Ferrotec Holdings Corporation

Company Profile

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1704G07EN－500

あなたの、そばに。

Always nearby you.

The Future by Ferrotec

I think this company's background is a rather unique one. We were established in Japan as a subsidiary of an American company in 1980, and became independent seven years later in 1987. We built a domestic factory and expanded into China in 1992. We took the company public in 1996, keeping that momentum through 1999 when we acquired our NASDAQ listed former parent company via a friendly take over bid. Twelve years had passed since becoming independent. The parent-child relationship had reversed, but by becoming "Ferrotec Group" once again, we were able to achieve dramatic growth. From April 2017, our company was renamed "Ferrotec Holdings Corporation", and shifted to a holding company structure. The sources of growth were applications of the company's core ferrofluid technologies, born from the Apollo Space program, and the topic of my master's thesis, thermoelectric modules.
Since that time, our offering has expanded and our portfolio has diversified. Ferrotec products are currently being utilized in a wide range of fields, such as, the electronics and automobile industries, household appliances, medical equipment, and photovoltaics. We will continue to strive to supply products that contribute to the society while being a company that helps to make the world a better place, a company that cares for the environment, and a company that continues to grow.

President and CEO Akira Yamamura

Satisfaction for our Customers
Earth Friendly and Environmentally Conscious
Dreams and Vitality to our Society

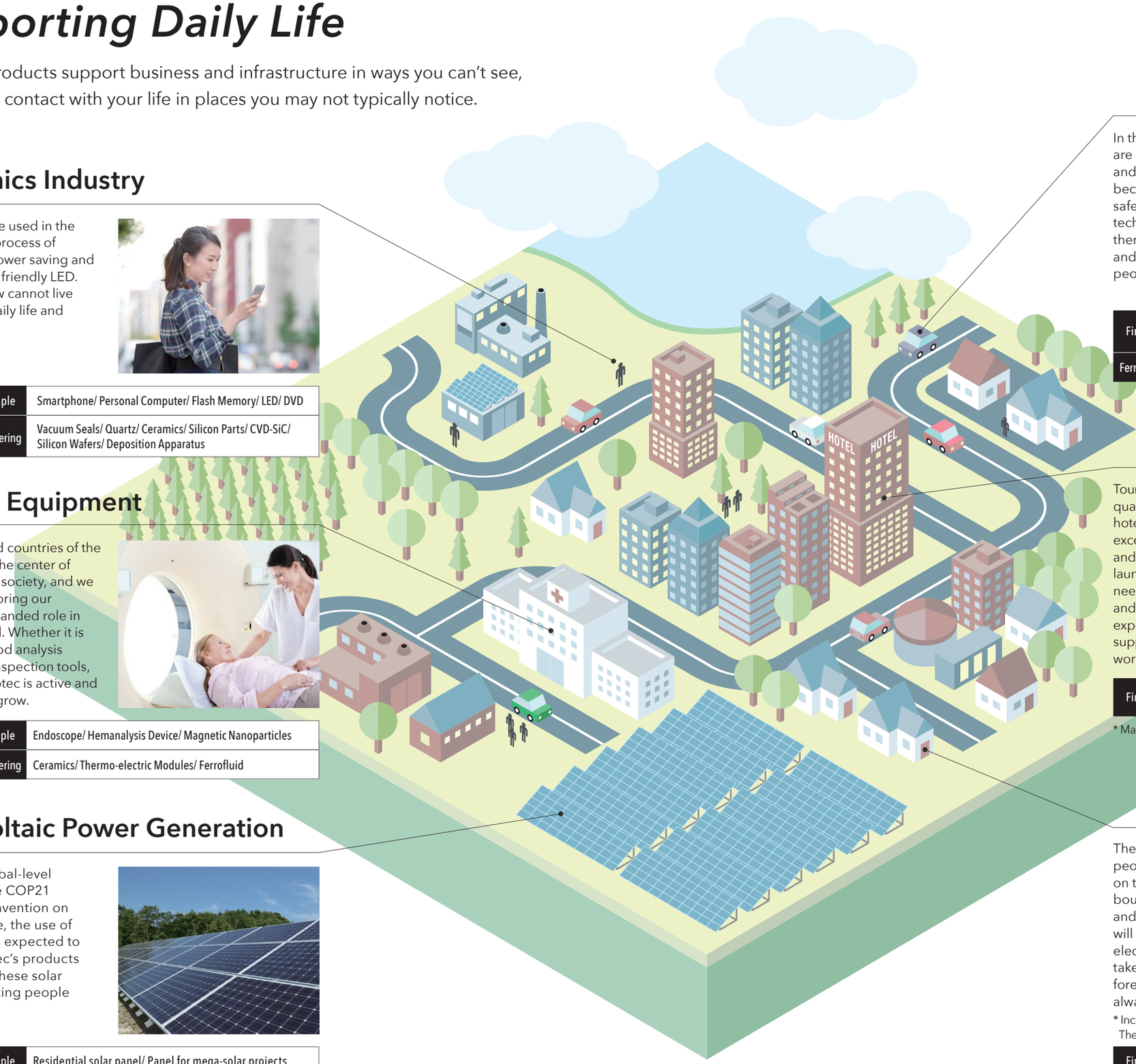
With a global perspective, Ferrotec operates in harmony with international and local communities, acting in good faith as a company that provides products and services that contributes to people everyday's life.

Earning satisfaction and trust from our customers
Contributing to solving global environmental problems
Devoted to serving society through manufacturing.

A company that is conscious, improves, and pursues happiness. Ferrotec.

Supporting Daily Life

Ferrotec's products support business and infrastructure in ways you can't see, and come in contact with your life in places you may not typically notice.



Electronics Industry

Our products are used in the manufacturing process of smartphones, power saving and environmentally friendly LED. Products we now cannot live without in our daily life and business.

Final product example	Smartphone/ Personal Computer/ Flash Memory/ LED/ DVD
Ferrotec's product offering	Vacuum Seals/ Quartz/ Ceramics/ Silicon Parts/ CVD-SiC/ Silicon Wafers/ Deposition Apparatus

Medical Equipment

In the developed countries of the world, Japan is the center of increased aging society, and we believe this will bring our company an expanded role in the medical field. Whether it is endoscope, blood analysis equipment, or inspection tools, in this field Ferrotec is active and will continue to grow.

Final product example	Endoscope/ Hemanalysis Device/ Magnetic Nanoparticles
Ferrotec's product offering	Ceramics/ Thermo-electric Modules/ Ferrofluid

Photovoltaic Power Generation

Against the global-level backdrop of the COP21 Framework Convention on Climate Change, the use of photovoltaics is expected to expand. Ferrotec's products are integral to these solar panels, supporting people everyday's life.

Final product example	Residential solar panel/ Panel for mega-solar projects
Ferrotec's product offering	Silicon Ingots for Solar Cells/ Wafers for Solar Cells/ Cells for Solar Modules

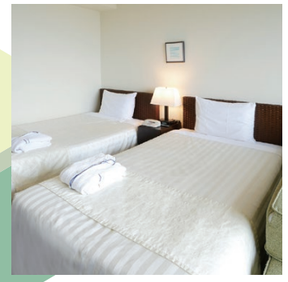
Automotive Industry

In this era, when self-driving taxis are undergoing field testing, EV and hybrids, and GPS has become universal, we need to safely manage and teach these technologies. Ferrotec is always there to accompany fun driving and safe transportation of people.

Final product example	temperature control seats/ car audio/ car navigation/ power control power semiconductor
Ferrotec's product offering	Thermo-electric Modules/ Ferrofluid/ Power Semiconductor Substrate

Laundry Equipment

Tourists to Japan appreciates the high quality of linen products at Japan's hotels. Supporting this are Ferrotec's exceptionally automated, energy and resource-conserving industrial laundry equipment. Increasing needs for high quality linen in China and emerging countries are expected in the future. Ferrotec supports the behind-the-scenes work for comfortable hotel life.



Final product example	Continuous washing machine/ Spin dryer/ Dryer/ Rolling machine etc.

* Manufactured by group company, Asahi Seisakusho.

Consumer Electronics

The IoT connects a variety of people, goods, and information on the internet, erasing the boundary between net products and consumer electronics, which will bring an era when consumer electronics will watch over and take care of people. At the forefront of this, Ferrotec is always there.

* Incorporated into the final product, such as thermo-electric modules. There are also those used in the manufacturing process such like quartz and ceramics.

Final product example	LCD TVs/ Air Conditioners/ Wine Cellars/ Dryers/ Audio speakers
Ferrotec's product offering	Thermo-electric Modules/ Ferrofluid/ Power Semiconductor Substrate

Semiconductors that create the future Ferrotec supports these foundations

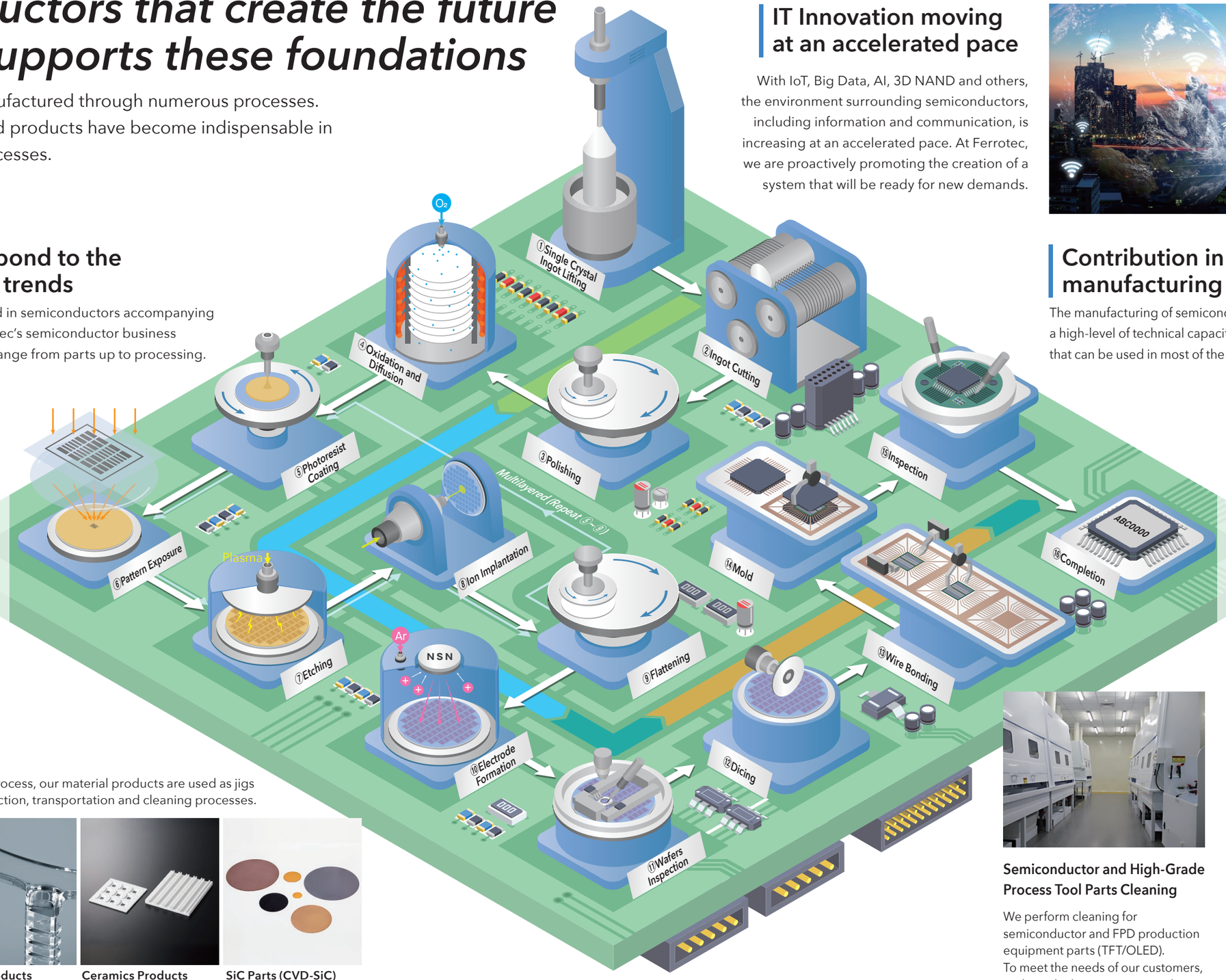
Semiconductors are manufactured through numerous processes. Ferrotec's technology and products have become indispensable in these manufacturing processes.

IT Innovation moving at an accelerated pace

With IoT, Big Data, AI, 3D NAND and others, the environment surrounding semiconductors, including information and communication, is increasing at an accelerated pace. At Ferrotec, we are proactively promoting the creation of a system that will be ready for new demands.

Products that respond to the latest technology trends

In order to answer future demand in semiconductors accompanying technological innovations, Ferrotec's semiconductor business covers numerous products that range from parts up to processing.



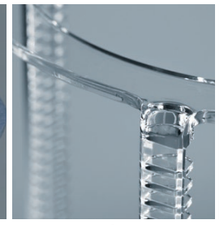
Equipment Related Products

For semiconductors boasting high-performance and high-yield, it is important to secure an airtight space without impurities during the manufacturing process. Our company's equipment related products demonstrate their performance in many processes.

Material Products

During the wafers manufacturing process, our material products are used as jigs and consumables in thin film production, transportation and cleaning processes.

Silicon Parts



Quartz Products

Ceramics Products

SiC Parts (CVD-SiC)

Contribution in the semiconductor manufacturing process

The manufacturing of semiconductors is complicated and requires a high-level of technical capacity. At Ferrotec, we provide products that can be used in most of the manufacturing processes.

Silicon Wafers Production

At our Chinese plant, we implement integrated manufacturing of silicon wafers from single crystals. Following small calibers of 6 inches or less, we will start the production of 8-inch wafers from FY2017.

Semiconductor and High-Grade Process Tool Parts Cleaning

We perform cleaning for semiconductor and FPD production equipment parts (TFT/OLED). To meet the needs of our customers, we have the latest equipment that supports Sub-28nm Microstructure.

Contract Manufacturing Service

In addition to the manufacturing of a variety of electric furnaces and assembly of deposition apparatus for the electronics industry, We also provide contract manufacturing service for any type of device.

Silicon Wafers Manufacturing — **Pattern Formation** — **Assembly**

① Single Crystal Ingot Lifting → ② Ingot Cutting → ③ Polishing → ④ Oxidation and Diffusion → ⑤ Photoresist Coating → ⑥ Pattern Exposure → ⑦ Etching → ⑧ Ion Implantation and CVD → ⑨ Flattening → ⑩ Electrode Formation → ⑪ Wafers Inspection → ⑫ Dicing → ⑬ Wire Bonding → ⑭ Mold → ⑮ Inspection → ⑯ Completion

Multilayered (Repeat ⑤~⑨)

The Equipment Related Business

In the equipment related business, we deal with products like manufacturing equipment for semiconductor, liquid crystal, organic EL and flat panel displays. The main products we produce and supply are vacuum seals, an application of ferrofluid technology, and material products, essential to the manufacturing process of semiconductors. This segment of course supports state-of-the-art semiconductor technology for tablet PC's and smartphones, and in the future, wearable devices where growth is expected. We have the wealth of accumulated technology and the know-how necessary for mass-production.

Vacuum Seals

Ensuring a Sealed Environment with no Contamination

The vacuum seals which use ferrofluid to enable transmission of rotational movement into the vacuum atmosphere are used in the manufacturing process of semiconductors, FPD, LED, and solar cells. They account for the company's core, and are used mainly in the etching and deposition processes of semiconductor wafers, as well as in the rotary mechanisms of delivery robots for FPD panels, isolating the sealed space from the outside, while precisely transmitting the necessary power for processing.

Examples of Products Used For:
LCD TV's, Smartphones, PC's, Flash Memory, CPU's, LED
*Used in the manufacturing process

Silicon Wafers

Integrated Production from the Single-Crystal Ingot

We have an integrated system for processing single-crystal ingots into semiconductor wafers for small diameter silicon wafers up to six inches. We have built a global supply system centered on mass production for bipolar IC, discrete circuit applications, and MEMS. Begin production of 8-inch wafers from 2017.

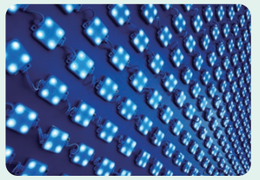
Examples of Products Used For:
LCD TV's, Smartphones, PC's, Flash memory, CPU's, LED
*Used in the manufacturing process

Vacuum Coating System

US-made Temescal Vacuum Coating Systems

High-performance e-beam guns and high-voltage power supply at the heart of Temescal devices offer a wide array of equipment from bell jar systems for universities, research laboratories, and small-scale manufacturing, to high throughput systems for large-scale manufacturing. As a global standard machine in compound semiconductors, they have been adopted by many customers, and are progressively being introduced in the manufacturing of LED's and communication chips.

Examples of Products Used For:
Smartphones, LED, HDD
*Used in the manufacturing process



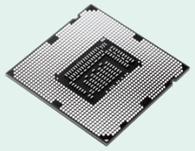
Essential Devices in the Manufacturing Process

Quartz Products

Ultra-High Purity Glass, Tough against Heat and Chemical Changes

The semiconductor manufacturing process involves frequent treatments of high heat and chemicals. Coming into play here are quartz products composed of ultra-high-purity silica glass. Whether it is in the thin film generation and diffusion process, or as jigs and consumables in the transport and cleaning process of wafers, our quartz products play an important role in the processing of increasingly thinning and high purification semiconductors.

Examples of Products Used For:
LCD TV's, Smartphones, PC's, Flash memory, CPU's, LED
*Used in the manufacturing process



Ceramics Products

Highly Strong and Pure Ceramics Supporting State-of-the-Art Processing Technology

We have achieved integrated production of fine ceramics and machinable ceramics that leverage advanced material technology, production technology, and precision processing technology under the strictest quality controlled conditions. Our ceramic products are widely adopted as high quality parts suited for the manufacturing process of semiconductors, which require high grades of purity, rigidity and precision.

Examples of Products Used For:
LCD TV's, Smartphones, PC's, Flash memory, CPU's, LED
*Used in the manufacturing process Surgical endoscope
* Used in the product

SiC Parts (CVD-SiC)

Ultra-High Purity, High Heat Resistance and High Wear Resistance Silicon Carbide Products from Original CVD Production Method

Our SiC products are a one to one compound of silicon (Si) and carbon (C), ultrapure and highly resistant to wear, heat, and corrosion. They are used widely in the manufacturing of semiconductors as wafer boats and tubes, and silicon wafer replacement dummy wafers, as jigs used at high temperatures.

Examples of Products Used For:
LCD TV's, Smartphones, PC's, Flash memory, CPU's, LED
*Used in the manufacturing process

Silicon Parts

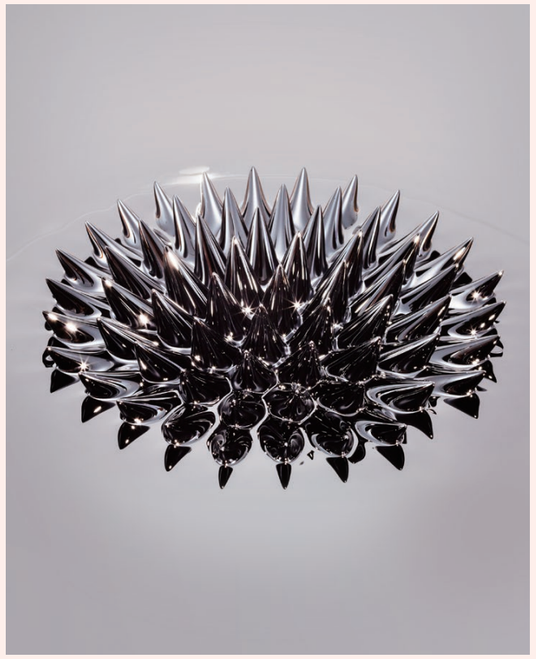
High-Purity Polysilicon Jigs used in Manufacturing Process

Our SiFusion TM product makes the manufacture of silicon jigs from ultrapure polysilicon possible for the first time, offering innovative solutions in the formation of the wafer and diffusion processes. It contributes to total cost saving for customers by achieving extended usage and improved operating rates in the diffusion process of reactive gas and reduced number of washes.

Examples of Products Used For:
LCD TV's, Smartphones, PC's, Flash memory, CPU's, LED
*Used in the manufacturing process

Electronic Device Business

In the electronic device business, there are the core technologies of Ferrotec—ferrofluid and thermo-electric modules, also known as Peltier cooling devices. Ferrofluid is used inside vacuum seals,utilized for wafer transfer robots, and installed in clean room equipment to prevent the intrusion of dust. Because thermo-electric modules act as a heat pump that transfers heat when an electrical current flows, they are used as a material to maintain and manage temperature for electronics. Capable of reaching temperatures from minus 20°C—equal to that of a freezer—to easily surpassing the boiling point of 100°C, our products are utilized in a wide range of fields, from medical equipment, semiconductors, and the telecommunication industry.



Ferrofluid

A Mysterious Liquid with Magnetic Attraction

While being a fluid, it is a functional material attracted to magnets and magnetized by external magnetic fields. In the 1960's NASA Space Program, it was developed to transport fuel in zero gravity. Currently it is used in speakers, actuators, sensors, recycling separation applications, and also in Vacuum seals—one of our company's core products.

Examples of Products Used For:
Car Audio, TV Speakers, Magnetic Nanoparticles
*Used in these products

Thermo-Electric Modules

By passing a direct current and resulting into thermo amplitude, here is the Temperature Control Semiconductor (Peltier Elements)

Thermo-electric modules are plate-like semiconductor cooling devices that work by using the movement of heat when a current flows through the junction of two different metals. Compact, lightweight, and Freon-free, they are used in temperature control seats of automobiles, cooling chillers, optical communications, biotechnology, air conditionners, dryers and a variety of consumer electronic products.

Examples of Products Used For:
Climate Control Seats for Automobiles, Car Navigation, Air Conditioners, Small Refrigerators, Shavers, Dryers
*Used in these products

Power Semiconductor Substrate

Application of Thermo-electric module Manufacturing Technology for Heat Dissipation and Insulation Substrate

Power semiconductor substrate is an insulated substrate manufactured by bonding a copper circuit on alumina and aluminum nitride ceramics through eutectic reaction. Power semiconductor substrates are a highly promising product that contributes to downsizing and energy-saving of trains, electric vehicles, air conditioners, and servers.

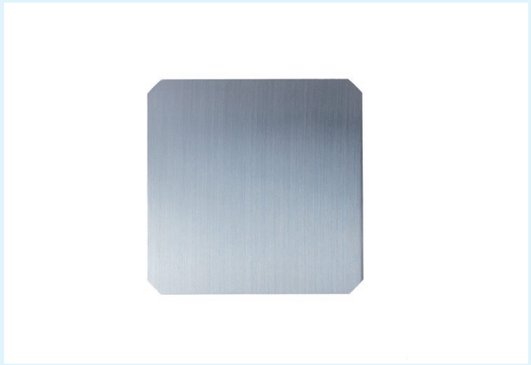
Examples of Products Used For:
Electric Vehicles, Machining Tools, Servers
*Used in these products

Photovoltaic Related Products

Quality stabilization of ingot products is essential for improved power generation efficiency of solar cells. When a quartz crucible filled with raw polysilicon is heated to a high temperature in an environment of inert gas, it will dissolve. Bringing polysilicon solution into contact with a seed crystal and pulling while slowly rotating, yields single-crystal silicon ingots. Ferrotec's single-crystal silicon ingot growing system uses an automated program to make it possible to produce single-crystal silicon ingot with high conversion efficiency. Ferrotec supplies a full line of photovoltaic related products such as crystal manufacturing apparatus, quartz crucibles, silicon products, and cells.

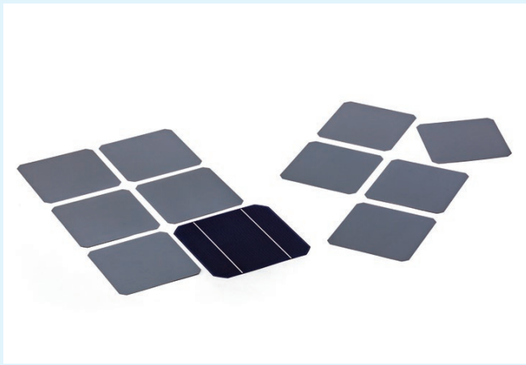
Ingots for Solar Cells

Raw silicon material is melted at high temperatures, then gradually cooled to generate crystallized ingots. In addition to single-crystal ingots with excellent regular atom arrangement and power generation performance, our in-house production equipment enables a stable supply of superior economic and production efficient multi-crystal ingots.



Wafers for Solar Cells

We produce single-crystal wafers by using a fixed abrasive grain wire saw to cut thin slices from ingots. Our wafers correspond to thinning wires, and are adopted in high conversion efficiency modules.



Cells for Solar Modules

What we call a "cell" is a wafer superposed with two different electrical property (p-type and n-type) semiconductors to form an electrode. Ferrotec produces single-crystal and multi-crystal cells, contributing to the high conversion efficiency of solar cell modules.

Single-Crystal Silicon Ingot Growing System

This is the apparatus for producing single-crystal ingots that takes advantage of our core technology cultivated in the semiconductor process. The silicon melt of dissolved raw polysilicon is pulled up in a vacuum furnace to shape the ingot. Maintaining the vacuum environment in the apparatus is our company's vacuum seal technology. The carbon heaters that melt the raw materials at high temperatures, as well as the receptacle crucibles are also our own products. We underpin the world's top class high conversion efficiency for single-crystal modules.

Multi-Crystal Silicon Ingot Casting System

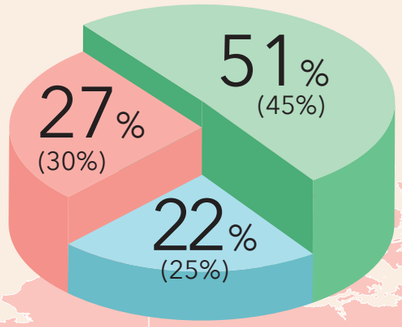
For their merit of good balance between cost and productivity, multi-crystal silicon Ingot casting apparatus for producing ingots with high productivity are the current mainstream in the increasing global demand for solar cells. Ferrotec's multi-crystal manufacturing apparatus can be mass-filled with polycrystalline material and recycled material as feedstock. The excellent quality of multi-crystal ingots and production efficiency contributes to the high conversion efficiency of multi-crystal modules.

Quartz Crucibles

Clean, heat resistant, pure quartz is indispensable for semiconductor manufacturing processes. These same high purity quartz crucibles are used as substrate containers for raw single-crystal Si material. Ferrotec provides its quartz products to manufacturers for the process of single-crystal Si applications including semiconductor and solar cell.

Eyes on the World

Ferrotec Group has developed a "Spirit of Craftsmanship" as a manufacturer all across the world. The United States' marketing and R&D expertise, Japan's industrial technology, China's development of mass production, Europe's own unique development capabilities, and the expanding technology infrastructure of Asia. In anticipation of production and sales, we have placed bases taking root around the globe. We are truly a transnational company.



*( ) is the previous year figures

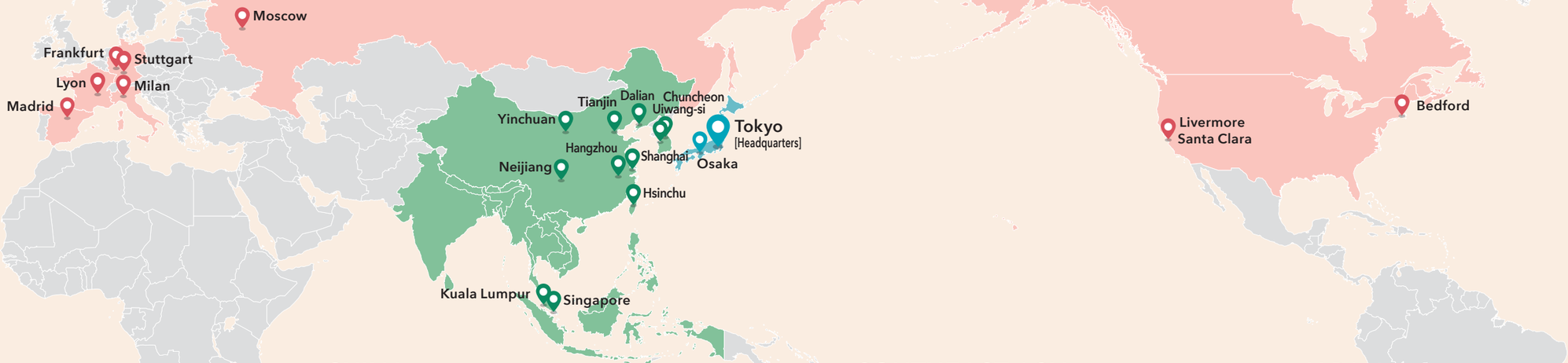
Consolidated Net Sales

Asia	37,535 (Millions of yen)
Japan	16,544 (Millions of yen)
Europe and America	19,768 (Millions of yen)

2017 3rd Quarter Total Sales

73.8billion yen

(Last year sales 69billion yen)



EUROPE

Frankfurt (Germany)

Stuttgart (Germany)

Products: Electron Beam Guns
(Vapor deposition apparatus for electronic gun)

Moscow (Russia)

Products:
Thermo-electric modules

Lyon (France)

Milan (Italy)

Madrid (Spain)

Sales Offices　Production Bases

CHINA

Hangzhou

Products: Thermo-electric module (Assembly), Vacuum Seals, Quartz, Fine Ceramics, Silicon Parts, Contract Manufacturing, Saw Blades, Cells for Solar Modules, Vessels

Shanghai

Products: Thermo-electric modules (Material), Power Semiconductor Substrate, Semiconductor Wafers, Wafers for Solar Cells,Solar Cell Manufacturing Equipment, Cleaning, Surface Treatment

Yinchuan

Products:
Silicon Ingots for Solar Cells
Quartz Crucibles for Solar Cells and Semiconductors
Semiconductor Ingots

Tianjin Products: Cleaning

Neijiang Products: Cleaning

Dalian Products: Cleaning

SOUTHEAST ASIA

Singapore

Hsinchu (Taiwan)

Uiwang-si (South Korea)

Chuncheon (South Korea) Products: CVD-SiC

Kuala Lumpur (Malaysia)

JAPAN

Tokyo [Headquarters]

Products:
Vacuum Seals, Ferrofluid (Chiba)
Fine Ceramics (Hyogo/ Ishikawa)
CVD-SiC (Okayama)
Industrial Equipment (Kanagawa)

Osaka

AMERICA

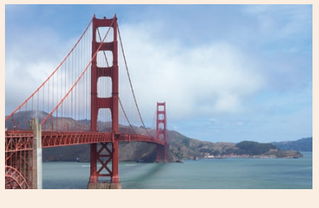
Bedford, NT

Products:
Vacuum Seals, Ferrofluid

Livermore

Products:
Vacuum Coating System

Santa Clara, CA



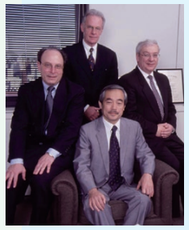
Honing our Technology, Connecting the Future

Without constantly improving our technology, we could not survive in the quickly innovating industry of electronics, which deals with semiconductors. The same goes for manufacturing, where day-to-day effort is required to connect to the next generation. M&A is also regarded as a powerful option for acquiring new technologies and expanding business.

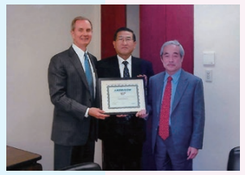
At Company Founding

Development staff for semiconductor crystal manufacturing equipment

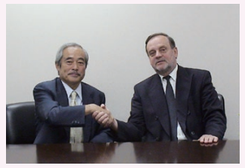
At the time of 1987 independence



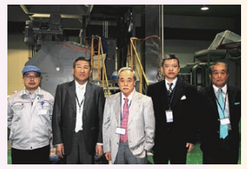
With United States executive after TOB



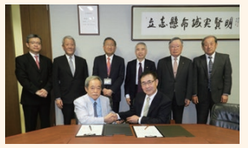
With CEO of US Company Amerigon



With CEO of NORD, Russia



In Yinchuan Factory



Signing Ceremony of the Asahi Seisakusho

Established Ferrotec as the Japanese subsidiary of the US company (formerly Nippon Ferrofluidics)

Full-scale sales of vacuum seal commence

Opened the Chiba factory to start production of 5.25 inch small seals for HDD

Started selling silicon single-crystal pulling apparatus

Developed the multi-chamber system vacuum seal. Became independent from the United States parent company

Developed 1mm thick HDD for laminate seal

Developed fluorine-based magnetic fluid for ultra-vacuum seal

Expanded to Hangzhou, China, founding the first of its China manufacturing base

Started mass production of vacuum seal for the three axes of LCD plasma etching apparatus

Established second plant in Shanghai, China. Renamed company as Ferrotec

In October, became listed on the Japan Securities Dealers Association (now the Tokyo Stock Exchange, JASDAQ Standard)

Established Ferrotec Quartz and started quartz products business

Acquired all outstanding shares of former US parent company Ferro Fluidics Inc. via friendly TOB

Set up business alliance with US company Amerigon Inc. (now Gentherm) for temperature control seat systems for automobiles

Began commissioning the manufacture of small-diameter silicon wafers at Shanghai, China factory

Subsidiary acquisition of Russia's thermo-electric module maker SCTB NORD Inc.

Sales began of solar cell silicon pulling apparatus

Acquired subsidiary for ceramics business, Sumikin Ceramics & Quartz, Inc.

Acquired subsidiary of vacuum deposition equipment business from England's Edwards Vacuum, Inc.

Established new large factory in Yinchuan, China

Implemented structural reforms for Photovoltaic economic bubble

Made affiliate of CVD-SiC product maker Admap Inc. through capital participation

Subsidiary acquisition of industrial equipment manufacturer Asahi Seisakusho through capital participation

83,000 (planned)

(million of yen)
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0

80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18

Foundation 1980-1986 (Founding and Market Involvement)

Independence 1987-1995 (Began Operations in China)

Expansion period 1996-2001 (M&A Continuation)

Accelerated Growth 2002-2013 (Chinese Market)

Second Accelerated Growth 2014- (Global Market)

Trends in Consolidated Sales

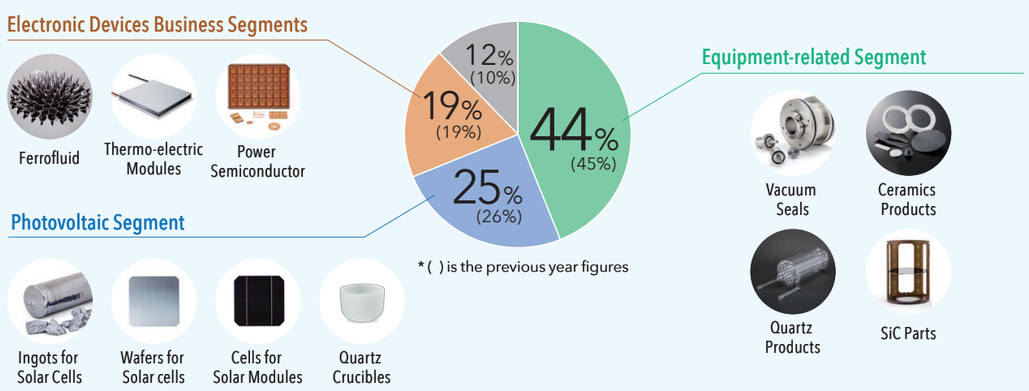
Changes in consolidated total equity

The Joy of Growth

Thirty six years have passed since our founding. We have overcome many peaks and valleys of the business environment such as the IT bubble and the economic downturn from the collapse of Lehman Brothers, to become the Ferrotec of today.
We will continue to be a company in which our stakeholders can enjoy enduring growth.

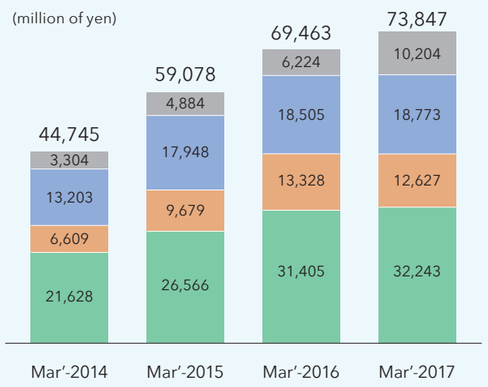
Segments

Equipment-related Business / Electronic Devices Business / Photovoltaic-related Business / Others

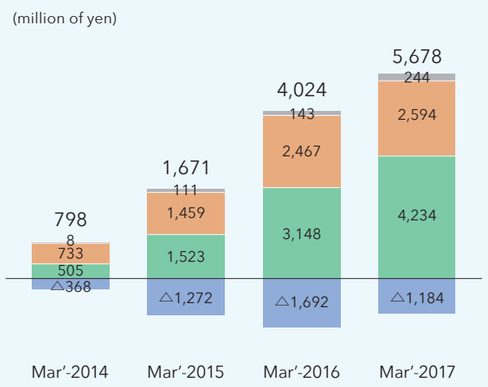


*( ) is the previous year figures

Trends in sales by segment

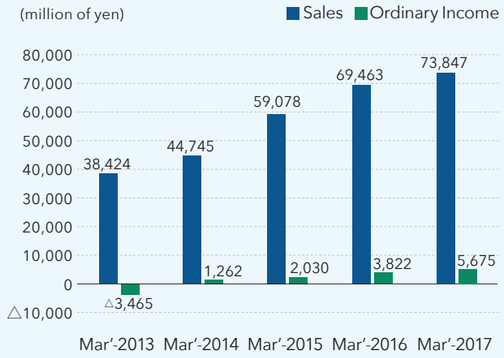


Operating profit ratio by segment

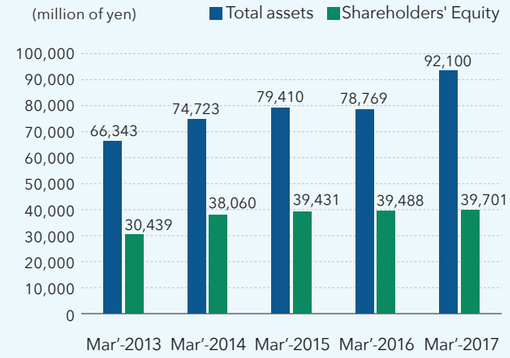


Financial Highlights

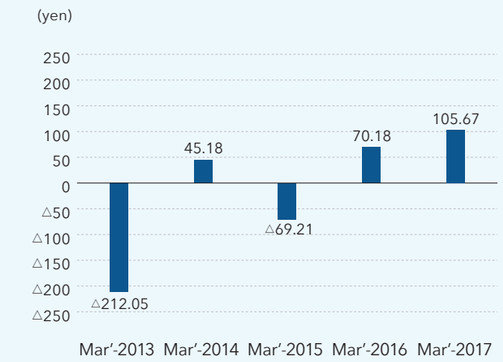
Sales/ Ordinary income



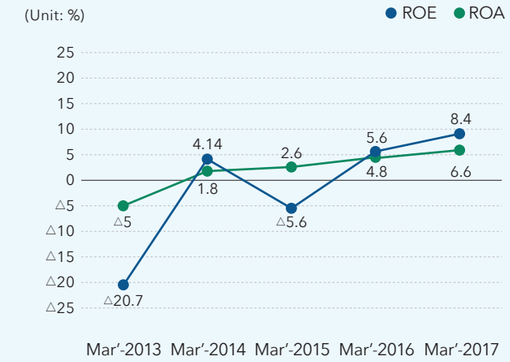
Total Assets/ Shareholder's Equity



Net income per share



ROE (return on equity) / ROA (return on assets)



Company Profile

Trade name	Ferrotec Holdings Corporation
Founded	September 27, 1980
Head Office	Nihonbashi Plaza Building 5F, 2-3-4 Nihonbashi, Chuo-ku, Tokyo 103-0027
JASDAQ Standard	(Securities Code: 6890)
Representative	CEO Akira Yamamura
Business Description	Management of group companies and R&D
Capital	13,215,388,330 yen
Shares Issued	30,903,702 shares
Affiliated Companies	[Consolidated Subsidiaries] 33 companies [Equity Method Subsidiaries] 6 companies
Employees	[Consolidated] 5,962 [Nonconsolidated] 68

Group company business

Equipment-related business: vacuum seal, quartz products, ceramics products, silicon products, silicon parts, wafer products

Electronic Device Business: thermo-electric modules, ferrofluid, power semiconductor substrate

Photovoltaic-related business: silicon crystal manufacturing equipment, quartz crucible, silicon for solar cell

* Others Laundry equipment and other related industrial equipment

See here for more information about financial data
http://www.ferrotec.jp/english/investor/FinancialData/AnnualFigure