Ferrotec Holdings Corporation

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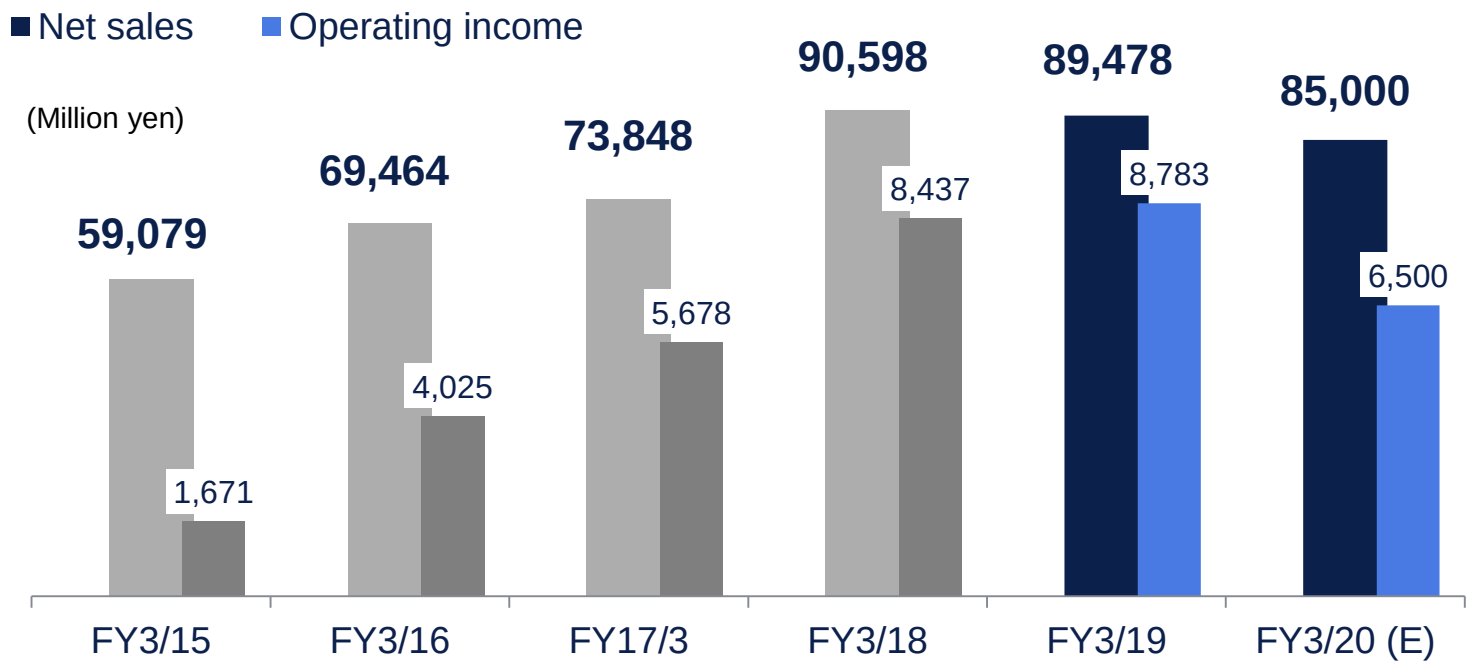
Medium-term Growth Strategy /Progress Reports

November 27, 2019

Business Results: Lower sales and profits in FY3/20 due to sluggish semiconductor market (adjustment bottomed out)

Despite a revision in the forecasts for FY3/20 due to adjustments in the semiconductor market, the market is expected to recover toward FY3/21.



Summary of the goals in the new 3-year mid-term management plan (FY3/20 to FY 3/22)

1. Strategic businesses

- To set semiconductor materials (quartz, ceramics, silicon, and CVD-SiC), semiconductor wafers, parts cleaning, and power semiconductor substrates as our strategic businesses, and grow them as stable revenue drivers
- To develop a mass-production system for medium and large-diameter wafers as soon as possible, to produce 880,000 units per month. We will secure a foothold for boosting sales and revenue from FY3/23, by covering the cost for launching the semiconductor wafer business with the revenue from strategic products.

2. Withdrawal from unprofitable business and mid/long-term strategy

- To withdraw from the underperforming photovoltaic business
- As for thermo-electric modules and ferrofluid, we try to use them for in-car applications as core products of our vehicle project, and grow them for the future core business.

3. Target KPIs

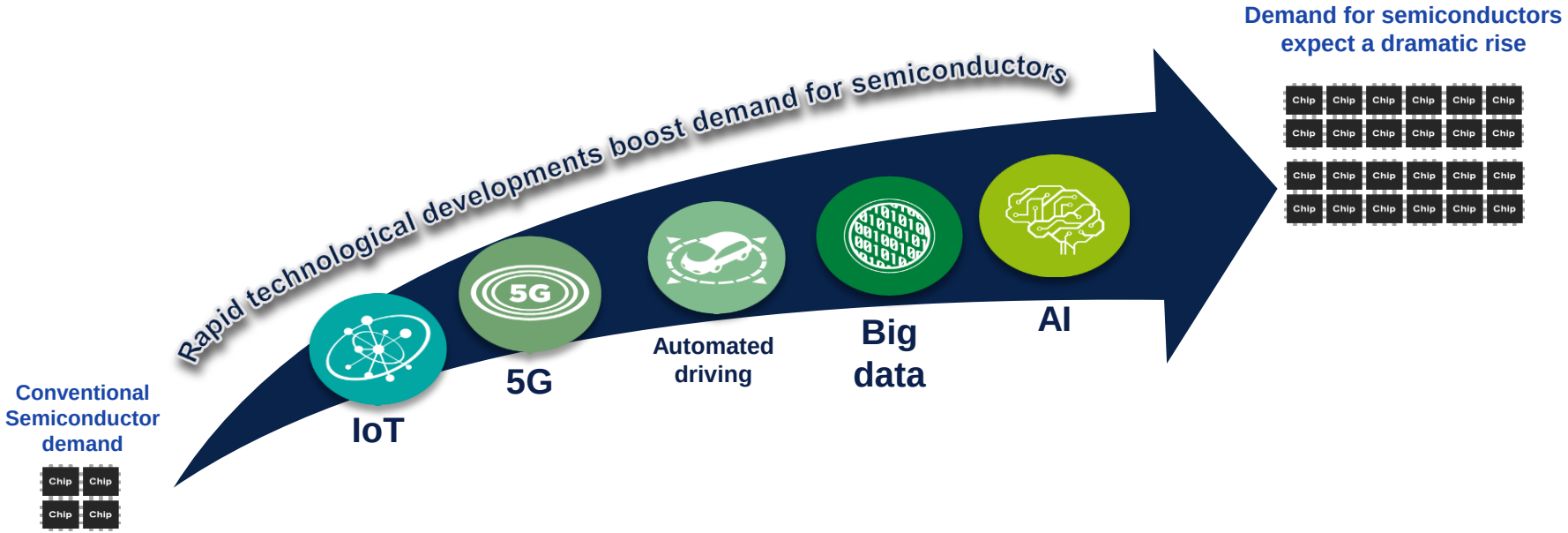
- The goals for the final fiscal year (FY3/22) of the mid-term management plan are consolidated sales of 125 billion yen and operating income of 12.5 billion yen.

(Operating margin: 10.0%), ROE: 10% or higher, ROIC: 6% or higher, equity ratio: 40% or higher

Market Perception:
Semiconductor demand is shifting to the next stage due to the rapid technological developments

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

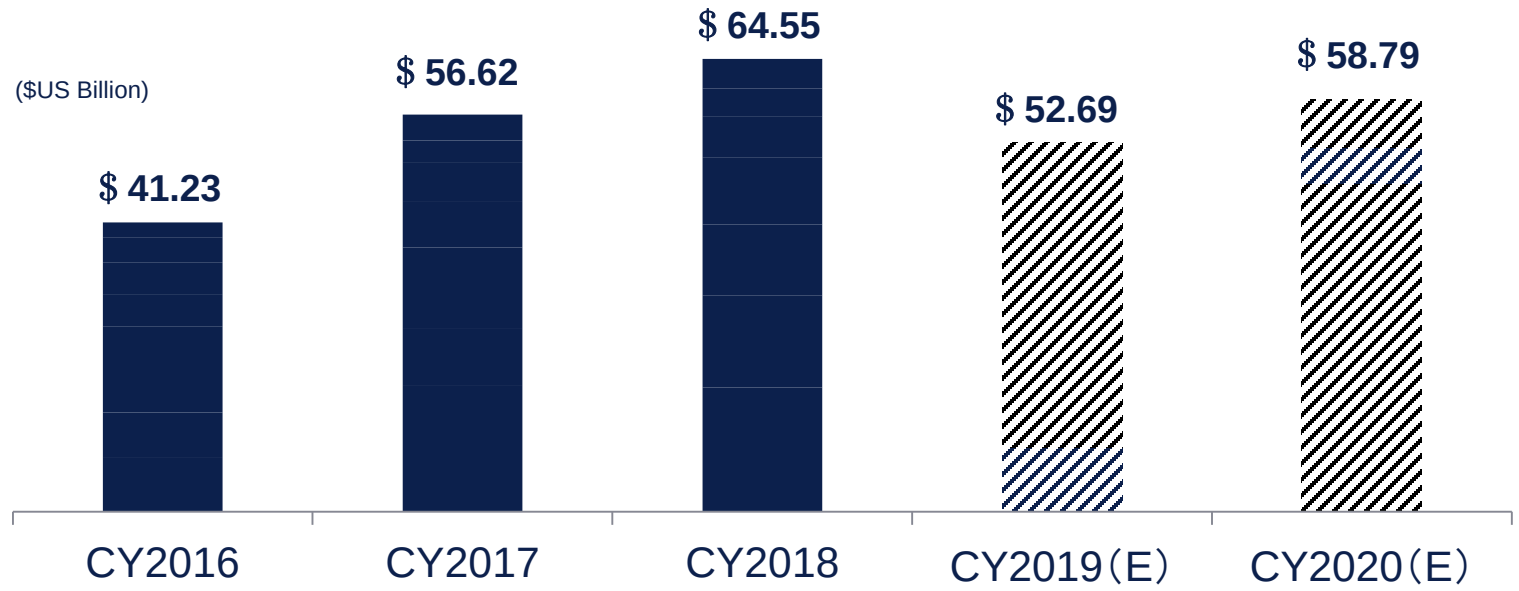
Demand for semiconductors is shifting to new era surpassing conventional needs



Market Perception: The semiconductor manufacturing market will bottom out this year and recover next year.

- The market trend will remain unpredictable due to the trade friction between the U.S. and China, but it is estimated that the stagnant market of semiconductor manufacturing equipment will start to recover in the second half of 2019 and grow again in 2020.

Sales in the global semiconductor manufacturing equipment market

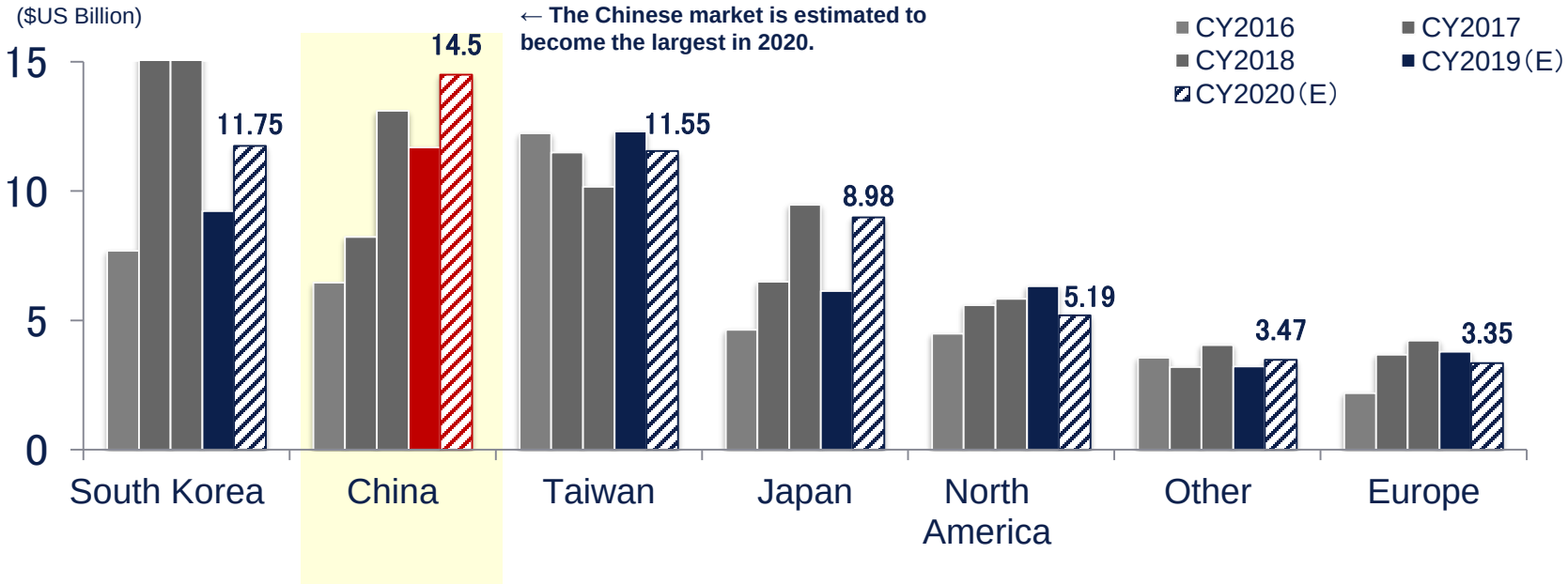


*** Prepared by the Company from the SEMI release in July 2019**
*** CY = Calendar year**

Market Perception: The Chinese semiconductor manufacturing market will become the largest in 2020.

The Chinese market, which has been sluggish due to the U.S.-China trade friction, will recover steeply from the next term, and have the largest sales for the first time, exceeding those in Taiwan.

Sales in the semiconductor manufacturing equipment market in each country



* Prepared by the Company from the SEMI release in July 2019
* CY = Calendar year

U.S.-China trade friction: We will take advantage of our share in China amid the trade friction.

- ✓ With the project “Made in China 2025,” Chinese manufacturers will continue capital investment for increasing the self-sufficiency ratio in China.
- ✓ Amid the U.S.-China trade friction, we are revising our supply chain.
- ✓ Our company cultivated the Chinese market earlier than other companies, established footholds in major industrial areas, and obtained a subsidy from the Chinese government in some areas, including Hangzhou. The government may provide semiconductor companies with income tax advantages.
- ✓ The share of our ceramic substrates for power semiconductors in China exceeds 90%. We are increasing Chinese customers steadily.

The U.S.-China trade friction produces negative effects in the short term, but provides us with a chance to expand our share in China in the medium/long term, and we will keep cultivating the Chinese market actively.

Our lineup of semiconductor-related products

Vacuum feedthroughs

*Semiconductor and FPD production equipment parts (market share: 65% (largest))

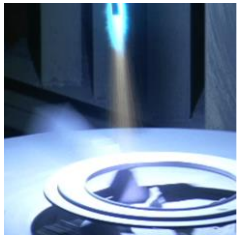
★Mid-term strategic products

Silicon wafers

*Monthly production capacity- 6 inch: 400 thousand, 8 inch: 100 thousand

Plan to increase production of 8 inches by 350 thousand sheets and 12 inches by 30 thousand sheets over the medium term

★Mid-term strategic products



Machinery Parts Cleaning

*Focus on the Chinese market

(Market share in China: 60% (largest))

Metal Precision Machining

*Growth forecast due to increase in future customers (factories) in China

Jigs and consumables for semiconductor manufacturing equipment (our mainstay material products)
★Medium term strategic products

Quartz

Silicon parts

Ceramics

CVD-SiC

Our strengths: not only capital investment-linked products (vacuum feedthroughs), but also a lineup of repeat consumables (materials) and services (equipment parts cleaning) linked to the production and operation of semiconductor device manufacturers.

Strengths of Semiconductor-Related Business: Features of semiconductor materials

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

Linkage between semiconductor materials and capital investment

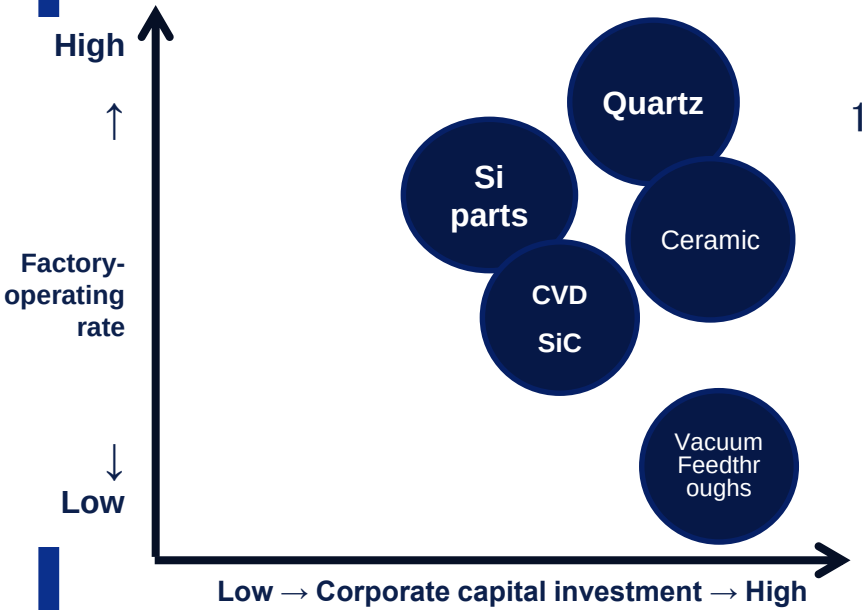
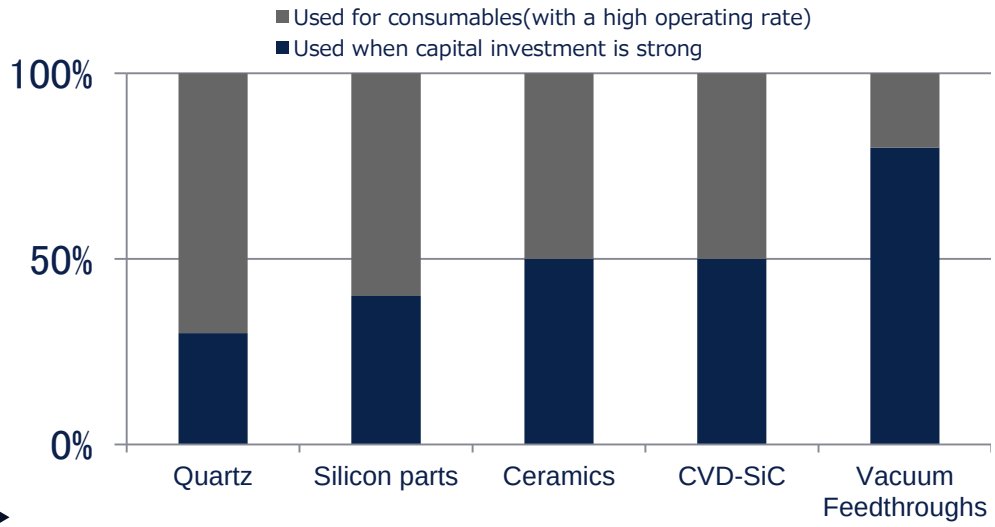


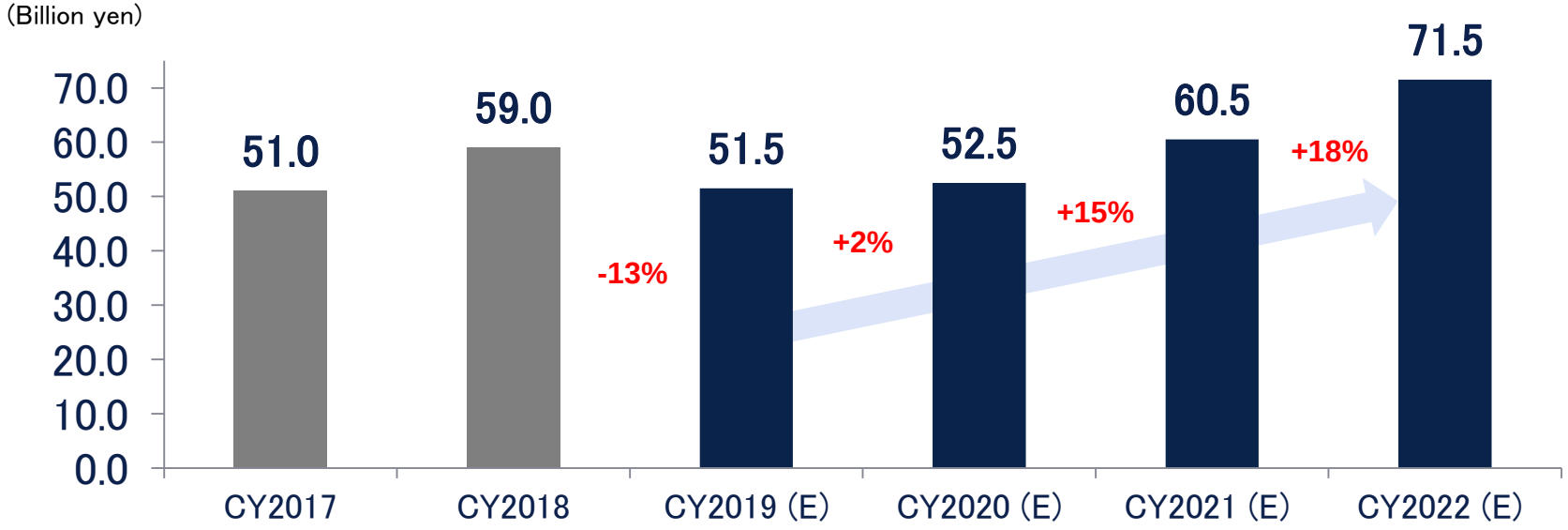
Image of sales ratio by application of each product



Market Recognition:
The WFE market is expected to recover from 2020 onward

- The WFE (Wafer Fab Equipment)* market bottomed out in 2019 and to grow again from 2020 onward.
- It is expected that the market in 2021 will exceed the level in 2018 and peak again in 2022.

Market Assumptions for WFE Market

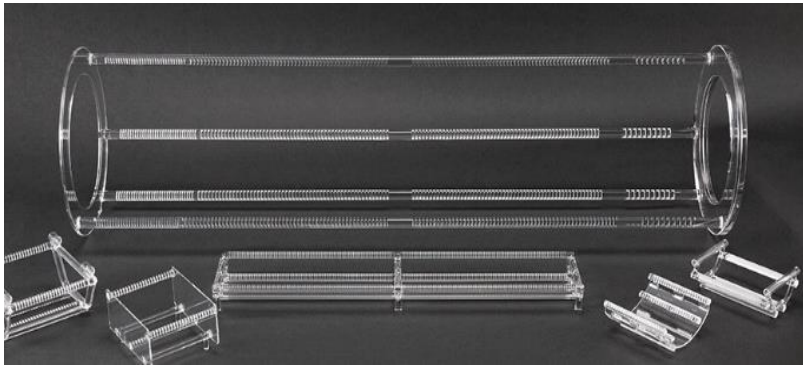


* WFE = Semiconductor front-end process equipment
* Preparation by the Company based on securities company research
* CY = Calendar year

Continue to increase production of semiconductor materials

- Sales of semiconductor materials, which have constant demand as consumables, are strong.
- In preparation for the increase in demand for capital investment due to the market recovery, we will improve our production capacity by enlarging our equipment production line.

Quartz products



Ceramic products

Silicon products

CVD-SiC products

Merger of Japanese subsidiaries for ceramics and CVD-SiC (Jan. 2020)

- Merger of the two companies, expecting the synergy for jigs and supplies for semiconductor manufacturing equipment (Jan. 2020)
- Enhancement of the capabilities of developing products of fine ceramics (FC), machinable ceramics (MC) and CVD-SiC and responding to customers

Production site *FC will be mass-produced in Hangzhou, China.

FC: Amagasaki (trial production)

MC: Ishikawa (trial production and mass-production)

Production site

CVD-SiC: Okayama (trial production and mass-production)

Common to Semiconductor Process and Customers

ウェーハ製造工程・前工程 ▶	① 単結晶インゴット引き上げ	② インゴット切断	③ 研磨	④ 酸化・拡散	⑤ フォトレジスト塗布	⑥ パターン露光	⑦ エッチング	⑧ イオン注入・CVD	⑨ 平坦化	⑩ 電極形成	⑪ ウエーハ検査
	シリコンウエーハ製造			パターン形成 (多層化（繰り返し⑤～⑧）)							
真空シール	●			●	●	●	●	●	●	●	
石英製品	●			●			●			●	
セラミックス	●		●	●		●	●		●	●	●
SiCパーツ(CVD-SiC)			●	●		●	●			●	●
シリコンパーツ				●			●				
半導体用シリコンウェーハ	●										
サーモモジュール					●						
単結晶引上装置	●										
ワイヤーソー角切装置		●									
受託加工	●	●	●	●	●	●	●	●	●	●	●
装置洗浄	●	●	●	●	●	●	●	●	●	●	●

Held a ceremony for completion of the new wafer factory in Hangzhou on Nov. 22, 2019

- Held a ceremony for completion of the new wafer factory in China, and about 450 people attended it.
- In the afternoon part, “Forum regarding the Chinese semiconductor industry” was held, and intellectuals exchanged their opinions on the trend of domestic production in China, etc.

Scene of the ceremony for completion of the new wafer factory in Hangzhou, China

Scene of the forum regarding the Chinese semiconductor industry

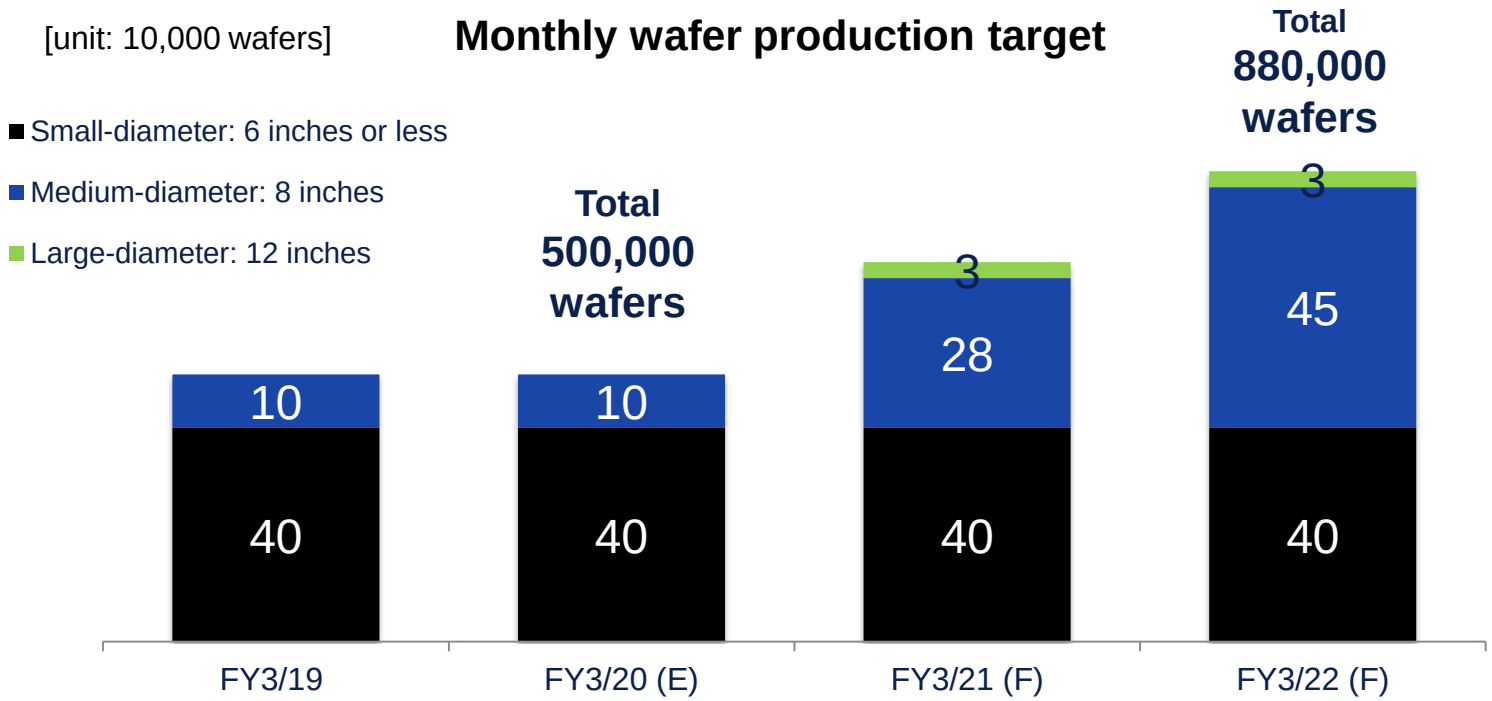
Wafer business: Shift to the system for selling 200-mm wafers according to demand

- The market itself is recovering, but the selling prices of wafers have been declining slightly.
- Accordingly, we revised the plan to establish a system to produce 350,000 units per month as soon as possible, and decided to prioritize the development of systems for manufacturing and sale according to demand (shifting production volumes to emphasize profitability).
- Construction of the Hangzhou Factory is ongoing and to be completed in this fiscal year. Mass production is planned to begin in FY3/21.
- We enlisted cooperation from GlobalWafers, a leading semiconductor manufacturer in Taiwan, shifted to the system for selling products by ourselves, and strengthened our sales structure.

New wafer factory in Hangzhou

Wafer business: Target capacities to produce 6/8/12-inch wafers per month (FY3/22)

- 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 880,000 units for large, medium, and small diameters by FY3/22

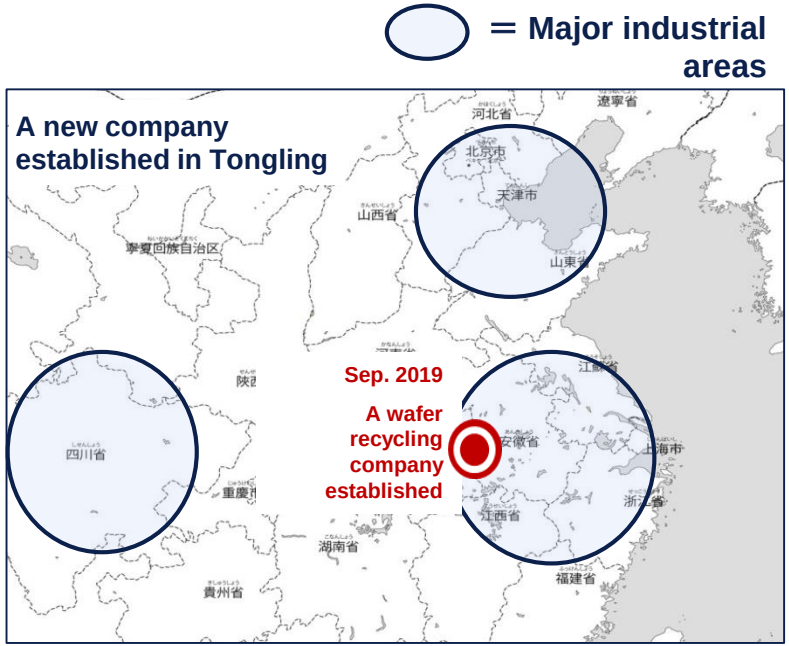


Wafer business: Launch of the wafer recycling business

- While the domestic production of semiconductors in China is spreading, the demand for recycling of monitor wafers (used before start of mass production) is growing rapidly. We are preparing for launching the monitor wafer recycling business.

■ Details of this business

- ✓ Enrich the services of the wafer business, while applying the resources of the wafer business and the know-how of the cleaning business.
- ✓ Jointly funded by our subsidiary and the investment fund of the government of Tongling, Anhui with shareholding ratio being 7:3.
- ✓ In Sep. of this year, we established a new company, which is a second-tier subsidiary, in Tongling, Anhui.
- ✓ We aim to construct a factory and start manufacturing by the end of FY2020. The investment amount is being estimated.
- ✓ The target monthly output is about 150,000 wafers.



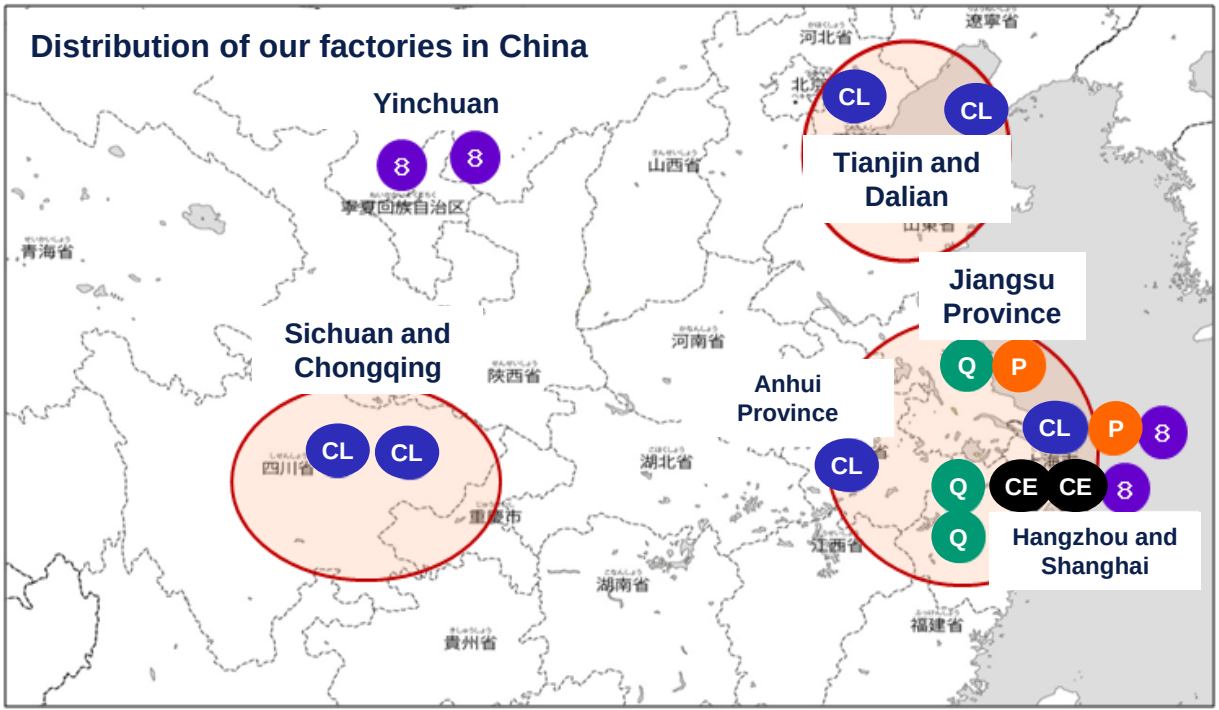
Cleaning business: To expand our market share while expecting mid/long-term demand

- Our cleaning business has already built the position of No.1 vendor in the precise recycling and cleaning market in China (share in China: 60%). Most of leading semiconductor foundries in China are clients of our cleaning business.
- Organizational restructuring to make the subsidiary in Anhui the top of the cleaning business group including 5 business establishments and 6 factories at the end of July
- As the mainstay of our recurring-revenue business, we will expand it inside China, and also plan to expand it outside China.

Shift to the holding company structure with the subsidiary in Anhui serving as the top

Ferrotech Group's map of production sites in China

- Decrease business risk by dispersing factories while expanding factories in China



Completed construction and commenced operations at plants in China

- Most of the new factories in China have been completed and are now in operation, moving to the mass production stage.
- Start operation in FY3/20 (current fiscal year) and plan to make a full-fledged contribution to sales from FY3/21 (next fiscal year)

Major plants in China recently completed and commenced operations

Quartz and DCB Factory
(Dongtai, Jiangsu Province)

Completed in November 2018

Quartz Factory
(Changshan, Zhejiang Province)

Completed in October 2018

Ingot Factory (Yinchuan No. 2)

Completed in May 2019

200 mm Wafer Factory
(Hangzhou)

Completed in November 2019

Cleaning Factory
(Anhui Province)

Completed in January 2019

Cleaning Factory
(Chongqing No.2)

Completed in January 2019

Lineup of our electronic device-related products

Thermo-electric modules

*As temperature adjustment devices, thermo-electric modules are increasingly used in the fields of automobiles, semiconductor manufacturing equipment, communications, medical biotechnology, consumer products, etc.

(Market share: 26% (TOP))

Thermo-electric modules for DNA amplification (biotechnology)

Power semiconductor substrates

★Mid-term strategic product

*In response to the global trend of power consumption reduction, the demand from clients needing power semiconductors is growing. (DIRECT COPPER BONDING technology for bonding a cooper circuit to an aluminum ceramics substrate)

Application of power semiconductors

Ferrofluid

*Used in a wider range of fields, including automobile speakers, high quality sound TV speakers, and smartphone vibration

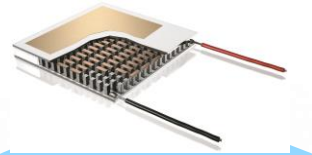
(Market share: 80% (TOP))

Electronic devices: Thermo-electric modules are increasingly used for various purposes, including 5G.

- The demand for thermo-electric modules is growing toward the full-scale operation of 5G.
- Thermo-electric modules are used in a wider range of fields, including consumer products, in addition to communications. It is possible to diversify our revenue sources by introducing them in a variety of industrial fields.

*The field of “wearable items,” including clothes, is promising, as we could flexibly deal with the regional characteristics and seasons of each country.

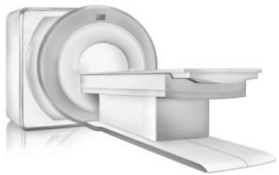
Automobiles



Modules for semiconductors

A wider range of target fields

Medicine



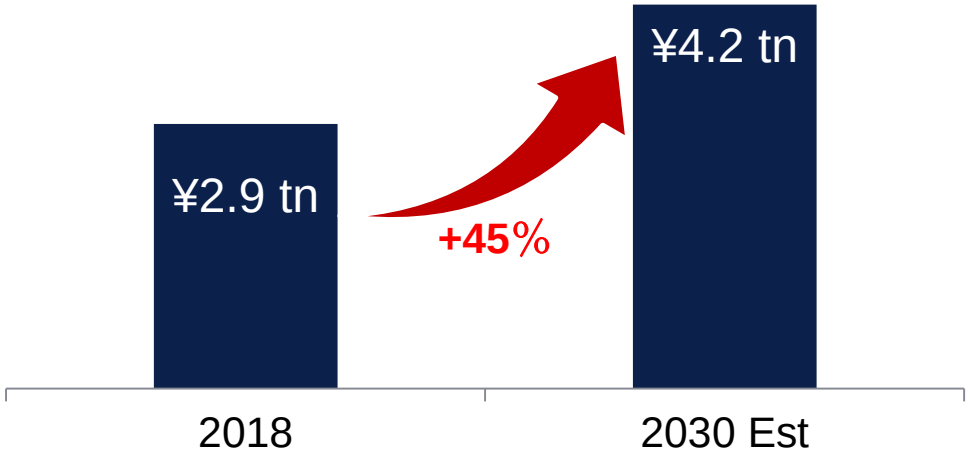
Consumer products

Mobile communication system (5G)

Electronic devices: For power semiconductors, AMB substrates will be released.

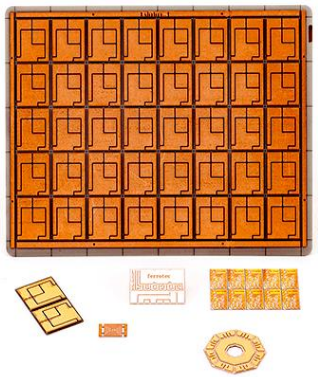
- The scale of the power semiconductor market is estimated to grow about 45% to 4 trillion yen by 2030.
- Demand is growing also in the fields of machine tool and automotive sectors. In addition to DCB substrates, AMB substrates will be released*.
- The new factory for power semiconductors in Jiangsu is expanding production capacity, and sales are estimated to keep growing from next term onward.
  (Hangzhou Factory in Shanghai can already produce 600,000 DCB substrates per month.)

Global market for power semiconductors



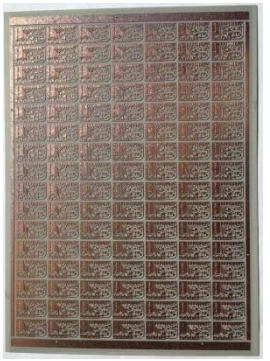
*Prepared by the Company based on data from Fuji Keizai Co., Ltd.

Demand for AMB base increased due to an increase in in-car use.



DCB board
(Direct Copper Bonding)

Material: Alumina ceramics



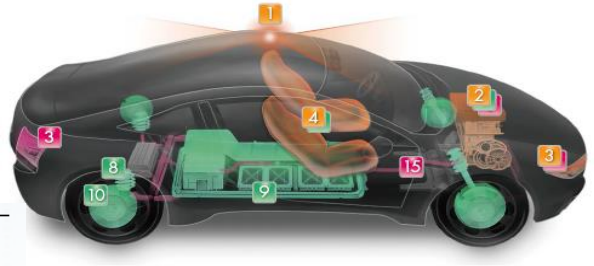
AMB board
(Active Metal Brazing)

Material: Silicon Nitride

Strengthen marketing to the automotive industry by applying our core technologies

- For next-generation automobiles, our core-technology products can be applied to a wide range of in-car products.
- We promote mainly thermo-electric modules, ferrofluid, and power semiconductor substrates, giving proposals to manufacturers of in-car parts.

Our Technologies for Automotive Products



Thermo-module application
1 Laser radar
2 Battery cooling
3 Laser headlights
4 Seat cooling system
5 Steering heater cooler
6 Cup holder
7 HUD (Head-up Display)

Magnetic fluids and applications
2 Engine suspension
4 Seat suspension
8 Suspension around the foot
9 Hzero® high-precision DC sensors for monitoring SOCs
10 Hzero ® composite wheel in motor
11 Touch Panel & Center
12 Audio

Power semiconductor substrates and applications
2 Engine
Bodies
3 Headlamp control and room lamp control
Powertrain
13 HEV motor control Transmission, brake and steering control

Examples of application of thermo-electric modules (for EVs and ADAS)

Thermo-electric module
battery heater/cooler

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

Thermo-electric module
ADAS camera cooler

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

To achieve consolidated sales of 20 billion yen in the automotive field over the next 3 years

Aiming for Sales of 20 Billion yen in Automotive Industry in the Next 3 Years

-From FY3/21 onwards, we will consider establishing a new "Automotive Segment" by separating automotive from electronic devices.

FY2020/3 (As of) Segment Composition

*Currently, automotive sales are around 2 billion yen.

- Semiconductor and other equipment-related
- Electronic device
- Others

Segment Composition for FY3/21 (from the Next Fiscal Year)

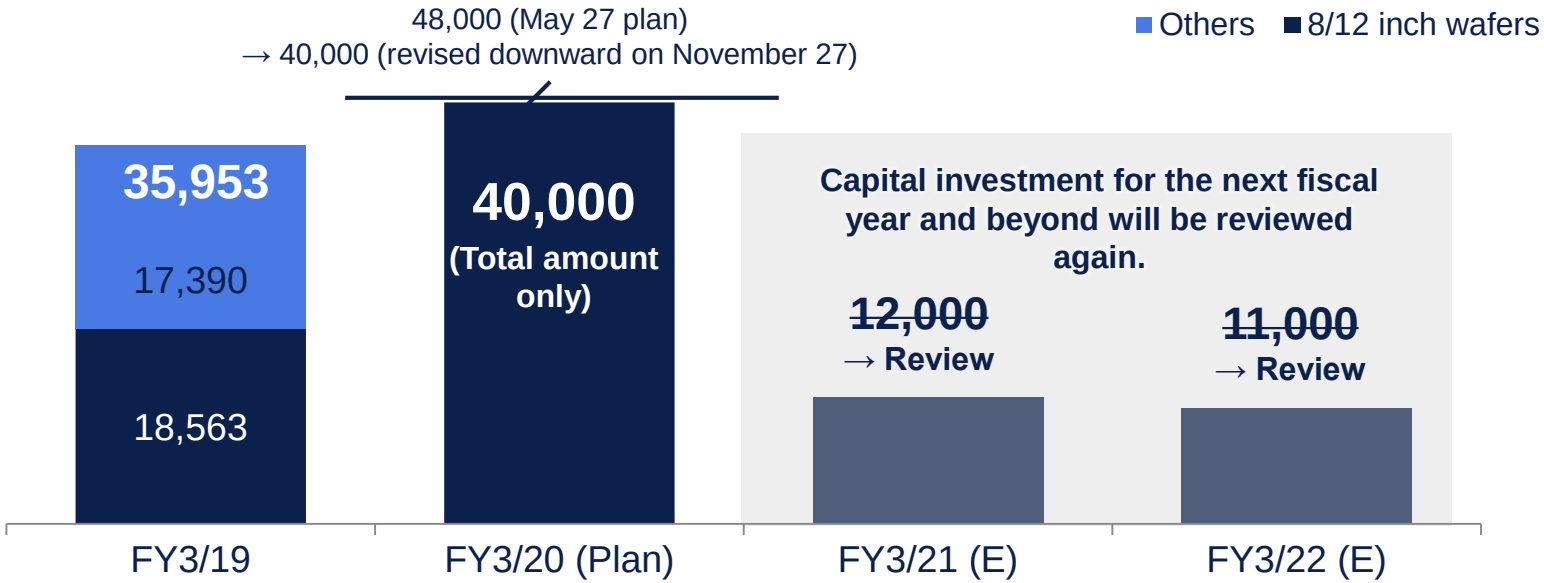
- Semiconductor and other equipment-related
- Electronic device
- **In-car mounted products (In consideration)**
- Others

Medium-term Capital Investment Plan is Scheduled to be Revised

- The capital investment plan at the time of the announcement of the medium-term management plan is currently under review, partly due to the entry into the wafer recycling business. (The plan for the period from FY3/21 to FY3/22 is scheduled to be disclosed at the results briefing in May 2020.)
- In terms of fund procurement, in addition to borrowing from banks and other entities in Japan, we considers a variety of financing methods, such as the effective use of expanding Chinese capital.

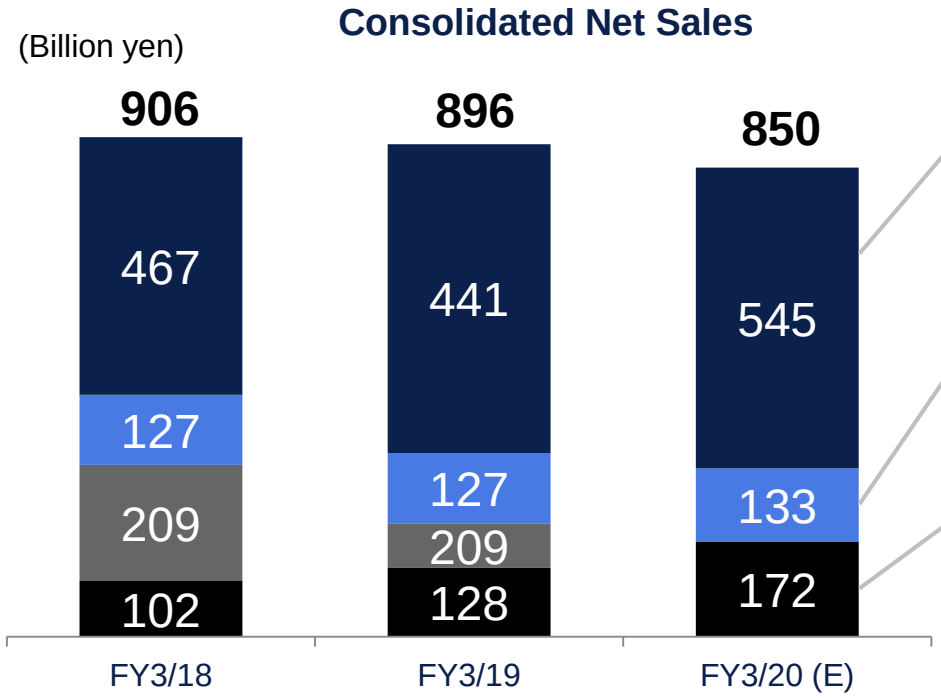
Capital Investment in Medium-Term Management Plan (To be revised)

(Million yen)



Full-year Forecast:
Expect Recovery from Next Fiscal Year Onward

- Revised down the initial forecast in light of conditions in the semiconductor market in the 1H of this year
- Performance is expected to remain weak in the 2H, but the market is expected to recover from the next fiscal year onward.



Semiconductor and other equipment-related:
54.5 billion yen

Electronic device:
13.3 billion yen

Other Business (Including Photovoltaic business):
17.2 billion yen

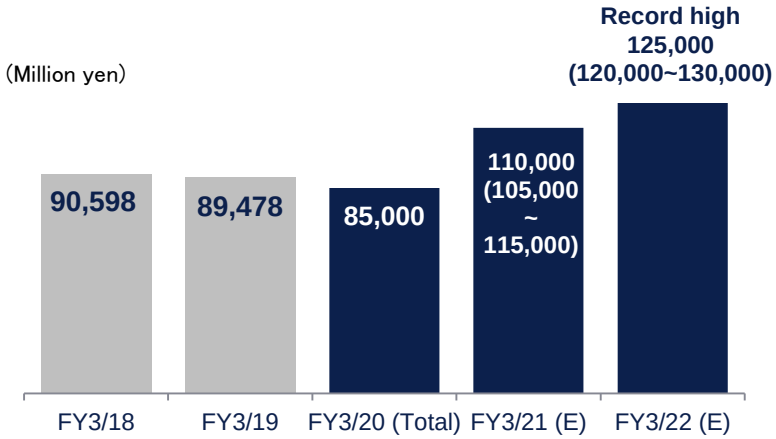
Medium-term targets:
Target for FY3/20 updated, FY3/21-FY3/22 remains unchanged

- Sales for the final year is forecasted to be 125 billion yen, the highest level ever (unchanged from FY3/21 to FY3/22)
- Figures for FY3/20 reflect the latest forecasts announced on November 7.

Net Sales (FY3/22)

125 billion yen

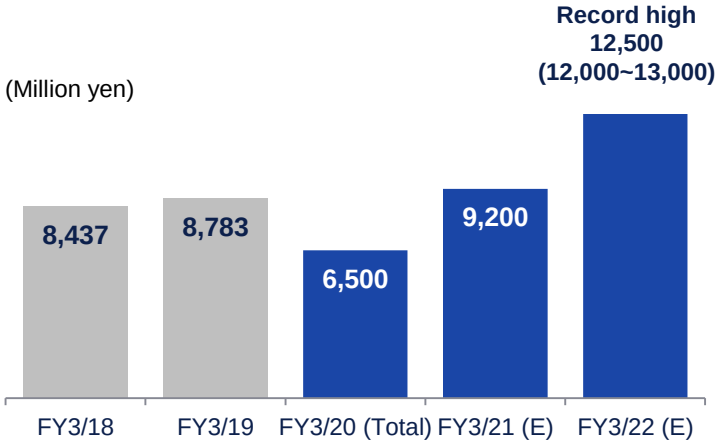
(Range: 120-130 billion yen)



Operating Income (FY3/22)

12.5 billion yen

(Range: 12-13 billion yen)



Prioritized policies of the entire corporate group (Items to be improved for sustainable growth)

Basic concept:

The secret of success in business is that executives and employees enjoy working. When they pursue ingenuity and work on their tasks vigorously, the productivity of the entire company and the motivation of employees improve.

Prioritized policies

1. Transfer of power to subsidiaries inside and outside Japan, and establishment of an independent management system

◊Enhancement of each subsidiary's functions for marketing, technology, manufacturing, personnel affairs, financial affairs, and accounting

◊Development of new materials and technologies. Each company will establish a development section and an R&D center.

2. Securing of excellent personnel and strengthening of educational systems

◊To invite doctors and researchers to increase the number of patent applications (promoting the collaborative development with universities)

◊Improvement in communication skills for maximizing group synergy (diversity strategy)

◊Development of educational systems for improving information security and IP management functions (globally)

Our group's priorities for the business in China

Priorities

1. Participation in national projects in the semiconductor field

◊Effective use of technical centers of national governments and ministries, and utilization of preferential treatment in national projects

◊Pursuit of technologies and products in the cutting-edge field, which cannot be imitated by foreign-affiliated Chinese enterprises

2. Restructuring of the group of Chinese subsidiaries, and discussion on fund procurement for growth

◊To discuss the establishment and functions of the holding company that manages multiple Chinese subsidiaries

◊Clarification of cutting-edge technologies and businesses to be grown and strengthened, and diversification of schemes for procuring funds for growth

Notes on forward-looking statements

- 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

Ferrotec Holdings Corporation