

**Securities ID code:6859**

# **ESPEC CORP.**

**Results Briefing for The Second Quarter  
of Fiscal Ending March 2019**

**November 20, 2018**

**[www.espec.co.jp](http://www.espec.co.jp)**

# Table of Contents

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**Company Profile**

**Financial Result for the Second Quarter of Fiscal Ending March 31, 2019**

**Analysis per Segment for the Second Quarter of Fiscal Ending March 31, 2019**

**Business Plan for the Fiscal Ending March 31, 2019**

**Reference**

# Company Profile

## World-leading manufacturer of environmental test chambers

Name	ESPEC CORP.
Head Office	3-5-6, Tenjinbashi, Kita-ku, Osaka
Represented By	Masaaki Ishida
Established	July 25, 1947
Incorporated	January 13, 1954
Paid-up Capital	¥6,895 Million
Shares Issued	23,781,394 Shares
Employees	1,519 (consolidated)
Main Business	Manufacture and Sales of Environmental Test Chambers, Energy Device Equipment, Semiconductor Equipment and Plant Factory. After-sales Service, Commissioned Tests and others.



Head office

Share of Environmental  
Test Chambers:

Over 30% worldwide, Over 60% domestic  
(As of September 30, 2018)

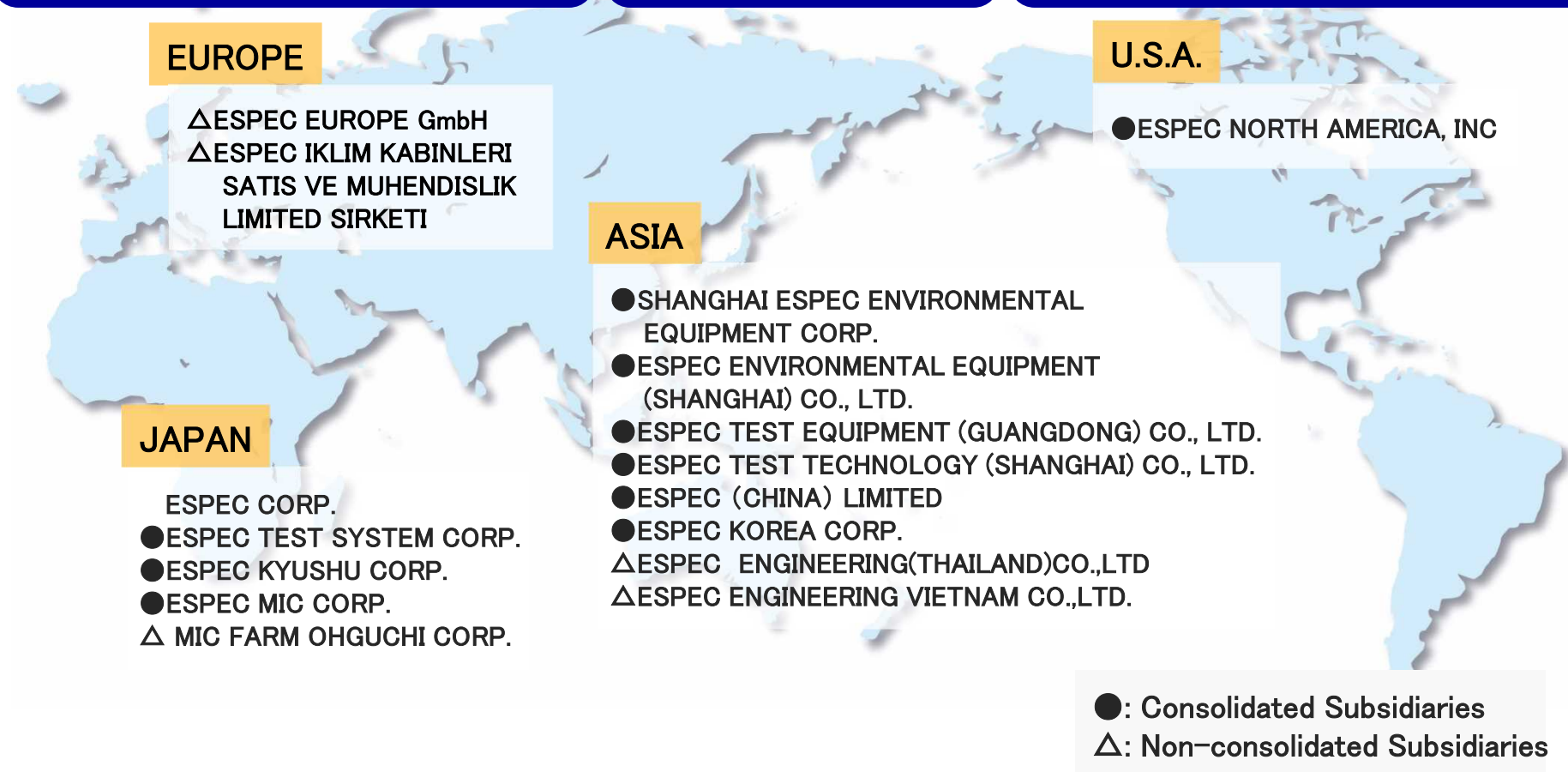
# Global Network

**Consolidated Subsidiaries**  
**10 companies**

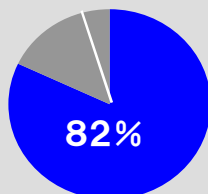
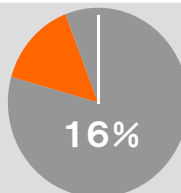
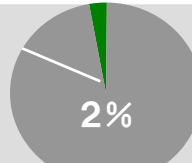
(Global 7 companies, Domestic 3 companies)

**Global Network**  
**45 countries**  
**33 companies**

**Business Facilities in Japan : 25**  
**Domestic Agencies in Japan : 46**



# Summary of ESPEC Business (Per Market / Use)

		Main Products	Market	Use	Sales composition (FY2018 2Q)
Equipment Business	Environmental Test Chambers	•Temperature & humidity chamber •Thermal shock chamber •Bench-top type temperature & humidity chamber •HAST chamber •Walk-in type temperature & humidity chamber •Combined temperature & humidity chamber •HALT & HASS test chamber •FPD equipment	•Electronic component and equipment market •Automobile market •Semiconductor market •Medicine, Cosmetics, Foods market •LCD and Organic Electro-Luminescence market	•For R & D •For credibility and evaluation •For production and inspection	 82%
	Energy Device Equipment	•Charge-discharge Cycle Evaluation Equipment •LIB safety evaluation system •Fuel cells evaluation system	•Next generation automobile market •Secondary batteries market •Fuel cells market	•For R & D •For credibility and evaluation •Safety evaluation •For production	
	Semiconductor Equipment	•Burn-in system •Semiconductor evaluation system •Instrumentation system	•Semiconductor market •Automobile market	•For production and inspection •For development and evaluation	
Service Business	After-sales Service and Engineering	•After-sales service •Construction around equipment	•Electronic component and equipment market •Automobile market •Semiconductor market	—	 16%
	Commissioned Tests and Facility Rentals	•Commissioned test   •Resale •Equipment rental   •Calibration		•For R & D •For credibility and evaluation	
Other Business	The forest wetland and greening Business	Reforestation (Tree planting) , Waterfront biotope restoration, Urban greening			 2%
	Plant Production Systems*	Plant factory, Equipment for growing plants*			

\*The name in the Other Businesses segment has been changed.

# 【Equipment Business】TOPICS

(October 2018)

## Increased production capacity of temperature (& humidity) chambers by 1.6 times

- Responded to expansion of demand against backdrop of the increased electrification of automobiles and technological development of automation
- Integrated design, procurement, production, inspection, and logistics functions, and strengthened quick responses and flexible responses

■ Start of operations: October 15, 2018

■ Total floor area: 2,200 m<sup>2</sup>

■ Location: On premises of Kobe R&D Center (Kobe City, Hyogo Prefecture)



Kobe R&D Center



Drive-in Chamber for Vehicle Testing

# 【Equipment Business】TOPICS

(September 2018)

## Expanded product lineups for the European market

### ■ Launched Environmental Stress Chamber AR series Rapid-Rate Temperature Cycle Type (5K/min)

- Complies with international IEC standards and German automobile industrial standard LV124
- Uses European F-gas Regulation-compliant low-GWP (global warming coefficient) refrigerant R-449A
- Total lineup of 28 models in Environmental Stress Chamber AR series



Environmental Stress Chamber AR series  
Rapid-Rate Temperature Cycle Type (5K/min)



# 【Equipment Business】TOPICS

(October 2018)

## Highly Accelerated Stress Test System (HAST) Wins 2018 Good Design Award

- This award marks ESPEC's 28th Good Design Award, and the fifth for the Highly Accelerated Stress Test System.
- A model redesign in November 2017 greatly increased the usability of the system through improved operability and visibility thanks to a new touch-panel color LCD controller, and simplified wiring thanks to color coding of the specimen signal terminals.



Highly Accelerated Stress Test System(HAST)



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# **Financial Result for the Second Quarter of Fiscal Ending March 31, 2019**

# Review of the First Half of Fiscal 2018

## External Environment

- Foreign exchange (U.S. dollar/yen) is at \$1 to ¥105~113
- Active development of EV conversion in line with strengthening of environmental regulations
- Active development of autonomous driving technology
- Active development of cutting-edge technologies such as IoT and AI

There were no significant changes in initial awareness of the environment

## Developments within ESPEC

- Orders with long delivery times increased
- Built system for increasing domestic production
- Strengthened profitability improvement activities for customized products
- Chinese business performed favorably due to the benefit of the "ONE ESPEC Structure" in China
- Expanded product lineup for Europe
  - ① Made compliant with IEC and German automobile industrial standard LV124
  - ② Made compliant with European F-gas Regulation
- Prepared to open a technology service base in Vietnam (Hanoi)

# Financial Highlights

Sales and profit both increased year on year in the first half of fiscal 2018

Fell short of the initial plan

	Year on Year	Initial plan
■ Orders–Received	○ The Equipment Business increased (especially environment test chambers)	○ The Equipment Business increased (especially environment test chambers)
■ Net sales	○ The Equipment Business increased (environment test chambers)	× Fell short in the Equipment Business as orders with long delivery times increased
■ Operating income	○ Increased due to the higher net sales and improvement in the cost of sales ratio	× Fell short due to a decline in net sales
■ Ordinary income, Net income*	○ Increased due to the increase in operating income	× Fell short due to a decline in operating income
■ Looking at dividends per share, the interim dividend was set at ¥22, while the year-end dividend is forecast at ¥40; accordingly, the annual dividend is forecast at ¥62 per share.		

\*Profit attributable to owners of parent

# Summary of Profits and Losses

(millions of yen)

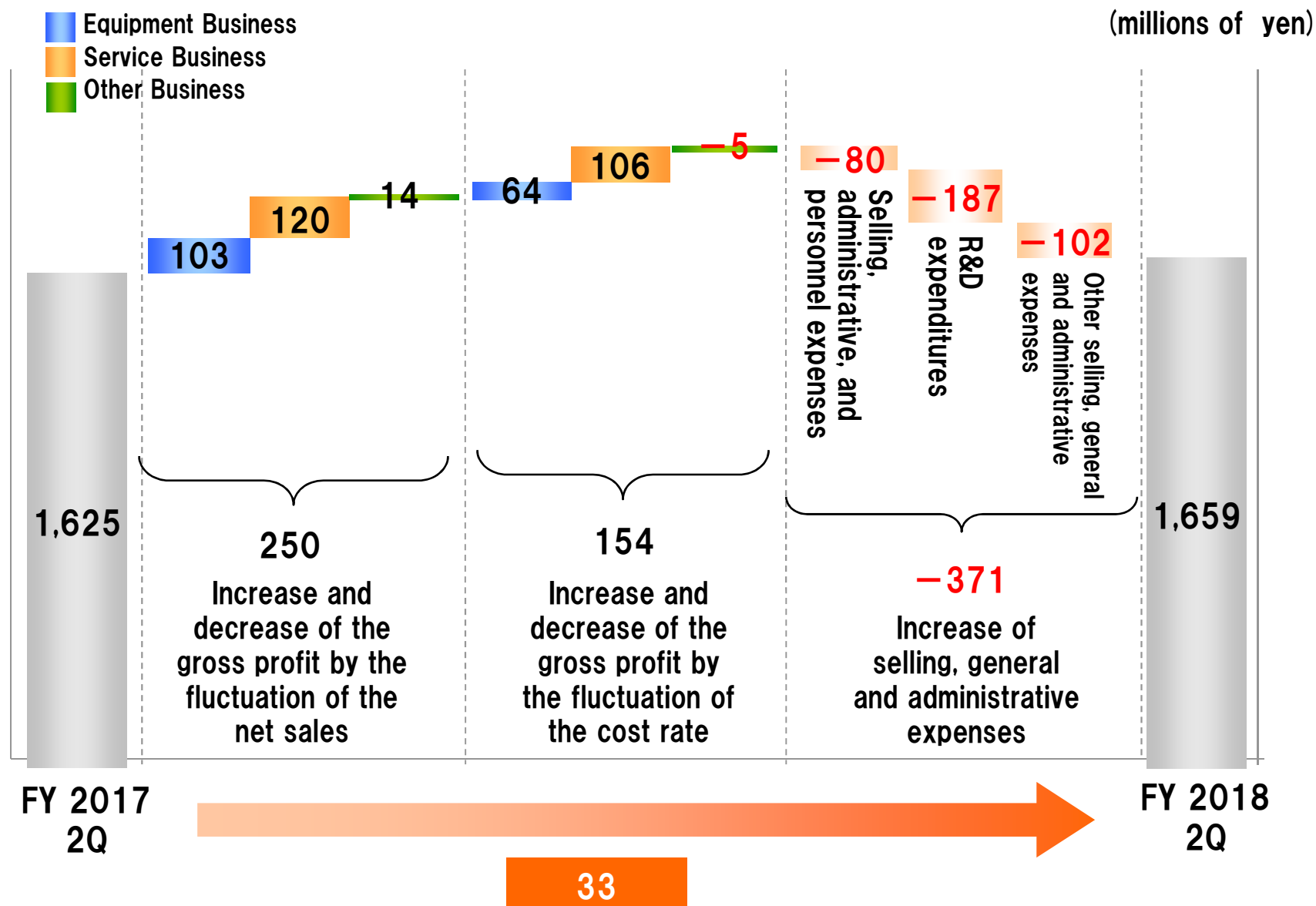
	FY 2017 2Q	FY 2018 2Q (Initial plan)	FY 2018 2Q	Year on Year	Initial plan ratio
Orders-Received	22,850	23,000	24,681	8.0%	7.3%
Net sales	18,396	20,500	19,092	3.8%	-6.9%
Cost of Net Sales (Cost of sales ratio)	11,770 (64.0%)	13,260 (64.7%)	12,062 (63.2%)	2.5%	-9.0%
Gross profit	6,625	7,240	7,030	6.1%	-2.9%
SG & A	4,999	5,440	5,371	7.4%	-1.3%
Operating income	1,625	1,800	1,659	2.1%	-7.8%
Ordinary income	1,691	1,850	1,732	2.4%	-6.4%
Profit attributable to owners of parent	1,165	1,300	1,270	9.0%	-2.2%

# Performance by Segment

(millions of yen)

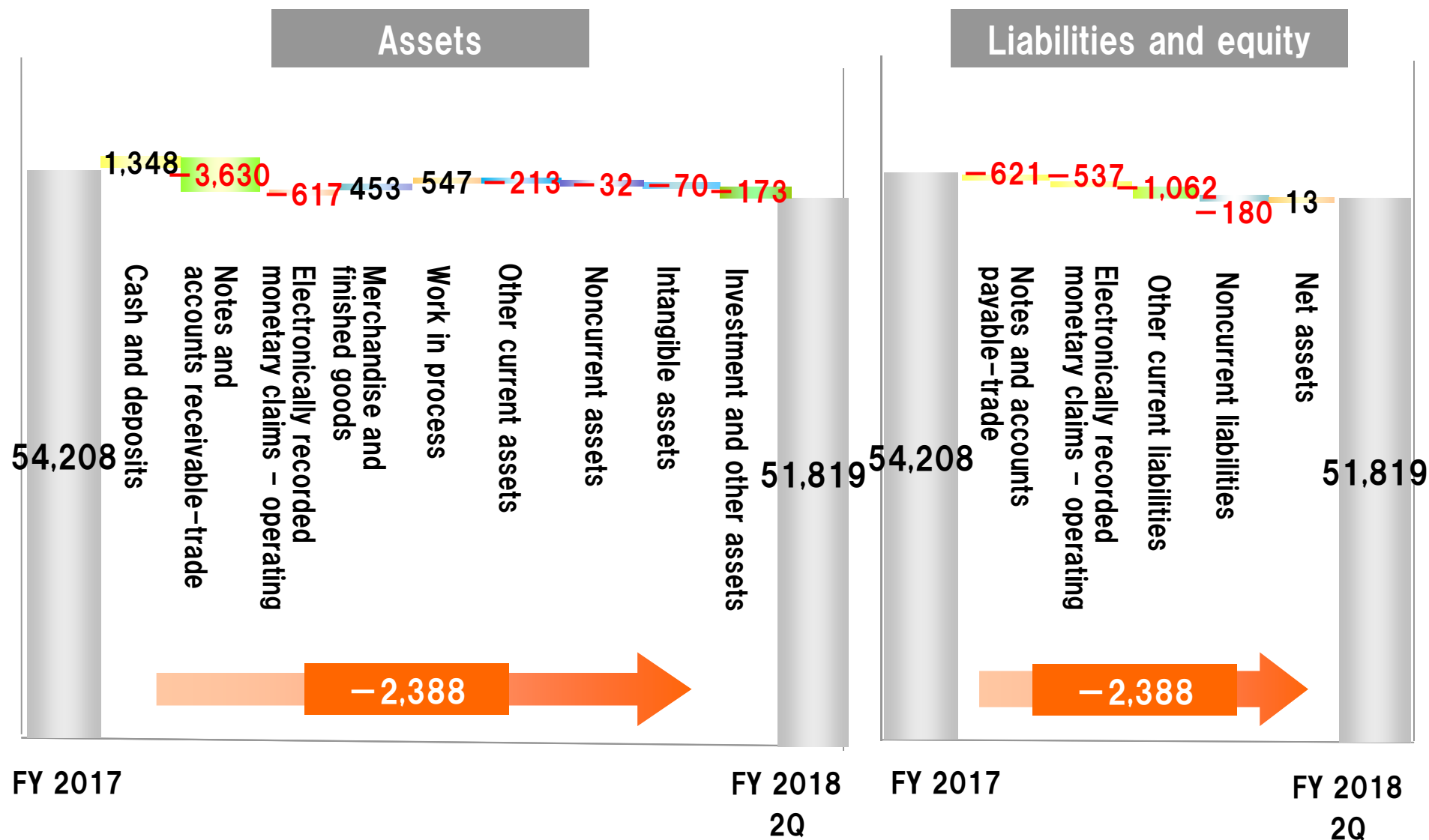
Segment		FY 2017 2Q	FY 2018 2Q (Initial plan)	FY 2018 2Q	Year on Year	Initial plan ratio
Equipment Business	Orders-Received	19,230	19,400	20,874	8.5%	7.6%
	Net Sales	15,355	17,200	15,639	1.9%	-9.1%
	Operating Income	1,621	1,700	1,457	-10.1%	-14.3%
Service Business	Orders-Received	3,061	3,100	3,238	5.8%	4.5%
	Net Sales	2,702	2,900	3,059	13.1%	5.4%
	Operating Income	87	150	284	225.3%	89.3%
Other Business	Orders-Received	674	600	679	0.7%	13.2%
	Net Sales	439	500	499	13.7%	-0.2%
	Operating Income	-82	-50	-83	—	—
Elimination	Orders-Received	-115	-100	-110	—	—
	Net Sales	-100	-100	-102	—	—
	Operating Income	-0	—	0	—	—
Total	Orders-Received	22,850	23,000	24,681	8.0%	7.3%
	Net Sales	18,396	20,500	19,092	3.8%	-6.9%
	Operating Income	1,625	1,800	1,659	2.1%	-7.8%

# Analysis of Operating Income Increase and Decrease Factor



# Statement of Assets and Liabilities

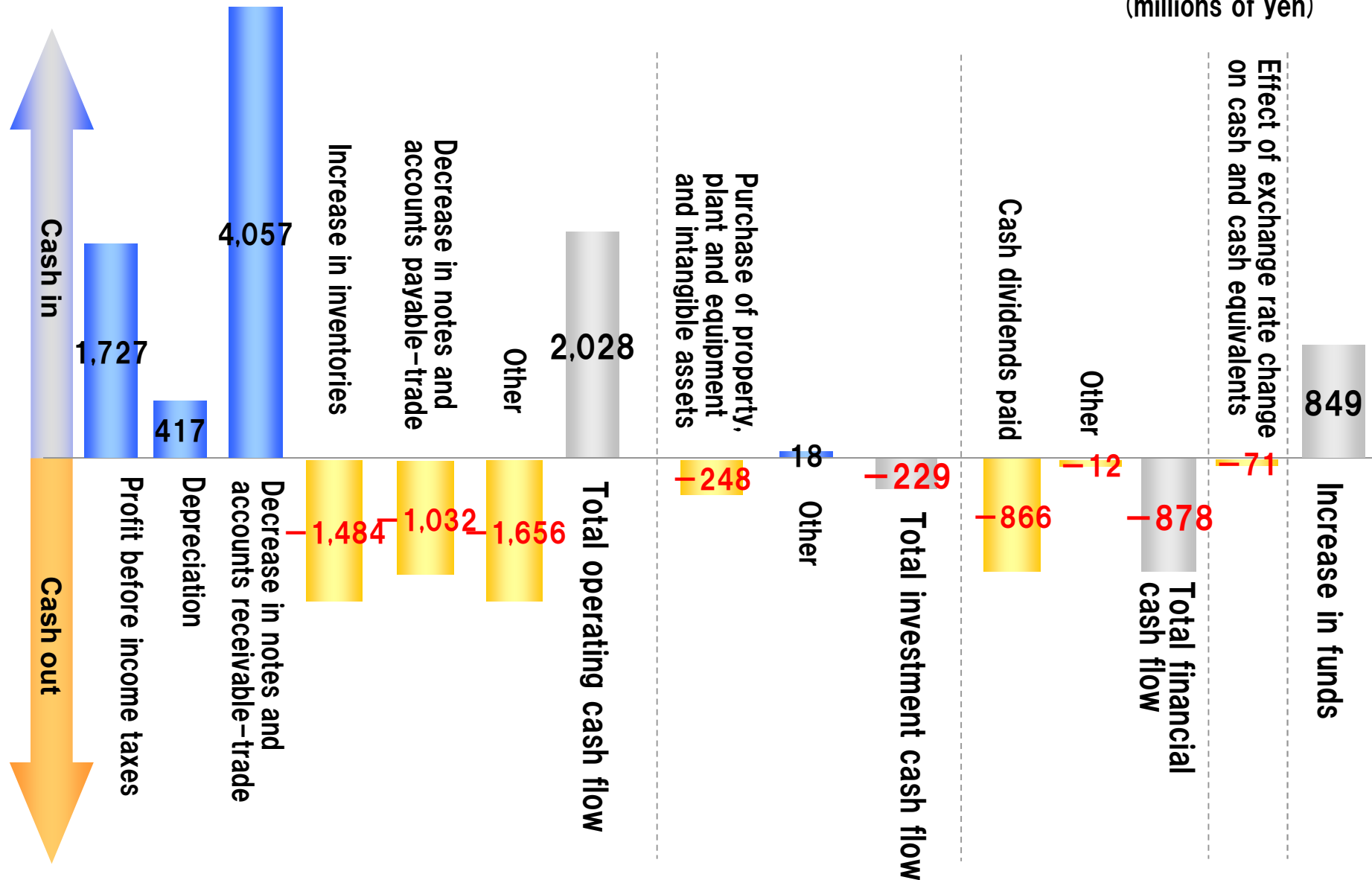
(millions of yen)





# Statement of Cash Flow

(millions of yen)



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# **Analysis per Segment for the Second Quarter of Fiscal Ending March 31, 2019**

# Equipment Business

## Environmental Test Chambers

- Both orders-received and net sales increased year on year

Orders-received exceeded the previous year, especially because of an increase in the customized products in Japan and overseas

Net sales exceeded the previous year, especially because of increases in standardized products and customized products in Japan and overseas

- Orders-received exceeded the initial plan

Net sales fell short of the initial plan, because orders with long delivery times increased

## Energy Device Equipment

- Orders-received increased year on year, but net sales decreased

Orders-received exceeded the previous year, because orders were favorable for evaluation systems for secondary batteries and fuel cell evaluation systems

Net sales decreased from previous year because orders with long delivery times increased

- Orders-received exceeded the initial plan, but net sales fell short because orders with long delivery times increased

## Semiconductor Equipment

- Orders-received and net sales both decreased year on year

- Orders-received and net sales both fell short of the initial plan

# Equipment Business

(millions of yen)

	FY 2017 2Q	FY 2018 2Q (Initial plan)	FY 2018 2Q	Year on Year	Initial plan ratio
Orders-Received	19, 230	19, 400	20, 874	8. 5%	7. 6%
Net Sales	15, 355	17, 200	15, 639	1. 9%	-9. 1%
Operating Income [Profit ratio (%) ]	1, 621 [10. 6%]	1, 700 [9. 9%]	1, 457 [9. 3%]	-10. 1%	-14. 3%

# Service Business

(millions of yen)

	FY 2017 2Q	FY 2018 2Q (Initial plan)	FY 2018 2Q	Year on Year	Initial plan ratio
Orders-Received	3,061	3,100	3,238	5.8%	4.5%
Net Sales	2,702	2,900	3,056	13.1%	5.4%
Operating Income [Profit ratio (%) ]	87 [3.2%]	150 [5.2%]	284 [9.3%]	225.3%	89.3%

## After-sales Service and Engineering

- Orders-received increased year on year, and net sales increased slightly year on year
- Orders-received exceeded the initial plan, and net sales were about the same as the plans

## Commissioned Tests and Facility Rentals

- Orders-received were mostly unchanged year on year and net sales increased
- Orders-received were about the same as the initial plan and net sales exceeded the initial plan
- Test consulting performed strongly, especially in the automobile markets, such as the Battery Safety Certification Center

# Other Business

(millions of yen)

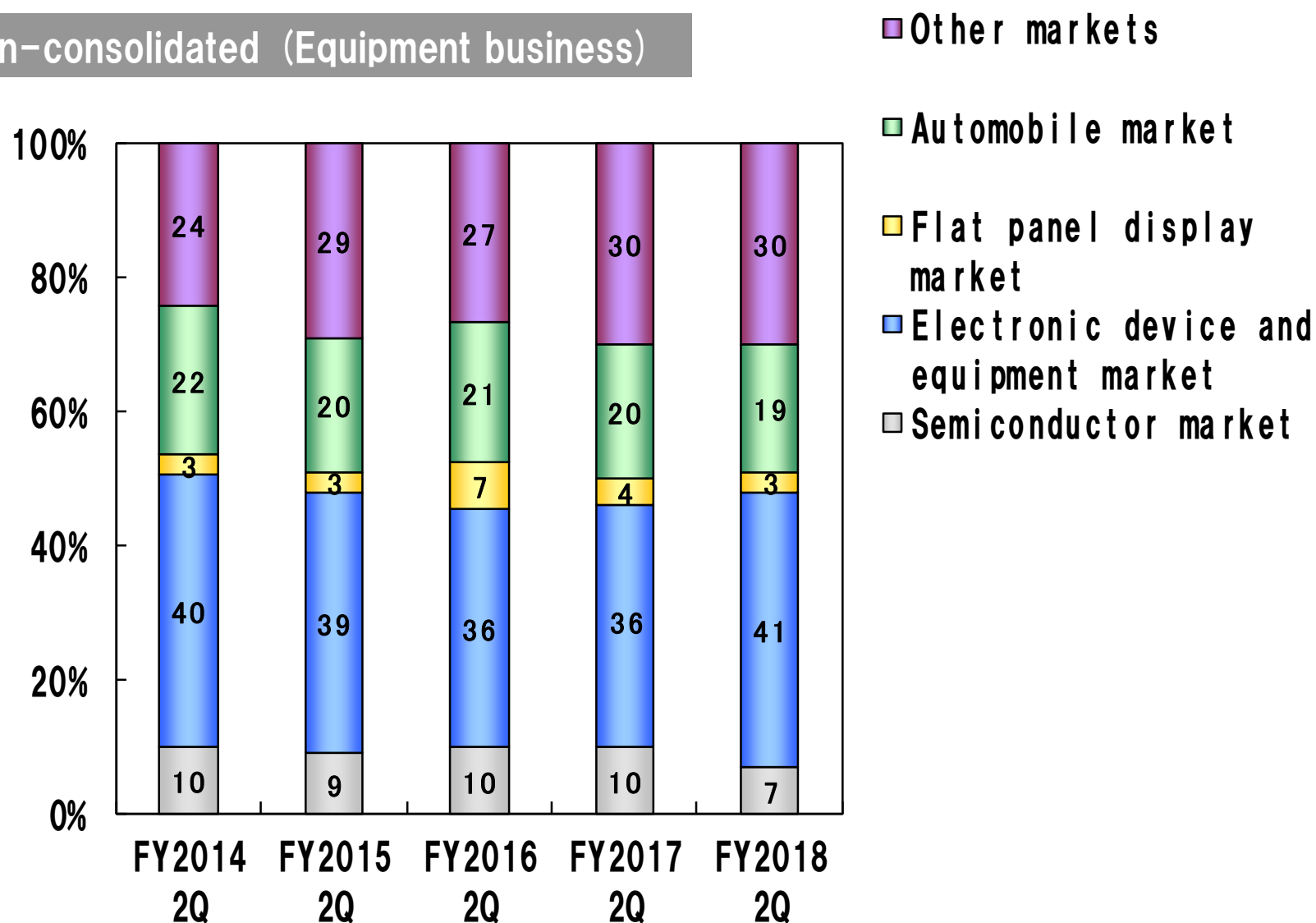
	FY 2017 2Q	FY 2018 2Q (Initial plan)	FY 2018 2Q	Year on Year	Initial plan ratio
Orders-Received	674	600	679	0.7%	13.2%
Net Sales	439	500	499	13.7%	-0.2%
Operating Income [Profit ratio (%) ]	-82 [-18.7%]	-50 [-10.0%]	-83 [-16.7%]	—	—

## The Forest Wetland and Greening Business, Plant Production Systems

- Although orders-received were mostly unchanged year on year, net sales increased
- An operating loss was incurred due to a worsening cost ratio and higher SG&A expenses

# Breakdown of Sales by Market

Non-consolidated (Equipment business)

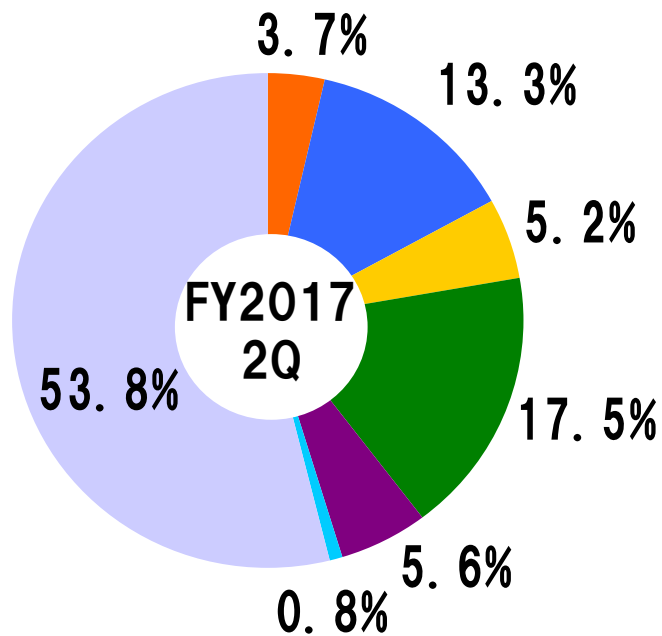




# Sales by Region

FY 2017 2Q

Overseas sales ratio: 46.2%

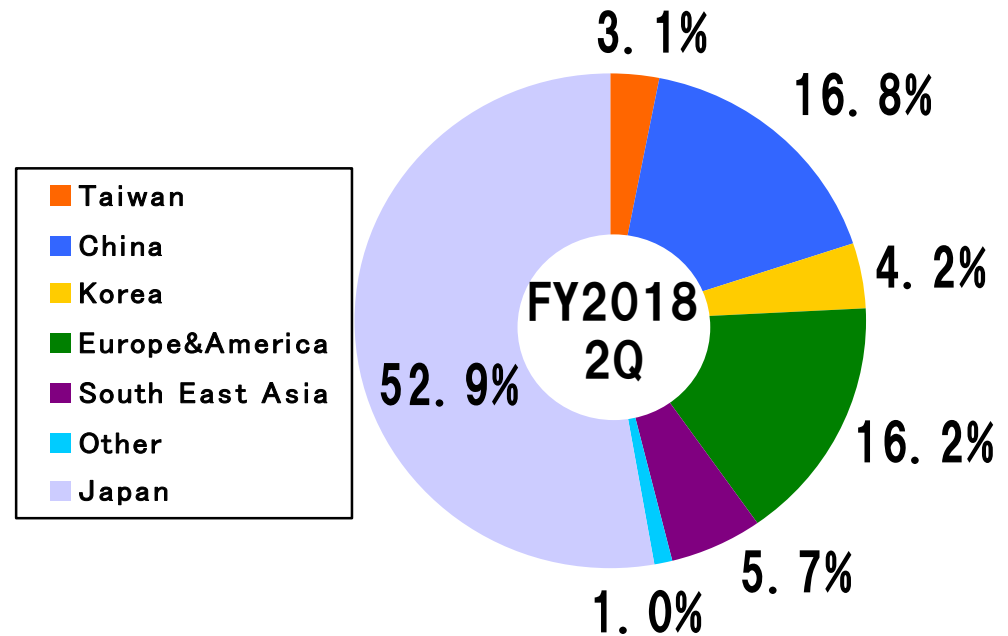


Total: 18,396 million yen

(Overseas sales: 8,491 million yen)

FY 2018 2Q

Overseas sales ratio: 47.1%



Total: 19,092 million yen

(Overseas sales: 8,983 million yen)

# Main Initiatives of The First Half of Fiscal 2018

## Increased domestic production capacity

1. Newly built a production area of temperature (& humidity) chambers, and increased production capacity by 1.6 times
2. Newly built a production area for customized products
3. Transferred production to production subsidiary



Kobe R&D Center



New production area



Drive-in Chamber for Vehicle Testing

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# **Business Plan for the Fiscal Ending March 31, 2019**

# FY 2018 Second half Awareness of the Environment

Equipment Business	Environmental Test Chambers	◎	Strong investment sentiment in the automobile market, both in Japan and overseas based on ongoing computerization, use of electronic components and development of automated driving.
		◎	Investments continued to be made in the IoT market in Japan and overseas, amid continuing technological innovation.
	Energy Device Equipment	○	Active investment in automotive rechargeable batteries, particularly in China
	Semiconductor Equipment	△	The semiconductor related market slowed down
Service Business	After-sales Service and Engineering , Commissioned Tests and Facility Rentals	○	After-sales service and engineering field is solid Favorable demand for commissioned tests centered on the automobile market
Other Business	The forest wetland and greening Business, Plant Production Systems	△	No significant changes in the Forest Wetland and Greening Business and Plant Production Systems

# Making All Overseas Subsidiaries Share the Same Fiscal Year-End

From fiscal 2018, the fiscal years of overseas consolidated subsidiaries (previously December) will be made the same as the fiscal years for consolidated subsidiaries in Japan (March). To accommodate this change, the overseas consolidated subsidiaries will record a 15-month period of financial results for fiscal 2018.

## ■Period for fiscal 2018 financial results

- Consolidated subsidiaries in Japan\*1: April 2018 to March 2019 (12 months)
- Overseas consolidated subsidiaries\*2: January 2018 to March 2019 (15 months)

FY2017 (Ended March 2018)	January~March 2017	April~June 2017	July~September 2017	October~December 2017	January~March 2018
		Consolidated subsidiaries in Japan			
	Overseas consolidated subsidiaries				
FY2018 (Ended March 2019)	January~March 2018	April~June 2018	July~September 2018	October~December 2018	January~March 2019
		Consolidated subsidiaries in Japan			
		First Half		Second half	
		Overseas consolidated subsidiaries			
	First Half		Second half		
FY2019 (Ended March 2020)	January~March 2019	April~June 2019	July~September 2019	October~December 2019	January~March 2020
		Consolidated subsidiaries in Japan			
		Overseas consolidated subsidiaries			

※1 ESPEC CORP.,ESPEC TEST SYSTEM CORP.,ESPEC KYUSHU CORP.,ESPEC MIC CORP.

※2 ESPEC NORTH AMERICA, INC.,SHANGHAI ESPEC ENVIRONMENTAL EQUIPMENT CORP.,ESPEC ENVIRONMENTAL EQUIPMENT (SHANGHAI) CO., LTD., ESPEC TEST EQUIPMENT (GUANGDONG) CO., LTD.,ESPEC TEST TECHNOLOGY (SHANGHAI) CO., LTD.,ESPEC (CHINA)LIMITED,ESPEC KOREA CORP.

# FY 2018 Assumed exchange rate

## ■ Assumed exchange rate

	FY 2016	FY 2017		FY 2018	
	Results	First half Results	Results	First half Results	Assumed
US\$(yen)	108.81	112.34	112.17	108.68	110.00

## Reference. FY 2018 Exchange rate sensitivity

(for every appreciation of ¥1 against the U.S. dollar)

Net Sales                      A decrease of ¥131 million

Operating Income            A decrease of ¥22 million

# Business Plan for the Fiscal Ending March 31,2019

(millions of yen)

	FY2017	FY2018					
	Results	First half (Results)	Plan		Reference: Plan for 12-month financial results period for overseas consolidated subsidiaries		
			Second half (Revised)	Full Year	Second half (Revised)	Full Year	Full Year (Initial Plan)
Orders-received	44, 775	24, 681	23, 819	48, 500	21, 319	46, 000	2. 7%
Net sales	44, 069	19, 092	28, 908	48, 000	26, 408	45, 500	3. 2%
Gross profit [Profit ratio (%) ]	15, 581 [35. 4%]	7, 030 [36. 8%]	9, 700 [33. 6%]	16, 730 [34. 9%]	8, 910 [33. 7%]	15, 940 [35. 0%]	2. 3%
Operating income (loss) [Profit ratio (%) ]	4, 602 [10. 4%]	1, 659 [8. 7%]	3, 141 [10. 9%]	4, 800 [10. 0%]	3, 041 [11. 5%]	4, 700 [10. 3%]	2. 1%
Ordinary income (loss) [Profit ratio (%) ]	4, 746 [10. 8%]	1, 732 [9. 1%]	3, 168 [11. 0%]	4, 900 [10. 2%]	3, 068 [11. 6%]	4, 800 [10. 5%]	1. 1%
Profit attributable to owners of parent [Profit ratio (%) ]	3, 308 [7. 5%]	1, 270 [6. 7%]	2, 280 [7. 9%]	3, 550 [7. 4%]	2, 230 [8. 4%]	3, 500 [7. 7%]	5. 8%
Capital expenditures	748	429	1, 291	1, 720	1, 261	1, 690	125. 8%
Depreciation expenses	811	413	552	965	492	905	11. 5%
R&D expenditures	1, 023	624	546	1, 170	536	1, 160	13. 3%
Profit Per Share (yen)	144. 76	55. 60	99. 71	155. 31	97. 52	153. 12	5. 7%



# Equipment Business

(millions of yen)

	FY 2017	FY 2018					
	Results	First half (Results)	Plan		Reference: Plan for 12-month financial results period for overseas consolidated subsidiaries		
			Second half (Revised)	Full Year	Second half (Revised)	Full Year	Full Year (Initial Plan)
Orders- received	37, 076	20, 874	19, 776	40, 650	17, 326	38, 200	3. 0%
Net sales	36, 602	15, 639	24, 611	40, 250	22, 161	37, 800	3. 3%
Operating income [Profit ratio (%) ]	4, 092 [11. 2%]	1, 457 [9. 3%]	2, 793 [11. 3%]	4, 250 [10. 6%]	2, 693 [12. 1%]	4, 150 [11. 0%]	1. 4%

# Service Business

(millions of yen)

	FY 2017	FY 2018					
	Results	First half (Results)	Plan		Reference: Plan for 12-month financial results period for overseas consolidated subsidiaries		
			Second half (Revised)	Full Year	Second half (Revised)	Full Year	Full Year (Initial Plan)
Orders- received	6, 488	3, 238	3, 412	6, 650	3, 362	6, 600	1. 7%
Net sales	6, 292	3, 056	3, 494	6, 550	3, 444	6, 500	3. 3%
Operating income [Profit ratio (%) ]	524 [8. 3%]	284 [9. 3%]	266 [7. 6%]	550 [8. 4%]	266 [7. 6%]	550 [8. 5%]	5. 0%

# Other Business

(millions of yen)

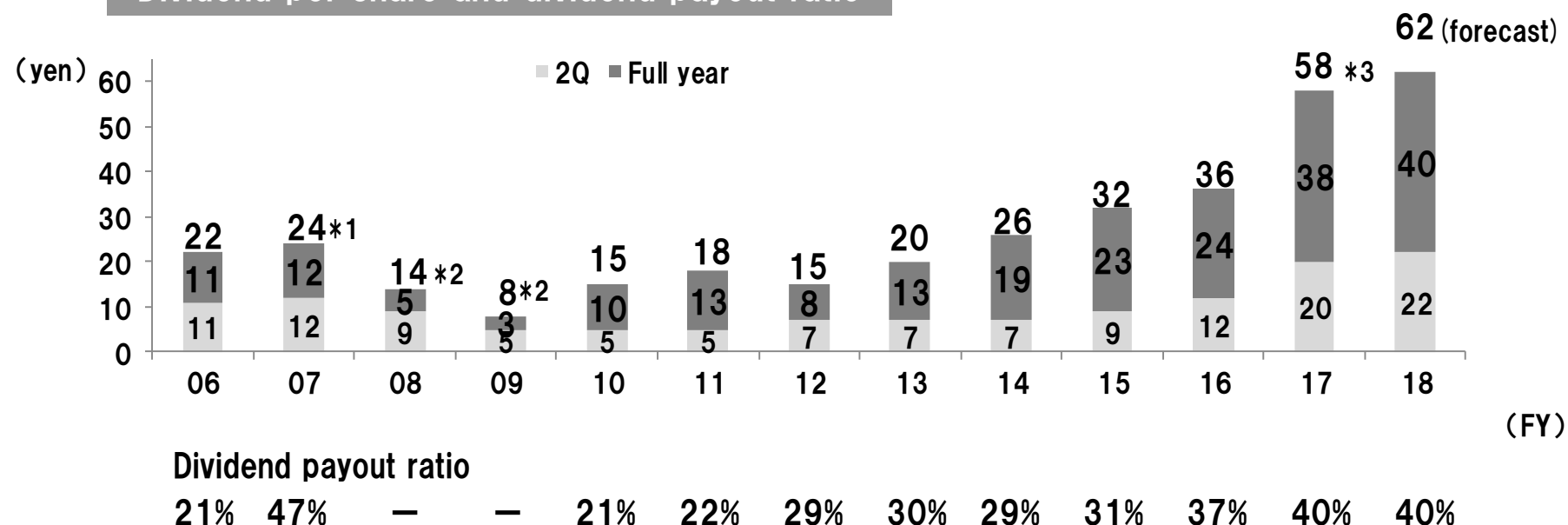
	FY 2017	FY 2018					
	Results	First half (Results)	Plan		Reference: Plan for 12-month financial results period for overseas consolidated subsidiaries		
			Second half (Revised)	Full Year	Second half (Revised)	Full Year	Full Year (Initial Plan)
Orders-received	1,416	679	721	1,400	721	1,400	-1.1%
Net sales	1,375	499	901	1,400	901	1,400	1.8%
Operating income [Profit ratio (%) ]	-15 [-1.1%]	-83 [-16.7%]	83 [9.2%]	0 [0.0%]	83 [9.2%]	0 [0.0%]	—

# Dividends

## Dividend policy

Recognizing that passing on profits to our shareholders is a key priority and that raising corporate value on a lasting basis is fundamental to raising shareholder value, dividends are decided taking into account sustainability and the dividend payout ratio.

## Dividend per share and dividend payout ratio



\*1.The dividend per share for FY2007 included a commemorative dividend of ¥2 per share to mark the Company's 60<sup>th</sup> founding anniversary.

\*2.Dividends were implemented in FY2008 and FY2009, despite posting a net loss.

\*3.The dividend per share for FY2017 includes a commemorative dividend of ¥2 per share to mark the Company's 70<sup>th</sup> founding anniversary (an interim dividend of ¥1 per share and a year-end dividend of ¥1 per share).

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Quality is more than a word

ESPEC

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**These materials contain forward-looking statements, including the Company's present plans and forecasts of performance, that reflect the Company's plans and forecasts based on the information presently available. These forward-looking statements are not guarantees of future performance, and plans, forecasts, and performance are subject to change depending on future conditions and various other factors.**

**INQUIRIES:**

**ESPEC CORP.**

**3-5-6, Tenjinbashi, Kita-ku, Osaka 530-8550, Japan**

**E-mail: [ir-div@espec.jp](mailto:ir-div@espec.jp)**

**Jyunko Nishitani (General Manager) ,**

**Ryosuke Watanabe and Yasutoshi Nakagawa**

**Corporate Communication Department**

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# Reference



# History of Environmental Test

## What is Environmental Test

Test to analyze and evaluate effects of environmental factors such as temperature, humidity, pressure, and light on various industrial products like electronic components in order to ensure product quality.

<1950s>

The environmental test was JIS-standardized in Japan for consumer products.



<1970s-1990s>

“Reliability” and “quality control” became important issues in product development. Demand increased dramatically due to a rapid shift toward computerization and the use of electronic components.



<Today>

Demand is expanding in the energy field, and the development field of automobiles' electrification and automated driving functions.



1961 Japan's First Environmental Test Chamber



【 Low temperature & humidity chamber "Lucifer" 】



Over 60% domestic

Over 30% worldwide

To Worldwide Market Share No.1

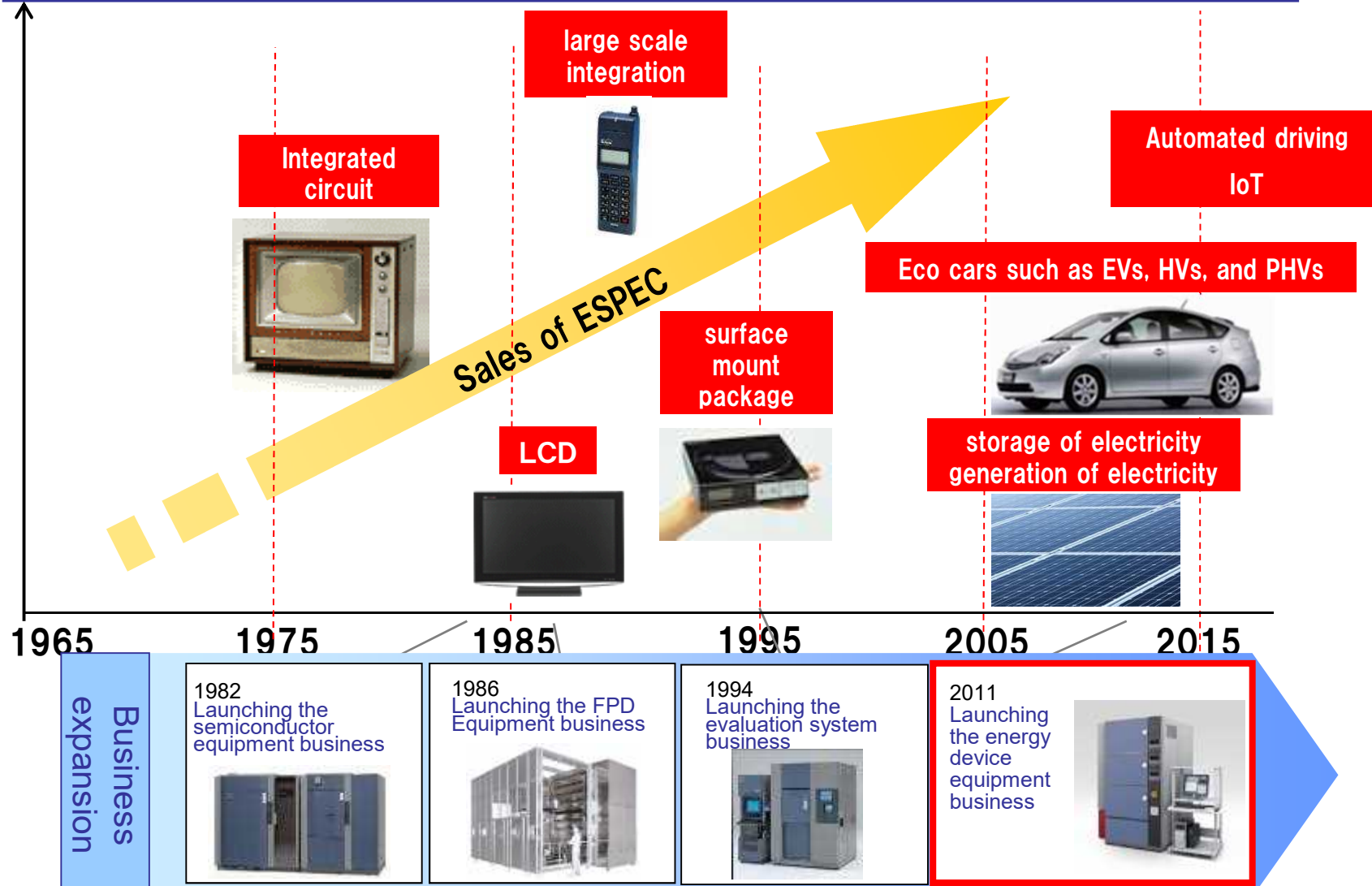


【 Temperature & Humidity Chamber 】

"Platinous J series"

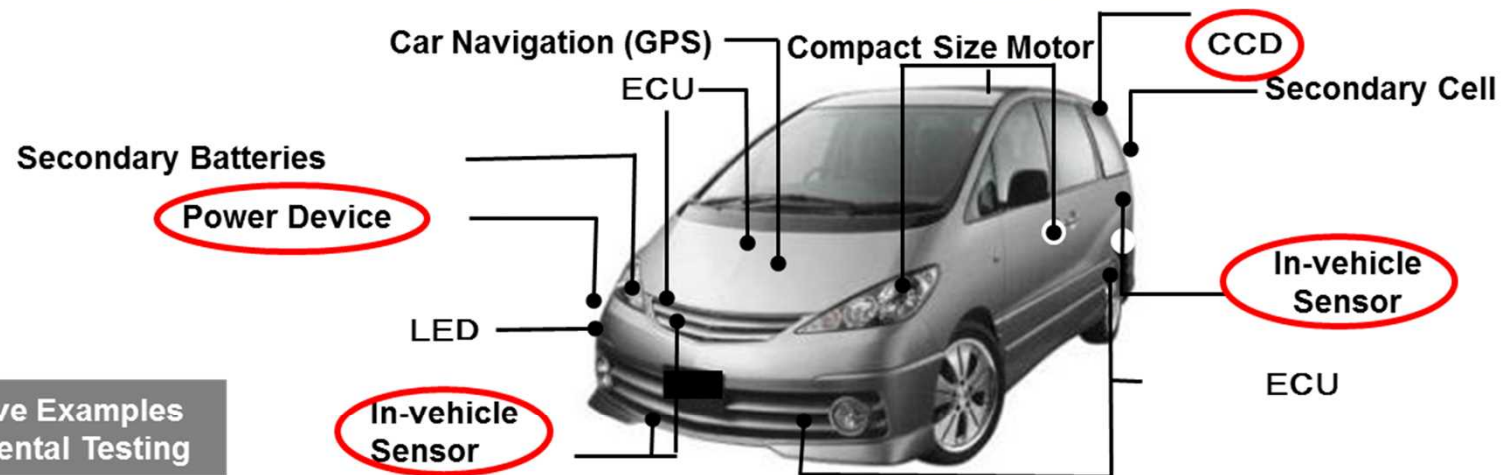
# Transition in Business

Expanding business based on the “environmental creation technology” refined during the course of developing environmental test chambers






# [Equipment Business]

## Usage Case with Environmental Test Chambers



Representative Examples  
for Environmental Testing

Device	Process/Test Condition		Our Products
<b>【Power Device】</b> 	Inspection	■ Thermal shock test: $-40^{\circ}\text{C} \rightleftharpoons +125^{\circ}\text{C}$	Thermal shock chamber
		■ High temperature exposure: $+175^{\circ}\text{C}$ , $+85^{\circ}\text{C}$	(Compact size) Oven
		■ Burn-in test	Burn-in chamber
<b>【In-vehicle Sensor】</b> 	Inspection	■ Temperature cycle test of printed circuit board: $-40^{\circ}\text{C} \rightleftharpoons +110^{\circ}\text{C}$	Temperature & humidity chamber (Platinous) / Oven
		■ Temperature characteristic test after soldering: Linear change between $-30^{\circ}\text{C}$ and $+85^{\circ}\text{C}$	Burn-in chamber, Rapid-rate thermal cycle chamber
	Evaluation	■ Thermal shock test: $-30^{\circ}\text{C} \rightleftharpoons \text{RT} \rightleftharpoons +80^{\circ}\text{C}$ , $-55^{\circ}\text{C} \rightleftharpoons +155^{\circ}\text{C}$	Thermal shock chamber
<b>【CCD/CMOS】</b> 	Production	■ Diffusion Test: $+150^{\circ}\text{C}$	Compact size Oven
		■ Drying after cleaning: $+85^{\circ}\text{C}$	Clean Oven
	Evaluation	■ Screening: $+85^{\circ}\text{C}$	Temperature chamber (Platinous) / Burn-in chamber
	Inspection	■ Temperature and humidity test: $+85^{\circ}\text{C} / +85\%\text{rh}$ , $+60^{\circ}\text{C} / 90\%\text{rh}$	Temperature & humidity chamber (Platinous)
		■ Acceleration test: $+120^{\circ}\text{C} / 100\%\text{rh}$	HAST chamber
		■ Thermal shock test: $-40^{\circ}\text{C} \rightleftharpoons +125^{\circ}\text{C}$ , $-20^{\circ}\text{C} \rightleftharpoons +85^{\circ}\text{C}$	Thermal shock chamber

# [Equipment Business] Main New Products

Release Date	Name of product	Features
Oct. 2018	Environmental Stress Chamber AR series Rapid-Rate Temperature Cycle Type (5K/min)	<ul style="list-style-type: none"> <li>•Conforms to IEC standards and a German automobile industry standard</li> <li>•Uses European F-gas Regulation-compliant low-GWP refrigerant R-449A</li> </ul>
Mar.2018	Environmental Stress Chamber AR Series Rapid-Rate Temperature Cycle Type	<ul style="list-style-type: none"> <li>•Second F-gas Regulation-compliant low-GWP refrigerant (R449) environmental testing chamber</li> </ul>
Feb.2018	Environmental Stress Chamber AR Series Standard Type	<ul style="list-style-type: none"> <li>•Added four models with new 220 L and 390 L chambers (with and without humidity control) , bringing the total lineup to 12 models</li> </ul>
Dec.2017	Faster Temperature (&Humidity) Chamber SM Series	<ul style="list-style-type: none"> <li>•Achieved temperature change of 5°C/min with 1,800 L capacity</li> <li>•Made networking functions a standard feature</li> </ul>
Nov.2017	Highly Accelerated Stress Test System (HAST)	<ul style="list-style-type: none"> <li>•Added a new controller for improved operability and visibility</li> <li>•Added new functions using networks</li> </ul>
Jul.2017	Thermal Shock Chamber TSA series	<ul style="list-style-type: none"> <li>•the first chambers in Japan to be compliant with European F-gas Regulation</li> </ul>
Nov.2016	High-Power Temperature & Humidity Chamber AR Series Rapid temperature change type	<ul style="list-style-type: none"> <li>•Compatible with IEC standards and automobile-related standards</li> <li>•Achieves rapid temperature change rate of up to 18°C/min</li> </ul>
Jun.2016	IPX9K-compatible testing equipment (High-pressure steam cleaning injection)	<ul style="list-style-type: none"> <li>•Evaluates the impact of high-pressure steam on electronic devices during cleaning of automobiles; meets ISO standards</li> </ul>
Jun.2016	Siloxane endurance testing equipment	<ul style="list-style-type: none"> <li>•Evaluates the impact on electronic devices of siloxane contained in resins and other materials, mainly in automobiles</li> </ul>



# [Equipment Business] TOPICS: Examples of Products Delivered

(Delivered in July 2018)

## ■ Delivery examples of temperature (& humidity) chambers, test chambers for use for building materials

### Uses

Reproduce the environment inside apartments (temperature and humidity) and outdoors (weather such as rain, snow, and solar radiation), conduct performance evaluations and durability tests of building materials for sash, balcony, etc.



temperature (& humidity) chambers, test chambers for use for building materials



Temperature (& humidity) chambers are movable so that building materials for testing can be easily changed



Furnished with irradiation equipment and watering (rain) equipment, to reproduce an outdoor weather environment

# [Equipment Business] TOPICS: Examples of Products Delivered

(Delivered in March 2016)

## ■ Smart System Research Facility, Fukushima Renewable Energy Institute, AIST (Koriyama city, Fukushima)

Product delivered:

Large walk-in type temperature & humidity chamber

Uses:

Performance and safety evaluation for large power conditioners for solar power generation  
Supports heat generation loads of 100 kw and large weights (21 tons)



Large walk-in type temperature & humidity chamber

## ■ National Laboratory for advanced energy storage technologies (NLAB), National Institute of Technology and Evaluation (Nanko, Osaka City)

Product delivered:

1. Walk-in type temperature & humidity chamber for charge-discharge testing
2. External short-circuit testing equipment (energy devices equipment)

Uses:

1. Evaluate the performance of storage batteries by repeatedly charging and discharging them
2. Evaluate safety by confirming that storage batteries will not catch fire or rupture if they short circuit



Walk-in type temperature & humidity chamber for charge-discharge testing

# [Equipment Business]

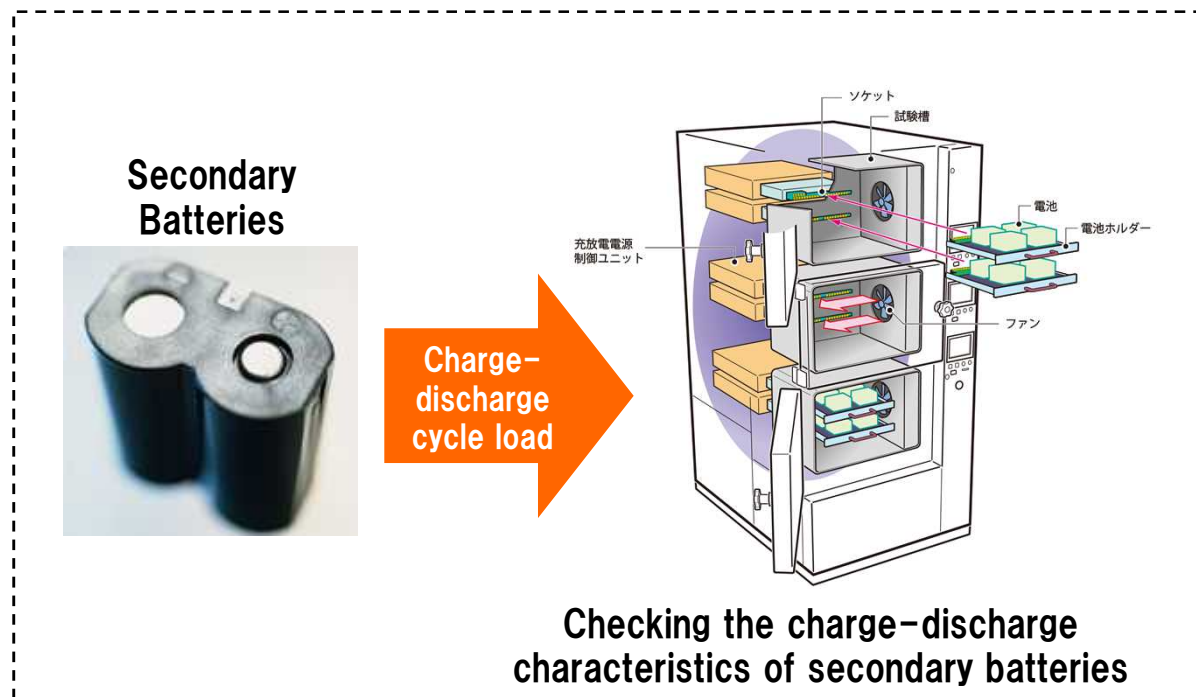
## Usage Case with Energy Device Equipment

### Charge-discharge Cycle Evaluation Equipment

Equipment for ensuring the reliability and safety of lithium-ion secondary batteries for next-generation vehicles (e.g., hybrid and electric vehicles)



Charge-discharge Cycle Evaluation Equipment



Evaluating the performance and life of secondary batteries

# [Equipment Business]

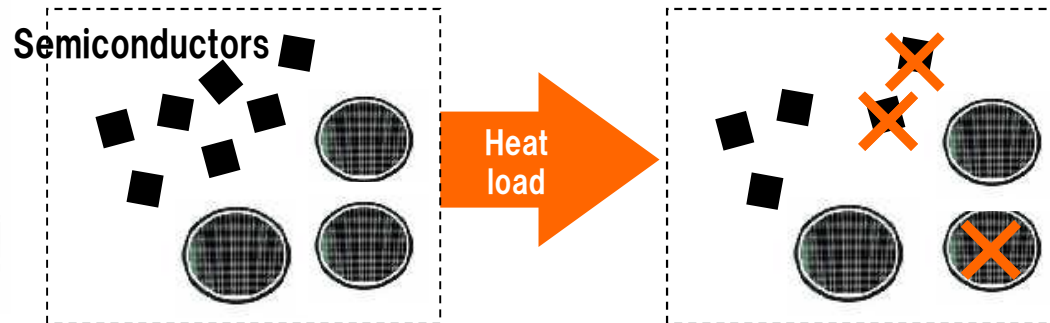
## Usage Case with Semiconductor Equipment

### Screening

Eliminate defective products to maintain initial-period quality at the final inspection stage of semiconductor device manufacturing



Burn-in chamber



Elimination of latent early failures

### Reliability Evaluation

Used to evaluate basic failure patterns to ensure reliability in the development of new technologies

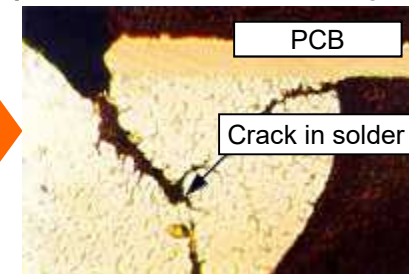


Conductor resistance evaluation system



Heat  
cycle  
load

Example of defect in soldered joint



Electrical evaluation of reliability of joints in electronic parts



# [Service Business]

## After-sales Service and Engineering

Preventive maintenance of products, maintenance service, and the upgrading/improvement and installation/relocation of products

- Speedy response via one of the most extensive networks in Japan
- Launching new services by utilizing the network function mounted in the equipment

## Commissioned Tests and Facility Rentals

Commissioning of testing, analysis, and evaluation; consulting; equipment rental; sales of used products; calibration of test equipment, etc.

- The company has five commissioned test centers in Japan, two commissioned test centers in China.  
(In Japan, 2 point of Utsunomiya, Toyota, Kariya and Kobe. In China, Shanghai, Suzhou)

- These centers are IECQ-approved independent testing laboratories that meet ISO/IEC17025 standards.
- The centers are also recognized as official calibration facilities under the Japan Calibration Service System (JCSS).
- Opened the world's first Battery Safety Certification Center.  
(in September 2015)
- Providing a one-stop service for testing and certification application services compliant with United Nations regulations on the safety of automotive rechargeable batteries.
- Entered into business alliance with TÜV SÜD Japan Ltd., a third-party certification agency  
(in October 2014)



Battery Safety Certification Center  
(in Utsunomiya Technocomplex)

# [Service Business] New Services Using Networks

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Industry's first new services using networks  
「ESPEC ONLINE SERIES」

\* Services started in November 2013

## ■ESPEC online support

Trouble notification and recovery service enabling peace of mind when using the Company's products

## ■ESPEC OnlineCore

A centralized management system enabling operators to monitor the operation status of multiple networked environmental testing chambers at a glance

## ■ESPEC OnlineConverter

A network adapter for LAN connection of non-network ready environmental testing chambers  
Enables remote monitoring and operation of networked environmental testing chambers

# [Service Business] TOPICS

**ESPEC provides commissioned tests and certification application services compliant with United Nations regulations at the world's first Battery Safety Certification Center**

Providing a one-stop service to support the implementation of 9 safety tests and applications for certification by certification agencies, as stipulated by UN ECE R100-2. Part II\*, a United Nations regulation.

(The facility was opened within the Utsunomiya Technocomplex in September 2015. )



**Battery Safety Certification Center  
(in Utsunomiya Technocomplex )**



**Crush Testing Equipment  
(No. 1 Safety Test Room)**



**No. 2 Safety Test Room**

# [Other Business]

## Environmental Engineering Business

### The forest wetland and greening Business

#### ■ Reforestation (Tree planting)

Recovery of local forest by selecting species and planting out seedlings using potential natural vegetation data.

#### ■ Waterfront biotope restoration

Reconstruction of natural environment, development of vegetative revetments, and water quality improvement using aquatic plants.

#### ■ Urban greening

Provision of roof and wall greening systems that use moss to effectively alleviate heat island effect.



### Plant Production Systems

Plant factories and research cultivation equipment for growing plants with optimally controlled variables, including light, temperature, humidity, and nutrients necessary for plant growth



Container plant factory



Phyto-toron

## [Other Business] TOPICS: Examples of Products Delivered

### ■ Arid Land Research Center, Tottori University

(Delivered in March 2016)

#### Products delivered:

Experimental System for Analyzing Responses of Dryland plants to Climate Changes (2 units)

(Simulates the climates of arid lands, including high temperature, low humidity, strong sunlight, and high winds)

#### Uses:

Plant cultivation experiments and experiments to develop efficient water-usage technologies in arid lands, research to solve issues facing arid lands



Experimental System for Analyzing Responses of Dryland plants to Climate Changes



Experiment in progress



# [Other Business] TOPICS

**Produced a high value-added vegetables using deep-seawater**

**Established in March 2016 near Haneda Airport at a plant factory\*,  
Production and sales of vegetables high in minerals  
with the use of deep sea water.**

**\* Joint research with DHC Corporation and Kyoto University**



**Interior of the plant factory and Factory-produced vegetables"mineraleaf"**

# Initiatives tackling environmental problems

## Achieved 71th place in the Nikkei Environmental Management Survey

### ● Forest preservation activity – Kehara Forest Creation Program

In March 2018, designated as an affiliated business of the Japan Committee for United Nations Decade on Biodiversity  
Since 2007, the Company's employee volunteers have increased to over 1,000 participants

### ● ESPEC Foundation for Global Environment Research and Technology (Charitable Trust)

Provides funding support every year for research, technology development on global environmental conservation.  
Established in 1997 on the 50th anniversary of ESPEC

### ● ESPEC Midori-no-gakko schools

Human resources certification, etc. based on Act on the Promotion of Environmental Conservation Activities through Environmental Education  
Seminars and events are held throughout Japan to train leaders who will think about the global environment



- Environmental Communication Award Won the Excellence Award for 2 consecutive years
- \*Sponsored by the Ministry of the Environment, and the Global Environmental Forum



# Initiatives tackling environmental problems

(March 2018)

**Designated as affiliated businesses of the Kebara Forest Creation Program:  
Creating a Mountain Full of Treasures—The Kyoto Model Forest Project, and The  
Japan Committee for the United Nations Decade on Biodiversity**

- The Kebara Forest Creation Program is a project in which ESPEC and ESPEC MIC CORP. are working with the Fukuchiyama City Oecho Kebara Residents Association regarding forest conservation activities
- ESPEC formulated Creating a Mountain Full of Treasures Project which freshly reveals the attractive treasures in the forest: The variety of living creatures which live in the Kebara Forest. ESPEC conducts conservation activities such as cutting down and thinning, produces maps showing where the living creatures are, and maintains walking courses



Participants in the Kebara Forest Creation Program



This project is designated as a project recommended by the Japan Committee for the United Nations Decade on Biodiversity (UNDB-J)



# To a company where employees can be more active

## Initiatives to promote women's success



From the Ministry of Health, Labor and Welfare:  
The Company received the "Kurumin" certification, which is granted to companies that support child-rearing. And the highest ranking of the certification mark "Eruboshi" based on the Act on Promotion of Women's Participation and Advancement in the Workplace.



The female leadership development program

## Employee Education System Enhancement

- Implement a Global Trainee Program aimed at developing human resources who are capable of working in international settings
- Enhance the education program to support management executive education and self-development
- Promote work style reforms



On-site training in the Global Trainee Program (U.S.)