

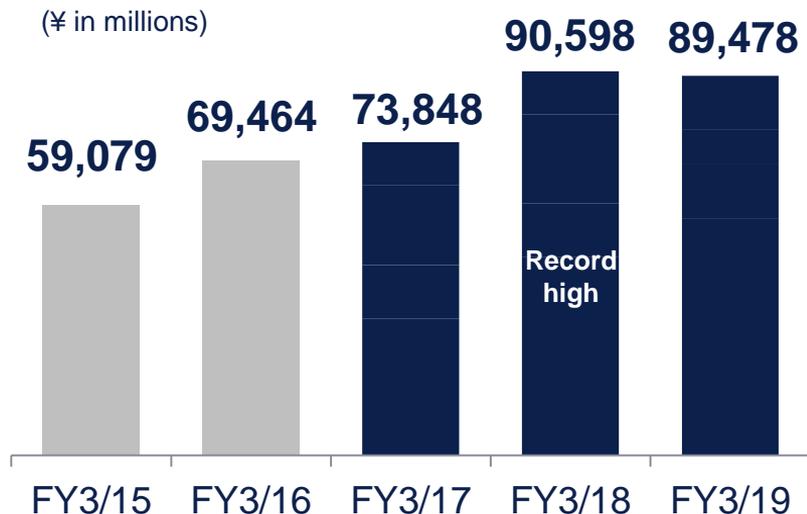


Ferrotec Holdings Corporation Medium term management plan

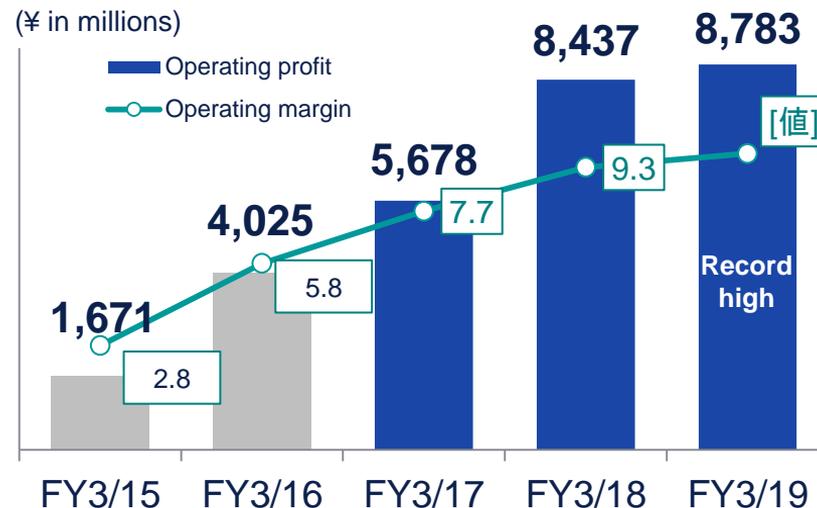
- To Be a Billion Dollar Company -
FY3/20-FY3/22

Semiconductor material-related drives growth, and sales and profits in recent years have reached record levels

Net sales

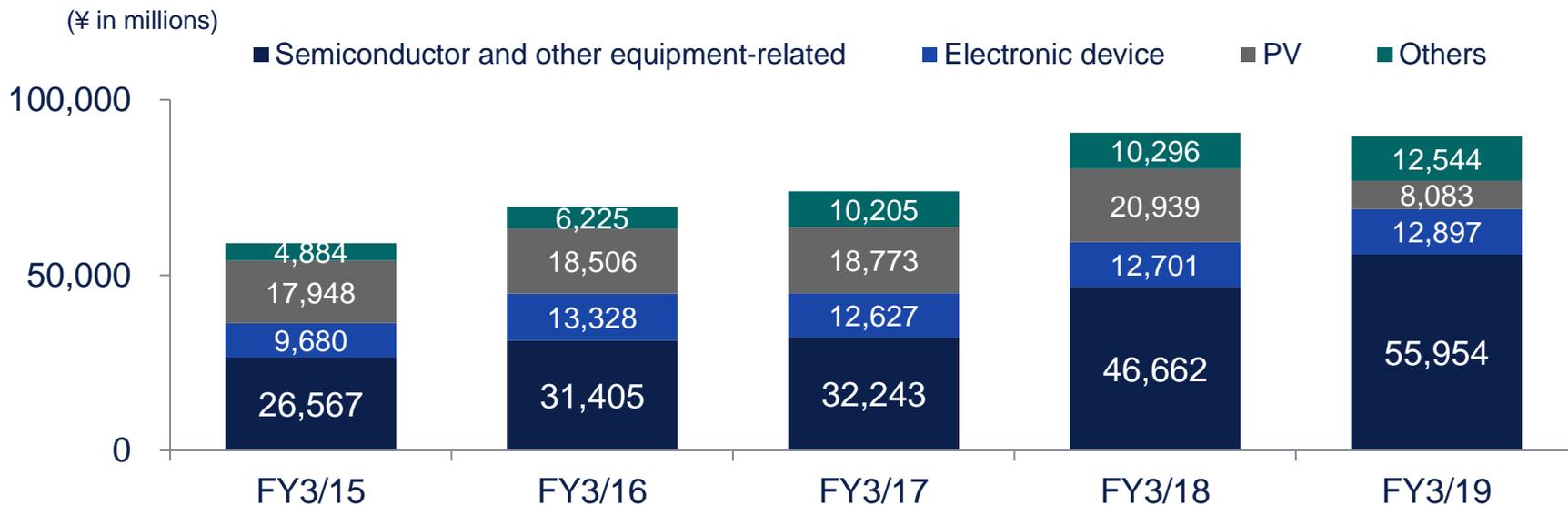


Operating income



Sales of Semiconductor and other equipment-related grew, but sales of photovoltaic-related declined due to strategic contraction.

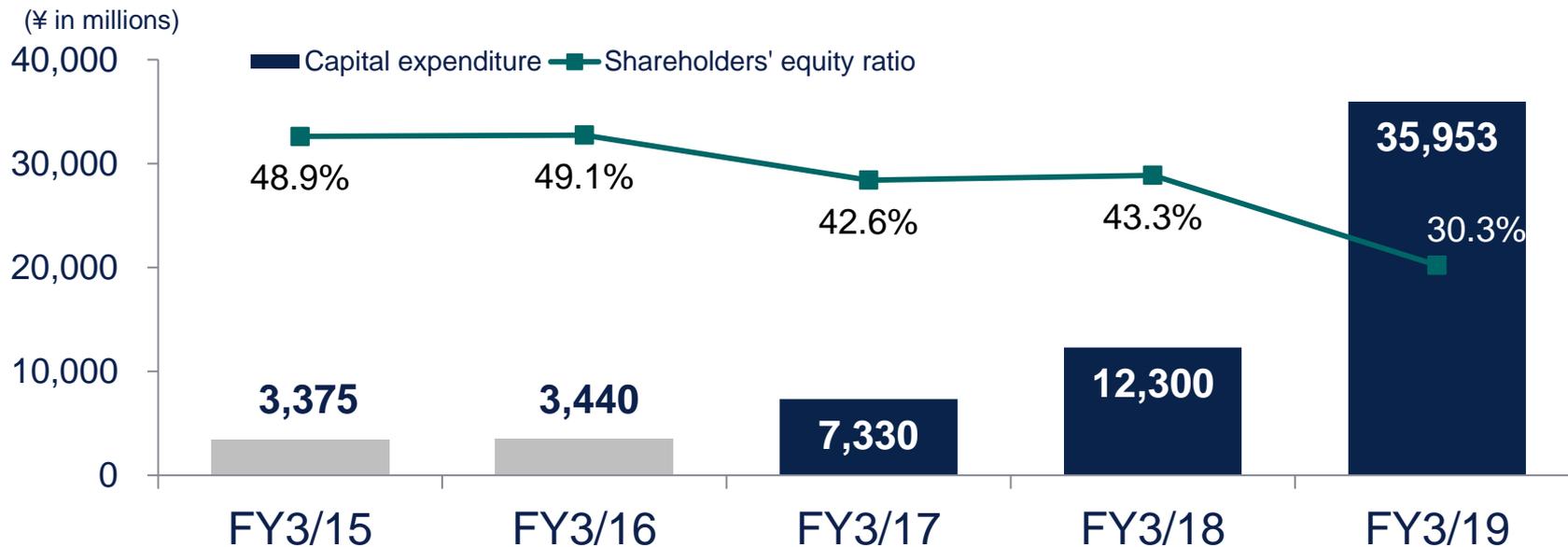
Transition of sales by segment



Note: Equipment parts cleaning falls under "Others" until FY2017 and "Semiconductor and other equipment-related" after FY2018.

Aggressive capital investments in high-growth Chinese market.

Financial condition (equity ratio) is slightly worsening due to borrowing for investment, etc.



Summary of management results for recent years

Results

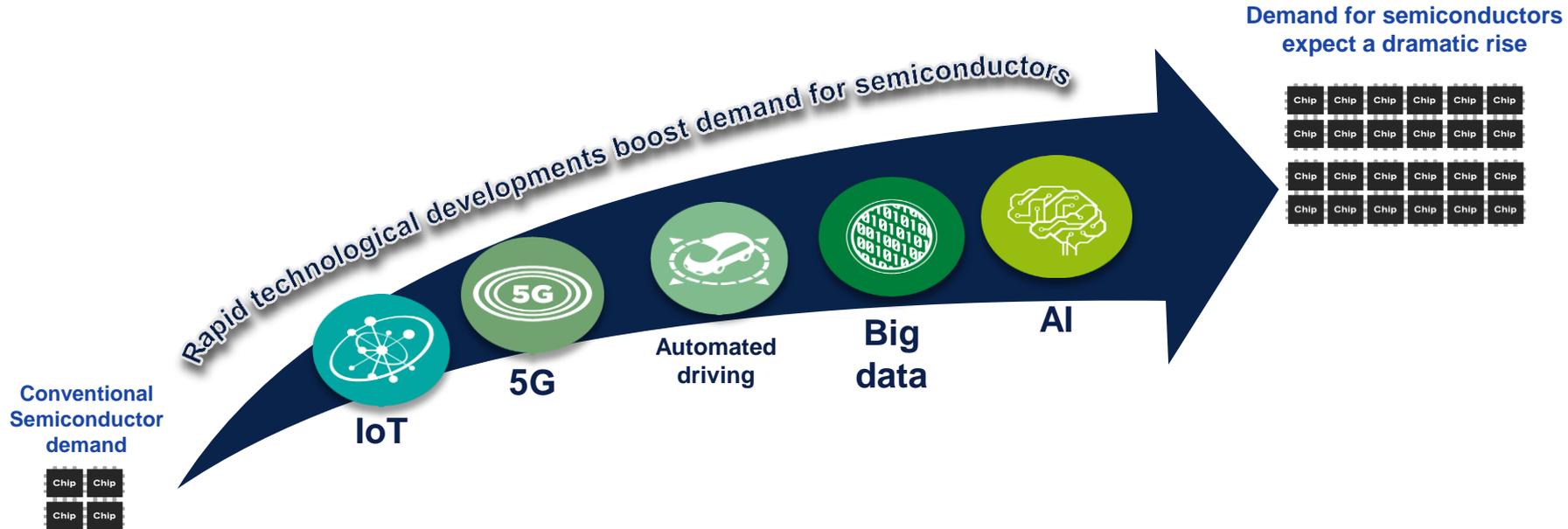
- ✓ Achieved record highs in both sales and operating income
- ✓ Steady improvement in operating margin
- ✓ Increase in production capacity and the number of customers through aggressive expansion into China

Future issues

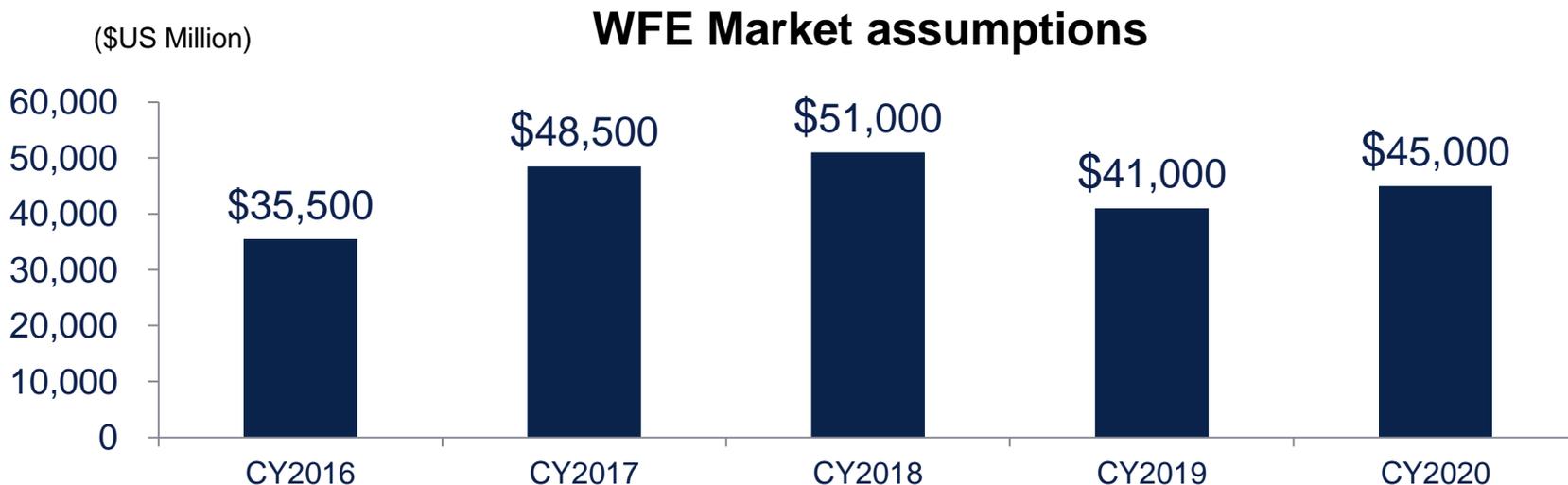
- Sales are highly correlated with the semiconductor market and are susceptible to fluctuations.
- Improve operating margin through withdrawal from the Photovoltaic business
- Financial conditions are on a slightly weak trend due to aggressive capital investments.

Technologies such as IoT, AI, automated driving, big data, etc. have evolved dramatically.

Demand for semiconductors is shifting to new era surpassing conventional needs



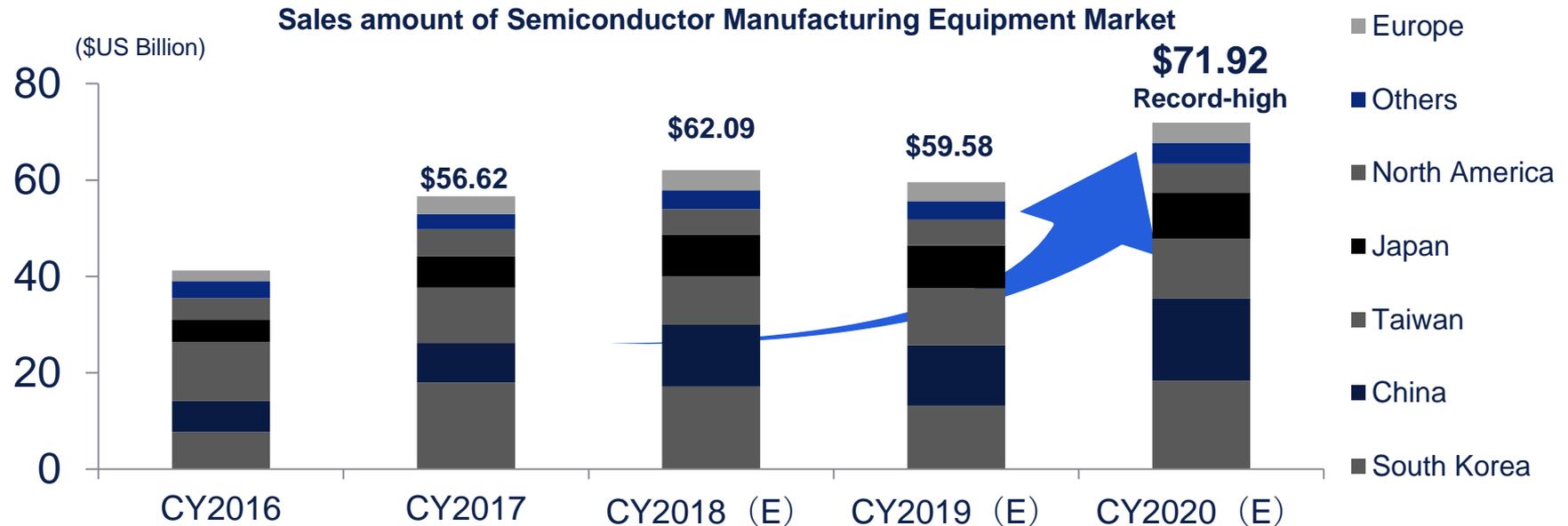
- The market for WFE (wafer front-end process) is expected to decline in 2019, but to recover toward 2020
- The same-level trend is expected from 2020 onward.
- Currently, U.S.-China relations are unclear, so we didn't take these effects into consideration.



* Based on research by securities companies

* CY = Calendar year

- Semiconductor manufacturing market is expected to decline 0.4% in 2019, but it will be risen again since the latter half of 2019, and is expected to increase by 20.7% to record-high level in 2020.
- Sales in Asia (South Korea, China, and Taiwan) boosted overall growth. Sales in China surpassed Taiwan and to become the world 's second largest customer.



KPI Summary (Target for FY3/22)

Net sales

125 billion yen

Operating income

12.5 billion yen

Operating profit margin

Over 10%

ROE

Over 10%

ROIC

Over 6%

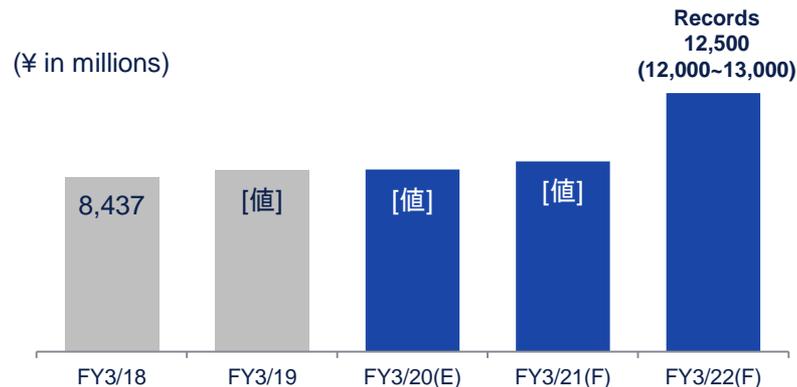
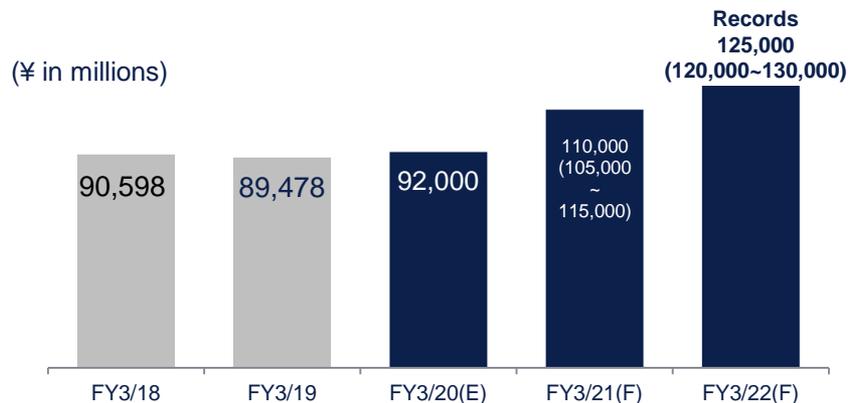
Shareholders' equity ratio

Over 40%

- Forecast record-high revenues of 125 billion yen in the final fiscal year due to strong semiconductor market
- Semiconductor market is somewhat uncertain, so we disclose targets on a range figure.

Net Sales (FY3/22)
125 billion yen
 (Range: 120-130 billion yen)

Operating Income (FY3/22)
12.5 billion yen
 (Range: 12-13 billion yen)



Business Results

Net sales to surpass 120 billion yen in the final fiscal year

Improving profitability and moving to the next stage as a billion dollar company

Product strategy

Improve business portfolio

Strengthen the Recurring Revenue business and automotive fields while focusing resources on robust semiconductor-related products

Capital investment

Capital investments to peak in FY3/20

Capital investments are planned to be 71 billion yen over the next 3 years. After that, we will enter the profitable stage.

Shareholder Returns

Consider increase dividend in accordance with improved performance

Focus on 4 businesses, centered on robust semiconductor materials

* “Semiconductor material” is sum of these four products: quartz, silicon parts, ceramics and CVD-SiC for jigs and consumables for semiconductor manufacturing equipment.

	Current net sales (FY3/19)		Final-year (FY3/22)
Semiconductor material	28.6 billion yen	+33.2%	38.1 billion yen
Wafer	7.2 billion yen	+291.6%	28.2 billion yen
Power semiconductors	2 billion yen	+250.0%	7 billion yen
Cleaning	3.5 billion yen	+142.9%	8.5 billion yen

Strengths of the Semiconductor-related Business: Characteristics of semiconductor material products

- Semiconductor materials are divided into consumables and products that are proportional to capital investment by manufacturers.
- Because we cover both consumables and products that are proportional to capital investments, **stable revenues can be secured even if capital investment peaks out.**

* "Semiconductor material" include these four products: quartz for jigs and consumables for semiconductor manufacturing equipment, silicon parts, ceramics and CVD-SiC.

Linkage between semiconductor materials and capital investments

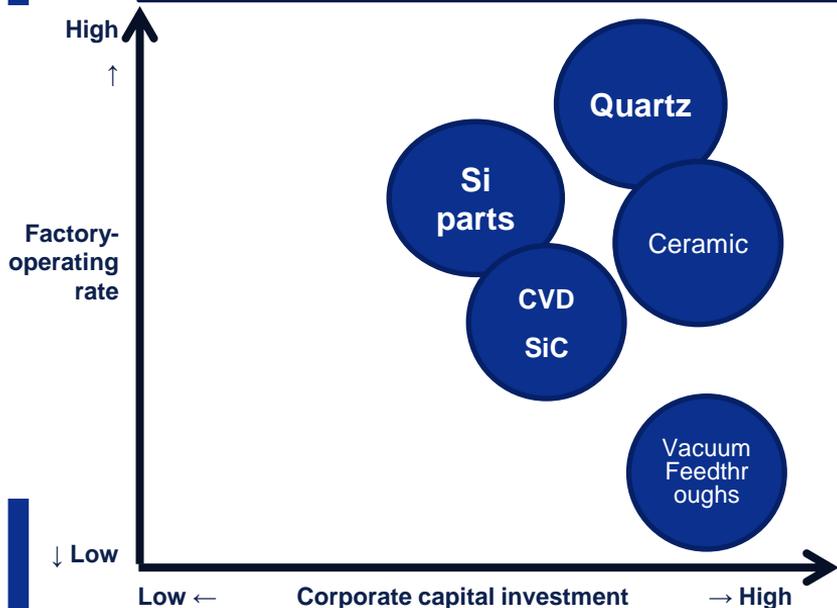
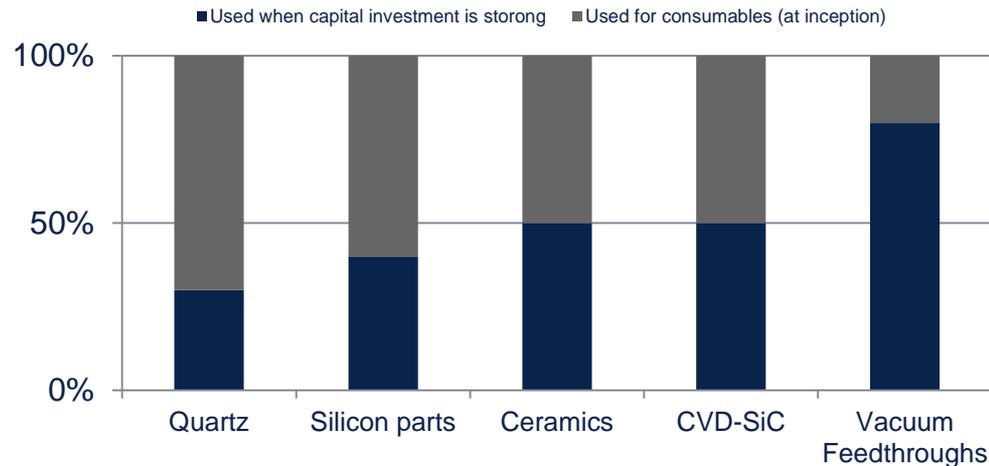
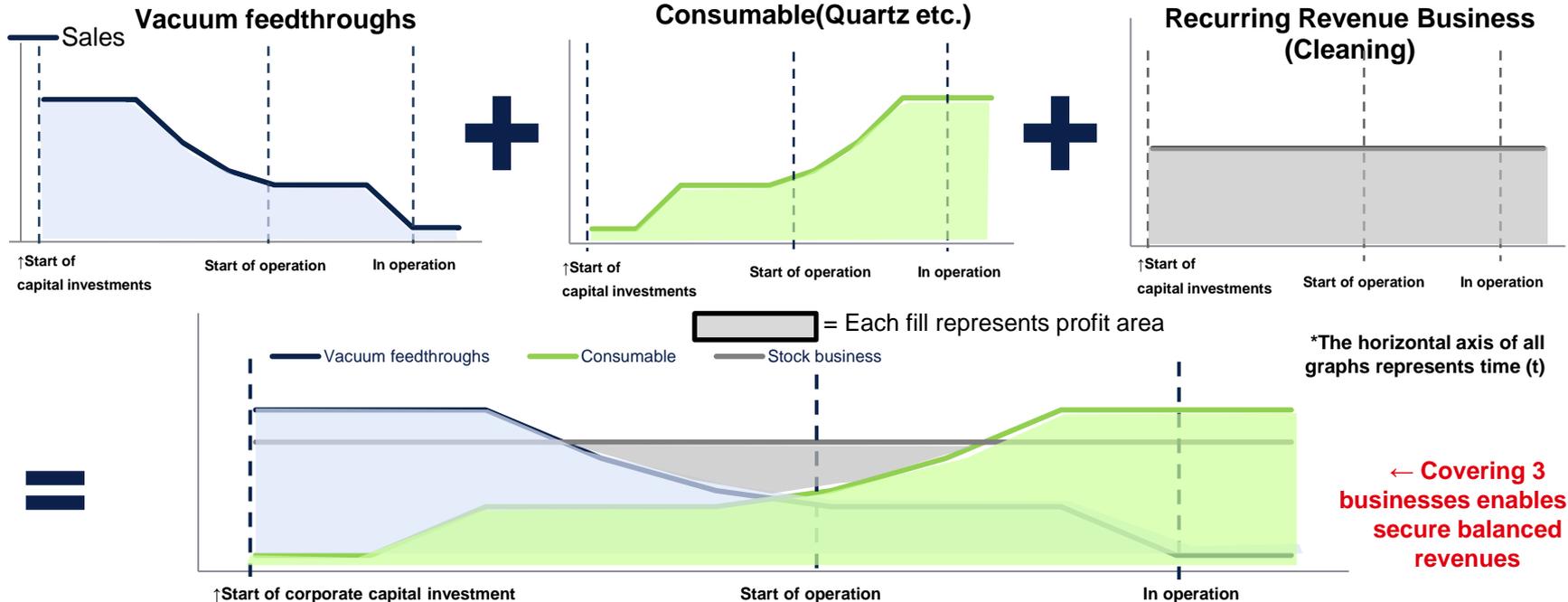


Image of sales ratio by application of each product

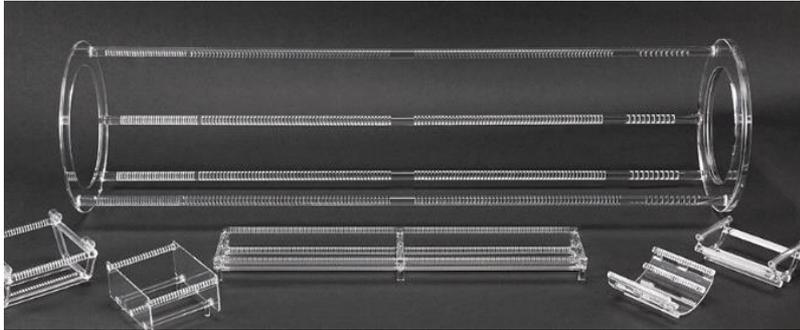


- By covering products with different peak demand timing, we are able to create a competitive advantage in its product portfolio, **enabling it to secure stable revenues and provide one-stop production.**



- Sales of semiconductor materials, which have constant demand as consumables, are strong.
- Expand production capacity by expanding production lines

Quartz product



Ceramic products



Silicon product



CVD-SiC products

- Quartz products performed particularly well among our material products
- Established Ferrotec Alion Factory in Yamagata, Zhejiang Province and Jiangsu Province, China

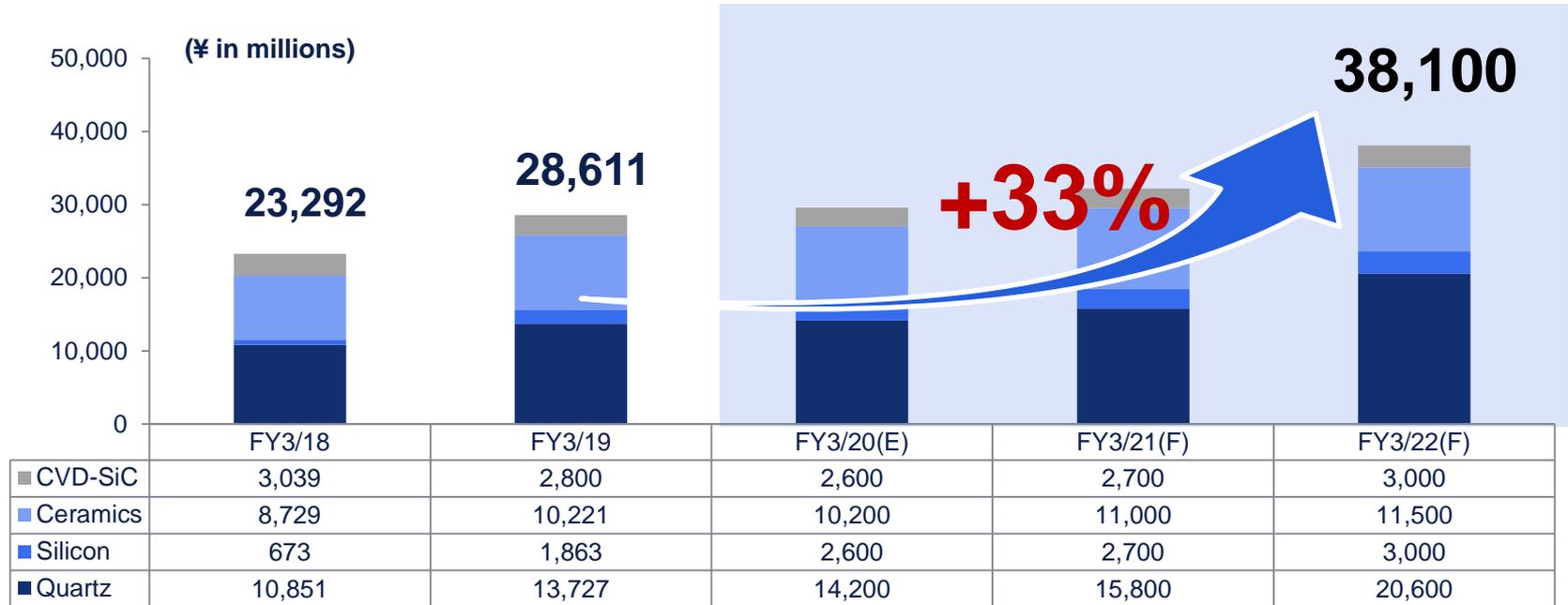
Outside of the factory (Dongtai, Jiangsu Province)



Ferrotec Alion (Yamagata Prefecture)



- Growing semiconductor materials to become our mainstay products
- Increase net sales by 33% in the final fiscal year, and remain sales composition ratio of semiconductor and other equipment-related business at over 30%



Progress of the Medium Diameter (8-inch) Wafer Business in China

- Mass production at the Shanghai Factory has already commenced, and sales commenced with a monthly production capacity of 0.1 million units.
- Construction of the Hangzhou Factory is ongoing and to be completed in this fiscal year. Operation is planned to begin in FY3/21.

**Yinchuan Ingot
Factory**



**Hangzhou Wafer Factory
Conceptual image**



Large-scale investment in large diameter (12-inch)

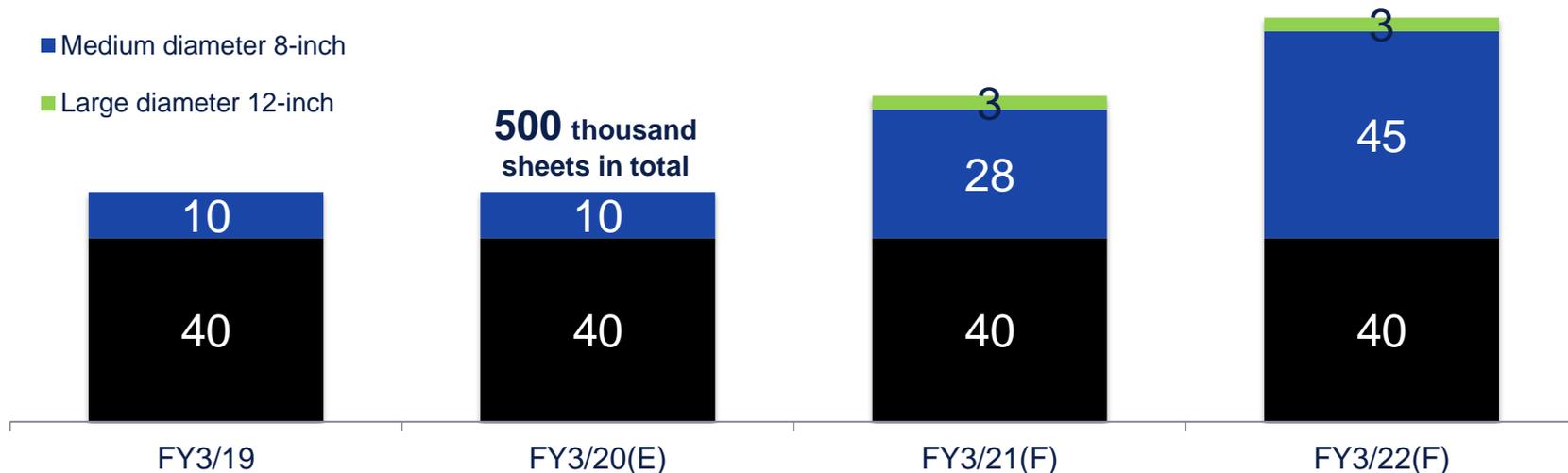
- Invest approximately 43.6 billion yen in large diameter wafers by FY3/22 in anticipation of medium- to long-term needs
- Aiming for monthly production capacity of approximately 880 thousand units for large, medium, and small diameters by FY3/22

(10 Thousand sheets)

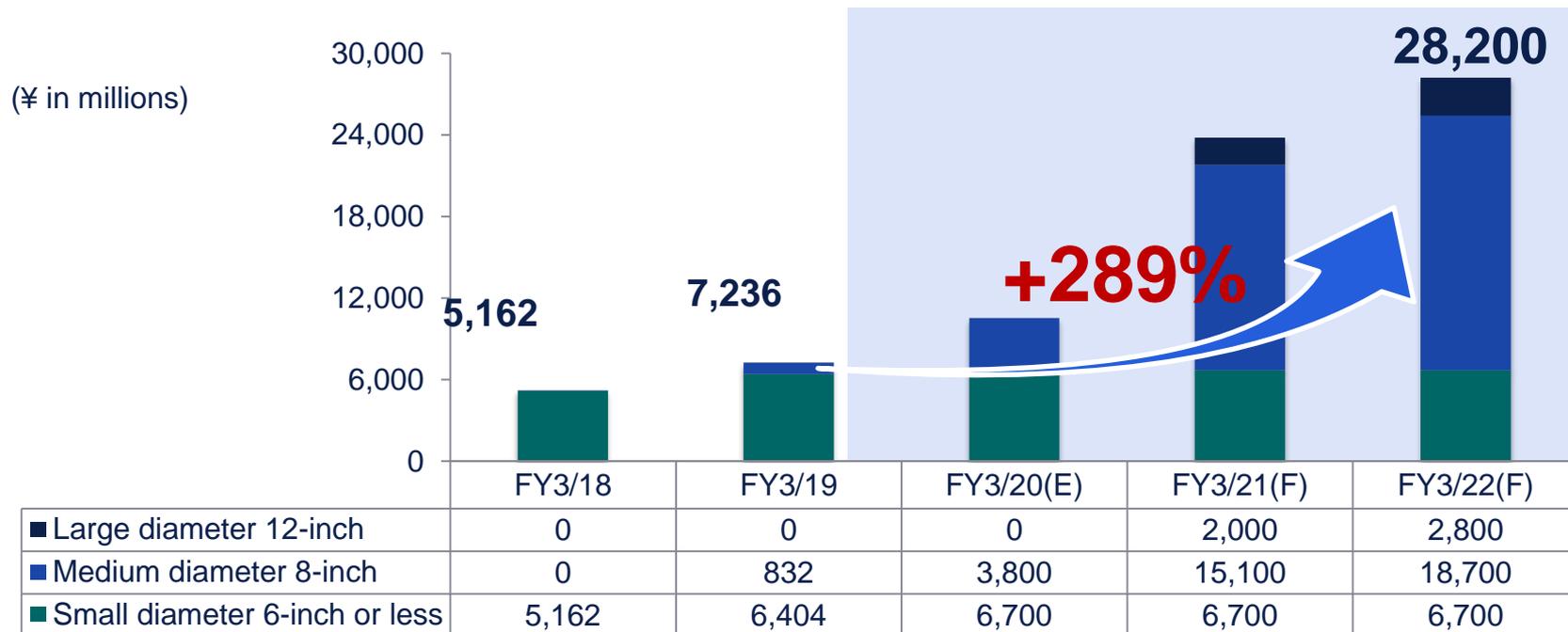
- Small diameter 6-inch or less
- Medium diameter 8-inch
- Large diameter 12-inch

Monthly wafer production target

880 thousand sheets in total



- Net sales of semiconductor wafers increased by 289.7% in the final year due to mass production of medium diameter (8-inch)
- Strengthen production of large diameter (12-inch) from the medium to long term perspective



- Medium diameter (‘8): Hangzhou base is expected to begin mass production and sales from Q1 2020 (FY3/21) onward.
- Large diameter (‘12): Hangzhou prototype line is expected to begin mass production and sales in the 2H of 2020 (FY3/21)

Mass production schedule			FY3/18	FY3/19	FY3/20(E)	FY3/21(F)	FY3/22(F)
Small diameter (6-inch or less)	Monthly production capacity	Shanghai	380 thousand sheets	Established a system of 0.4 million pieces	0.4 million sheets	0.4 million sheets	0.4 million sheets
	Price assumptions		Increase by about 5%	About 10% increase	About 3% to 5% down	Flat	Flat
Medium diameter (8-inch)	Monthly production capacity	Shanghai	Prototype and certification	Restart of production in July	0.1 million sheets	0.1 million sheets	0.1 million sheets
		Hangzhou			Prototyping/certification	Start of mass production-350 thousand sheets	350 thousand sheets
		Total		Establish production system for 0.1 million sheets/m in December	0.1 million sheets	About 350 thousand on average	450 thousand sheets
	Price assumptions		10% increase	20% increase	Down 3% to 5%	Flat	Flat
Large diameter (12-inch)	Monthly production capacity	Hangzhou				Prototype and certification-30 thousand sheets	30 thousand sheets
	Price assumptions					Flat	Flat
Total monthly production			380 thousand sheets	0.5 million sheets	0.6 million sheets	About 750 thousand sheets	880 thousand sheets

- Revenues in the wafer business are linked to global unit sales prices.
- Despite aggressive construction of factories since last year, due to the recent decline in unit prices, the company aims to achieve profitability of 8-inch in FY3/22 and 12-inch in FY3/24.
- Aiming to make the business profitable as soon as possible by raising unit prices through quality improvements and reducing costs through cost reductions

The overall wafer business is planned to be profitable in the next 3 years



- Completed construction of factories in Anhui Province and Najiang in Sichuan Province (line 2) in China. We have 5 bases and 6 factories.
- Plan to increase sales by 159% in 3 years as the core of recurring revenue business, and consider to establish more new bases

Neijiang Cleaning Factory Bldg.2

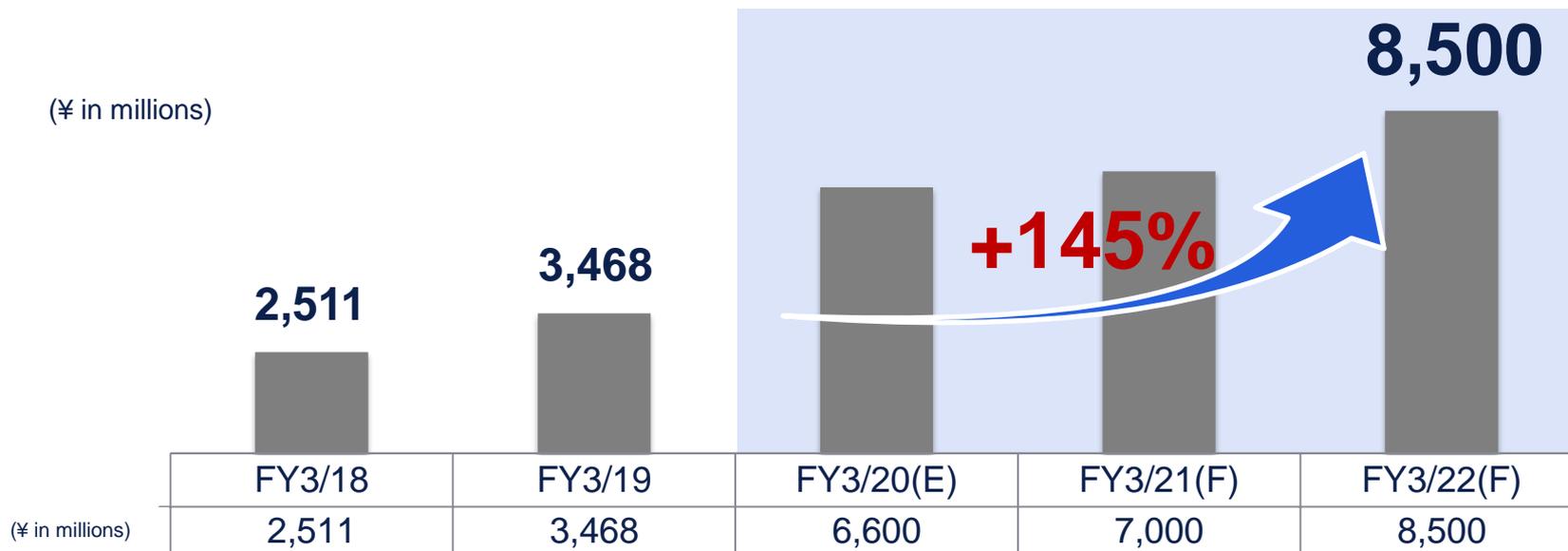


Tongling, Anhui Province Cleaning Factory



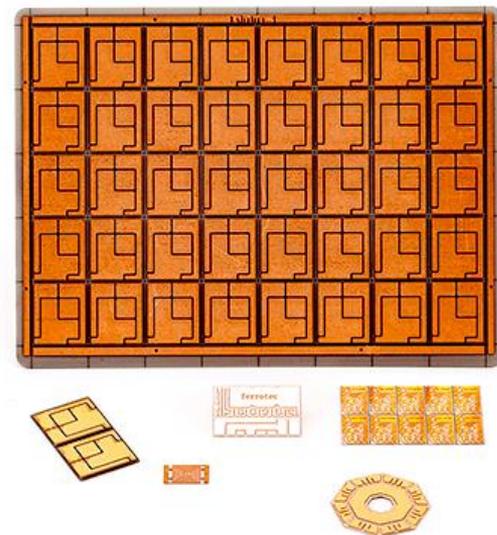
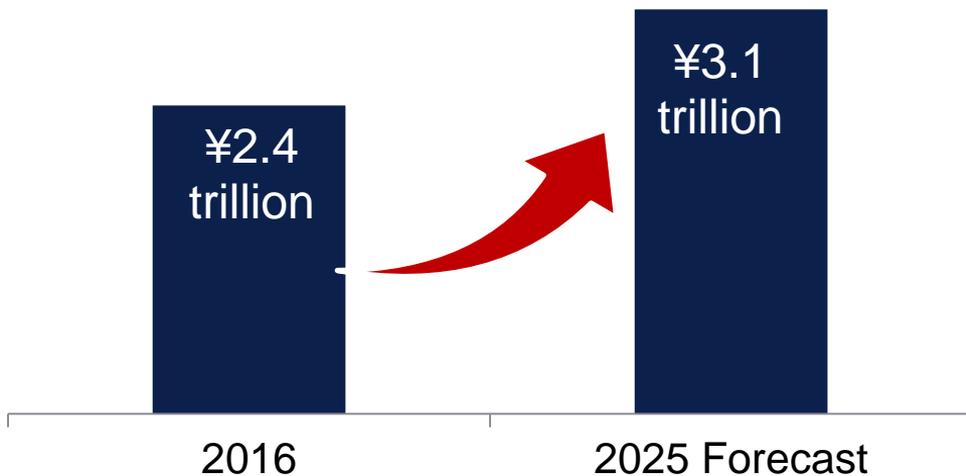
Strategic Products 3: Strengthen Cleaning business

- Parts cleaning: To establish new factories in Tongling and Neijiang, Sichuan province (No. 2) from FY3/19. From FY3/20 onwards, we plan to increase production at 5 bases and 6 factories.
- In the medium term, we will consider establishing more new bases as necessary while considering the semiconductor and FPD market trends. Aiming to increase revenue by 145% in 3 years (FY3/19 → FY3/22)



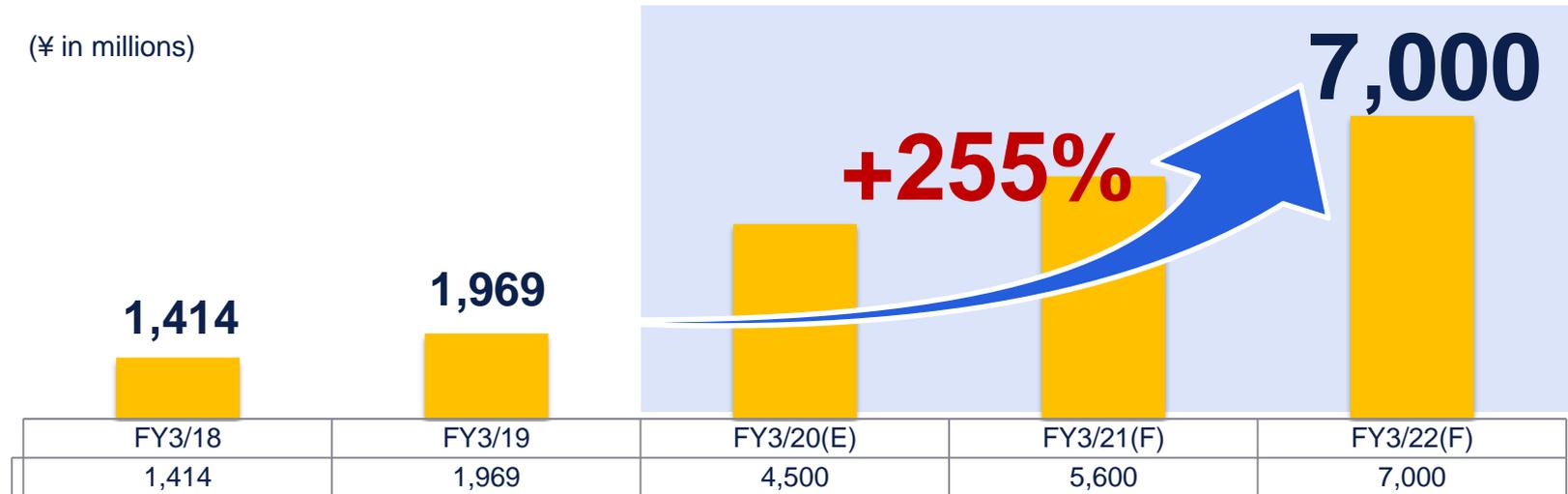
- Expect over 30% growth until 2025, becoming 3 trillion yen market
- Demand also increased in the machine tool and automotive sectors.
- Construction of new factory for power semiconductors in Jiangsu Province completed, resulting in a significant increase in sales due to increased production capacity

Global market for power semiconductors

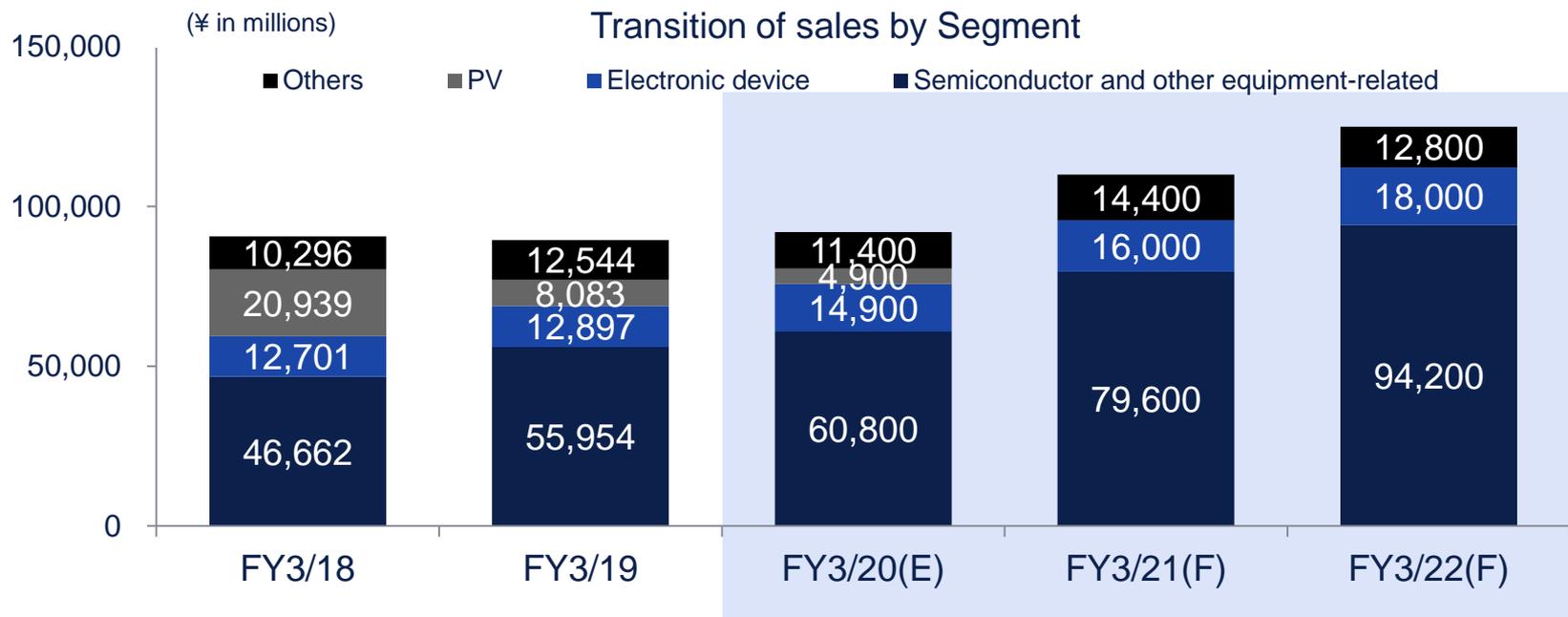


- From FY3/19, established Dongtai factory following Shanghai factory.
- In the medium term, we aim to increase sales by 255% in 3 years (FY3/19 → FY3/22) by mass-producing aluminum ceramics as well as silicon nitride and aluminum nitride substrates.

(¥ in millions)



- Growth in semiconductor and other equipment-related businesses due to strengthening of semiconductor materials
- Transfer the photovoltaic business to the Other segment from FY3/21 onward



Segment Operating Income: Targets for the Medium-Term Plan and Profit Structure

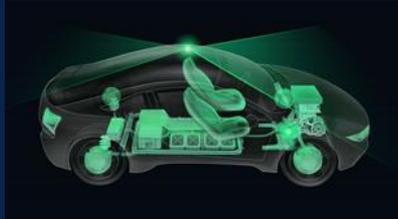
- Expect growth in sales of semiconductor and other equipment-related products (particularly materials-related products)

Operating Income Margin by Segment

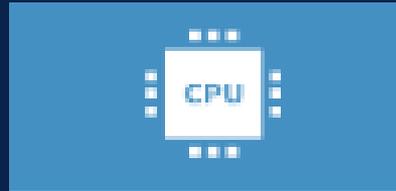
	FY3/18	FY3/19	FY3/20-FY3/22 (medium-term plan)	
Segment	Result	Result	Operating margin range	Remarks
Semiconductor and other equipment-related	16.1%	16.4%	8% to 13%	Segment profit to decrease during the medium-term plan due to increased production of medium-and large-diameter wafers. Quartz and parts cleaning have high growth potential and will become a profit pillar. In the wafer business as a whole, the company expects profitability to improve from FY3/23 onwards.
Electronic device	23.7%	18.3%	15% to 20%	Due to increased production of power semiconductor substrates, operating income is forecast to decline recently due to changes in the segment mix. The company expects operating margin to rise again as a result of the introduction of new thermoelectric modules for automobiles and high-value-added products for power semiconductor substrates.
Photovoltaic-related	-7.6%	-20.5%	Plan to eliminate this segment from FY3/21	Photovoltaic segment will be eliminated from FY3/21. If there are limited business continuity products, we will remain only profitable businesses.
Company-wide	9.3%	9.8%	8% to 13%	Forecast these trends: an increase in profits due to the withdrawal from the Photovoltaic segment, a decrease in profits affected by higher depreciation costs due to the expansion of the semiconductor wafer business, and an increase in profits due to the expansion of the strategic growth products (materials, parts cleaning and DCB power semiconductors). From FY3/23 onwards, expect operating margin to increase due to improved profits of semiconductor wafer business.

Including the favorable performance of the semiconductor-related business,
Utilize core technologies and products to expand products in the following 6 fields

Automobile



Semiconductor



Energy



Biotechnology and Medical



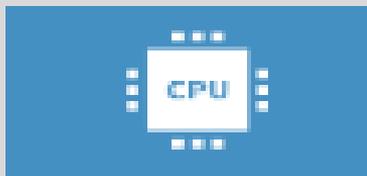
Communication



Contract manufacturing



Semiconductor



Continue to expand production lines for materials products that are strongly demanded by customers

Produce 12-inch wafer pilot line

Automobile



Build a system for mass production of substrates for IGBT power semiconductors used in electric vehicles

Develop application products such as sub-air conditioners for EV vehicles and head-up displays other than temperature control sheets.

Energy



Develop application products for thermoelectric modules for the control of lithium ions used in electric vehicles

Biotechnology and Medical



Diffusion into DNA amplification equipment, blood separators, and regenerative medicine using thermomodules

Strengthen product capabilities to realize drug delivery (transporting a pharmaceutical compound in the body)

Communication



Expected to grow due to progress in 5G

Thermo modules are often used to prevent heat of mobile communication systems and inside of antennas.

Contract production



Proportionate to the growth of the semiconductor market

Combine vacuum technologies and precision metal processing to expand contract manufacturing from semiconductor manufacturing equipment manufacturers

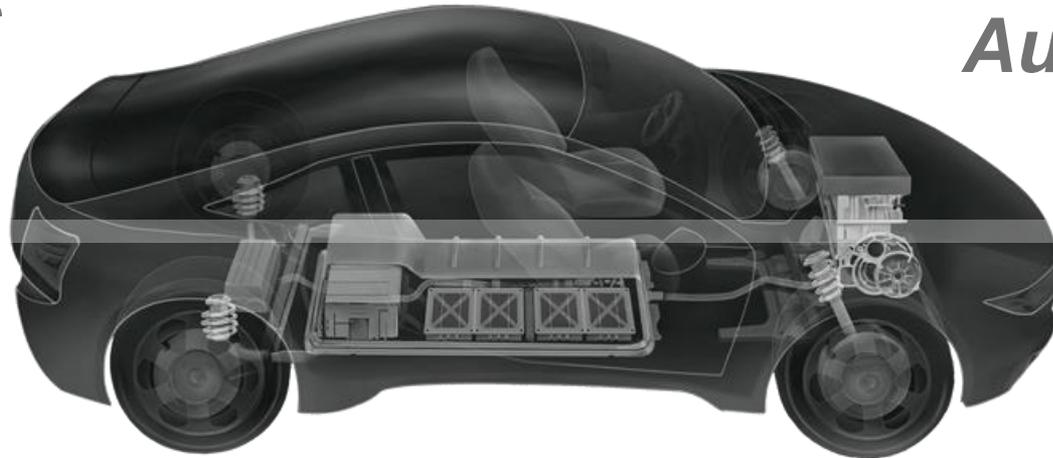
Strengthening the automotive business

Full-fledged launch of automotive projects

ADAS

*Automated
Car*

*Assistant
System*



EV

- Strengthen marketing to the automotive industry by leveraging the broad product lineup
- Propose new technologies by combining core technologies

Ferrotec Proposed New Technologies for Peltier Devices and Ferrofluid in Automotive World

日刊工業新聞配信ニュース「提供：日刊工業新聞」からの新しい配信コンテンツがあります。

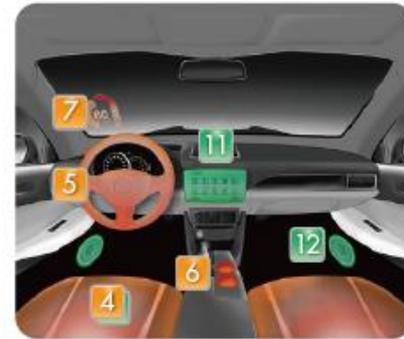
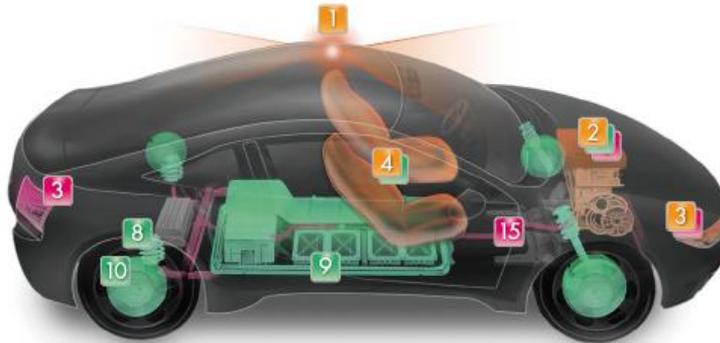
in 機械要素 材料 自動車（四輪・二輪） 注目記事

2019年2月5日(火曜日)

フェロテックホールディングス（<http://www.ferrotec.co.jp/>）傘下のフェロテック（<http://www.ferrotec.jp/>）は1月16日～18日に東京都江東区の東京ビッグサイトで開催された「第11回オートモティブワールド」に出展、自動車向けのペルチェ素子（サーモモジュール）および磁性流体の新技術について、動態展示を含めて紹介、ペルチェ素子と磁性流体の適用による各種のメリットを提案した。



Mainly developing thermo-modules, ferrofluid, and power semiconductors, etc. and making proposals for in-car mounted products suitable for further advancement

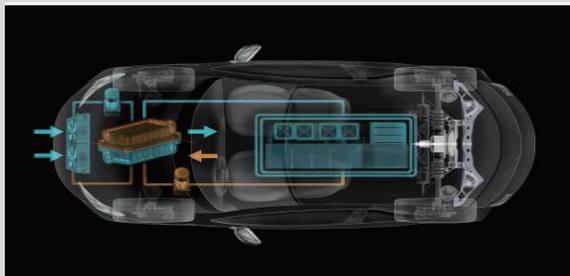


Thermo-module application 	Magnetic fluids and applications 	Power semiconductor substrates and applications 
1 Laser radar	2 Engine suspension	2 Engine
2 Battery cooling	4 Seat suspension	Bodies
3 Laser headlights	8 Suspension around the foot	3 Headlamp control and room lamp control
4 Seat cooling system	9 Hzero® high-precision DC sensors for monitoring SOCs	Powertrain
5 Steering heater cooler	10 Hzero® composite wheel in motor	13 HEV motor control
6 Cup holder	11 Touch Panel & Center	Transmission, brake and steering control
7 HUD (Head-up Display)	12 Audio	

← Our core technology products cover a wide range of automotive products

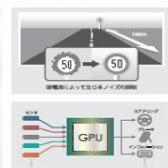
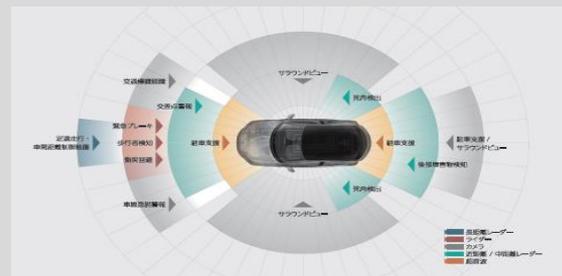
Thermomodule Battery heater/cooler

Heat transfer by heat pump. Temperature control (cooling and heating) of lithium-ion batteries for EVs at low power consumption



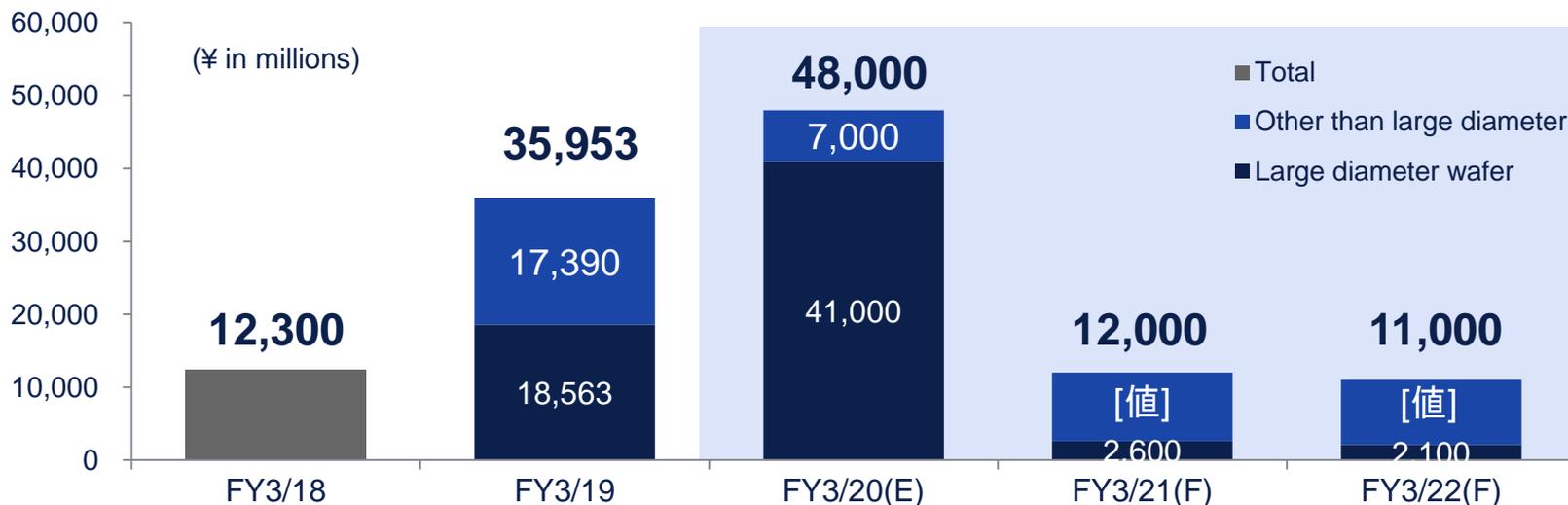
Thermomodule ADAS camera cooler

Heat dissipation of CMOS image sensors used in ADAS cameras (temperature control to accurately check distances)



Capital investment plan: To peak in FY3/20

- Capital investments are expected to peak in FY3/20, totaling approximately 71 billion yen.
- FY3/20 will be a peak period due to the concentration of investment in medium-and large-diameter wafers (8-inch and 12-inch)
- Continue to increase production capacity for semiconductor-related materials (quartz, ceramics, silicon) and cleaning businesses as strategic products



- ROIC and ROE are expected to temporarily decline until FY3/21 due to large scale capital investments centered on large-diameter wafers.
- From FY3/21 onwards, capital investments will come to a halt, and the company plans to improve ROIC by putting this business on track and implementing various improvement measures.

	New Medium-term Management Plan				
	FY3/18	FY3/19	FY3/20(E)	FY3/21(F)	FY3/22(F)
ROIC*	8.4%	6.0%	4.3%	4.4%	6.0%
ROE	5.2%	5.7%	9.2%	8.7%	10.8%
ROS*	7.9%	9.0%	8.9%	7.5%	8.0%
CAPEX(¥ in millions)	12,300	35,953	48,000	12,000	11,000



ROIC improvement measures:

- ① Cost reductions (production shifts in key business divisions to the Dongtai and Changshan factories, where manufacturing costs are low)
- ② Reduce working capital (reduce company-wide inventories by 10%)
- ③ Improve production efficiency (promote company-wide automation)

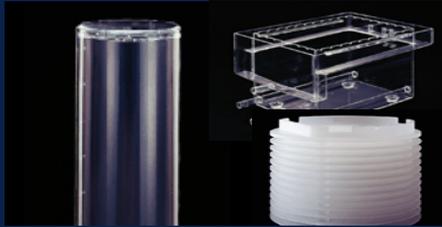
※ ROIC = Operating income (1-effective tax rate)/(Working capital + Fixed assets)

ROS = Ordinary income ÷ Net sales × 100

Thermo-electric module



Quartz



Ceramics



Silicon pulling device



Vacuum feedthroughs



Wafer products



Ultra-vacuum metal processing



- The forward-looking statements in this document are based on information available as of the date of publication of this document and assumptions concerning uncertain factors affecting future results.
- Actual results may differ materially from these forecasts due to various factors. Such factors include, but are not limited to, international conditions, economic conditions, product supply and demand trends, raw material prices and market conditions, and exchange rates.
- Quantitative targets and capital investments in these materials represent medium-to long-term strategies and visions, and are not performance forecasts. We undertake no obligation to update any information with respect to these matters.
- For official forecasts, please refer to the disclosure of financial results based on the Tokyo Stock Exchange Regulations.

<Inquiries>

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Thank You

