

Ferrotec Holdings Corporation

6890

TSE JASDAQ

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■ Index

■ Summary	01
1. 1H FY3/19 results	01
2. FY3/19 forecast	01
3. Longer-term outlook: Implementing robust capital investments.....	01
■ Company profile	02
1. Company profile.....	02
2. History	02
■ Business overview	03
1. Business segments.....	03
2. Semiconductor and other equipment-related.....	04
3. Electronic devices.....	05
4. Photovoltaic-related.....	06
5. Others.....	08
6. Features and strengths	08
■ Business performance	09
1. Review of 1H FY3/19 results.....	09
2. Segment overview	11
3. Major capital investment.....	14
■ Business outlook	14
1. FY3/19 forecast.....	14
2. Outlook by segment.....	15
■ Medium- to long-term growth strategy	17
1. Measures to achieve medium-term targets.....	17
2. Main investment plans in semiconductor and other equipment-related businesses	18
3. Strengthening automotive business.....	19
4. Electronic devices business.....	20
5. Capital investment plans.....	20
6. Outlook for the photovoltaic-related business	20
7. Improvements in non-financial aspects.....	21
■ Shareholder return policy	21

Summary

Leading manufacturer of quartz, silicon, ceramic, and other inorganic parts and products. Core customers are major semiconductor production equipment firms

Ferrotec Holdings <6890> (hereafter, also “the Company”) manufactures vacuum seals, quartz products, ceramic products, CVD-SiC, ferrofluids, thermo-electric modules, silicon wafers, solar-cell silicon, and other various products, equipment, parts, and materials. The Company also provides cleaning service for various parts to semiconductor production equipment (SPE) manufacturers and silicon wafer polishing.

1. 1H FY3/19 results

In 1H FY3/19, Ferrotec reported ¥45,230mn in net sales (+5.2% year on year (YoY)), ¥5,069mn in operating profit (+12.7%), ¥4,866mn in ordinary profit (+26.1%), and ¥2,824mn in net income attributable to owners of parent (+22.9%). Operating profit increased at a double-digit pace YoY, despite weakness in photovoltaic-related and electronic devices, thanks to higher sales and profit in its mainstay semiconductor and other equipment-related business amid healthy conditions in the global semiconductor market. Ordinary profit and net income attributable to owners of parent rose by larger margins due to forex income. While segment trends were mixed, the Company continued to deliver improvement in overall profit and we think the results roughly met expectations.

2. FY3/19 forecast

For FY3/19, the Company projects ¥92,000mn in net sales (+1.5% YoY), ¥9,800mn in operating profit (+16.2%), ¥8,500mn in ordinary profit (+18.8%), and ¥5,300mn in net income attributable to owners of parent (+97.9%). It lowered the sales target from the period-start level (¥98,000mn) because of sluggishness in photovoltaic-related business, but also expects a smaller loss. Furthermore, even though semiconductor-related capital investments might be somewhat slower, the Company retains the full-year profit outlook because of likely expansion of cleaning and other new businesses as production activity remains upbeat.

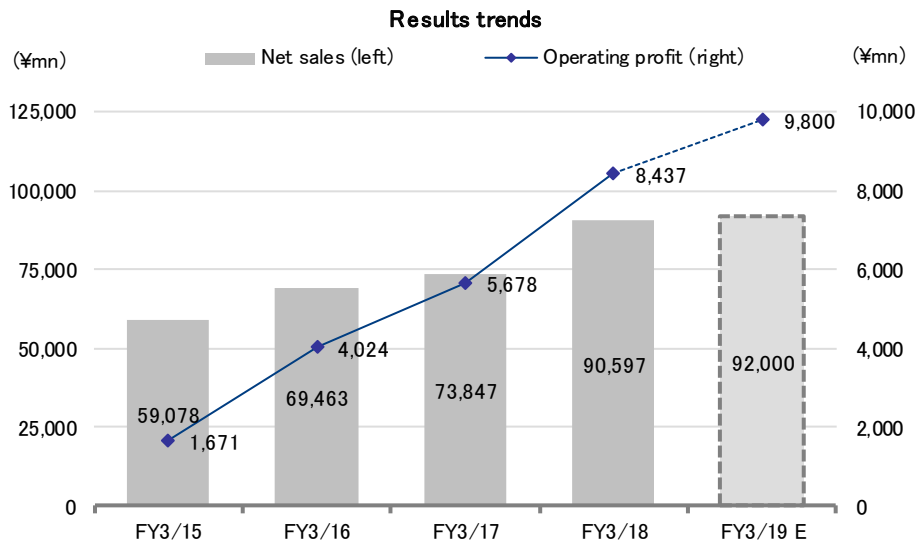
3. Longer-term outlook: Implementing robust capital investments

While the Company has not announced clear quantitative goals, it plans to significantly expand production facilities for core products over the next few years. It revised FY3/19 capex spending downward to ¥30,000mn (vs. the period-start plan’s ¥40,000), but is likely to raise the FY3/20 budget to ¥40,000mn (vs. ¥30,000mn previously). The Company intends to quickly broaden its business scope based on an outlook for longer term continuation of strong investments in semiconductor and SPE industries, its main customers, despite recent modest slowdown. It also sees opportunities in the automotive industry and has already created an internal project team. The Company is putting efforts into ESG activities too. We think upcoming changes not only quantitatively but also qualitatively should be closely monitored.

Key Points

- Leading manufacturer of quartz, ceramic, and other inorganic products; mainly supplies the semiconductor industry
- Operating profit likely to increase 16.2% YoY in FY3/19 even with a modest slowdown in the semiconductor industry
- High capital investments at ¥30,000mn in FY3/19; focus on activities including qualitative aspects

Summary



Source: Prepared by FISCO from the Company's financial results

Company profile

Manufactures a wide range of parts and products mainly for semiconductor production equipment firms

1. Company profile

Ferrotec is a pure holding company with 35 consolidated subsidiaries and six equity-method affiliates and 6,719 group employees as of March 31, 2018. It was originally established as US-based Ferrofluidics Corporation's Japanese entity (former Nippon Ferrofluidics Co., Ltd.) in 1980, but later separated from the parent company and has pursued an independent path.

It manufactures vacuum seals, quartz products, ceramic products, CVD-SiC, ferrofluids, thermo-electric modules, silicon wafers, solar-cell silicon, and other various products that are mainly made from inorganic materials, equipment, parts, and materials. It also handles cleaning and consignment processing and assembly of various parts and products for SPE firms. Primary customers thus are global major SPE firms.

2. History

The Company has a very unique history. It was initially established as the Japanese entity of a US company in 1980 and mainly conducted import sales of the parent's products (vacuum seals, etc.). In 1982, it built a plant in Chiba Prefecture and began direct production. Ties to the parent company faded as the Company's ratio of self-manufactured products climbed. The Company completely split from the parent in 1987 and embarked on a separate path. It then developed proprietary products, such as HDD laminated seals and ultra-high vacuum ferrofluids (fluorine-based magnetic fluids). It established the first Chinese site (Hangzhou) in 1992 and created a second Chinese production site in Shanghai and changed the company name to Ferrotec Corporation in 1995.

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Company profile

The Company continued to expand the product line-up and businesses. It registered shares with the Japan Securities Dealers Association as an OTC publicly-traded stock in 1996. It acquired Ferrofluidics Co., Ltd., the former US parent company, as a subsidiary in a friendly TOB in 1999. Events in the early 2000s included a business alliance in automotive temperature control systems with US-based Gentherm Incorporated (former Amerigon) in 2001, the start of consignment processing of small-diameter silicon wafers at the Shanghai plant in 2002, and the acquisition of Russia-based thermo module manufacturer SCTB NORD as a subsidiary in 2005. The Company widened business scope more recently through the purchase of a vacuum deposition equipment business from UK-based Edwards Vacuum in 2010, the launch of a large plant in Yinchuan (China) in 2011, acquisition of a stake in Admap Inc., a CVD-SiC product supplier, making it a subsidiary in 2015, and capital participation in Asahi Seisakusho Co., Ltd., an industrial equipment firm, making it a subsidiary in 2016. The Company transitioned to a holding company in spring 2017 and currently operates as an international company with manufacturing subsidiaries and sales companies located in nine countries worldwide, including Japan, Europe, America, China, and Southeast Asia.

The Company listed shares through an OTC registration with the JSDA in October 1996. It now trades on the Tokyo Stock Exchange's JASDAQ (Standard) market.

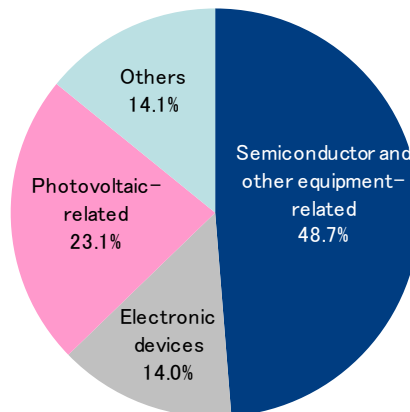
Business overview

Has wide-ranging business content (products), but semiconductor and other equipment-related business is the main area

1. Business segments

Ferrotec has broad business content because of its proprietary development of many products and acquisitions of numerous companies as subsidiaries through M&A activity, as described above. Its business segments are semiconductor and other equipment-related business (48.7% of overall sales in FY3/18), electronic devices business (14.0%), photovoltaic-related business (23.1%), and others business (14.1%).

**Net sales by segment
(FY3/18: ¥90,597mn)**



Source: Prepared by FISCO from the Company's results briefing materials

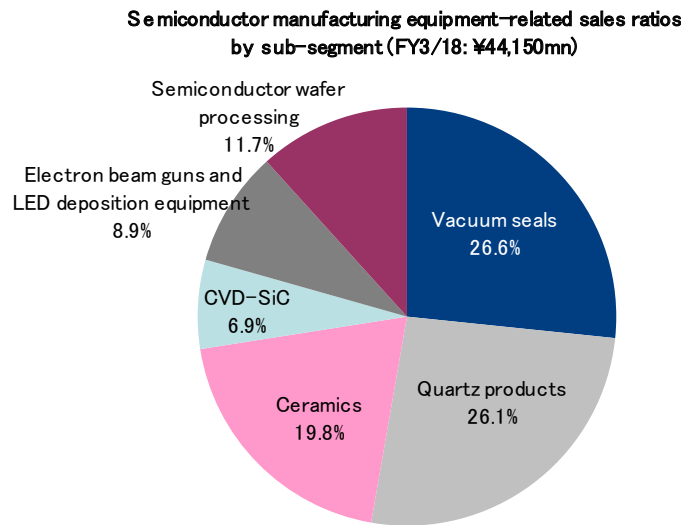
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Business overview

Additionally, these segments consist of the sub-segments described below.

2. Semiconductor and other equipment-related

The semiconductor and other equipment-related business covers vacuum seals, quartz products, ceramics, CVD-SiC, electron-beam guns and LED deposition equipment, and semiconductor wafer processing sub-segments.



Source: Prepared by FISCO from the Company's results briefing materials

(1) Vacuum seals (13.0% of overall sales in FY3/18)

Vacuum seals function as a rotary manipulator into a vacuum environment using ferrofluid and are utilized in semiconductor, FPD, LED, solar cell, and other manufacturing processes. These are Ferrotec's core products used mainly in semiconductor wafer etching and deposition processes and in the rotary mechanism of FPD panel conveyance robots. They are capable of precisely transferring required power for processing while keeping sealed space separated from the outside.

Sales shares by industries (FY3/18) are semiconductors at 30%, LEDs at 10%, FPDs at 21%, solar cells at 18% and others (mainly consignment business, etc.) at 21%.

(2) Quartz products (12.7% of overall sales in FY3/18)

Quartz products are silica glass with very high purity that can withstand heat and chemical changes. Ferrotec's products are primarily utilized in semiconductor manufacturing for the wafer deposition and dispersion process and as jigs and consumables in conveyance and cleaning processes. Quartz products serve in an important capacity in semiconductor manufacturing processes that are becoming more precise and requiring higher purity levels.

Sales shares by industries (FY3/18) are OEM mainly to major semiconductor manufacturers at 66%, end users (device manufacturers) at 23%, LEDs at 1%, photovoltaic at 2%, LCDs at 1%, and others at 4%. Main OEM sites are three major companies in Japan, two major companies in the US, and one company in China.

Business overview

(3) Ceramics (9.6% of overall sales in FY3/18)

Ferrotec supplies a variety of ceramic parts with high strength and high purity utilizing the material technologies, production technologies and precision processing technologies that it possesses. Ferrotec's offerings can be categorized as fine ceramics (FC) with robust strength, high purity, and excellent heat resistance and machinable ceramics (MC) that can undergo advanced machine processing. The former are mainly used as parts in semiconductor manufacturing equipment. In particular, they are vital to the dry-etching method (plasma etchers). The latter are used as parts and jigs in a variety of processing. Demand is growing for use as jigs in the semiconductor inspection process (for wafer probers). Usage in advanced medical equipment that leverages precision processing features is also growing in recent years.

Sales shares by major products (FY3/18) are MC semiconductor inspection at 19%, MC domestic general at 5%, MC exports at 7%, FC semiconductor equipment at 17%, FC exports at 33%, and others at 23%.

(4) CVD-SiC (3.4% of overall sales in FY3/18)

Ferrotec realizes very high purity, excellent heat resistance, high wear resistance, and erosion resistance in silicon carbide (SiC) products that apply a proprietary CVD production method. It is broadly utilized in jigs for use in high temperatures, including wafer boats and tubes and dummy wafers (silicon wafer replacements).

Sales shares by regions (FY3/18) are China at 41%, Japan at 28%, North America at 20%, Taiwan at 10%, and Europe at 1%.

(5) Electron beam guns and LED deposition equipment (4.3% of overall sales in FY3/18)

Ferrotec supplies electron-beam (EB) guns and a wide range of US-made Temescal mount systems (precision deposition equipment), which are outfitted with an advanced EB guns and high voltage power supply as core components, from smaller production types for universities and research centers to large product models with high throughput. Many customers employ these systems as a global standard for compound semiconductors that are likely to be adopted in next-generation communications and other areas. Steady advances are proceeding in LED and communications chip process areas.

(6) Semiconductor wafer processing (5.7% of overall sales in FY3/18)

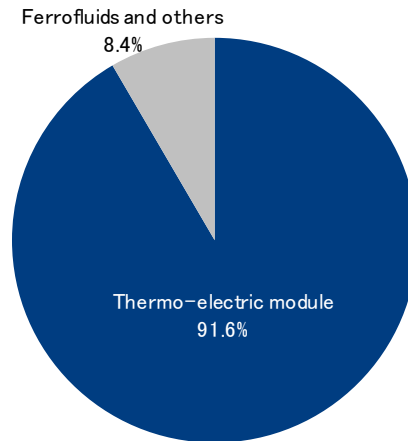
Ferrotec handles integrated production from mono-crystal ingots to wafer processing for small-diameter silicon wafers (six inches or less) for the semiconductor industry. It has built global supply operations mainly for volume-output products used by bipolar ICs, discrete circuit applications, and MEMS. It also started production of eight-inch wafers in 2017, and has built a framework to boost volume output for eight-inch wafers, as shall be noted later.

3. Electronic devices

The electronic devices business consists of thermo-electric modules and ferrofluids and others.

Business overview

**Electronic device sales ratios by sub-segments
 (FY3/18: ¥12,701mn)**



Source: Prepared by FISCO from the Company's results briefing materials

(1) Thermo-electric modules (12.8% of overall sales in FY3/18)

Thermo-electric modules are plate-like semiconductor cooling devices (Peltier devices) that utilize the effect of heat transferring from one metal to the other when electric current flows through a junction between two types of metal. These modules are compact and lightweight and do not require freons. Common uses are temperature-control sheets in automobiles and cooling chillers, optical communications, biochemical, air-conditioners, and dryers and other consumer electronics products.

Sales shares by industry (FY3/18) are automotive at 29%, automotive, other at 1%, semiconductors at 14%, photology at 5%, biochemical at 14%, communications equipment at 6%, scientific areas at 3%, consumer at 10%, power device substrates at 12%, and others at 7%.

(2) Ferrofluids and others (1.2% of overall sales in FY3/18)

Ferrofluids are a functional liquid material that is magnetically affected by external magnetic fields and is attracted to magnets. The NASA space program in the 1960s developed ferrofluids for the purpose of transporting fuel in a zero-gravity environment. Today they are utilized in speakers, actuators, sensors, recycling separation, and vacuum seals (which are one of Ferrotec's main products).

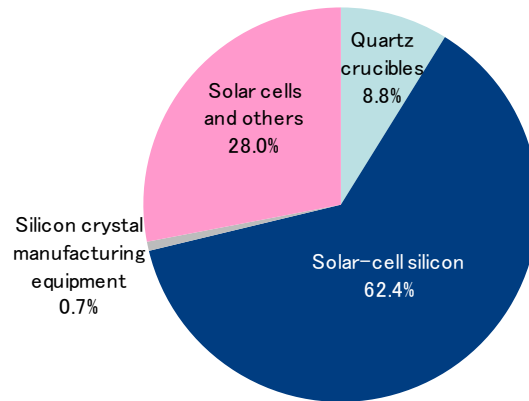
Other businesses include power semiconductor substrates. They are heat-dissipation and insulation substrates that apply thermo-electric module manufacturing technologies and bond a copper circuit board to alumina and aluminum nitride ceramics through a eutectic reaction. These products contribute to downsizing and energy savings in trains, electric-drive vehicles, air-conditioners, and servers and are likely to attract growing demand.

4. Photovoltaic-related

The photovoltaic-related business consists of quartz crucible, solar-cell silicon, silicon crystal manufacturing equipment, and solar cells and other products.

Business overview

**Photovoltaic-related sales ratios by sub-segments
 (FY3/18: ¥20,938mn)**



Source: Prepared by FISCO from the Company's results briefing materials

(1) Quartz crucibles (2.0% of overall sales in FY3/18)

Ferrotec's quartz crucibles use raw materials with the same level of high purity as quartz products vital to the semiconductor manufacturing process and serve as containers for mono-crystal silicon raw material. Main customers are manufacturers of mono-crystal silicon for semiconductor and photovoltaic applications. The policy going forward will be to secure earnings by increasing the ratio of semiconductor customers.

(2) Solar-cell silicon (14.4% of overall sales in FY3/18)

Ferrotec produces crystallized ingots by melting raw-material silicon at a high temperature and then gradually cooling it. Besides mono-crystal ingots with excellent power-generation performance thanks to well-ordered atomic arrangement, Ferrotec also makes multi-crystal ingots economically and with robust production efficiency using its own production facilities.

It produces thinly sliced mono-crystal wafers by cutting these ingots with a fixed abrasive grain wire saw. Ferrotec's wafers correspond to thinning wires and are utilized in modules with high power conversion.

(3) Silicon crystal manufacturing equipment (0.2% of overall sales in FY3/18)

Mono-crystal drawing equipment is manufacturing equipment for mono-crystal silicon ingots utilizing Ferrotec's core technology cultivated in the semiconductor process. The ingot shape is formed while drawing silicon melt, which is obtained by melting raw-material polysilicon in a vacuum electric furnace. This equipment incorporates many products based on Ferrotec technologies, including vacuum seals, carbon heaters (for melting the raw material at high temperatures), and receiving crucibles.

Ferrotec also manufactures multi-crystal manufacturing equipment that makes ingots with robust productivity. Its manufacturing equipment supports high-volume filling of polycrystalline materials and recycled materials and performs well in multi-crystal ingot quality and productivity. These features contribute to high conversion efficiency for multi-crystal modules.

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Business overview

(4) Solar cells and others (6.5% of overall sales in FY3/18)

Solar cells combine a photovoltaic wafer with an electrode that uses two types of electrode (p-type, n-type) semiconductors with different electrical properties. Ferrotec manufactures mono-crystal and multi-crystal cells and sells these cells to photovoltaic product firms.

5. Others (14.1% of overall sales in FY3/18)

This business includes various consignment tasks and cleaning procedures for SPE parts. As explained below, this business was removed from the others segment and included into the semiconductor and other equipment-related segment from FY3/19.

6. Features and strengths**(1) Pioneer in inorganic materials**

The Company has been involved for many years in production and processing of a wide range of inorganic materials, including quartz, silicon, silicon nitride, and silicon carbide (SiC). It hence has accumulated extensive knowhow (material qualities, production method, processing method, etc.) related to these materials. We believe this aspect is a characteristic and strength.

(2) Handles production equipment too

Additionally, the Company handles not just materials, but also various types of production equipment. It therefore possesses production equipment as well and offers customers a variety of proposals (solutions), including materials, processed parts, finished products, and manufacturing equipment.

(3) Supports one-stop solutions

Furthermore, the Company engages in service businesses, such as cleaning SPE parts (removal, cleaning, reinstallation) and production equipment assembly. Customers can conduct one-stop outsourcing of material supply, parts processing, equipment assembly, and parts cleaning. We think this is an important strength.

(4) Trust relationship with major customers

The Company's main customers are global top-class SPE manufacturers because its products are primarily utilized in SPE and semiconductor production processes as explained above. The top three firms in FY3/18 sales were two US-based production equipment firms and a Japanese equipment firm. The Company has supplied these leading SPE manufacturers with products and parts over many years. We believe its deep trust relationships with these customers are assets and strength.

Business performance

Sales and profits are increasing on continuation of robust demand from the semiconductor industry

1. Review of 1H FY3/19 results

(1) Earnings

In 1H FY3/19, Ferrotec reported ¥45,230mn in net sales (+5.2% YoY), ¥5,069mn in operating profit (+12.7%), ¥4,866mn in ordinary profit (+26.1%), and ¥2,824mn in net income attributable to owners of parent (+22.9%). Operating profit increased at a double-digit pace YoY, despite weakness in solar cells and electronic devices, thanks to higher sales and profit in its mainstay SPE-related business amid healthy conditions in the global semiconductor market. While segment trends were mixed, the Company continued to deliver improvement in overall profit and we think the results roughly met expectations.

Gross profit climbed 12.9% YoY to ¥13,877mn with improvement of overall gross margin to 30.7% (vs. 28.6% in the previous year). Operating profit rose 12.7% because of a 13.0% increase in SG&A expenses accompanying business expansion. Ordinary profit and net income attributable to owners of parent increased by larger margins than operating profit on a shift in forex income (under non-operating income) from the previous year's ¥312mn loss to a ¥96mn profit in 1H FY3/19.

Ferrotec booked large capital investments totaling ¥11,114mn (compared to ¥4,702mn in 1H FY3/18), mainly because of capital investments at the Chinese subsidiaries, while depreciation costs were ¥2,651mn (¥1,916mn).

1H FY3/19 results

	FY3/18 1H		FY3/19 1H		(¥mn, %)	
	Amount	% of sales	Amount	% of sales	Change	% change
Net sales	42,983	100.0	45,230	100.0	2,247	5.2
Gross profit	12,293	28.6	13,877	30.7	1,584	12.9
SG&A expenses	7,795	18.1	8,808	19.5	1,013	13.0
Operating profit	4,498	10.5	5,069	11.2	571	12.7
Ordinary profit	3,857	9.0	4,866	10.8	1,009	26.1
Net income attributable to owners of parent	2,299	5.4	2,824	6.2	526	22.9
Capital investment	4,702	-	11,114	-	6,412	136.4
Depreciation	1,916	-	2,651	-	735	38.4

Source: Prepared by FISCO from the Company's results briefing materials

Cash and deposit holdings rose due to corporate bond and share issuances and tangible fixed assets grew too

(2) Financial condition

In financial standing at the end of 1H FY3/19, the Company reported ¥80,292mn in current assets (up ¥13,465mn from the end of the previous fiscal year), mainly on increases of ¥13,071mn in cash and deposits, ¥375mn in notes and accounts receivables, and decrease of ¥265mn in inventories. Fixed assets climbed ¥8,576mn from the end of previous fiscal year to ¥60,208mn with additions of ¥7,731mn to tangible fixed assets primarily from capital investments, ¥639mn to intangible fixed assets, and ¥206mn in investments and other assets. Total assets hence grew by ¥22,042mn to ¥140,500mn.

Liabilities rose by ¥21,535mn from the end of the previous fiscal year to ¥88,180mn, mainly on increases of ¥3,788mn in short-term debt, including current portion of long-term borrowings, ¥5,286mn in bonds, and ¥10,649mn in long-term debt, and a ¥375mn decline in notes and accounts payable. Net assets were up ¥507mn from the end of the previous fiscal year to ¥52,319mn with gains of ¥2,381mn in retained earnings from net income attributable to owners of parent and a decrease of ¥2,146mn in foreign currency translation adjustment.

Consolidated balance sheet

	(¥mn)		
	FY3/18	FY3/19 1H	Change
Cash and deposit	23,648	36,720	13,071
Notes and accounts receivable	20,700	21,076	375
Inventories	16,773	16,507	-265
Total current assets	66,826	80,292	13,465
Tangible fixed assets	43,541	51,273	7,731
Intangible fixed assets	2,922	3,561	639
Investments and other assets	5,166	5,373	206
Total fixed assets	51,631	60,208	8,576
Total assets	118,457	140,500	22,042
Notes and accounts payable	18,419	18,043	-375
Short-term debt	5,874	8,978	3,103
Current portion of long-term borrowings	5,055	5,741	685
Total current liabilities	43,477	48,518	5,040
Bonds	2,418	7,704	5,286
Long-term debt	11,478	22,127	10,649
Total fixed liabilities	23,167	39,662	16,494
Total liabilities	66,645	88,180	21,535
Net assets	51,812	52,319	507

Source: Prepared by FISCO from the Company's financial results

(3) Cash flow conditions

Cash flow provided by operating activities during 1H FY3/19 was ¥5,403mn. Major inflows include income before income taxes of ¥4,731mn, depreciation of ¥2,651mn. Major outflows include a ¥1,324mn increase in notes and accounts receivable and a ¥181mn in inventories. Cash flow used in investing activities was ¥12,251mn, mainly due to ¥11,114mn in purchase of property, plant and equipment. Cash flow provided by financing activities was ¥20,679mn, with ¥14,639mn inflow from an increase in long-term debt, proceeds from the issuance of bonds of ¥6,638mn, versus outflows of ¥443mn in payments for dividend.

As a result, the balance of cash and cash equivalents increased ¥13,071mn to ¥36,720mn at the end of 1H FY3/19.

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Business performance

Cash flow statement

	(¥mn)	
	FY3/18 1H	FY3/19 1H
Cash flow from operating activities	4,794	5,403
Income before income taxes	3,802	4,731
Depreciation	1,916	2,651
Changes in notes and accounts receivable (-: increase)	-2,665	-1,324
Changes in inventories (-: increase)	-1,053	-181
Changes in accounts payable (-: decrease)	1,902	-214
Cash flow from investing activities	-4,640	-12,251
Purchase of property, plant and equipment	-4,702	-11,114
Cash flow from financing activities	12,311	20,679
Changes in short-term debt and long-term debt	778	14,639
Proceeds from the issuance of bonds	3,245	6,638
Proceeds from the issuance of stock	8,659	-
Cash dividends paid	-370	-443
Changes in cash and cash equivalents	12,327	13,071
Cash and cash equivalents, end of year	27,166	36,720

Source: Prepared by FISCO from the Company's financial results

2. Segment overview

In segment results, sales and profits increased to ¥27,030mn in sales (+31.1% YoY) and ¥5,059mn in operating profit (+43.9%) for mainstay semiconductor and other equipment-related and ¥5,879mn in sales (-6.8%) and ¥1,231mn in operating profit (-19.5%) for electronic devices. Photovoltaic-related sales decreased 48.2% to ¥5,166mn and operating loss was ¥1,029mn (vs. a ¥668mn loss a year earlier) due to booking inventory valuation losses and other factors. The others business booked ¥7,156mn in sales (+17.5% YoY) and a ¥169mn operating loss (vs. a ¥139mn profit a year ago).

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Business performance

Segment sales and operating profit

(¥mn, %)

	FY3/18 1H		FY3/19 1H		Change	% change
	Amount	Composition ratio	Amount	Composition ratio		
Net sales	42,983	100.0	45,230	100.0	2,247	5.2
Semiconductor and other equipment-related business	20,617	48.0	27,030	59.8	6,413	31.1
Vacuum seals	5,622	13.1	6,704	14.8	1,082	19.2
Quartz products	5,153	12.0	7,300	16.1	2,147	41.7
Ceramics	4,087	9.5	5,302	11.7	1,215	29.7
CVD-SiC	1,643	3.8	1,291	2.9	-352	-21.4
EB guns and LED deposition systems	1,674	3.9	2,458	5.4	784	46.8
Wafer processing	2,438	5.7	2,360	5.2	-78	-3.2
Parts cleaning	1,074	2.5	1,615	3.6	541	50.4
Electronic devices business	6,305	14.7	5,879	13.0	-426	-6.8
Thermo-electric modules	5,853	13.6	5,451	12.1	-402	-6.9
Ferrofluids and others	452	1.1	428	0.9	-24	-5.3
Photovoltaic-related business	9,971	23.2	5,166	11.4	-4,805	-48.2
Quartz crucibles	811	1.9	554	1.2	-257	-31.7
Solar-cell silicon	6,078	14.1	2,687	5.9	-3,391	-55.8
Silicon crystal manufacturing equipment	77	0.2	125	0.3	48	62.3
Solar cells and others	3,006	7.0	1,800	4.0	-1,206	-40.1
Others business	6,090	14.2	7,156	15.8	1,066	17.5
Operating profit	4,498	10.5	5,069	11.2	571	12.7
Semiconductor and other equipment-related business	3,515	17.0	5,059	18.7	1,544	43.9
Electronic devices business	1,530	24.3	1,231	21.0	-299	-19.5
Photovoltaic-related business	-668	-	-1,029	-	-361	-
Others business	139	2.3	-169	-	-308	-
Adjustment value	-18	-	-22	-	-4	-

Note: The Company booked "parts cleaning" under "others" in FY3/18 and under "semiconductor and other equipment related business" from FY3/19.

Source: Prepared by FISCO from the Company's results briefing materials

Below we review conditions in the major sub-segments.

(1) Vacuum seals business

Sales grew at a steady 19.2% YoY pace to ¥6,704mn. Demand from the vacuum process expanded in SPE business, while OLED-related demand was somewhat weak in the FPD market due to the impact of investment delays by South Korean and Chinese manufacturers. Consignment processing demand was healthy for the semiconductor application and from the Chinese market.

(2) Quartz products

Sales were vibrant with a 41.7% YoY gain to ¥7,300mn. New deals in manufacturing equipment increased amid healthy investments in memory, IoT, and automotive areas. There was also a rise in demand for quartz consumable parts from semiconductor end users (device manufacturers). The Company began volume-production deliveries of Si etcher parts to a major domestic manufacturing equipment firm too.

Business performance

(3) Ceramic products

Sales improved 29.7% YoY to ¥5,302mn. Machinable ceramics posted upbeat overseas sales of semiconductor inspection apparatus materials, but domestic business was sluggish. Domestic general industrial equipment and medical areas were solid. Fine ceramics booked healthy sales for products used in semiconductor etching and film formation equipment in Japan and enjoyed robust demand from etching equipment in overseas business too.

(4) CVD-SiC products

Sales dropped 21.4% YoY to ¥1,291mn. While SPE materials performed well in Japan and overseas, demand slowed for some mass-produced new equipment parts and for adoption of alternative materials.

(5) Wafer processing and parts cleaning

Semiconductor wafer processing sales fell 3.2% YoY to ¥2,360mn. The Company solidified operations for 400,000 wafers a month in mainstay six-inch wafer business during 1H. It did not book any eight-inch wafer sales in 1H because production of eight-inch wafers, which had been halted due to environmental measures, resumed in July 2018.

Parts cleaning (note) sales grew at a healthy pace with a 50.4% YoY increase to ¥1,615mn.

* The Company booked "parts cleaning" under "others" through FY3/18 and under "semiconductor and other equipment-related business" from FY3/19.

(6) Thermo-electric module products

Sales were sluggish with a 6.9% YoY decline to ¥5,451mn. In the automotive business, products for temperature-controlled seats incurred slightly weaker sales conditions in the US market. The Company launched automotive project activities to expand sales of TE applied products for automobiles. It is also starting volume production for cup holders and other auto applications.

In other industrial areas, SPE and wafer cooling applications exhibited smooth trends. The Company has been expanding applications in consumer and biomedical areas. Optical communications demand was steady in the telecom area thanks to 5G investments.

(7) Quartz crucibles

Sales weakened with a 31.7% YoY decline to ¥554mn. Sales of monocrystal crucibles for solar-cell use dropped from the latter half of 1H because of the impact of subsidy measures by the Chinese government. Semiconductor-use crucibles, meanwhile, recorded an increase in monocrystal crucible sales. The Company ended production and sales of vessels for multi-crystalline ingots production, resulting in a decline in segment sales.

(8) Solar cell silicon

Sales fell substantially with a 55.8% YoY decline to ¥2,687mn. The biggest setback was a sharp change in the market after the Chinese government's revision of solar cell policies (531 Policy; revisions to the subsidies policy). Market prices moved significantly lower because of diminished demand and tougher competition. The Company's business hence incurred losses from the latter half of 1H. It adjusted production of unprofitable products affected by a shipment halt in the latter half of 1H due to quality issues at a major OEM customer and booked valuation loss for inventories at the end of 1H.

Business performance

(9) Photovoltaic cells

Sales, including other business, were down 40.1% YoY to ¥1,800mn. Losses widened in the latter half of 1H because of rapid market shrinkage and steep price decline following China's "531 Policy" rollout. The Company hence shifted to OEM (processing fee business) in an effort to improve profitability.

3. Major capital investment

The Company spent ¥11,114mn on capital investments in 1H FY3/19 (vs. ¥4,702mn in the previous year). Main outlays were large-diameter wafer (eight inch) production facilities, additions to quartz product and ceramic production facilities, and a new cleaning service plant. The Company expects to keep these capital investments at high levels in FY3/19 and FY3/20, as explained below.

■ Business outlook

Healthy demand mainly from the SPE industry. Profit outlook unchanged despite downward revisions

1. FY3/19 forecast

The Company guides for ¥92,000mn in sales (+1.5% YoY), ¥9,800mn in operating profit (+16.2%), ¥8,500mn in ordinary profit (+18.8%), and ¥5,300mn in net income attributable to owners of parent (+97.9%) in FY3/19. The Company reduced the sales target from the period-start level (¥98,000mn), mainly on a large shortfall in photovoltaic-related business versus its initial outlook. In profits, however, it has not changed FY3/19 targets since it had already anticipated losses in the photovoltaic-related business. While activity in the semiconductor industry as a whole has eased somewhat from the overheated conditions seen at one point, the industry remains at a high level in absolute terms and the Company believes it can achieve period-start targets.

The Company expects a reduction in FY3/19 capex from ¥40,000mn in the period-start plan to about ¥30,000mn, but this is a delay, rather than a downward revision, and FY3/20 capex is likely to be higher than previously planned.

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Business outlook

Segment sales and operating profit outlooks

	FY3/18		FY3/19 forecast			
	Amount	Composition ratio	Amount	Composition ratio	Change	% change
Net sales	90,597	100.0	92,000	100.0	1,403	1.5
Semiconductor and other equipment-related business	44,150	48.7	57,699	62.7	13,549	30.7
Vacuum seals	11,761	13.0	13,869	15.1	2,108	17.9
Quartz products	11,523	12.7	14,900	16.2	3,377	29.3
Ceramics	8,729	9.6	11,100	12.1	2,371	27.2
CVD-SiC	3,039	3.4	2,900	3.2	-139	-4.6
EB guns and LED deposition systems	3,936	4.3	4,630	5.0	694	17.6
Wafer processing	5,161	5.7	6,600	7.2	1,439	27.9
Parts cleaning	2,511	2.8	3,700	4.0	1,189	47.4
Electronic devices business	12,701	14.0	12,000	13.0	-701	-5.5
Thermo-electric modules	11,634	12.8	11,050	12.0	-584	-5.0
Ferrofluids and others	1,068	1.2	950	1.0	-118	-11.0
Photovoltaic-related business	20,938	23.1	9,000	9.8	-11,938	-57.0
Quartz crucibles	1,850	2.0	1,404	1.5	-446	-24.1
Solar-cell silicon	13,066	14.4	4,371	4.8	-8,695	-66.5
Silicon crystal manufacturing equipment	157	0.2	125	0.1	-32	-20.3
Solar cells and others	5,865	6.5	3,100	3.4	-2,765	-47.1
Others business	12,807	14.1	13,301	14.5	494	3.9
Gross profit	24,915	27.5	27,468	29.9	2,553	10.2
SG&A expenses	16,477	18.2	17,668	19.2	1,191	7.2
Operating profit	8,437	9.3	9,800	10.7	1,363	16.2
Ordinary profit	7,157	7.9	8,500	9.2	1,343	18.8
Net income attributable to owners of parent	2,678	3.0	5,300	5.8	2,622	97.9
Capital investment	12,300	-	30,000	-	17,700	143.9
Depreciation	4,188	-	5,000	-	812	19.4

Note: The Company booked "parts cleaning" under "others" in FY3/18 and under "semiconductor and other equipment related business" from FY3/19.

Source: Prepared by FISCO from the Company's results briefing materials

2. Outlook by segment

Below we present segment and sub-segment sales outlooks.

(1) Semiconductor and other equipment-related business: ¥57,699mn in sales (+30.7% YoY)

a) The Company expects ¥13,869mn in sales for the vacuum seals business (+17.9% YoY). Demand for the SPE-related business might modestly weaken due to the impact of delays in memory investments. Demand is likely to be weak for both OLEDs and LCDs in the FPD market. The Company aims to maintain operating rates through recruitment of consignment processing demand in areas other than solar cells and SPE.

Key measures are continued joint development with SPE manufacturers and capex in large processing equipment, generating synergies via better relationships among group companies, and bolstering sales in China utilizing existing channels and brands of group companies.

Business outlook

b) The Company projects ¥14,900mn in quartz product sales (+29.3% YoY). While there have been multiple project delays in SPE-related investments, mainly for memory business (DRAM, 3D-NAND), supply-demand conditions remain tight for quartz products with a high consumables ratio and strong operating levels should continue in 2H too. The Company expects increased output by Chinese semiconductor manufacturers and robust demand from new fabs again in 2H. It also forecasts increases in Si ports and Si parts for miniaturization high-temperature processes.

Key measures are significantly increasing facilities to accommodate demand from major OEM customers (plant construction started at Changshan and Dongtai sites in China) and reinforcement of development projects for the next and subsequent generations.

c) The Company expects ¥11,100mn in ceramic product sales (+27.2% YoY). It anticipates healthy sales of overseas semiconductor inspection apparatus materials in machinable ceramics. Overseas etching equipment parts should perform well in fine ceramics. However, demand has slumped for domestic semiconductor film formation equipment parts, and domestic FPD equipment parts are sluggish as well.

As ongoing policies, the Company aims to expand sales of high value-added products with excellent heat and electrical features for vehicles in machinable ceramics and increase sales of products that meet customer demand, such as ceramic parts and materials with excellent electrical features and surface-treatment enhanced products, in fine ceramics.

d) The Company forecasts roughly flat sales of CVD-SiC products at ¥2,900mn (-4.6% YoY). This outlook assumes continuation of upbeat trends in SPE parts and materials in Japan and overseas. Demand for high-purity heat-resistant parts is increasing too.

As measures, the Company plans to strengthen production operations in order to meet parts demand from SPE manufacturers and also intends to bolster development and prototyping operations and improve collaboration within the group.

e) The Company expects ¥6,600mn in semiconductor wafer processing sales (+27.9% YoY). For six-inch wafers, it already has an operation to process 400,000 wafers a month and aims to maintain a high operating level. For eight-inch wafers, it has already resumed production at the Shanghai plant and should have operations running for 100,000 wafers in 2019. Additionally, it is building a new plant in Hangzhou (as explained below) and plans to have capacity for 450,000 wafers a month ready by FY3/21.

f) Parts cleaning: The Company has separated this business from the others segment and includes it as a new sub-segment under the semiconductor and other equipment-related business from FY3/19 (+47.4% YoY). It expects ¥3,700mn in FY3/19 sales. The Company intends to further bolster production capacity with a new plant in Anhui and a second plant in Neijiang, Sichuan.

(2) Electronic devices: ¥12,000mn (-5.5% YoY)

a) The Company projects ¥11,050mn in thermo-electric module sales (-5.0% YoY), a modest decline. For automotive business, sales are likely to stay at the 1H level again in 2H because of ongoing sluggishness in temperature-controlled seats. The Company will be developing applied products for next-generation automobiles. For other industries, consumer assemblies are healthy and the optical communications application should remain upbeat.

Business outlook

As measures, the Company plans to implement global sales expansion efforts for TE subassembly products and develop automotive applications.

b) The Company expects ¥950mn in ferrofluid and other product sales (-11.0% YoY).

(3) Photovoltaic-related: ¥9,000mn (-57.0% YoY)

a) The Company expects ¥1,404mn in quartz crucible sales (-21.4% YoY). Sales for semiconductor plants are vibrant, including growth in large crucibles applied to eight-inch wafers. Semiconductor business is becoming the main area for crucibles. Gross profit has been rising thanks to high added value of these products. The Company is just selling large-diameter products for solar cells.

As measures, it aims to expand sales by focusing on semiconductor business. It plans to complete a semiconductor crucible plant building (with higher cleanliness standards and automated assembly) and begin operation in 2018. The Company is also pursuing development of a large melting furnace to prepare for 32-inch wafers in the near future. It hopes to start volume production as soon as 1H 2019.

b) The Company forecasts a steep decline in solar-cell silicon sales to ¥4,371mn (-66.5% YoY). It has decided to restrict itself to OEM (this avoids valuation losses due to being a processing fee business) because of the prospect of market prices remaining at a low level and to place emphasis on the operation rate and profitability.

As measures, it is working on delivery of high-quality OEM products and pursuing reduced oxygen and finer slicing. It will also continue production adjustments for unprofitable products and make more advances in inventory processing.

c) The Company expects a 20.3% YoY drop in silicon crystal production equipment to ¥125mn. While it anticipates continued decline in this business, it is moving forward with in-house production of a semiconductor system.

d) The Company forecasts a 47.1% YoY decline in cells and other sales to ¥3,100mn. It hopes to expand OEM business and improve profitability in light of anticipated continuation of low prices.

(4) Others business: ¥13,301mn (+3.9% YoY)

Despite separation of SPE parts cleaning as the semiconductor and other equipment-related business from FY3/19, the Company projects a slight increase in segment sales.

■ Medium- to long-term growth strategy

Planning aggressive capital investments to increase output of key products

1. Measures to achieve medium-term targets

The Company plans to conduct concentrated capital investments in areas with robust demand in order to achieve growth over the medium term. Main initiatives are listed below.

Medium- to long-term growth strategy

- (1) Investing management resources into semiconductor and other equipment-related business: eight 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

The Company also intends to promote reforms in non-financial areas, such as ESG initiatives and work style reforms.

2. Main investment plans in semiconductor and other equipment-related businesses

The Company's products are used in almost all semiconductor front-end processes (pulling equipment, outsourced processing, quartz products, ceramics, CVD-SiC, equipment cleaning, vacuum seals, and silicon parts). With further expansion of the global SPE market expected, the Company aims to increase business by investing business resources in this area.

(1) Quartz: Increase production capacity by adding new lines

It plans to bolster facilities because of growing demand from major domestic and US customers. The Company already completed plants in Jiangsu and Zhejiang (China) in October 2018 and expects full-fledged sales contributions from FY3/20.

(2) Ceramics: Expanding production capacity in Japan and overseas

In Japan, the Company started operation of the Ishikawa Development Center in January 2018 and plans to strengthen development capabilities through integrated activities with the Kansai plant (located in Hyogo). With growing demand from major US and Japanese companies, the Company is setting up a No.2 building at the Jiangdong plant (Hangzhou) that should be finished in around January 2019 and begin contributing to sales in FY3/20.

(3) Equipment Contract Processing Business

The Company will establish OEM capabilities for SPE and other items and aims to strengthen consignment output in areas of strength.

(4) Eight inch wafers: Bolstering volume output capabilities for crystal (ingots) and at the wafer plant in China

The Company currently has wafer production operations for 400,000 six-inch wafers (monthly value; same below) in China. It possesses facilities with capacity for 100,000 eight-inch wafers as well in Shanghai. While it halted output due to environment issues at the request of the Chinese government in December 2017, production resumed in July 2018. The Company plans to raise output, albeit at a gradual pace. It is scheduled to complete additional capacity in Hangzhou (350,000 wafers) in around February to March 2019 and aims to begin volume production by the end of 2019 after installing equipment and machinery and implementing test production. Through these initiatives, it should be ready in 2020 with ingots (six-inch and eight-inch) in Yinchuan and total output capacity of 850,000 wafers with 400,000 six-inch wafers at Shanghai, 100,000 eight-inch wafers at Shanghai, and 350,000 eight-inch wafers at Hangzhou.

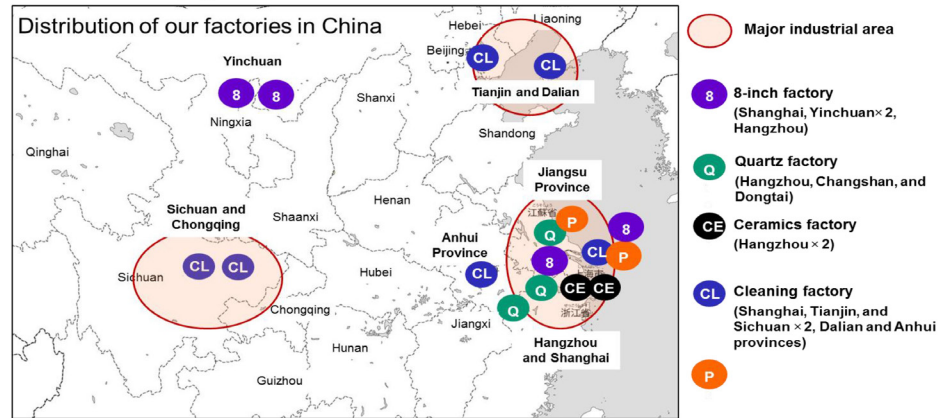
(5) Cleaning business

The Company is strengthening its cleaning business for SPE parts and materials that currently holds a market share of about 60% in China. This action comes in response to requests from major customers amid the shift to finer processing and 3D structures in semiconductors. Specifically, it plans to build a new cleaning plant at a fifth location in Anhui (China) with operations starting at the end of 2018 and contributions to sales in FY3/20.

Medium- to long-term growth strategy

The Company's major plants over the next few years are shown below based on the capital investment plan described above.

Expansion of production capacity
 Decentralizing factories while developing factories in major areas,
 and so reducing business risks



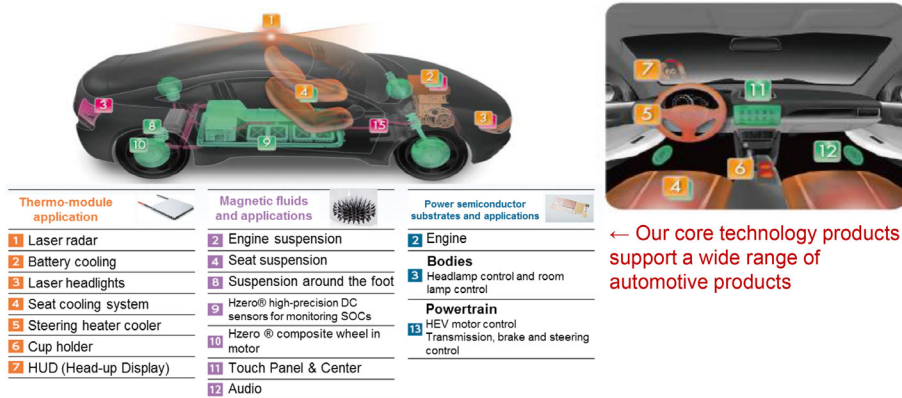
Source: Prepared by FISCO from the Company's material on the medium-term growth strategy

3. Strengthening automotive business

The Company expects consolidation of new technologies in automobiles and growing demand for automotive semiconductors as the EV shift proceeds. It also anticipates inclusion of many of its products in automobiles, including thermo-electric modules, ferrofluids, and power semiconductors. Given these trends, the Company intends to bolster automotive business as a longer-term strategy. Its first initiative is formation of the "Automotive Project," an internal team, and activities started in January 2018.

Expansion of in-car products

Mainly developing thermo-modules, magnetic fluids, and power semiconductors, etc. and making proposals to in-car mounted product manufacturers



Source: Prepared by FISCO from the Company's material on the medium-term growth strategy

Medium- to long-term growth strategy

4. Electronic devices business

The Company wants to broaden application scope of thermo-electric modules to communications, medical, and other areas. It is also putting efforts into the development of power-generation modules. Furthermore, the Company is looking at opportunities in the industrial power semiconductor market that is likely to achieve 30% growth through 2030 (¥4trn market). It is building a power semiconductor substrate plant in Jiangsu amid strong requests from customers.

As explained above, plans call for a variety of facility additions and plant construction during FY3/19-20. We review the roadmap for this period next.

New plant implementation plan

New factory in China Operation schedule		(Current) CY2018	CY2019				CY2020				CY2021		...
Factory	Place	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	
8-inch wafer Second line	Hangzhou, Zhejiang Province		To be completed around Feb-Mar 2019										
Quartz-product	Changshan, Zhejiang Province Dongtai, Jiangsu Province		Completed construction in Zhejiang Province in October 2018 and Jiangsu Province in November 2018										
Ceramic products	Hangzhou, Zhejiang Province		To be completed around January 2019										
Parts cleaning	Neijiang, Sichuan Province Tongling, Anhui Province		2 nd factory in Sichuan to be completed in December 2018 The one in Anhui to be completed in January 2019										
Substrates for power semiconductors	Dongtai, Jiangsu Province		Completed in July 2018										
Silicon crystal	Ningxia Autonomous Region Yinchuan		To be completed around March 2019										

Source: Prepared by FISCO from the Company's material on the medium-term growth strategy

5. Capital investment plans

The Company initially budgeted ¥40,000mn in capital investments for FY3/19, including ¥24,000mn for eight-inch wafers, ¥8,000mn for quartz, ¥3,000mn for power semiconductors, ¥4,000mn for a cleaning plant, and ¥1,000mn for others. It has delayed some of these investments because of changes in the business environment and adjusted the FY3/19 capex outlook to roughly ¥30,000mn.

Financing plans, meanwhile, consisted of ¥25,000 in loans, ¥10,000mn in leases, and ¥5,000mn in Chinese subsidies.

It might seem fairly risky for the Company to embark on capital investments totaling ¥40,000mn, considering its ¥90,000mn in sales. However, while momentum has settled down in the semiconductor and SPE industry at this point, we expect continued growth by the industry over the longer term and the Company wants to leverage this wave. We think it is important to pay close attention to the Company's trends in light of plans to achieve rapid growth in the next few years.

6. Outlook for the photovoltaic-related business

The Company announced that it intends to exit the photovoltaic-related business, which has severely eroded, during FY3/20 and offered the following explanation of related adjustments and costs (losses).

We encourage readers to review our complete legal statement on "Disclaimer" page.

Medium- to long-term growth strategy

“We will start with a review of how to handle inactive facilities. The main point for continuing businesses with weakened profitability, meanwhile, is how to conduct impairment charge accounting. Book value for our facilities in the photovoltaic-related business is roughly ¥6,000-6,200mn, and we currently see a possible need for accounting action on ¥2,400-3,200mn. We will carefully assess market trends, review suitable accounting methods to estimate the affected value, and disclose the results once content is finalized. Time needed for sales negotiations on existing facilities is the reason for not immediately exiting. There might also be adjustments to the exit timing because of the necessity of holding discussions with various stakeholders related to the exit.”

7. Improvements in non-financial aspects

Besides the financial growth described above, the Company is aggressively pursuing qualitative (non-financial) activities, such as ESG and work style reforms. Specific efforts are listed below.

(1) Scholarship program

Offers scholarships at Anaheim University and Zhejiang University). Promotes social contributions that support young people globally.

(2) Contributions to local society

Subsidiary Asahi Seisakusho cleans up the area around the Shonan plant and interacts with the local residents' association. Contributes to contacts with local residents and improves the environment.

(3) Personnel cultivation

Implements monthly discussions between young group employees and top executives to pass along corporate ideals and promote long-term personnel cultivation.

Shareholder return policy

Priority on aggressive capital investments for the time being

The Company pays dividends as shareholder return. It expects to pay a ¥24 annual dividend in FY3/19. While the payout ratio is just 16.8%, we think management is putting priority on profit retention (capital investments) because of plans for robust capital investments over the next few years as explained above.



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