

Research and Development

● R&D Policies and Strategies

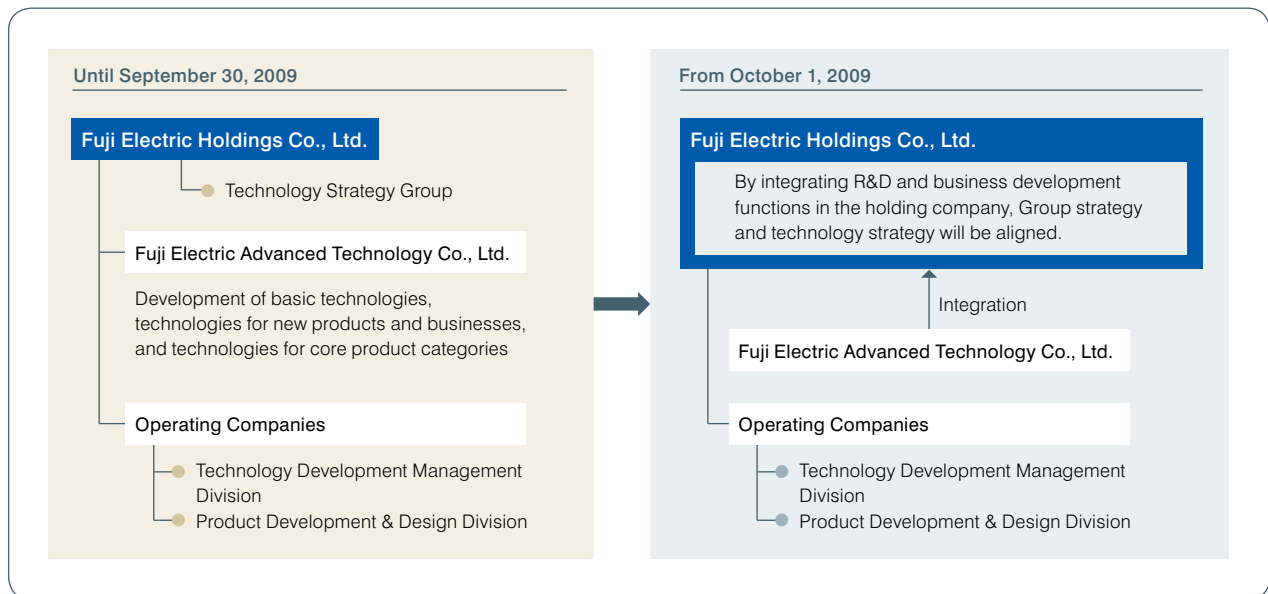
The Fuji Electric Group is pursuing more selective and focused research and development, and in accordance with the key words “energy and the environment,” the Group is working to develop components as well as solutions that use those components. The Group aims to promote the reinforcement of technological capabilities and the strengthening of medium- to long-term basic research activities with the aim of generating high market share, high revenues, and highly profitable products.

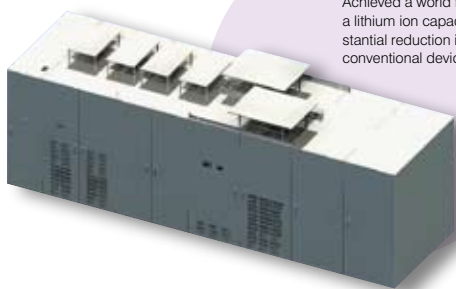
Specifically, based on electrical and machinery technologies, the Group works to refine distinctive core technologies, such as power electronics, and to upgrade technology development and basic research to accelerate the launch of distinctive new products. At the same time, we invest strategically in key product categories that support the core business of the Group.

● R&D Organization

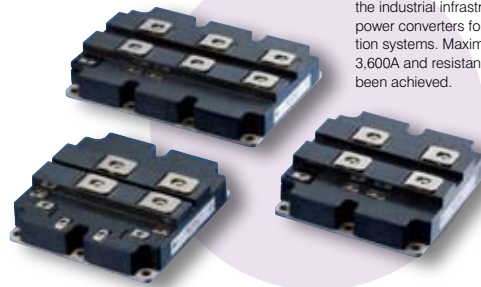
As the Group’s dedicated R&D company, Fuji Electric Advanced Technology Co., Ltd., has focused on the development of basic technologies, technologies for new products and businesses, technologies for core product categories, and technologies for production, as well as the creation of a common technology platform in the Group. From October 1, 2009, Fuji Electric Advanced Technology will be merged into the holding company.

By having each operating company focus on product development while aligning technology strategy with Group management strategy, we will work to enhance the centripetal force of Group management and increase the speed of commercialization, thereby maximizing corporate value.





High-voltage Drop/Dip Compensator using a Lithium Ion Capacitor
 Achieved a world first with a unit that use a lithium ion capacitor, resulting in a substantial reduction in size compared with conventional devices.



Industrial IGBT High-power Modules
 IGBT high-power modules have been developed and commercialized for use in high-voltage, large-power inverters in the industrial infrastructure sector and in power converters for wind power generation systems. Maximum currents of 3,600A and resistance of 1,700V have been achieved.

● Products Resulting from Successful R&D Initiatives

Energy & Electric Systems Group

In drives, we achieved a world first with the development and April 2009 launch of a high-voltage drop/dip compensator that uses a small, light lithium ion capacitor module as its energy storage device. The new device has two to three times the energy density of conventional electric double-layer capacitors, resulting in a 40% reduction in size. Also, for the China market, we developed a series of high-voltage inverters with 10kV output that will contribute to substantial energy savings, principally in the operation of fans and pumps.

In electric power systems, we completed development of technology to increase the capacity of air-cooled generators that can be manufactured in shorter periods of time. Using this technology, we have developed a new air-cooled generator that has one of the largest capacities in the world (290MVA output), and we plan to start shipments in 2009.

In automation, in measuring instruments, we have developed gas analyzers that can simultaneously measure seven constituents, including CO₂ in addition to the six constituents for which measurement is mandatory under the Air Pollution Control Law of Japan, such as NO_x and SO₂. Also, in film-type solar cells, we took steps to further increase quality and productivity and to improve conversion efficiency and output.

In ED&C components, meanwhile, we developed an MPC-Web unit with onboard Web server capabilities, as well as standard packaged software for building power monitoring systems that utilize the MPC-Web unit. In this way, we commercialized systems that facilitate energy saving.

Electronic Devices Group

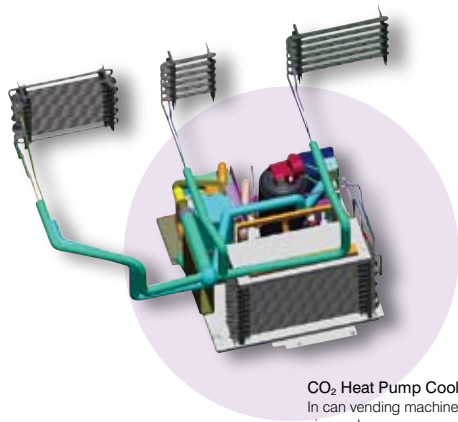
In semiconductors, targeting the fields of industrial infrastructure and alternative energy, such as wind power, we commercialized a high-power module that can support current ratings up to 3,600A and a sixth-generation IGBT module that contributes to reduced sizes of and higher efficiency in conversion systems. In automotive electrical and electronics equipment, we commercialized such products as high-voltage MOSFETs that contribute to increased fuel efficiency. In power supplies for such products as ultra-thin TVs, where there is an ongoing trend toward lower power consumption, we commercialized new series of quasi resonant mode power supply control ICs and high-efficiency, low-noise power ICs, which can be used to make high-efficiency power supply devices.

In magnetic disks, we led the industry in the development of ECC media technology that realizes further advances in perpendicular recording media, and we commercialized 2.5-inch 250 GB glass substrate media and 3.5-inch 500 GB aluminum substrate media. We also developed more reliable protective film technology, and commercialized 2.5 inch aluminum substrate media for servers.

In photoconductive drums, we commercialized photoconductive drums for small, inexpensive four-cycle laser printers and various organic photoconductors that meet market needs with a 40% increase in durability in comparison with conventional products.

GLOSSARY

- **Capacitor:** An electrical component that stores an electrical charge.
- **Drop/dip compensator:** Device that compensates for a drop in voltage by using energy stored in an accumulator or capacitor in response to the occurrence of voltage drops (decreased voltage for less than 2 seconds), which are a cause of production machinery malfunctions or stoppages.



CO₂ Heat Pump Cooling Unit
 In can vending machines, we reduced the size and energy consumption of the heat pump cooling unit that uses CO₂ refrigerant.



Phosphoric Acid Fuel Cell (PAFC)
 As a highly efficient 100kW power generator, these fuel cells contribute to energy saving and CO₂ emissions reduction.

Retail Systems Group

In vending machines and food service equipment, we worked to expand the application of advanced energy-saving technologies to can vending machines, and we completed environmental friendliness enhancement measures for key machines. In cup vending machines, we utilized CO₂ as a natural refrigerant and succeeded in reducing energy consumption to 60% of the level of conventional machines.

In currency handling systems, we developed verification technology that offers substantially enhanced sensitivity in comparison with conventional technology, and we commercialized paper currency verification equipment that features reduced incidence of such problems as paper currency jamming. Also, in contactless IC card-related products, we commercialized terminals that are compatible with multiple brands of e-money and feature the industry's smallest footprint.

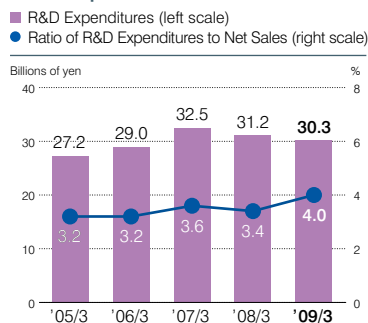
In cold-chain equipment, we developed picking equipment that maintains the safety of frozen products. Following field trials, this equipment has been applied in actual sites. In display cases, we developed a reduced energy-type product that reflects consideration for air conditioning, and we are currently proceeding with field trials.

New Businesses and New Core Technologies

In phosphoric acid fuel cell (PAFC) power generation equipment, in July 2008 we became the first company in Japan to receive authorization for a product as an "emergency power supply" under the Japanese Fire Service Law. During non-emergency use, these fuel cells supply power and heat as a highly efficient 100kW power generator, and contribute to energy savings and reduced CO₂ emissions. During emergency use, they switch from system operation to independent operation within 40 seconds and serve as a power source for firefighting equipment. We also completed development of a new model that we had been working on since fiscal 2007. We have integrated ancillary equipment to substantially reduce installation time and increased reliability, and we plan to begin shipments from the second half of fiscal 2009.

In core technologies, meanwhile, we are working to strengthen individual technologies while also working to speed up and increase the efficiency of product design and development by creating a technology platform consisting of the Group's common core technologies in electronics, embedded systems, and other such fields, and we are utilizing the results of these initiatives throughout the Group.

R&D Expenditures



Share of R&D Expenditures by Segment (Fiscal 2008)

