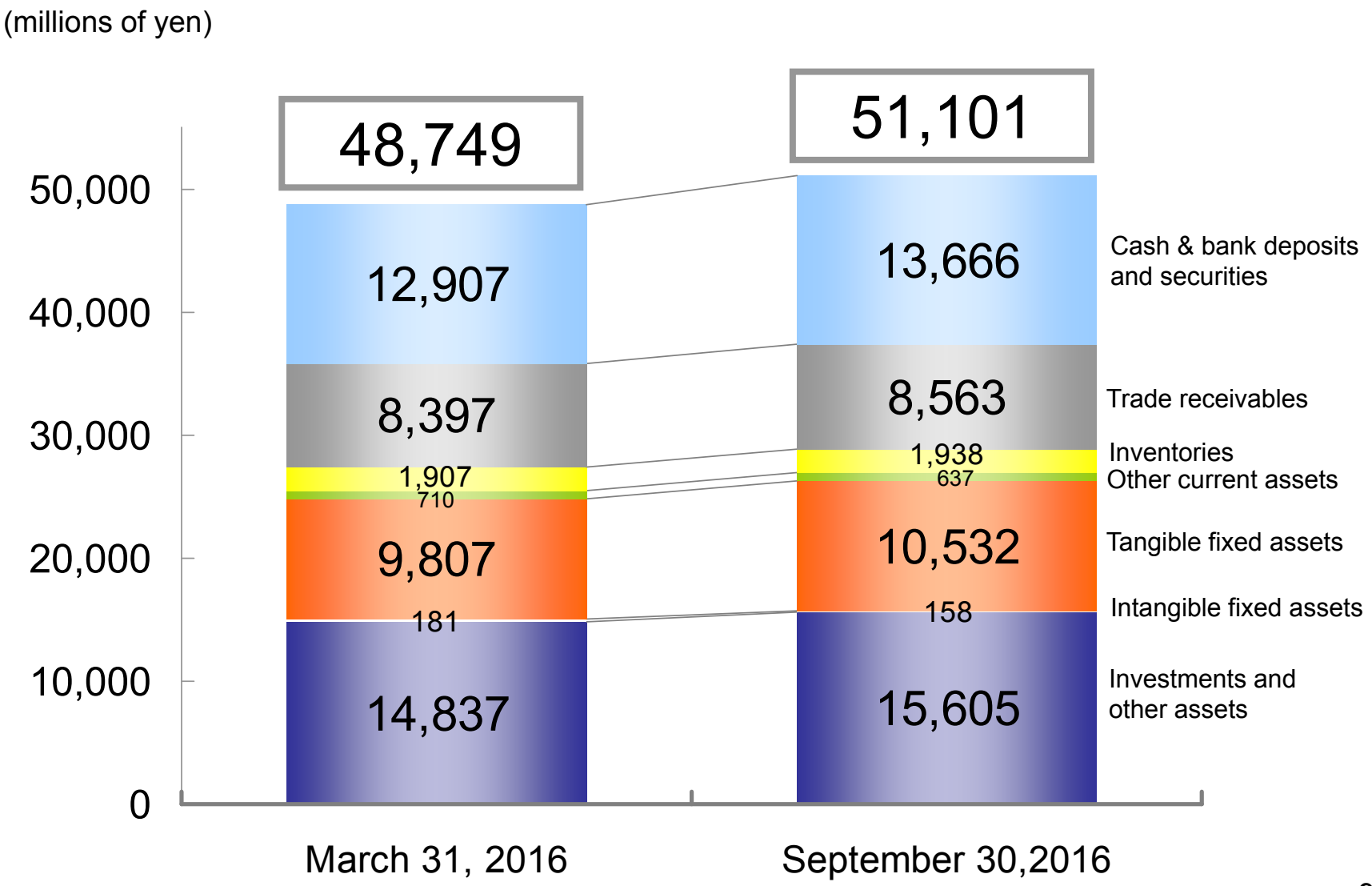
Status of consolidated assets



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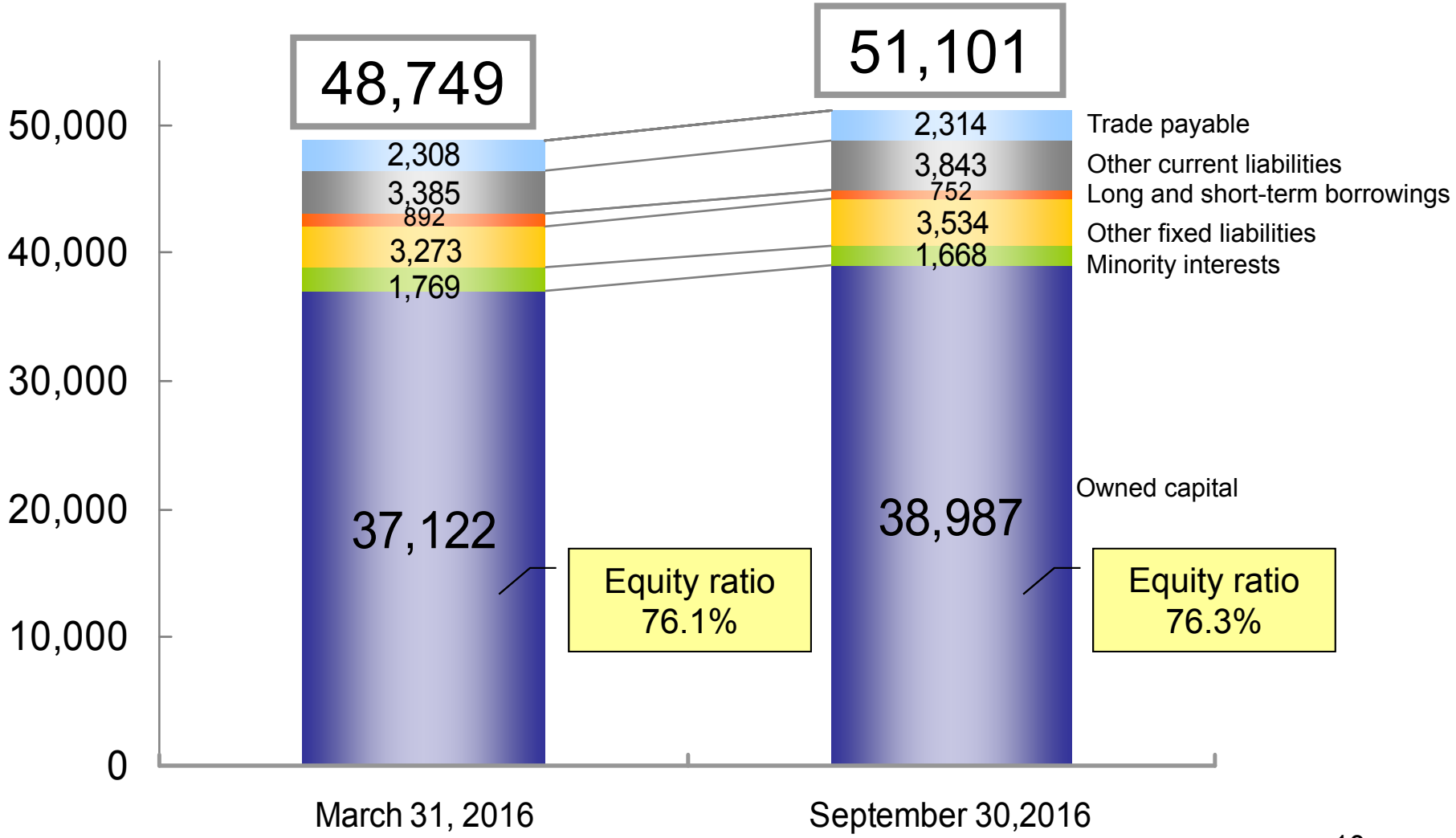
Status of consolidated liabilities and net assets



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Status of consolidated cash flows

(millions of yen)	1st-half of FY ended Mar.31,2016	1st-half of FY ending Mar.31,2017
Cash flow from operating activities	2,938	3,382
Cash flow from investing activities	▲1,795	▲1,033
Cash flow from financing activities	▲290	▲991
Effect of exchange rate changes on cash and cash equivalents	62	▲400
Net increase (decrease) in cash and cash equivalents	915	957
Cash and cash equivalents at end of year	10,645	11,396

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Performance Forecast for Fiscal Year Ending March 31, 2017

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Revised consolidated results forecast for fiscal year ending March 31, 2017

(millions of yen)

	Original forecasts (announced May 13)		Revised forecasts (announced Nov. 4)		Vs. original forecasts	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	30,000	100.0	30,000	100.0	-	-
Operating income	8,200	27.3	8,100	27.0	▲100	▲1.2
Ordinary income	8,900	29.7	8,400	28.0	▲500	▲5.6
Net income *1	6,000	20.0	5,800	19.3	▲200	▲3.3

*1 Assumed exchange rate for FY17/3 forecasts 1USD ＝ ¥104.00 1EUR ＝ ¥115.00 1CNY ＝ ¥15.50
*2 Net income refers to net income attributable to owners of parent.

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Revised non-consolidated results forecast for fiscal year ending March 31, 2017

(millions of yen)

	Original forecasts (announced May 13)		Revised forecasts (announced Nov. 4)		Vs. original forecasts	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	25,500	100.0	26,300	100.0	800	3.1
Operating income	6,200	24.3	6,550	24.9	350	5.6
Ordinary income	6,650	26.1	6,950	26.4	300	4.5
Net income	4,700	18.4	4,950	18.8	250	5.3

※Assumed exchange rate for FY17/3 forecasts 1USD ＝ ¥104.00 1EUR ＝ ¥115.00 1CNY ＝ ¥15.50

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Consolidated performance forecast for fiscal year ending March 31, 2017

(millions of yen)

	FY ended Mar. 31, 2016		Forecasts FY ending Mar. 31, 2017		Year-on-year change	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	28,278	100.0	30,000	100.0	1,721	6.1
Operating income	7,618	26.9	8,100	27.0	481	6.3
Ordinary income	7,829	27.7	8,400	28.0	570	7.3
Net income *1	5,001	17.7	5,800	19.3	798	16.0
EPS（yen）	54.60	–	63.32	–	8.72	16.0
Capital investment	4,296	–	4,200	–	▲96	▲2.2
Depreciation costs	1,524	–	1,780	–	255	16.8
R&D costs	1,404	–	1,450	–	45	3.2

*1 Net income refers to net income attributable to owners of parent.
*2 Assumed exchange rate for FY ending Mar.31, 2017 forecasts 1US$ = ¥104.00 1€ = ¥115.00 1CNY=¥15.50

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Forecasts of main group companies for fiscal year ending March 31, 2017

(millions of yen)

	Equity stake	Net sales		Net income	
		Amount	Year-on-year change (%)	Amount	Year-on-year change (%)
Harmonic Drive Systems Inc.	—	26,300	10.8	4,950	7.4
HD Systems, Inc. (Harmonic Drive L.L.C) (U.S.A)	100% (51%)	4,600	▲5.2	250	▲7.1
Harmonic AD, Inc.	100%	2,350	4.8	150	6.2
Harmonic Drive Systems (Shanghai) Co., Ltd.	100%	2,300	▲10.9	▲40	—
Harmonic Drive AG (Germany)	36.8%	10,500	5.7	1,600	110.1

Percent change(%) indicates increase or decrease from same period of previous fiscal year.

*1 Exchange rates: Jan. – Dec., 2015 1US$ = 121.05 yen, Jan. – Dec., 2016 forecast 1US$ = 107.00 yen
*2 Exchange rates: Jan. – Dec., 2015 1CHY = 19.22 yen, Jan. – Dec., 2016 forecast 1CYN = 16.00 yen
*3 Exchange rates: Jan. – Dec., 2015 1€ = 134.31 yen, Jan. – Dec., 2016 forecast 1€ = 119.00 yen
*4 Net income of US subsidiaries (consolidated) is after excluding minority interests.
*5 For overseas subsidiaries and affiliates, the fiscal year ends December 31.

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Non-Consolidated performance forecast for fiscal year ending March 31, 2017

(millions of yen)

	FY2016/3		FY2017/3 forecasts		Year-on-year change	
	Amount	Percent (%)	Amount	Percent (%)	Change	Rate (%)
Net sales	23,740	100.0	26,300	100.0	2,559	10.8
Operating income	5,913	24.9	6,550	24.9	636	10.8
Ordinary income	6,625	27.9	6,950	26.4	324	4.9
Net income	4,608	19.4	4,950	18.8	341	7.4
EPS (yen)	50.31	–	54.04	–	3.73	7.4
Capital investment	3,462	–	3,600	–	137	4.0
Depreciation costs	898	–	1,150	–	251	28.0
R&D costs	1,395	–	1,430	–	34	2.5

Assumed exchange rate for FY17/3 forecasts 1USD = ¥104.00 1EUR = ¥115.00 1CNY = ¥15.50

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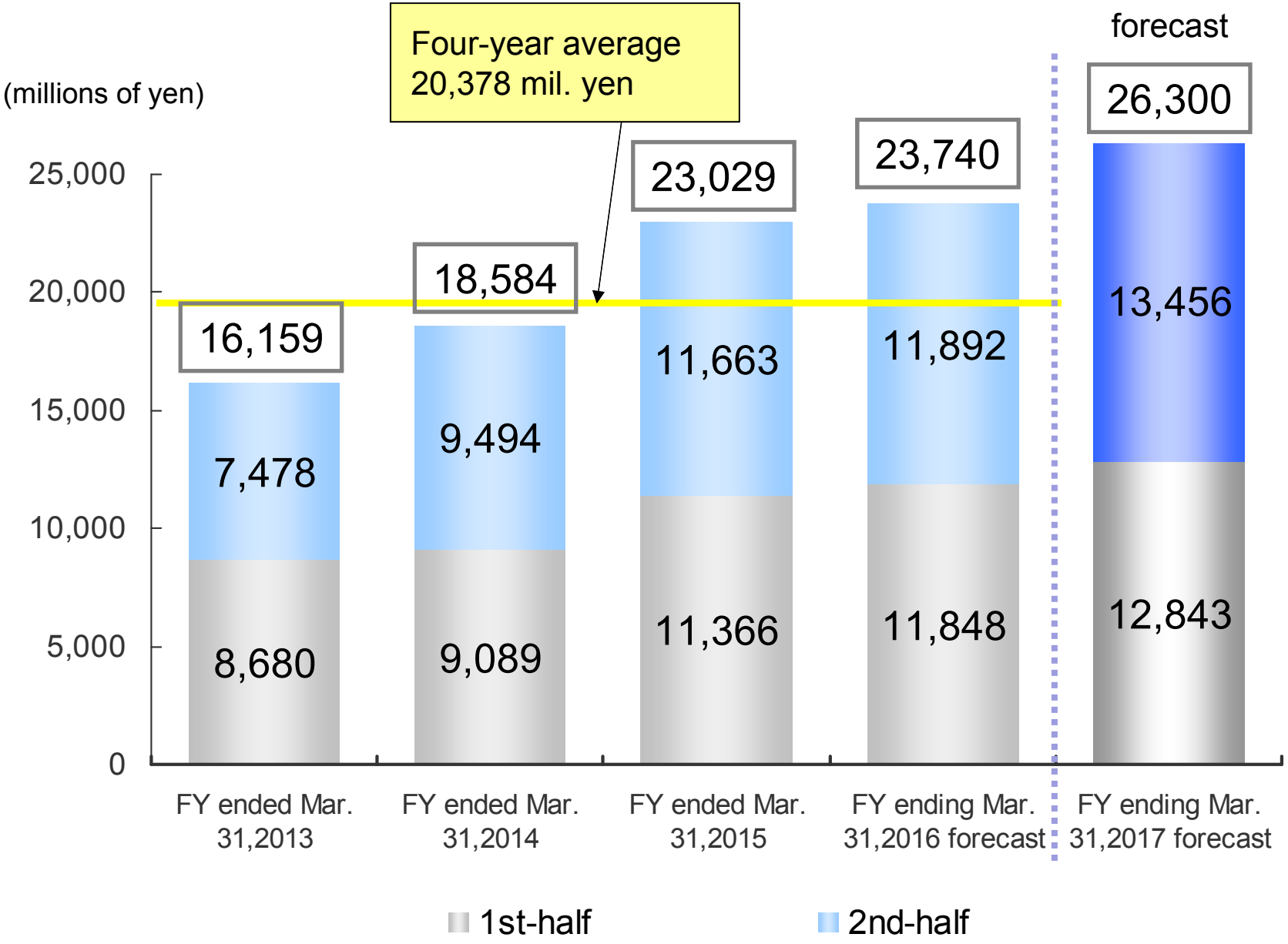
Sales trend line (non-consolidated)



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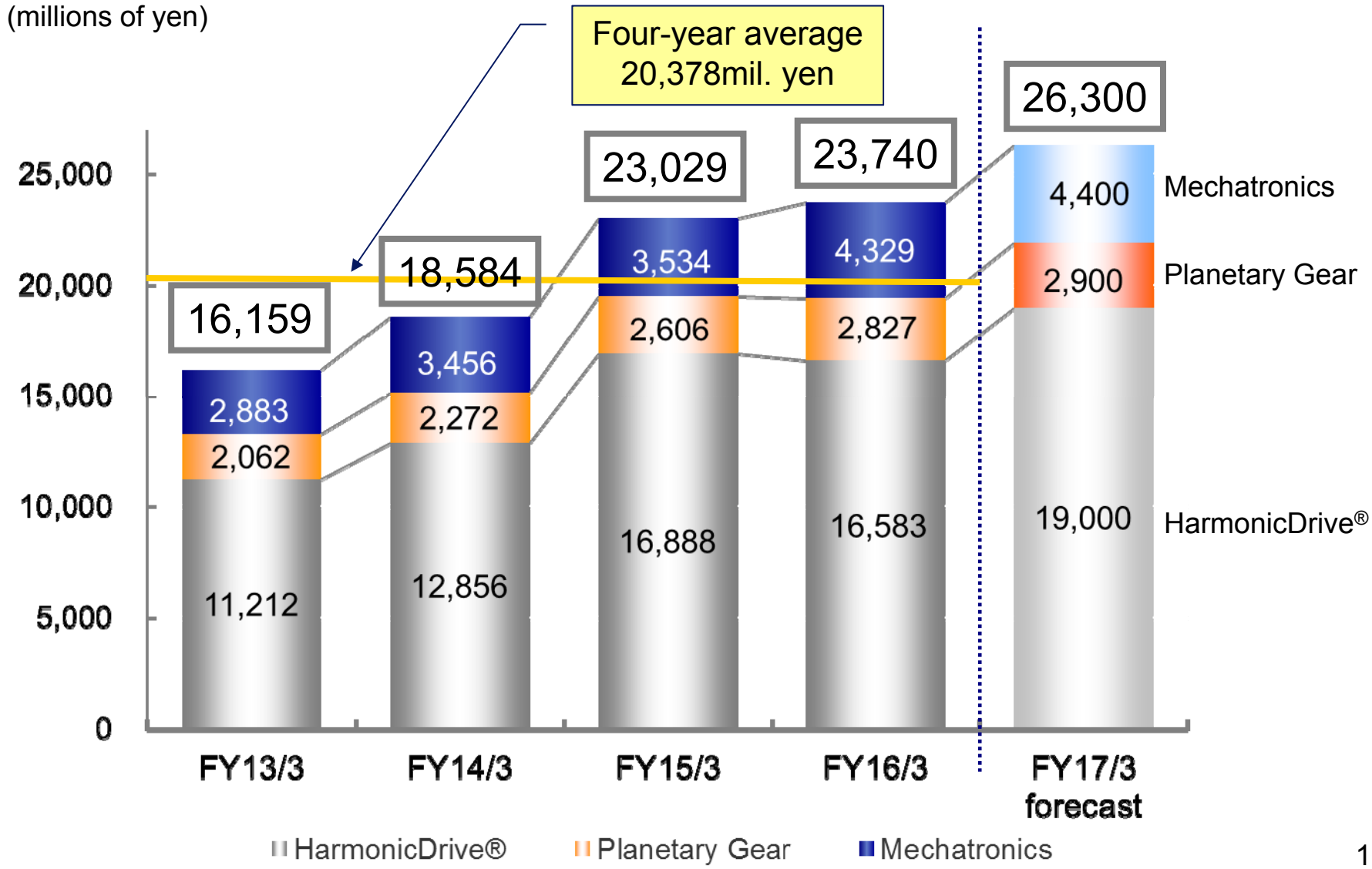
Sales trend line by product (non-consolidated)



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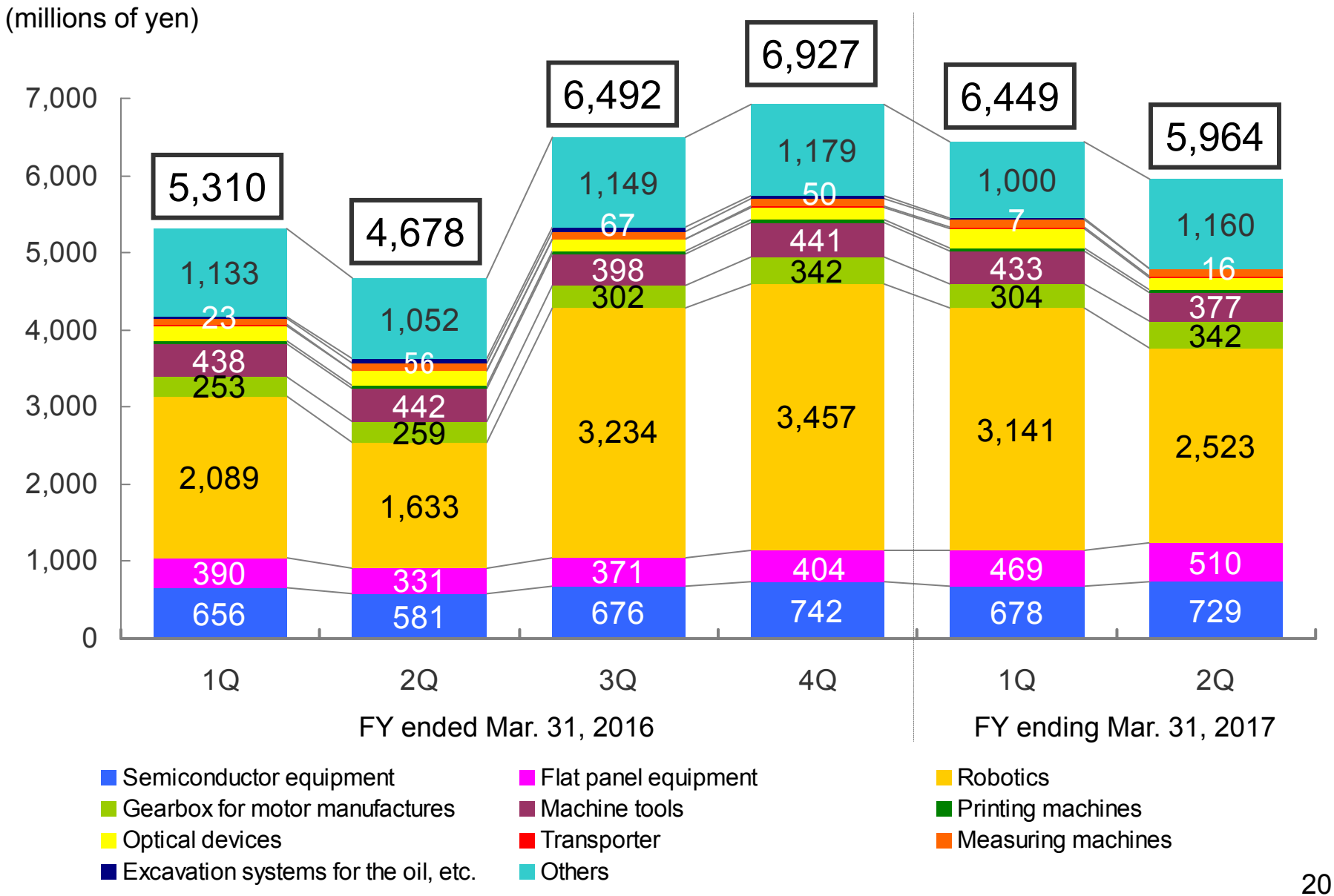
Non-consolidated bookings by application (quarterly)



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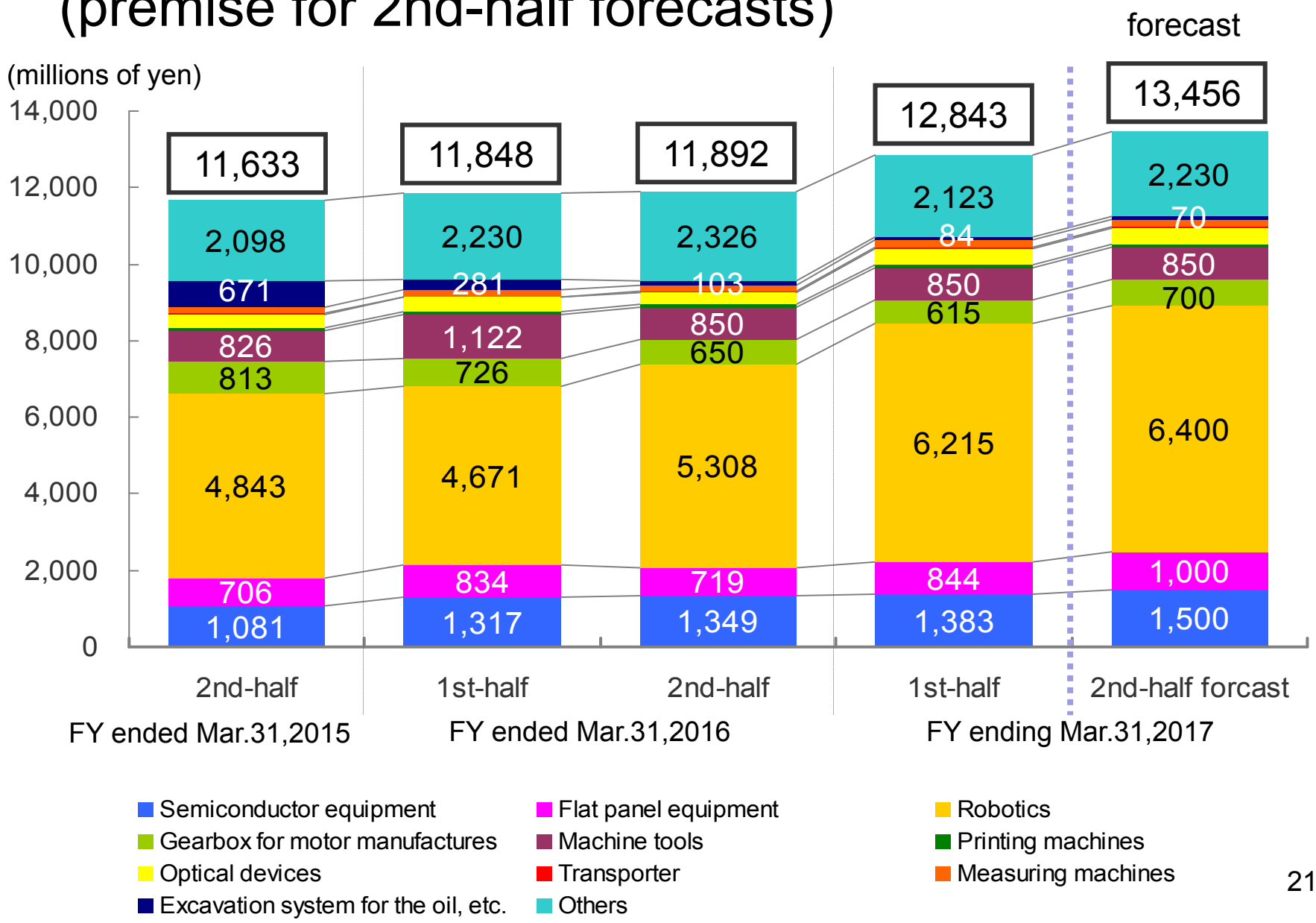
Non-consolidated net sales by application (premise for 2nd-half forecasts)



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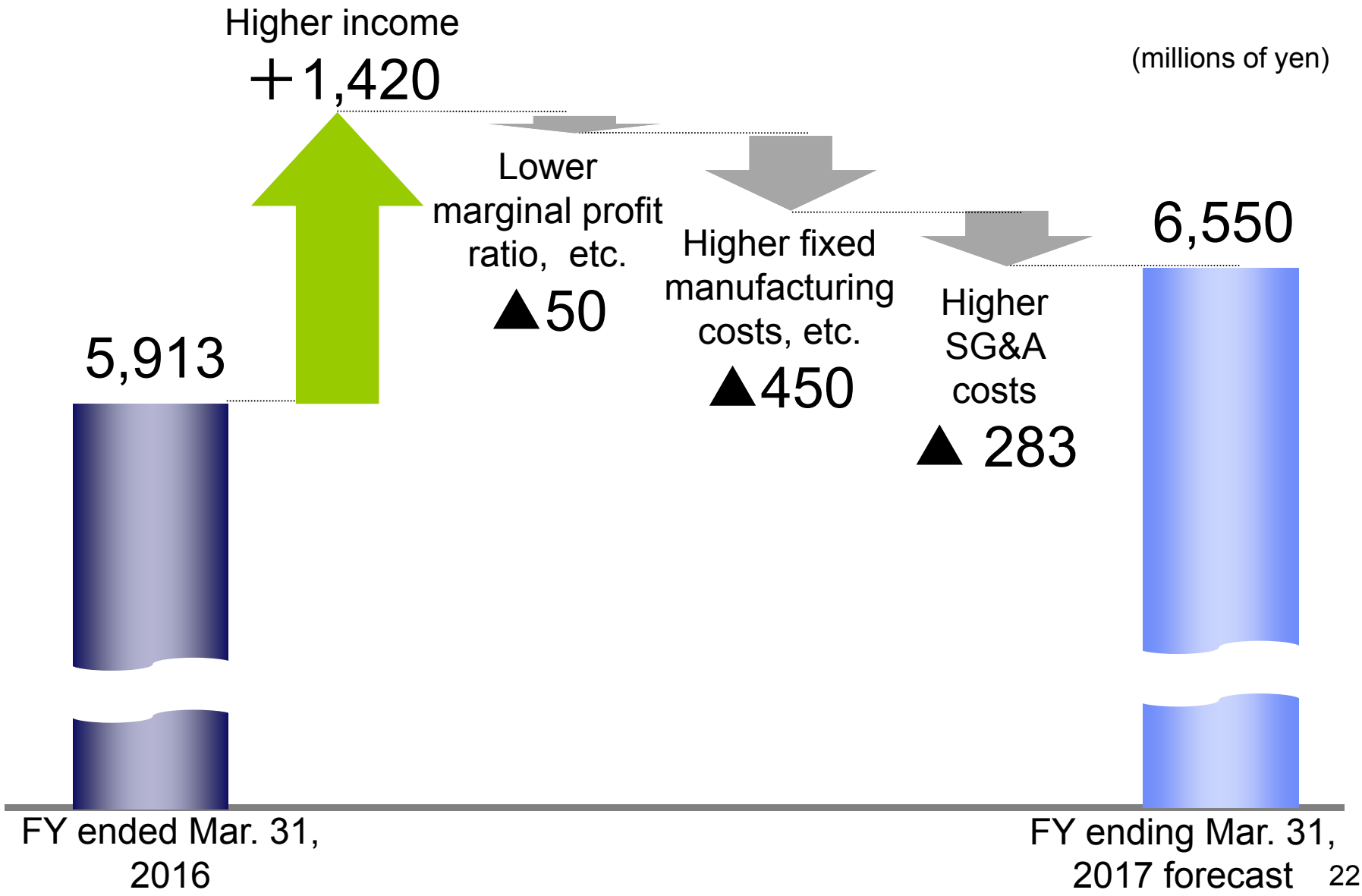
Factors in year-on-year change in non-consolidated operating income (fiscal year ending March 31, 2016 forecast)



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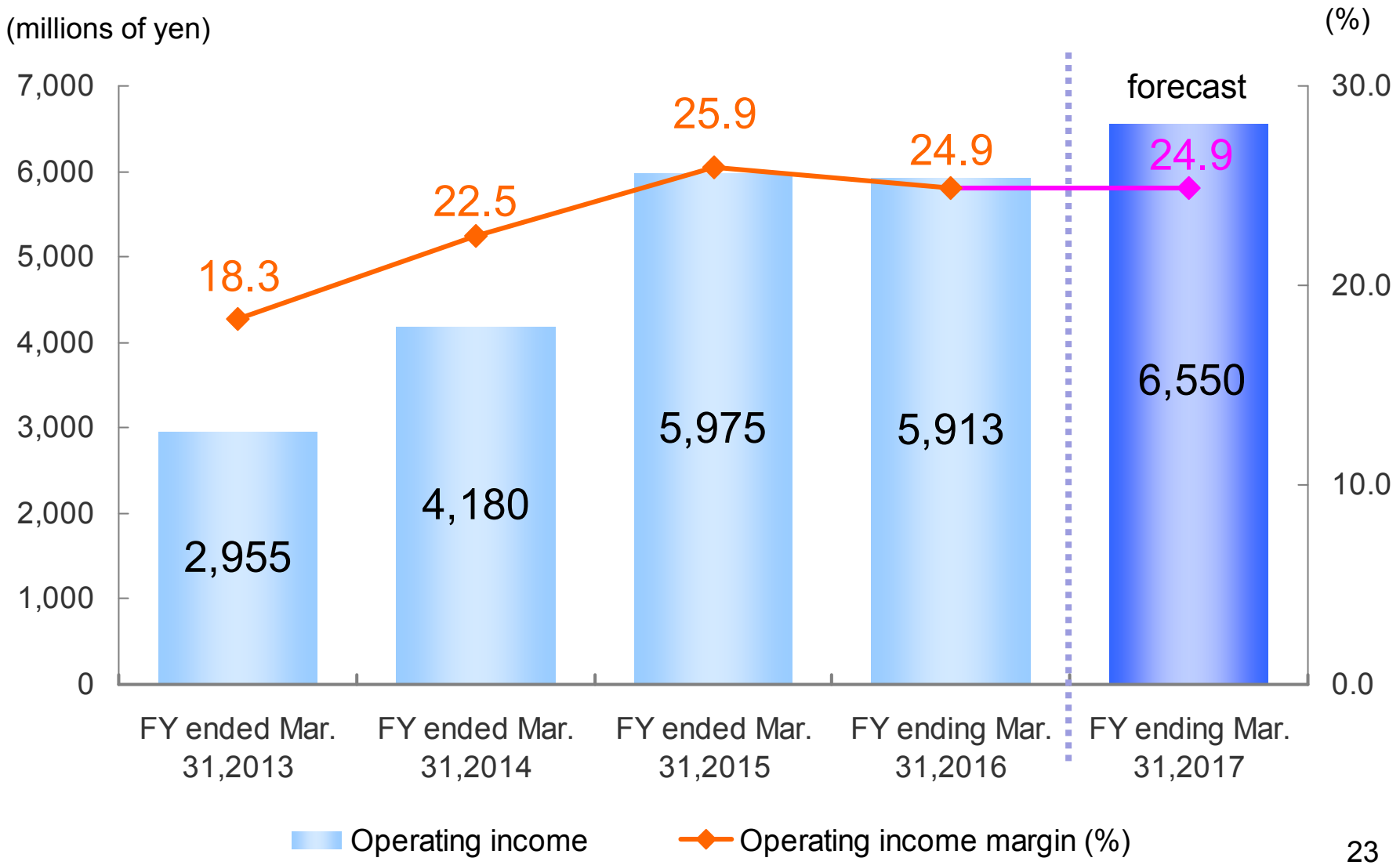
Trends in operating income (non-consolidated)



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Future Outlook

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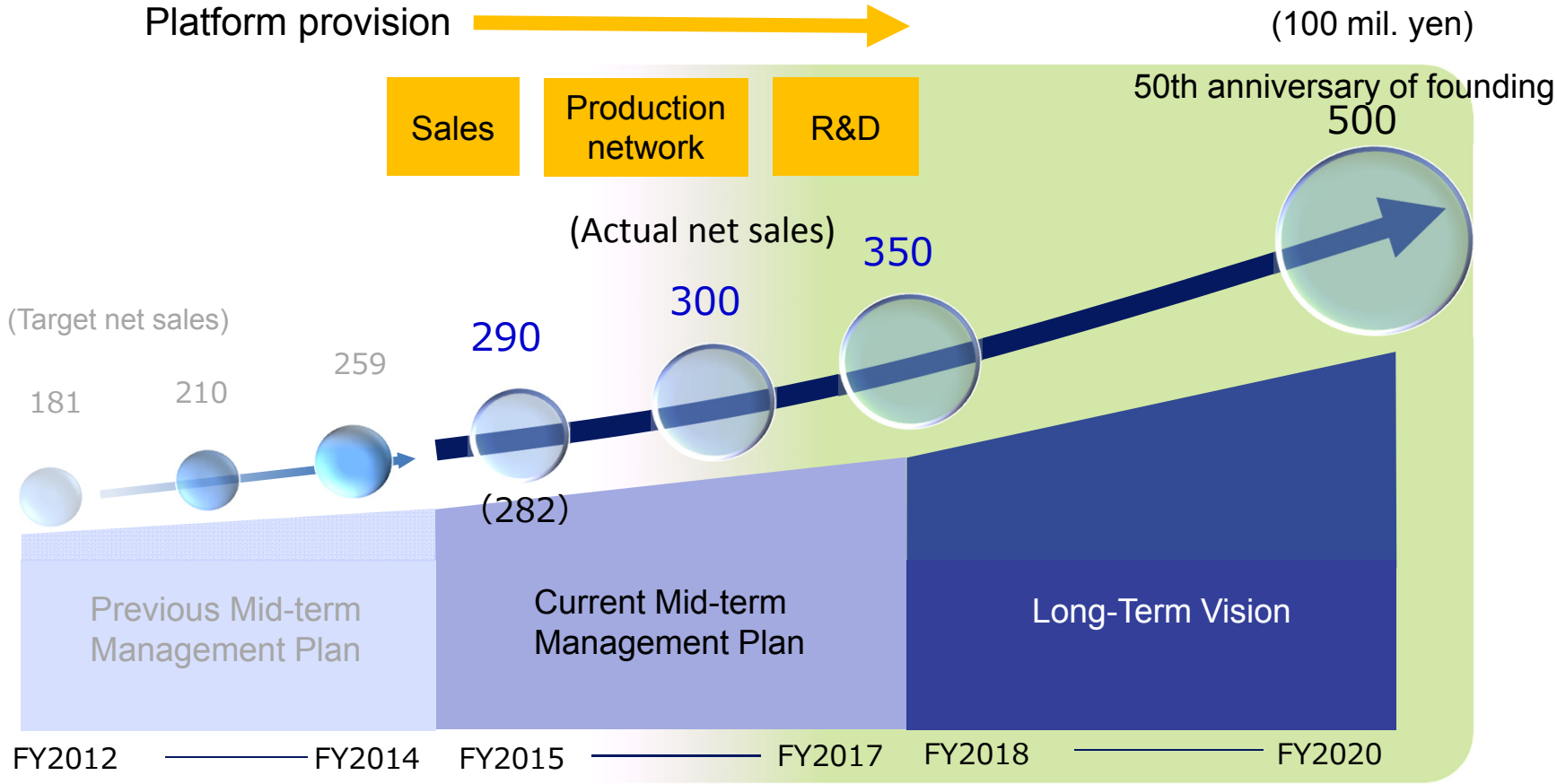
Realizing our Long-Term Vision

Provision of platforms for sales, R&D, and production



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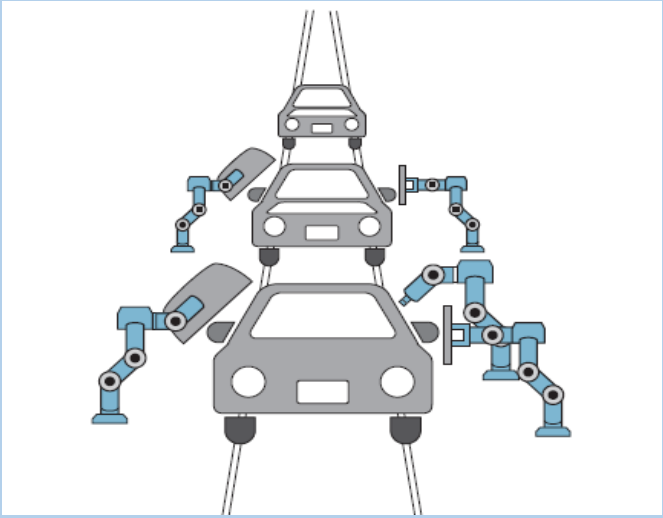
Sales: Trends in Main Application Fields (1)

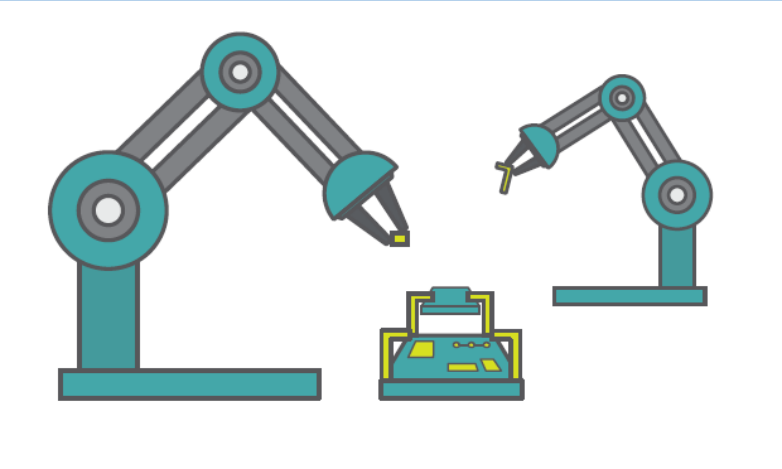
Industrial robots Provide high added value (load capacity, speed)

- Fusion of robots with AI and big data (IoT)

Handle welding, heavy lifting, high-precision



Advances in sensors enabling application to flexible manufacturing



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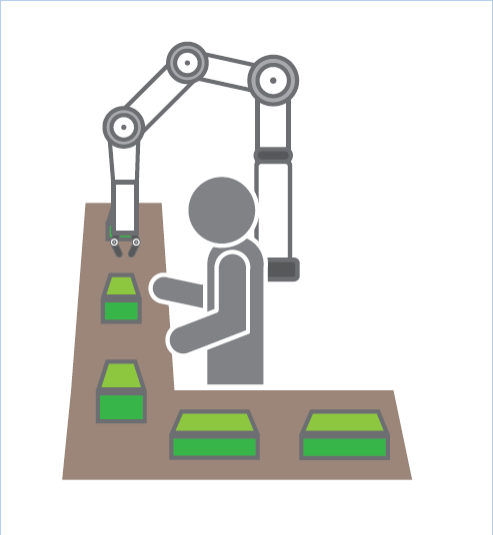
Sales: Trends in Main Application Fields (2)

Co-bots Low added value tasks

- Expanding collaboration between people and robots
- Replacing people with robots

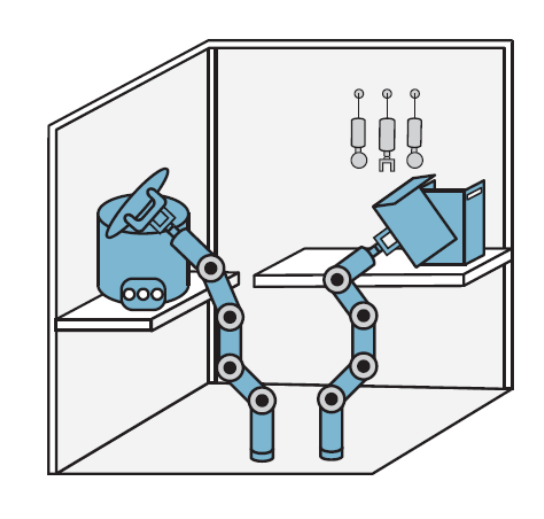
Collaboration between people and robots



Typical usage areas

- **Car manufacturing**
- **Manufacturing of electronic equipment and devices**
- **Food service industry**
- **Manufacturing of cosmetics, pharmaceuticals, and food**

Home appliance manufacturer examples：
Robots replacing people for cell production



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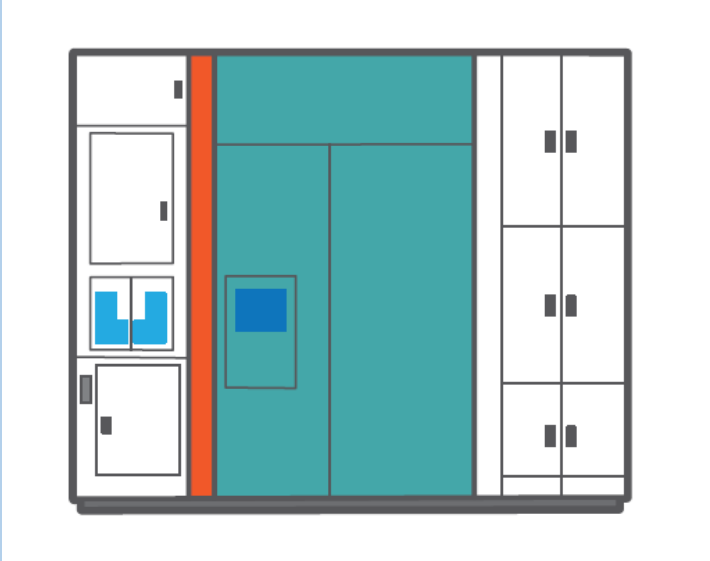
Sales: Trends in Main Application Fields (3)

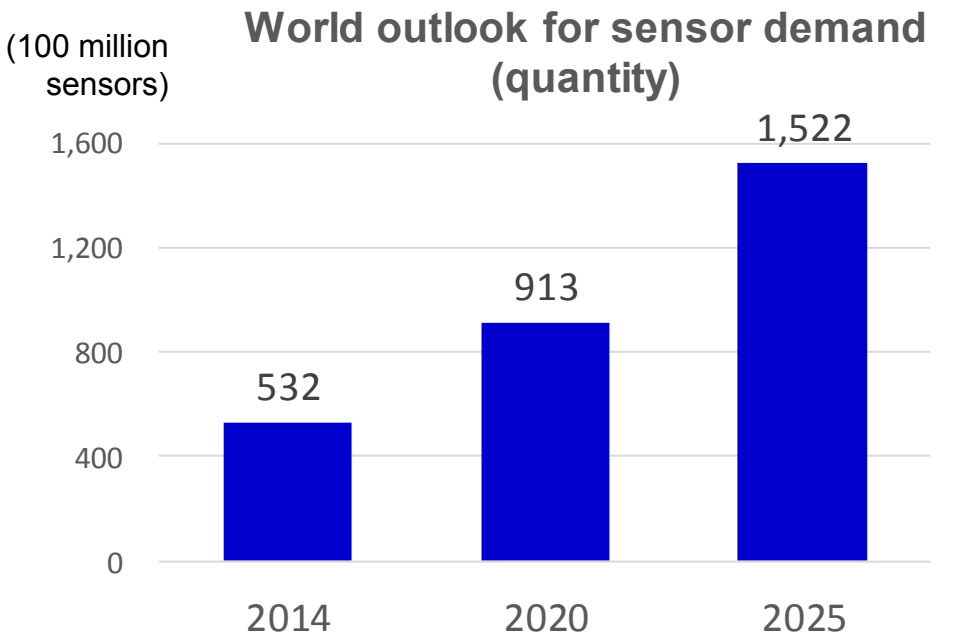
Semiconductor manufacturing equipment

On the way to the trillion-sensor era

- Expansion of investment in 3D (stacked) semiconductors
- Acceleration of development of latest miniaturization techniques

Semiconductor manufacturing equipment





Source: JEITA (Japan Electronics & Information Technology Industries Association)

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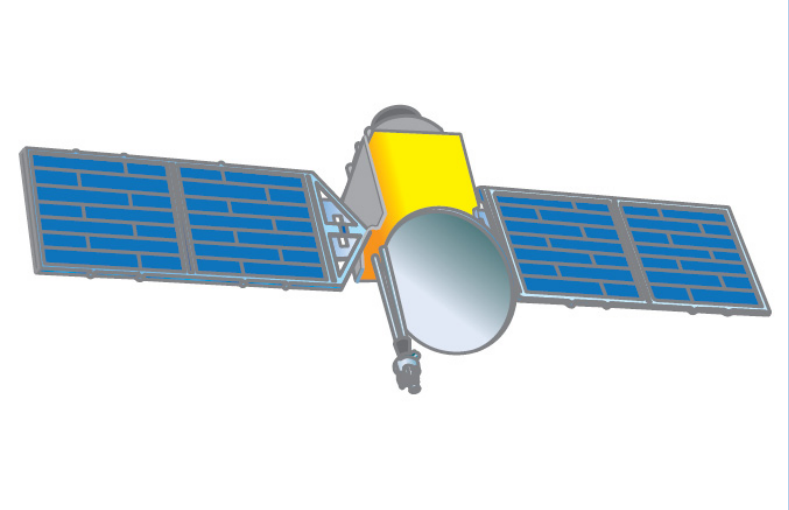
Sales: Trends in Main Application Fields (4)

Other

- In-vehicle
- Space
- Medical equipment

In-vehicle

Communication Satellites



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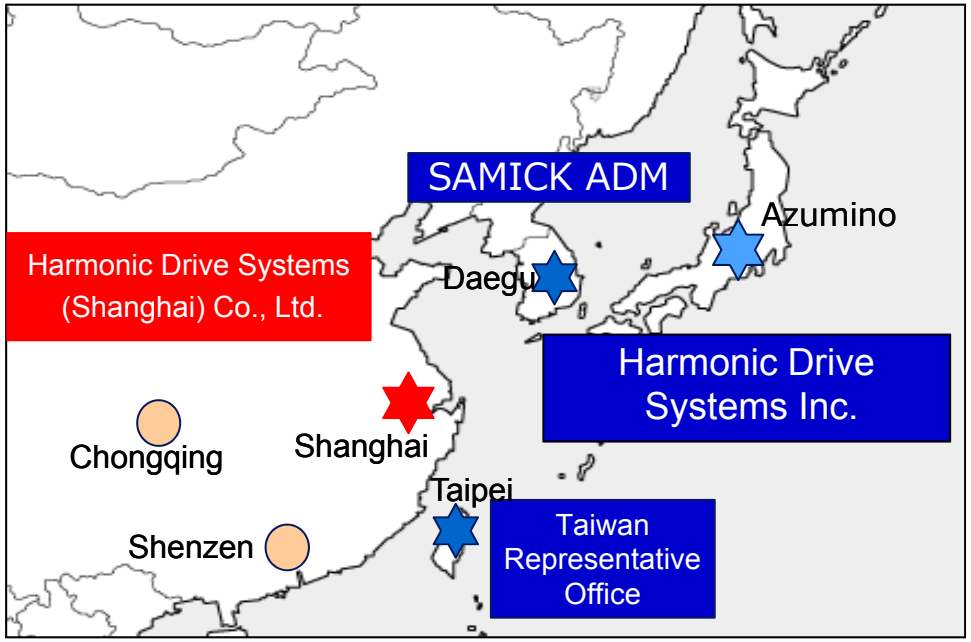
Sales (Asian Market)

Taiwan Representative Office established

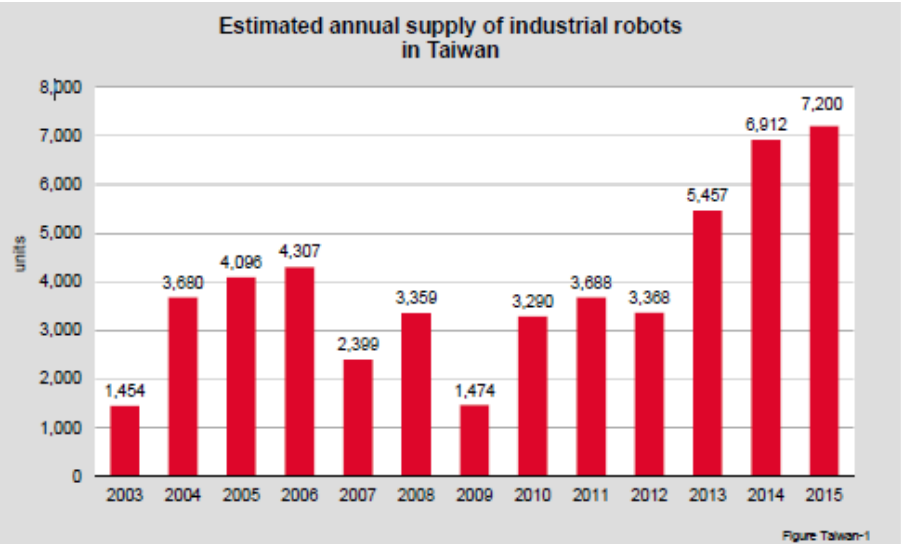
■ Electronic parts, semiconductors, EMS and other industries are flourishing

Markets for robots, semiconductor manufacturing equipment, machine tools and other factory automation products are also expanding

- New robot manufacturers, and makers of built-in EMS robots and collaborative robots, are growing



Industrial robot supply trends in Taiwan



Source: IFRS WR Industrial Robots 2016

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Production: Worldwide Production Network

Harmonic Drive AG

- Location: Limburg, Lahn, Germany
- Production scale: 10,000 units/month

Germany

South Korea

Japan

USA

Harmonic Drive LLC

- Location: Massachusetts, USA
- Production scale: 4,000 units/month

SAMICK ADM Co., Ltd.

- Location: Daegu, South Korea
- Production scale: 1,000 units/month

Japan Domestic

Harmonic Drive Systems Inc.

Harmonic AD, Inc.

Harmonic Precision Inc.

Winbel Co., Ltd.

- Production scale: 50,000 units/month

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Production: Further expansion in production capacity to 80,000 units/month

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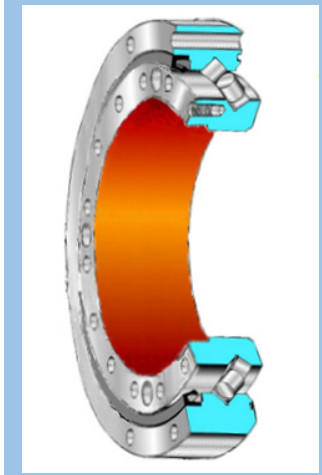
Production: Crossed roller bearings

Harmonic Precision Inc.

- Location: Matsumoto-shi, Nagano
- Employees: 118 (including temporary staff) (as of March 31, 2016)

Internal structure of unit product
Crossed roller bearing

Crossed roller bearings

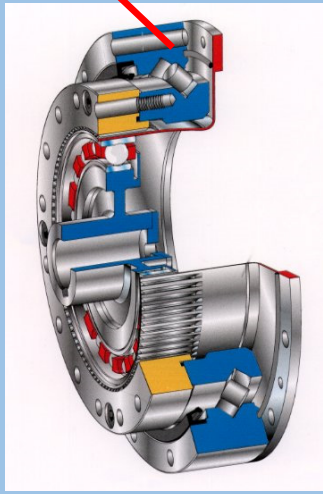


Crossed roller bearings (CRB) are bearings using cylindrical rollers.

Features

- Compact shape
- Large load capacity
- High strength at all angles

→ Standard in HarmonicDrive® unit products, planetary speed reducers, and mechatronics (MT) actuators



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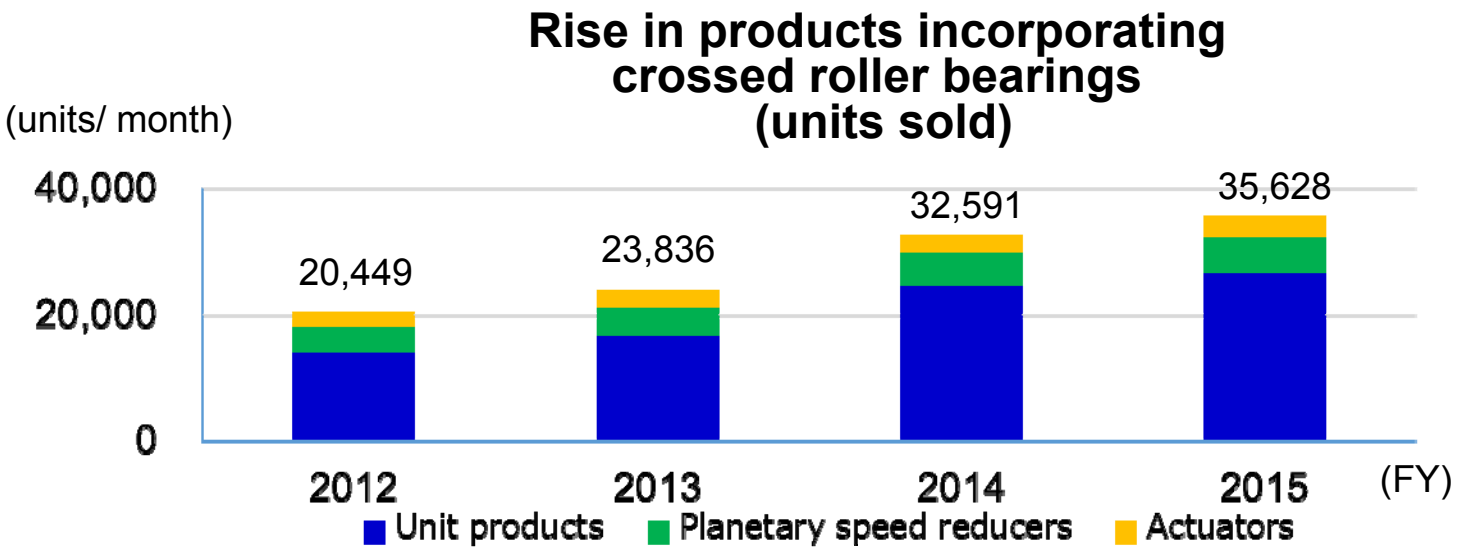
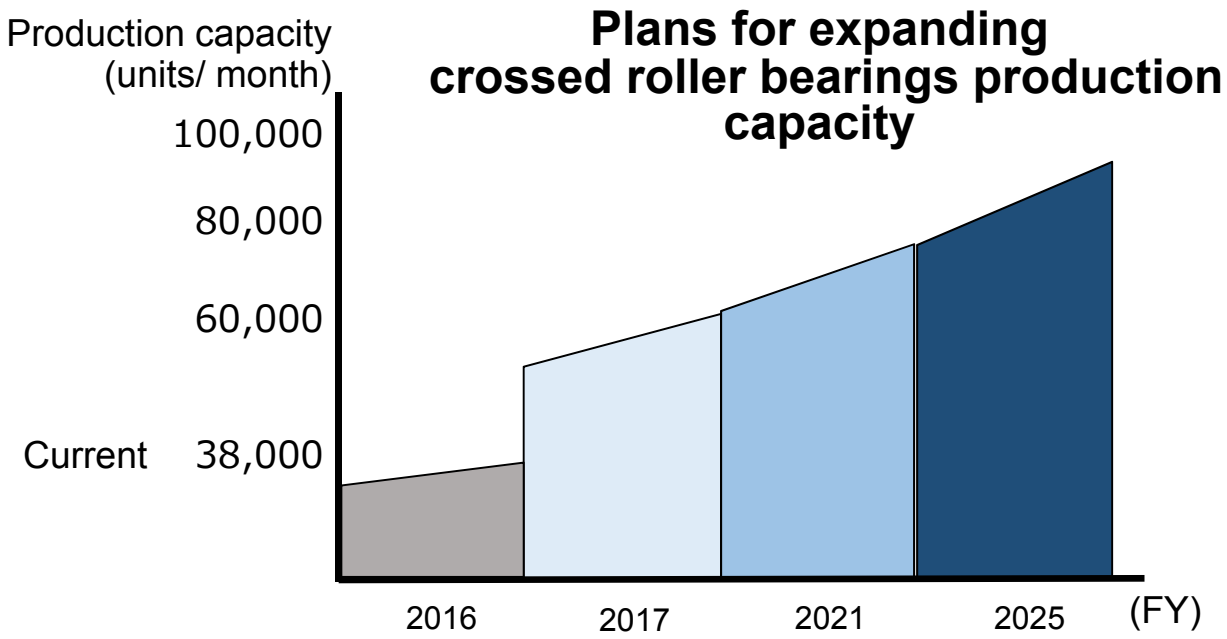
Production: Capacity expansion for crossed roller bearings





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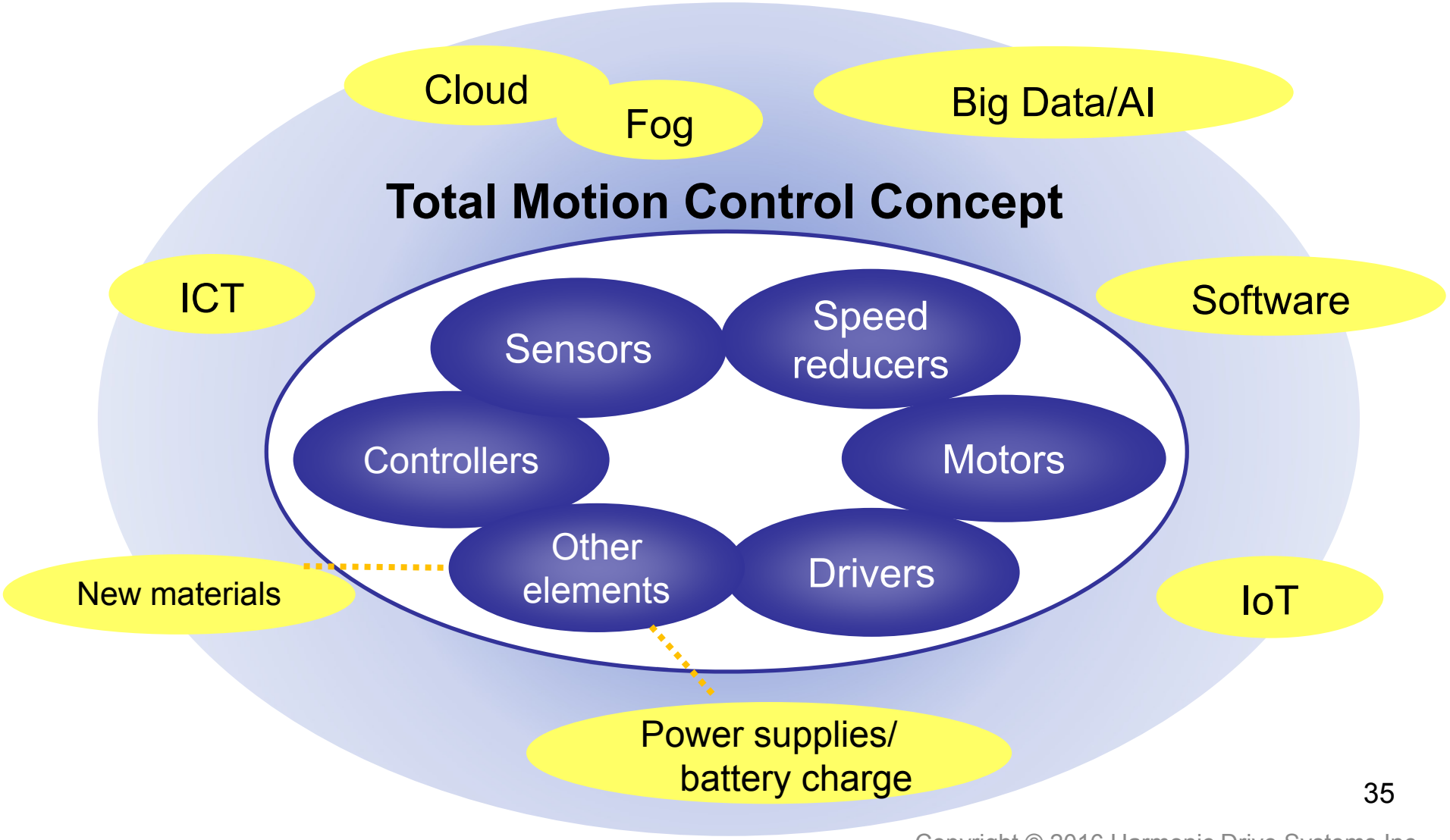
Research and Development:
The Total Motion Control Ecosystem



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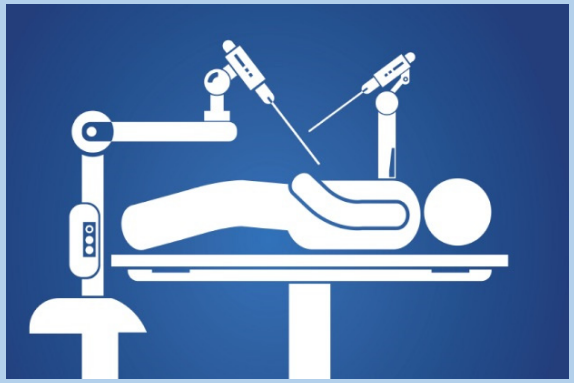
Research and Development: Deepening of R&D

■HarmonicDrive® fundamental/applied research

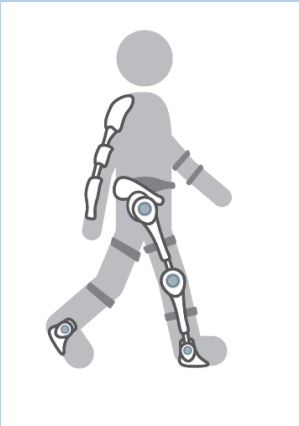
- Lubricating materials
- Stress analysis
- Tiny 5 mm-diameter HarmonicDrive®

■Development of applications

- Space
- Medical equipment
- In-vehicle
- Service robots



Surgical robot



Service robot

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Research and Development: Deepening of R&D

■Silicon Valley office established

- Gateway to latest robotics technologies
- Joint research with SRI*: Abacus drive (pure rolling cycloid)
- Joint research with other US research institutions and universities

*Stanford Research Institute

Abacus drive
(pure rolling cycloid)

Advantages of the Abacus drive

- **High energy efficiency (low loss)**
- **Low reduction ratio region (complementary with strain wave gearing devices)**
- **Few parts**

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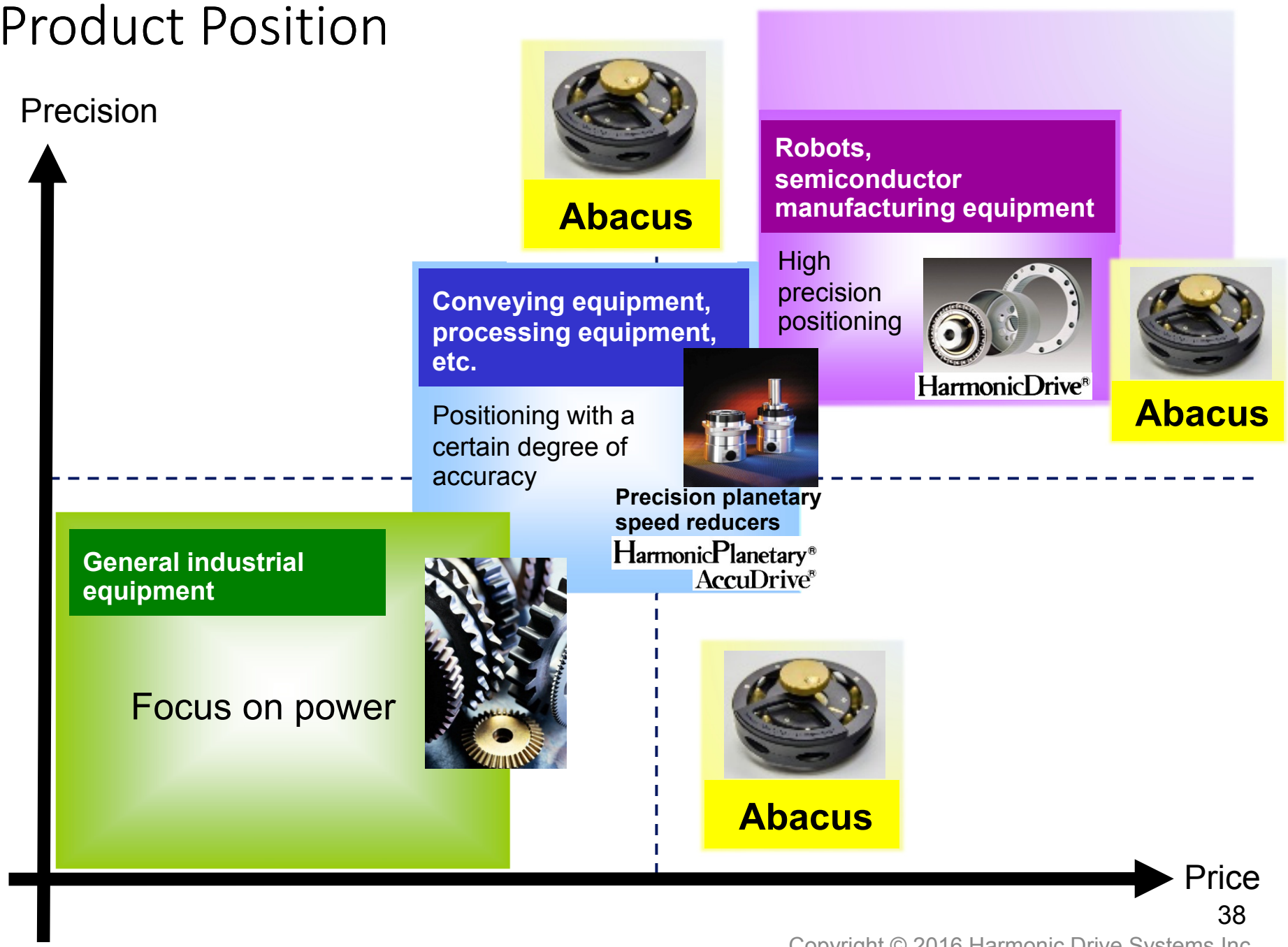
Product Position



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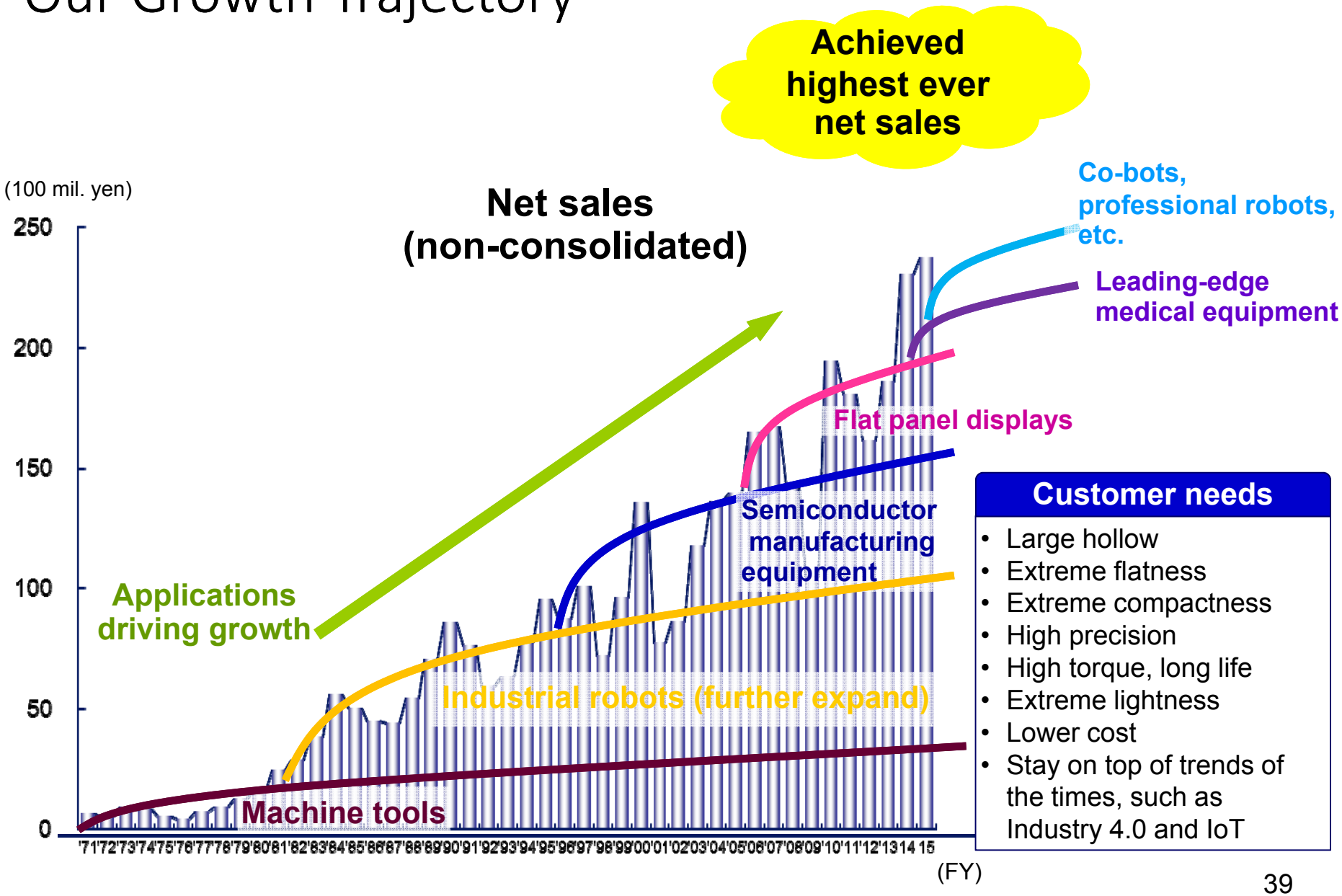
Our Growth Trajectory



Customer needs

- Large hollow
- Extreme flatness
- Extreme compactness
- High precision
- High torque, long life
- Extreme lightness
- Lower cost
- Stay on top of trends of the times, such as Industry 4.0 and IoT

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The performance targets and other numerical data presented herein are forecasts based on information available to the HDS Group at the time this material was prepared, and are subject to the influence of uncertainties including those in the economic and competitive environment. Actual performance may therefore differ materially from the forecasts given in this material.

Harmonic Drive Systems Inc.

For more information:

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