Ferrotec Holdings Corporation

Medium-term Growth Strategy

May 28, 2018

(JASDAQ 6890)

http://www.ferrotec.co.jp/

Growth fields to which we belong

FerroTec

By industry

Semiconductor and FPD

Automobile

Growth fields to which we belong

FerroTec

By industry

Energy

Biotechnology and Medical

Growth fields to which we belong

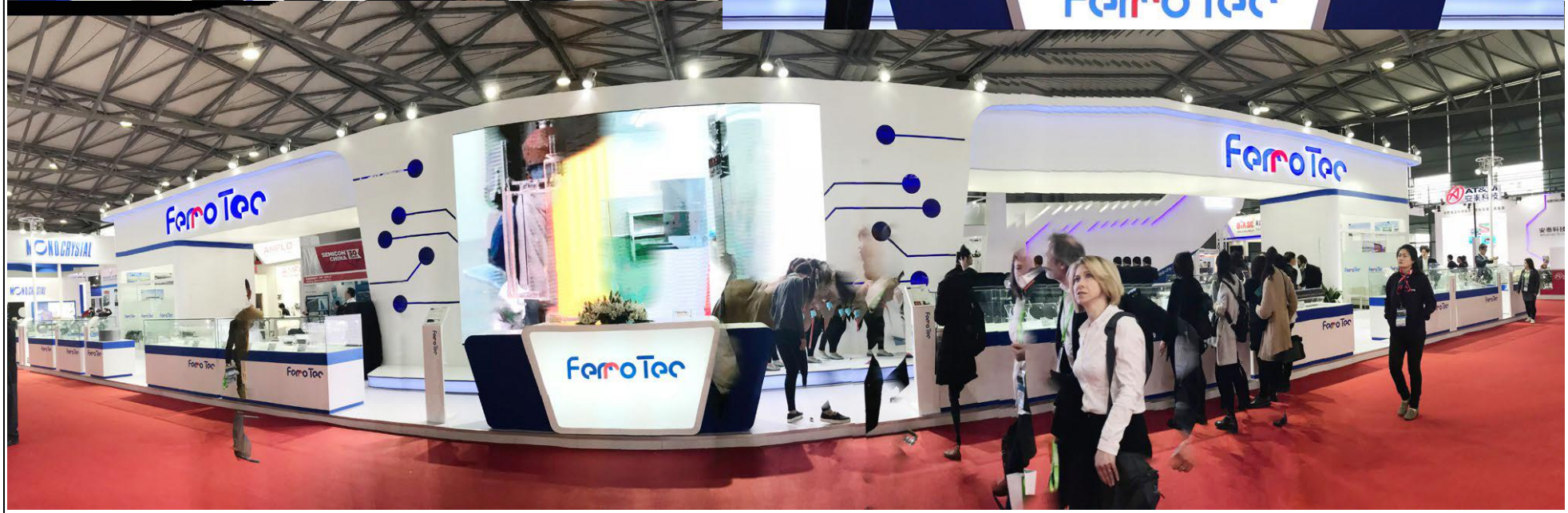
FerroTec

By industry

Communication	Contract production

SEMICON® CHINA

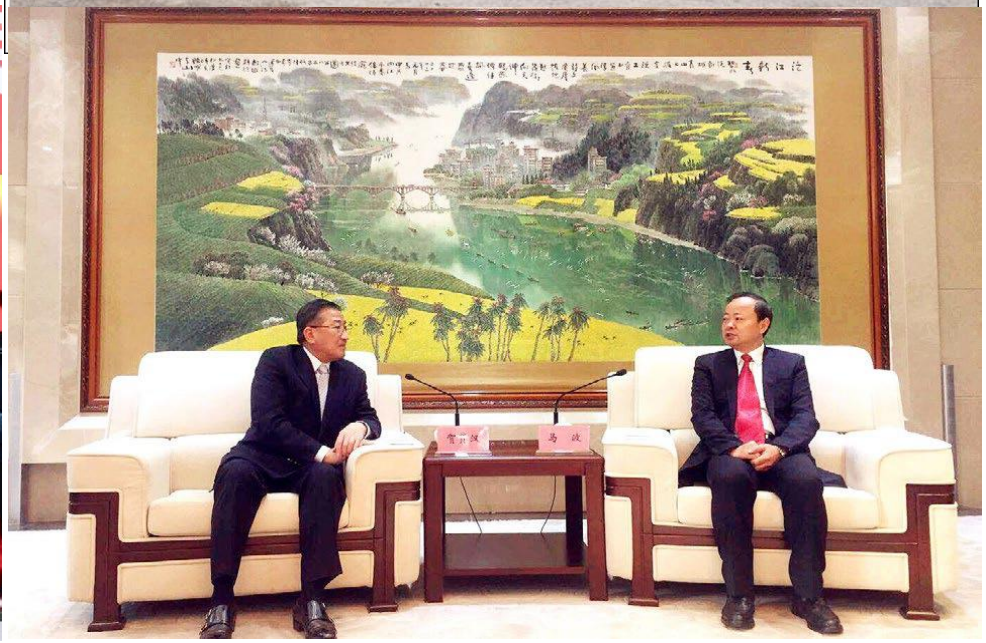
FerroTec



Expansion of production capacity

A lot of groundbreaking ceremonies are being planned in 2018

Changshan, Zhejiang province	Second Quarts Factory
Neijiang, Sichuan province	Second Cleaning Factory
Yinchuan, Ningxia	Second Si Crystal Factory
Tongling, Anhui province	Establishment of a new cleaning factory

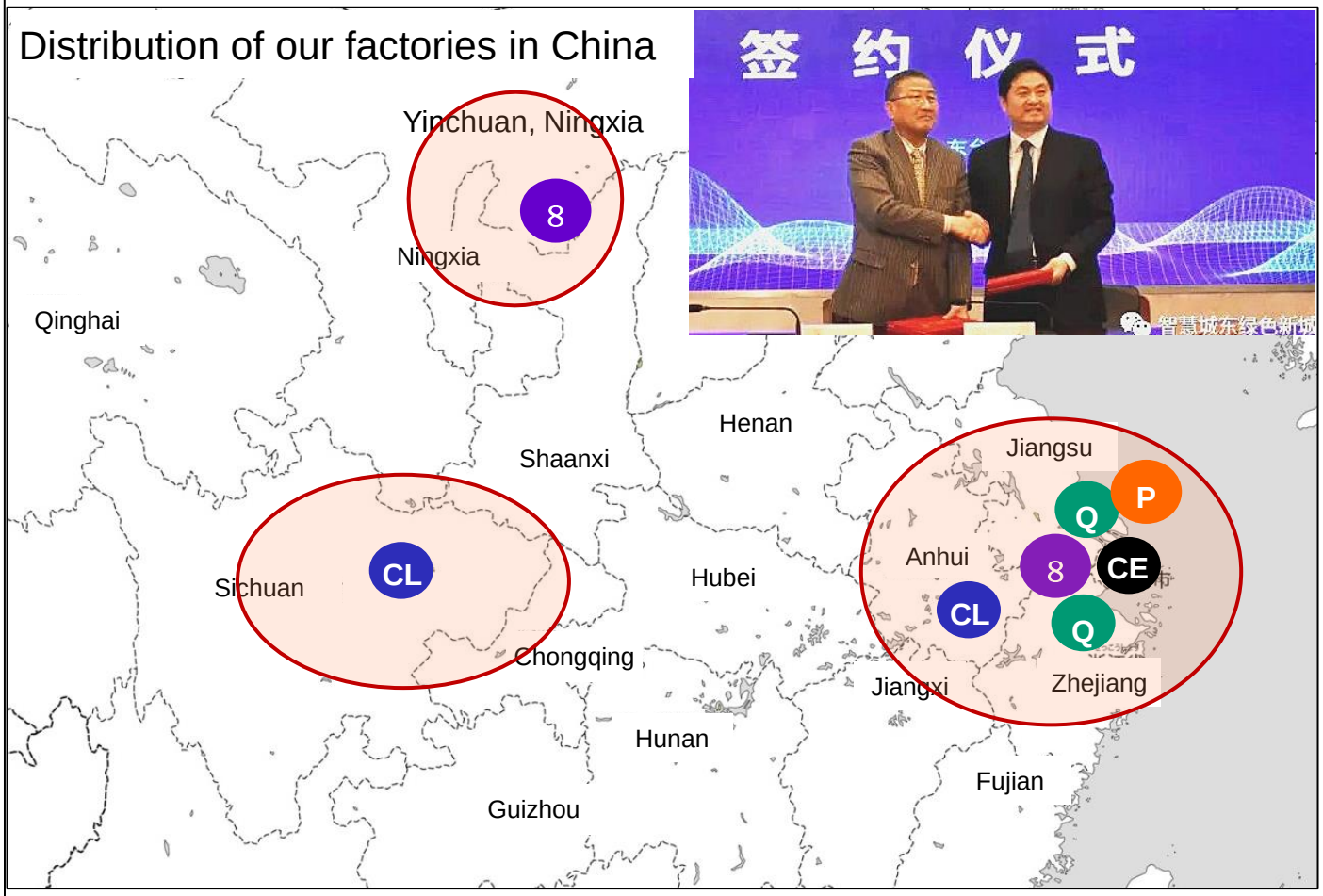


Expansion of production capacity

Eight new factories are on construction with support from local governments

Half of them is scheduled to be constructed by the end of the year

Distribution of our factories in China



= Industrial area (where new factories are on construction)

8 = **8-inch factory (Second Crystal Factory in Yinchuan, Hangzhou Koto)**

Q = **Quartz factory (Hangzhou Changshan, Jiangsu Dongtai)**

CE = **Ceramics factory (Hangzhou Dongjiang)**

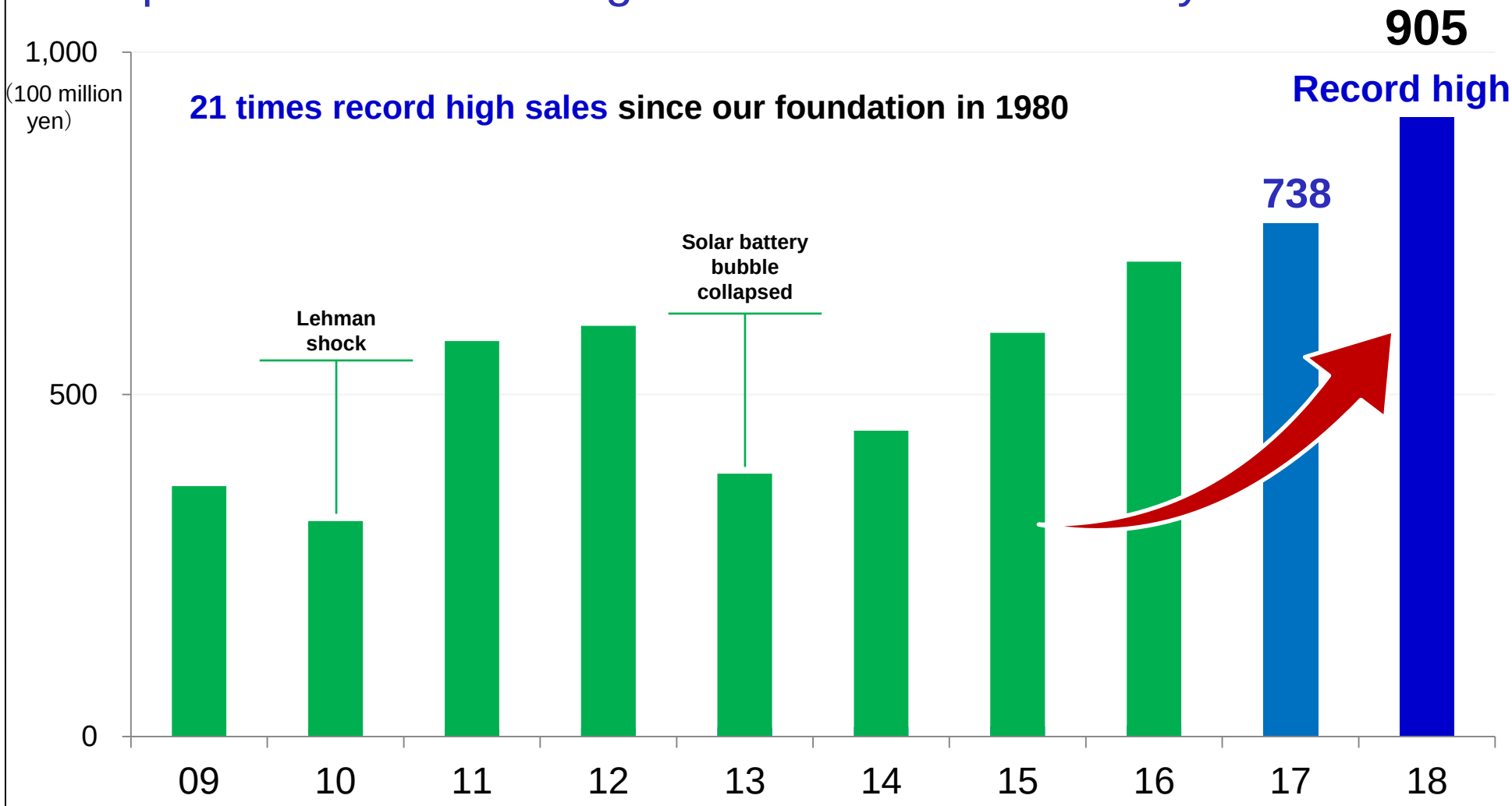
CL = **Cleaning factory (Second in Sichuan , Dalian and Anhui Tongling)**

P = **Power semiconductor factory(Jiangsu Dongtai)**

Exceeded record high sales

Exceeded record high sales

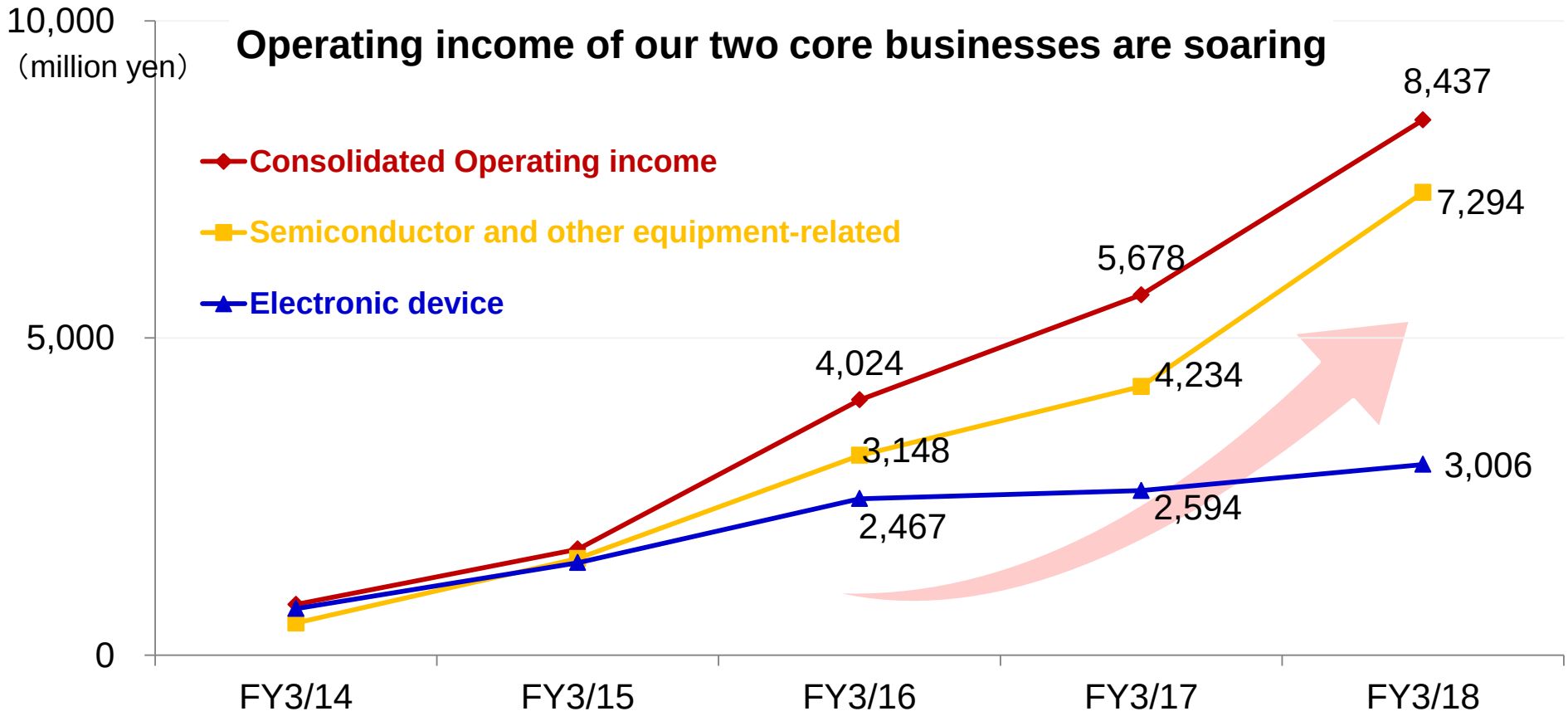
Anticipate further record high sales in the next fiscal year



Concentrate on core businesses

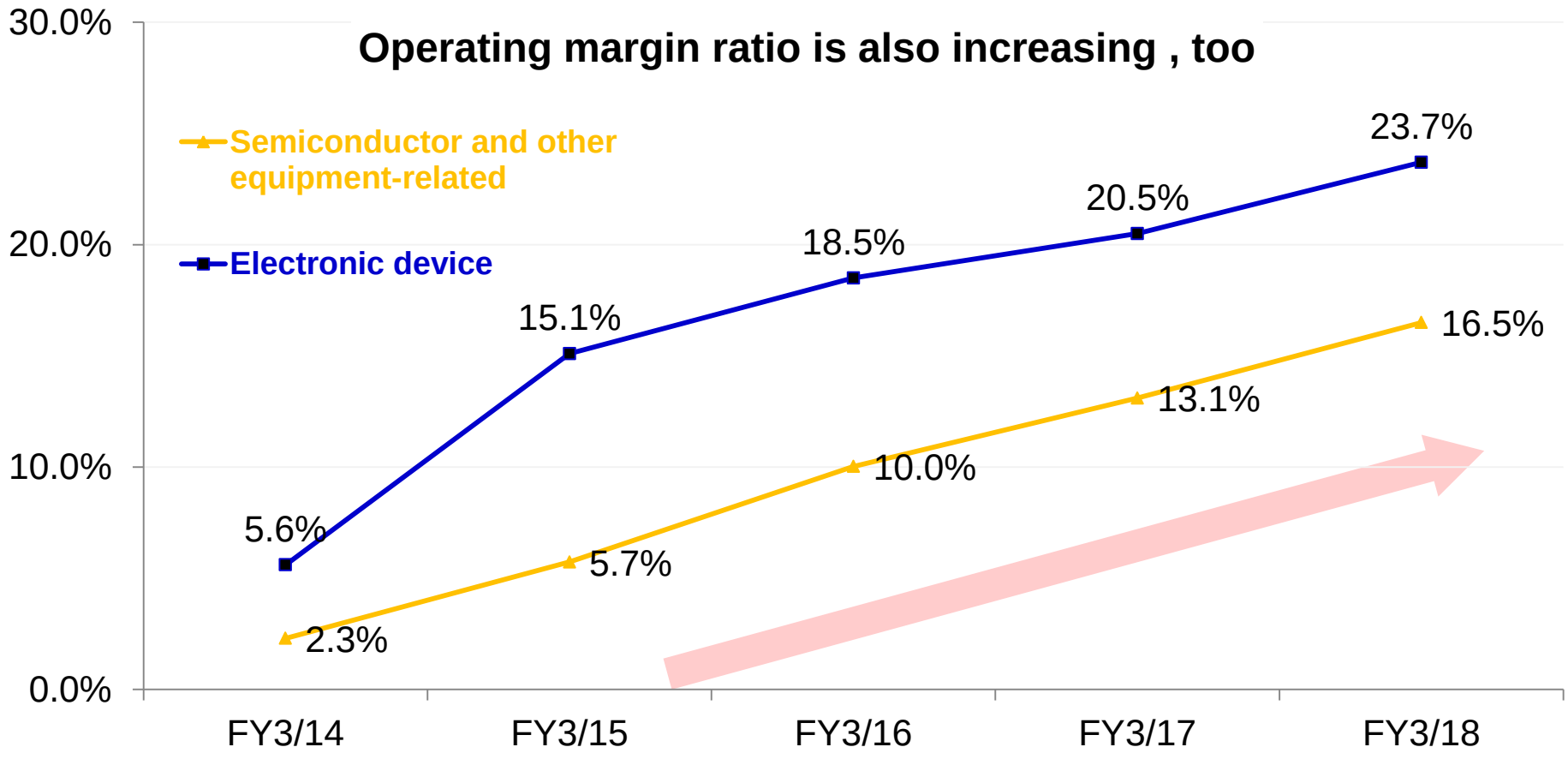
Concentrate management resources on semiconductor and other equipment-related business

To increase production capacity for strong demand



Concentrate on core businesses

Make Semiconductor and other equipment-related and Electronic device business to be higher profitable business



Growth fields to which we belong

By industry

Semiconductor	**Automobile**	**Energy**
Biotechnology and Medical	**Communication**	**Contract production**

Technological trends and new demand for semiconductors

◆ Prolonged demand for semiconductors continued due to technological innovation

	Technological trends	Influence to semiconductor market
	IoT	Lots of different devices are being newly connected to the network ⇒ Increase in semiconductor demand (discrete, power system) in new fields
	3D-NAND	Demand for miniaturization, and for the replacement of high-speed large-capacity devices is emerging ⇒ Increase in demand for consumable supplies due to complicated process stages
	Big data	Demand for semiconductor memory increasing for enormous data analysis applications
	AI	Increase in integrated data volume due to utilization of big data ⇒ Increased demand for memory, sensors, etc.
	Automatic driving	Increase in demand for parts accompanying the addition of new functions
	Mobile communications system (5G)	High speed and large capacity, increased number of terminal connections ⇒ Increase in demand for memory for use in edge servers and for sensors
	Power semiconductor	Trend toward worldwide power saving ⇒ Expansion of demand deriving from increased adoption of inverters

Measures to achieve medium-term targets

Continue to concentrate capital investment in areas with strong demand

1. **Investing management resources into semiconductor and other equipment-related business**
   - ・・・8-inch wafers, material products, cleaning business

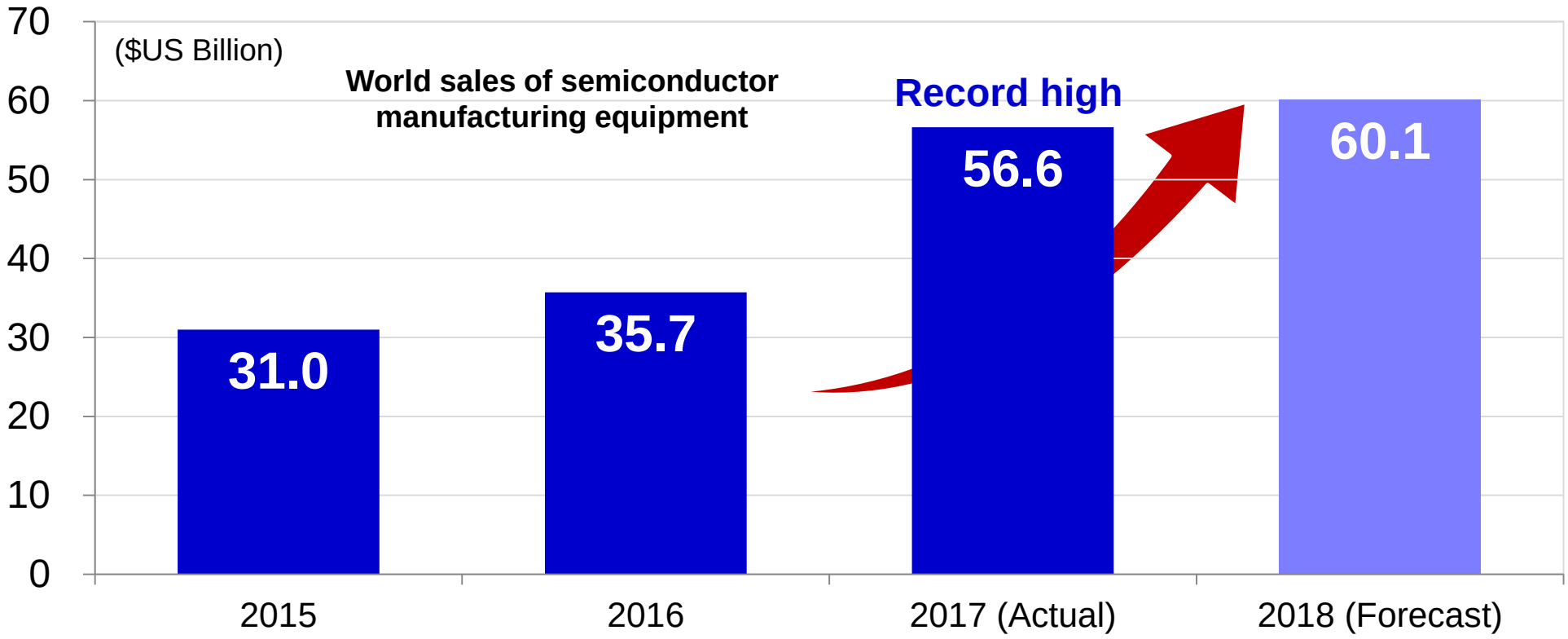
2. **Introducing applied products into the automobile industry (electric vehicles)**
   - ・・・Applications other than automobile seats

3. **Expansion in growth of the electronic device business**
   - ・・・Strengthen communications, medical, and domestic electrical appliances fields

Semiconductor market remains favorable

World sales of semiconductor manufacturing equipment in 2017 reached a record high

- Jumped by 37% from 2016, reaching a record high since 2000
- Growth in Asia such as South Korea and China is especially apparent



※Created using SEMI data
※2018 forecast is as of December 2017

Cover area of our products for semiconductor process

Our products are used in almost all semiconductor manufacturing processes, so demand is expected to increase further

Pulling device

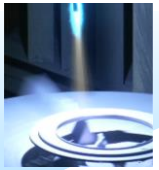
Contract processing

Quartz-product

Ceramics

CVD-SiC

Equipment cleaning



Vacuum feedthroughs

Silicon parts

～ General semiconductor manufacturing process (partially omitted)

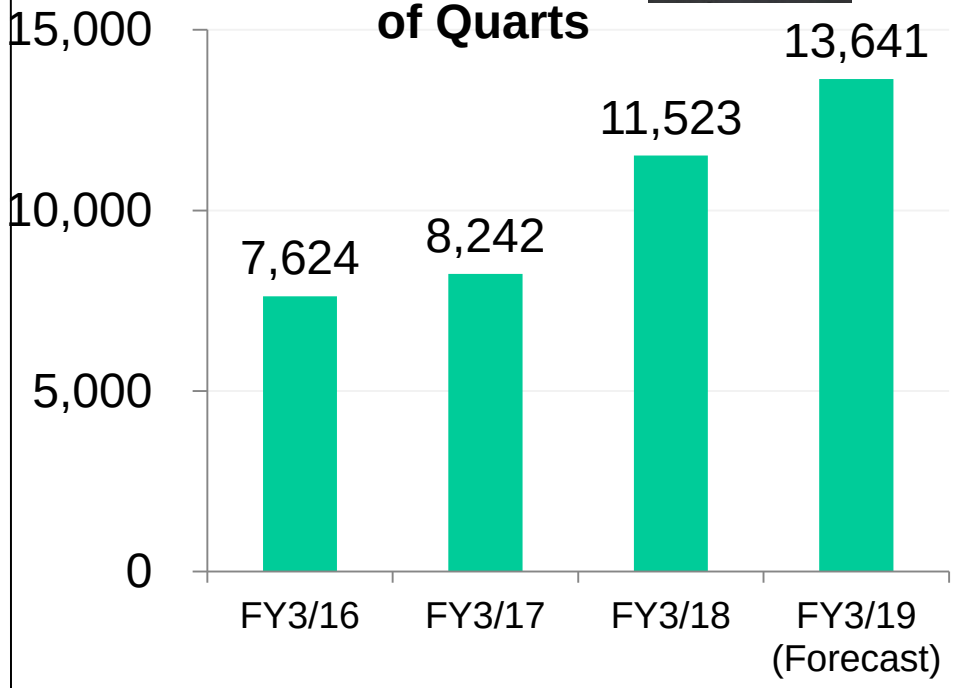
1. Ingot pulling
2. Ingot cutting
3. Polishing
4. Oxidation and diffusion
5. Photoresist application
6. Pattern exposure
7. Etching
8. Ionic influx
9. Flattening
10. Electrode formation
11. Wafer inspection
To post-processing

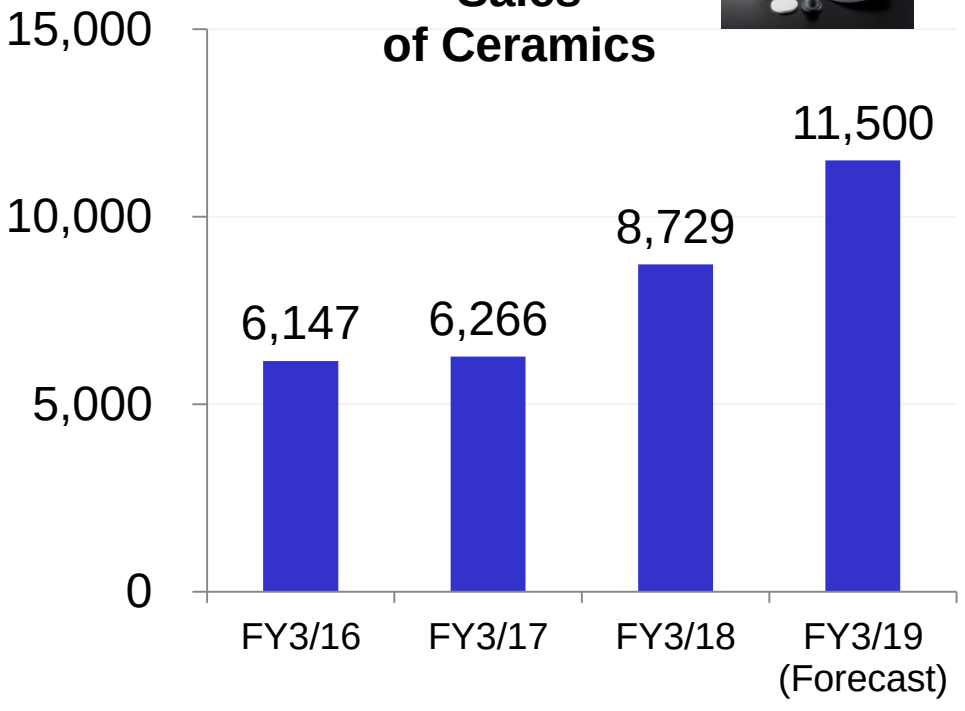
Covers most semiconductor manufacturing processes

Structural reforms to higher profitability

Semiconductor and other equipment-related business is growing strongly due to increased demand

Concentrate management resources on semiconductor and other equipment-related business to increase production

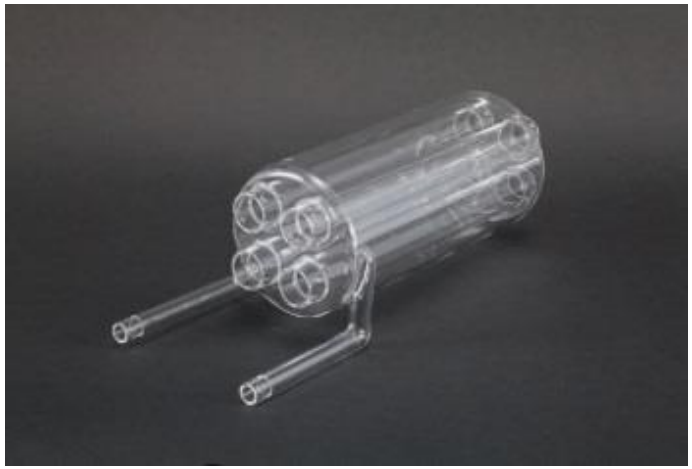


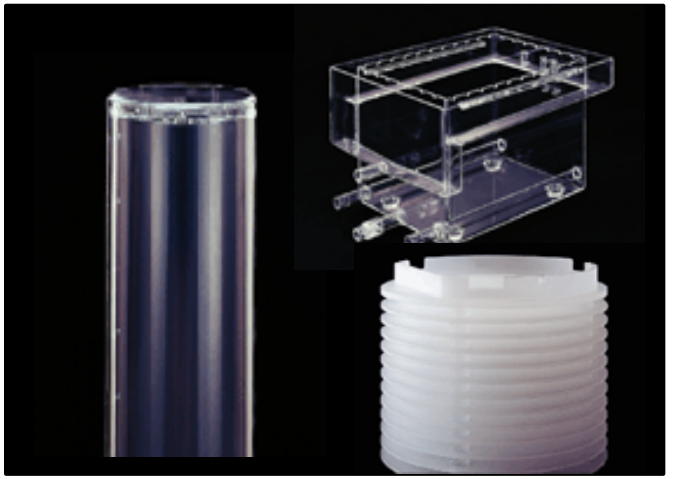


Quartz: Increase production capacity by adding new lines

- Expand production lines due to increased demand from major U.S. and Japanese companies
- Continue capital investment in anticipation of increased demand
- A new factory in Jiangsu Province, China, is under construction

  → To be completed around October 2018, and contribution to sales is expected from FY3/20





Ceramics: Expanding Production Capacity in Japan and Overseas

Japan

- Ishikawa Development Center started operation in January 2018
- In the future, the Kansai Plant in Hyogo will also be integrated to strengthen development capacity

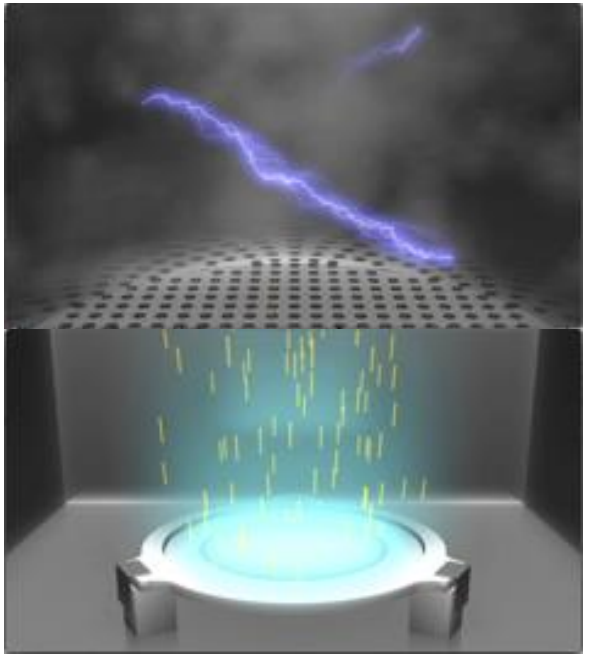
Overseas

- Built the second factory in China due to increased demand from major U.S. and Japanese companies
- Construction will be completed around January 2019, and contribution to sales is expected from FY3/20

Equipment Contract Processing Business:

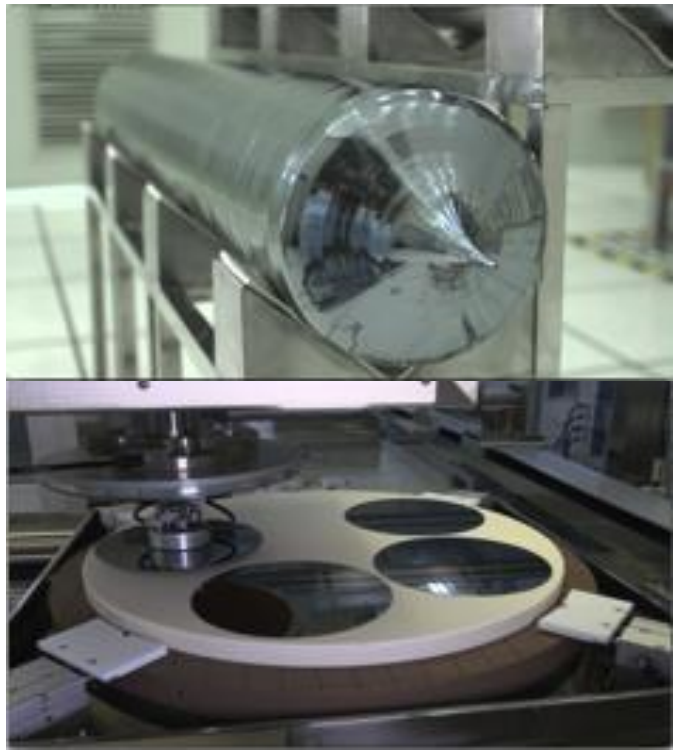
OEM production for semiconductor manufacturing equipment

・・・Strengthen contract production in special fields

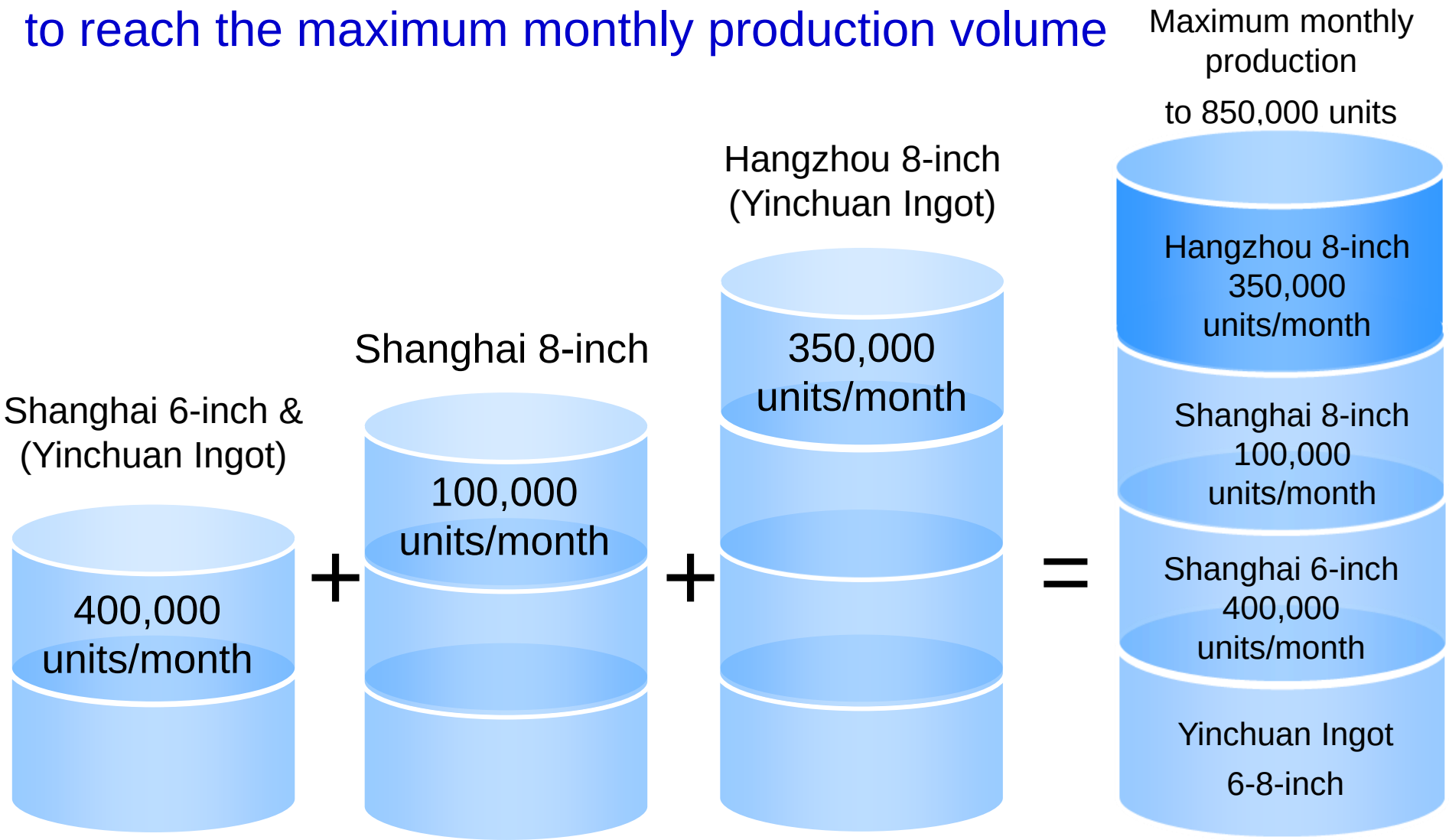


China's 8-inch crystal and wafer production factories are ready for mass production.

- Aiming to start mass production in two Yinchuan factories and Hangzhou factory in 2019



In China, aim to start full-operation in 2020 to reach the maximum monthly production volume



Expansion of cleaning business

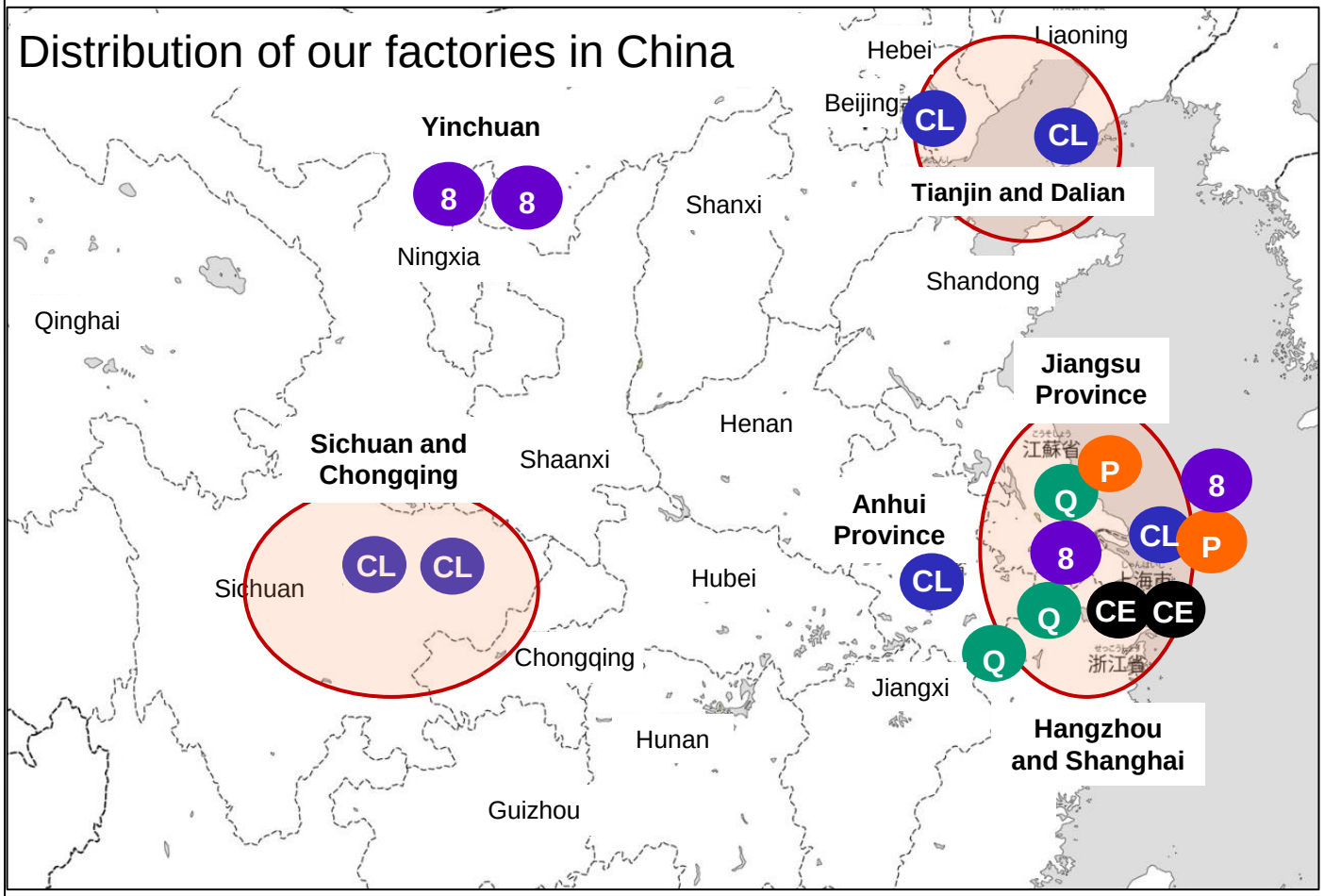
Continued strong customers' demand for increase in production volumes due to miniaturization and 3D-ization of semiconductors

→We plan to establish a fifth cleaning factory in Anhui Province, China.

It is scheduled to start operations from the end of 2018, and to contribute to sales from FY3/20

Expansion of production capacity

Decentralizing factories while developing factories in major areas, and so reducing business risks



Major industrial area

8 **8-inch factory**
(Shanghai, Yinchuan× 2, Hangzhou)

Q **Quartz factory**
(Hangzhou, Changshan, and Dongtai)

CE **Ceramics factory**
(Hangzhou × 2)

CL **Cleaning factory**
(Shanghai, Tianjin, and Sichuan × 2, Dalian and Anhui provinces)

P **Power semiconductor factory**
(Shanghai, Dongtai)

Construction plan for new factories

Increase in production is expected to make a full contribution in FY3/20

New plant in China Operation schedule		FY3/19				FY3/20				FY3/2021				. . .
Factory	Place	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	
8-inch wafer secondary line	Hangzhou					Around 1Q 2019-Completed								
Quartz	Jiangsu Province, Dongtai													
Ceramics	Hangzhou													
Cleaning factory	Anhui Province, Sichuan Province													
DCB substrate	Jiangsu Province, Dongtai													
Silicon crystal(second)	Yinchuan													

Measures to achieve medium-term targets

Continue to concentrate capital investment in areas with strong demand

1. **Investing management resources into semiconductor and other equipment-related business**
   - ・・・8-inch wafers, material products, cleaning business

2. **Introducing applied products into the automobile industry (electric vehicles)**
   - ・・・Applications other than automobile seats

3. **Expansion in growth of the electronic device business**
   - ・・・Strengthen communications, medical, and domestic electrical appliances fields

Advent of advanced driving support system

Forecast that global sales of new cars will reach 100 million units in 2020*

Next-generation technologies will be concentrated in automobiles, demand for automotive semiconductors will accelerate

Next-generation technology

- **Image sensor**
- **Edge computer**
- **Big data**
- **Mobile communication**
- **Power semiconductor**

Etc...

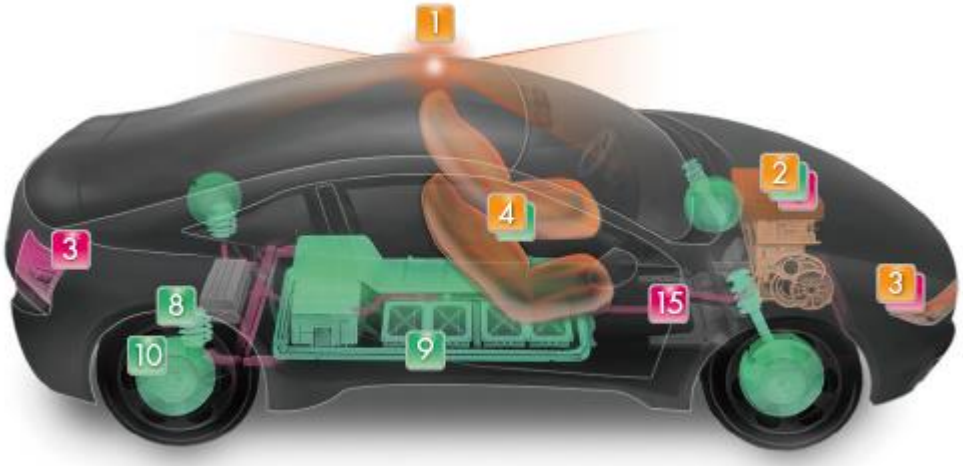
All technology trends fusing into a single unit

Automatic operation and EV conversion

Increase in number of mounted parts →
Increase in parts demand

*Source: Manufacturing Industry Bureau, Ministry of Economy, Trade and Industry, Source: "Structural eChanges in the Automotive Industry and Their Equality"

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



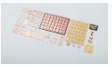
Thermo-module application

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

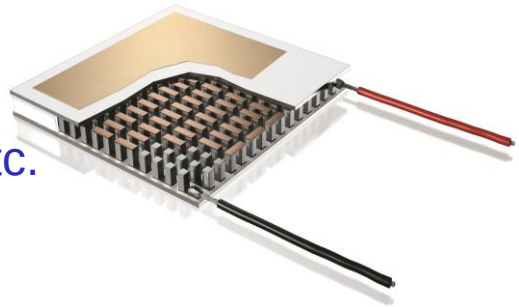
3. Headlamp control and room lamp control

Powertrain

13. HEV motor control
Transmission, brake and steering control

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

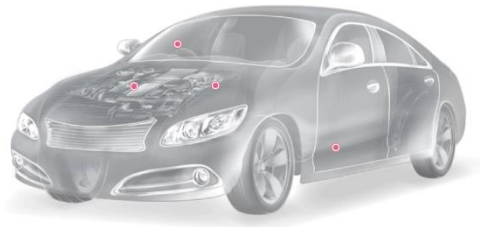
Expand the support area of thermoelectric modules



- Expand the range of communications and medical care, etc.
- Focus on development of power generation modules

Unit model

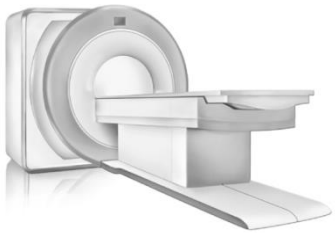
Generation module



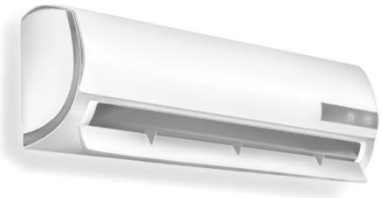
Advanced Vehicles

Expand the support area

Medical



Commercial-off-the-shelf product



Mobile communication system (5 G)

Capture the industrial power semiconductor market

- Forecast over 30% growth, becoming a ¥4 trillion scale market by 2030
- Rapid increase in demand from customers for increased production
- Construct a power semiconductor substrate factory in Jiangsu Province in response to increased demand

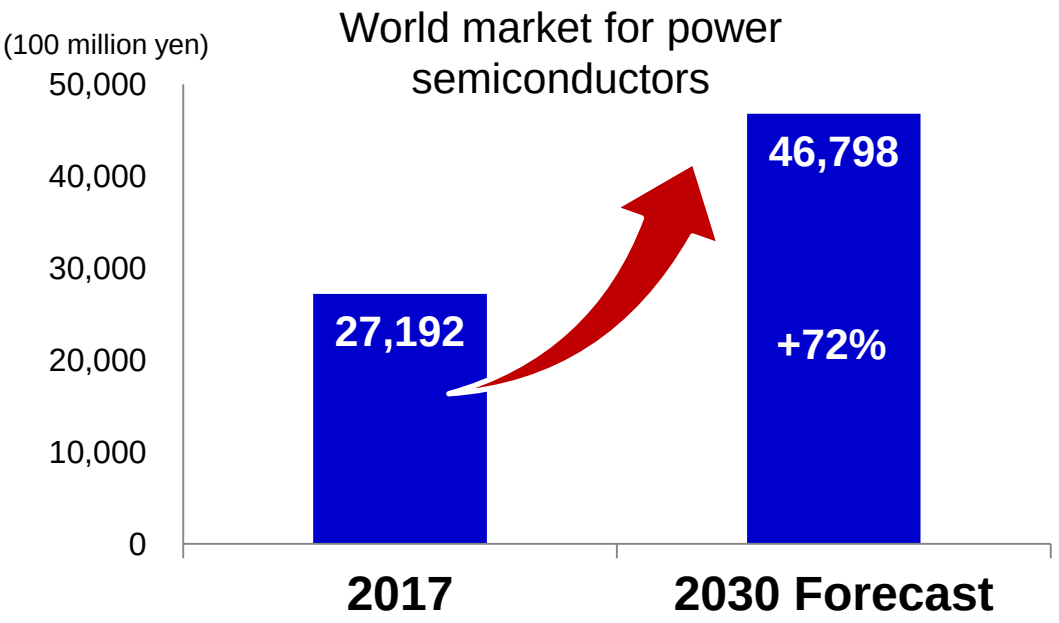

Shinkansen


Electric vehicle


Welding robot


Train operation sheet

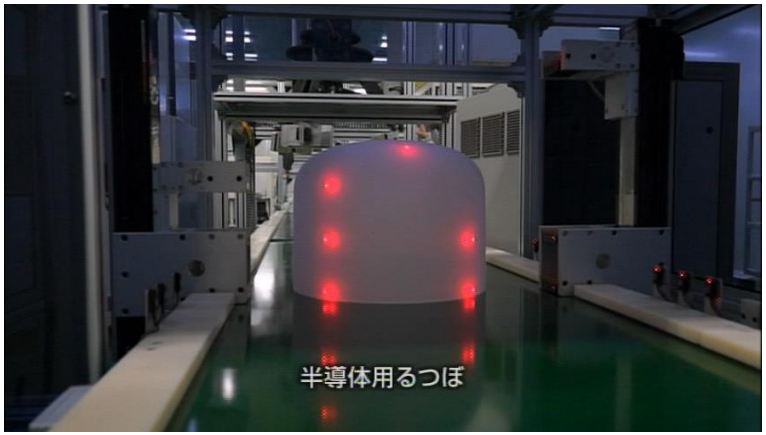

Home appliance inverter



※Compiled by the company from data of Fuji Keizai Co., Ltd.

Reorganization of photovoltaic-related business

- Silicon mono-crystal manufacturing equipment for semiconductor applications currently in operation
- Pulling apparatus for 12-inch application currently at prototyping stage
- Approximately 50% of the quartz crucibles are shifted in semiconductor applications



Shift to semiconductor applications

Strengthening European Sales Structure

Strengthen sales in Europe in anticipation of an increase in automobile demand due to the advancement of industry 4.0, smart factories, etc.

- Strengthen cooperation between Germany and Russia to expand the thermoelectric module business
- Demand for increased production from large-scale power semiconductor customers
- Acquire contract processing orders from famous European machinery manufacturers

← Established operational bases in a wide range of locations in Europe, mainly at the head office in Germany

*ESG (Environmental, Social and Governance)

Activities in Japan and Overseas

Scholarship Program

Develop scholarship systems for Anaheim University in the USA and Zhejiang University in China

↓

Contributing to the development of human resources with roots in local communities

Contribution to local communities

Contributing to Local Communities

Undertaking a clean-up of the area around the Shonan factory and sponsoring meetings with local residents *

↓

Contributing to interaction with local residents and to environmental improvement

*Implemented at Asahi Plant, a subsidiary

Development of human resources

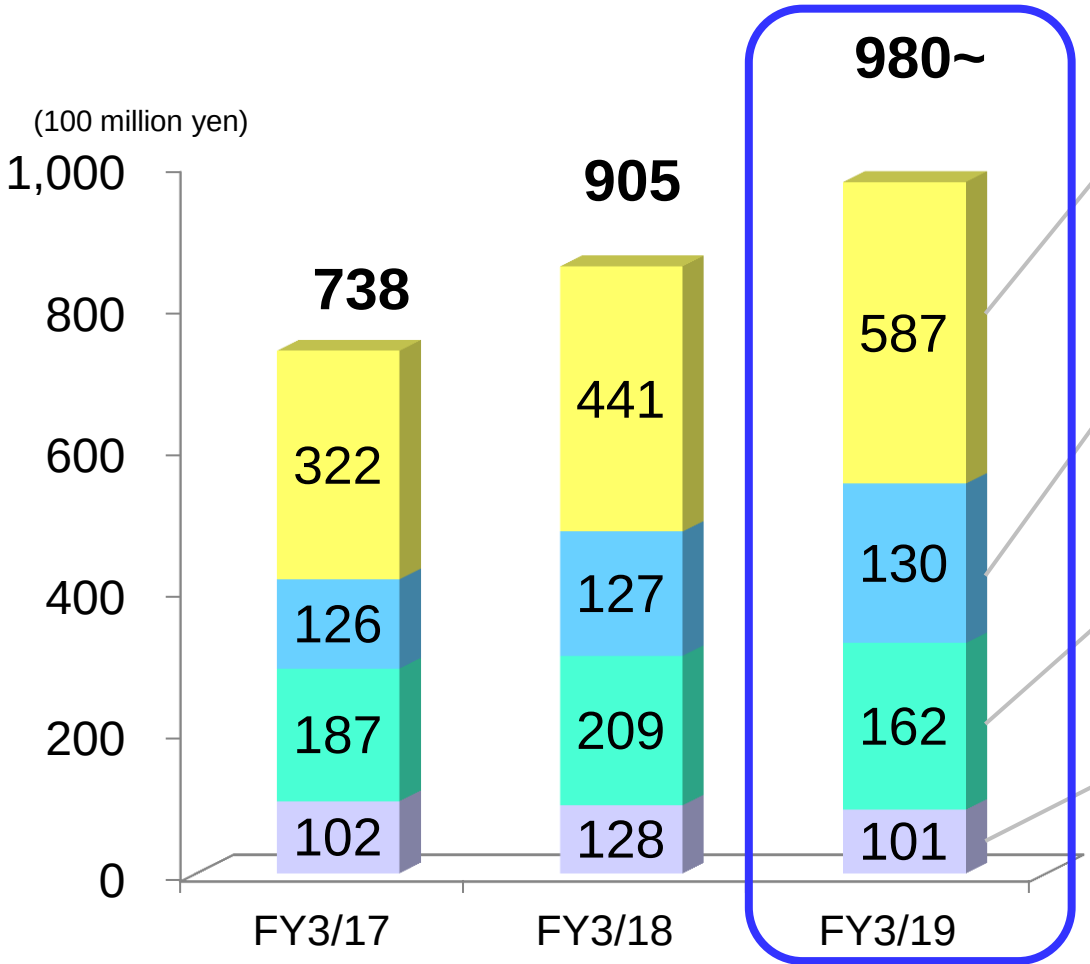
Holding talks between young employees and top management every month

↓

Inheritance of management philosophy, long-term development of human resources

Sales target

We target net sales at 100 billion yen and operating margin at 10% level for the final year of the mid-term plan



Semiconductor and Other Equipment-related
: 58.7~ billion yen

Electronic Device
: 13~ billion yen

Photovoltaic-related
: 16.2~ billion yen

General Industrial Equipment (Others)
: 10.1~ billion yen